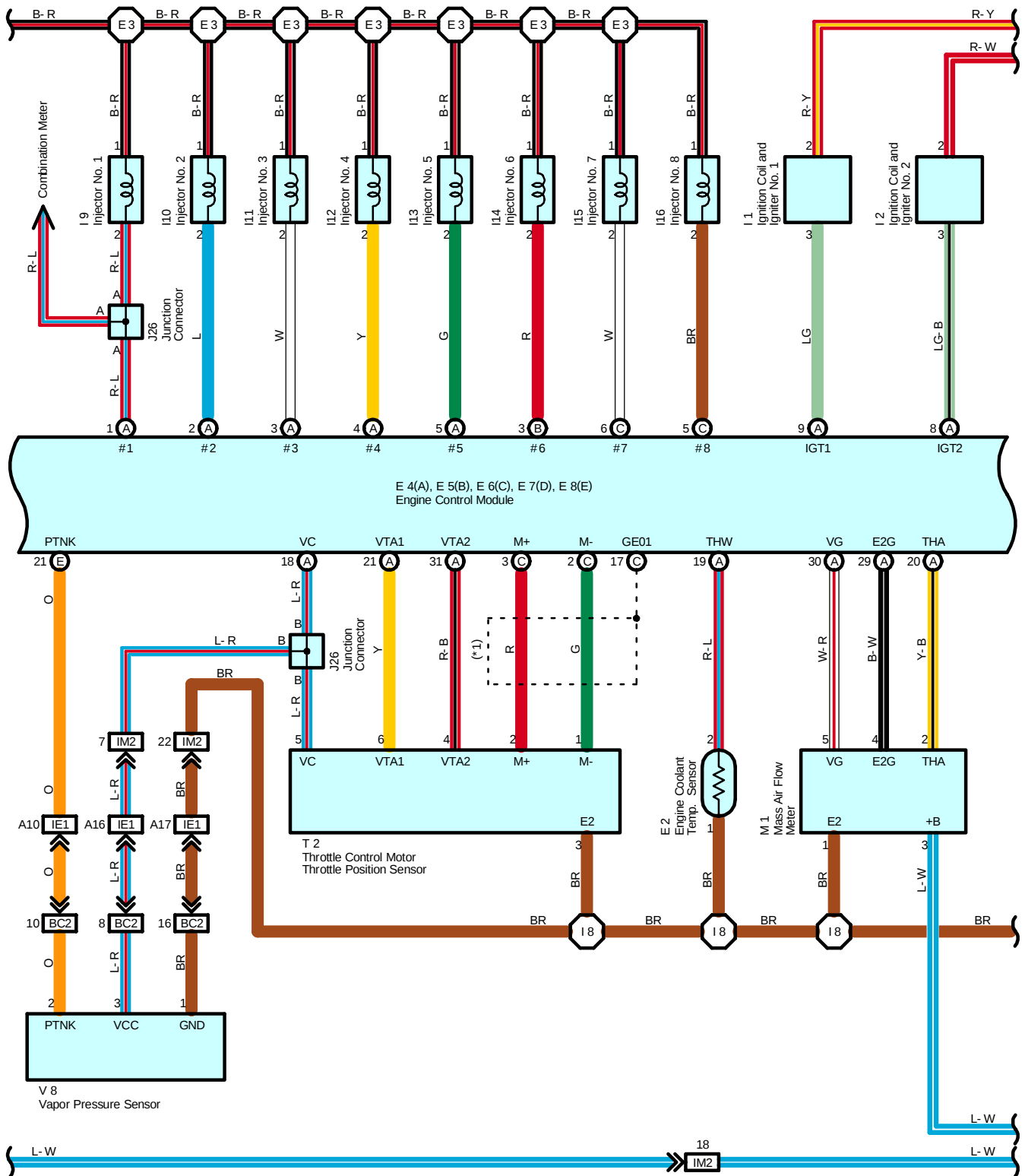
