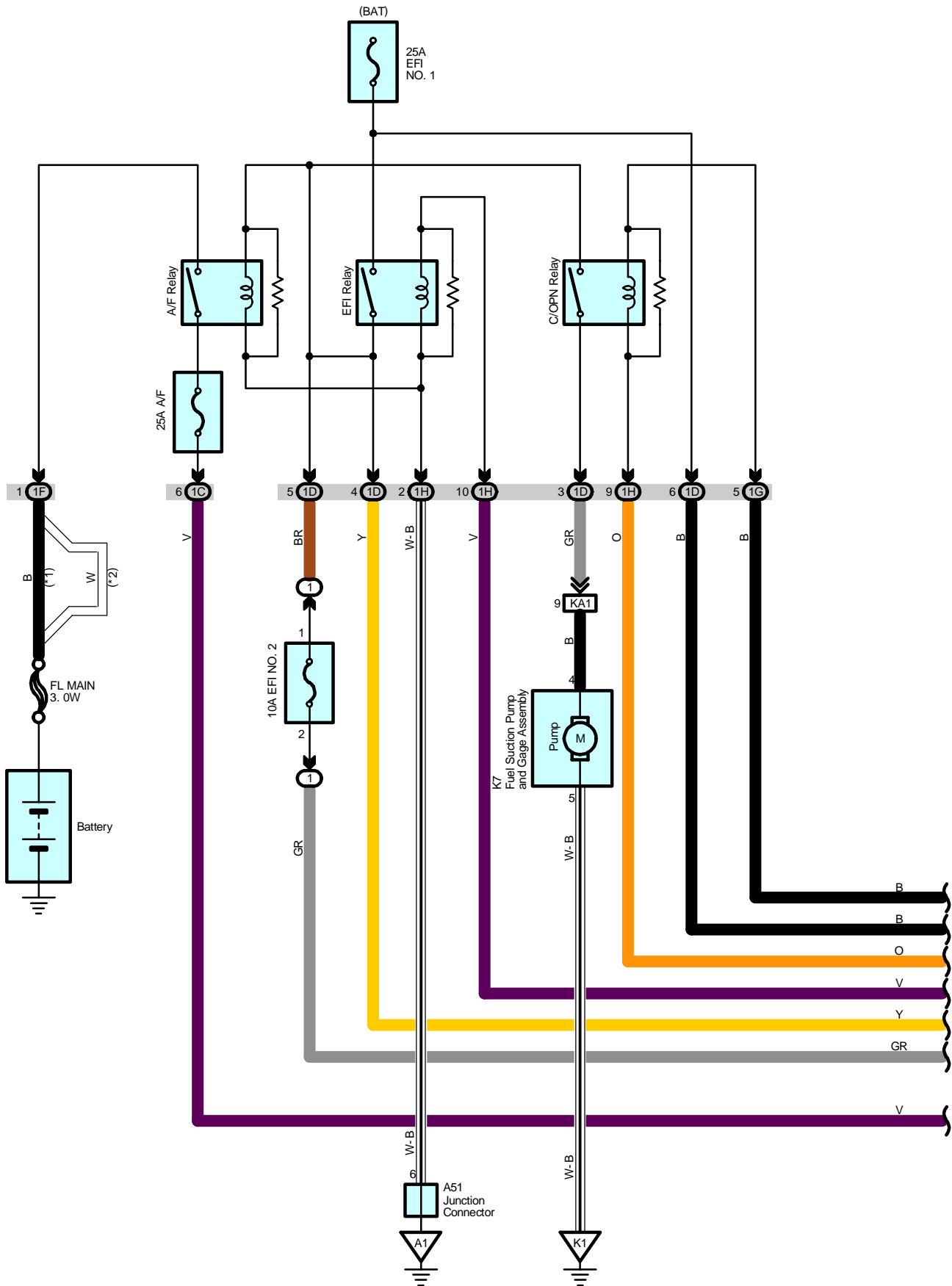
