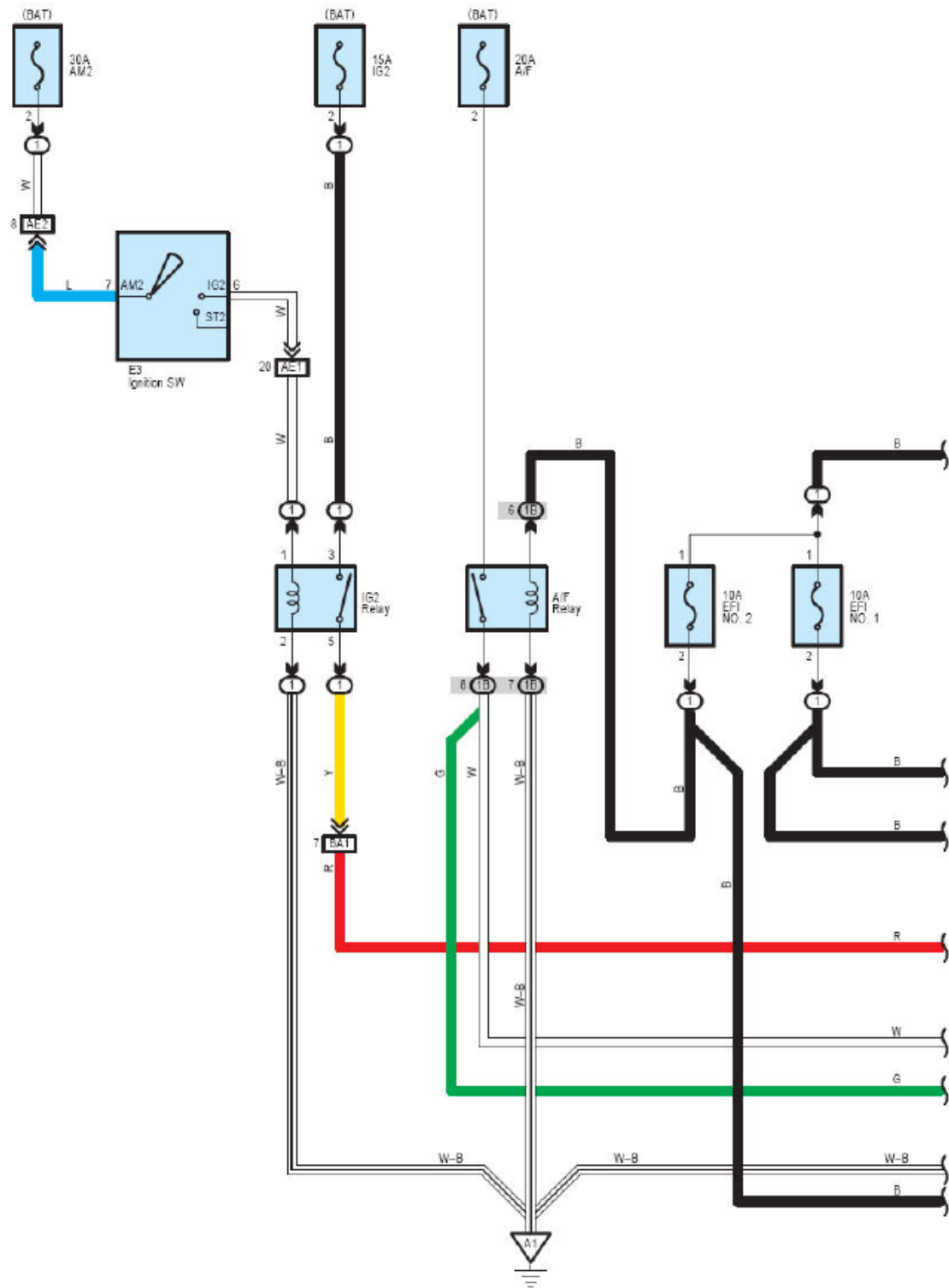
