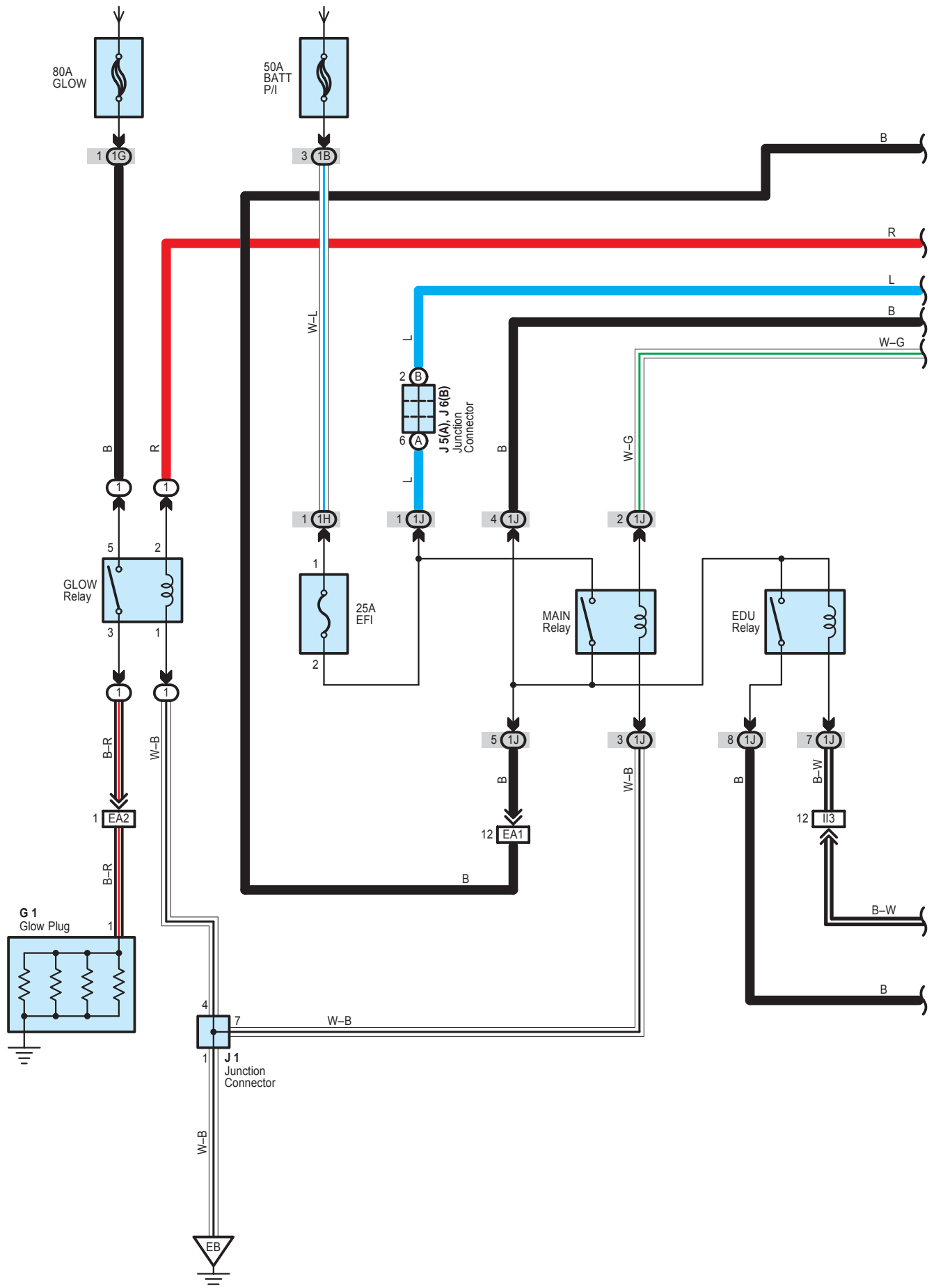
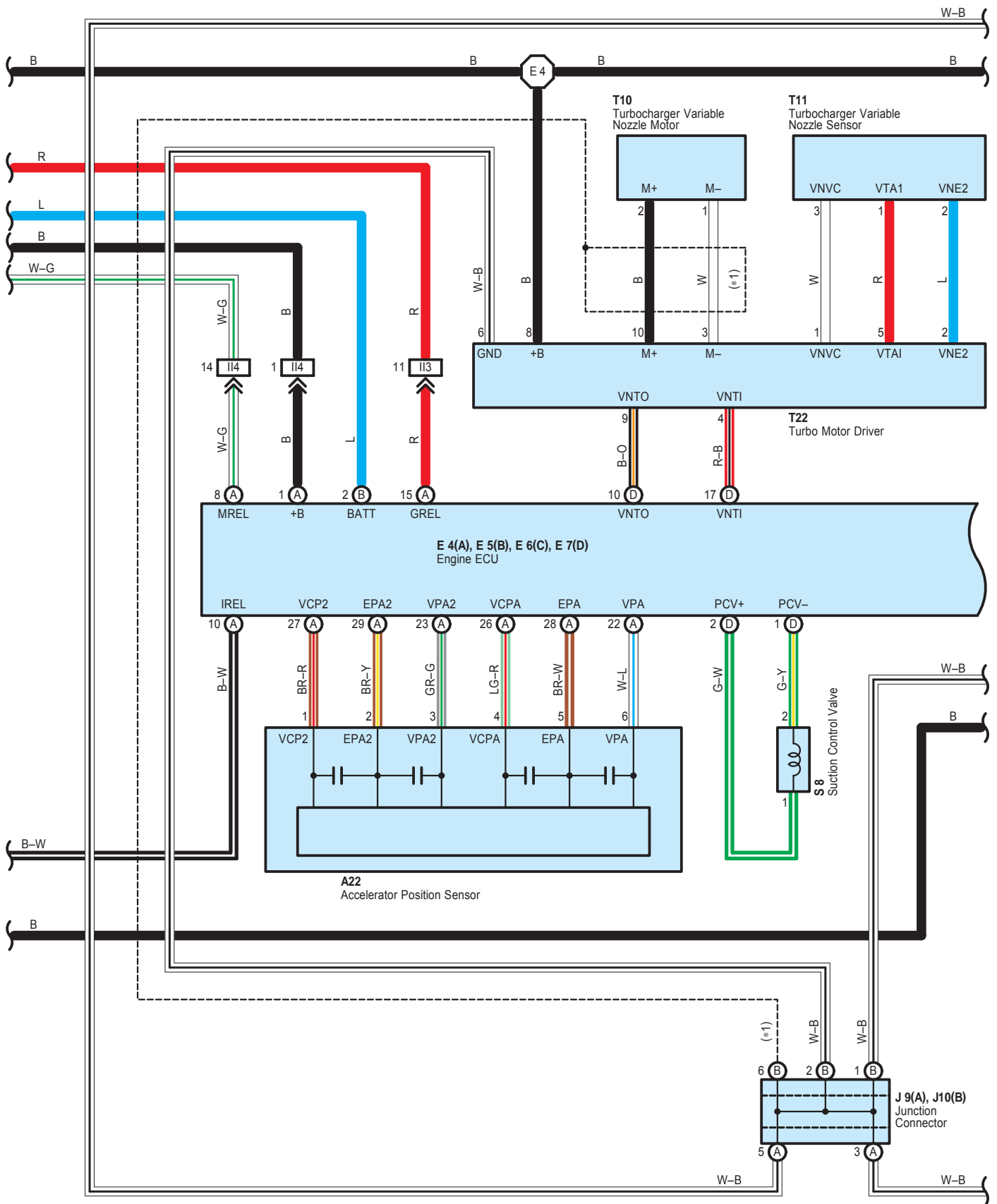


