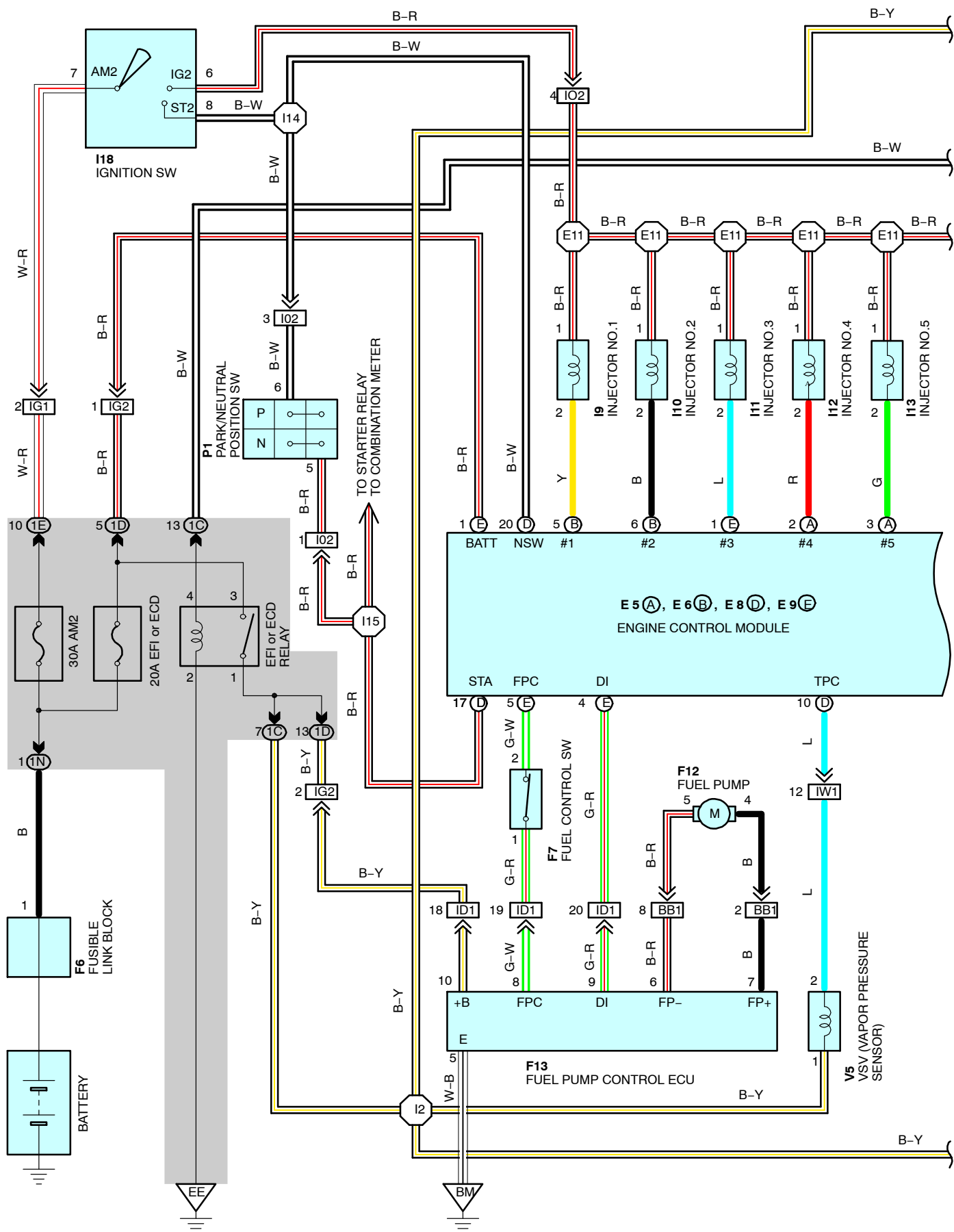