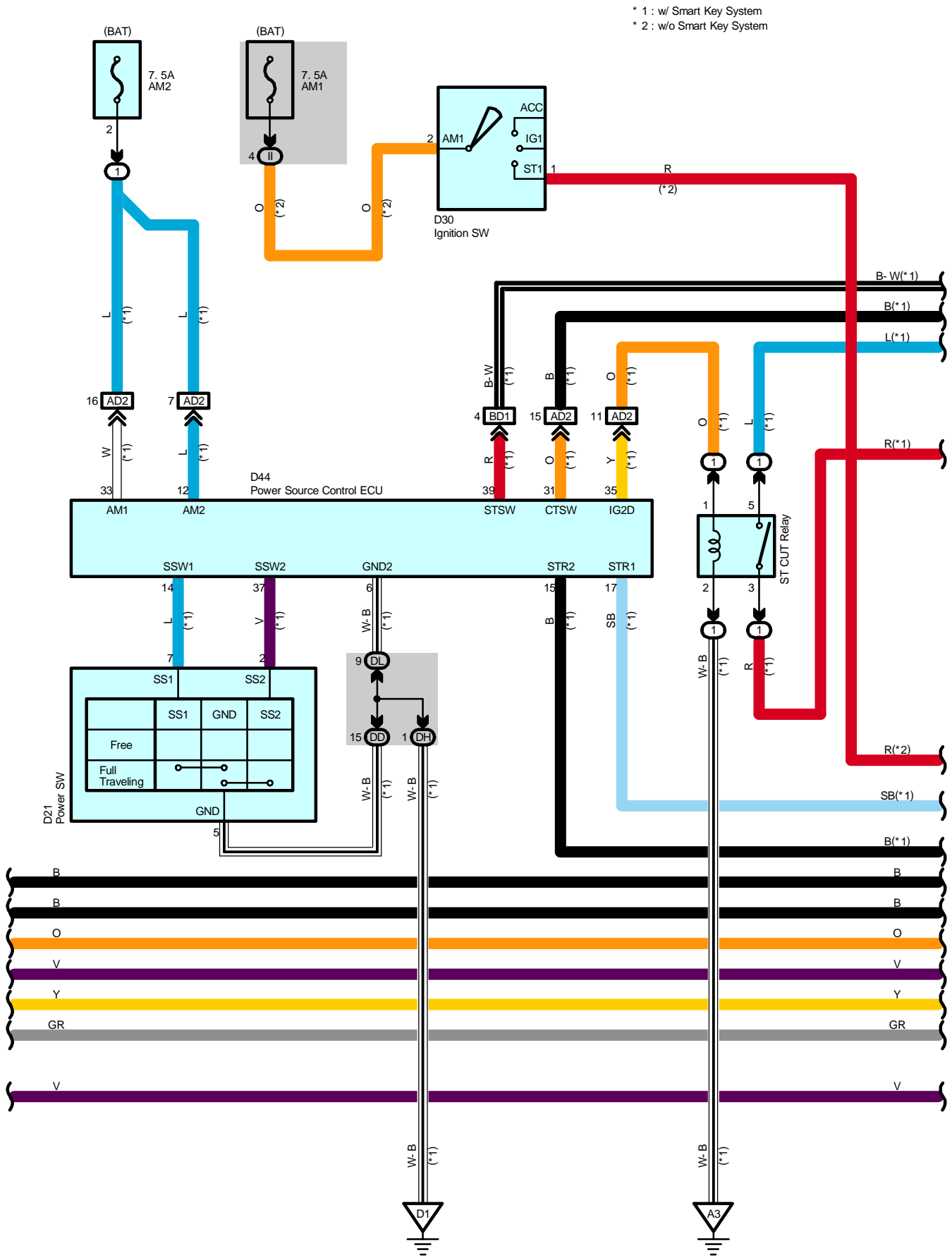
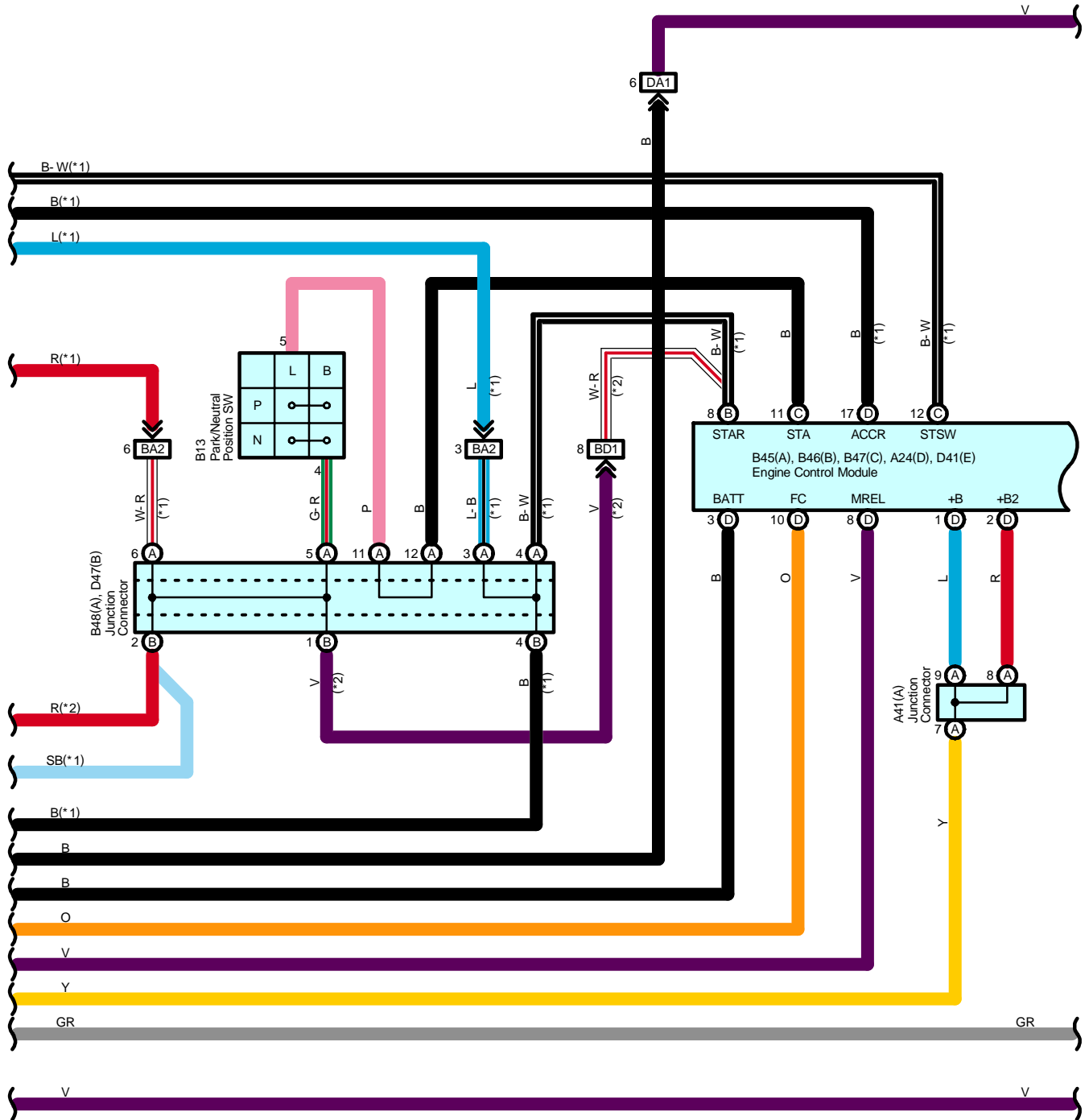