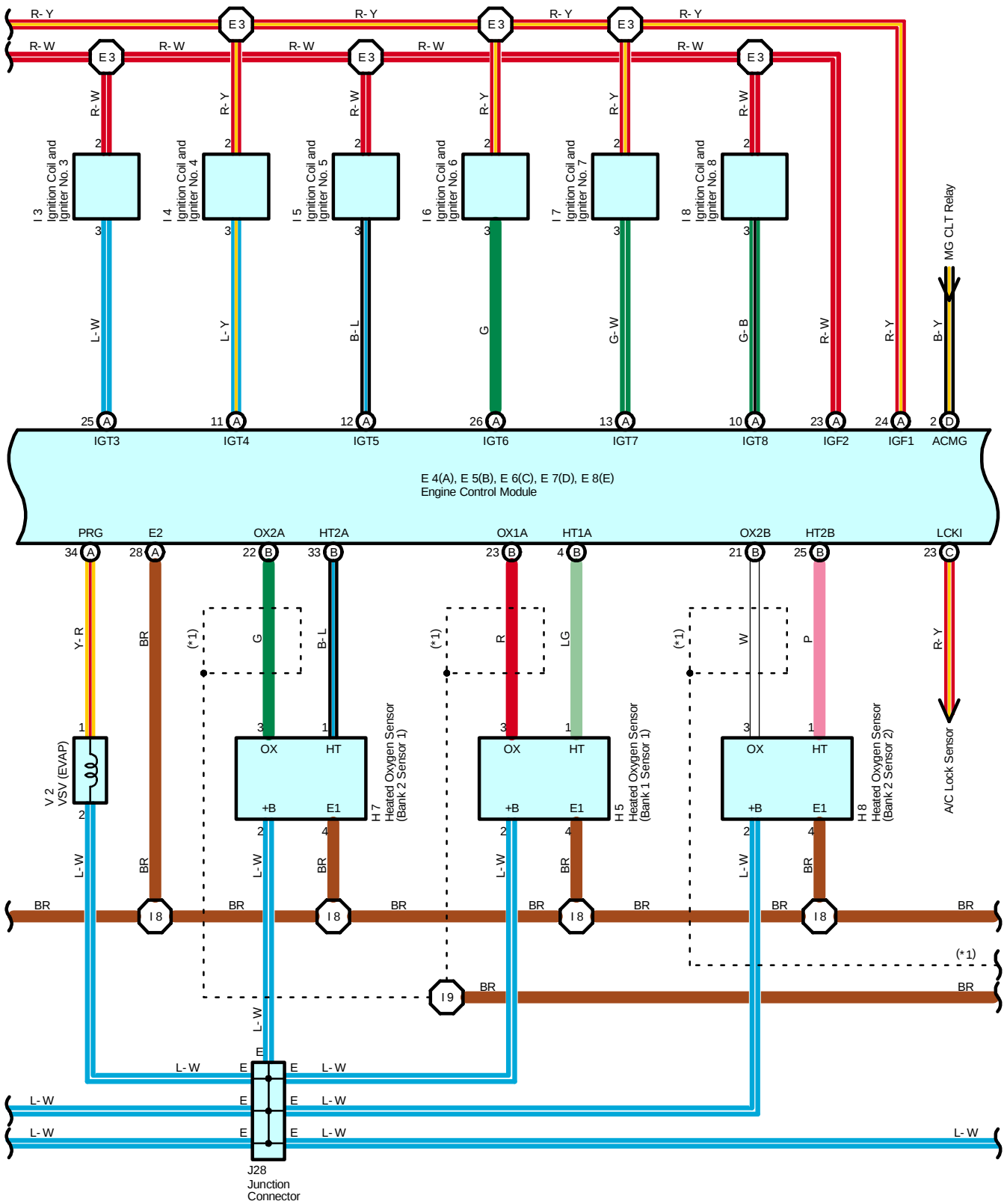




