## Engine Control (2AZ-FE, 1AZ-FE)

#### **System Outline**

The engine control system utilizes a microcomputer and maintains overall control of the engine, transaxle etc. An outline of the engine control is given 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. which is input into TERMINAL THW of the engine and ECT ECU (A/T), engine ECU (M/T) 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 (A/T), engine ECU (M/T).

(3) Oxygen density signal circuit

The oxygen density in the exhaust emission is detected by the heated oxygen sensor and input as a control signal to TERMINAL OX1B of the engine and ECT ECU (A/T), engine ECU (M/T).

(4) 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 G22+ of the engine and ECT ECU (A/T), engine ECU (M/T), and engine RPM is input into 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 (A/T), engine ECU (M/T).

(6) Vehicle speed circuit

The vehicle speed sensor, detects the vehicle speed and input to ABS speed sensor of the skid control ECU, from skid control ECU to TERMINAL SPD of the engine and ECT ECU (A/T), engine ECU (M/T), Via combination meter.

(7) Battery signal circuit

Voltage is constantly applied to TERMINAL BATT of the engine and ECT ECU (A/T), engine ECU (M/T). With the ignition SW turned on, the voltage for engine and ECT ECU (A/T), engine ECU (M/T) start—up power supply is applied to TERMINAL +B of the engine and ECT ECU (A/T), engine ECU (M/T) via the EFI main relay.

(8) A/C SW signal circuit

The A/C control assembly inputs the A/C operations into TERMINAL A/CS of the engine and ECT ECU (A/T), engine ECU (M/T).

(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 (A/T), engine ECU (M/T) 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 (A/T), engine ECU (M/T) as a control signal.

(11) Engine knock signal circuit

Engine knocking is detected by knock sensor and the signal is input into TERMINAL KNK1 as a control signal.

(12) Air fuel ratio signal system

The air fuel ratio is detected and input as a control signal into TERMINAL AF1A+ of the engine and ECT ECU (A/T), engine ECU (M/T).

#### 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 (A/T), engine ECU (M/T). And the control signal is output to TERMINALS #10, #20, #30, #40 of the engine and ECT ECU (A/T), engine ECU (M/T) to operate the injector (Inject the fuel). The EFI system controls the fuel injection operation by the engine and ECT ECU (A/T), engine ECU (M/T) 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 (A/T), engine ECU (M/T) from each sensor. The best ignition timing is decided according to this data and the memorized data in the engine and ECT ECU (A/T), engine ECU (M/T) and the control signal is output to TERMINALS IGT1, IGT2, IGT3, IGT4. 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 heated oxygen sensor to improve detection performance of the sensor.
The engine and ECT ECU (A/T), engine ECU (M/T) evaluates the signals from each sensor, and outputs current to
TERMINAL HT1B to control the heater.

### 3. Diagnosis System

With the diagnosis system, when there is a malfunction in the engine and ECT ECU (A/T), engine ECU (M/T) 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 and ECT ECU (A/T), engine ECU (M/T) memory or else stops the engine.