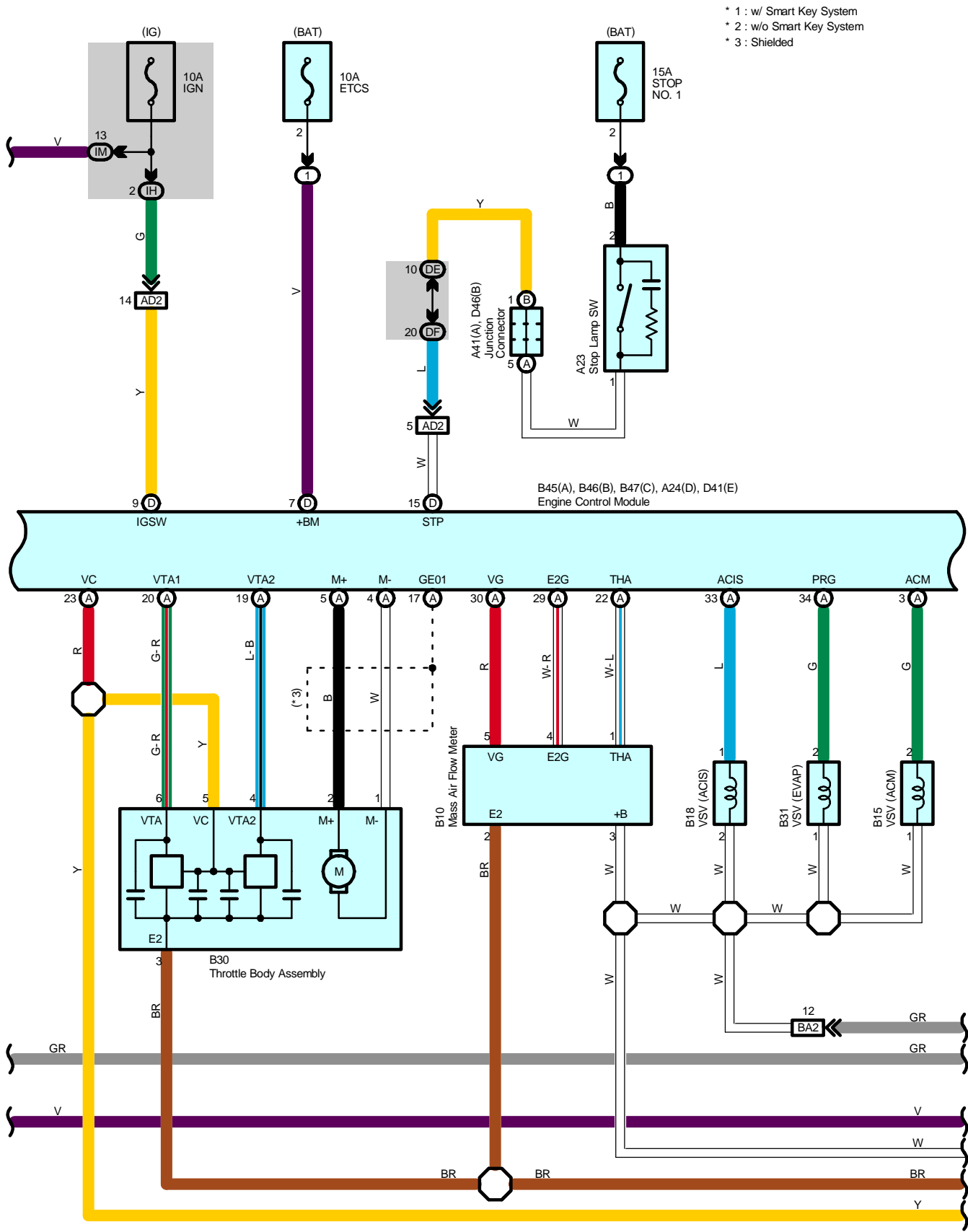


