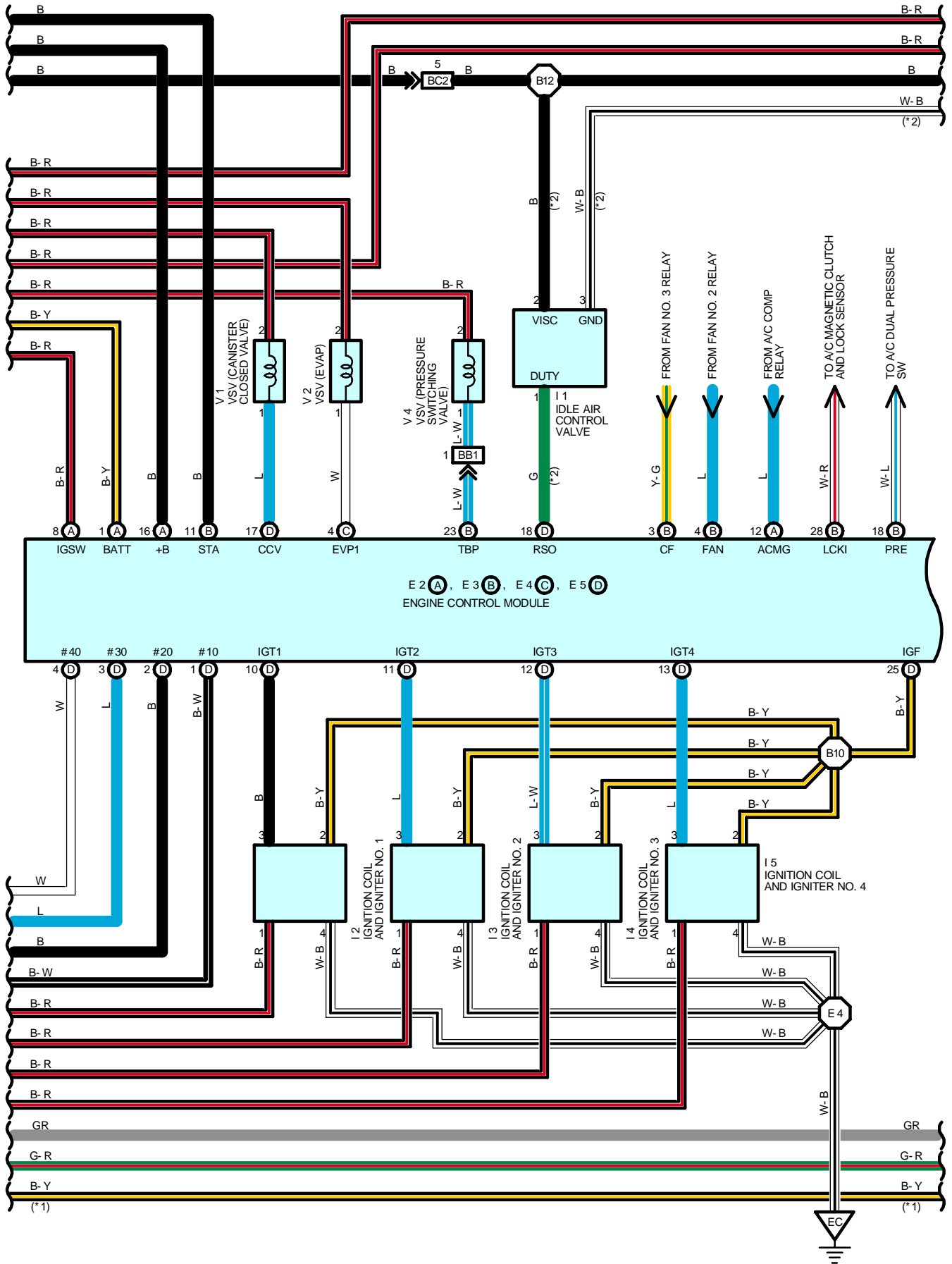
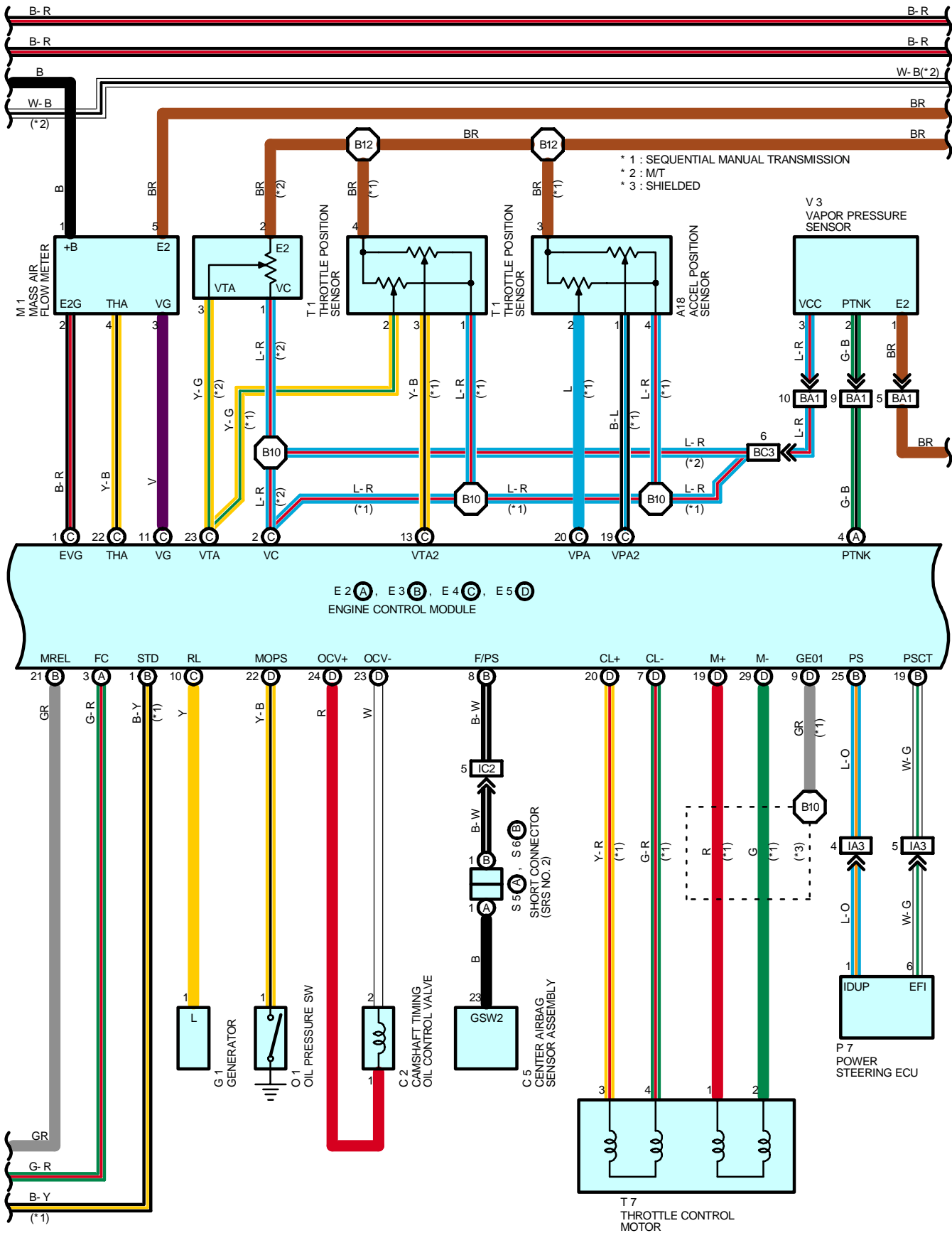