Engine Control (1KD-FTV)

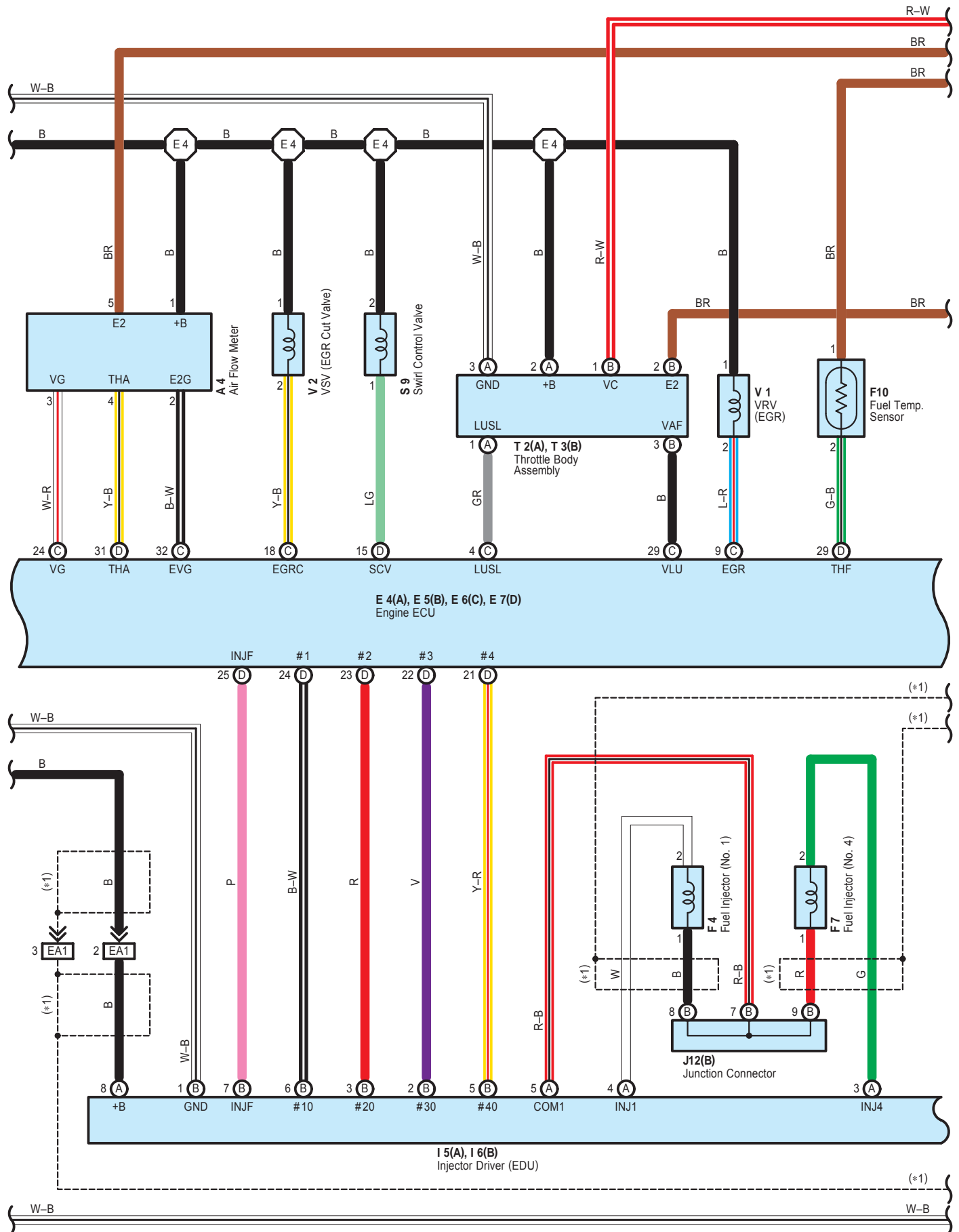
From Power Source System (See Page 58)

