

SYSTEM OUTLINE

This system utilizes an engine and ECT ECU 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 EFI water 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 and ECT ECU as a control signal.

(2) Intake air temp. signal circuit

The intake air temp. sensor is installed in the air flow meter and detects the intake air temp., which is input as a control signal to TERMINAL THA of the engine and ECT ECU.

(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 and ECT ECU.

To stabilize detection performance by the heated oxygen sensors, the heated oxygen sensors are warmed. This heater is also controlled by the engine and ECT ECU (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 and ECT ECU 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 and ECT ECU 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 and ECT ECU.

(6) Vehicle speed circuit

The speed sensor detects the vehicle speed and inputs a control signal to TERMINAL SP2+ of the engine and ECT ECU.

(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 and ECT ECU.

(8) Battery signal circuit

Voltage is constantly applied to the battery terminal of the engine and ECT ECU. When the ignition SW is turned to ON, voltage for engine and ECT ECU operation is applied via the EFI MAIN relay to TERMINALS +B and +B1 of the engine and ECT ECU.

(9) Intake air volume signal circuit

Intake air volume is detected by the air flow meter and the signal is input to TERMINAL VG of the engine and ECT ECU 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 and ECT ECU 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 and ECT ECU 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 and ECT ECU.

ENGINE CONTROL (RHD)

2. CONTROL SYSTEM

* EFI system

The EFI system monitors the engine condition through the signals input from each sensor to the engine and ECT ECU. The best fuel injection timing is decided based on this data and the program memorized by the engine and ECT ECU, and the control signal is output to TERMINALS #1, #2, #3, #4, #5, #6, #7 and #8 of the engine and ECT ECU to operate the injector (Inject the fuel). The EFI system controls the fuel injection operation by the engine and ECT ECU in response to the driving conditions.

* ESA system

The ESA system monitors the engine condition through the signals input to the engine and ECT ECU from each sensor. The best ignition timing is decided according to this data and the memorized data in the engine and ECT ECU, 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 and ECT ECU 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 and ECT ECU 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 and ECT ECU 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 and ECT ECU signal system, the malfunctioning system is recorded in the memory. The malfunctioning system can be found by reading the code displayed by the check engine warning light (Europe) or multi-display (Australia).

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 and ECT ECU memory or else stops the engine.

SERVICE HINTS

E4 (B), E5 (C), E6 (D), E7 (E) ENGINE AND ECT ECU

(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

○ : PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
A9	126 (RHD)	H20	131 (RHD)	J13	131 (RHD)
A13	126 (RHD)	I1	128 (RHD)	J14	131 (RHD)
A14	130 (RHD)	I2	128 (RHD)	J17	A 131 (RHD)
A22	130 (RHD)	I3	128 (RHD)	J18	B 131 (RHD)
A23	130 (RHD)	I4	128 (RHD)	J24	135 (RHD)
A27	130 (RHD)	I5	128 (RHD)	K2	128 (RHD)
C1	126 (RHD)	I6	128 (RHD)	K3	128 (RHD)
C2	126 (RHD)	I7	128 (RHD)	N1	129 (RHD)
C3	126 (RHD)	I8	128 (RHD)	O2	129 (RHD)
C4	126 (RHD)	I9	128 (RHD)	P3	A 132 (RHD)
C6	130 (RHD)	I10	128 (RHD)	S3	129 (RHD)
C12	130 (RHD)	I11	128 (RHD)	S11	A 133 (RHD)
D1	131 (RHD)	I12	128 (RHD)	S12	B 133 (RHD)
D2	131 (RHD)	I13	128 (RHD)	S13	C 133 (RHD)
E2	126 (RHD)	I14	128 (RHD)	S14	D 133 (RHD)
E3	A 126 (RHD)	I15	128 (RHD)	S17	133 (RHD)
E4	B 126 (RHD)	I16	128 (RHD)	S21	133 (RHD)
E5	C 126 (RHD)	I17	131 (RHD)	T2	129 (RHD)
E6	D 126 (RHD)	J1	A 128 (RHD)	T3	129 (RHD)
E7	E 126 (RHD)	J2	B 128 (RHD)	T9	133 (RHD)
E9	126 (RHD)	J3	A 128 (RHD)	V2	129 (RHD)
F11	127 (RHD)	J4	B 128 (RHD)	V3	129 (RHD)
F19	134 (RHD)	J5	A 128 (RHD)	V4	129 (RHD)
G1	131 (RHD)	J6	B 128 (RHD)	V5	129 (RHD)
H9	127 (RHD)	J7	128 (RHD)	V6	129 (RHD)
H10	127 (RHD)	J9	131 (RHD)		
H19	131 (RHD)	J11	131 (RHD)		

○ : RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	81	Engine Room No.1 R/B (Engine Compartment Left)
4	85 (RHD)	Fusible Link Block (Engine Compartment Left)

○ : JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
4A	85 (RHD)	Engine Room Main Wire and Fusible Link Block (Engine Compartment Left)
DC	99 (RHD)	Engine Room Main Wire and Driver Side J/B (Right Kick Panel)
DE	100 (RHD)	Instrument Panel Wire and Driver Side J/B (Right Kick Panel)
DF		
DH		
PD	106 (RHD)	Engine Room Main Wire and Passenger Side J/B (Left Kick Panel)
PE	105 (RHD)	Instrument Panel Wire and Passenger Side J/B (Left Kick Panel)
PF		
PH		

ENGINE CONTROL (RHD)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EB2	152 (RHD)	Engine Wire and Engine Room Main Wire (Inside of ECU Box)
EC1	152 (RHD)	Engine No.2 Wire and Engine Wire (Behind the Intake Manifold)
IC2	154 (RHD)	Instrument Panel Wire and Engine Room Main Wire (Cowl Side Panel LH)
IC3		
IC4		
IE1	156 (RHD)	Engine Room Main Wire and Floor No.2 Wire (Left Kick Panel)
IH2	156 (RHD)	Instrument Panel Wire and Engine Room Main Wire (Cowl Side Panel RH)
IH3		

: GROUND POINTS

Code	See Page	Ground Points Location
ED	152 (RHD)	Under the Fusible Link Block
EE	152 (RHD)	RH Side of Cylinder Head
EF	152 (RHD)	LH Side of Cylinder Head
IG	154 (RHD)	Cowl Side Panel LH
IH	154 (RHD)	Left Side of Shift Lever
BM	158 (RHD)	Quarter Panel LH

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E1	152 (RHD)	Engine Room Main Wire	E11	152 (RHD)	Engine Wire
E2			E12		
E8	152 (RHD)	Engine Wire	E13	152 (RHD)	Engine Room Main Wire
E9	152 (RHD)	Engine Room Main Wire	I1	156 (RHD)	Instrument Panel Wire

