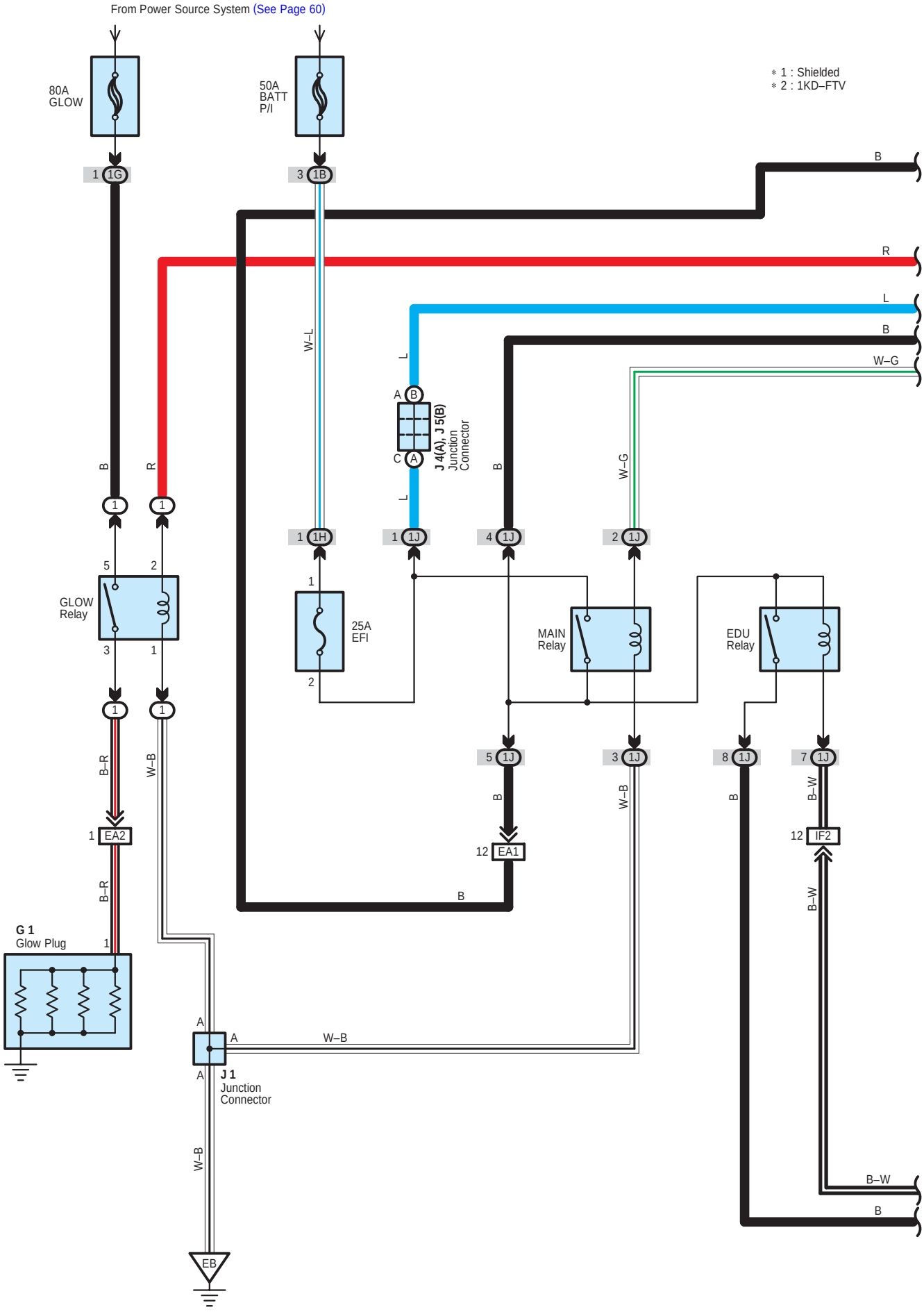
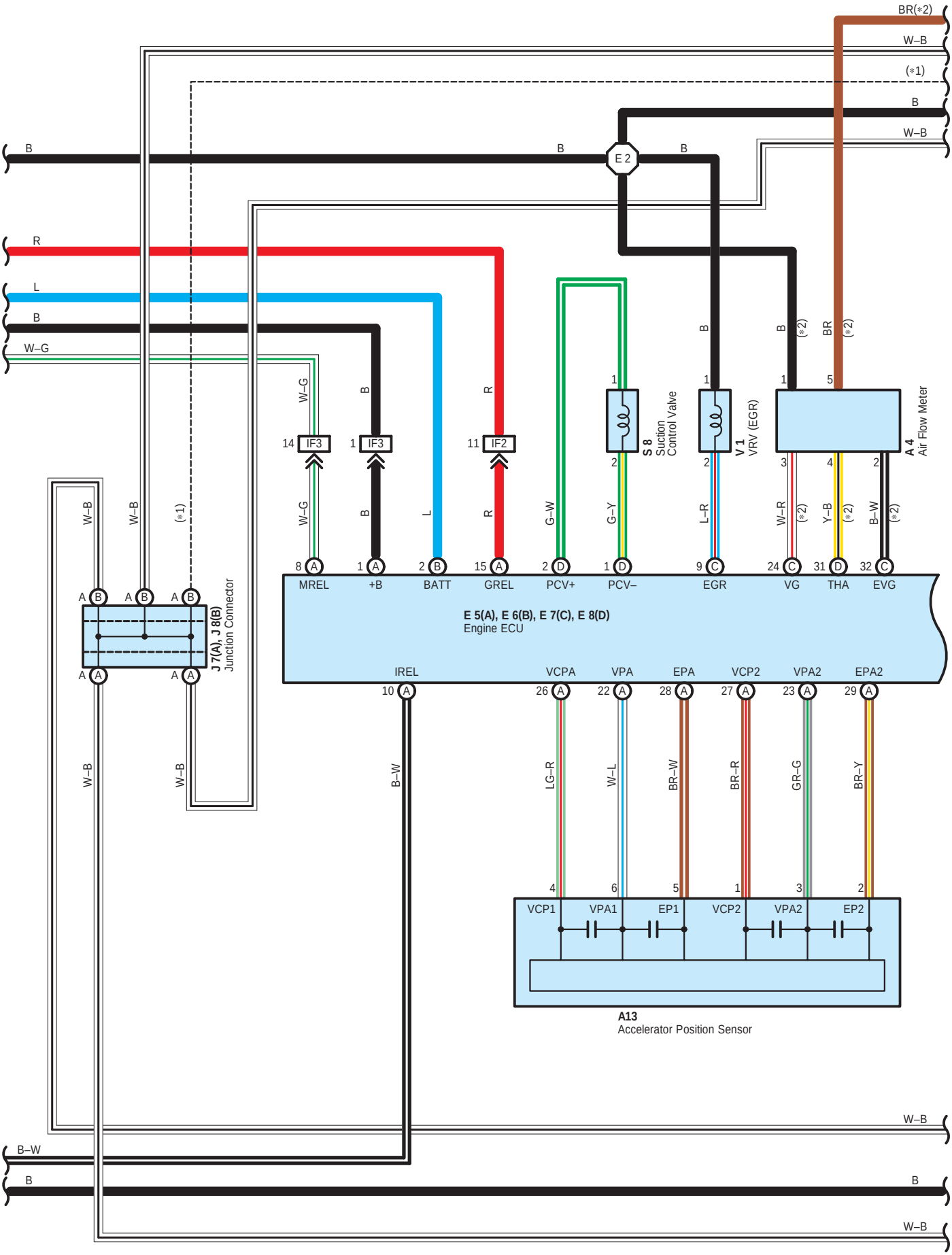
