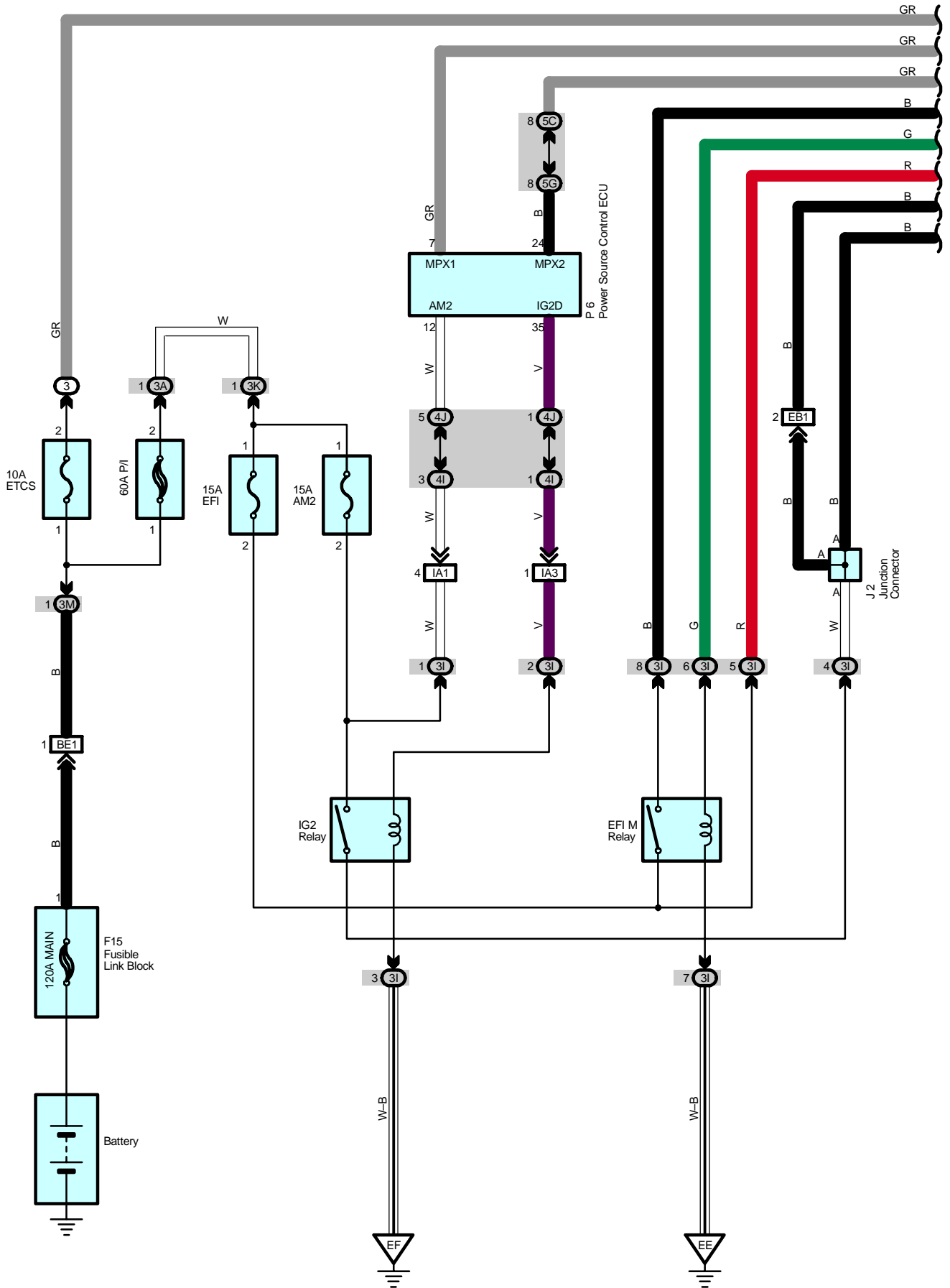