# Engine Control





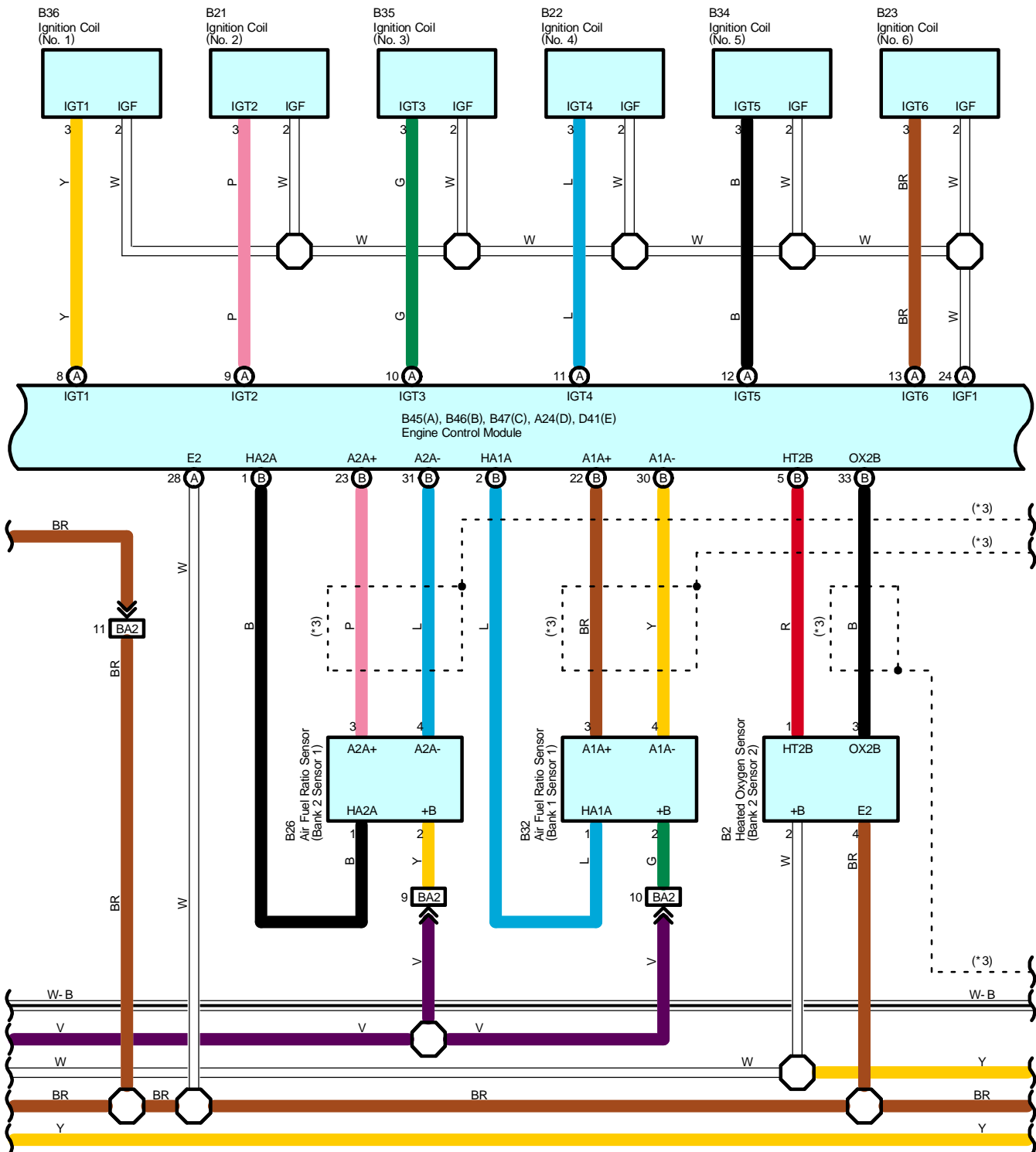


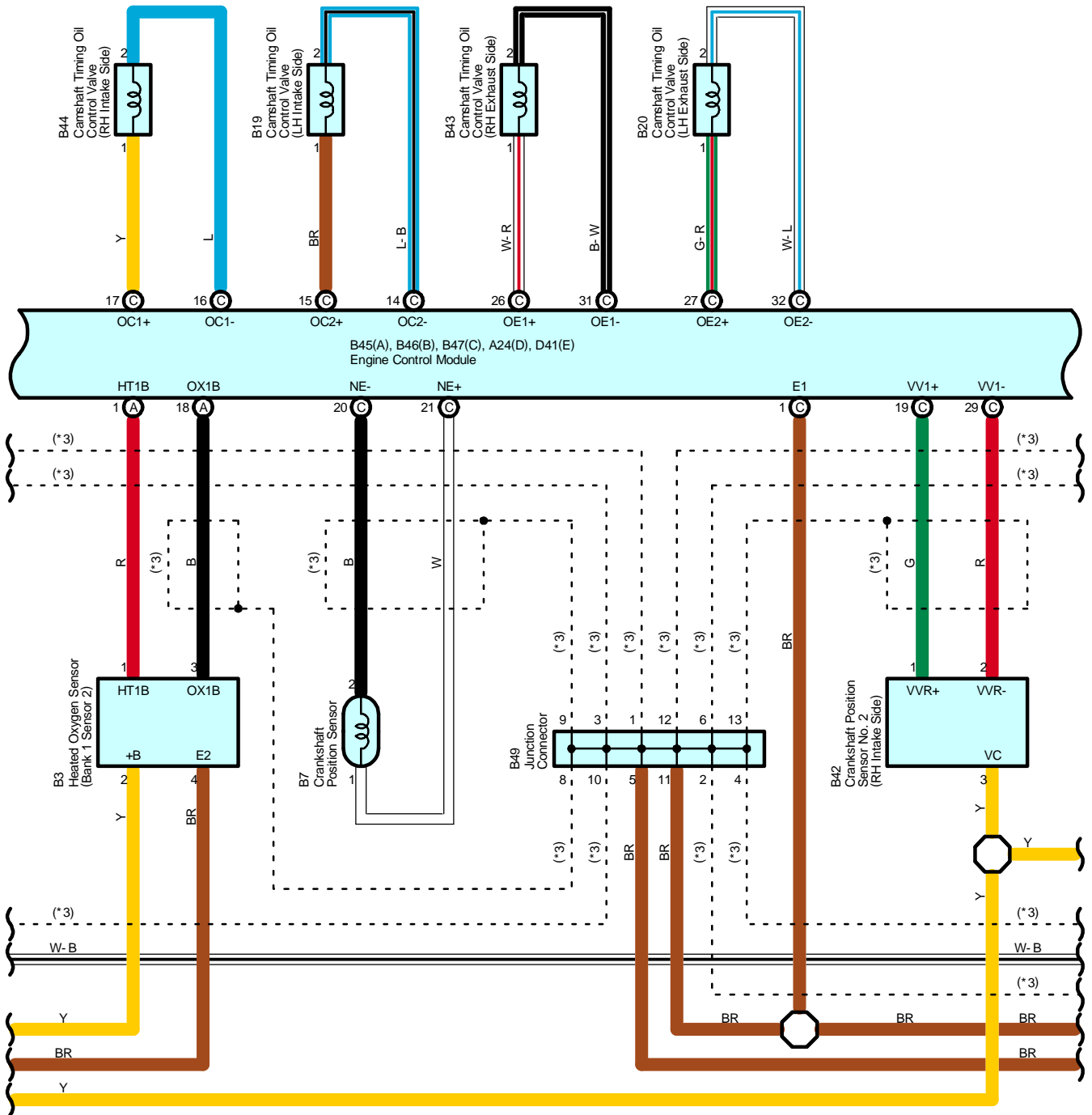


- \* 1 : w/ Smart Key System
- \* 2 : w/o Smart Key System
- \* 3 : Shielded