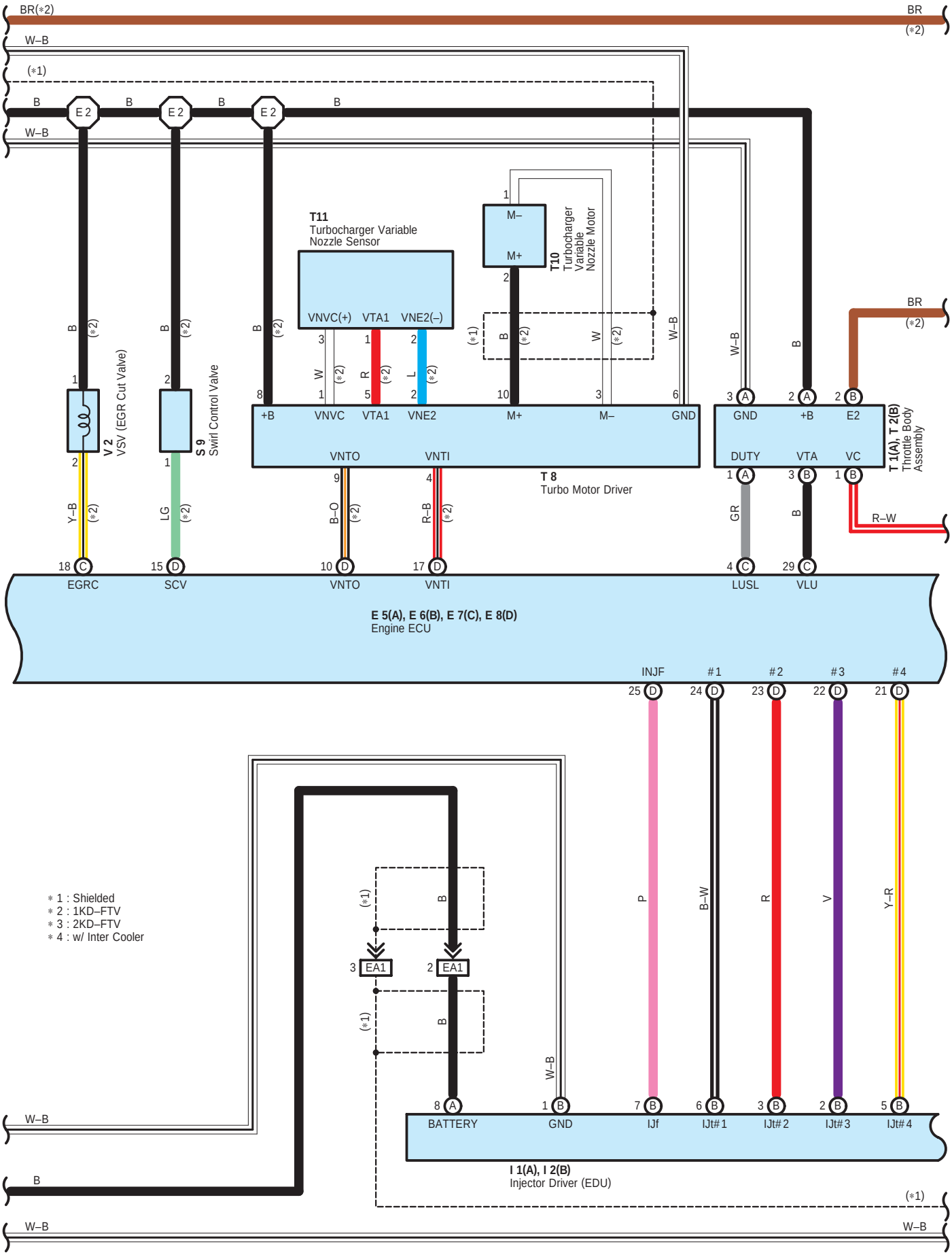
