

System Outline

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

1. Input Signals

- (1) Water temp. signal circuit
The water temp. sensor detects the engine coolant temp. and has a built-in thermistor with a resistance varies according to the engine coolant temp. Thus the engine coolant temp. is input in the form of a control signal to TERMINAL THW of the engine ECU.
- (2) Inlet air temp. signal circuit
The inlet air temp. sensor is detects the inlet air temp., which is input as a control signal to TERMINAL THIA of the engine ECU.
- (3) RPM signal circuit
Camshaft position and crankshaft position are detected by the camshaft position sensor and crankshaft position sensor. Camshaft position is input as a control signal to TERMINAL G1 of the engine ECU, and engine RPM is input into TERMINAL NE+.
- (4) Throttle signal circuit
The accelerator position sensor detects the accelerator pedal opening angle, which is input as a control signal to TERMINALS VPA, VPA2 of the engine ECU.
- (5) Vehicle speed signal circuit
The speed sensor detects the vehicle speed and inputs a control signal to TERMINAL SP1 of the engine ECU.
- (6) Battery signal circuit
Voltage is constantly applied to TERMINAL BATT of the engine ECU. When the engine start/stop SW is pushed to IG ON position, voltage for engine ECU operation is applied via the EFI MAIN relay to TERMINAL +B of the engine ECU.
- (7) Started signal circuit
To confirm that the engine is cranking, the voltage applied to the starter motor during cranking is detected and is input as a control signal to TERMINAL STA of the engine ECU.
- (8) Fuel temp. signal circuit
The fuel temp. sensor is detects the fuel temp., which is input as a control signal to TERMINAL THF of the engine ECU.
- (9) Intake air vacuum pressure signal system
Intake air vacuum pressure is detected by the turbo pressure sensor and is input as a control signal to TERMINAL PIM of the engine ECU.
- (10) Stop lamp SW signal circuit
The stop lamp SW is used to detect whether the vehicle is braking or not and the signal is input into TERMINAL STP of the engine ECU as a control signal.

2. Control System

- * EGR control system

The EGR control system detects the signals from each sensors, then the current is output to the TERMINAL VN to control the VRV (EGR).

- * Common rail pressure control

The rail pressure is controlled by calculating the target rail pressure based on the engine status (Engine opening, engine speed), as well as the amount of fuel to be pressure-fed from the supply pump and the relief rate of the pressure reducing valve so that the detection value of the rail pressure sensor will meet the target value, and sending a signal to the suction volume regulating and pressure reducing valves.

- * Fuel injection timing control

The fuel injection timing is controlled by calculating the basic fuel injection timing based on the engine status (Engine opening, engine speed), making corrections according to the water temperature, suction air temperature, suction air pressure, etc., then sending a signal to the solenoid control valve of the ejector via the electronic driver unit.

- * Fuel injection rate control

The fuel injection rate is controlled by calculating the basic fuel injection rate based on the engine status (Engine opening, engine speed), making corrections according to the water temperature, suction air temperature, suction air pressure, etc., then sending a signal to the solenoid control valve of the ejector via the electronic driver unit.

- * Pilot injection control

The fuel injection timing and rate are controlled by calculating the pilot injection rate and timing based on the engine status (Engine opening, engine speed), making corrections according to the water temperature, suction air temperature, suction air pressure, etc., then sending a signal to the solenoid control valve of the ejector via the electronic driver unit.

3. Diagnosis System

With the diagnosis system, when there is a malfunctioning in the ECU signal system, the malfunction system is recorded in the memory. The malfunctioning system can be found by reading the display (Code) of the check engine warning light.

4. Fail-safe System

When a malfunction occurs 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 ECU memory or else stops the engine.