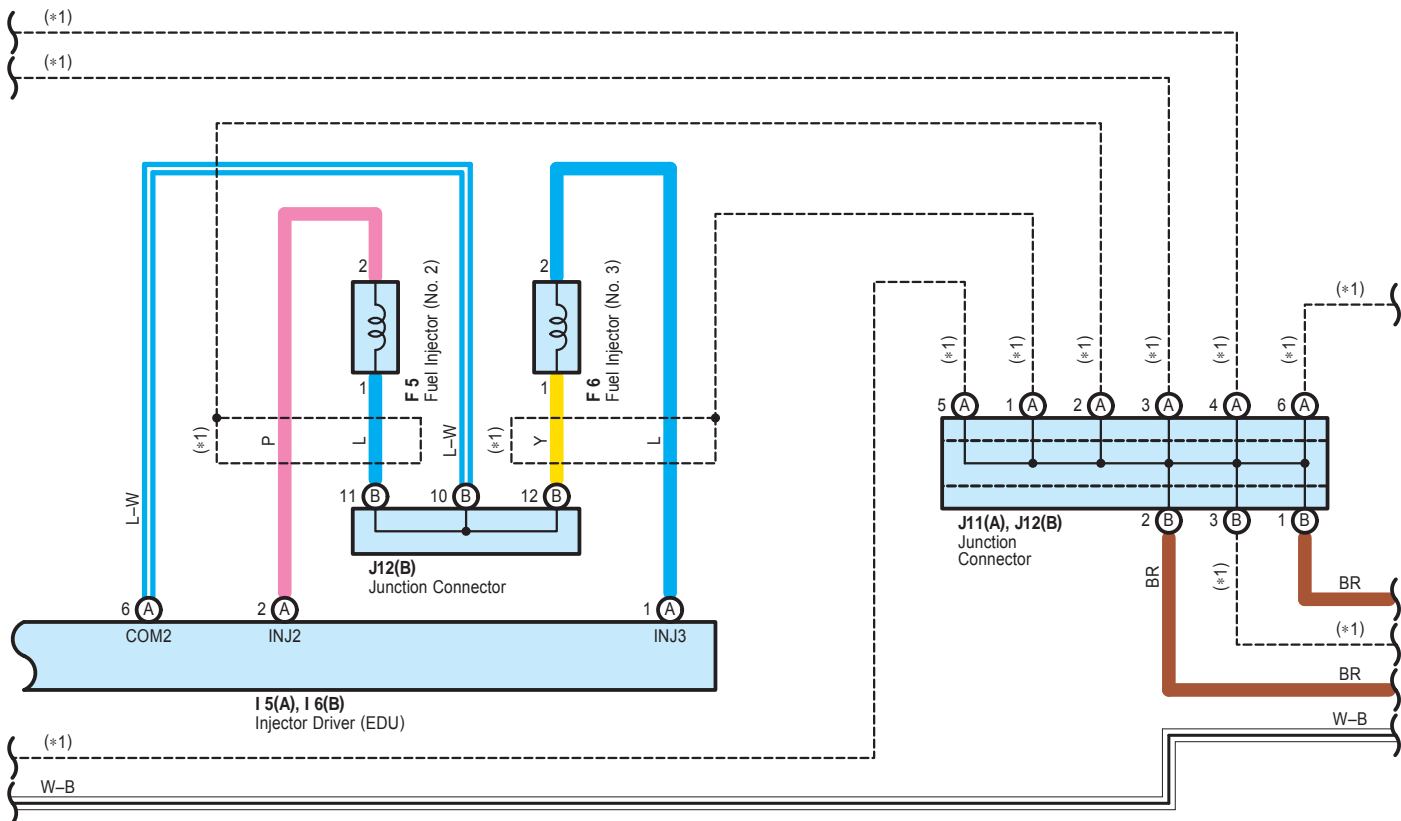
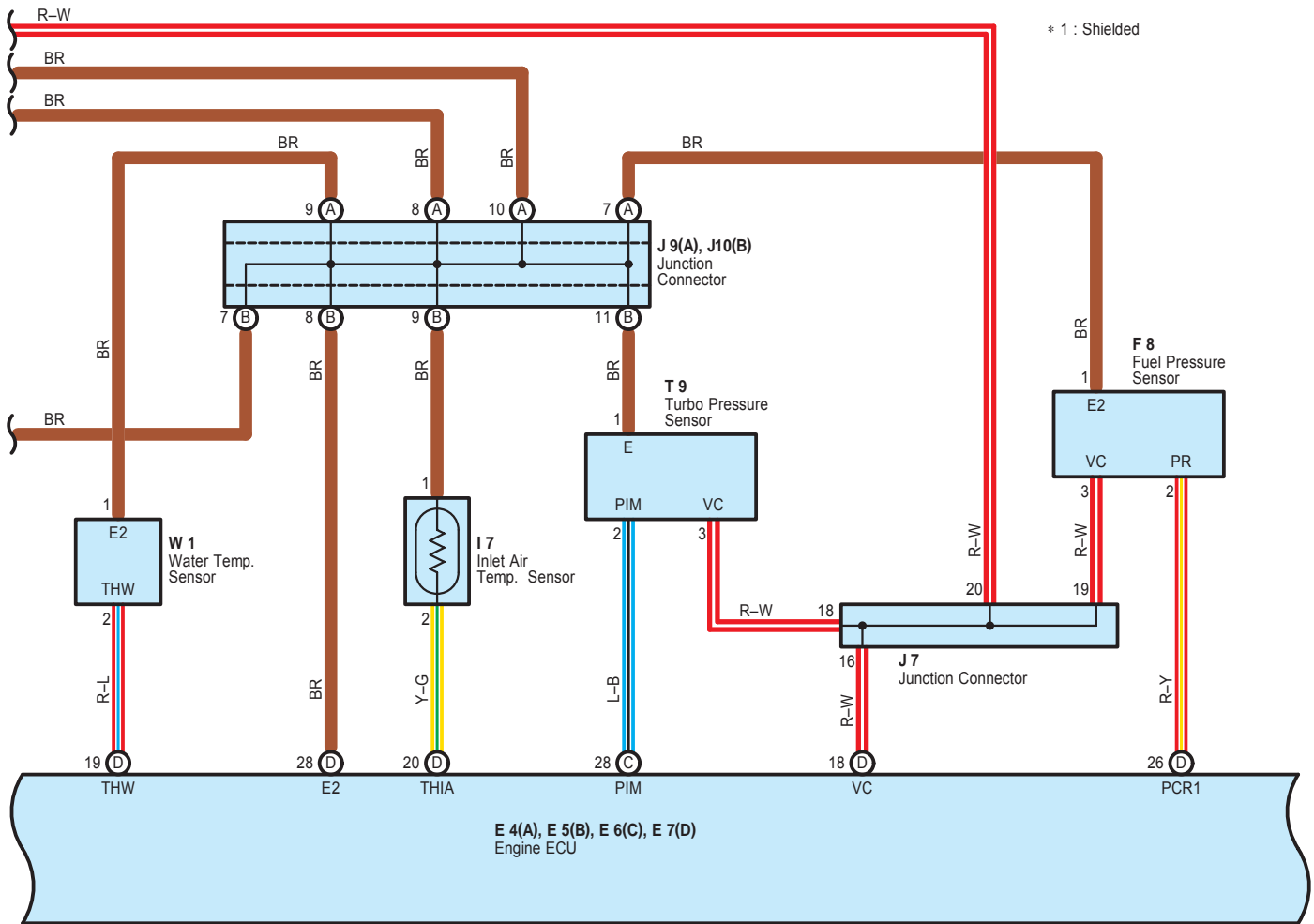


