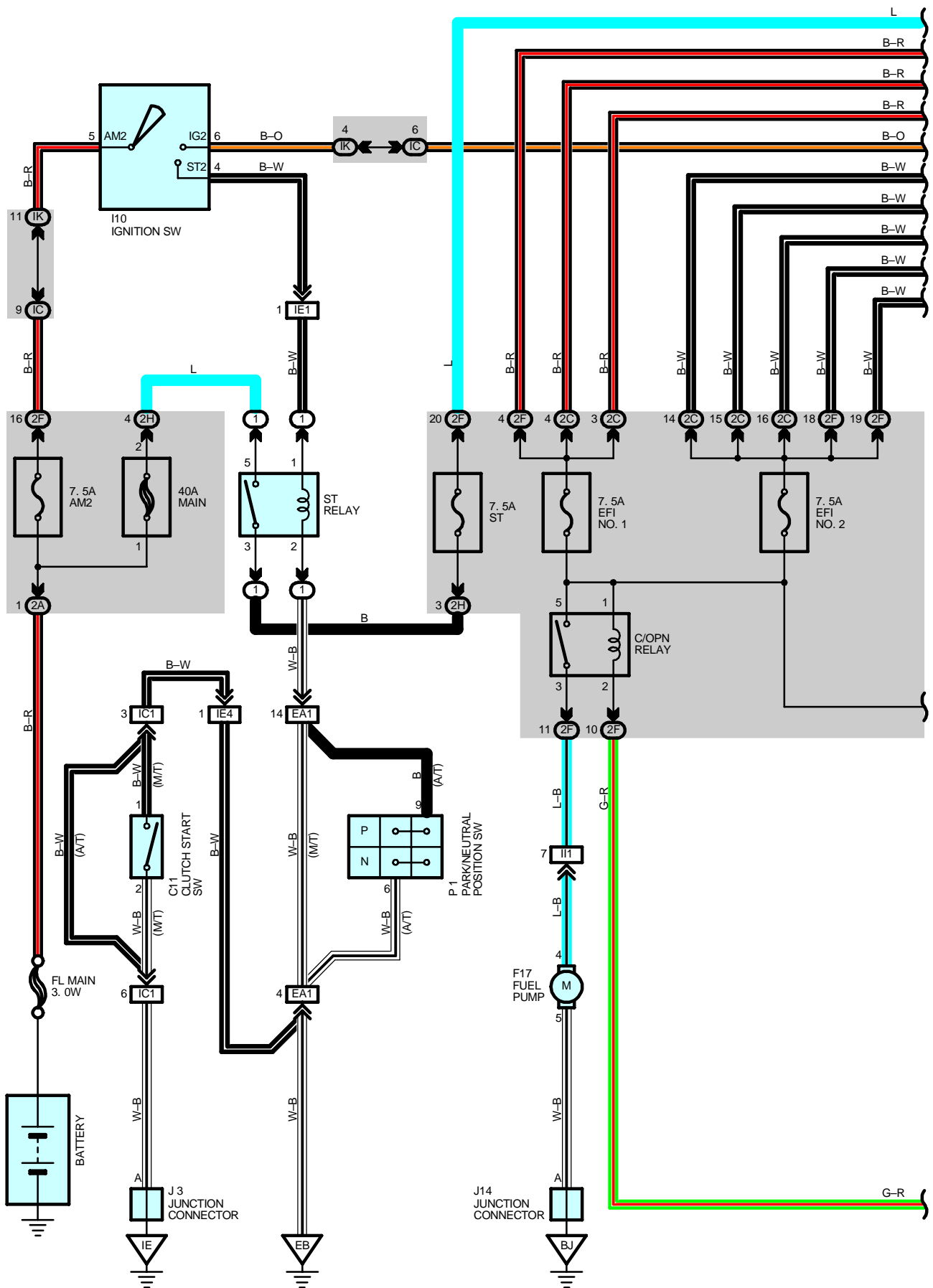