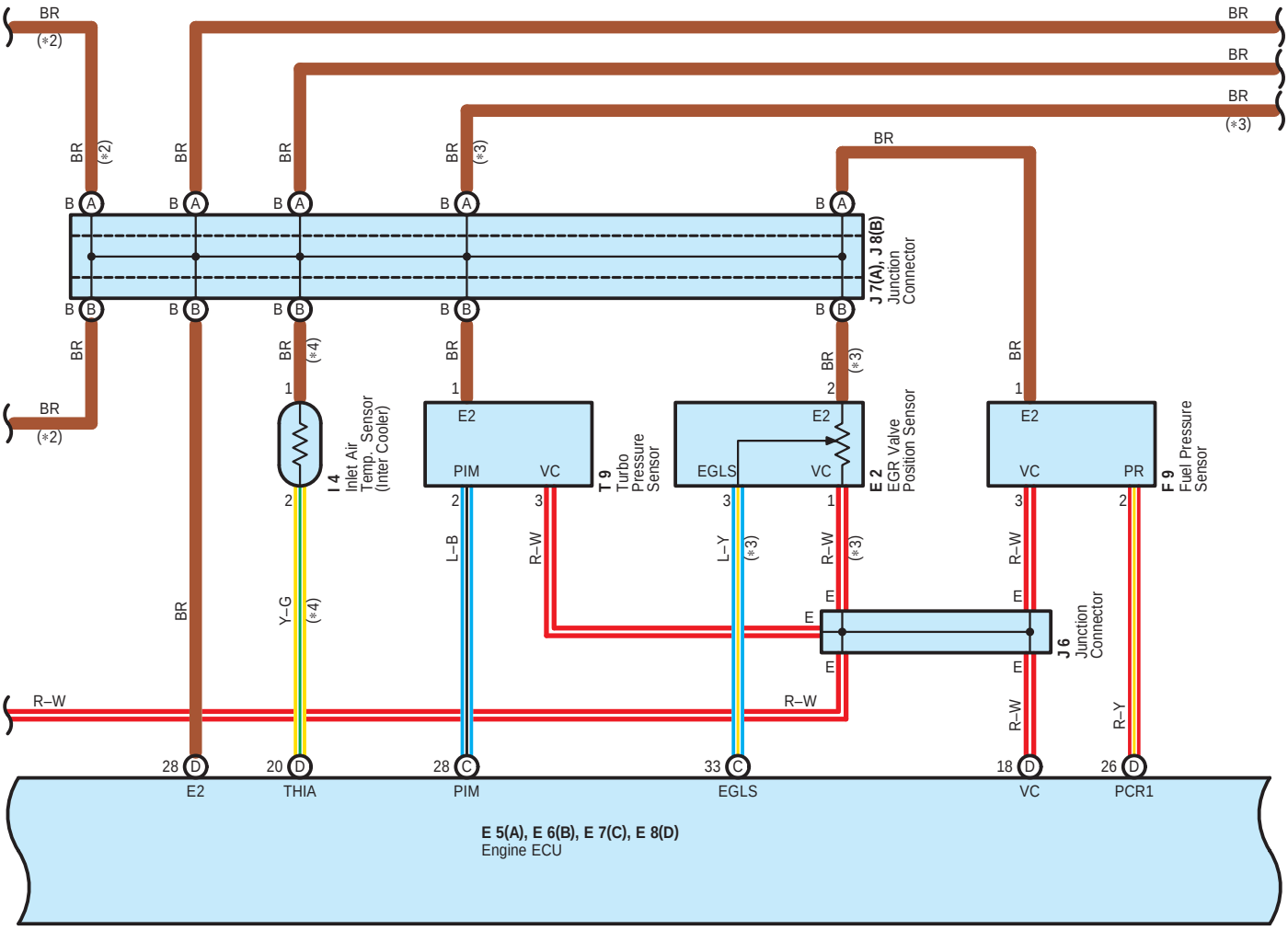
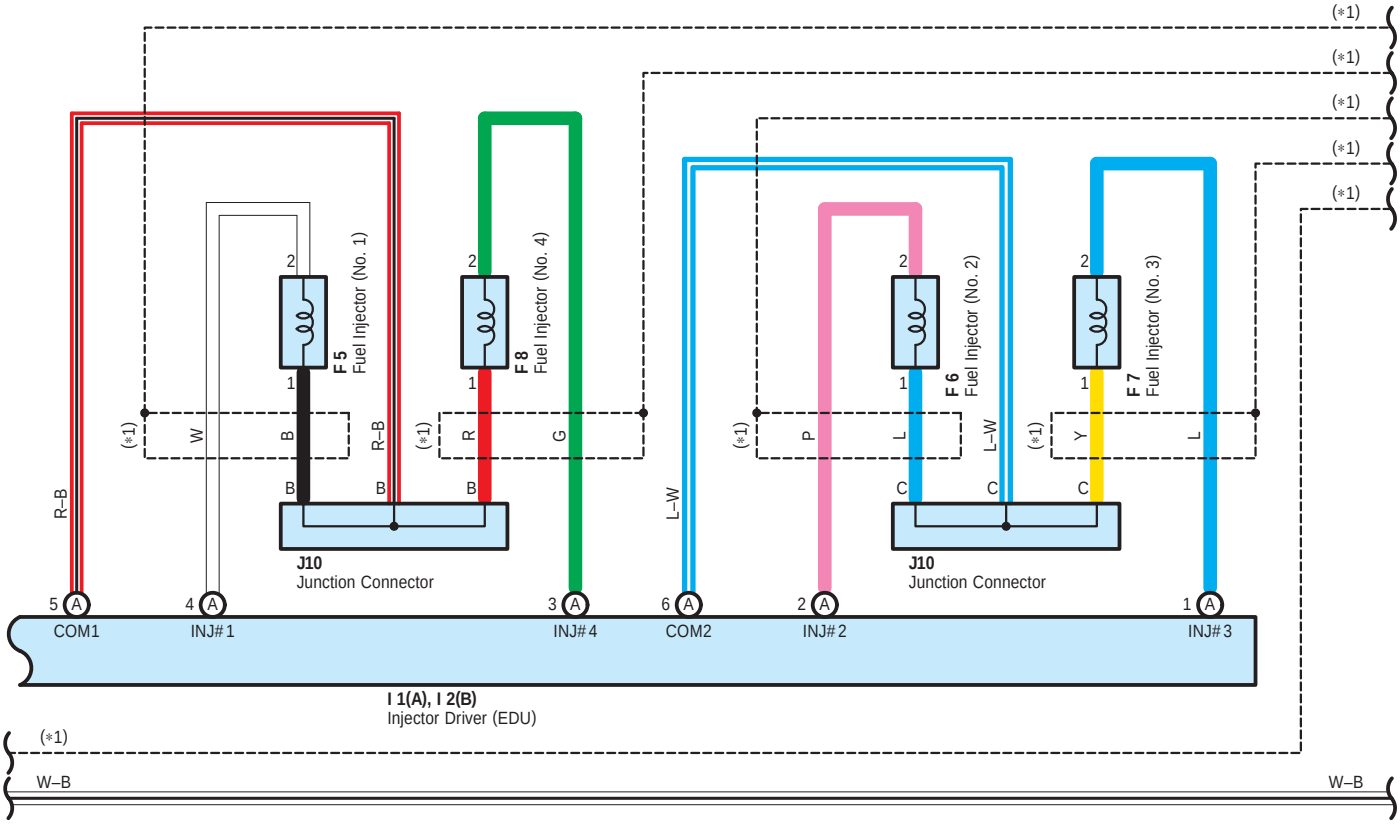
