SYSTEM OUTLINE

The engine control system utilizes a microcomputer and maintains overall control of the engine, transmission etc. An outline of the engine control is given here.

1. INPUT SIGNALS

(1) Engine coolant temp. signal circuit

The water temp. sensor detects the engine coolant temp. and has a built–in thermister with a resistance, which varies according to the engine coolant temp.. The engine coolant temp. which 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 density signal circuit

The oxygen density in the exhaust emission is detected by the heated oxygen sensors and input as a control signal to **TERMINALS OX1A, OX2A, OX1B** and **OX2B** of the engine and ECT ECU.

(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,engine RPM is detected by the crankshaft position sensor and is input as a control signal to **TERMINAL NE+**.

(5) Throttle position signal circuit

The throttle position sensor detects the throttle valve opening angle as a control signal, which is input into **TERMINAL VTA** of the engine and ECT ECU.

(6) Vehicle speed circuit

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

(7) Battery signal circuit

Voltage is constantly applied to **TERMINAL BATT** of the engine and ECT ECU. With the ignition SW turned on, the voltage for engine and ECT ECU start–up power supply is applied to **TERMINALS +B, B2** of the engine and ECT ECU via the EFI relay.

The current flowing through the **IGN** fuse flows to **TERMINAL IGSW** of the engine and ECT ECU.

Voltage is constantly applied to **TERMINAL BM** of the engine and ECT ECU.

(8) 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.

(9) Stop light SW signal circuit

The stop light SW is used to detect whether the vehicle is braking or not and the signal is input into **TERMINAL STP** of the engine and ECT ECU as a control signal.

(10) Starter signal circuit

To confirm whether the engine is cranking, the voltage is 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.

(11) Engine knock signal circuit

Engine knocking is detected by knock sensors and the signal is input into **TERMINALS KNK1** and **KNK2** as a control signal.

2. CONTROL SYSTEM

* EFI system
  The EFI system monitors the engine condition through the signals input from each sensor (Input signals from (1) to (11) etc.) to the engine and ECT ECU. And the control signal is output to **TERMINALS #10, #20, #30, #40, #50** and **#60** 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 (Input signals from (1), (2), (4), to (11) etc.). 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 **TERMINALS IGT, IGT2, IGT3**. This signal controls the 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 oxygen sensors to improve detection performance of the sensors. The engine and ECT ECU evaluates the signals from each sensor (Input signals from (1), (2), (4), (7), to (9) etc.), and outputs current to **TERMINALS HT1A, HT2A, HT1B** and **HT2B** to control the heater.
* Fuel pump control system
  The engine and ECT ECU outputs current to **TERMINAL FPC** and controls the fuel pump control ECU and fuel pump drive speed in response to the driving conditions.
* 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.
* 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 body ECU of the multiplex communication system

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.

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

EFI RELAY

5–3 : Closed with ignition SW at **ON** or **ST** position

W3 WATER TEMP. SENSOR

1–2 : Approx. **15.0** kΩ (**–20**˚C, **–4**˚F)
Approx. **2.45** kΩ (**20**˚C, **68**˚F)
Approx. **0.32** kΩ (**80**˚C, **176**˚F)
Approx. **0.14** kΩ (**110**˚C, **230**˚F)

E2 (A), E3 (B), E5 (D), E6 (E) ENGINE AND ECT ECU

BATT–GROUND : Always approx. **12** volts
BM–GROUND : Always approx. **12** volts
IGSW–GROUND : Approx. **12** volts with ignition SW at **ON** or **ST** position
+B, B2–GROUND : Approx. **12** volts with ignition SW at **ON** or **ST** position
VC–GROUND : **4.5**–**5.5** volts with ignition SW on
VTA2–GROUND : **2.0**–**2.9** volts with ignition SW on and throttle valve fully closed
4.6–**5.0** volts with ignition SW on and throttle valve fully opened
VTA–GROUND : **0.4**–**1.0** volts with ignition SW on and throttle valve fully closed
3.2–**4.8** volts with ignition SW on and throttle valve fully opened
VPA–GROUND : **0.25**–**0.9** volts with ignition SW at on and accelerator fully closed
3.2–**4.8** volts with ignition SW at on and accelerator fully opened
VPA2–GROUND : **1.8**–**2.7** volts with ignition SW at on and accelerator fully closed
4.7–**5.0** volts with ignition SW at on and accelerator fully opened
THA–GROUND : **0.5**–**3.4** volts with idling, intake air temp. **20**˚C (**68**˚F)
THW–GROUND : **0.2**–**1.0** volts with idling, coolant temp. **80**˚C (**176**˚F)
STA–GROUND : **6.0** volts or more with cranking
TC–GROUND : **9.0**–**14.0** volts with ignition SW on
W–GROUND : **9.0**–**14.0** volts with idling
0–**3.0** volts with ignition SW on
ACMG–GROUND : **0**–**1.5** volts with A/C SW on (at idling)
7.5–**14.0** volts with A/C SW off and throttle valve fully open
#10, #20, #30, #40, #50, #60–GROUND : **9.0**–**14.0** volts with ignition SW on pulse generation with idling

