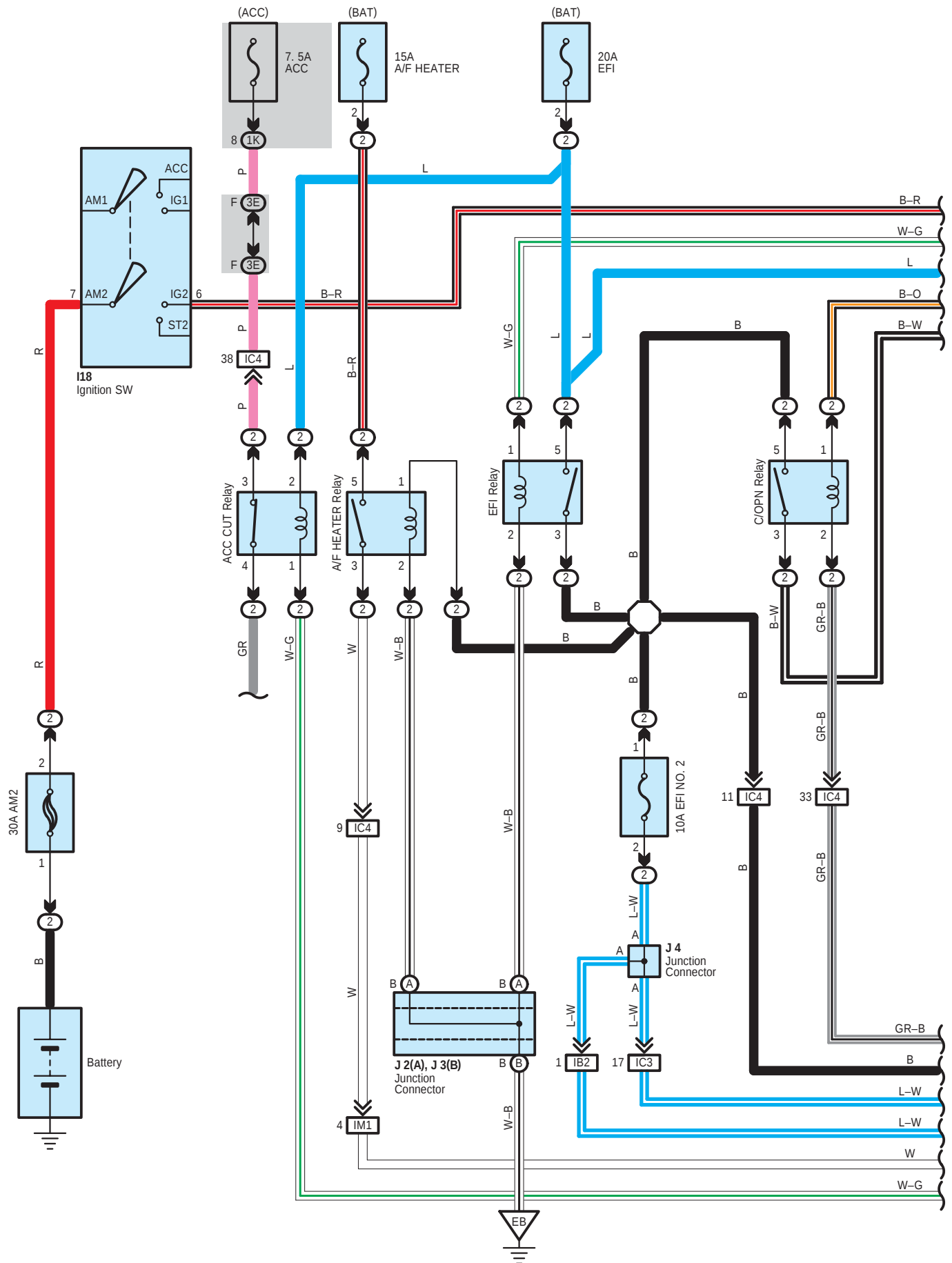