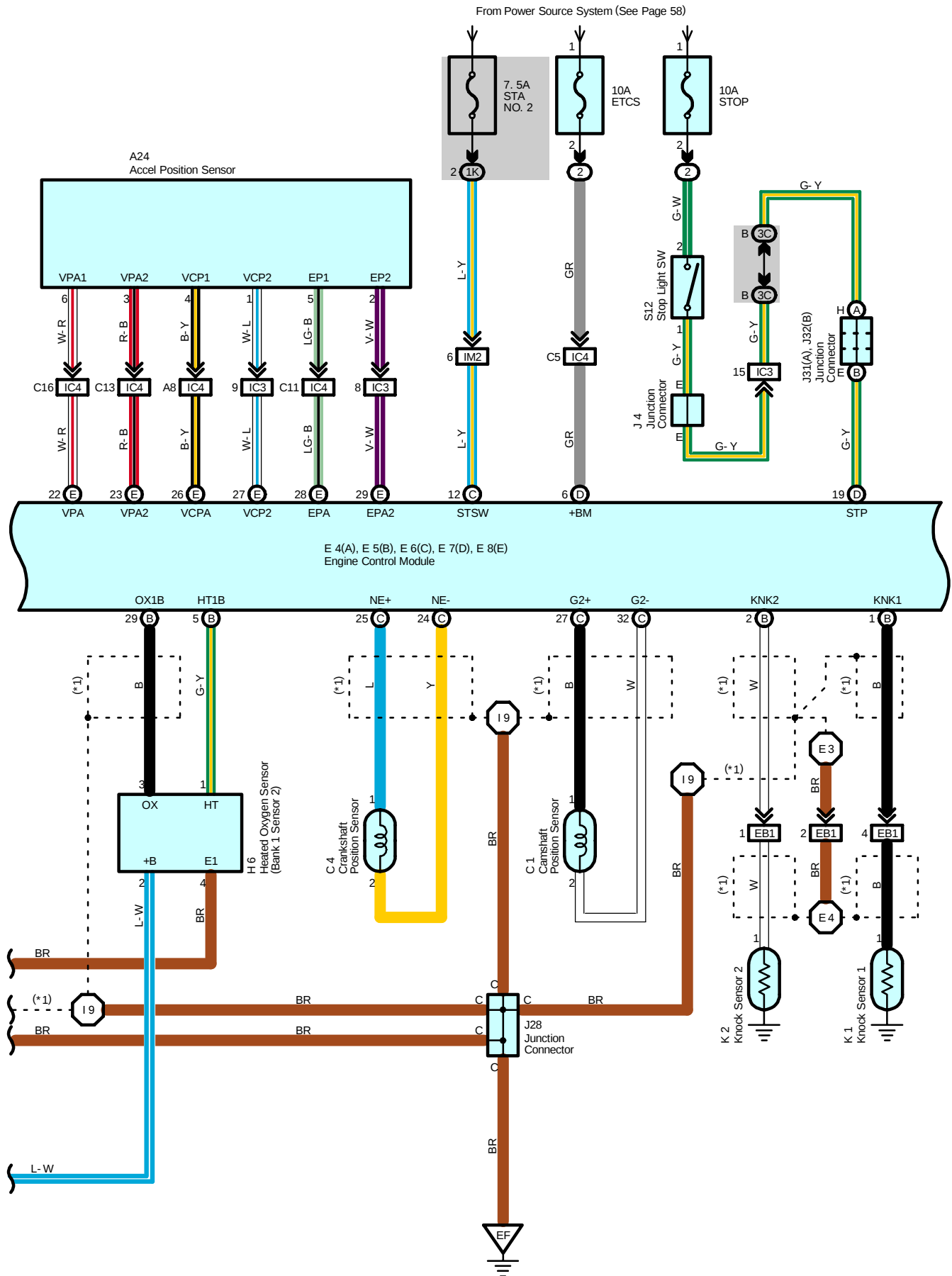
Engine Control (2UZ-FE)