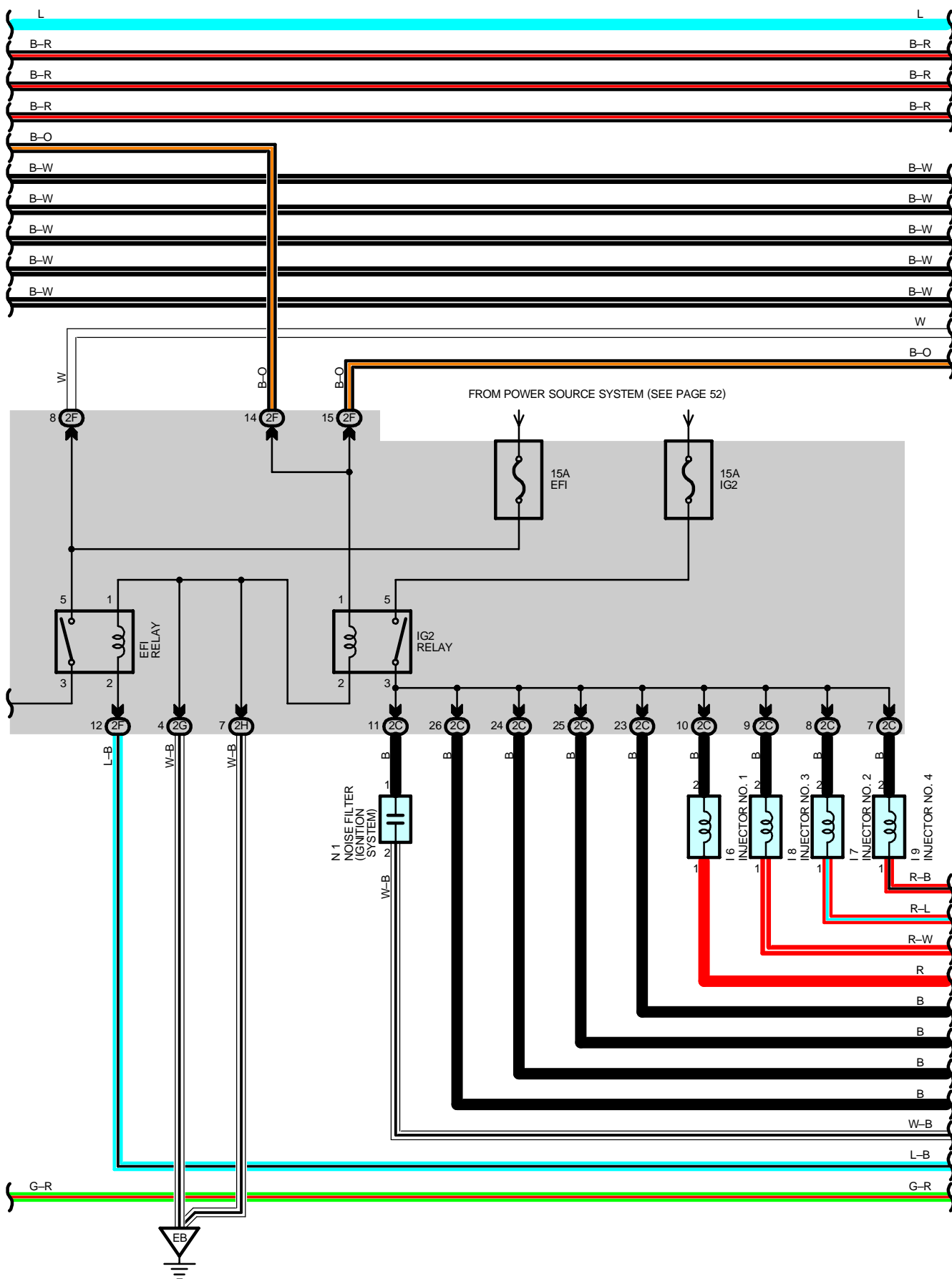