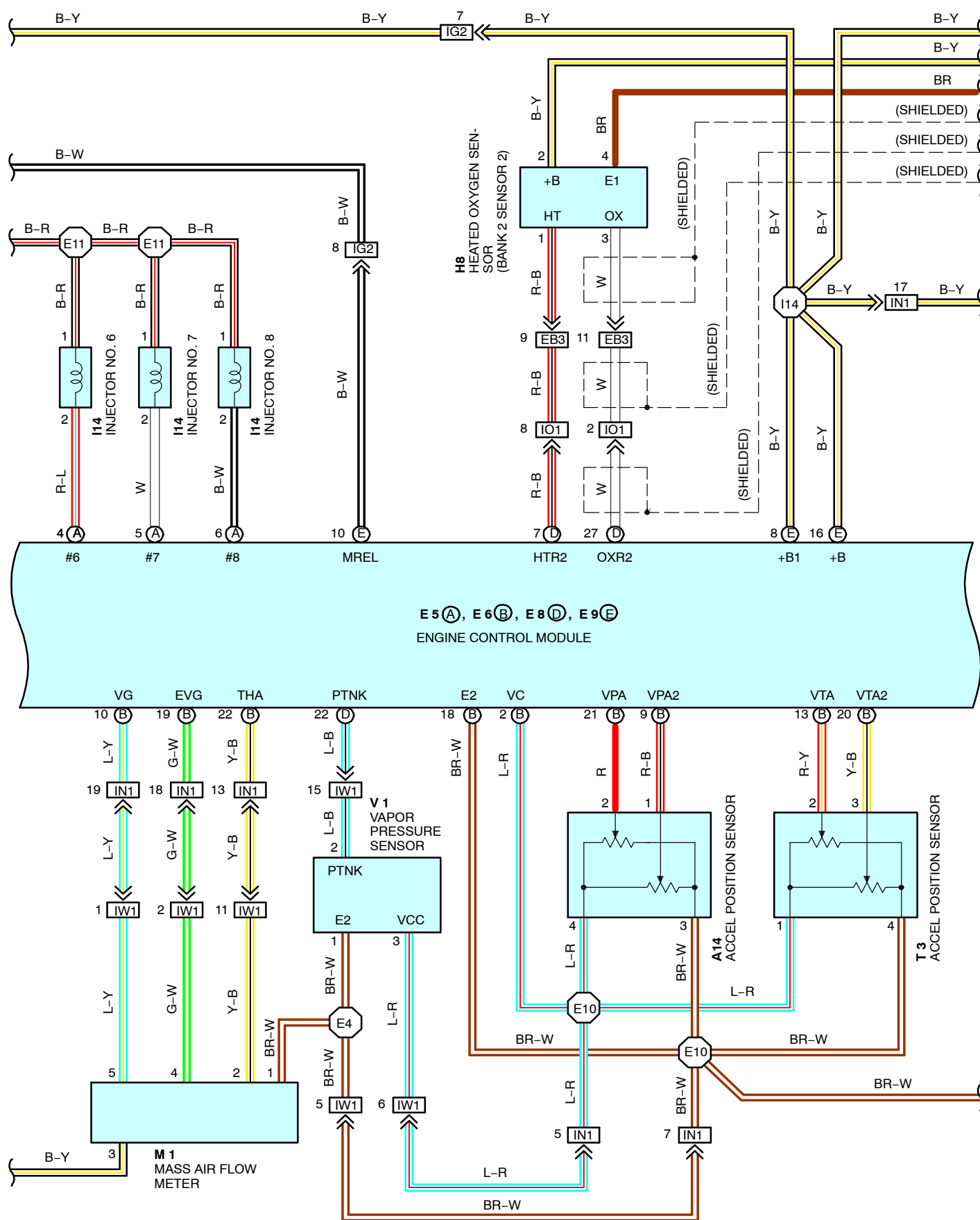