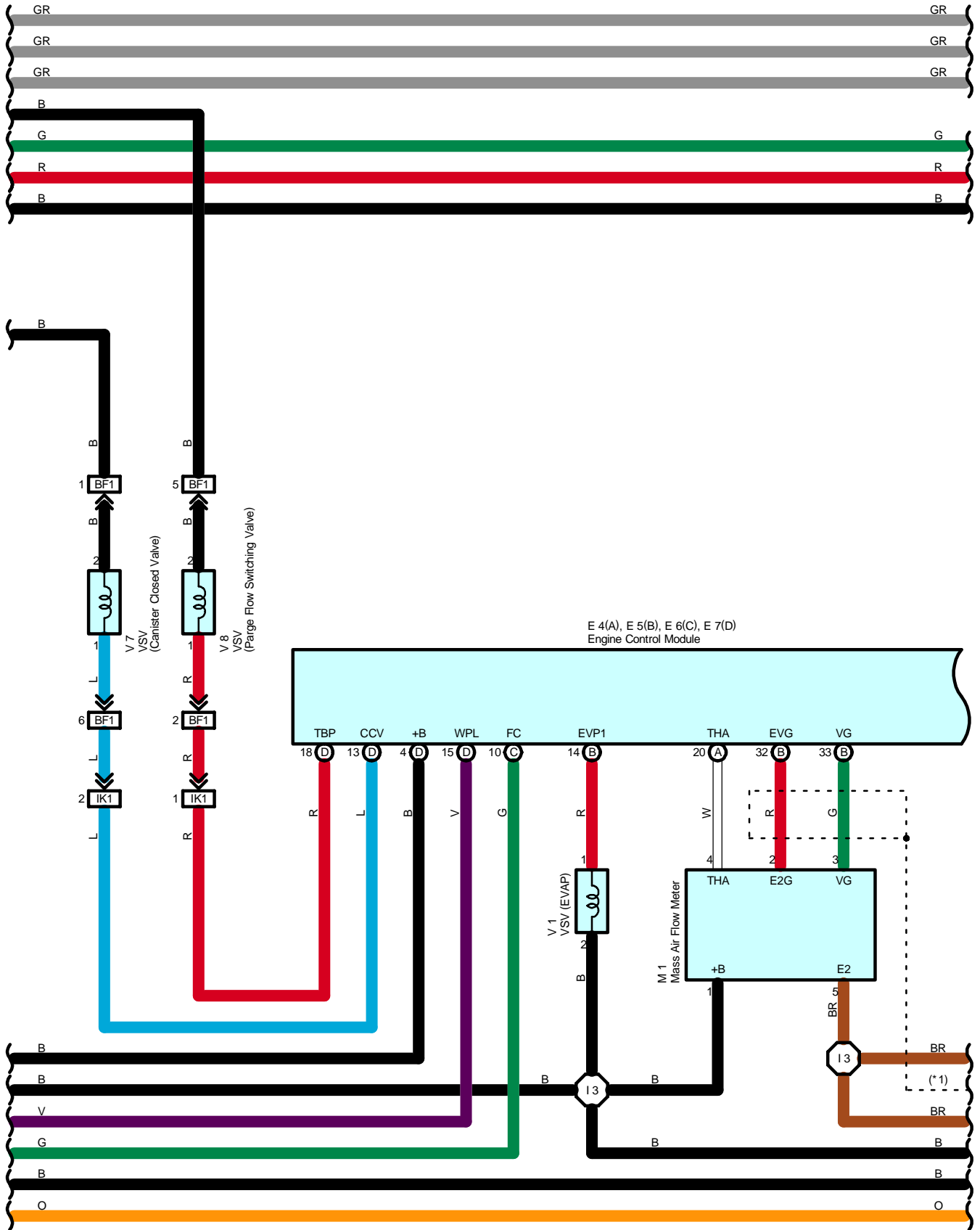