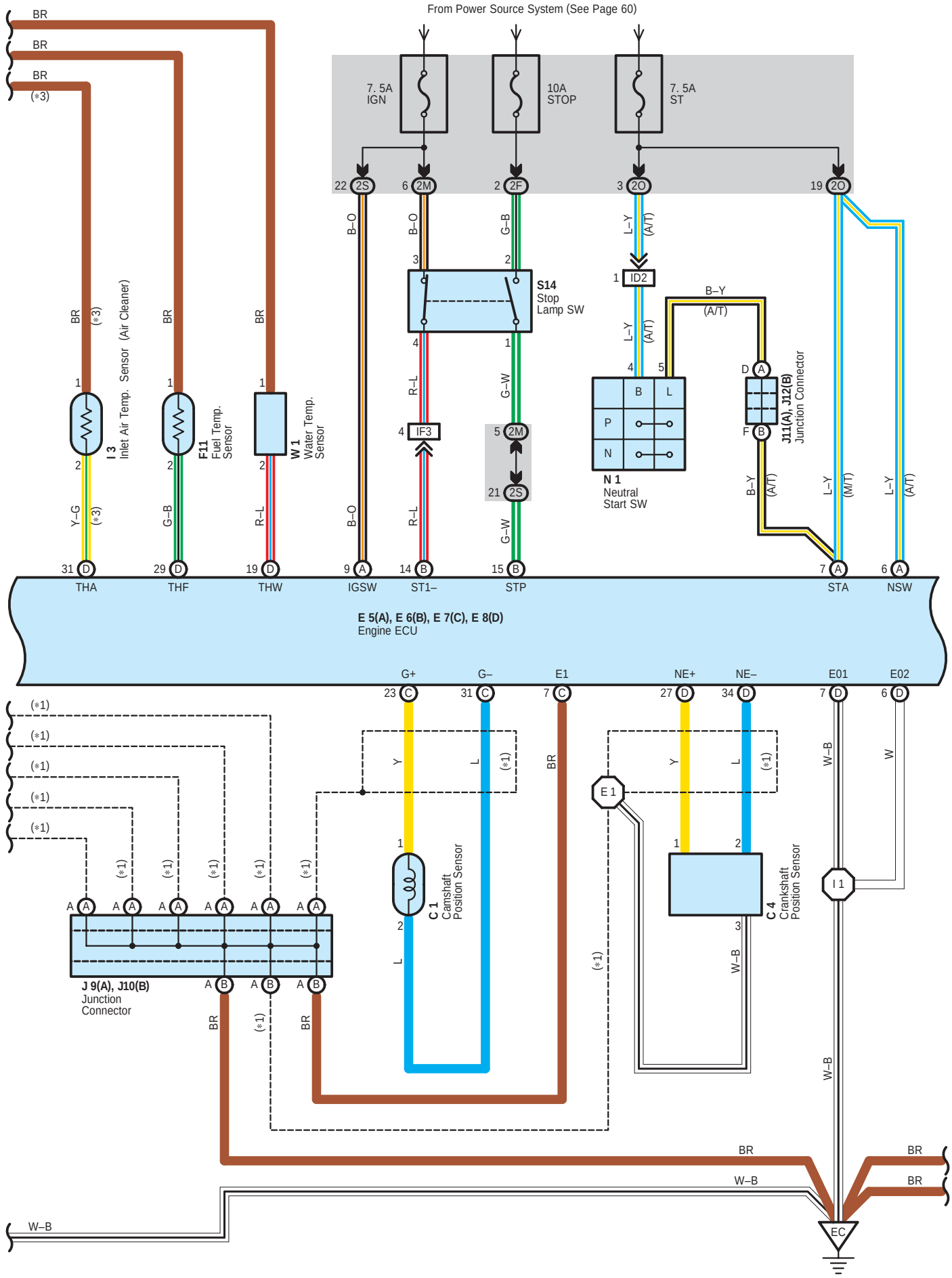