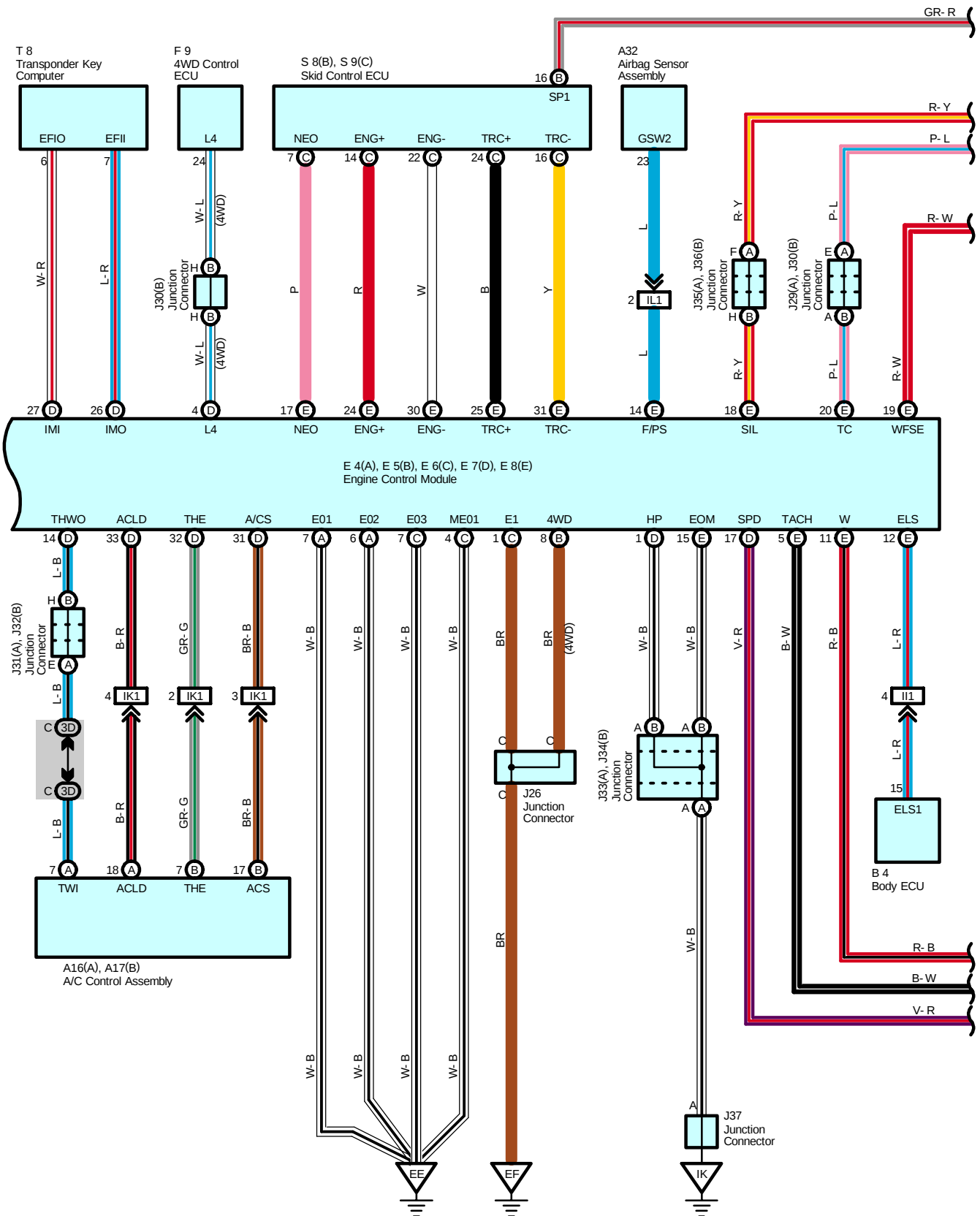
* 1 : Shielded

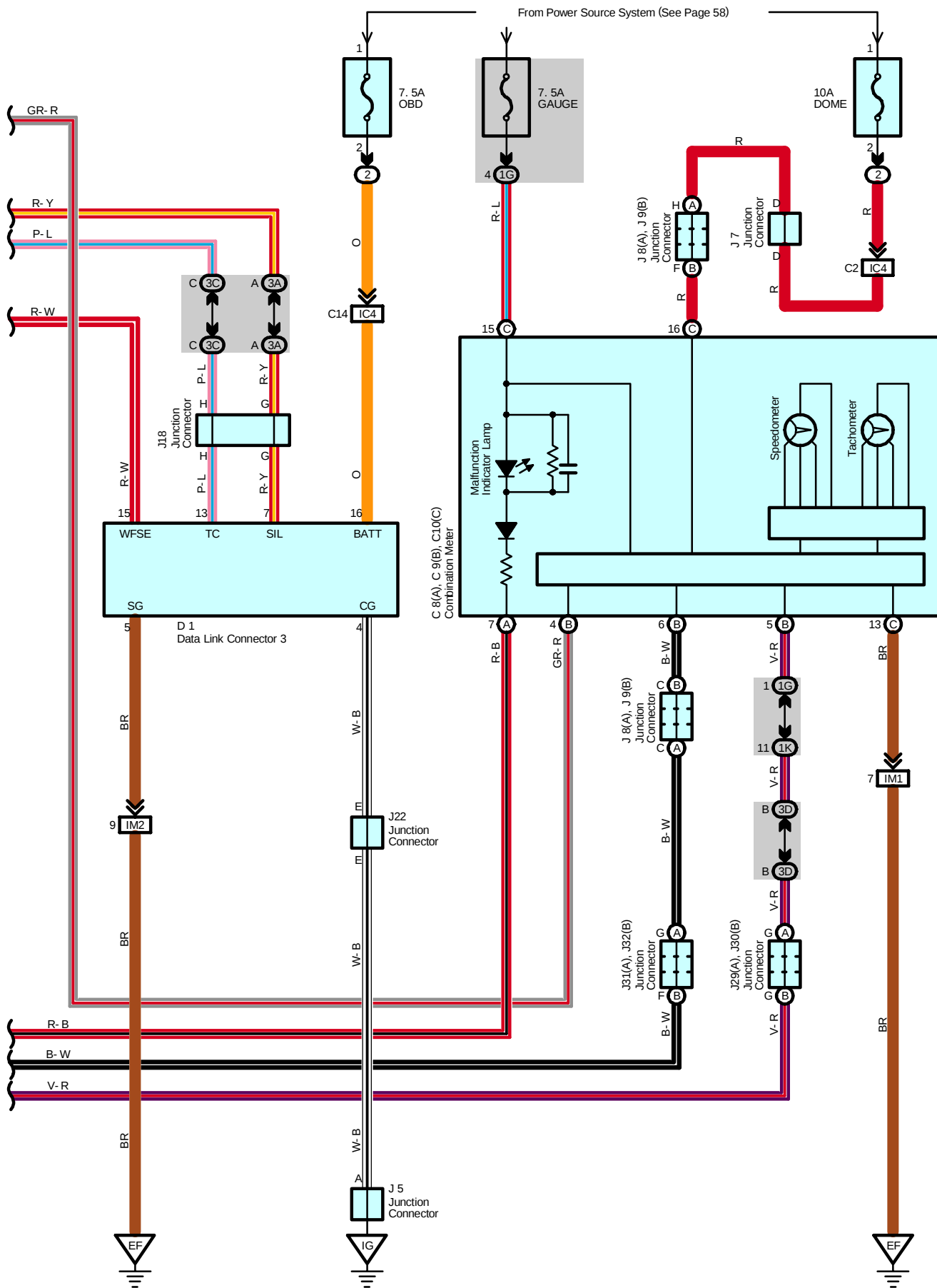


Engine Control (2UZ-FE)



* 1 : Shielded





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 engine coolant 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 control module as a control signal.
- (2) Intake air temp. signal circuit
The intake air temp. sensor is installed in the mass air flow meter and detects the intake air temp., which is input as a control signal to TERMINAL THA of the engine control module.
- (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 to TERMINALS OX1A, OX1B, OX2A and OX2B of the engine control module.
- (4) RPM signal circuit
The camshaft position is detected by the camshaft position sensor and is input into TERMINAL G2+ of the engine control module as a control signal. Also, the engine RPM is detected by the crankshaft position sensor and the signal is input into TERMINAL NE+ of the engine control module.
- (5) Throttle position sensor signal circuit
The throttle position sensor detects the throttle valve opening angle as a control signal, which is input into TERMINALS VTA1 and VTA2 of the engine control module.
- (6) Vehicle speed circuit
The vehicle speed sensor detects the vehicle speed, and the signal is input into TERMINAL SPD of the engine control module via the combination meter, from TERMINAL SP1 of the skid control ECU.
- (7) Battery signal circuit
Voltage is constantly applied to TERMINAL BATT of the engine control module. When the ignition SW is turned on, the voltage for engine control module start up power supply is applied through the EFI relay, to TERMINALS +B and +B2 of the engine control module. The current from the IGN fuse flows to TERMINAL IGSW of the engine control module, and voltage is constantly applied to TERMINAL +BM.
- (8) Intake air volume signal circuit
The intake air volume is detected by the mass air flow meter, and is input as a control signal to TERMINAL VG of the engine control module.
- (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 control module as a control signal.
- (10) Starter signal circuit
To confirm whether the engine is cranking, the voltage applied to the starter motor when the engine is cranking is detected, and is input into TERMINAL STA of the engine control module as a control signal.
- (11) Engine knock signal circuit
Engine knocking is detected by the knock sensors, and is input into TERMINALS KNK1 and KNK2 of the engine control module as a control signal.
- (12) A/C SW signal system
The operating voltage of the A/C magnetic clutch is detected and input in the form of a control signal to TERMINAL A/CS of the engine control module.