* 1 : Shielded

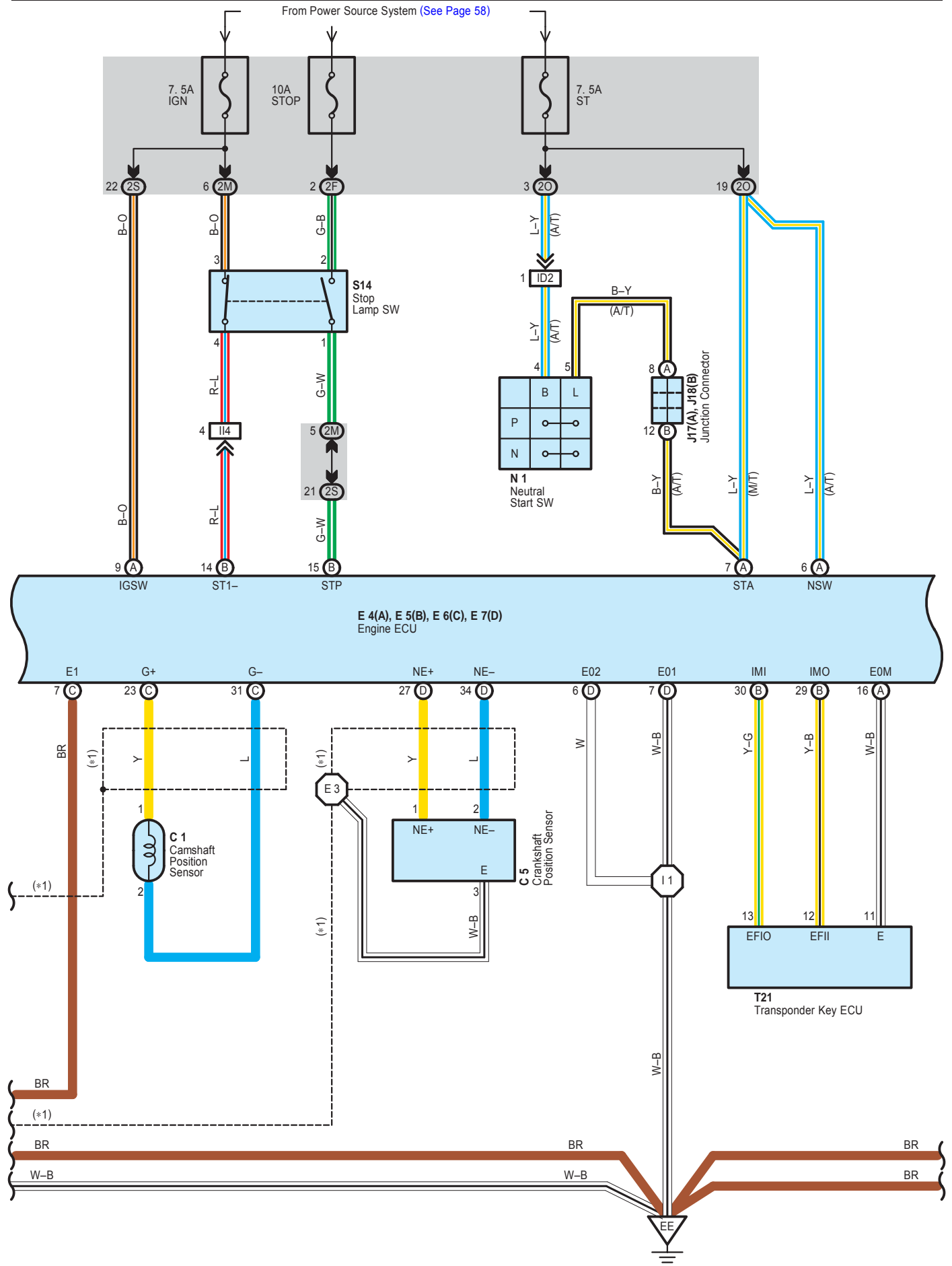


Engine Control (1KD-FTV)

