

ENGINE CONTROL

SYSTEM OUTLINE

This system utilizes an engine control module and maintains overall control of the engine, transmission and so on. An outline of the engine control is explained here.

1. INPUT SIGNALS

- (1) Engine coolant temp. signal circuit
The engine coolant temp. sensor detects the engine coolant temp. and has a built-in thermistor with a resistance which varies according to the engine coolant temp. The engine coolant temp. is input into TERMINAL THW of the engine control module as a control signal.
- (2) Intake air temp. signal circuit
The intake air temp. sensor is installed in the mass air flow meter and detects the intake air temp., which is input as a control signal to TERMINAL THA of the engine control module.
- (3) Oxygen sensor signal circuit
The oxygen density in the exhaust emission is detected and is input as a control signal from the heated oxygen sensors (Bank 1 sensor 1, bank 2 sensor 1, bank 1 sensor 2 and bank 2 sensor 2) to TERMINALS OXL1, OXR1, OXL2 and OXR2 of the engine control module.
To stabilize detection performance by the heated oxygen sensors, the heated oxygen sensors are warmed. This heater is also controlled by the engine control module (HTL, HTR, HTL2 and HTR2).
- (4) RPM signal circuit
Camshaft position is detected by the camshaft position sensor and its signal is input to TERMINAL G2 of the engine control module as a control signal. Also, the engine RPM is detected by the crankshaft position sensor installed in the cylinder block and the signal is input into TERMINAL NE+ of the engine control module as a control signal.
- (5) Throttle signal circuit
The throttle position sensor detects the throttle valve opening angle as a control signal, which is input into TERMINALS VTA and VTA2 of the engine control module.
- (6) Vehicle speed circuit
The vehicle speed sensor detects the vehicle speed and inputs a control signal to TERMINAL SP2+ of the engine control module.
- (7) Accelerator signal circuit
The Accelerator position sensor detects the accelerator pedal opening degree. And the control signal is input in the TERMINAL VPA and VPA2 of the engine control module.
- (8) Battery signal circuit
Voltage is constantly applied to the battery terminal of the engine control module. When the ignition SW is turned to ON, voltage for engine control module operation is applied via the EFI MAIN relay to TERMINALS +B and +B1 of the engine control module.
- (9) Intake air volume signal circuit
Intake air volume is detected by the mass air flow meter and the signal is input to TERMINAL VG of the engine control module as a control signal.
- (10) Stop light SW signal circuit
The stop light SW is used to detect whether or not the vehicle is braking and the signal is input into TERMINAL STP of the engine control module as a control signal.
- (11) Starter signal circuit
To confirm whether the engine is cranking, the voltage applied to the starter motor during cranking is detected and the signal is input into TERMINAL STA of the engine control module as a control signal.
- (12) Engine knock signal circuit
Engine knocking is detected by knock sensor LH and RH and the signal is input into TERMINALS KNKL and KNKR as a control signal.
- (13) VVT-I signal circuit
The VVT sensor LH, RH detects the real valve timing. And the control signal is input in TERMINAL VVL+ and VVR+ of the engine control module.

2. CONTROL SYSTEM

- * SFI system
The SFI system monitors the engine condition through the signals input from each sensor to the engine control module. The best fuel injection timing is decided based on this data and the program memorized by the engine control module, and the control signal is output to TERMINALS #1, #2, #3, #4, #5, #6, #7 and #8 of the engine control module to operate the injector (Inject the fuel). The SFI system controls the fuel injection operation by the engine control module in response to the driving conditions.
- * ESA system
The ESA system monitors the engine condition through the signals input to the engine control module from each sensor. The best ignition timing is decided according to this data and the memorized data in the engine control module, and the control signal is output to TERMINAL IGT1, IGT2, IGT3, IGT4, IGT5, IGT6, IGT7 and IGT8. This signal controls the ignition coil and igniter to provide the best ignition timing for the driving conditions.
- * Heated oxygen sensor heater control system
The heated oxygen sensor heater control system turns the heater on when the intake air volume is low (Temp. of exhaust emissions is low), and warms up the heated oxygen sensors (Bank 1 sensor 1, bank 2 sensor 1, bank 1 sensor 2 and bank 2 sensor 2) to improve detection performance of the sensors.
The engine control module evaluates the signals from each sensor, and outputs current to TERMINALS HTL, HTR, HTL2 and HTR2 to control the heater.
- * ACIS
ACIS includes a valve in the bulkhead separating the surge tank into two parts. This valve is opened and closed in accordance with the driving conditions to control the intake manifold length in two stages for increased engine output in all ranges from low to high speeds.
The engine control module judges the engine speed by the signals from each sensor and outputs signals to the TERMINAL ACIS to control the VSV (ACIS).
- * ETCS-i
The ETCS-i controls the engine output at its optimal level corresponding to the opening of the accel. pedal under all driving conditions.
- * MPX
The MPX communicates with the combination meter, A/C control assembly, as well as J/B ECU of the multiplex communication system
- * Fuel pump control
The engine control module outputs current to TERMINAL FPR and controls the F/PMP relay and fuel pump drive speed in response to driving conditions.

3. DIAGNOSIS SYSTEM

With the diagnosis system, when there is a malfunction in the engine control module signal system, the malfunctioning system is recorded in the memory. The malfunctioning system can be found by reading the code displayed by the malfunction indicator lamp.

4. FAIL-SAFE SYSTEM

When a malfunction has occurred in any system, if there is a possibility of engine trouble being caused by continued control based on the signals from that system, the fail-safe system either controls the system by using data (Standard values) recorded in the engine control module memory or else stops the engine.

SERVICE HINTS

E3 (B), E4 (C), E5 (D), E6 (E) ENGINE CONTROL MODULE

- (B) 4, (B) 7-GROUND : Always approx. 12 volts
- (B) 17-GROUND : Approx. 12 volts with ignition SW at ON or ST position
- (B) 2, (C) 1, (C) 2, (C) 3, (D) 4, (E) 7-GROUND : Always continuity