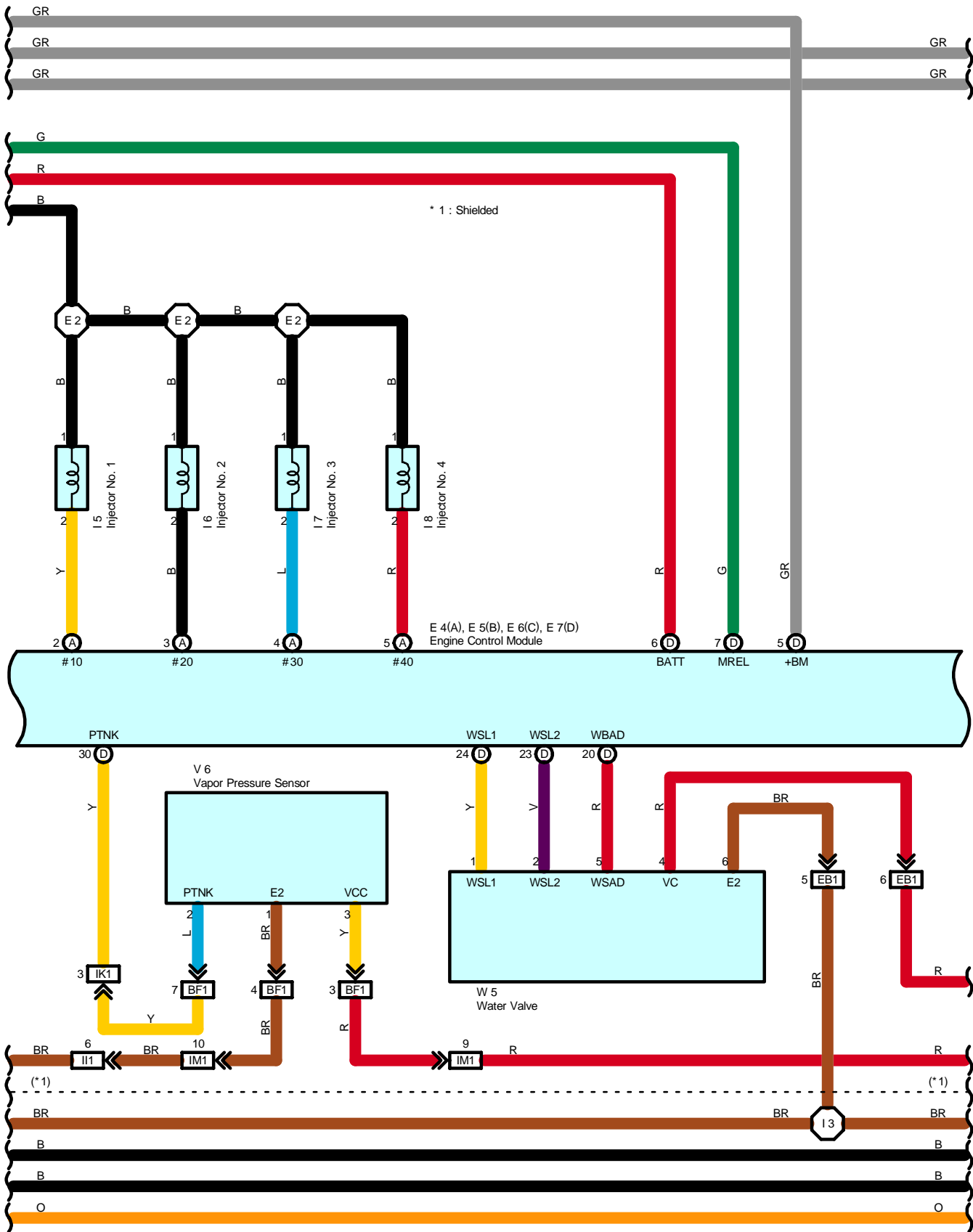