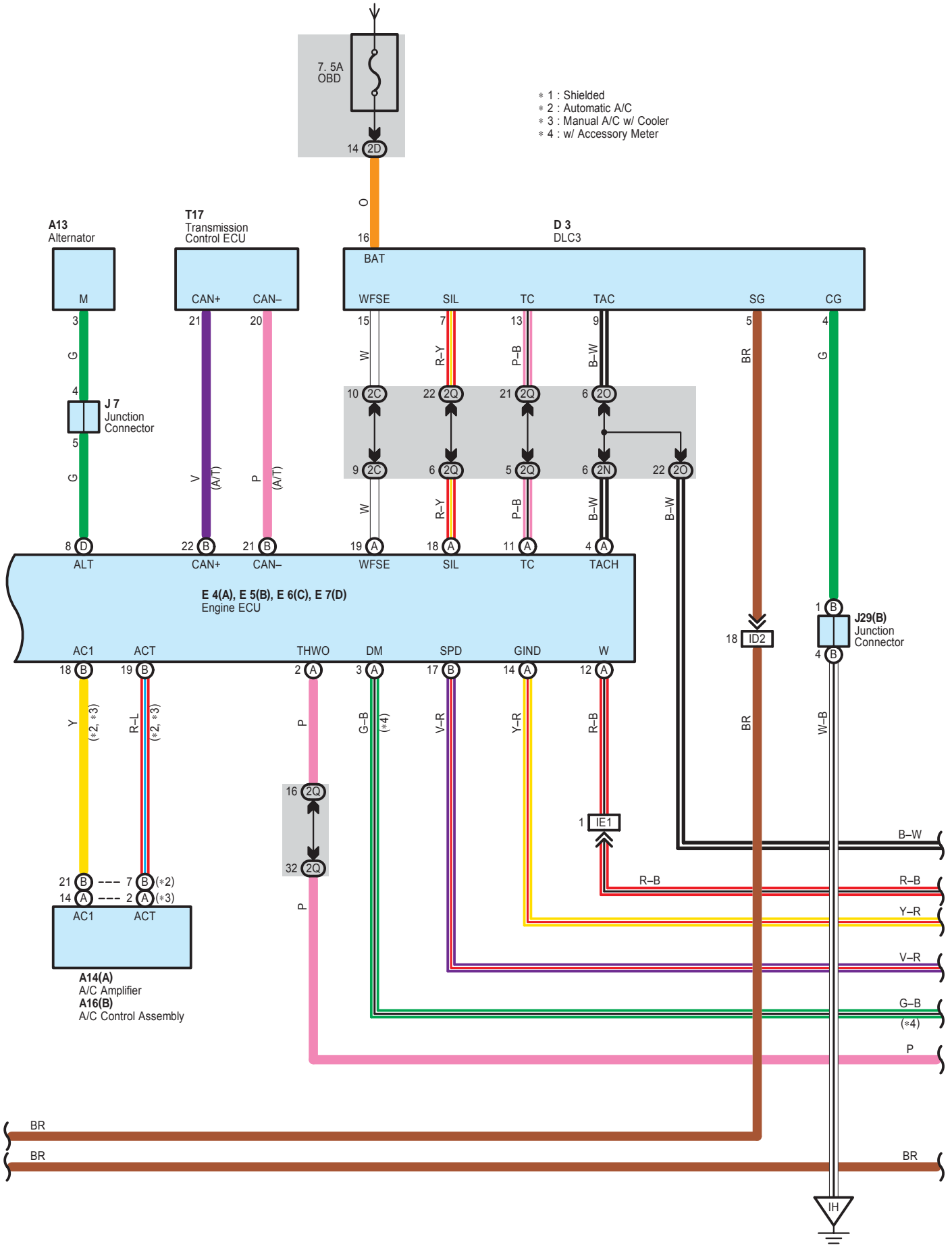




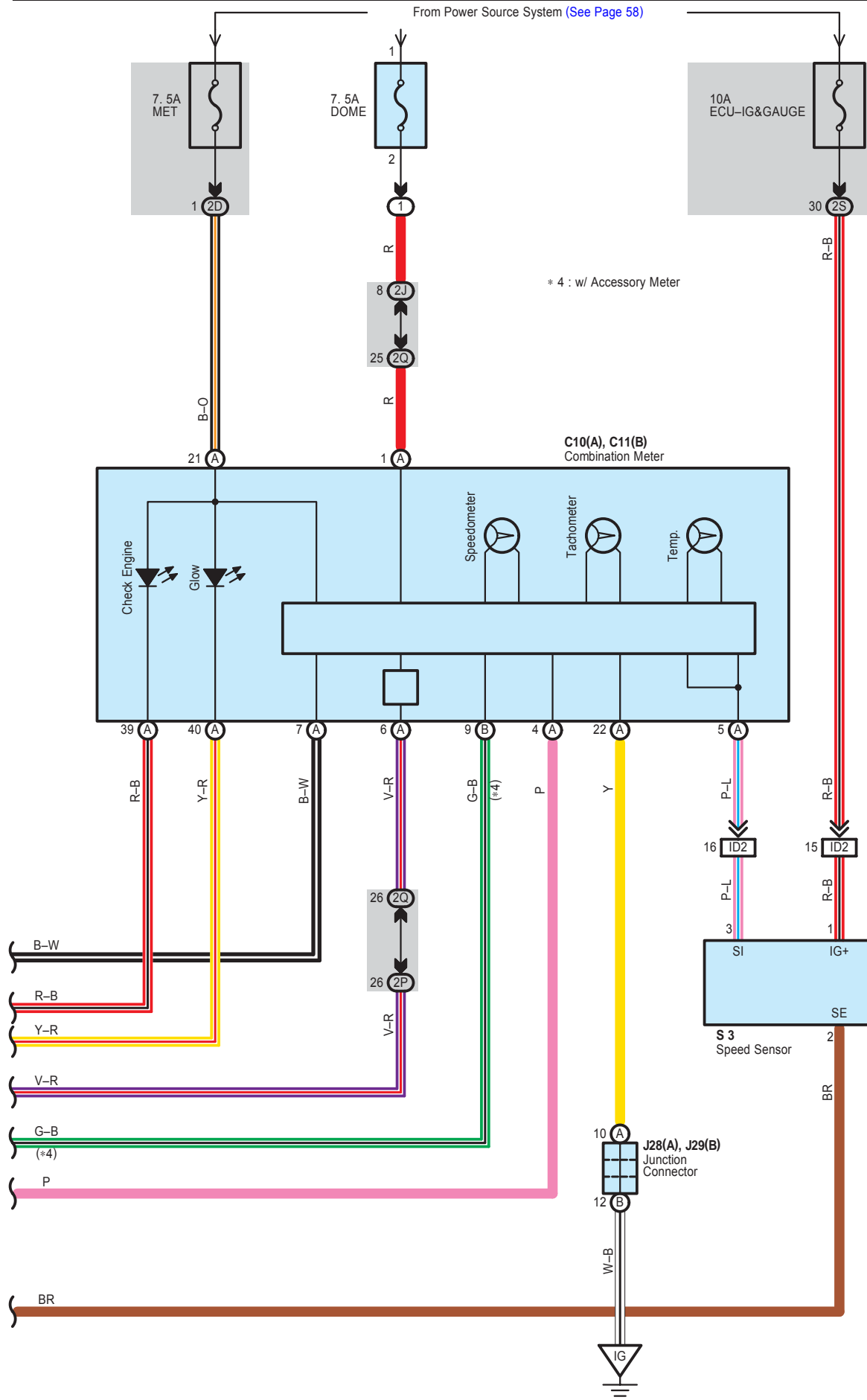
Engine Control (1KD-FTV)



- * 1 : Shielded
- * 2 : Automatic A/C
- * 3 : Manual A/C w/ Cooler
- * 4 : w/ Accessory Meter



Engine Control (1KD-FTV)



System Outline

This system utilizes an engine ECU and maintains overall control of the engine, transmission and so on. An outline of the engine control is explained here.