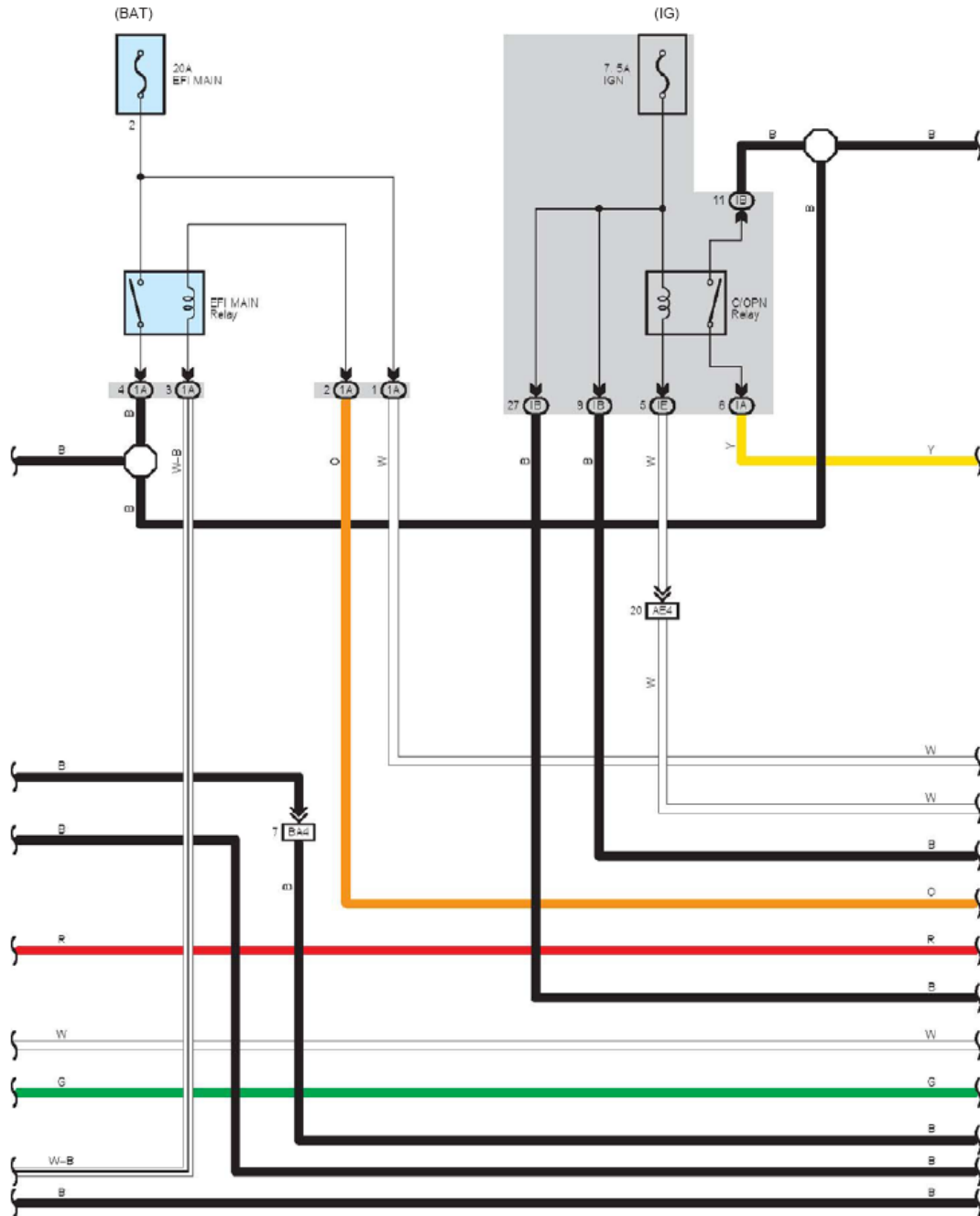
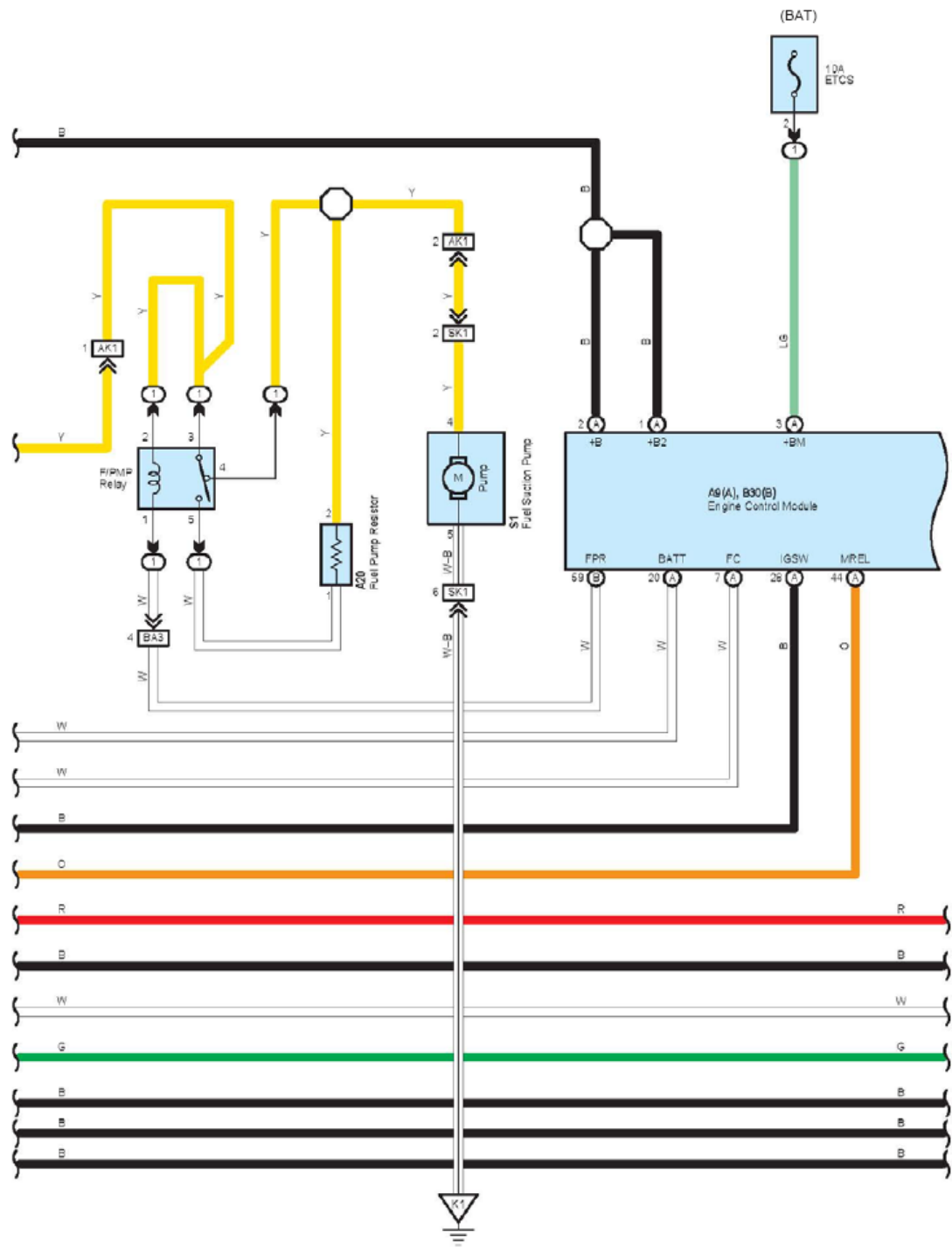