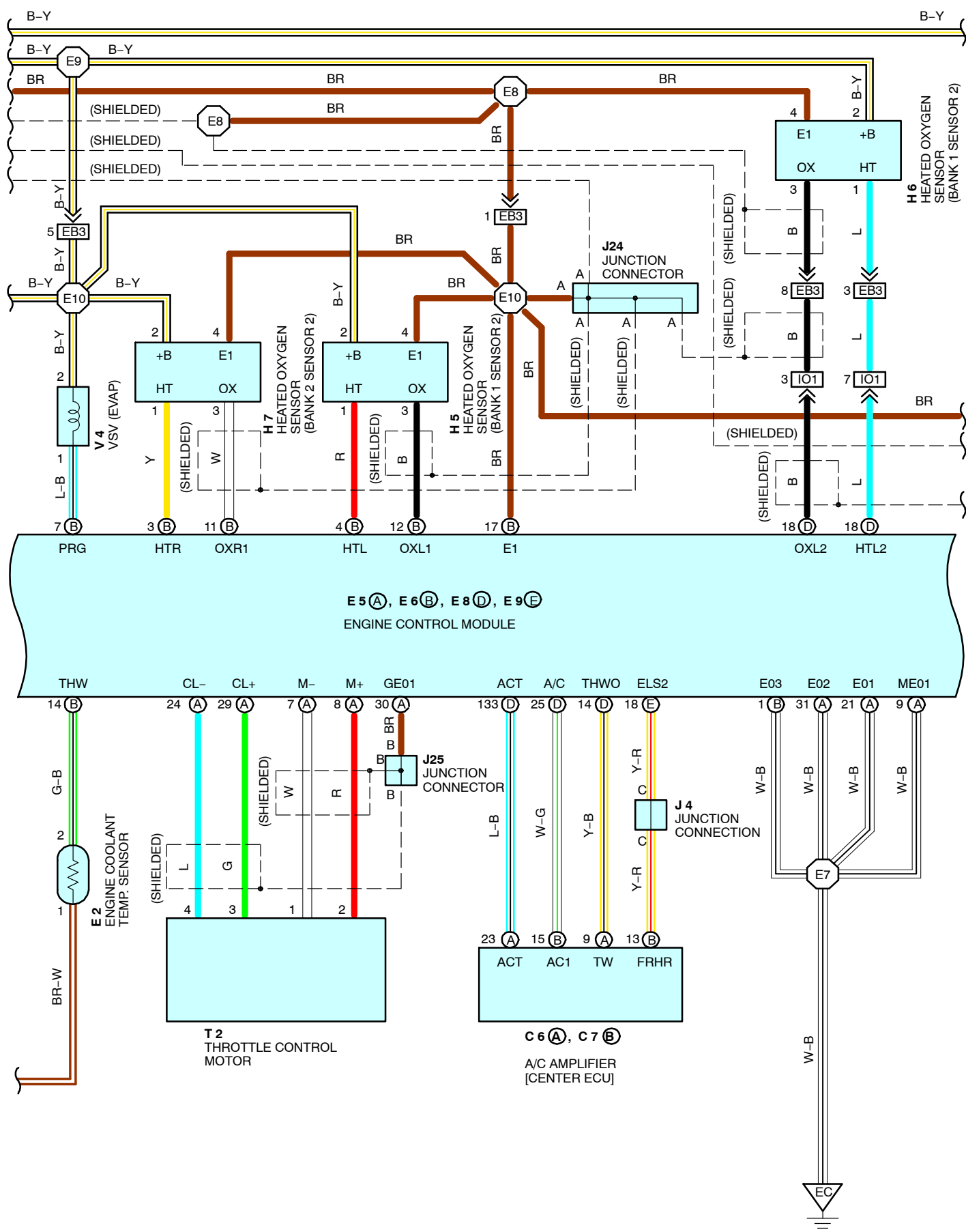