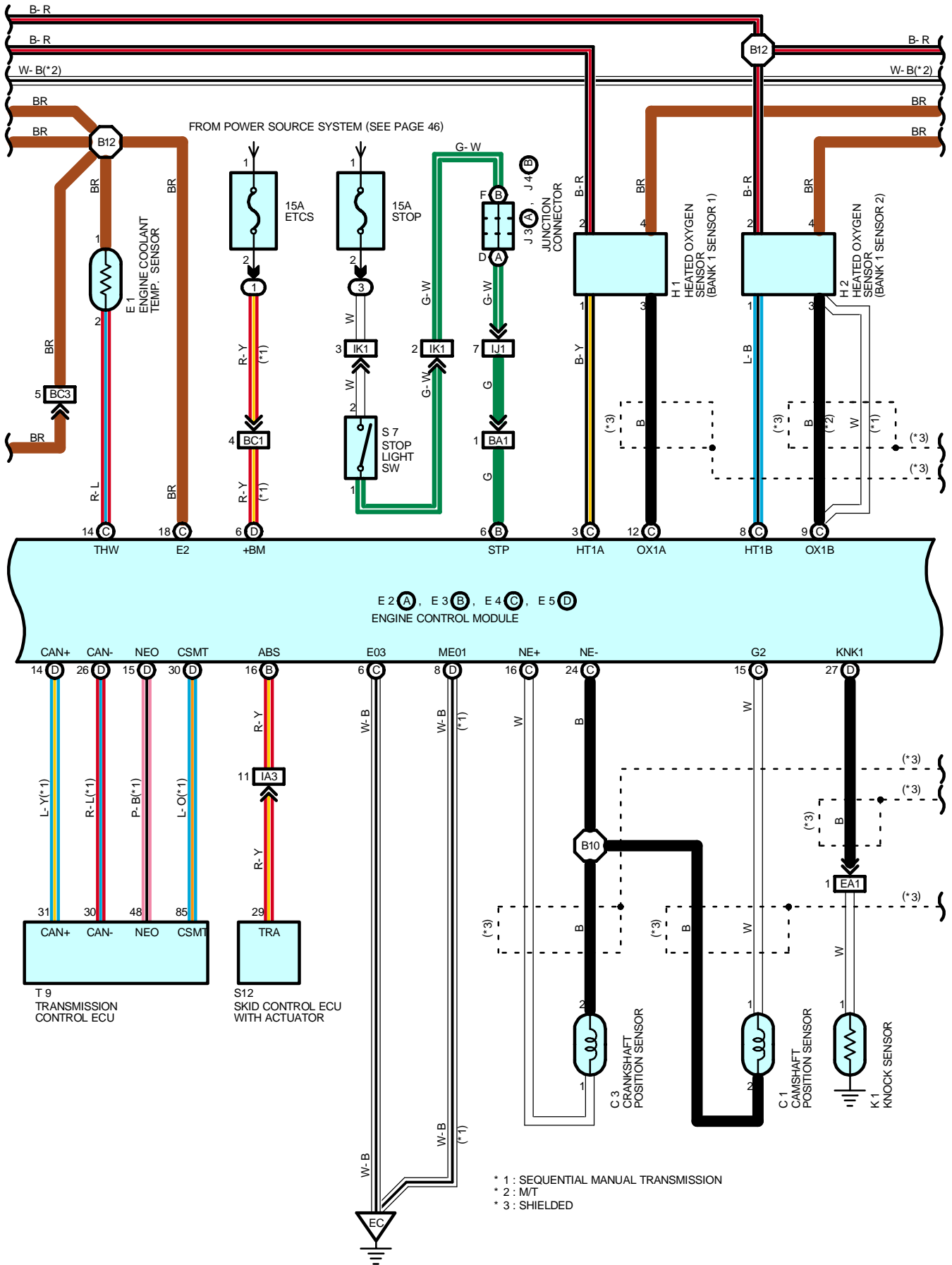