2. Control System

- * SFI system

The SFI system monitors the engine condition through the signals input from each sensors to the engine control module. The control signal is sent to the engine control module TERMINALS #1, #2, #3, #4, #5, #6, #7 and #8 to operate the injector (Fuel injection). The SFI system controls the fuel injection by the engine control module in response to the driving conditions.

- * ESA system

The ESA system monitors the engine condition through the signals input from each sensors to the engine control module. The best ignition timing is decided according to this data and the data memorized in the engine control module. The control signal is output to TERMINALS IGT1, IGT2, IGT3, IGT4, IGT5, IGT6, IGT7 and IGT8, and these signals control the igniter to provide the best ignition timing.

- * 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 emission is low), and warms up the heated oxygen sensors to improve their detection performance. The engine control module evaluates the signals from each sensors, and outputs current to TERMINALS HT1A, HT1B, HT2A or HT2B to control the heater.

- * Fuel pump control system

The engine control module supplies current to TERMINAL FPR, and controls the operation speed of the fuel pump with the FUEL PUMP relay.

- * ACIS

The 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 in accordance with the opening of the accelerator pedal, under all driving conditions.

- * Engine start control system

The engine control module allows power to be supplied from the TERMINAL STAR to the STA relay via park/neutral position SW until complete combustion is confirmed by engine RPM after the detection of ignition SW ST signal by the TERMINAL STSW.

With this arrangement, engine can be started without holding the ignition key in the ST position. At the same time, the TERMINAL ACCR is controlled so that the engine control module turns off ACC CUT relay, shutting off power to the accessories.

3. Diagnosis System

When there is a malfunction in the engine control module signal system, the malfunctioning system is recorded in the memory. The malfunctioning system can be found by reading the code displayed on the malfunction indicator lamp.

4. Fail-Safe System

When a malfunction has occurred in any system, there is a possibility of causing engine trouble due to continued control based on that system. In that case, the fail-safe system either controls the system using the data (Standard values) recorded in the engine control module memory, or else stops the engine.

Service Hints

EFI Relay

5-3 : Closed with the ignition SW at ON position

E2 Engine Coolant 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)

E4 (A), E5 (B), E6 (C), E7 (D), E8 (E) Engine Control Module

BATT-E1 : Always 9.0-14.0 volts
 +BM-E1 : Always 9.0-14.0 volts
 IGSW-E1 : 9.0-14.0 volts with the ignition SW at ON position
 +B, +B2-E1 : 9.0-14.0 volts with the ignition SW at ON position
 VC-E1 : 4.5-5.5 volts with the ignition SW at ON position
 VTA2-E1 : 2.0-2.9 volts with the ignition SW on and throttle valve fully closed
 : 4.7-5.1 volts with the ignition SW on and throttle valve fully open
 VTA1-E1 : 0.4-1.0 volts with the ignition SW on and throttle valve fully closed
 : 3.2-4.8 volts with the ignition SW on and throttle valve fully open
 VPA-E1 : 0.3-0.9 volts with the ignition SW on and throttle valve fully closed
 : 3.2-4.8 volts with the ignition SW on and throttle valve fully open
 VPA2-E1 : 1.8-2.7 volts with the ignition SW on and throttle valve fully closed
 : 4.7-5.1 volts with the ignition SW on and throttle valve fully open
 THA-E1 : 0.5-3.4 volts with the idling, intake air temp. 0°C (32°F) -80°C (176°F)
 THW-E1 : 0.2-1.0 volts with the idling, engine coolant temp. 60°C (140°F) -120°C (248°F)
 STA-E1 : 6.0 volts or more with the engine cranking
 W-E1 : 9.0-14.0 volts with the idling and malfunction indicator lamp off
 SPD-E1 : Pulse generation with the vehicle moving
 STP-E1 : 7.5-14.0 volts with the brake pedal depressed