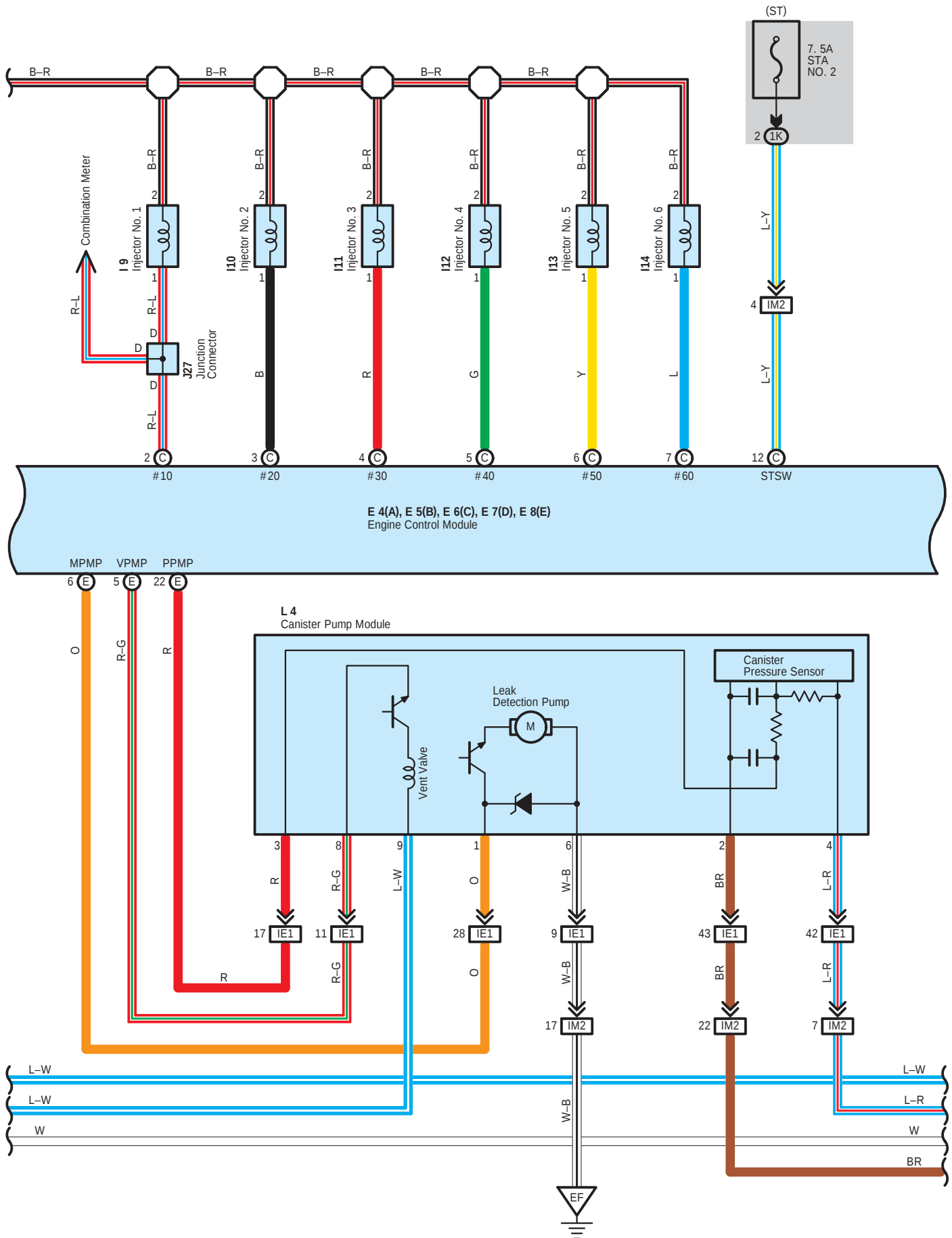