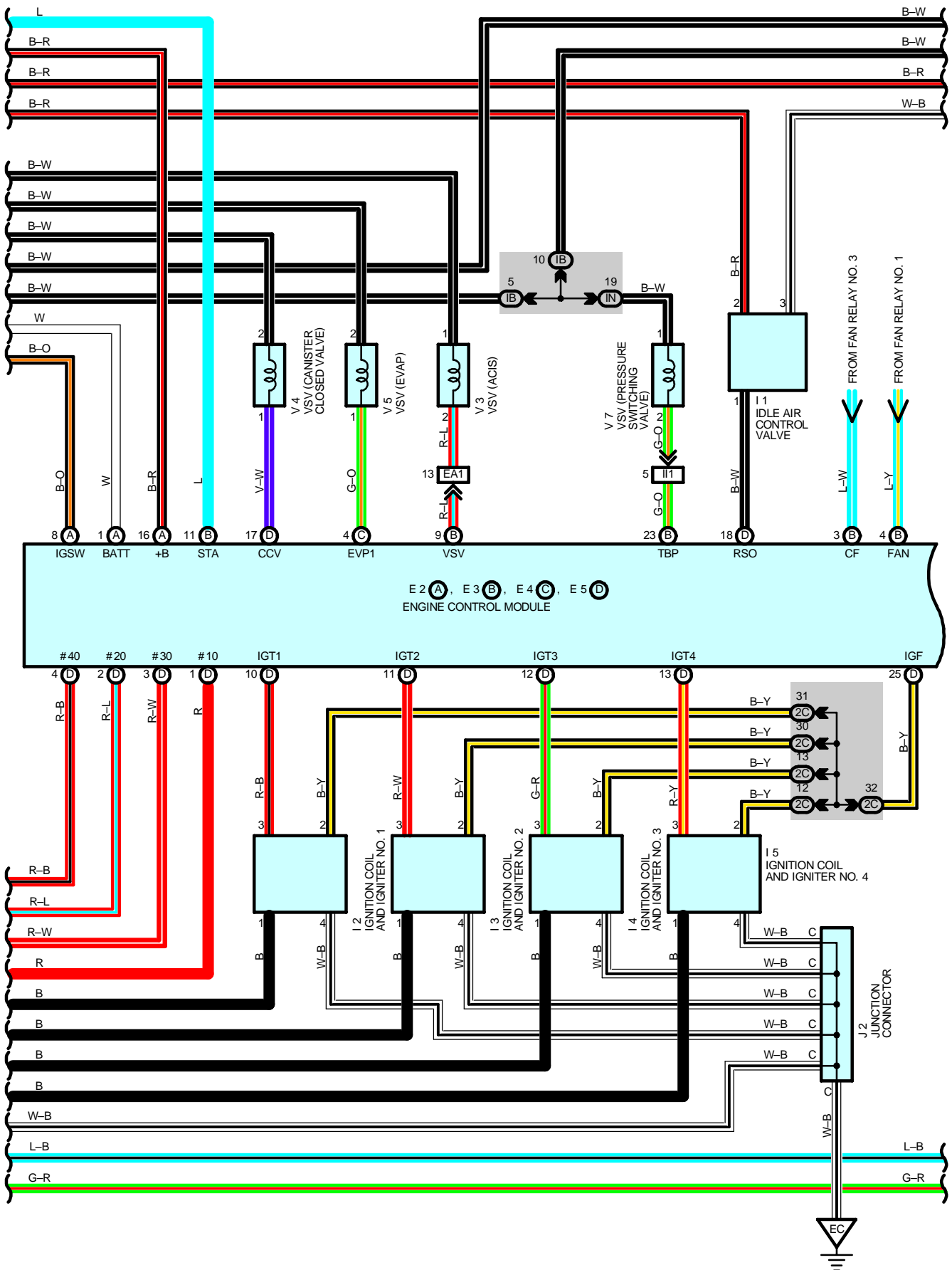