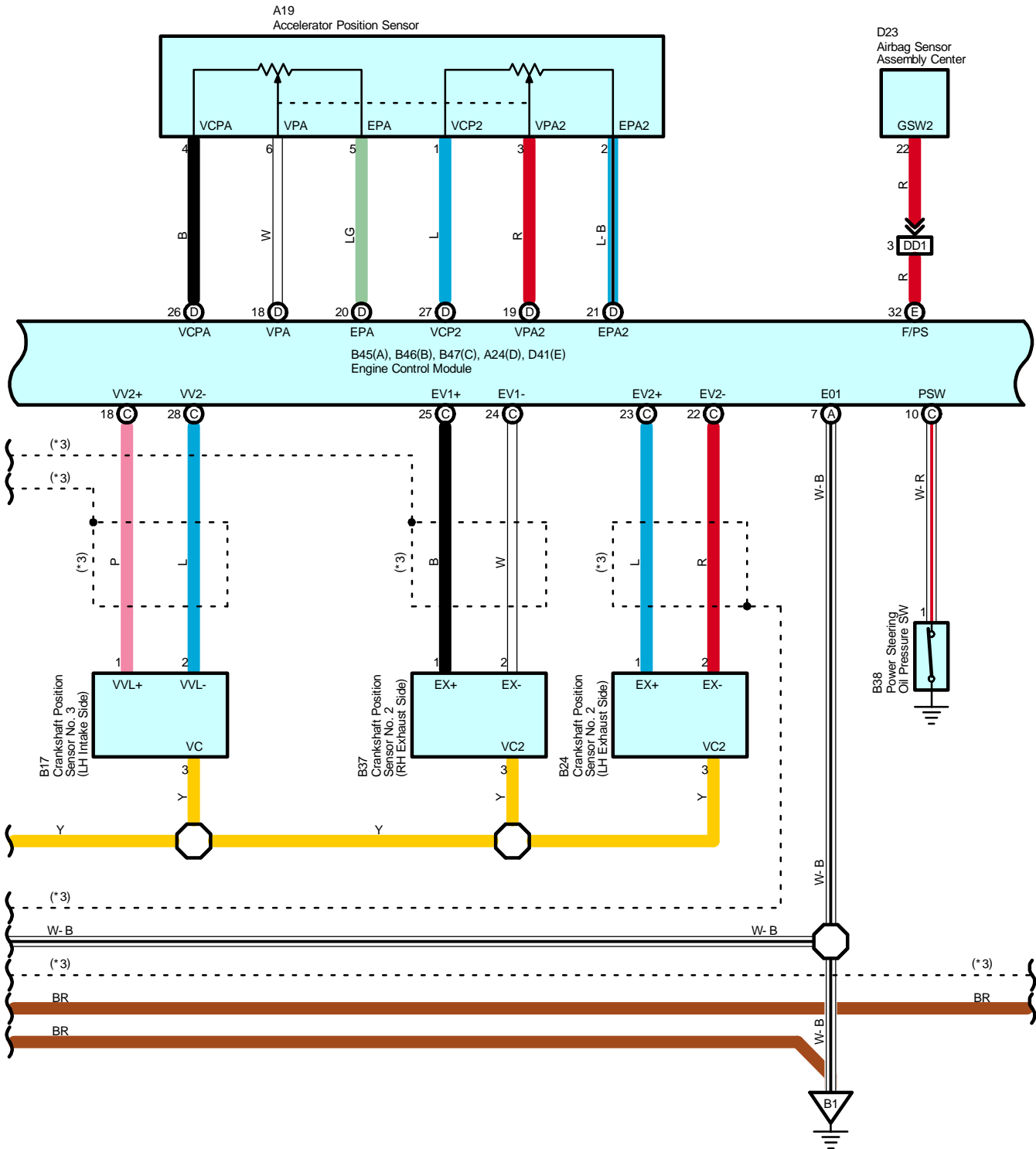


\* 3 : Shielded

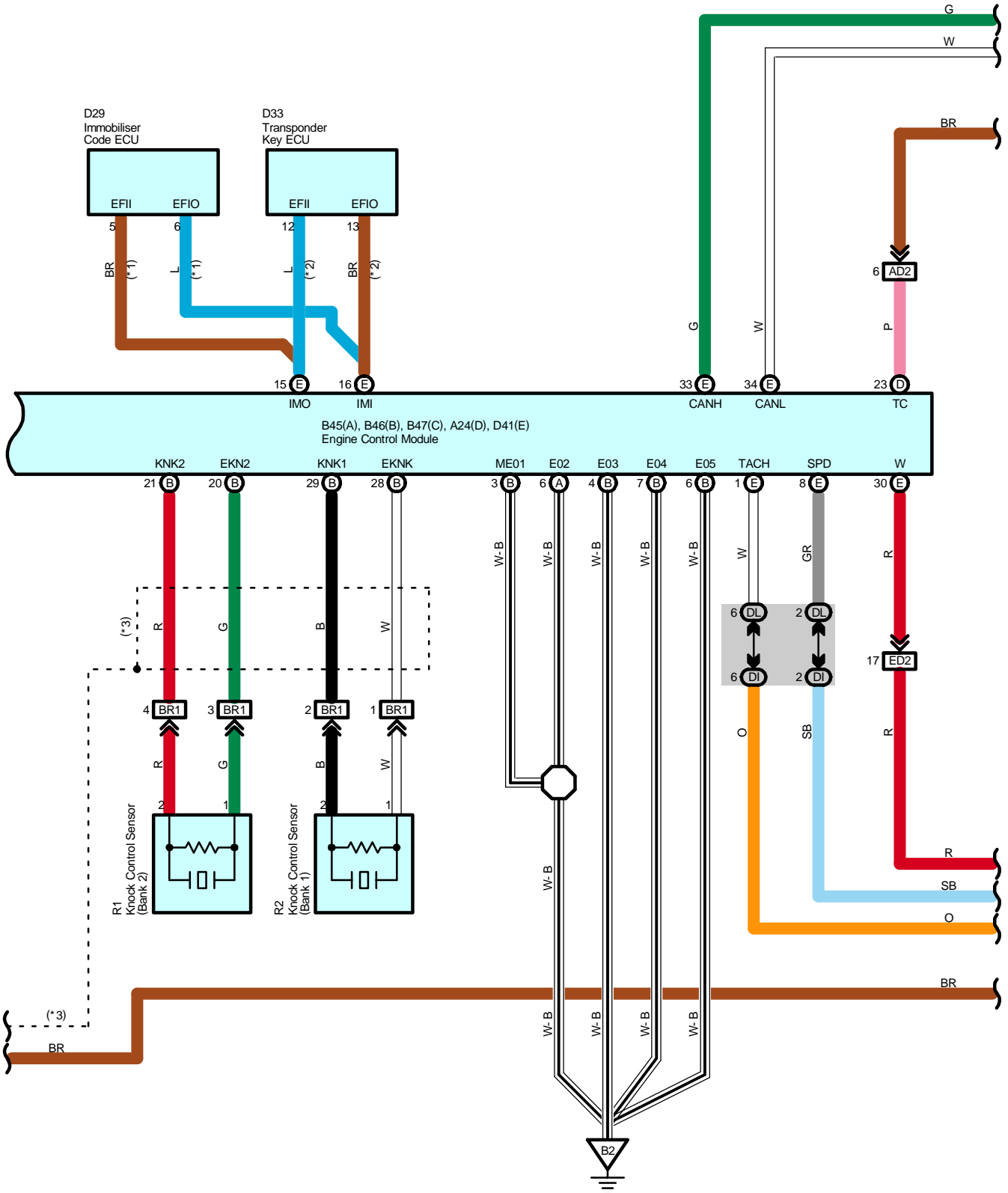




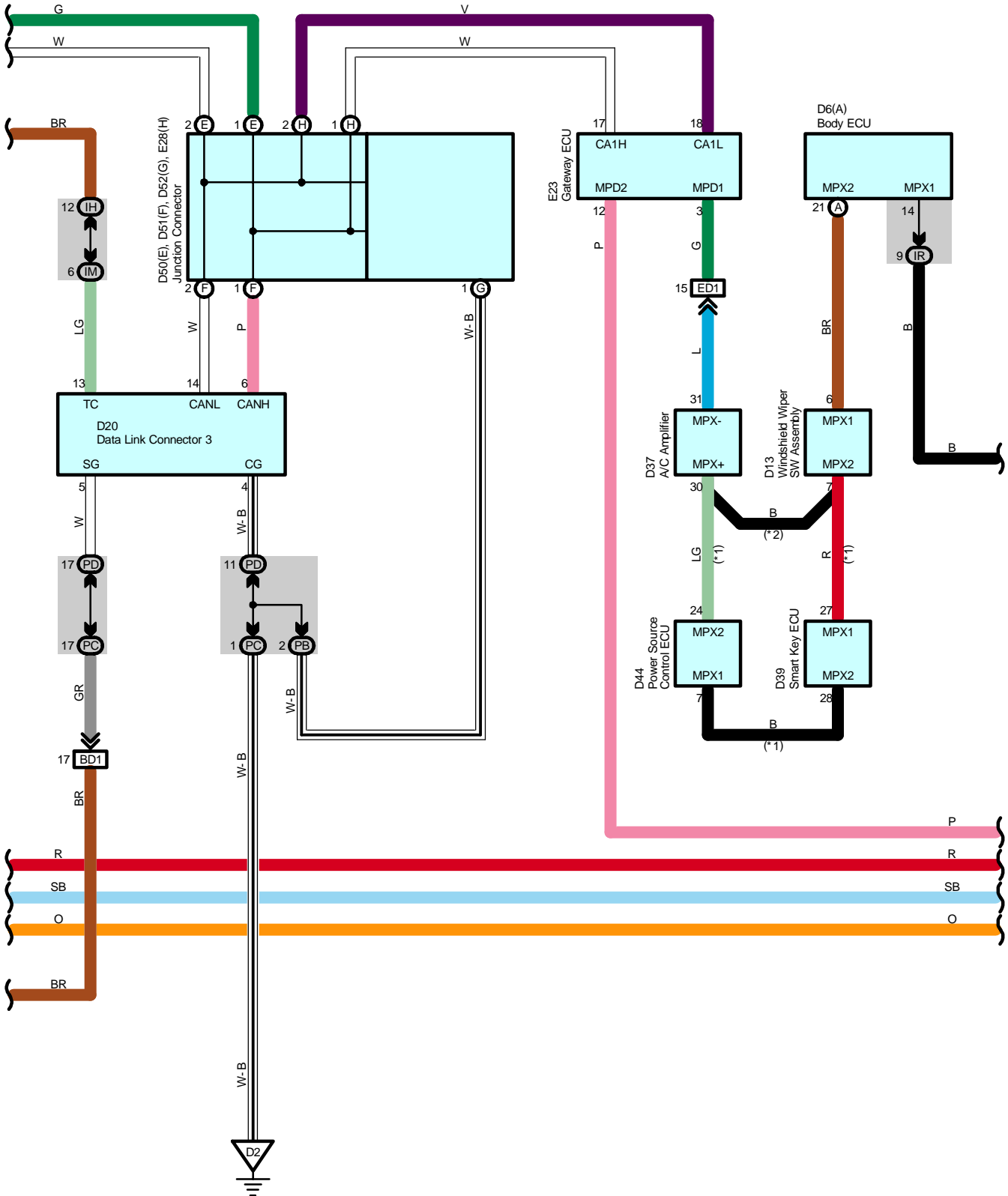
\* 3 : Shielded