Service Hints

E4 (A), E5 (B), E6 (C), E7 (D) Engine ECU

- BATT-E1 : Always 9.0–14.0 volts
- +B-E1 : 9.0–14.0 volts (Engine start/stop SW at IG ON position)
- VC, VCPA, VCP2, VCS-E1 : 4.5–5.5 volts (Engine start/stop SW at IG ON position)
- MREL-E1 : 9.0–14.0 volts (Engine start/stop SW at IG ON position)
- IREL-E1 : 0–1.5 volts (Engine idling)
9.0–14.0 volts (Engine start/stop SW at OFF position)
- GREL-E1 : 9.0–14.0 volts (Engine cranking)
0–1.5 volts (Engine idling (More than 600 seconds passed away after the engine started to run))
- NE+ -NE- : Pulse generation (Engine idling)
- G1-G- : Pulse generation (Engine idling)
- VPA-EPA : 0.5–1.1 volts (Engine start/stop SW at IG ON position and accelerator pedal fully closed)
3.0–4.6 volts (Engine start/stop SW at IG ON position and accelerator pedal fully opened)
- VPA2-EPA2 : 0.9–2.3 volts (Engine start/stop SW at IG ON position and accelerator pedal fully closed)
3.4–5.0 volts (Engine start/stop SW at IG ON position and accelerator pedal fully opened)
- STP-E1 : 7.5–14.0 volts (Engine start/stop SW at IG ON position and brake pedal depressed)
0–1.5 volts (Engine start/stop SW at IG ON position and brake pedal released)
- ST1- -E1 : 0–1.5 volts (Engine start/stop SW at IG ON position and brake pedal depressed)
7.5–14.0 volts (Engine start/stop SW at IG ON position and brake pedal released)
- PIM-E2 : 0.2–0.8 volts (When a negative pressure of 40 kPa (300 mmHg) is applied)
1.3–1.9 volts (During air release)
3.2–3.8 volts (When a pressure of 69 kPa (0.7 kg/cm³) is applied)
- THW-E2 : 0.2–1.0 volts (During warm-up and coolant temp. 60°C, 140°F–120°C, 248°F)
- THA-E2 : 0.5–3.4 volts (During warm-up and intake temp. 0°C, 32°F–80°C, 176°F)
- THIA-E2 : 0.5–3.4 volts (During warm-up and intake air temp. 0°C, 32°F–80°C, 176°F)
- THF-E2 : 0.5–3.4 volts (During cooling with the engine start/stop SW kept at the IG ON position)
- VG-E2 : 0.5–3.4 volts (Engine idling)
- PCR1-E2 : 1.8–2.1 volts (Engine idling)
- PCR2-E2 : 1.2–1.5 volts (Engine idling)
- ALT-E1 : Pulse generation (Engine idling)
- RL-E1 : 9.0–14.0 volts (Engine idling)
- PCV+ -PCV- : Pulse generation (Engine idling)
- #1, #2, #3, #4-E1 : Pulse generation (Engine idling)
- PRD-E1 : 4.0–6.5 volts (Engine start/stop SW at OFF position)
- INJF-E1 : Pulse generation (Engine idling)
- EG+A-E1 : Pulse generation (During idling after warm-up)
- EG-A-E1 : Pulse generation (During idling after warm-up)
- EG+B-E1 : Pulse generation (During idling after warm-up)
- EG-B-E1 : Pulse generation (During idling after warm-up)
- LU+A-E1 : Pulse generation (During racing after warm-up)
- LU-A-E1 : Pulse generation (During racing after warm-up)
- LU+B-E1 : Pulse generation (During racing after warm-up)
- LU-B-E1 : Pulse generation (During racing after warm-up)
- VN-E1 : Pulse generation (Engine start/stop SW at IG ON position)
- MPX1-E1 : Pulse generation (During idling after warm-up)
- MPX2-E1 : Pulse generation (During idling after warm-up)
- W-E1 : 0–3.0 volts (Check engine warning light lights up and engine start/stop SW at IG ON position)
9.0–14.0 volts (Engine idling and except check engine warning light lights up)
- TACH-E1 : Pulse generation (Engine idling)
- TC-E1 : 9.0–14.0 volts (Engine start/stop SW at IG ON position)
0–3.0 volts (The DLC3 is shorted between the TERMINALS TC and CG)

Engine Control (1CD–FTV)