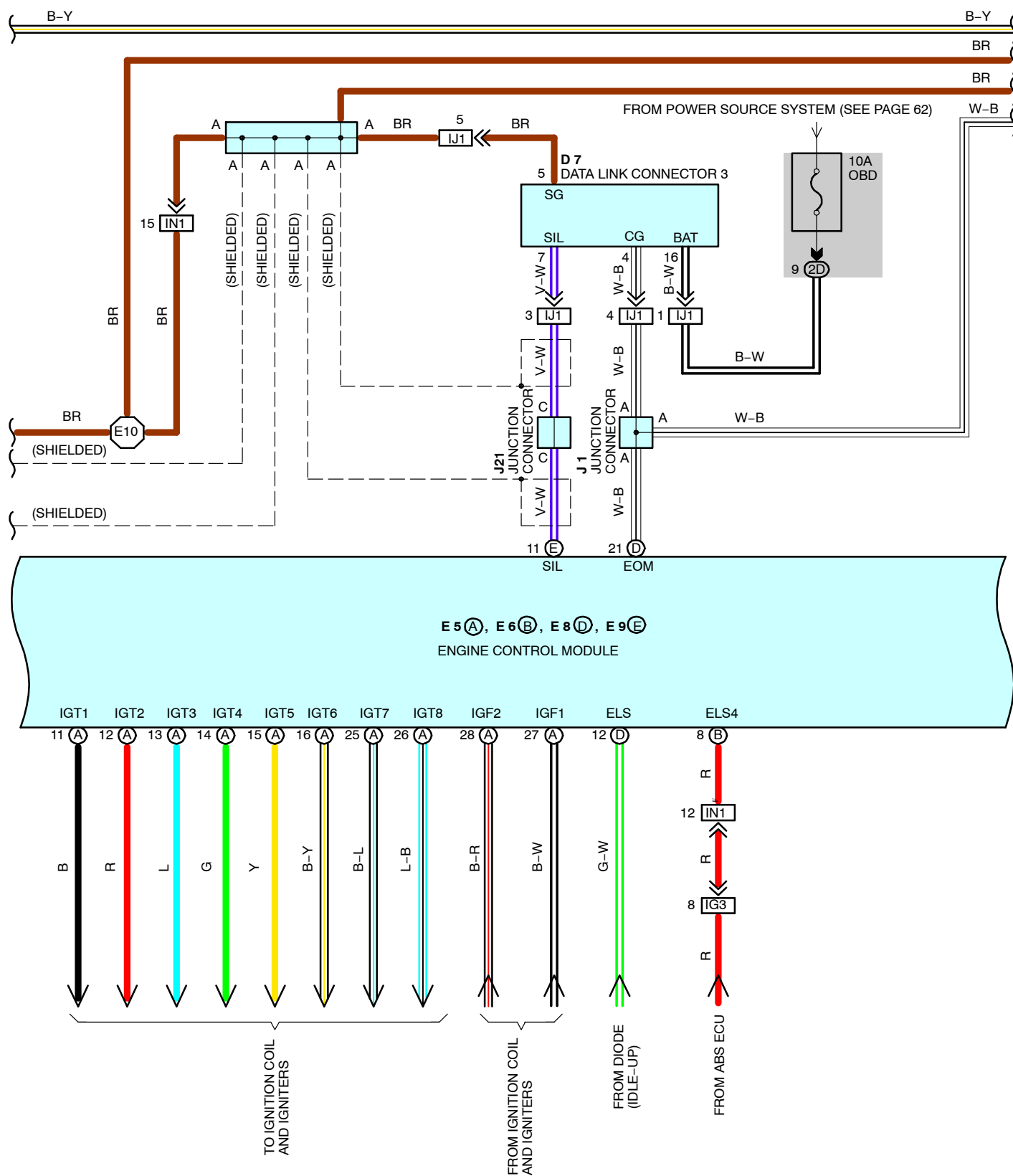
ENGINE CONTROL AND IMMOBILISER SYSTEM



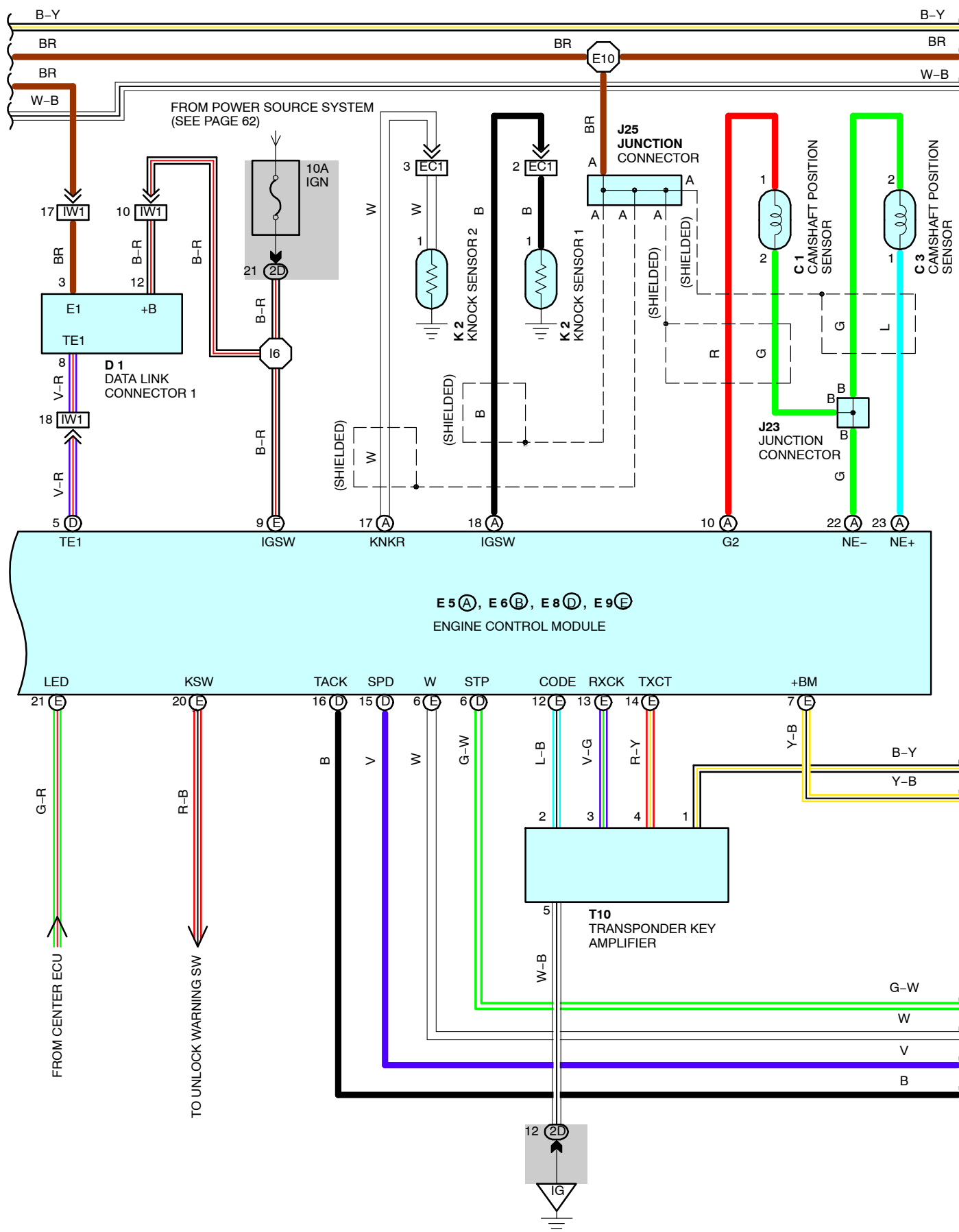


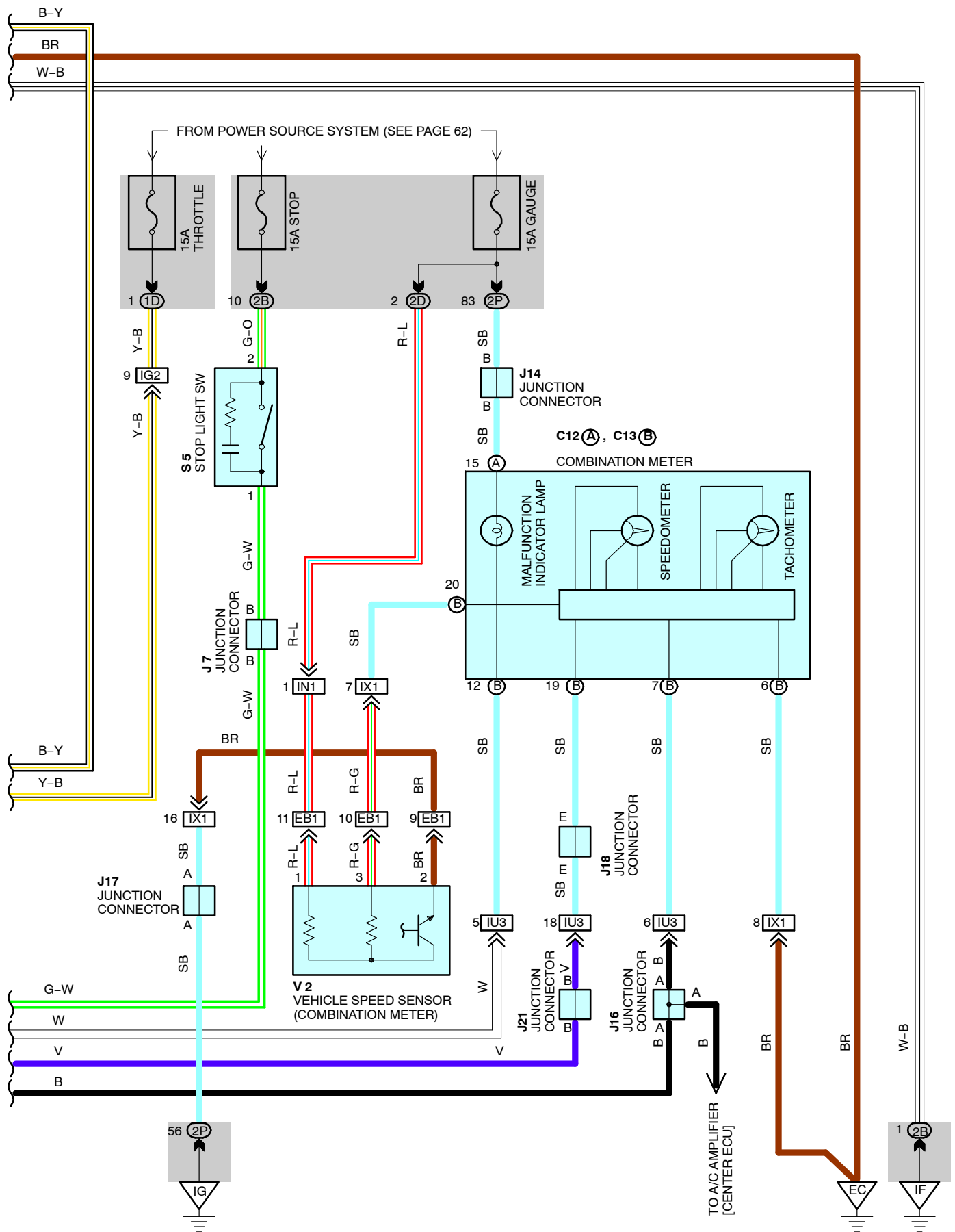
ENGINE CONTROL AND IMMOBILISER SYSTEM





ENGINE CONTROL AND IMMOBILISER SYSTEM





ENGINE CONTROL AND IMMOBILISER SYSTEM

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 OXL1, OXR1, OXL2, OXR2** of the engine control module.

(4) RPM signal circuit

The camshaft position is detected by the camshaft position sensor and is input into **TERMINAL G2** 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 **TERMINAL VTA** of the engine control module.

(6) Vehicle speed circuit

The vehicle speed sensor (Combination meter) detects the vehicle speed, and the signal is input into **TERMINAL SPD** of the engine control module via the combination meter.

(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 or ECD relay, to **TERMINALS +B, +B1** 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 KNKL, KNKR** of the engine control module as a control signal.

2. CONTROL SYSTEM

- * SFI system

The SFI system monitors the engine condition through the signals input from each of the sensors to the engine control module. The control signal is sent to the engine control module **TERMINALS #1, #2, #3, #4, #5, #6, #7, #8** 