From Power Source System (See Page 60)
80A GLOW
50A BATT P/I
* 1 : Shielded
* 2 : 1KD–FTV
1 1G
3 1B
B
R
L
B
W–G
W–L
L
A B
C A
J 4(A), J 5(B) Junction Connector
L
B
W–G
B
R
1
1
1 1H
1 1J
4 1J
2 1J
5
2
GLOW Relay
3
1
1
25A EFI
2
MAIN Relay
EDU Relay
1
1
5 1J
3 1J
8 1J
7 1J
B–R
W–B
B
W–B
B
B–W
1 EA2
12 EA1
12 IF2
B–R
B–W
B
G 1
Glow Plug
1
A
A
W–B
A
J 1
Junction Connector
W–B
B–W
B
EB


BR(*2)
W–B
(*1)
B
W–B
B
B
E 2
B
R
L
B
W–G
W–G
B
R
14 IF3
1 IF3
11 IF2
1
S 8
Suction Control Valve
1
V 1
VRV (EGR)
B
B
(*2)
BR
(*2)
1
5
A 4
Air Flow Meter
2
2
3
4
2
W–G
B
L
R
G–W
G–Y
L–R
W–R
(*2)
Y–B
(*2)
B–W
(*2)
8 A
MREL
1 A
+B
2 B
BATT
15 A
GREL
2 D
PCV+
1 D
PCV–
9 C
EGR
24 C
VG
31 D
THA
32 C
EVG
E 5(A), E 6(B), E 7(C), E 8(D)
Engine ECU
W–B
W–B
(*1)
A B A B A B
A A A A
J 7(A), J 8(B)
Junction Connector
IREL
VCPA
VPA
EPA
VCP2
VPA2
EPA2
10 A
26 A
22 A
28 A
27 A
23 A
29 A
B–W
LG–R
W–L
BR–W
BR–R
GR–G
BR–Y
W–B
W–B
4
6
5
1
3
2
VCP1
VPA1
EP1
VCP2
VPA2
EP2
A13
Accelerator Position Sensor
W–B
B–W
B
B
W–B

