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 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.

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 malti–display (G.C.C.).

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	112 (LHD)	H20	117 (LHD)	J13	117 (LHD)
A13	112 (LHD)	I1	114 (LHD)	J14	117 (LHD)
A14	116 (LHD)	I2	114 (LHD)	J17 A	117 (LHD)
A22	116 (LHD)	I3	114 (LHD)	J18 B	117 (LHD)
A23	116 (LHD)	I4	114 (LHD)	J24	121 (LHD)
A27	116 (LHD)	I5	114 (LHD)	K2	114 (LHD)
C1	112 (LHD)	I6	114 (LHD)	K3	114 (LHD)
C2	112 (LHD)	I7	114 (LHD)	N1	115 (LHD)
C3	112 (LHD)	I8	114 (LHD)	O2	115 (LHD)
C4	112 (LHD)	I9	114 (LHD)	P3 A	118 (LHD)
C6	116 (LHD)	I10	114 (LHD)	S3	115 (LHD)
C12	116 (LHD)	I11	114 (LHD)	S11 A	119 (LHD)
D1	117 (LHD)	I12	114 (LHD)	S12 B	119 (LHD)
D2	117 (LHD)	I13	114 (LHD)	S13 C	119 (LHD)
E2	112 (LHD)	I14	114 (LHD)	S14 D	119 (LHD)
E3 A	112 (LHD)	I15	114 (LHD)	S17	119 (LHD)
E4 B	112 (LHD)	I16	114 (LHD)	S21	119 (LHD)
E5 C	112 (LHD)	I17	117 (LHD)	T2	115 (LHD)
E6 D	112 (LHD)	J1 A	114 (LHD)	T3	115 (LHD)
E7 E	112 (LHD)	J2 B	114 (LHD)	T9	119 (LHD)
E9	112 (LHD)	J3 A	114 (LHD)	V2	115 (LHD)
F11	113 (LHD)	J4 B	114 (LHD)	V3	115 (LHD)
F19	120 (LHD)	J5 A	114 (LHD)	V4	115 (LHD)
G1	117 (LHD)	J6 B	114 (LHD)	V5	115 (LHD)
H9	113 (LHD)	J7	114 (LHD)	V6	115 (LHD)
H10	113 (LHD)	J9	117 (LHD)		
H19	117 (LHD)	J11	117 (LHD)		

: RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	81	Engine Room No.1 R/B (Engine Compartment Left)
4	84 (LHD)	Fusible Link Block (Engine Compartment Right)

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
4A	84 (LHD)	Engine Room Main Wire and Fusible Link Block (Engine Compartment Right)
DC	88 (LHD)	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
DE	87 (LHD)	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
DF		
DH		
PE	94 (LHD)	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)
PF		
PH		

ENGINE CONTROL (LHD)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EB2	140 (LHD)	Engine Wire and Engine Room Main Wire (Inside of ECU Box)
EC1	140 (LHD)	Engine No.2 Wire and Engine Wire (Behind the Intake Manifold)
IB2	142 (LHD)	Instrument Panel Wire and Engine Room Main Wire (Cowl Side Panel LH)
IB3		
IB4		
IC1	142 (LHD)	Instrument Panel Wire and Floor No.2 Wire (Cowl Side Panel LH)
IH2	144 (LHD)	Instrument Panel Wire and Engine Room Main Wire (Cowl Side Panel RH)
IH3		

: GROUND POINTS

Code	See Page	Ground Points Location
EC	140 (LHD)	Radiator Side Support LH
EE	140 (LHD)	RH Side of Cylinder Head
EF	140 (LHD)	LH Side of Cylinder Head
IH	142 (LHD)	Right Side of Shift Lever
IK	142 (LHD)	Cowl Side Panel RH
BM	146 (LHD)	Quarter Panel LH

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E1	140 (LHD)	Engine Room Main Wire	E10	140 (LHD)	Engine Room Main Wire
E2			E12	140 (LHD)	Engine Wire
E8	140 (LHD)	Engine Wire	E13		
E9	140 (LHD)	Engine Room Main Wire	I1	144 (LHD)	Instrument Panel Wire