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 of the 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, IGT6, IGT7, IGT8**, 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 of the sensors, and outputs current to **TERMINALS HTL, HTR, HTL2, HTR2** to control the heater.

- * Fuel pump control system

The engine control module supplies current to **TERMINAL FPC**, and controls the operation speed of the fuel pump with the fuel pump control ECU.

- * 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.

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 AND IMMOBILISER SYSTEM

SERVICE HINTS

EFI OR ECD RELAY

1-3 : Closed with ignition SW at **ON** or **ST** position

E2 ENGINE COOLANT TEMP. SENSOR

1-2: Approx. : **16.2 kΩ** (**-20°C**, **-4°F**)
 : Approx. **2.45 kΩ** (**20°C**, **68°F**)
 : Approx. **0.32 kΩ** (**80°C**, **176°F**)

E6 (B), E8 (D), E9 (E) ENGINE CONTROL MODULE

BATT-E1 : Always **9.0-14.0** volts
 +BM-E1 : Always **9.0-14.0** volts
 IGSW-E1 : **9.0-14.0** volts with ignition SW at **ON** or **ST** position
 +B, +B1-E1 : **9.0-14.0** volts with ignition SW at **ON** or **ST** position
 VC-E2 : **4.5-5.5** volts with ignition SW on
 VTA2-E2 : **2.0-2.9** volts with ignition SW on and throttle valve fully closed