Engine Control

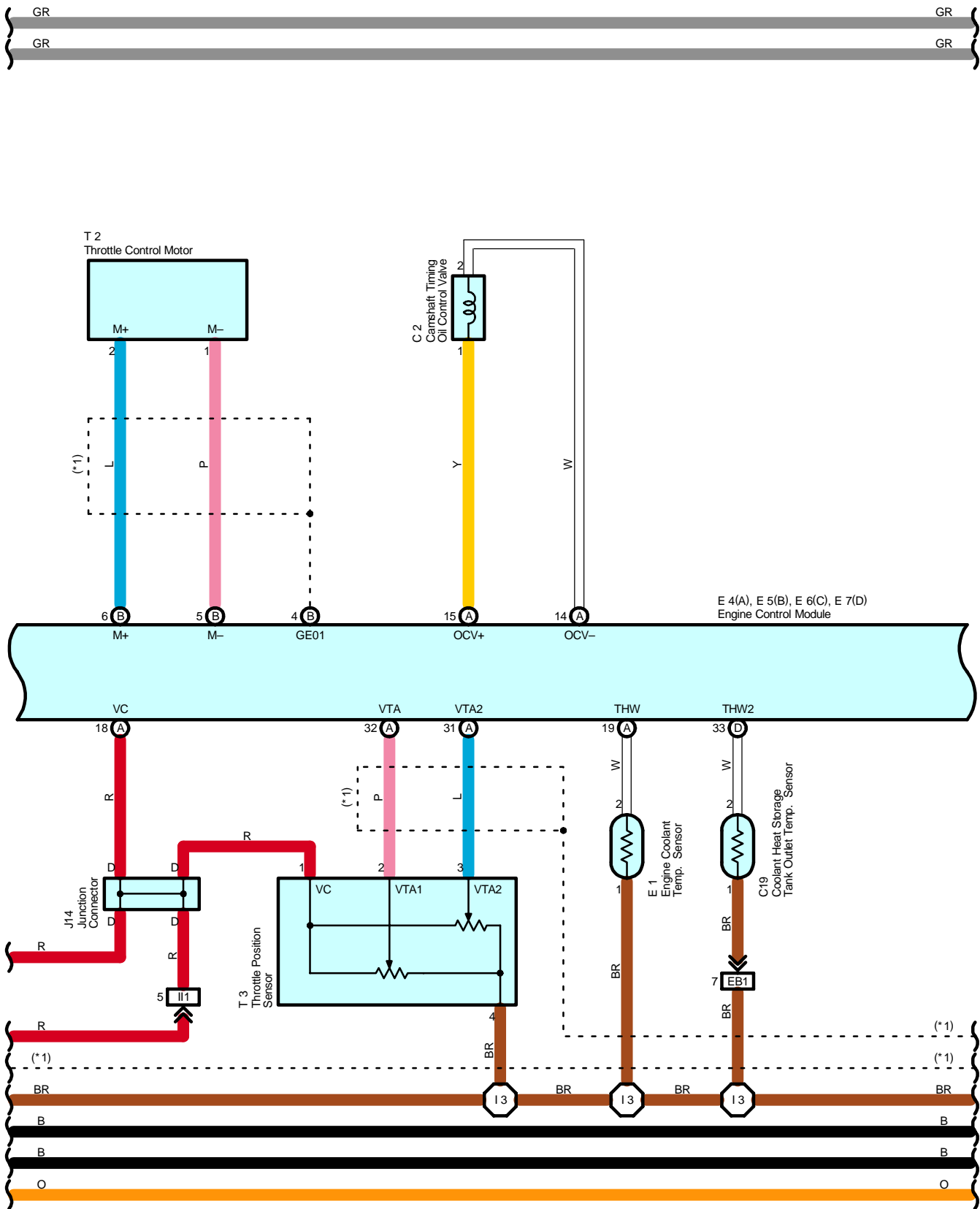


Engine Control

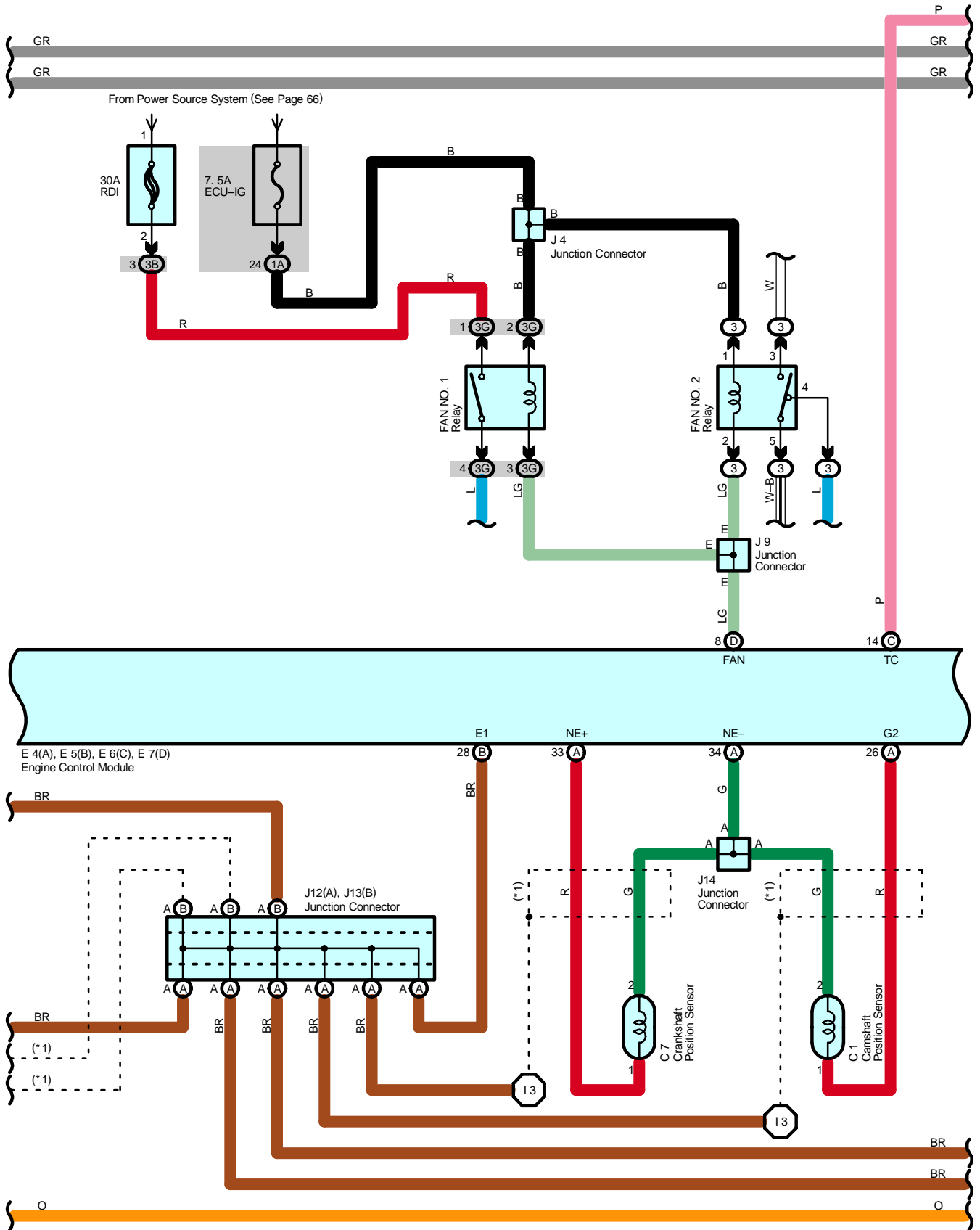


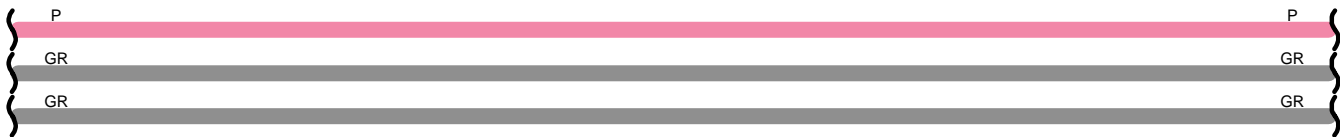


Engine Control

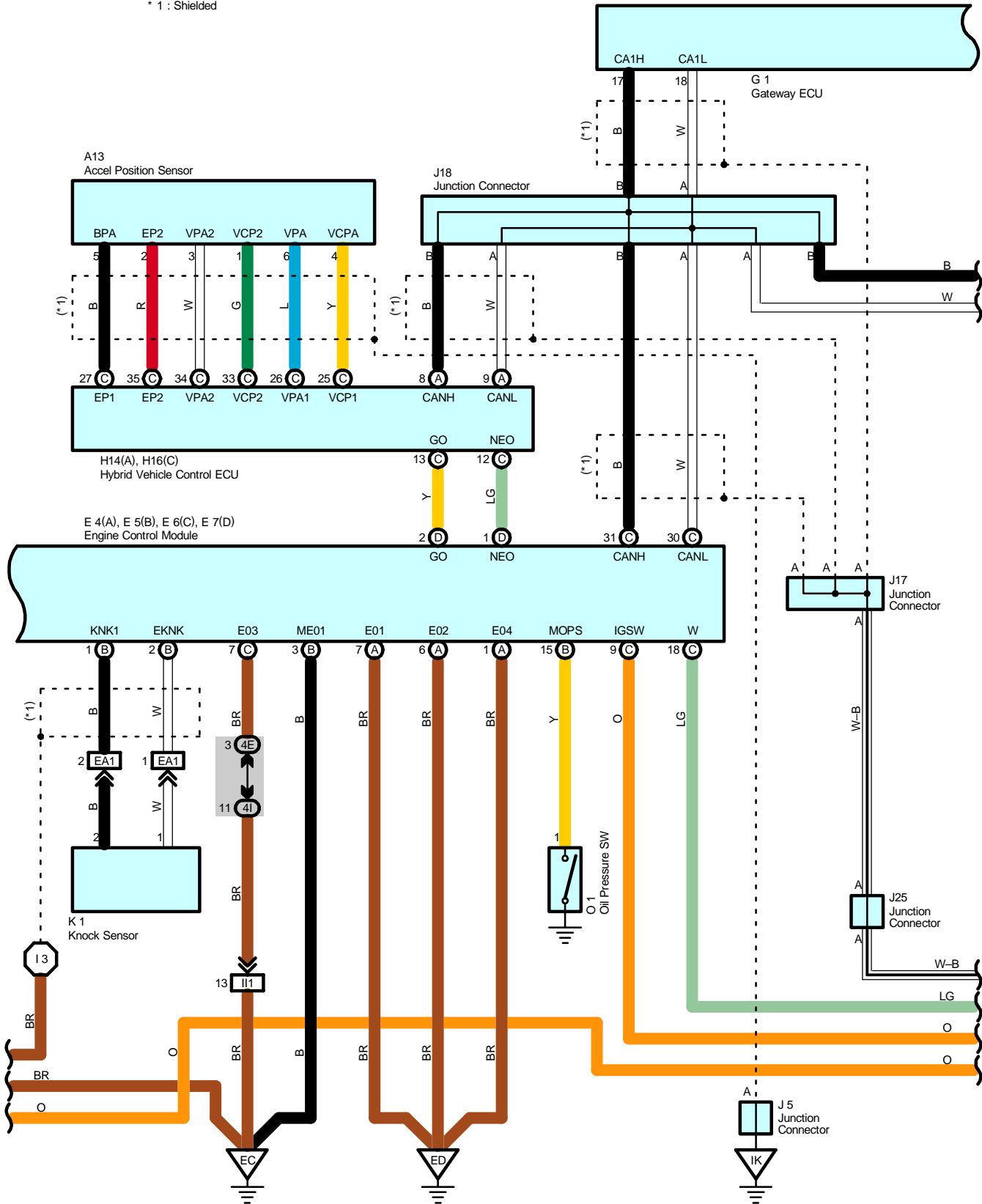


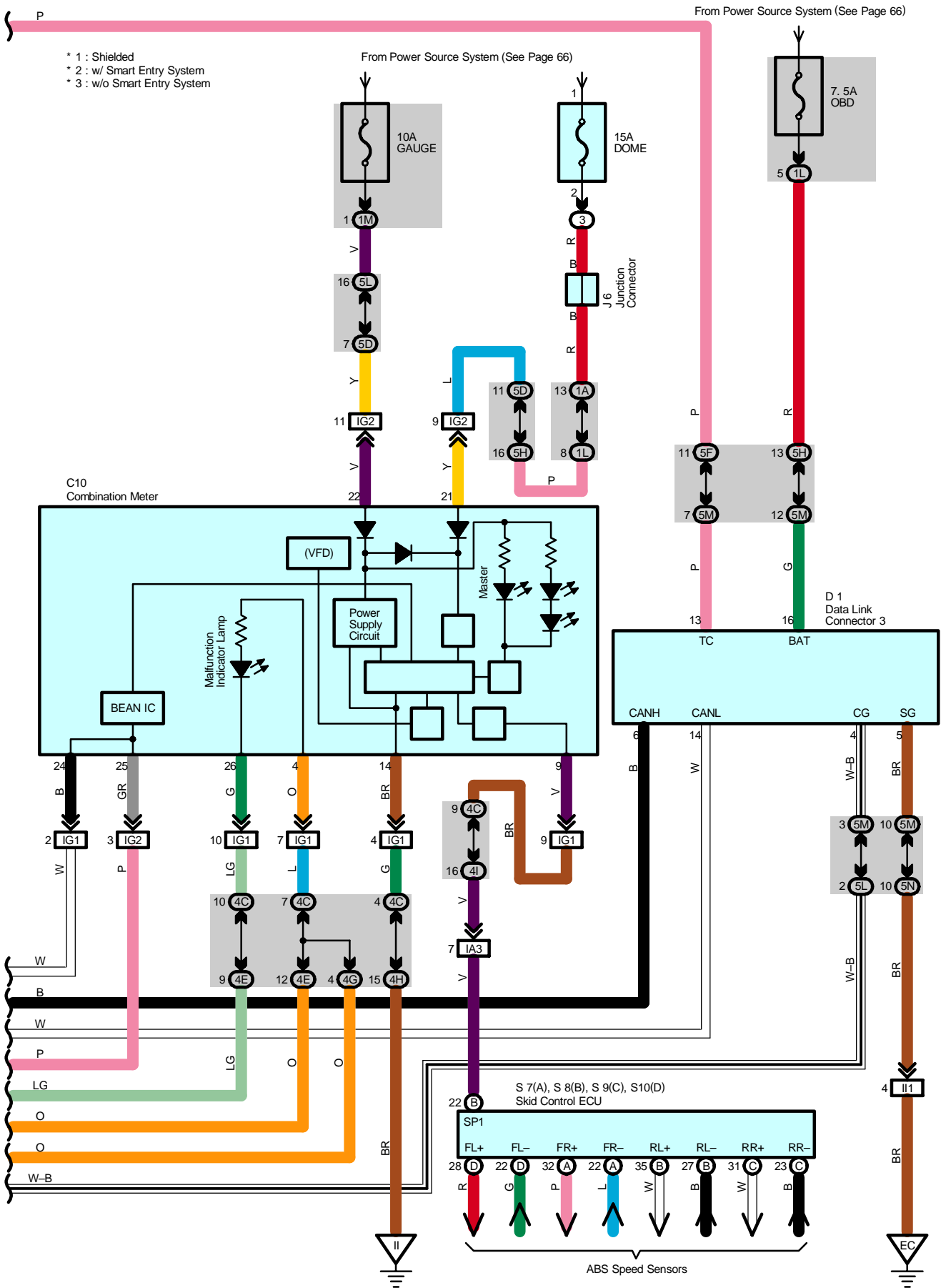
Engine Control





* 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 to TERMINAL THA of the engine control module as a control signal.

(3) Oxygen sensor signal circuit

The oxygen density in the exhaust emission is detected and is input from the heated oxygen sensors to TERMINAL OX1B of the engine control module as a control signal.

(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 VTA and VTA2 of the engine control module.

(6) Vehicle speed signal circuit

ABS speed sensor detects vehicle speed and the speed signal is input from skid control ECU to engine control module.

(7) Battery signal circuit

Voltage is constantly applied to TERMINAL BATT of the engine control module. When the power SW is pushed on, the voltage for engine control module starts up power supply which is applied through the EFI M relay, to TERMINAL +B 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 to TERMINAL VG of the engine control module as a control signal.