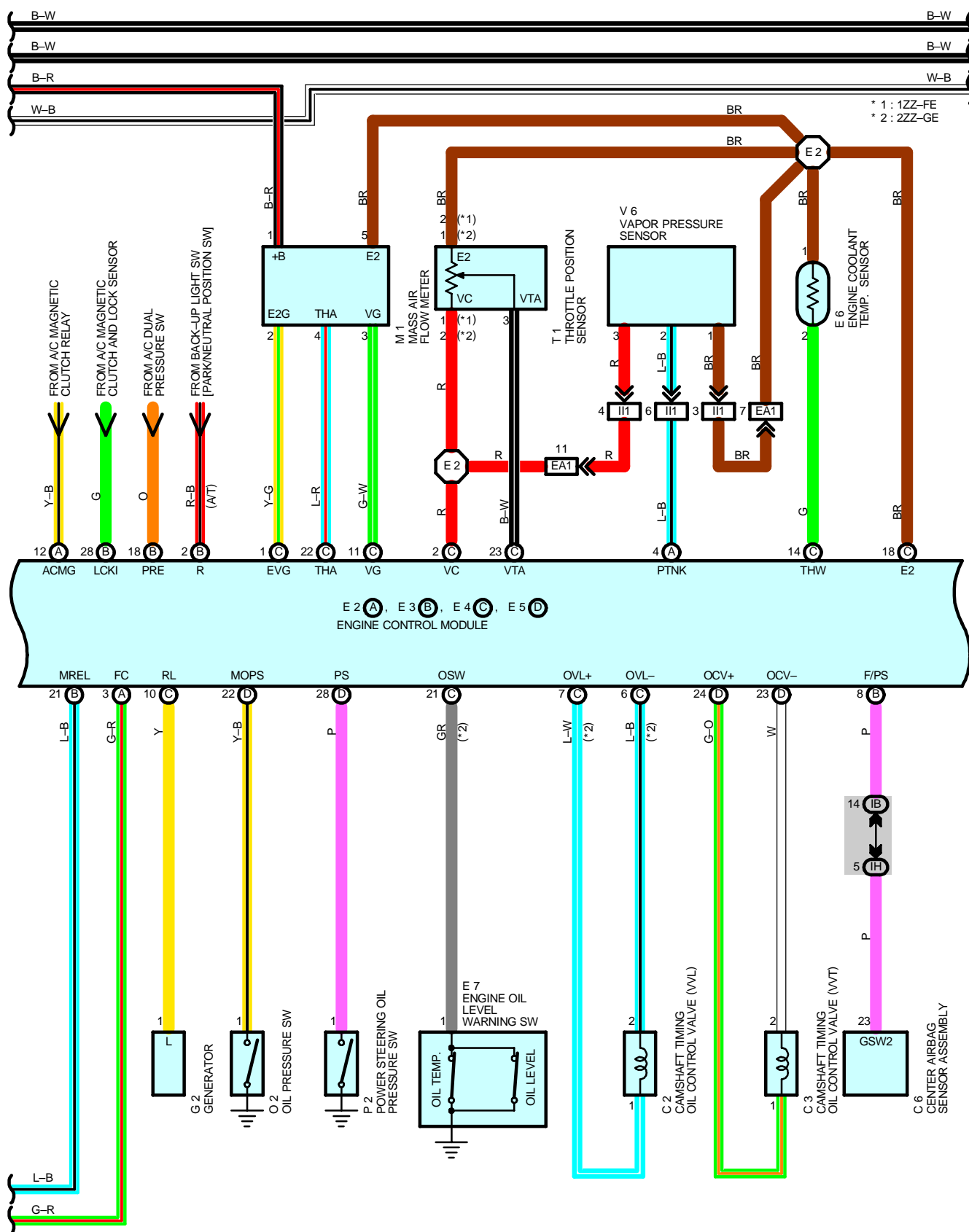
ENGINE CONTROL





ENGINE CONTROL





SYSTEM OUTLINE

This system utilizes an engine control module 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 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 (Bank 1 sensor 1, bank 1 sensor 2) to TERMINALS OX1A, OX1B of the engine control module.

To stabilize detection performance by the heated oxygen sensors, the heated oxygen sensors are warmed. This heater is also controlled by the engine control module (HT1A, HT1B).

(4) RPM signal circuit

Camshaft position is detected by the camshaft position sensor and its signal is input to TERMINAL G2 of the engine control module 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 control module 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 TERMINAL VTA of the engine control module.

(6) Vehicle speed circuit

The vehicle speed sensor, installed inside the transmission, detects the vehicle speed and inputs a control signal into TERMINAL SPD of the engine control module.

(7) A/C SW signal circuit

The operating voltage of the A/C magnetic clutch is detected and the signal is input into TERMINAL ACMG of the engine control module as a control signal.

(8) Battery signal circuit

Voltage is constantly applied to TERMINAL BATT of the engine control module. With the ignition SW turned on, Voltage for engine control module start-up power supply is applied to TERMINAL +B of the engine control module via the EFI relay.

(9) Intake air volume signal circuit

Intake air volume is detected by the mass air flow meter and the signal is input to TERMINAL VG of the engine control module 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 control module 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 control module as a control signal.