 : **4.6-5.0** volts with ignition SW on and throttle valve fully opened
 VTA-E2 : **0.4-1.0** volts with ignition SW on and throttle valve fully closed
 : **3.2-4.8** volts with ignition SW on and throttle valve fully opened
 VPA-E2 : **0.25-0.9** volts with ignition SW at on and accelerator fully closed
 : **3.2-4.8** volts with ignition SW at on and accelerator fully opened
 VPA2-E2 : **1.8-2.7** volts with ignition SW at on and accelerator fully closed
 : **4.7-5.0** volts with ignition SW at on and accelerator fully opened
 THA-E2 : **0.5-3.4** volts with idling, intake air temp. **20°C** (**68°F**)
 THW-E2 : **0.2-1.0** volts with idling, coolant temp. **80°C** (**176°F**)
 STA-E1 : **6.0** volts or more with cranking
 TE1-E1 : **9.0-14.0** volts with ignition SW on
 W-E1 : **9.0-14.0** volts with idling
 : **0-3.0** volts with ignition SW on

○ : PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
A14	36	H6	37	J21	39
C1	36	H7	37	J22	39
C3	36	H8	37	J23	39
C6	A 38	I9	37	J24	39
C7	B 38	I10	37	J25	39
C12	A 38	I11	37	K1	37
C13	B 38	I12	37	K2	37
D1	36	I13	37	M1	37
D7	38	I14	37	P1	37
E2	36	I15	37	S5	39
E5	A 38	I16	37	T2	37
E6	B 38	I18	38	T3	37
E8	D 38	J1	39	T10	39
E9	E 38	J4	39	V1	37
F6	36	J7	39	V2	37
F7	38	J14	39	V4	37
F12	40	J16	39	V5	37
F13	40	J17	39		
H5	37	J18	39		

 : JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1C	21	Engine Room No.2 Wire and Engine Room J/B (Engine Compartment Left)
1D		
1E		
1N	21	Engine Room No.3 Wire and Engine Room J/B (Engine Compartment Left)
2B	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2D		
2P	26	Instrument Panel Integration Wire and Cowl Side J/B LH (Left Kick Panel)

 : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EB1	44	Engine Wire and Transmission Wire (On the Transmission)
EB3		
EC1	44	Engine No.2 Wire and Engine Wire (Rear Side of Intake Manifold)
ID1	46	Dash Wire and Floor Wire (Left Kick Panel)
IG1	48	Engine Room No.2 Wire and Dash Wire (Behind the Combination Meter)
IG2		
IG3		
IJ1	48	Dash Wire and Detector Wire (Instrument Panel Center)
IN1	50	Engine Wire and Dash Wire (Behind the Glove Box)
IO1		
IO2		
IU3	50	Instrument Panel Integration Wire and Dash Wire (Behind the Glove Box)
IW1	52	Engine Room No.2 Wire and Dash Wire (Behind the Glove Box)
IX1	52	Instrument Panel Integration Wire and Engine Wire (Behind the Glove Box)
BB1	54	Floor Wire and Fuel Tank Wire (Near the Fuel Tank)

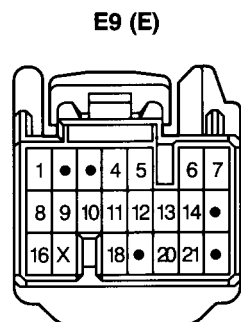
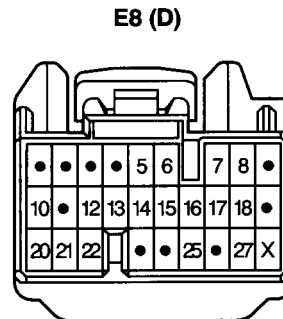
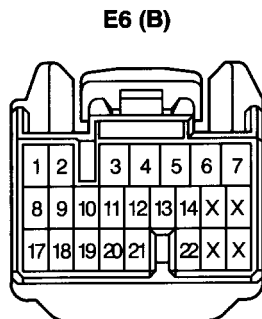
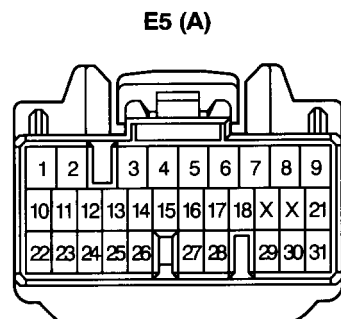
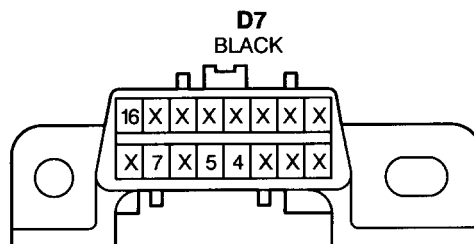
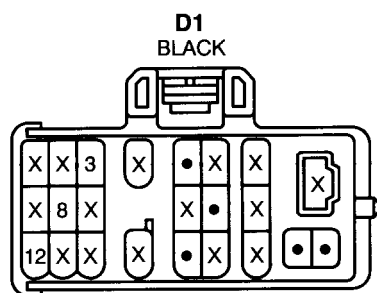
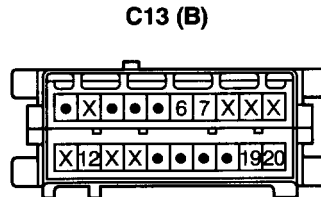
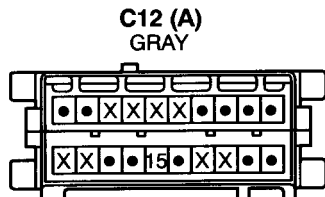
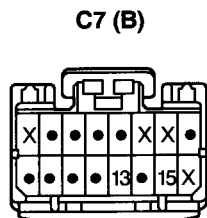
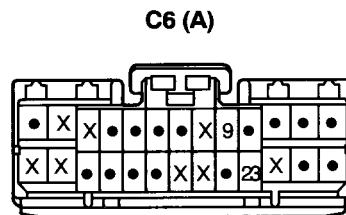
 : GROUND POINTS