(9) Water temp. (CHS) signal circuit

The water temp. (CHS) sensor detects the water temp. (CHS) and has a built-in thermistor with a resistance which varies according to the water temp. (CHS). The water temp. (CHS) is input into TERMINAL THW2 of the engine control module as a control signal.

(10) Engine knock signal circuit

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

(11) Air fuel ratio signal circuit

The air fuel ratio is detected and input into TERMINAL A1A+ of the engine control module as a control signal.

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 #10, #20, #30 and #40 to operate the injector (Fuel injection). The SFI system controls the fuel injection with the engine control module according 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 stored in the engine control module. The control signal is output to TERMINALS IGT1, IGT2, IGT3 and IGT4, and these signals control the igniter to provide the best ignition timing.

*** Heater control system of heated oxygen sensor**

The heater control system of heated oxygen sensor 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 detecting performance. The engine control module evaluates the signals from each sensors, and outputs current to TERMINAL HT1B to control the heater.

*** Heater control system of air fuel ratio sensor**

The heater control system of air fuel ratio sensor turns the heater on when the intake air volume is low (Temp. of exhaust emission is low), and warms up the air fuel ratio sensor to improve detecting performance of the sensor.

The engine control module evaluates the signals from each sensor, current is output to TERMINAL HA1A, controlling the heater.

*** Fuel pump control system**

The engine control module supplies current to TERMINAL FC, and controls the operation of the fuel pump with the C/OPN relay.

*** VVT-i**

VVT-i controls the intake camshaft to optimal valve timing in accordance with the engine condition.

*** CHS system**

Engine control module controls CHS W/P relay to run electric pump to supply heated water stored in CHS tank to engine head. The electric pump stops when the water reaches certain temperature or certain time goes by. Warming engine head optimizes combustion conditions at engine start to reduce emission of incomplete combustion gas.

3. Diagnosis System

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

4. Fail-Safe System