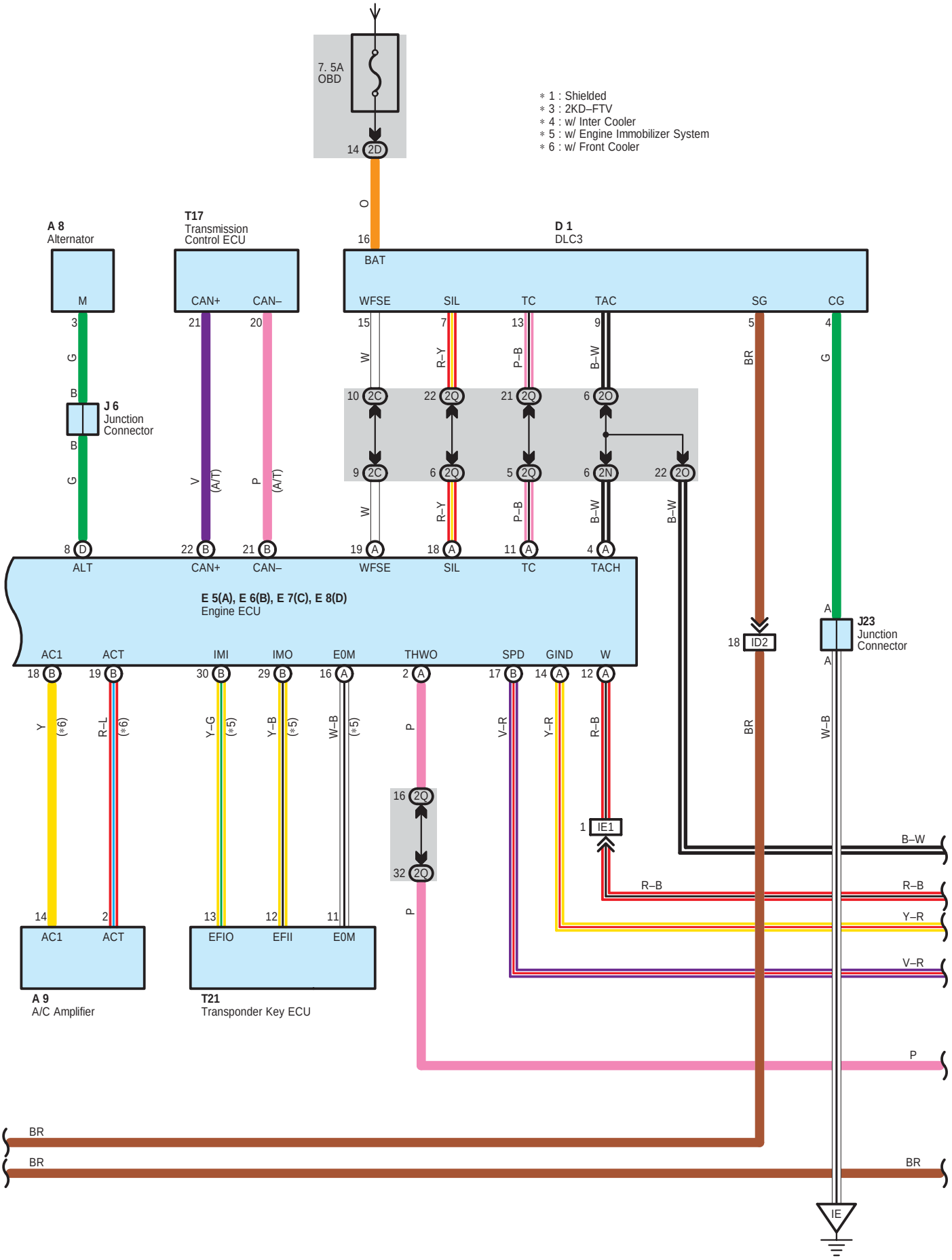

BR(*2)
BR
(*2)
W–B
(*1)
B
E 2
T11
Turbocharger Variable
Nozzle Sensor
VNVC(+)
VTA1
VNE2(–)
T10
Turbocharger
Variable
Nozzle Motor
M–
M+
V 2
VSV (EGR Cut Valve)
S 9
Swirl Control Valve
+B
VNVC
VTA1
VNE2
M+
M–
GND
VNTO
VNTI
T 8
Turbo Motor Driver
DUTY
VTA
VC
T 1(A), T 2(B)
Throttle Body
Assembly
R–W
EGRC
SCV
VNTO
VNTI
LUSL
VLU
E 5(A), E 6(B), E 7(C), E 8(D)
Engine ECU
INJF
#1
#2
#3
#4
* 1 : Shielded
* 2 : 1KD–FTV
* 3 : 2KD–FTV
* 4 : w/ Inter Cooler
EA1
BATTERY
GND
IJf
IJt#1
IJt#2
IJt#3
IJt#4
I 1(A), I 2(B)
Injector Driver (EDU)