Code	See Page	Ground Points Location
EC	44	Rear Bank of Right Cylinder Head
EE	44	Front Left Side of Fender Apron
IF	46	Set Bolt of Cowl Side J/B LH
IG		
BM	54	Left Rear Side Quarter Panel

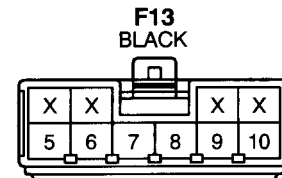
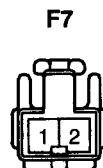
 : SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E4	44	Engine Room No.2 Wire	E11	44	Engine Wire
E7	44	Engine Wire	I2	48	Engine Room No.2 Wire
E8	44	Transmission Wire	I6	48	Dash Wire
E9			I14		
E10	44	Engine Wire	I15		

ENGINE CONTROL AND IMMOBILISER SYSTEM



F6
(See Page 34)



H5
DARK GRAY



H6
DARK GRAY



H7
DARK GRAY



H8
DARK GRAY



I9
BLUE



I10
BLUE



I11
BLUE



I12
BLUE



I13
BLUE



I14
BLUE



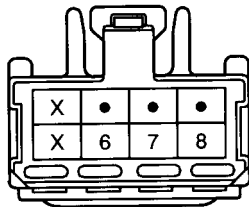
I15
BLUE



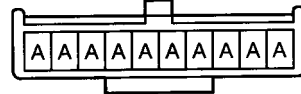
I16
BLUE



I18

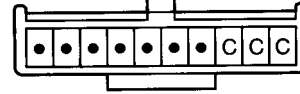


J1



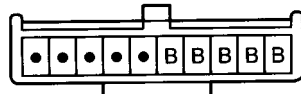
(Hint : See Page 7)

J4
BLUE



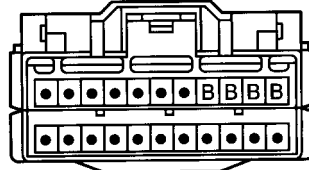
(Hint : See Page 7)

J7
GREEN



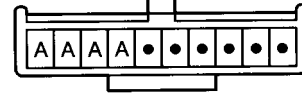
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J14



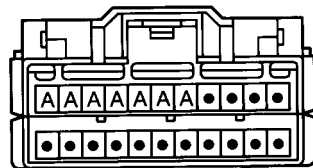
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J16
BLUE



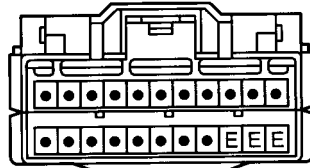
(Hint : See Page 7)

J17



(Hint : See Page 7)

J18
GRAY



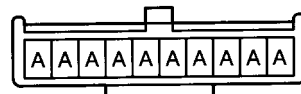
(Hint : See Page 7)

J21
BLUE



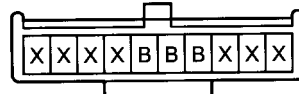
(Hint : See Page 7)

J22



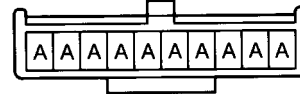
(Hint : See Page 7)

J23
BLUE



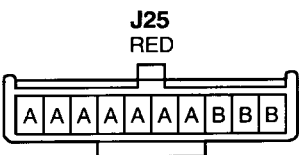
(Hint : See Page 7)

J24



(Hint : See Page 7)

ENGINE CONTROL AND IMMOBILISER SYSTEM



(Hint : See Page 7)

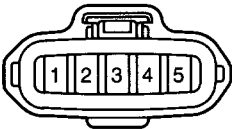
K1
DARK GRAY



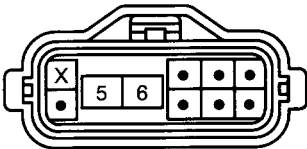
K2
DARK GRAY



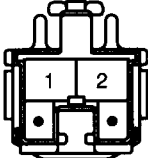
M1
BLACK



P1
GRAY



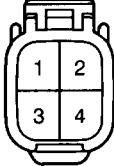
S5
BLUE



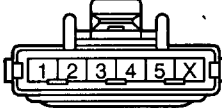
T2
GRAY



T3
GRAY



T10
BLACK



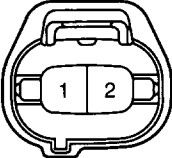
V1
BLACK



V2
BLACK



V4
BLACK



V5
BLUE