ENGINE CONTROL

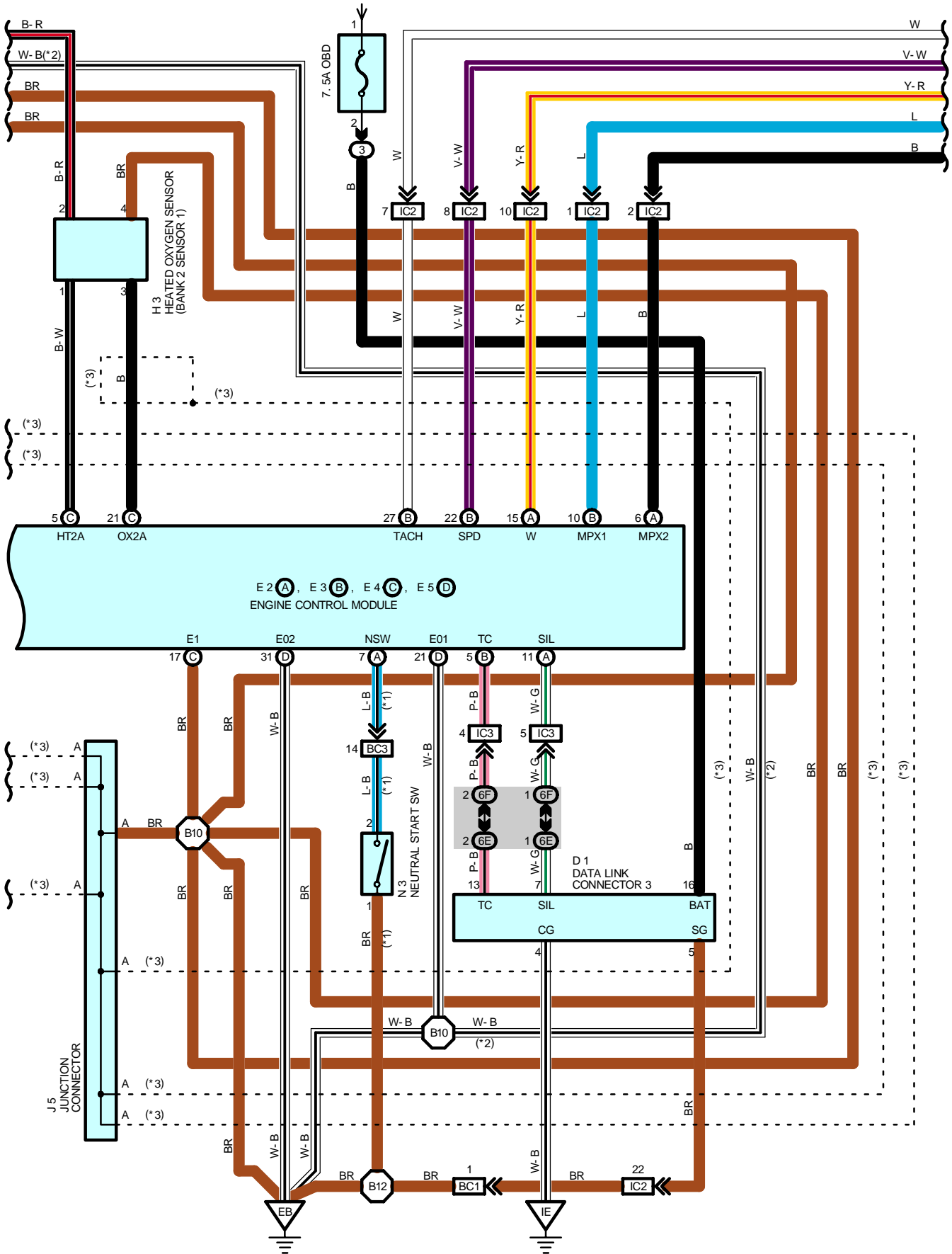




ENGINE CONTROL



FROM POWER SOURCE SYSTEM (SEE PAGE 46)



SYSTEM OUTLINE

This system utilizes an engine control module and maintains overall control of the engine 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, bank 2 sensor 1) to TERMINALS OX1A, OX1B, OX2A 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, HT2A).
- (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, VTA2 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 MAIN 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 KNK1 as a control signal.

2. CONTROL SYSTEM

* SFI system

The SFI system monitors the engine condition through the signals input from each sensor 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. 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, bank 2 sensor 1) to improve detection performance of the sensors.

The engine control module evaluates the signals from each sensor, and outputs current to TERMINALS HT1A, HT1B, HT2A to control the heater.

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)
VTA2-E2 : **0.3- 0.9** volts (Ignition SW ON and throttle valve fully closed)
3.6- 4.4 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 : **5.0- 10.0** k Ω (Throttle valve fully open)
0.2- 5.5 k Ω (Throttle valve fully closed)
VTA2-E2 : **5.0- 10.0** k Ω (Throttle valve fully open)
0.2- 5.5 k Ω (Throttle valve fully closed)
VC-E2 : **2.0- 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-E1 : **19.3- 22.3** Ω

C/OPN RELAY

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

EFI MAIN RELAY

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

E1 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**)

ENGINE CONTROL

○ : PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
A18	30	H1	30	M1	31
C1	30	H2	30	N1	31
C2	30	H3	30	N3	31
C3	30	I1	30	O1	31
C5	32	I2	30	P7	35
C9	32	I3	30	S5	A 33
C10	A 32	I4	30	S6	B 33
C11	B 32	I5	30	S7	33
C12	C 32	I6	30	S12	35
D1	32	I7	30	T1	31
E1	30	I8	30	T7	31
E2	A 34	I9	30	T9	35
E3	B 34	I10	33	V1	31
E4	C 34	J3	A 33	V2	31
E5	D 34	J4	B 33	V3	35
F12	34	J5	35	V4	35
G1	30	K1	31		

○ : RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	22	Fusible Link Block (Engine Compartment Left)
2	23	Engine Room R/B (Left Side of Room Partition Panel)
3	24	R/B No.3 (Left Side of Instrument Panel)

○ : JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
6E	26	Instrument Panel Wire and J/B No.6 (Instrument Panel Brace LH)
6F		

□ : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EA1	36	Engine No.4 Wire and Engine Wire (Near the Generator)
IA3	38	Engine Room Main Wire and Luggage Room Wire (Left Kick Panel)
IC1	38	Engine Room Main Wire and Instrument Panel Wire (Left Kick Panel)
IC2		
IC3		
IJ1	40	Floor Wire and Instrument Panel Wire (Right Kick Panel)
IK1	40	Instrument Panel Wire and Switch Wire (Instrument Panel Brace LH)
BA1	42	Engine Room Main Wire and Floor Wire (Right Side of Room Partition Panel)
BB1	42	Engine Room No.4 Wire and Engine Room Main Wire (Left Side of Room Partition Panel)
BC1	42	Engine Wire and Engine Room Main Wire (Quarter Panel LH)
BC2		
BC3		

▽ : GROUND POINTS

Code	See Page	Ground Points Location
EA	36	Suspension Tower Rear LH
EB	36	Engine Block LH
EC		
IE	38	Left Kick Panel
BI	42	Suspension Tower Front RH
BK	42	Under the Center Pillar RH



: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E2	36	Engine Wire	B9	42	Engine Room Main Wire
E3			B10	42	Engine Wire
E4			B12		
B7	42	Engine Room Main Wire			