○ : Parts Location

Code	See Page	Code	See Page	Code	See Page
A5	42 (*2) 52 (*4)	E8	55 (RHD)	J16	45 (LHD)
A8	42 (*2) 52 (*4)	F4	42 (*2) 52 (*4)	J17	A 45 (LHD) 55 (RHD)
A11	B 44 (LHD) 54 (RHD)	F5	42 (*2) 52 (*4)	J18	B 45 (LHD) 55 (RHD)
A12	A 44 (LHD) 54 (RHD)	F6	42 (*2) 52 (*4)	J19	45 (LHD) 55 (RHD)
A18	44 (LHD) 54 (RHD)	F7	42 (*2) 52 (*4)	J22	55 (RHD)
B8	44 (LHD) 54 (RHD)	F8	42 (*2) 52 (*4)	J23	B 55 (RHD)
C1	42 (*2) 52 (*4)	F10	42 (*2) 52 (*4)	J28	55 (RHD)
C7	42 (*2) 52 (*4)	G1	42 (*2) 52 (*4)	P2	43 (*2) 53 (*4)
C13	44 (LHD) 54 (RHD)	G2	42 (*2) 52 (*4)	S5	A 43 (*2) 53 (*4) B 43 (*2) 53 (*4)
C14	44 (LHD) 54 (RHD)	I5	A 43 (*2) 53 (*4)	S10	43 (*2) 53 (*4)
D5	45 (LHD) 55 (RHD)	I6	B 43 (*2) 53 (*4)	S17	47 (LHD) 57 (RHD)
E1	42 (*2) 52 (*4)	I7	43 (*2) 53 (*4)	T3	43 (*2) 53 (*4)
E4	A 45 (LHD) 55 (RHD)	I8	45 (LHD) 55 (RHD)	T4	43 (*2) 53 (*4)
E5	B 45 (LHD) 55 (RHD)	J3	A 45 (LHD)	T6	43 (*2) 53 (*4)
E6	C 45 (LHD) 55 (RHD)	J4	A 45 (LHD) 55 (RHD)	T16	47 (LHD) 57 (RHD)
E7	D 45 (LHD) 55 (RHD)	J11	A 45 (LHD) 55 (RHD)	V1	43 (*2) 53 (*4)
E8	45 (LHD)	J12	B 45 (LHD) 55 (RHD)	W1	43 (*2) 53 (*4)
		J13	45 (LHD)		

○ : Relay Blocks

Code	See Page	Relay Blocks (Relay Block Location)
1	25 (*6)	Engine Room R/B No.1 (Engine Compartment Left)
3	26	Engine Room R/B No.3 (Left Side of the Suspension Tower)
5	28	Fuse Block (Lower Finish Panel)

* 1 : LHD 1ZZ–FE, 3ZZ–FE * 2 : LHD 1CD–FTV * 3 : RHD 1ZZ–FE, 3ZZ–FE * 4 : RHD 1CD–FTV * 5 : 1ZZ–FE, 3ZZ–FE * 6 : 1CD–FTV



: Junction Block and Wire Harness Connector

Code	See Page	Junction Block and Wire Harness (Connector Location)
CA	36 (LHD)	Instrument Panel Wire and Center J/B (Behind the Combination Meter)
	36 (RHD)	Instrument Panel Wire and Center J/B (Instrument Panel Reinforcement RH)
CC	36 (LHD)	Instrument Panel Wire and Center J/B (Behind the Combination Meter)
	36 (RHD)	Instrument Panel Wire and Center J/B (Instrument Panel Reinforcement RH)
CD	36 (LHD)	Instrument Panel Wire and Center J/B (Behind the Combination Meter)
	36 (RHD)	Instrument Panel Wire and Center J/B (Instrument Panel Reinforcement RH)
CE	36 (LHD)	Instrument Panel Wire and Center J/B (Behind the Combination Meter)
	36 (RHD)	Instrument Panel Wire and Center J/B (Instrument Panel Reinforcement RH)
CF	36 (LHD)	Instrument Panel Wire and Center J/B (Behind the Combination Meter)
	36 (RHD)	Instrument Panel Wire and Center J/B (Instrument Panel Reinforcement RH)
CH	37 (LHD)	Instrument Panel Wire and Center J/B (Behind the Combination Meter)
	37 (RHD)	Instrument Panel Wire and Center J/B (Instrument Panel Reinforcement RH)
CJ	37 (LHD)	Instrument Panel Wire and Center J/B (Behind the Combination Meter)
	37 (RHD)	Instrument Panel Wire and Center J/B (Instrument Panel Reinforcement RH)
DA	32	Instrument Panel Wire and Instrument Panel J/B (Left Side of the Instrument Panel)
DB		
DC		
DH		