### **Service Hints** E6 (A), E7 (B), E8 (C), E9 (D), E10 (E) Engine and ECT ECU (A/T), Engine ECU (M/T) BATT-E1: Always 9.0-14.0 volts VC-E2: 4.5-5.5 volts (Ignition SW at ON position) VTA-E2: 0.3-1.0 volts (Ignition SW on and throttle valve fully closed) 3.2–4.9 volts (Ignition SW on and throttle valve fully open) VG-E2G: 1.1-1.5 volts (Engine idling and A/C SW off) THA-E2: 0.5-3.4 volts (Engine idling and intake air temp. 20°C, 68°F) THW-E2: 0.2-1.0 volts (Engine idling and coolant temp. 80°C, 176°F) IGF-E1: 4.5-5.5 volts (Ignition SW at ON position) Pulse generation (Engine idling) SIL-E1: Pulse generation (During transmission) TACH-E1: Pulse generation (Engine idling) STA-E1: 6.0 volts or more (Engine cranking) FC-E01: 9.0-14.0 volts (Ignition SW at ON position) SPD-E1: Pulse generation (Ignition SW on and rotate driving wheel slowly) W-E01: Below 3.0 volts (Ignition SW at ON position) NSW-E1: 9.0-14.0 volts (Ignition SW on and other shift position in P or N position) 0-3.0 volts (Ignition SW on and shift position in P or N position) EVP1-E01: 9.0-14.0 volts (Ignition SW at ON position) STP-E1: 7.5-14.0 volts (Ignition SW on and brake pedal depressed) Below 1.5 volts (Ignition SW on and brake pedal released) KNK1-E1: Pulse generation (Engine idling) PSW-E1: 9.0-14.0 volts (Ignition SW at ON position) HAF1A-E04: Below 3.0 volts (Engine idling) IGSW-E1: 9.0-14.0 volts (Ignition SW at ON position) MREL-E1: 9.0-14.0 volts (Ignition SW at ON position) G22+, NE+ -NE- : Pulse generation (Engine idling) OCV+ -OCV- : Pulse generation (Ignition SW at ON position) HT1B-E1: 9.0-14.0 volts (Engine idling) Below 3.0 volts (Ignition SW at ON position) AF1A+ -E1: 3.3 volts (Ignition SW at ON position) AF1A--E1: 3.0 volts (Ignition SW at ON position) OX1B-E1: Pulse generation (Maintain engine speed at 2500 rpm for 90 sec. after warming up) IGT1, IGT2, IGT3, IGT4-E1: Pulse generation (Engine idling)

#10, #20, #30, #40-E01: 9.0-14.0 volts (Ignition SW at ON position)

Pulse generation (Engine idling)

## : Parts Location

Code		See Page	Code		See Page	Code	See Page
	۸4	38 (*1)	E7	В	40 (LHD)	19	39 (*1)
"	\ <del>4</del>	48 (*2)	] ='		50 (RHD)	19	49 (*2)
	٧9	38 (*1)	E8	С	40 (LHD)	l10	39 (*1)
′	19	48 (*2)	] [0		50 (RHD)	110	49 (*2)
	10	38 (*1)	E9	D	40 (LHD)	l14	41 (LHD)
^	10	48 (*2)			50 (RHD)		51 (RHD)
	17	40 (LHD)	E10	Е	40 (LHD)	l15	41 (LHD)
^	17	50 (RHD)	] [10		50 (RHD)		51 (RHD)
	22	40 (LHD)	F12		42 (LHD)	J1	41 (LHD)
	<b>ZZ</b>	50 (RHD)			52 (RHD)	31	51 (RHD)
	21	38 (*1)	H9		38 (*1)	J11	42 (LHD)
	<i>,</i> 1	48 (*2)			48 (*2)	311	52 (RHD)
	3	38 (*1)	- I1		39 (*1)	K1	39 (*1)
	,,,	48 (*2)			49 (*2)	KI	49 (*2)
C7	Α	40 (LHD)	- 12		39 (*1)	P1	39 (*1)
	^	50 (RHD)	12		49 (*2)		49 (*2)
C8	В	40 (LHD)	- 13	3	39 (*1)	S14	41 (LHD)
		50 (RHD)			49 (*2)		51 (RHD)
_	)3	40 (LHD)		4	39 (*1)	T2	39 (*1)
	,5	50 (RHD)	14		49 (*2)	12	49 (*2)
	2	38 (*1)	- 17		39 (*1)	V4	39 (*1)
	. <u>_</u>	48 (*2)			49 (*2)	V <del>T</del>	49 (*2)
E6	Α	40 (LHD)	· 18	 8	39 (*1)	V5	39 (*1)
	_ ^	50 (RHD)	] "	J	49 (*2)	<b>V</b> 3	49 (*2)

<sup>\* 1 :</sup> LHD 2AZ-FE, 1AZ-FE

## : Relay Blocks

Code See Page Relay Blocks (Relay Block Location)		I INGIAY DIOCKS (INGIAY DIOCK EOGALIOT)
1	22	Engine Room R/B (Engine Compartment Left)