○ : Parts Location

Code		See Page	Code	See Page	Code	See Page
A16	A	36	I2	33 (2UZ-FE)	J28	38
A17	B	36	I3	33 (2UZ-FE)	J29	A 38
A24		36	I4	33 (2UZ-FE)	J30	B 38
A32		36	I5	33 (2UZ-FE)	J31	A 38
B4		36	I6	33 (2UZ-FE)	J32	B 38
C1		32 (2UZ-FE)	I7	33 (2UZ-FE)	J33	A 38
C4		32 (2UZ-FE)	I8	33 (2UZ-FE)	J34	B 38
C8	A	37	I9	33 (2UZ-FE)	J35	A 38
C9	B	37	I10	33 (2UZ-FE)	J36	B 38
C10	C	37	I11	33 (2UZ-FE)	J37	38
D1		37	I12	33 (2UZ-FE)	J40	A 40
E2		32 (2UZ-FE)	I13	33 (2UZ-FE)	J41	B 40
E4	A	37	I14	33 (2UZ-FE)	K1	33 (2UZ-FE)
E5	B	37	I15	33 (2UZ-FE)	K2	33 (2UZ-FE)
E6	C	37	I16	33 (2UZ-FE)	M1	33 (2UZ-FE)
E7	D	37	I18	37	P1	33 (2UZ-FE)
E8	E	37	J2	33 (2UZ-FE)	S8	B 39
F8		32 (2UZ-FE)	J4	38	S9	C 39
F9		37	J5	38	S12	39
F14		40	J7	38	T2	33 (2UZ-FE)
H5		32 (2UZ-FE)	J8	A 38	T8	39
H6		32 (2UZ-FE)	J9	B 38	V2	33 (2UZ-FE)
H7		32 (2UZ-FE)	J18	38	V8	41
H8		32 (2UZ-FE)	J22	38	V10	41
I1		33 (2UZ-FE)	J26	38		

Engine Control (2UZ-FE)

: Relay Blocks

Code	See Page	Relay Blocks (Relay Block Location)
2	22	Engine Room R/B (Engine Compartment Left)

: Junction Block and Wire Harness Connector

Code	See Page	Junction Block and Wire Harness (Connector Location)
1D	24	Engine Room Main Wire and Driver Side J/B (Lower Finish Panel)
1E		
1G	25	Instrument Panel Wire and Driver Side J/B (Lower Finish Panel)
1J		
1K		
3A	28	Instrument Panel Wire and Center J/B (Instrument Panel Brace RH)
3C		
3D		
3E		

: Connector Joining Wire Harness and Wire Harness

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EA1	44 (2UZ-FE)	Engine No.2 Wire and Engine Room Main Wire (Under the Engine Room R/B)
EB1	44 (2UZ-FE)	Engine No.2 Wire and Engine Wire (Near the Starter)
IB1	48	Floor No.2 Wire and Engine Room Main Wire (Left Kick Panel)
IB2		
IC3	48	Instrument Panel Wire and Engine Room Main Wire (Left Kick Panel)
IC4		
IE1	50	Instrument Panel Wire and Floor No.2 Wire (Left Kick Panel)
II1	50	Instrument Panel Wire and Instrument Panel Wire (Instrument Panel Brace LH)
IK1	50	Instrument Panel Wire and Instrument Panel Wire (Left Upper Side of the Glove Box)
IL1	50	Instrument Panel Wire and Instrument Panel Wire (Right Upper Side of the Glove Box)
IM1	52	Engine Wire and Instrument Panel Wire (Right Side of Blower Unit)
IM2		
BC2	54	Frame Wire and Floor No.2 Wire (Under the Rear LH Seat)

: Ground Points

Code	See Page	Ground Points Location
EB	44 (2UZ-FE)	Front Left Fender
EE	44 (2UZ-FE)	Rear Side of Right Bank Cylinder Block
EF	44 (2UZ-FE)	Rear Side of Left Bank Cylinder Block
IG	48	Left Kick Panel
IK	48	Right Kick Panel
BL	54	Floor Seat Crossmember LH
BO	54	Rear Pillar LH

: Splice Points

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E3	44 (2UZ-FE)	Engine Wire	I2	50	Engine Room Main Wire
E4	44 (2UZ-FE)	Engine No.2 Wire	I8	50	Engine Wire
E6	44 (2UZ-FE)	Engine Room Main Wire	I9		
I1	50				