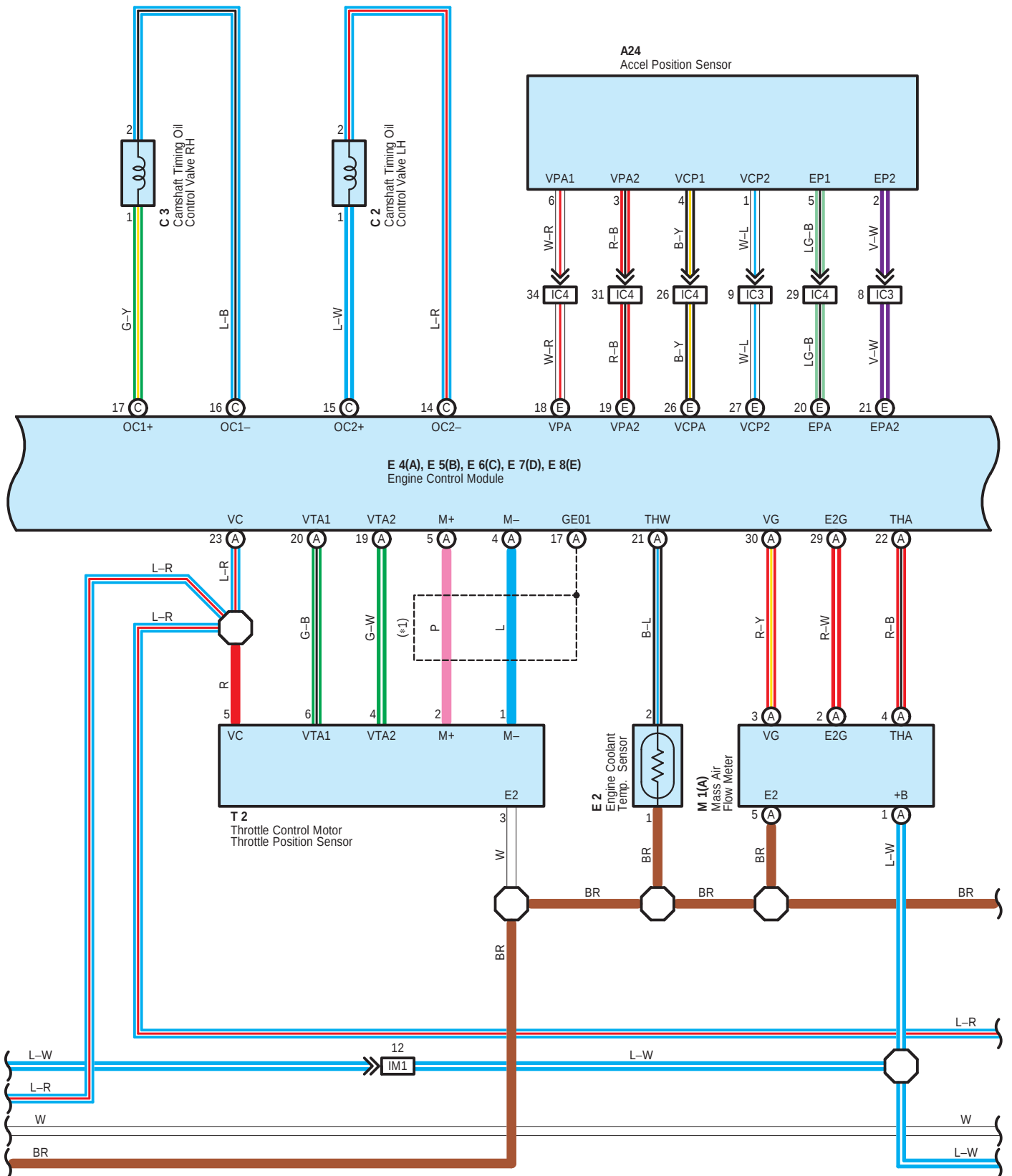
Engine Control for 1GR-FE



Engine Control for 1GR-FE

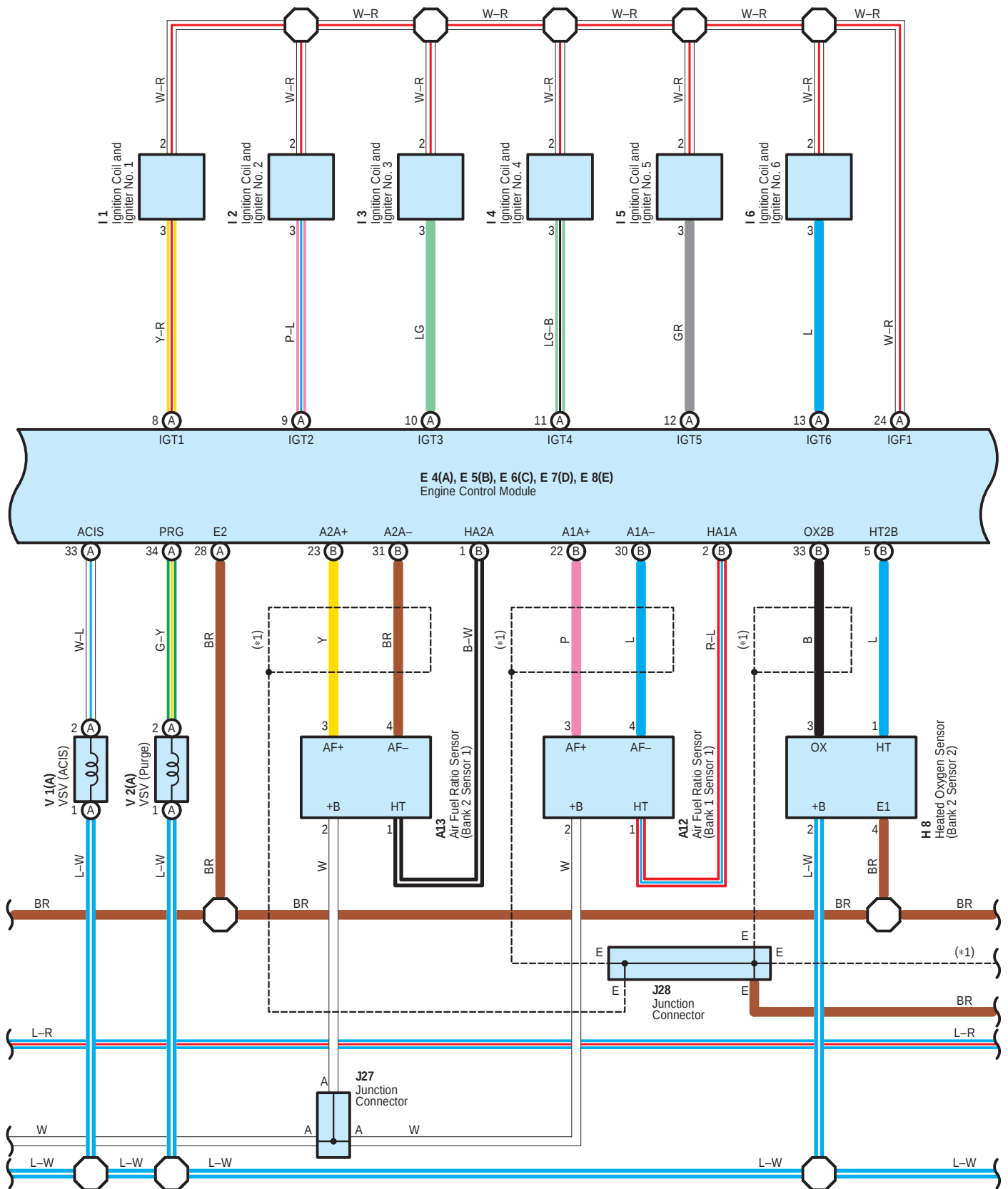


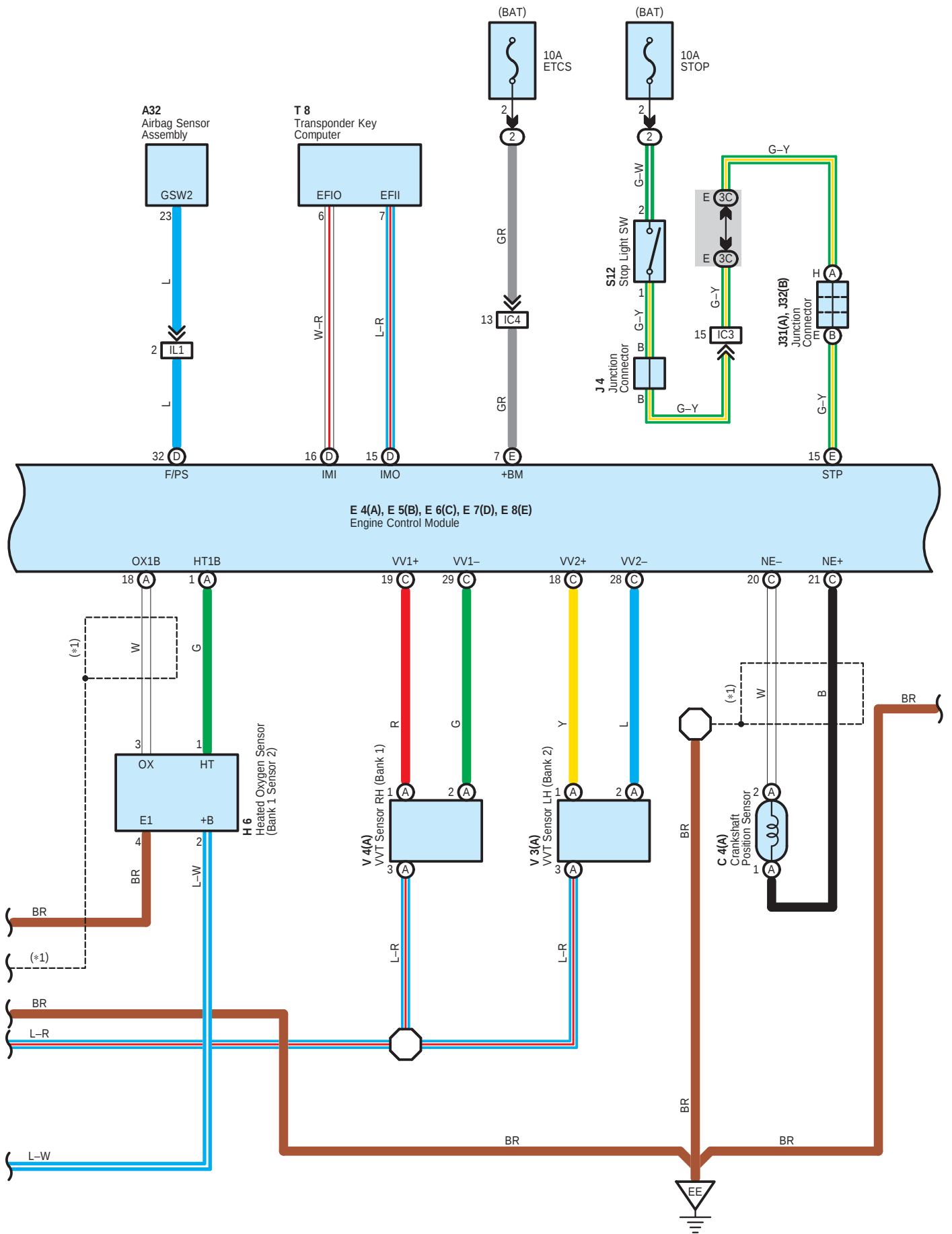
* 1 : Shielded



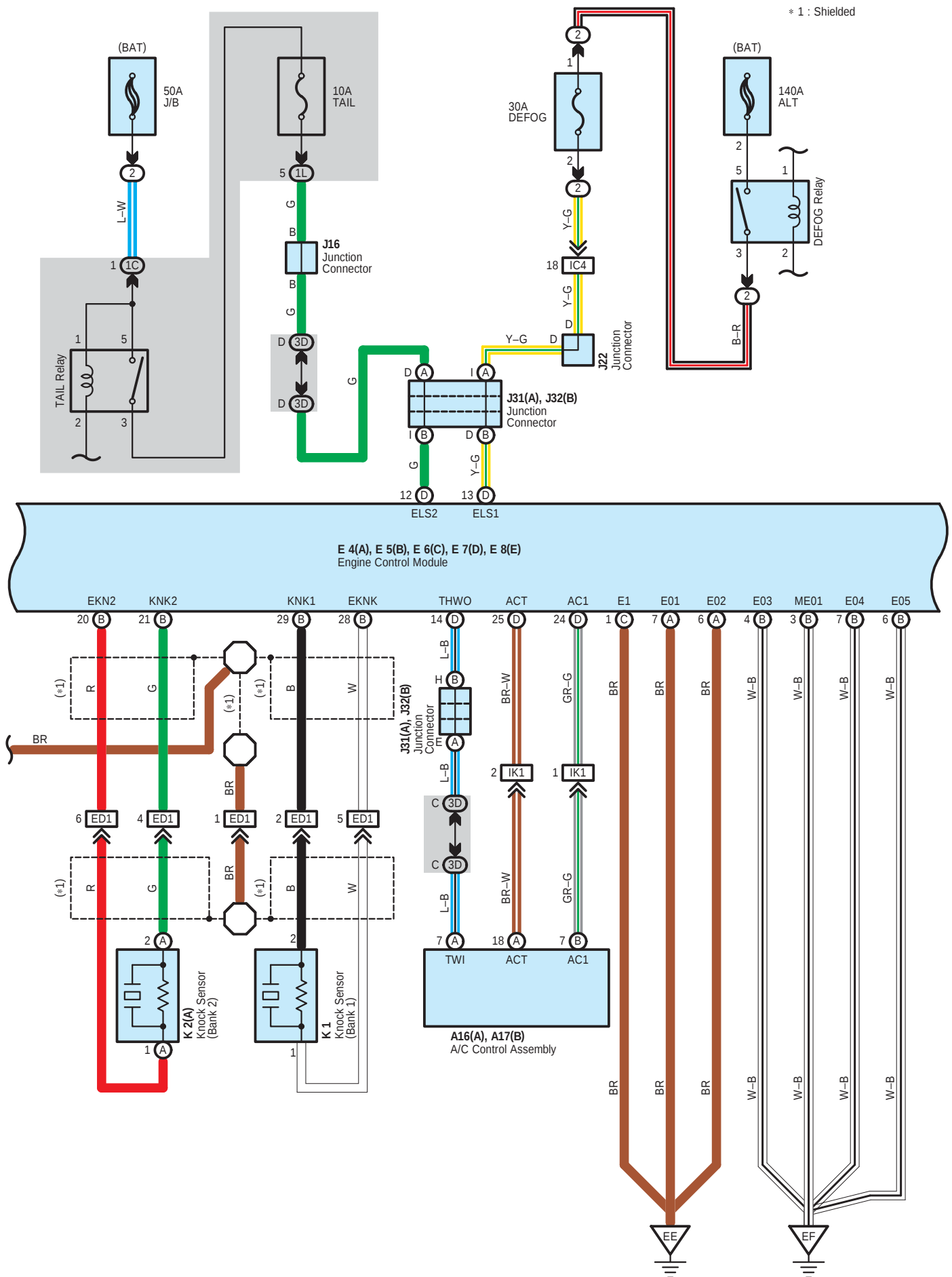
Engine Control for 1GR-FE

* 1 : Shielded