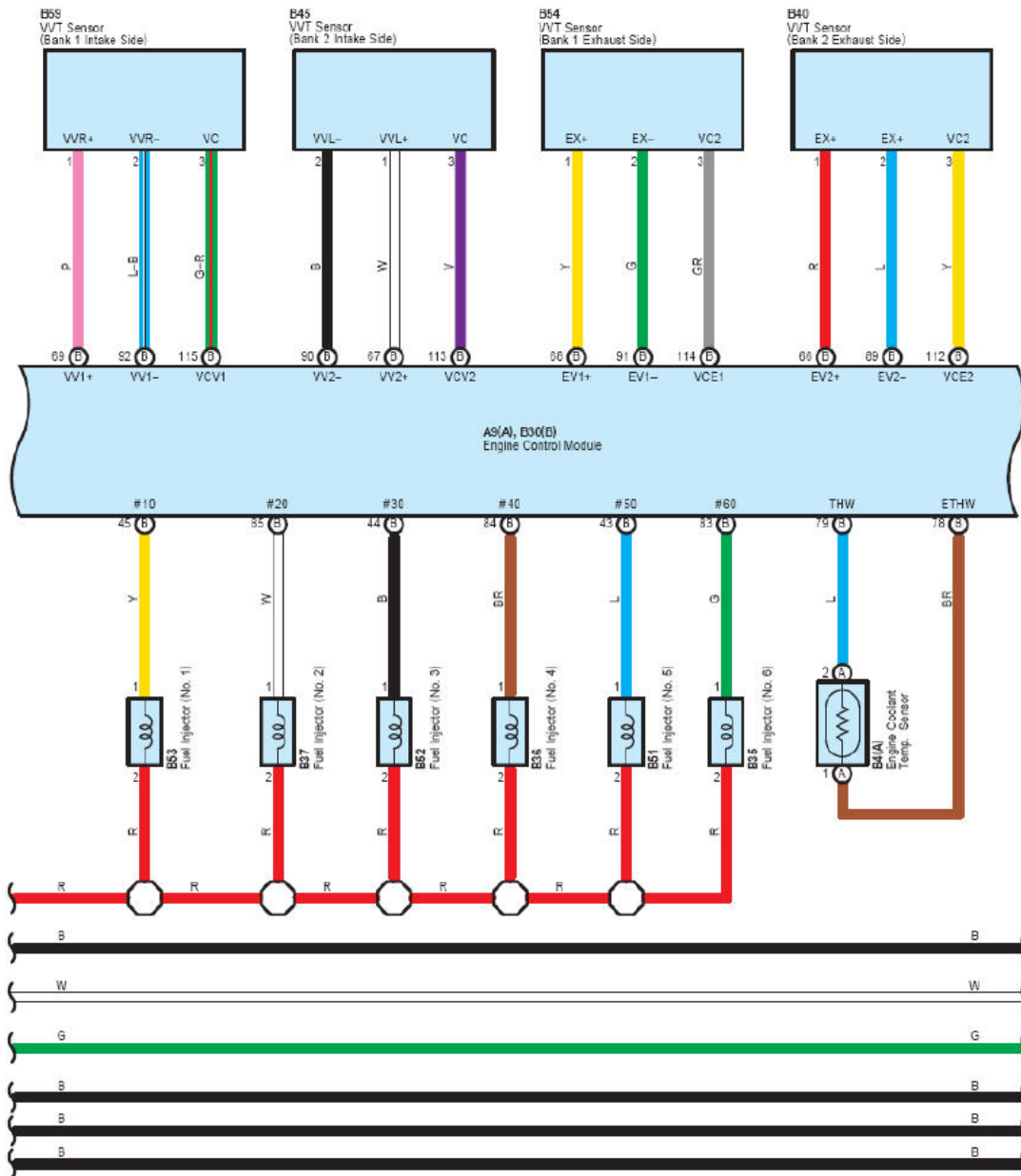