## : Junction Block and Wire Harness Connector

Code	See Page	Junction Block and Wire Harness (Connector Location)				
1A						
1B	25	Engine Room Main Wire and Engine Room J/B (Engine Compartment Left)				
1C						
1D						
1E						
1H	1					
1J	]					
1K	25 Engine Wire and Engine Room J/B (Engine Compartment Left)					
1L	25	Engine wife and Engine Room 3/D (Engine Companine Refl)				
2A	28	Instrument Panel Wire and Driver Side J/B (Lower Finish Panel)				
2E	28	Engine Room Main Wire and Driver Side J/B (Lower Finish Panel)				
2G	20	Ligine Room Main Wife and Driver Side 3/D (Lower Fillish Fatier)				
2L		Instrument Panel Wire and Driver Side J/B (Lower Finish Panel)				
2M	29					
20						
2R						
ЗА	34 (LHD)	Instrument Panel Wire and Passenger Side J/B (Instrument Panel Brace RH)				
	35 (RHD)	Instrument Panel Wire and Passenger Side J/B (Instrument Panel Brace LH)				
3B	34 (LHD) Instrument Panel Wire and Passenger Side J/B (Instrument Panel Brace RH)					
JD	35 (RHD) Instrument Panel Wire and Passenger Side J/B (Instrument Panel Brace LH)					

<sup>\* 2 :</sup> RHD 2AZ-FE, 1AZ-FE

# **Engine Control (2AZ-FE, 1AZ-FE)**

## : Connector Joining Wire Harness and Wire Harness

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)					
ID1	60 (LHD)	Engine Room Main Wire and Floor Wire (Left Side of Driver Side J/B)					
	72 (RHD)	- Lingille Rooff Wall Wille and Floor Wille (Left Side of Driver Side 3/b)					
IF1	60 (LHD)	Engine Room Main Wire and Instrument Panel Wire (Right Side of Steering Column Tube)					
1 171	72 (RHD)	Engine Room Main Wire and Instrument Panel Wire (Left Side of Steering Column Tube)					
IF3	60 (LHD)	Engine Room Main Wire and Instrument Panel Wire (Right Side of Steering Column Tube)					
_ "3	72 (RHD)	Engine Room Main Wire and Instrument Panel Wire (Left Side of Steering Column Tube)					
IF4	60 (LHD)	Engine Room Main Wire and Instrument Panel Wire (Right Side of Steering Column Tube)					
" 4	72 (RHD)	Engine Room Main Wire and Instrument Panel Wire (Left Side of Steering Column Tube)					
IF5	60 (LHD)	Engine Room Main Wire and Instrument Panel Wire (Right Side of Steering Column Tube)					
11.3	72 (RHD)	Engine Room Main Wire and Instrument Panel Wire (Left Side of Steering Column Tube)					
II1	62 (LHD)	Instrument Panel Wire and Instrument Panel Wire (Instrument Panel Reinforcement RH)					
""	74 (RHD)	Instrument Panel Wire and Instrument Panel Wire (Instrument Panel Reinforcement LH)					
IK1	62 (LHD)						
IIXI	74 (RHD)	Engine Wire and Instrument Panel Wire (Behind the Glove Box)					
IK2	62 (LHD)	- Lingille wille and institutional allei wille (behind the Glove Box)					
111/2	74 (RHD)						
IO1	74 (RHD)	Floor Wire and Floor No.2 Wire (Under the Front Passenger's Seat)					

## : Ground Points

Code	See Page	Ground Points Location			
ED	58 (*1)	Left Fender			
	70 (*2)	Letti ender			
EG	58 (*1)	Left Side of Cylinder Head			
	70 (*2)	Lett Side of Cylinder Flead			
EH	58 (*1)	Intake Side of Cylinder Block			
	70 (*2)	III. lake Side of Cyllinder Block			
II	60 (LHD)	Cowl Side Panel LH			
IJ	60 (LHD)	Instrument Panel Brace LH			
IK	72 (RHD)				
IN	72 (RHD)	Instrument Panel Reinforcement RH			
BQ	64 (LHD)	Front Side of Rear Quarter Wheel House LH			
الم الم	76 (RHD)				

<sup>\* 1 :</sup> LHD 2AZ-FE, 1AZ-FE

## : Splice Points

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E5	58 (*1)	Engine Wire	16	74 (RHD)	Engine Wire
	70 (*2)	Linginie vviile	17	62 (LHD)	
13	62 (LHD)	Engine Room Main Wire		74 (RHD)	
	74 (RHD)	Lingine Room wain wire	18	62 (LHD)	
16	62 (LHD)	Engine Wire		74 (RHD)	

<sup>\* 2 :</sup> RHD 2AZ-FE, 1AZ-FE