I5, I6, I7, I8, I9, I10 INJECTOR NO.1, NO.2, NO.3, NO.4, NO.5, NO.6

1–2 : **13.4**–**14.2** Ω

○ : PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
A10	68 (LHD)	H14	68 (LHD)	J14	74 (LHD)
A11	68 (LHD)	H15	68 (LHD)	J15	74 (LHD)
A16	72 (LHD)	H16	68 (LHD)	J16	74 (LHD)
A23	72 (LHD)	H23	72 (LHD)	J18	74 (LHD)
B5	72 (LHD)	I1	70 (LHD)	J21	78 (LHD)
C1	68 (LHD)	I5	70 (LHD)	K1	70 (LHD)
C2	68 (LHD)	I6	70 (LHD)	K2	70 (LHD)
C3	68 (LHD)	I7	70 (LHD)	M2	74 (LHD)
C4	68 (LHD)	I8	70 (LHD)	N1	70 (LHD)
C11 A	72 (LHD)	I9	70 (LHD)	P1	70 (LHD)
C12 B	72 (LHD)	I10	70 (LHD)	S1	70 (LHD)
D2	72 (LHD)	I12	72 (LHD)	S12	74 (LHD)
E2 A	68 (LHD)	J2	70 (LHD)	T2	70 (LHD)
E3 B	68 (LHD)	J3 A	70 (LHD)	T3	70 (LHD)
E4 C	68 (LHD)	J4 B	70 (LHD)	T5	74 (LHD)
E5 D	68 (LHD)	J5	70 (LHD)	T6	74 (LHD)
E6 E	68 (LHD)	J7	74 (LHD)	V1	70 (LHD)
E7 F	68 (LHD)	J8	74 (LHD)	V2	70 (LHD)
F15	76 (LHD)	J9	74 (LHD)	V3	70 (LHD)
F16	76 (LHD)	J10	74 (LHD)	W3	70 (LHD)

: RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	54 (LHD)	Engine Room No.1 R/B (Engine Compartment Right)

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	58 (LHD)	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1D	58 (LHD)	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1F	58 (LHD)	Cowl Wire and Driver Side J/B (Left Kick Panel)
1G	59 (LHD)	
1H		
1J		
2F	60 (LHD)	Cowl Wire and Passenger Side J/B (Right Kick Panel)
2G	61 (LHD)	

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EA1	96 (LHD)	Engine Wire and Cowl Wire (Inside of the ECU Box)
EA2		
EA3		
EA4		
IA1	98 (LHD)	Engine Room Main Wire and Cowl Wire (Near the Driver Side J/B)
IA2		
IC2	98 (LHD)	Floor No.2 Wire and Cowl Wire (Left Kick Panel)
IC3		
IE1	98 (LHD)	Instrument Panel Wire and Cowl Wire (Left Side of the Steering Column)
II1	100 (LHD)	Engine Room Main Wire and Cowl Wire (Near the Passenger Side R/B)
II4		
IJ1	100 (LHD)	Instrument Panel Wire and Cowl Wire (Left Side of the Blower Unit)

: GROUND POINTS

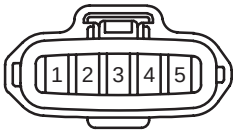
Code	See Page	Ground Points Location
EB	96 (LHD)	Left Fender
EC	96 (LHD)	Front Side of the Intake Manifold
ED	96 (LHD)	Rear Side of the Intake Manifold
EE	96 (LHD)	Under the ABS & TRC & VSC Actuator
IF	98 (LHD)	Left Kick Panel
II	98 (LHD)	Right Side of the Cowl Panel
BJ	102 (LHD)	Rear Floor Partition Panel LH
BK	102 (LHD)	Quarter Panel LH