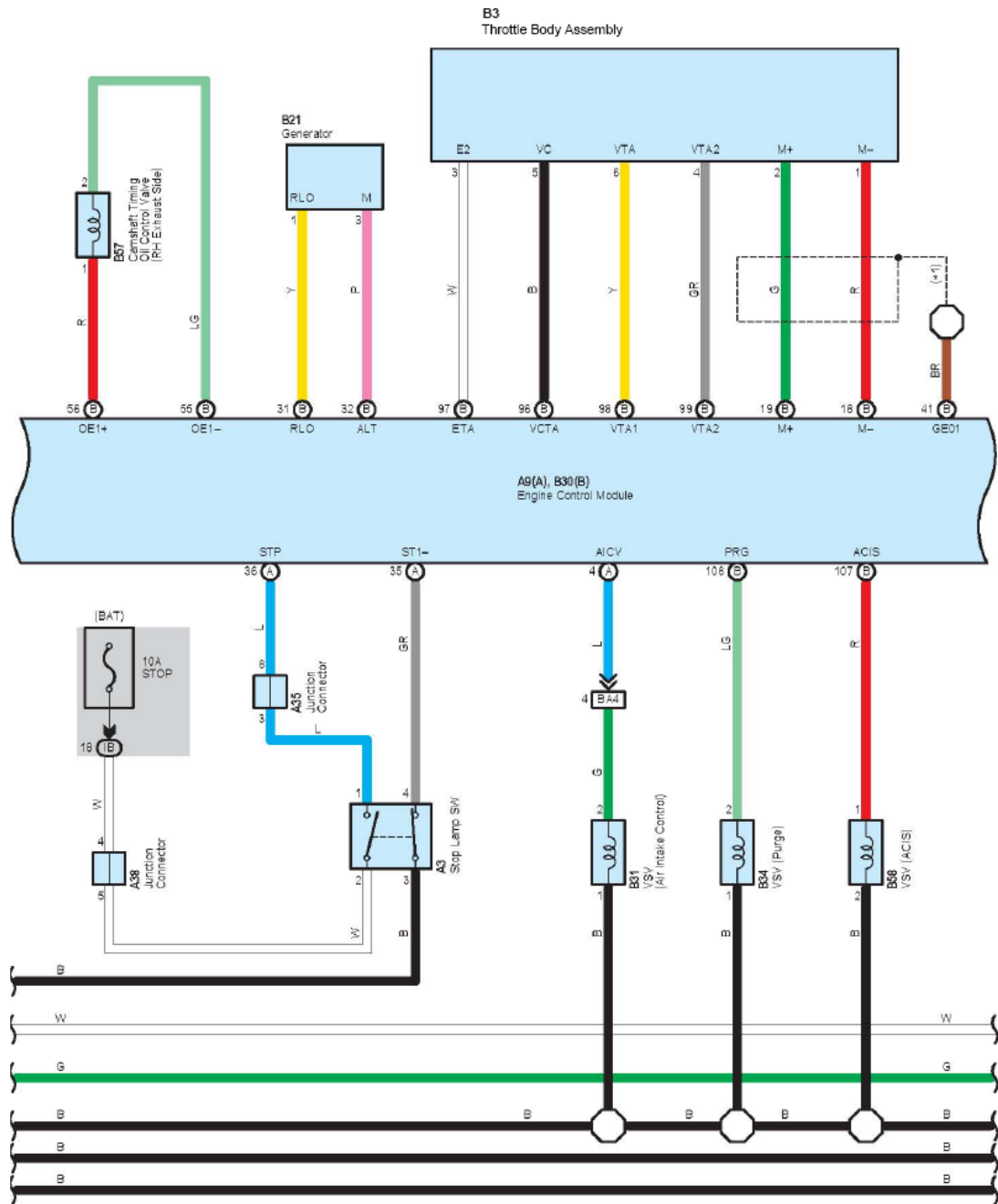
Engine Control for 2GR-FE

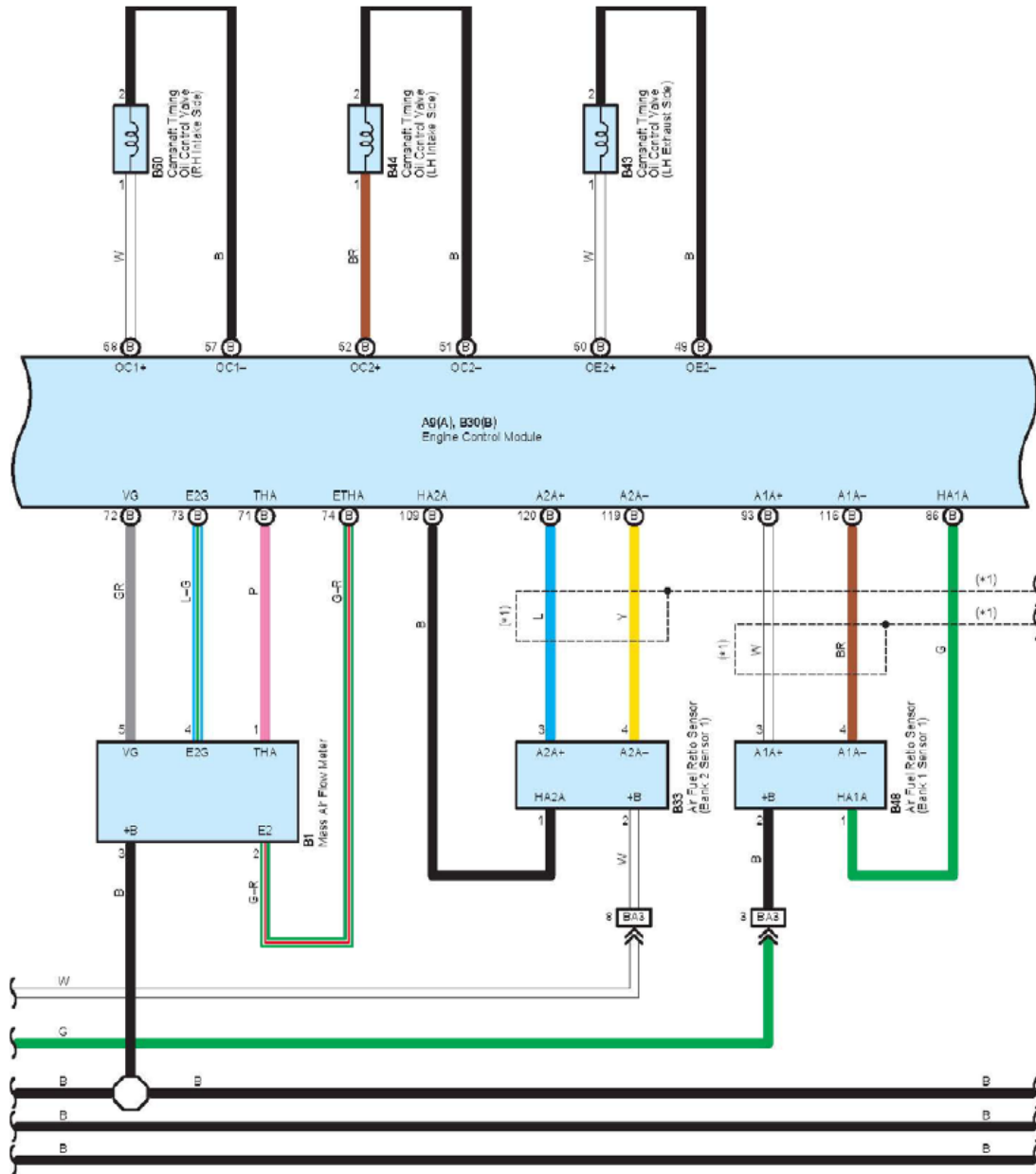


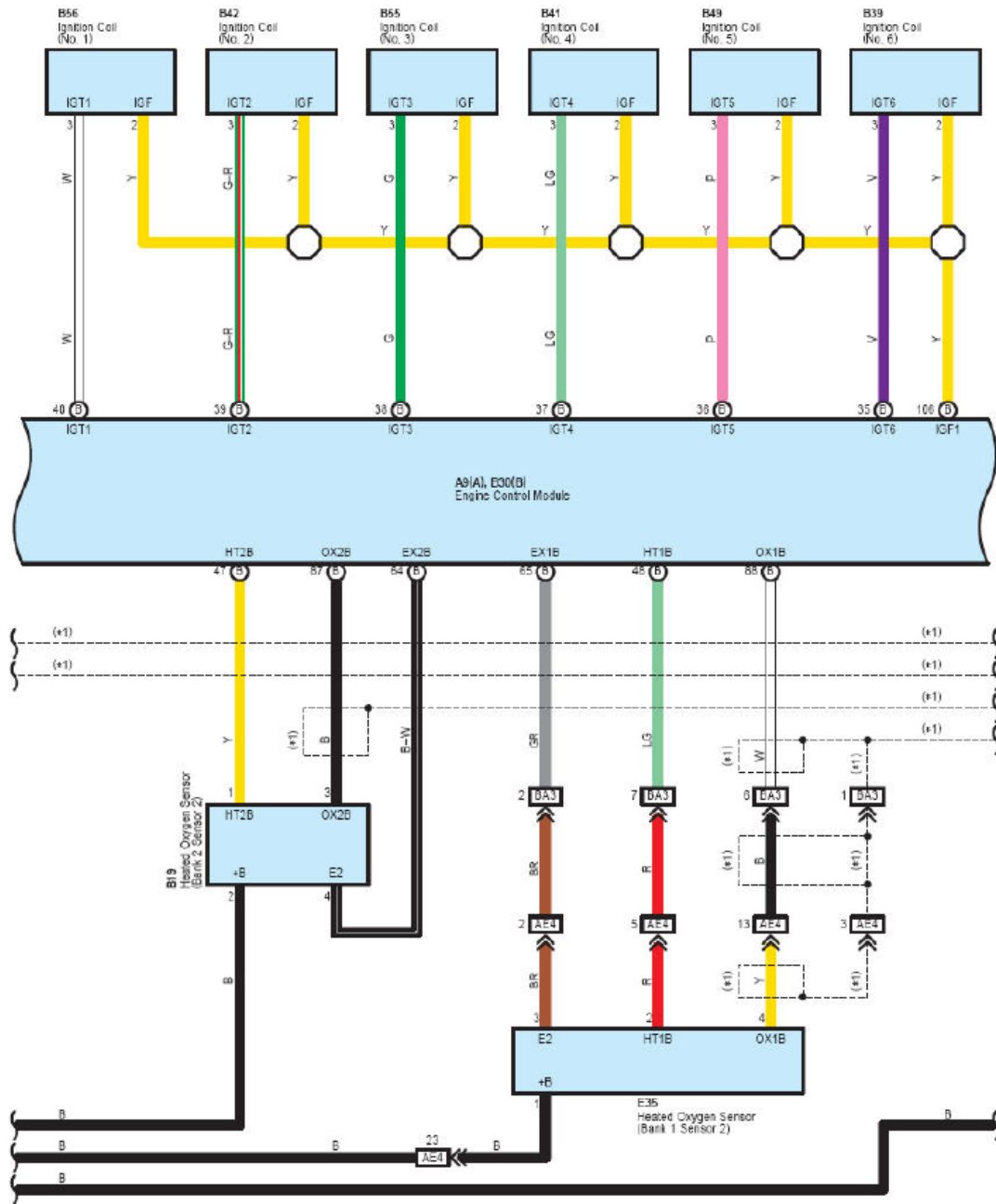


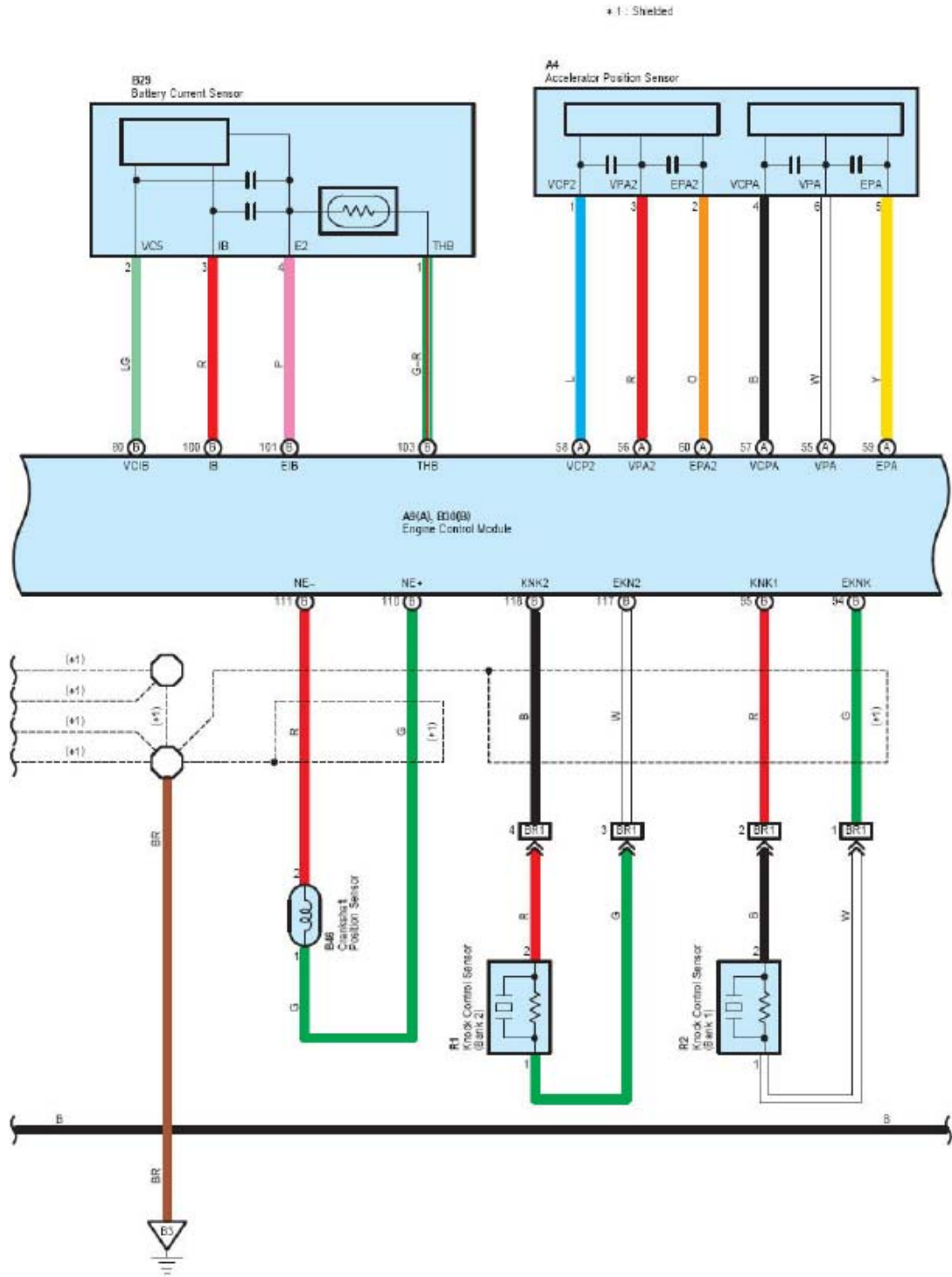


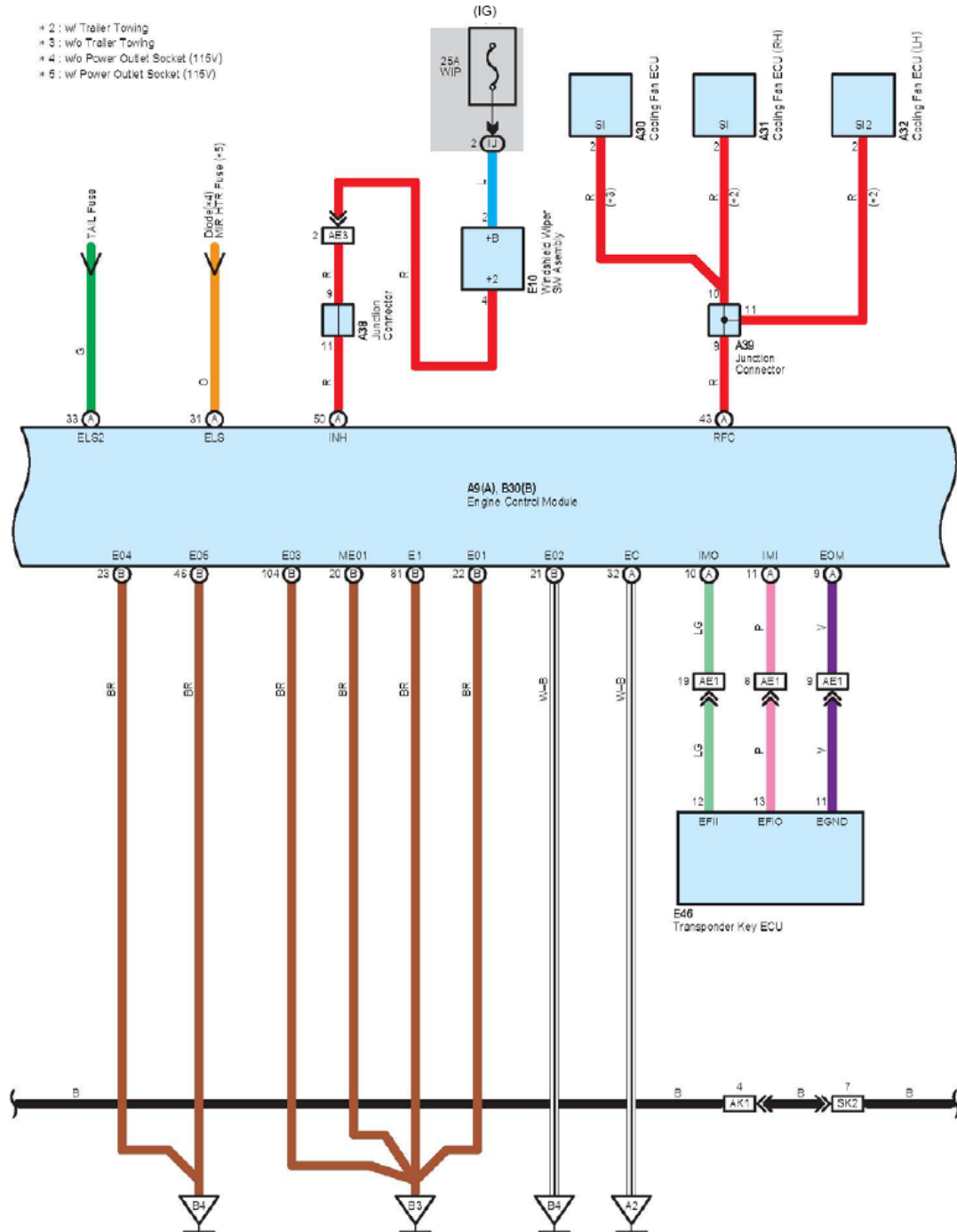


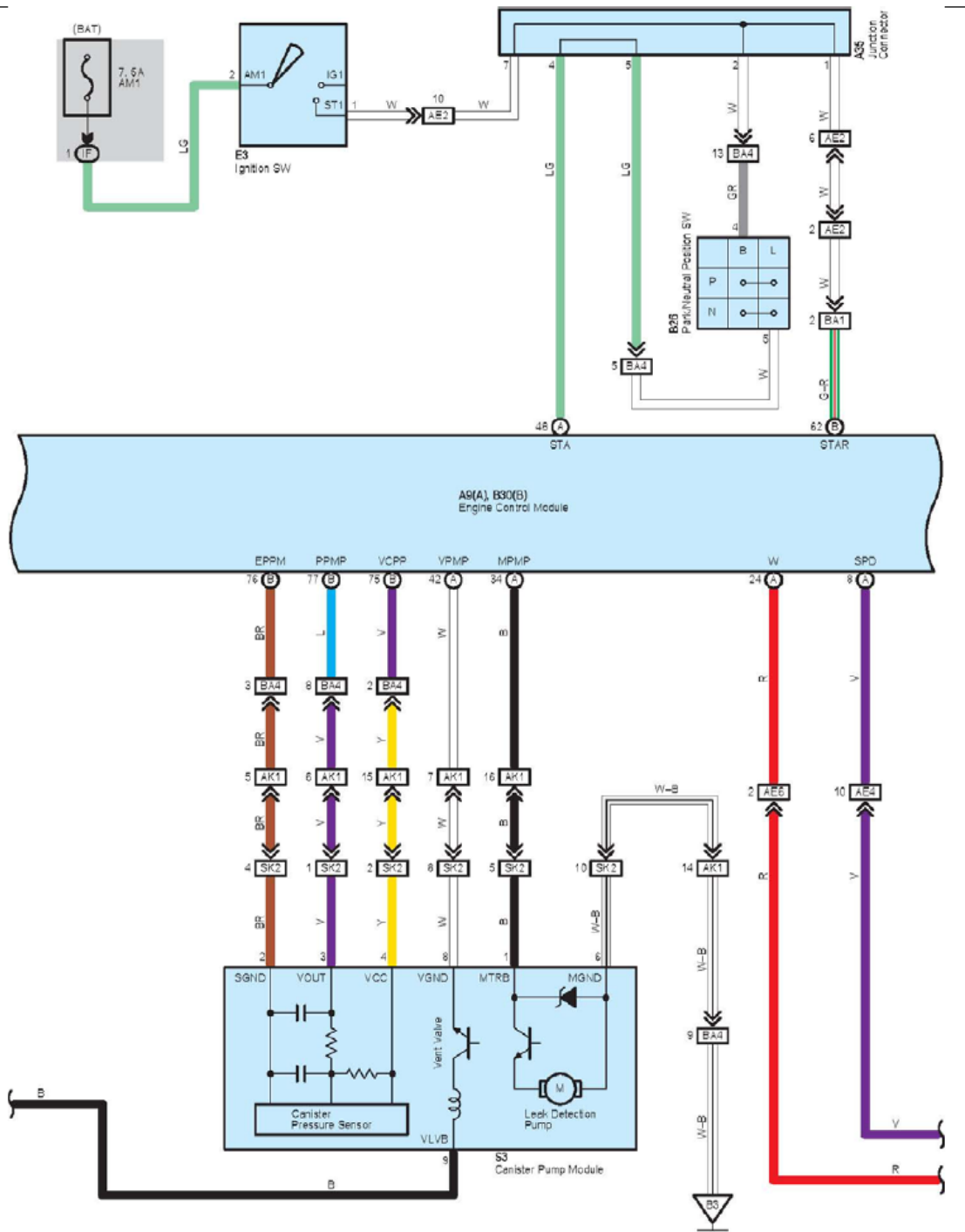


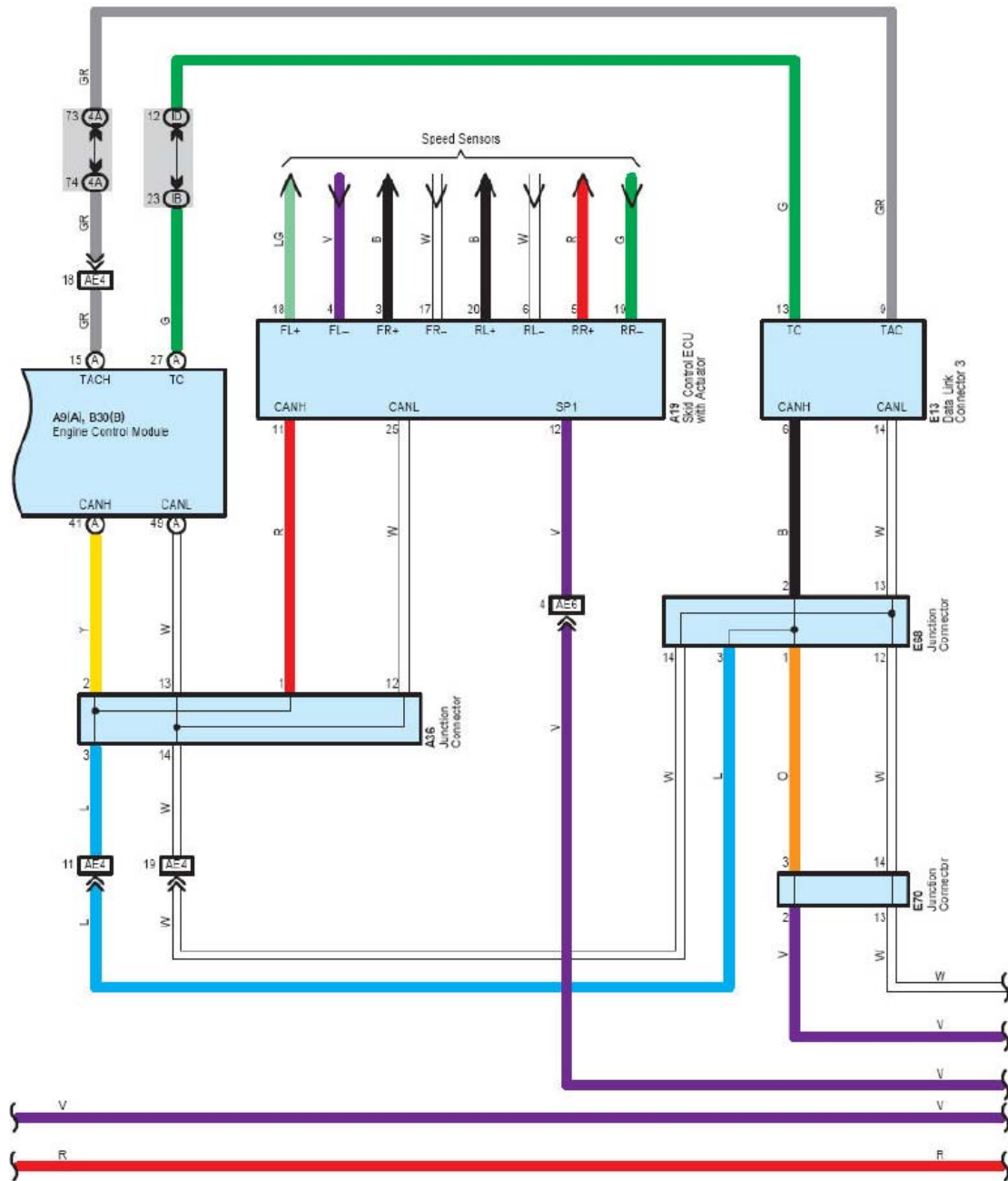


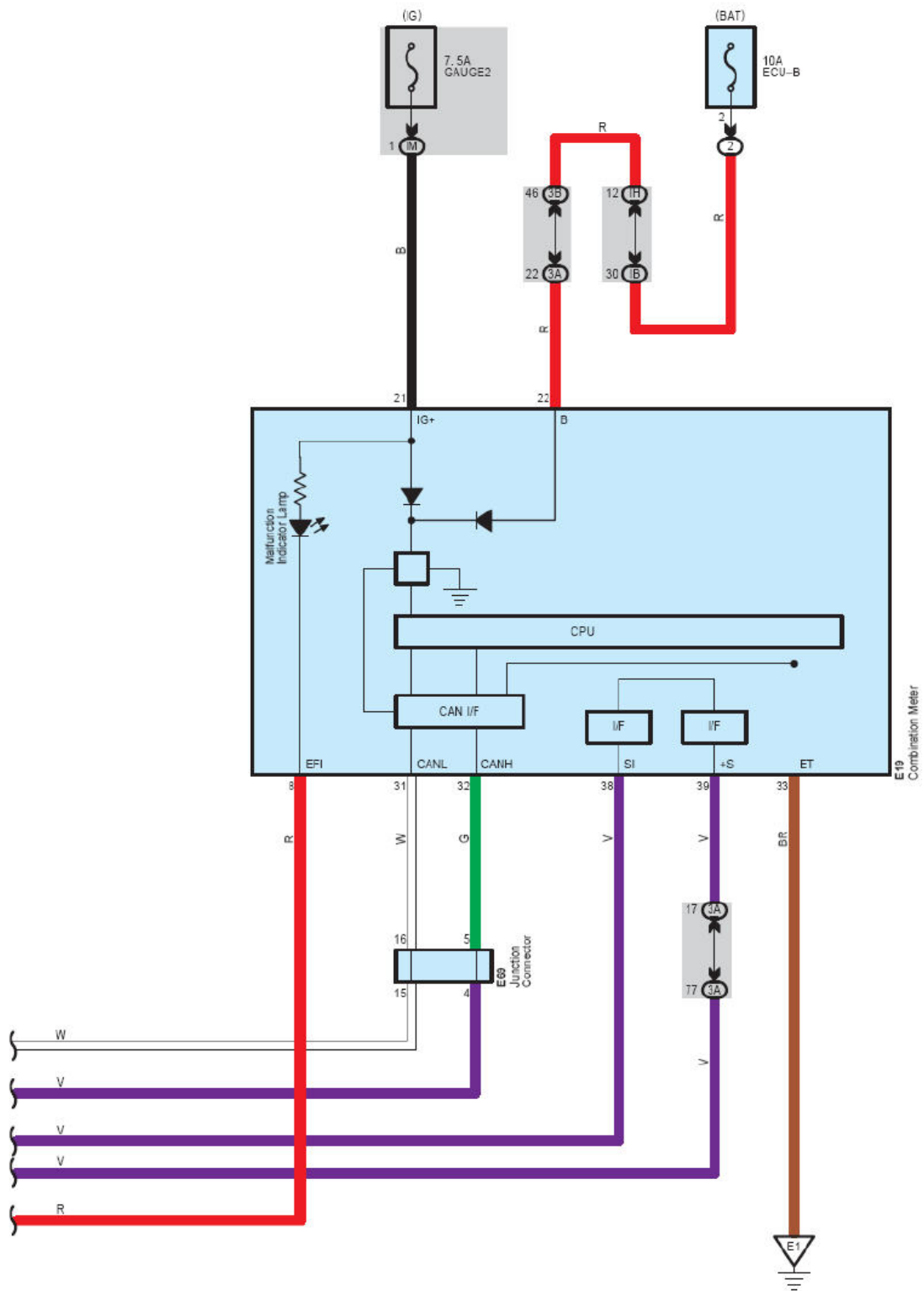












System Outline

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 VVT sensor (Bank 1 exhaust side, bank 1 intake side and bank 2 exhaust side), VVT sensor (Bank 2 