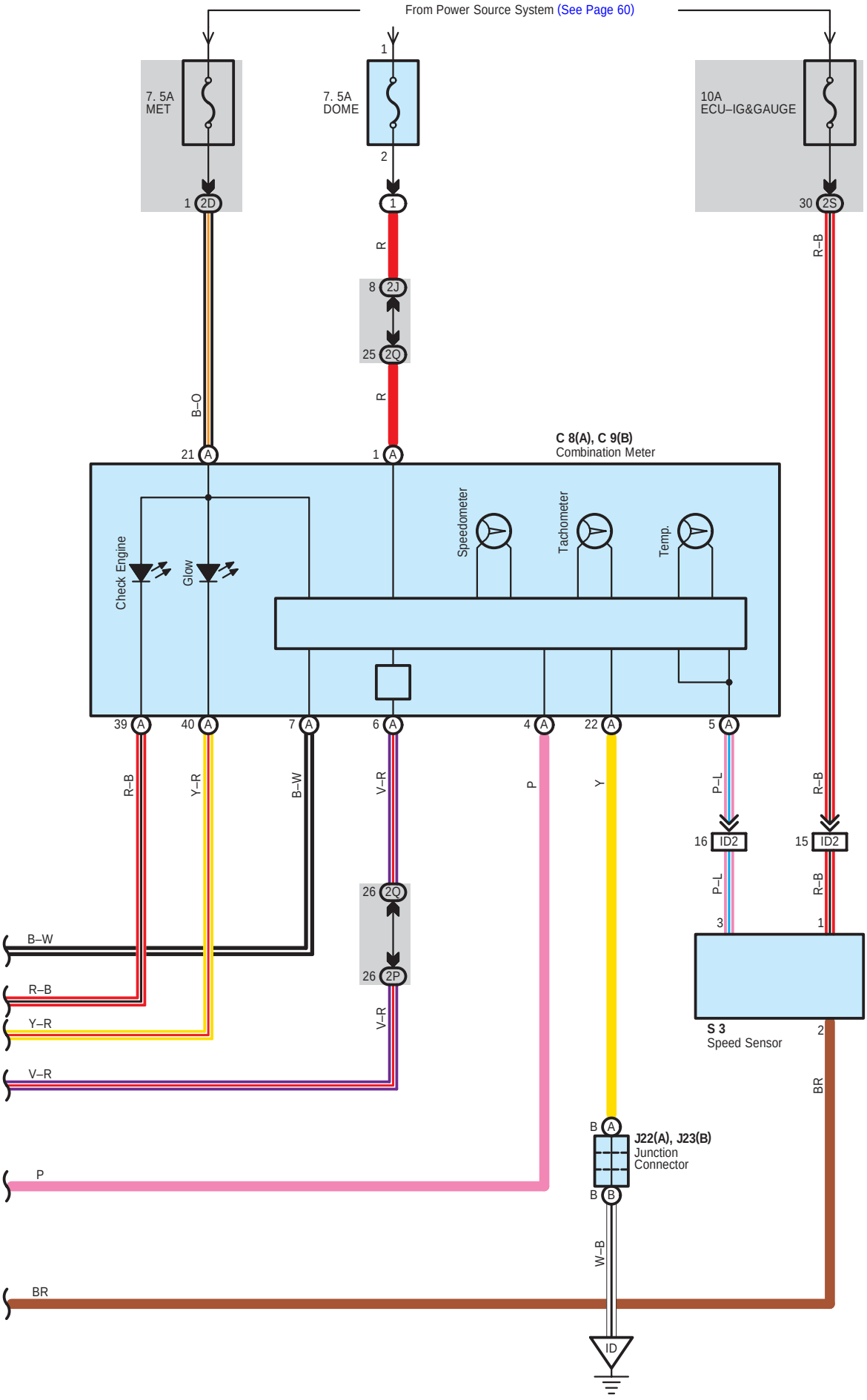

BR
(*2)
BR
BR
BR
(*3)
J7(A), J8(B)
Junction Connector
I 4
Inlet Air Temp. Sensor (Inter Cooler)
T 9
Turbo Pressure Sensor
E 2
EGR Valve Position Sensor
F 9
Fuel Pressure Sensor
J 6
Junction Connector
Y–G
L–B
R–W
L–Y
R–Y
E2
PIM
VC
EGLS
PR
28 D E2
20 D THIA
28 C PIM
33 C EGLS
18 D VC
26 D PCR1
E 5(A), E 6(B), E 7(C), E 8(D)
Engine ECU