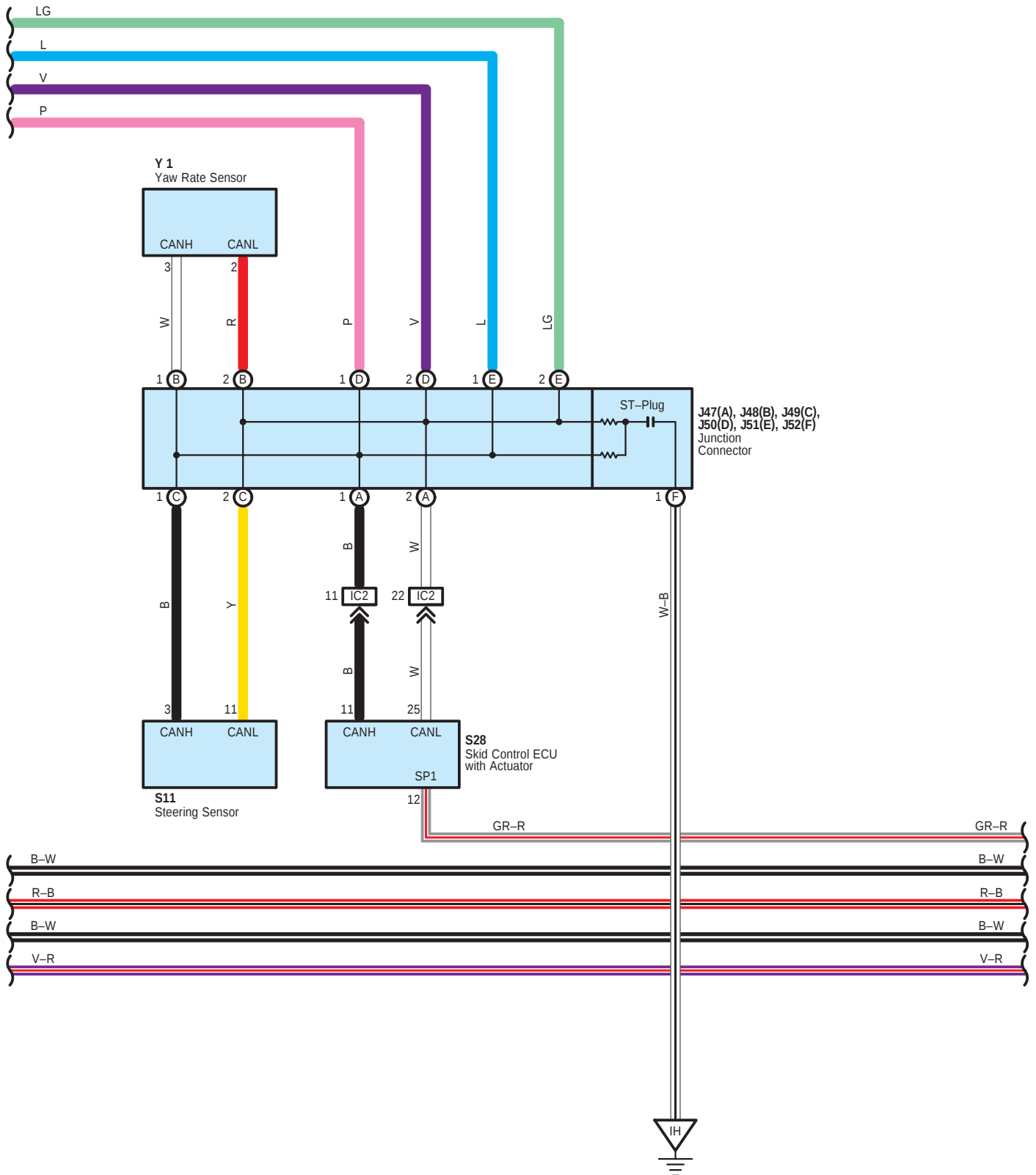


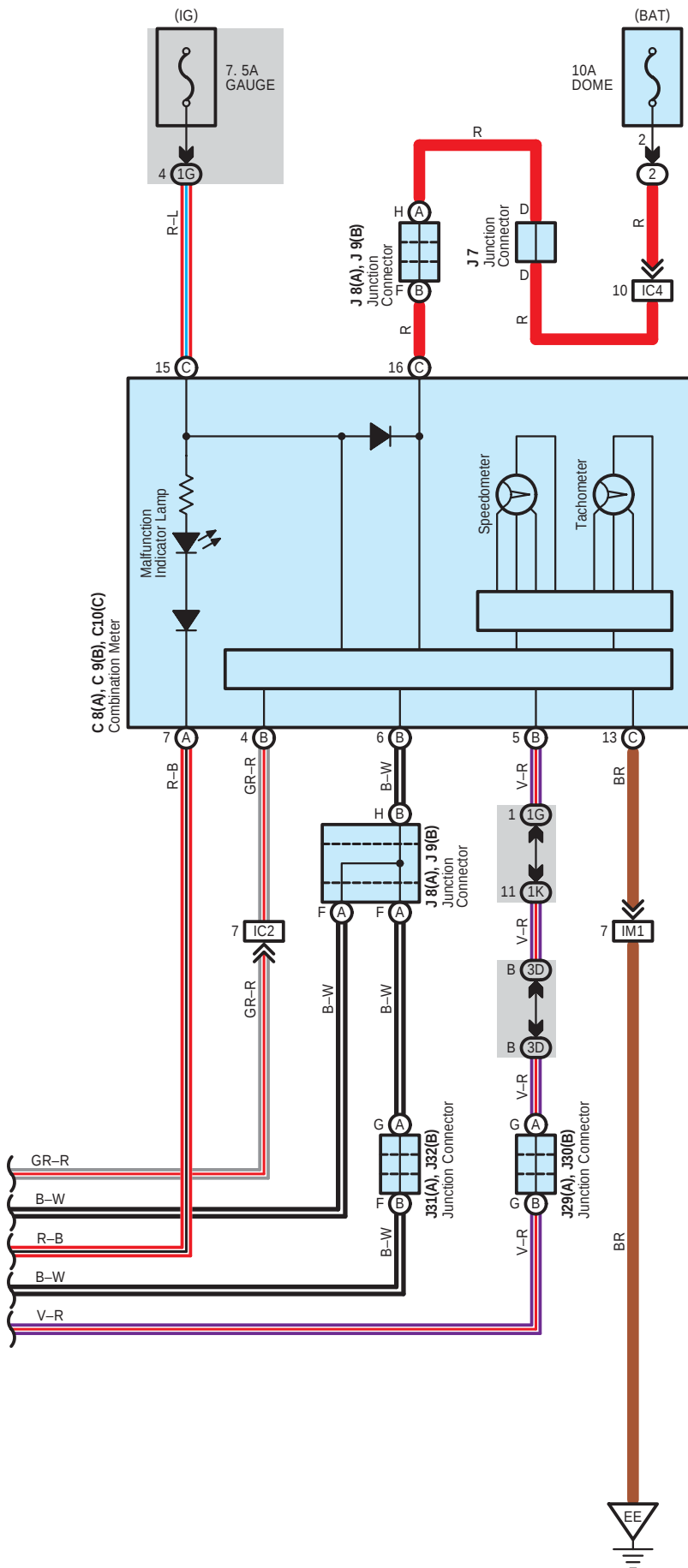


Engine Control for 1GR-FE



Engine Control for 1GR-FE





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 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

The camshaft position is detected by the VVT sensor (Bank 1) and (Bank 2), and is input into TERMINALS VV1+ and VV2+ 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 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 is turned on, the voltage for engine control module start up power supply is applied through the EFI relay, to TERMINALS +B and +B2 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 as a control signal to TERMINAL VG of the engine control module.

(9) Stop light SW signal circuit

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

(12) A/C SW signal system

The operating voltage of the A/C magnetic clutch is detected and input in the form of a control signal to TERMINAL AC1 of the engine control module.

(13) Air fuel ratio signal circuit

The air fuel ratio is detected and input as a control signal into TERMINALS A1A+ and 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 TERMINAL 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.