: SPLICE POINTS

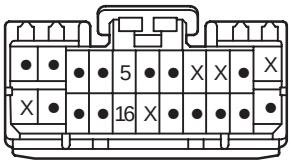
Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E1	96 (LHD)	Engine Wire	E3	96 (LHD)	Engine Wire
E2			E4	96 (LHD)	Cowl Wire

A10 BLACK

A11 BLACK



A16



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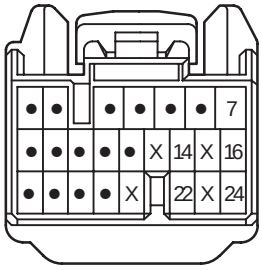
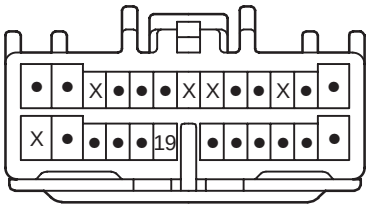


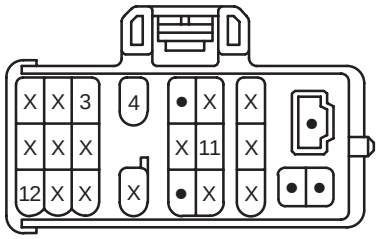
B5



C1 BLACK

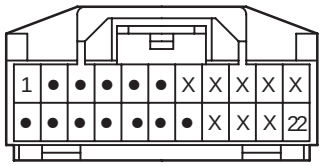
C2 BLACK

C3 BLACK

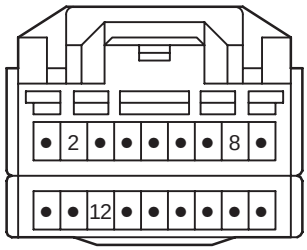


C4 DARK GARY

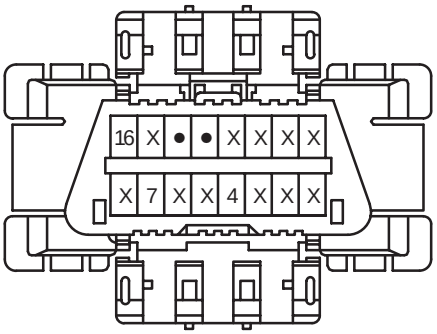
C11 (A)



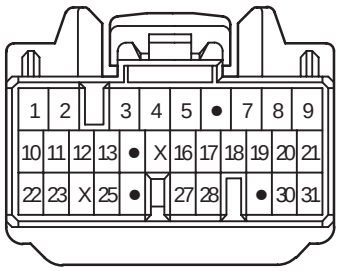
C12 (B)



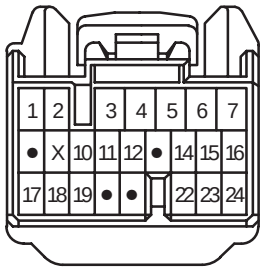
D2



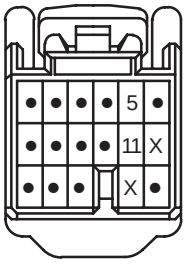
E2 (A)



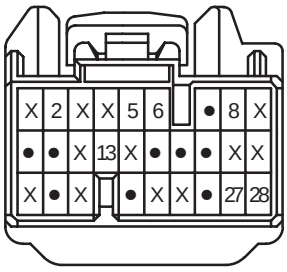
E3 (B)



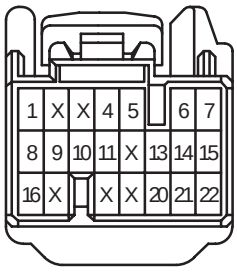
E4 (C)



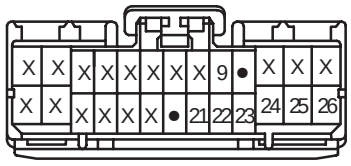
E5 (D)



E6 (E)

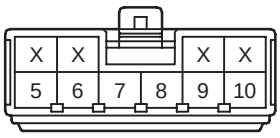


E7 (F)