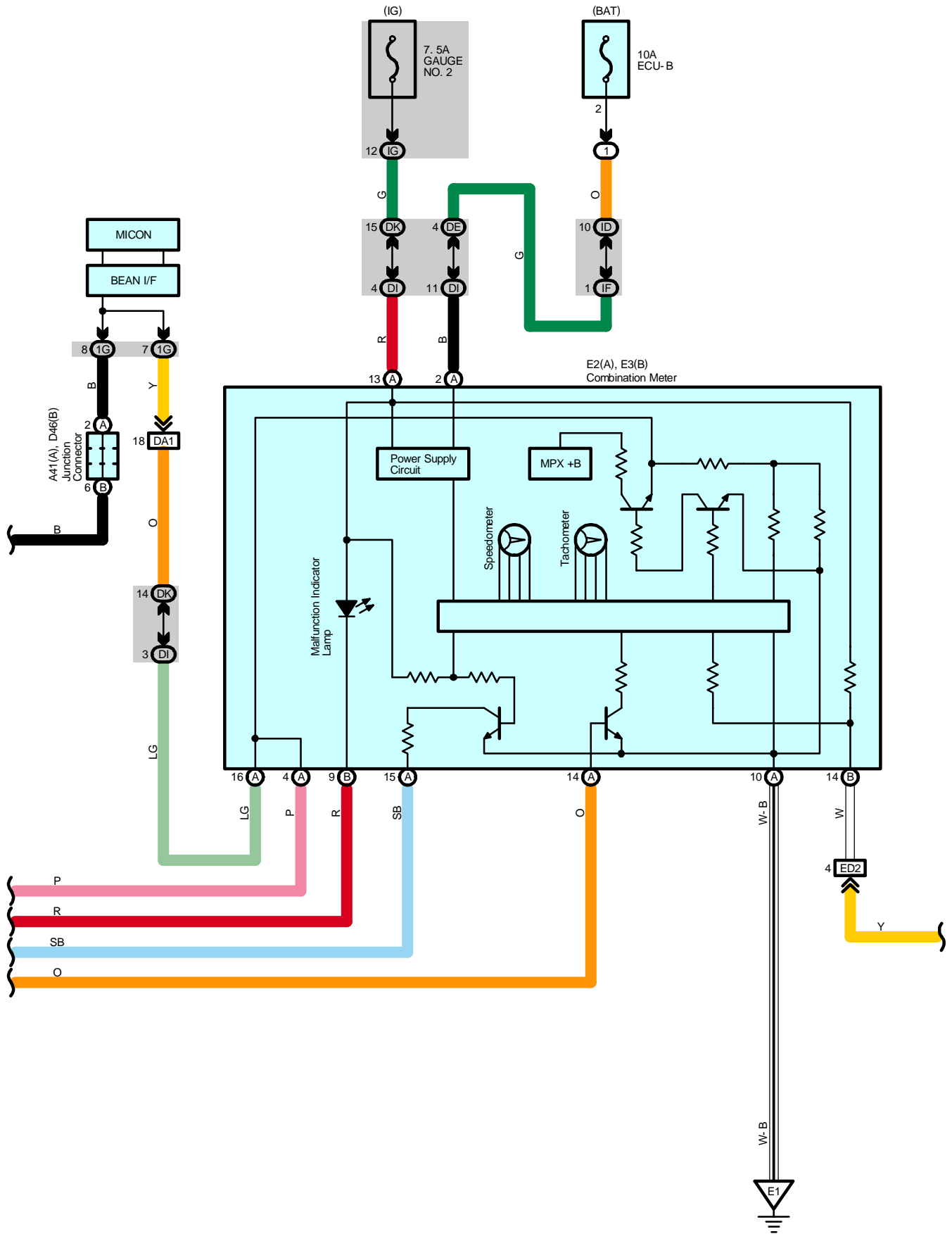
# Engine Control

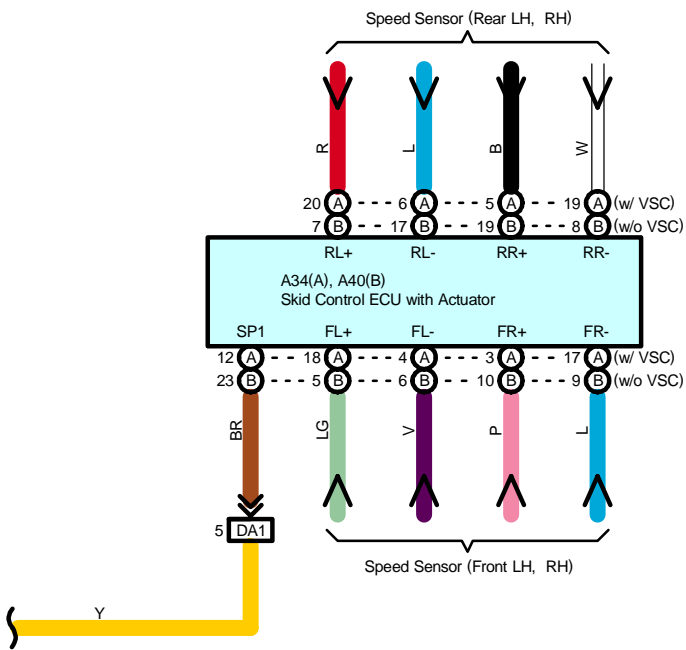


- \* 1 : w/ Smart Key System
- \* 2 : w/o Smart Key System
- \* 3 : Shielded



# Engine Control





## 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 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 OX1B and OX2B of the engine control module.