(*1)
F 5
Fuel Injector (No. 1)
F 8
Fuel Injector (No. 4)
F 6
Fuel Injector (No. 2)
F 7
Fuel Injector (No. 3)
J10
Junction Connector
R–B
L–W
5 A COM1
4 A INJ#1
3 A INJ#4
6 A COM2
2 A INJ#2
1 A INJ#3
I 1(A), I 2(B)
Injector Driver (EDU)
W–B


From Power Source System (See Page 60)
7. 5A IGN
10A STOP
7. 5A ST
22 2S
6 2M
2 2F
3 2O
19 2O
B–O
G–B
L–Y (A/T)
S14 Stop Lamp SW
ID2
B–Y (A/T)
N 1 Neutral Start SW
J11(A), J12(B) Junction Connector
I 3 Inlet Air Temp. Sensor (Air Cleaner)
F11 Fuel Temp. Sensor
W 1 Water Temp. Sensor
IF3
R–L
G–W
Y–G
L–Y (M/T)
THA
THF
THW
IGSW
ST1–
STP
STA
NSW
E 5(A), E 6(B), E 7(C), E 8(D) Engine ECU
G+
G–
E1
NE+
NE–
E01
E02
C 1 Camshaft Position Sensor
C 4 Crankshaft Position Sensor
E 1
I 1
J 9(A), J10(B) Junction Connector
W–B
BR
EC

From Power Source System (See Page 60)




From Power Source System (See Page 60)
7. 5A
MET
7. 5A
DOME
10A
ECU–IG&GAUGE
1 2D
1
2
1 2J
8 2J
25 2Q
30 2S
R
R
R–B
B–O
21 A
1 A
C 8(A), C 9(B)
Combination Meter
Check Engine
Glow
Speedometer
Tachometer
Temp.
39 A
40 A
7 A
6 A
4 A
22 A
5 A
R–B
Y–R
B–W
V–R
P
Y
P–L
R–B
16 ID2
15 ID2
P–L
R–B
3
1
26 2Q
26 2P
V–R
B–W
R–B
Y–R
V–R
S 3
Speed Sensor
2
BR
B A
B B
J22(A), J23(B)
Junction
Connector
P
W–B
BR
ID

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. of air cleaner, which is input as a control signal to TERMINAL THA of the engine ECU.

The intake air temp. sensor is detects the intake air temp. of inter cooler, 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

E5 (A), E6 (B), E7 (C), E8 (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 : 1.2–1.6 volts (When a negative pressure of 40 kPA (300 mmhg) is applied)
1.3–1.9 volts (During air release)
3.2–3.8 volts (When a pressure of 69 kPA (0.7 kg/cm^3) is applied)
THW–E2 : 0.2–1.0 volts (During warm–up and coolant temp. 60˚C, 140˚F–120˚C, 248˚F)
THA–E2 : 0.5–3.4 volts (During warm–up and intake temp. 0˚C, 32˚F–80˚C, 176˚F)
THIA–E2 : 0.5–3.4 volts (During warm–up and intake air 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))
EGLS–E2 : 0.6–1.4 volts (Ignition SW at ON position)
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)
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 position in P or N position)
9–14.0 volts (Other shift position in P or N position)

: Parts Location

Code	See Page	Code	See Page	Code	See Page
A4	36	F9	36	J23 B	38
A8	36	F11	36	N1	37
A9	38	G1	36	S3	37
A13	38	I1 A	36	S8	37
C1	36	I2 B	36	S9	37
C4	36	I3	36	S14	39
C8 A	38	I4	36	T1 A	37
C9 B	38	J1	37	T2 B	37
D1	38	J4 A	38	T8	39
E2	36	J5 B	38	T9	37
E5 A	38	J6	38	T10	37
E6 B	38	J7 A	38	T11	37
E7 C	38	J8 B	38	T17	39
E8 D	38	J9 A	38	T21	39
F5	36	J10 B	38	V1	37
F6	36	J11 A	38	V2	37
F7	36	J12 B	38	W1	37
F8	36	J22 A	38		

: 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	46	Engine Wire and Engine Room Main Wire (Inside of Engine Room R/B and Engine Room J/B)
EA2		
ID2	48	Engine Wire and Instrument Panel Wire (Behind the Glove Box)
IE1	48	Instrument Panel Wire and Instrument Panel Wire (Instrument Panel Reinforcement LH)
IF2	50	Engine Room Main Wire and Instrument Panel Wire (Behind the Driver Side J/B)
IF3		

 **: Ground Points**

Code	See Page	Ground Points Location
EB	46	Left Side of the Fender Apron
EC	46	Rear Side of the Cylinder Block
ID	48	Instrument Panel Reinforcement Center
IE	48	Instrument Panel Reinforcement RH

 **: Splice Points**

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E1	46	Engine Wire	I1	50	Engine Wire
E2					