F15

F16 BLACK



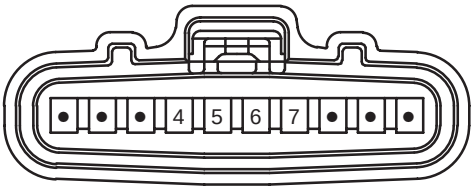
H14 DARK GRAY

H15 DARK GRAY

H16 DARK GRAY

H23 DARK GRAY

I1 BLACK



I5 DARK GRAY

I6 BROWN

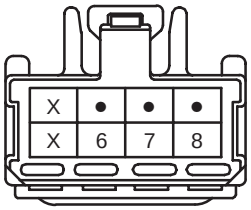
I7 DARK GRAY

I8 BROWN

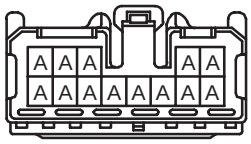
I9 DARK GRAY

I10 BROWN

I12

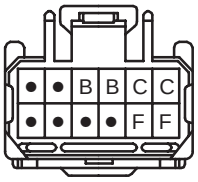


J2 ORANGE



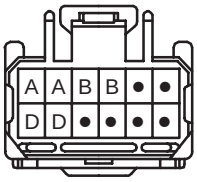
(Hint : See Page 7, 23, 39)

J3 (A)



(Hint : See Page 7, 23, 39)

J4 (B)

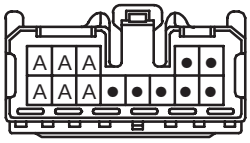


(Hint : See Page 7, 23, 39)

J5 BLUE

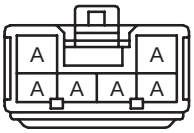
(Hint : See Page 7, 23, 39)

J7 GRAY



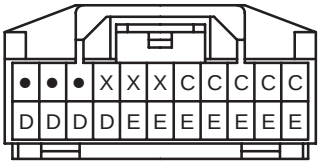
(Hint : See Page 7, 23, 39)

J8



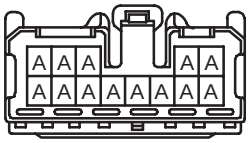
(Hint : See Page 7, 23, 39)

J9



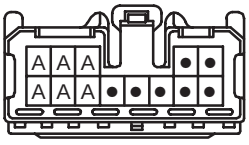
(Hint : See Page 7, 23, 39)

J10 ORANGE



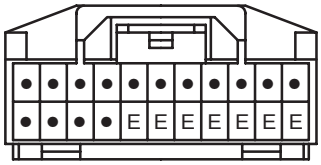
(Hint : See Page 7, 23, 39)

J14 GRAY



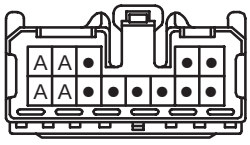
(Hint : See Page 7, 23, 39)

J15



(Hint : See Page 7, 23, 39)

J16

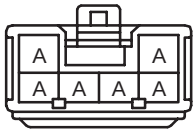


(Hint : See Page 7, 23, 39)

J18

(Hint : See Page 7, 23, 39)

J21

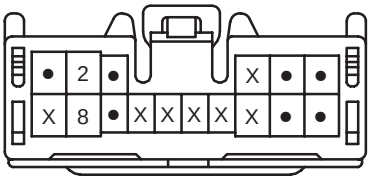


(Hint : See Page 7, 23, 39)

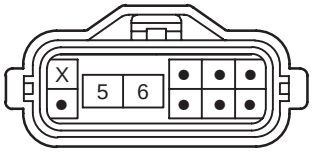
K1 DARK GRAY

K2 DARK GRAY

M2 BLUE

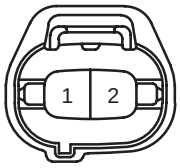


N1 GRAY

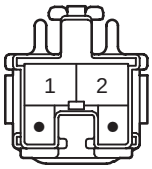


P1 DARK GRAY

S1 BLACK



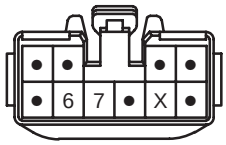
S12 BLUE



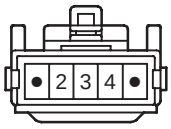
T2 GRAY

T3 BLACK

T5 GRAY

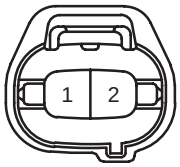


T6

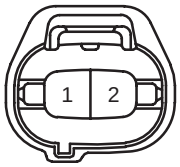


V1 BLACK

V2 BROWN



V3 BLUE



W3 BLACK