#### (4) RPM signal circuit

Camshaft position is detected by the crankshaft position sensor No.2 (RH exhaust side, RH intake side and LH exhaust side), crankshaft position sensor No.3 (LH intake side) and their signals are input to TERMINALS EV1+, EV2+, VV1+ and VV2+ of the engine control module as control signals. 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 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 with actuator.

#### (7) Battery signal circuit

Voltage is constantly applied to TERMINAL BATT of the engine control module. When the power SW is pushed on (Power SW type), or when the ignition SW is turned on (Ignition SW type), the voltage for engine control module start-up power supply is applied to TERMINAL +B and +B2 of engine control module via EFI relay.

#### (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 lamp SW signal circuit

The stop lamp 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 control sensors, and is input into TERMINALS KNK1 and KNK2 of the engine control module as a control signal.

#### (12) Air fuel ratio signal circuit

The air fuel ratio is detected and input as a control signal into TERMINALS A1A+, A2A+ 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 #10, #20, #30, #40, #50 and #60 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 and IGT6, 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 HT1B or HT2B to control the heater.

### **\* Air fuel ratio sensor heater control system**

The air fuel ratio 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 air fuel ratio sensor to improve detection performance of the sensor.

The engine control module evaluates the signals from each sensor, current is output to TERMINALS HA1A and HA2A, controlling the heater.

### **\* 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.

### **\* VVT-i**

Controls the intake camshaft to an optimal valve timing in accordance with the engine condition.

## **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.

# Engine Control

## ○ : Parts Location

Code	See Page	Code	See Page	Code	See Page
A13	48	B26	49	D13	51
A19	50	B27	49	D20	51
A23	50	B28	49	D21	51
A24	D 50	B29	49	D23	51
A34	A 48	B30	49	D29	51
A40	B 48	B31	49	D30	51
A41	A 50	B32	49	D33	51
A42	50	B34	49	D37	51
A51	48	B35	49	D39	52
B2	49	B36	49	D41	E 52
B3	49	B37	49	D44	52
B7	49	B38	49	D46	B 52
B9	49	B39	49	D47	B 52
B10	49	B40	49	D50	E 52
B13	49	B41	49	D51	F 52
B15	49	B42	49	D52	G 52
B17	49	B43	49	E2	A 52
B18	49	B44	49	E3	B 52
B19	49	B45	A 50	E23	53
B20	49	B46	B 50	E28	H 53
B21	49	B47	C 50	K7	54
B22	49	B48	A 50	K11	54
B23	49	B49	50	R1	49
B24	49	D6	A 51	R2	49

## ○ : Relay Blocks

Code	See Page	Relay Blocks (Relay Block Location)
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)
1C	24	Engine Room Main Wire and Engine Room J/B (Engine Compartment Left)
1D		
1F	22	
1G	24	
1H		
DD	36	Instrument Panel Wire and Driver Side J/B (Behind the Combination Meter)
DE		
DF		
DH		
DI	36	Instrument Panel No.2 Wire and Driver Side J/B (Behind the Combination Meter)
DK	36	Instrument Panel Wire and Driver Side J/B (Behind the Combination Meter)
DL		
ID	30	Engine Room Main Wire and Instrument Panel J/B (Lower Finish Panel)
IF	30	Instrument Panel Wire and Instrument Panel J/B (Lower Finish Panel)
IG	31	
IH		
II		
IM	30	
IR		
PB	42	Instrument Panel Wire and Passenger Side J/B (Instrument Panel Reinforcement RH)
PC		
PD		

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

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
AD2	60	Engine Room Main Wire and Instrument Panel Wire (Right Side of the Instrument Panel J/B)
BA1	58	Engine Wire and Engine Room Main Wire (Inside of the Engine Room R/B and Engine Room J/B)
BA2		
BD1	60	Engine Wire and Instrument Panel Wire (Right Side of the Blower Unit)
BR1	58	Engine Wire and Sensor Wire (Left Side of the Cylinder Block)
DA1	60	Instrument Panel Wire and Engine Room Main Wire (Left Kick Panel)
DD1	60	Instrument Panel Wire and Instrument Panel Wire (Instrument Panel Center)
DK3	60	Instrument Panel Wire and Floor No.1 Wire (Left Kick Panel)
ED1	61	Instrument Panel No.2 Wire and Instrument Panel Wire (Left Side of the Instrument Panel)
ED2		
KA1	61	Floor No.1 Wire and Engine Room Main Wire (Left Side of the Instrument Panel)

 : **Ground Points**

Code	See Page	Ground Points Location
A1	58	Front Left Fender
A3	60	Left Side of the Instrument Panel
B1	58	Cylinder Head
B2	58	Left Side of the Cylinder Block
D1	60	Left Kick Panel
D2	60	Instrument Panel Brace LH
E1	60	Under the Combination Meter
K1	62	Left Rear Quarter Panel