1. Input Signals

(1) Water temp. signal circuit

The water temp. sensor detects the engine coolant temp. and has a built-in thermistor with a resistance varies according to the engine coolant temp. Thus the engine coolant temp. is input in the form of a control signal to TERMINAL THW of the engine ECU.

(2) Intake air temp. signal circuit

The intake air temp. sensor is detects the intake air temp., which is input as a control signal to TERMINAL THIA of the engine ECU.

(3) RPM signal circuit

Camshaft position and crankshaft position are detected by the camshaft position sensor and crankshaft position sensor. Camshaft position is input as a control signal to TERMINAL G+ of the engine ECU, and engine RPM is input into TERMINAL NE+.

(4) Throttle signal circuit

The accelerator position sensor detects the accelerator pedal opening angle, which is input as a control signal to TERMINALS VPA and VPA2 of the engine ECU.

(5) Vehicle speed signal circuit

The speed sensor detects the vehicle speed and inputs a control signal to TERMINAL SPD of the engine ECU via the combination meter.

(6) Battery signal circuit

Voltage is constantly applied to TERMINAL BATT of the engine ECU. When the ignition SW is turned to on, voltage for engine ECU operation is applied via the MAIN relay to TERMINAL +B of the engine ECU.

(7) Started signal circuit

To confirm that the engine is cranking, the voltage applied to the starter motor during cranking is detected and is input as a control signal to TERMINAL STA of the engine ECU.

(8) Fuel temp. signal circuit

The fuel temp. sensor is detects the fuel temp., which is input as a control signal to TERMINAL THF of the engine ECU.

(9) Intake air vacuum pressure signal system

Intake air vacuum pressure is detected by the turbo pressure sensor and is input as a control signal to TERMINAL PIM of the engine ECU.

2. Control System

- * EGR control

The EGR control system detects the signals from each sensor, then the current is output to the TERMINAL EGR to control the VRV (EGR).

- * Common rail pressure control

The target rail pressure is calculated according to the engine status (Accelerator opening, engine speed) and environmental change detected by sensors. The fuel amount to be pressure-fed from the supply pump is calculated so as to match the indicated value of rail pressure sensor with the target value and the signal is sent to the intake amount adjusting valve of the supply pump in order to control the rail pressure.

- * Fuel injection timing control

The fuel injection timing is controlled by calculating the basic fuel injection timing based on the engine status (Accelerator opening, engine speed), making corrections according to environmental change detected by sensors, then sending a signal to the solenoid control valve of the injector via the injector driver (EDU).

- * Fuel injection volume control

The fuel injection volume is controlled by calculating the basic fuel injection volume based on the engine status (Accelerator opening, engine speed), making corrections according to environmental change detected by sensors and the inside pressure conditions in the rail, then sending a signal to the solenoid control valve of the injector via the injector driver (EDU).

- * Pilot injection control

The fuel injection volume and timing are controlled by calculating the pilot injection volume/timing based on the engine status (Accelerator opening, engine speed), making corrections according to environmental change detected by sensors, then sending a signal to the solenoid control valve of the injector via the injector driver (EDU).

3. Diagnosis System

With the diagnosis system, when there is a malfunctioning in the engine ECU signal system, the malfunction system is recorded in the memory. The malfunctioning system can be found by reading the display (Code) of the check engine warning light.

4. Fail-Safe System

When a malfunction occurs 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 ECU memory or else stops the engine.