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

Engine Control

Service Hints

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

BATT-E1 : Always approx. 9–14 volts
 +B-E1 : 9–14 volts with the power SW at IG ON position
 VC-E2 : 4.5–5.5 volts with the power SW at IG ON position
 IGF-E1 : Pulse generation with the engine idling
 THA-E2 : 0.5–3.4 volts with the engine idling and the intake air temp. 0~80°C (32~176°F)
 THW-E2 : 0.2–1.0 volts with the engine idling and the engine coolant temp. 60~120°C (140~248°F)
 W-E1 : 9–14 volts with the engine idling and malfunction indicator lamp off
 FC-E1 : 9–14 volts with the power SW at IG ON position and the engine stopping
 : 0–3 volts with the engine idling
 +BM-E1 : Always approx. 9–14 volts
 MREL-E1 : 9–14 volts with the power SW at IG ON position
 EVP1-E1 : 9–14 volts with the power SW at IG ON position and the engine not running
 TC-E1 : 9–14 volts with the power SW at IG ON position and the engine not running
 KNK1-EKNK : Pulse generation with the engine idling
 NE+, G2-NE- : Pulse generation with the engine idling
 IGT1, IGT2, IGT3, IGT4-E1 : Pulse generation with the engine idling
 E01, E02, E03, E04, E1, E2, ME01-Ground : Always continuity