: Connector Joining Wire Harness and Wire Harness

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
ED1	62 (*2)	Engine Wire and Engine Room Main Wire (Engine Compartment Left)
	72 (*4)	
EF1	62 (*2)	Engine Wire and Engine No.5 Wire (Near the Starter)
	72 (*4)	
EG1	62 (*2)	Engine Wire and Engine No.6 Wire (Near the Starter)
	72 (*4)	
EH1	62 (*2)	Engine Wire and Engine No.4 Wire (Near the Starter)
	72 (*4)	
IA1	64 (LHD)	Engine Room Main Wire and Instrument Panel Wire (Behind the Combination Meter)
	74 (RHD)	Engine Room Main Wire and Instrument Panel Wire (Left Side of the Instrument Panel)
IA2	64 (LHD)	Engine Room Main Wire and Instrument Panel Wire (Behind the Combination Meter)
	74 (RHD)	Engine Room Main Wire and Instrument Panel Wire (Left Side of the Instrument Panel)
IA4	64 (LHD)	Engine Room Main Wire and Instrument Panel Wire (Behind the Combination Meter)
IA8	64 (LHD)	Engine Room Main Wire and Instrument Panel Wire (Behind the Combination Meter)
	74 (RHD)	Engine Room Main Wire and Instrument Panel Wire (Left Side of the Instrument Panel)
IA9	74 (RHD)	Engine Room Main Wire and Instrument Panel Wire (Left Side of the Instrument Panel)
IE1	64 (LHD)	Instrument Panel Wire and Floor Wire (Left Kick Panel)
IE2	64 (LHD)	
	74 (RHD)	
IE3	64 (LHD)	
	74 (RHD)	
IF1	66 (LHD)	Instrument Panel Wire and Switch Wire (Instrument Panel Brace LH)
IJ1	66 (LHD)	Engine Wire and Instrument Panel Wire (Behind the Glove Box)
	76 (RHD)	
IJ2	66 (LHD)	
	76 (RHD)	
IO1	76 (RHD)	Instrument Panel Wire and Switch Wire (Right Side of the Instrument Panel)

* 1 : LHD 1ZZ-FE, 3ZZ-FE * 2 : LHD 1CD-FTV * 3 : RHD 1ZZ-FE, 3ZZ-FE * 4 : RHD 1CD-FTV * 5 : 1ZZ-FE, 3ZZ-FE * 6 : 1CD-FTV

Engine Control (1CD-FTV)



: Ground Points

Code	See Page	Ground Points Location
ED	62 (*2)	Engine Compartment Left
	72 (*4)	
EH	62 (*2)	Near the Starter
	72 (*4)	
II	64 (LHD)	Left Kick Panel
	74 (RHD)	
IM	64 (LHD)	Right Kick Panel
	74 (RHD)	



: Splice Points

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E5	62 (*2)	Engine Wire	E6	72 (*4)	Engine Wire
	72 (*4)		I9	66 (LHD)	
E6	62 (*2)			76 (RHD)	

* 1 : LHD 1ZZ-FE, 3ZZ-FE * 2 : LHD 1CD-FTV * 3 : RHD 1ZZ-FE, 3ZZ-FE * 4 : RHD 1CD-FTV * 5 : 1ZZ-FE, 3ZZ-FE * 6 : 1CD-FTV