Service Hints

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

- BATT-E1 : Always 9.0–14.0 volts
- +B-E1 : 9.0–14.0 volts (Ignition SW at ON position)
- VC, VCPA, VCP2-E2 : 4.5–5.5 volts (Ignition SW at ON position)
- STA-E1 : 6.0 volts or more (Engine cranking)
- MREL-E1 : 9.0–14.0 volts (Ignition SW at ON position)
- 0–1.5 volts (More than 10 seconds passed away after the ignition SW was turned to OFF)
- IREL-E1 : 0–1.5 volts (Engine idling)
- 9.0–14.0 volts (Ignition SW at OFF position)
- GREL-E1 : 9.0–14.0 volts (Engine cranking)
- 0–1.5 volts (Engine idling (More than 600 seconds passed away after the engine started to run))
- NE+ -NE- : Pulse generation (Engine idling)
- G+ -G- : Pulse generation (Engine idling)
- SPD-E1 : Pulse generation (In driving at about 20km/h)
- VPA-EPA : 0.5–1.1 volts (Ignition SW on and accelerator pedal fully closed)
- 3.0–4.6 volts (Ignition SW on and accelerator pedal fully opened)
- VPA2-EPA2 : 0.9–2.3 volts (Ignition SW on and accelerator pedal fully closed)
- 3.4–5.0 volts (Ignition SW on and accelerator pedal fully opened)
- STP-E1 : 7.5–14.0 volts (Ignition SW on and brake pedal depressed)
- 0–1.5 volts (Ignition SW on and brake pedal released)
- ST1- -E1 : 0–1.5 volts (Ignition SW on and brake pedal depressed)
- 7.5–14.0 volts (Ignition SW on and brake pedal released)
- PIM-E2 : 1.3–1.9 volts (When a negative pressure of 40 kPa is applied)
- 2.4–3.1 volts (During air release)
- 3.7–4.3 volts (When a pressure of 170 kPa is applied)
- THW-E2 : 0.2–1.0 volts (During warm-up and coolant temp. 60°C, 140°F–120°C, 248°F)
- THIA-E2 : 0.5–3.4 volts (During warm-up and intake temp. 0°C, 32°F–80°C, 176°F)
- THF-E2 : 0.5–3.4 volts (During cooling with the ignition SW kept at the ON position)
- VG-E2 : 0.5–3.4 volts (Engine idling)
- PCR1-E2 : 1.3–1.8 volts (Engine idling)
- ALT-E1 : Pulse generation (Engine idling)
- PCV+ -PCV- : Pulse generation (Engine idling)
- #1, #2, #3, #4-E1 : Pulse generation (Engine idling)
- INJF-E1 : Pulse generation (Engine idling)
- EGR-E1 : 9.0–14.0 volts (Ignition SW at ON position)
- : Pulse generation (EGR at ON position (Staying at 1500r/min after warm-up))
- AC1-E1 : 0–1.5 volts (A/C SW on (Magnetic clutch ON))
- 7.5–14.0 volts (A/C SW off)
- ACT-E1 : 3.5–14.0 volts (Ignition SW at ON position)
- 0–1.5 volts (During air conditioner's operation cut
- (For 5 seconds during driving at 30km/h or slower at full throttle))
- W-E1 : 0–3.0 volts (Check engine warning light lights up and ignition SW at ON position)
- 9.0–14.0 volts (Engine idling and except check engine warning light lights up)
- GIND-E1 : 0–3.0 volts (Glow indicator light lights up and ignition SW at ON position)
- 9.0–14.0 volts (Engine idling)
- TACH-E1 : Pulse generation (Engine idling)
- THWO-E1 : Pulse generation (Engine idling)
- DM-E1 : Pulse generation (Engine idling)
- TC-E1 : 9.0–14.0 volts (Ignition SW at ON position)
- 0–3.0 volts (The DLC3 is shorted between the TERMINALS TC and CG)
- CAN+ -CAN- : 54.0–69.0 Ω (More than 10 seconds passed away after the ignition SW was turned to OFF)
- VNTO-E1 : Pulse generation (Engine idling)
- VNTI-E1 : Pulse generation (Engine idling)
- NSW-E1 : 0–0.3 volts (Shift positon in P or N position)
- 9.0–14.0 volts (Other shift position in P or N position)

Engine Control (1KD-FTV)

: Parts Location

Code	See Page	Code	See Page	Code	See Page
A4	38 (1KD-FTV)	F8	38 (1KD-FTV)	N1	39 (1KD-FTV)
A13	38 (1KD-FTV)	F10	38 (1KD-FTV)	S3	39 (1KD-FTV)
A14	40	G1	38 (1KD-FTV)	S8	39 (1KD-FTV)
A16	40	I5	39 (1KD-FTV)	S9	39 (1KD-FTV)
A22	40	I6	39 (1KD-FTV)	S14	43
C1	38 (1KD-FTV)	I7	39 (1KD-FTV)	T2	39 (1KD-FTV)
C5	38 (1KD-FTV)	J1	39 (1KD-FTV)	T3	39 (1KD-FTV)
C10	41	J5	42	T9	39 (1KD-FTV)
C11	41	J6	42	T10	39 (1KD-FTV)
D3	41	J7	42	T11	39 (1KD-FTV)
E4	41	J9	42	T17	43
E5	41	J10	42	T21	43
E6	41	J11	42	T22	43
E7	41	J12	42	V1	39 (1KD-FTV)
F4	38 (1KD-FTV)	J17	42	V2	39 (1KD-FTV)
F5	38 (1KD-FTV)	J18	42	W1	39 (1KD-FTV)
F6	38 (1KD-FTV)	J28	42		
F7	38 (1KD-FTV)	J29	42		

: 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)
1B	23	Engine Room Main Wire and Engine Room J/B (Engine Compartment Left)
1G		
1H	24	
1J		
2C	28	Instrument Panel Wire and Driver Side J/B (Instrument Panel Brace RH)
2D		
2F	28	Engine Room Main Wire and Driver Side J/B (Instrument Panel Brace RH)
2J		
2M		
2N	29	Instrument Panel Wire and Driver Side J/B (Instrument Panel Brace RH)
2O		
2P		
2Q		
2S		

: Connector Joining Wire Harness and Wire Harness

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EA1	48 (1KD-FTV)	Engine Wire and Engine Room Main Wire (Inside of Engine Room R/B and Engine Room J/B)
EA2		
ID2	50	Engine Wire and Instrument Panel Wire (Behind the Glove Box)
IE1	50	Instrument Panel Wire and Instrument Panel Wire (Instrument Panel Reinforcement LH)
II3	52	Engine Room Main Wire and Instrument Panel Wire (Behind the Driver Side J/B)
II4		

**: Ground Points**

Code	See Page	Ground Points Location
EB	48 (1KD-FTV)	Left Side of the Fender Apron
EE	48 (1KD-FTV)	Rear Side of the Cylinder Block
IG	50	Instrument Panel Reinforcement Center
IH	50	Instrument Panel Reinforcement RH

**: Splice Points**

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E3	48 (1KD-FTV)	Engine Wire	I1	52	Engine Wire
E4					