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 ignition SW turned on, the voltage for engine control module start-up power supply is applied to TERMINAL +B and +B2 of engine control module via EFI MAIN 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.

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.

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.

Relay Blocks

Code	Relay Blocks (Relay Block Location)
1	Engine Room R/B No.1 (Engine Compartment Left)
2	Engine Room R/B No.2 (Engine Compartment Right)

Junction Block and Wire Harness Connector

Code	Junction Block and Wire Harness (Connector Location)
1A	Engine Room Main Wire and Engine Room J/B (Engine Compartment Left)Engine Room Main Wire and Engine Room J/B (Engine Compartment Left)
1B _	
3A	Instrument Panel Wire and J/B No.3 (Instrument Panel Center)Instrument Panel Wire and J/B No.3 (Instrument Panel Center)
3B _	
4A	Instrument Panel Wire and J/B No.4 (Instrument Panel Center)
IA	Floor Wire and Instrument Panel J/B (Cowl Side Left)
IB	Engine Room Main Wire and Instrument Panel J/B (Cowl Side Left)
ID	Instrument Panel Wire and Instrument Panel J/B (Cowl Side Left)Instrument Panel Wire and Instrument Panel J/B (Cowl Side Left)
IE _	
IF _	
IH _	
IJ _	
IM	

Connector Joining Wire Harness and Wire Harness

Code	Joining Wire Harness and Wire Harness (Connector Location)
AE1	Engine Room Main Wire and Instrument Panel Wire (Left Side of the Instrument Panel)Engine Room Main Wire and Instrument Panel Wire (Left Side of the Instrument Panel)
AE2 _	
AE3 _	
AE4 _	
AE6 _	
AK1	Engine Room Main Wire and Floor Wire (Left Kick Panel)
BA1	Engine Wire and Engine Room Main Wire (Inside of the Engine Room R/B No.1 and Engine Room J/B No.1)Engine Wire and Engine Room Main Wire (Inside of the Engine Room R/B No.1 and Engine Room J/B No.1)
BA3 _	
BA4 _	
BR1	Engine Wire and Sensor Wire (Left Side of the Cylinder Block)
SK1	Fuel Gauge Wire and Floor Wire (Under the Console Box)Fuel Gauge Wire and Floor Wire (Under the Console Box)
SK2 _	

Ground Points

Code	Ground Points Location
A1	Front Left Fender
A2 _	
B3	Left Side of the Cylinder HeadLeft Side of the Cylinder Head
B4 _	
E1	Left Kick Panel
K1	Left Center Pillar