(12) Engine knock signal circuit

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

2. CONTROL SYSTEM

* SFI system

The SFI system monitors the engine condition through the signals input from each sensor (Input signals from (1) to (12) etc.) to the engine control module. The best fuel injection timing is decided based on this data and the program memorized by the engine control module, and the control signal is output to TERMINALS #10, #20, #30 and #40 of the engine control module to operate the injector (Inject the fuel). The sequential multiport fuel injection (Electronic fuel injection) system controls the fuel injection operation by the engine control module in response to the driving conditions.

* ESA system

The ESA system monitors the engine condition through the signals input to the engine control module from each sensor (Input signals from (1), (2), (4) to (12) etc.). The best ignition timing is decided according to this data and the memorized data in the engine control module, and the control signal is output to TERMINALS IGT1, IGT2, IGT3 and 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 sensors (Bank 1 sensor 1, bank 1 sensor 2) to improve detection performance of the sensors.

The engine control module evaluates the signals from each sensor (Input signals from (1), (2), (4), (8) to (10) etc.), and outputs current to TERMINALS HT1A, HT1B 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 control module judges the engine speed by the signals ((4), (5)) from each sensor and outputs signals to the TERMINAL VSV to control the VSV (ACIS).

* MPX

The MPX communicates with the combination meter, 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 control module 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 control module memory or else stops the engine.

SERVICE HINTS

E2 (A), E3 (B), E4 (C), E5 (D) ENGINE CONTROL MODULE

BATT-E1 : Always **9.0–14.0** volts

+B-E1 : **9.0–14.0** volts (Ignition SW at **ON** position)

VC-E2 : **4.5–5.5** volts (Ignition SW at **ON** position)

VTA-E2 : **0.3–0.8** volts (Ignition SW ON and throttle valve fully closed)

3.2–4.9 volts (Ignition SW ON and throttle valve open)

THA-E2 : **0.5–3.4** volts (Ignition SW ON and intake air temp. **20°C, 68°F**)

THW-E2 : **0.2–1.0** volts (Ignition SW ON and coolant temp. **80°C, 176°F**)

STA-E1 : **6.0–14.0** volts (Engine cranking)

W-E1 : **9.0–14.0** volts (No trouble and engine running)

STP-E1 : **9.0–14.0** volts (Brake pedal depress)

RSO-E1 : **9.0–14.0** volts (Ignition SW at **ON** position)

IGT1, IGT2, IGT3, IGT4-E1 : **0.8–1.2** volts (Engine cranking or idling)

#10, #20, #30, #40-E01, E02 : **9.0–14.0** volts (Ignition SW at **ON** position)

RESISTANCE OF ECU WIRING CONNECTORS

(Disconnect wiring connector)

VTA-E2 : **3.3–10.0** k Ω (Throttle valve fully open)

0.2–0.8 k Ω (Throttle valve fully closed)

VC-E2 : **3.0–7.0** k Ω

THA-E2 : **2.0–3.0** k Ω (Intake air temp. **20°C, 68°F**)

THW-E2 : **0.2–0.4** k Ω (Coolant temp. **80°C, 176°F**)

RSO : **19.3–22.3** Ω

C/OPN RELAY

5–3 : Closed with the starter cranking and engine running

EFI RELAY

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

E6 ENGINE COOLANT TEMP. SENSOR

1–2 : **10.0–20.0** k Ω (**–20°C, –4°F**)

4.0–7.0 k Ω (**0°C, 32°F**)

2.0–3.0 k Ω (**20°C, 68°F**)

0.9–1.3 k Ω (**40°C, 104°F**)

0.4–0.7 k Ω (**60°C, 140°F**)

0.2–0.4 k Ω (**80°C, 176°F**)

○ : PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
B6	36	G2	34 (2ZZ-GE)	J14	38
C1	32 (1ZZ-FE)	H8	37	K1	33 (1ZZ-FE)
	34 (2ZZ-GE)	H9	37		35 (2ZZ-GE)
C2	34 (2ZZ-GE)	I1	33 (1ZZ-FE)	M1	33 (1ZZ-FE)
C3	32 (1ZZ-FE)		35 (2ZZ-GE)		35 (2ZZ-GE)
	34 (2ZZ-GE)	I2	33 (1ZZ-FE)	N1	33 (1ZZ-FE)
C4	32 (1ZZ-FE)		35 (2ZZ-GE)		35 (2ZZ-GE)
	34 (2ZZ-GE)	I3	33 (1ZZ-FE)	O2	33 (1ZZ-FE)
C6	36		35 (2ZZ-GE)		35 (2ZZ-GE)
C11	36	I4	33 (1ZZ-FE)	P1	33 (1ZZ-FE)
C12 A	36		35 (2ZZ-GE)		35 (2ZZ-GE)
C13 B	36	I5	33 (1ZZ-FE)	P2	33 (1ZZ-FE)
C18	36		35 (2ZZ-GE)		35 (2ZZ-GE)
D1	36	I6	33 (1ZZ-FE)	S8	37
E2 A	32 (1ZZ-FE)		35 (2ZZ-GE)	T1	33 (1ZZ-FE)
	34 (2ZZ-GE)	I7	33 (1ZZ-FE)		35 (2ZZ-GE)
E3 B	32 (1ZZ-FE)		35 (2ZZ-GE)	V1	33 (1ZZ-FE)
	34 (2ZZ-GE)	I8	33 (1ZZ-FE)		35 (2ZZ-GE)
E4 C	32 (1ZZ-FE)		35 (2ZZ-GE)	V3	33 (1ZZ-FE)
	34 (2ZZ-GE)	I9	33 (1ZZ-FE)		35 (2ZZ-GE)
E5 D	32 (1ZZ-FE)		35 (2ZZ-GE)	V4	33 (1ZZ-FE)
	34 (2ZZ-GE)	I10	37		35 (2ZZ-GE)
E6	32 (1ZZ-FE)	J1	33 (1ZZ-FE)	V5	33 (1ZZ-FE)
	34 (2ZZ-GE)		35 (2ZZ-GE)		35 (2ZZ-GE)
E7	34 (2ZZ-GE)	J2	33 (1ZZ-FE)	V6	39
F17	38		35 (2ZZ-GE)	V7	39
G2	32 (1ZZ-FE)	J3	37		

○ : RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	26	Engine Room R/B No.1 (Engine Compartment Left)

○ : JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
IB	25	Engine Room Main Wire and Instrument Panel J/B (Instrument Panel Brace RH)
IC		
IF	25	Instrument Panel Wire and Instrument Panel J/B (Instrument Panel Brace RH)
IH		
IK		
IM		
IN	25	Floor Wire and Instrument Panel J/B (Instrument Panel Brace RH)
2A	23	Engine Wire and Engine Room J/B (Engine Compartment Left)
2B		
2C		
2F	23	Engine Room Main Wire and Engine Room J/B (Engine Compartment Left)
2G		
2H		

ENGINE CONTROL

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EA1	40 (1ZZ-FE)	Engine Wire and Engine Room Main Wire (Inside of Engine Room R/B No.1)
	42 (2ZZ-GE)	
EA2	40 (1ZZ-FE)	
	42 (2ZZ-GE)	
EB1	40 (1ZZ-FE)	Engine No.4 Wire and Engine Wire (Under the Intake Manifold)
	42 (2ZZ-GE)	
IC1	44	Instrument Panel Wire and Instrument Panel No.2 Wire (Instrument Panel Reinforcement LH)
IE1	44	Engine Room Main Wire and Instrument Panel Wire (Instrument Panel Brace LH)
IE3		
IE4		
IE5		
II1	46	Engine Room Main Wire and Floor Wire (Instrument Panel Brace LH)

: GROUND POINTS

Code	See Page	Ground Points Location
EB	40 (1ZZ-FE)	Front Left Fender
	42 (2ZZ-GE)	
EC	40 (1ZZ-FE)	Cylinder Head Cover LH
	42 (2ZZ-GE)	
ED	40 (1ZZ-FE)	
	42 (2ZZ-GE)	
IE	44	Cowl Side Panel LH
IH	44	Cowl Side Panel RH
BJ	48	Luggage Room Left

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E1	40 (1ZZ-FE)	Engine Room Main Wire	E2	40 (1ZZ-FE)	Engine Wire
	42 (2ZZ-GE)			42 (2ZZ-GE)	