○ : Parts Location

Code	See Page	Code	See Page	Code	See Page
A5	44	I1	45	J25	48
A8	46	I2	45	J32	51
A13	46	I3	45	K1	45
B5	A 46	I4	45	M1	45
C1	44	I5	45	M13	48
C2	44	I6	45	O1	45
C7	44	I7	45	P6	49
C10	47	I8	45	S7	A 49
C19	44	J1	45	S8	B 49
C20	44	J2	45	S9	C 49
D1	47	J4	45	S10	D 49
E1	44	J5	48	S11	49
E4	A 47	J6	48	T2	45
E5	B 47	J9	48	T3	45
E6	C 47	J12	A 48	T4	49
E7	D 47	J13	B 48	T5	49
F14	51	J14	48	V1	45
F15	51	J15	48	V6	53
G1	47	J16	48	V7	53
H13	47	J17	48	V8	53
H14	A 47	J18	48	W5	45
H16	C 47	J24	48		

○ : Relay Blocks

Code	See Page	Relay Blocks (Relay Block Location)
2	26	Engine Room R/B No.2 (Right Side of Reserve Tank)
3	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	28	Engine Room Main Wire and Driver Side J/B (Lower Finish Panel)
1E	28	Instrument Panel Wire and Driver Side J/B (Lower Finish Panel)
1F		
1G		
1L		
1M		
3A	22	Engine Room Main Wire and Engine Room J/B (Engine Compartment Left)
3B		
3G		
3I		
3K	22	Frame Wire and Engine Room J/B (Engine Compartment Left)
3M		
4C	36	Instrument Panel Wire and Center Connector No.1 (Behind the Combination Meter)
4D		
4E		
4F		
4G		
4H		
4I		
4J		
4K		
4L		
5C	40	Instrument Panel Wire and Center Connector No.2 (Instrument Panel Brace RH)
5D		
5E		
5F		
5G		
5H		
5J		
5K		
5L		
5M		
5N		

**: Connector Joining Wire Harness and Wire Harness**

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EA1	54	Engine Wire and Engine No.4 Wire (Near the Radiator Fan)
EB1	54	Engine Wire and Engine Room Main Wire (Inside of the Engine Room R/B)
IA1	56	Engine Room Main Wire and Instrument Panel Wire (Upper Parts of Front Body Pillar LH)
IA3		
IF1	56	Floor Wire and Engine Room Main Wire (Left Kick Panel)
IG1	58	Instrument Panel Wire and Instrument Panel No.2 Wire (Behind the Combination Meter)
IG2		
II1	58	Engine Wire and Instrument Panel Wire (Behind the Glove Box)
IJ1	58	Engine Room Main Wire and Instrument Panel Wire (Behind the Glove Box)
IK1	58	Engine Room Main Wire and Floor No.2 Wire (Cowl Side Panel RH)
IM1	58	Instrument Panel Wire and Floor No.2 Wire (Right Kick Panel)
IN1	58	Floor No.2 Wire and Engine Room Main Wire (Right Kick Panel)
BE1	60	Frame Wire and Floor No.2 Wire (Front Side of Left Quarter Panel)
BF1	60	Floor No.2 Wire and Fuel Tank Wire (Near the Fuel Tank)
BM1	62	Floor No.2 Wire and Floor Wire (Rear Side of Right Quarter Panel)

Engine Control



: Ground Points

Code	See Page	Ground Points Location
EC	54	Engine Block
ED		
EE	54	Left Side of the Suspension Tower
EF		
IH	56	Cowl Side Panel LH
II	56	Instrument Panel Brace LH
IK	56	Cowl Side Panel RH
BQ	60	Rear Side of Right Quarter Panel



: Splice Points

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E2	54	Engine Wire	I3	58	Engine Wire
I2	58	Instrument Panel Wire			