* Fuel pump control system

The engine control module supplies current to TERMINAL FPR, and controls the operation speed of the fuel pump with the FUEL PUMP relay.

* 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.

* Engine start control system

The engine control module allows power to be supplied from the TERMINAL STAR/NSW to the STA relay via park/neutral position SW until complete combustion is confirmed by engine RPM after the detection of ignition SW ST signal by the TERMINAL STSW.

With this arrangement, engine can be started without holding the ignition key in the ST position. At the same time, the TERMINAL ACCR is controlled so that the engine control module turns off ACC CUT relay, shutting off power to the accessories.

* 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 for 1GR-FE

: Parts Location

Code	See Page	Code	See Page	Code	See Page
A11	34 (1GR-FE)	I3	35 (1GR-FE)	J34	B 38
A12	34 (1GR-FE)	I4	35 (1GR-FE)	J37	38
A13	34 (1GR-FE)	I5	35 (1GR-FE)	J40	A 40
A16	A 36	I6	35 (1GR-FE)	J41	B 40
A17	B 36	I9	35 (1GR-FE)	J47	A 38
A24	36	I10	35 (1GR-FE)	J48	B 38
A32	36	I11	35 (1GR-FE)	J49	C 38
C2	34 (1GR-FE)	I12	35 (1GR-FE)	J50	D 38
C3	34 (1GR-FE)	I13	35 (1GR-FE)	J51	E 38
C4	A 34 (1GR-FE)	I14	35 (1GR-FE)	J52	F 38
C8	A 37	I18	37	K1	35 (1GR-FE)
C9	B 37	J2	A 35 (1GR-FE)	K2	A 35 (1GR-FE)
C10	C 37	J3	B 35 (1GR-FE)	L4	40
D1	37	J4	38	M1	A 35 (1GR-FE)
E2	34 (1GR-FE)	J5	38	P1	35 (1GR-FE)
E4	A 37	J7	38	P2	35 (1GR-FE)
E5	B 37	J8	A 38	S11	39
E6	C 37	J9	B 38	S12	39
E7	D 37	J16	38	S28	35 (1GR-FE)
E8	E 37	J18	38	T2	35 (1GR-FE)
F8	34 (1GR-FE)	J22	38	T8	39
F9	A 37	J27	38	V1	A 35 (1GR-FE)
F10	B 37	J28	38	V2	A 35 (1GR-FE)
F14	40	J29	A 38	V3	A 35 (1GR-FE)
H6	34 (1GR-FE)	J30	B 38	V4	A 35 (1GR-FE)
H8	34 (1GR-FE)	J31	A 38	Y1	39
I1	35 (1GR-FE)	J32	B 38		
I2	35 (1GR-FE)	J33	A 38		

: Relay Blocks

Code	See Page	Relay Blocks (Relay Block Location)
2	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 Driver Side J/B (Lower Finish Panel)
1D		
1E		
1G	25	Instrument Panel Wire and Driver Side J/B (Lower Finish Panel)
1H		
1J		
1K		
1L		
3C	28	Instrument Panel Wire and Center J/B (Instrument Panel Brace RH)
3D		
3E		

 : Connector Joining Wire Harness and Wire Harness

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EC1	45 (1GR-FE)	Engine Wire and Differential Wire (Near the Front Differential)
ED1	45 (1GR-FE)	Engine Wire and Sensor Wire (Rear Side of Right Bank Cylinder Block)
IB1	46	Floor No.2 Wire and Engine Room Main Wire (Left Kick Panel)
IB2		
IC2	46	Instrument Panel Wire and Engine Room Main Wire (Left Kick Panel)
IC3		
IC4		
IE1	46	Instrument Panel Wire and Floor No.2 Wire (Left Kick Panel)
IK1	47	Instrument Panel Wire and Instrument Panel Wire (Left Upper Side of the Glove Box)
IL1	47	Instrument Panel Wire and Instrument Panel Wire (Right Upper Side of the Glove Box)
IM1	47	Engine Wire and Instrument Panel Wire (Right Side of Blower Unit)
IM2		

 : Ground Points

Code	See Page	Ground Points Location
EB	45 (1GR-FE)	Front Left Fender
EE	45 (1GR-FE)	Rear Side of Right Bank Cylinder Block
EF	45 (1GR-FE)	Rear Side of Left Bank Cylinder Block
IG	46	Left Kick Panel
IH	46	Instrument Panel Brace LH
IK	46	Right Kick Panel
BL	48	Floor Seat Crossmember LH
BO	48	Rear Pillar LH