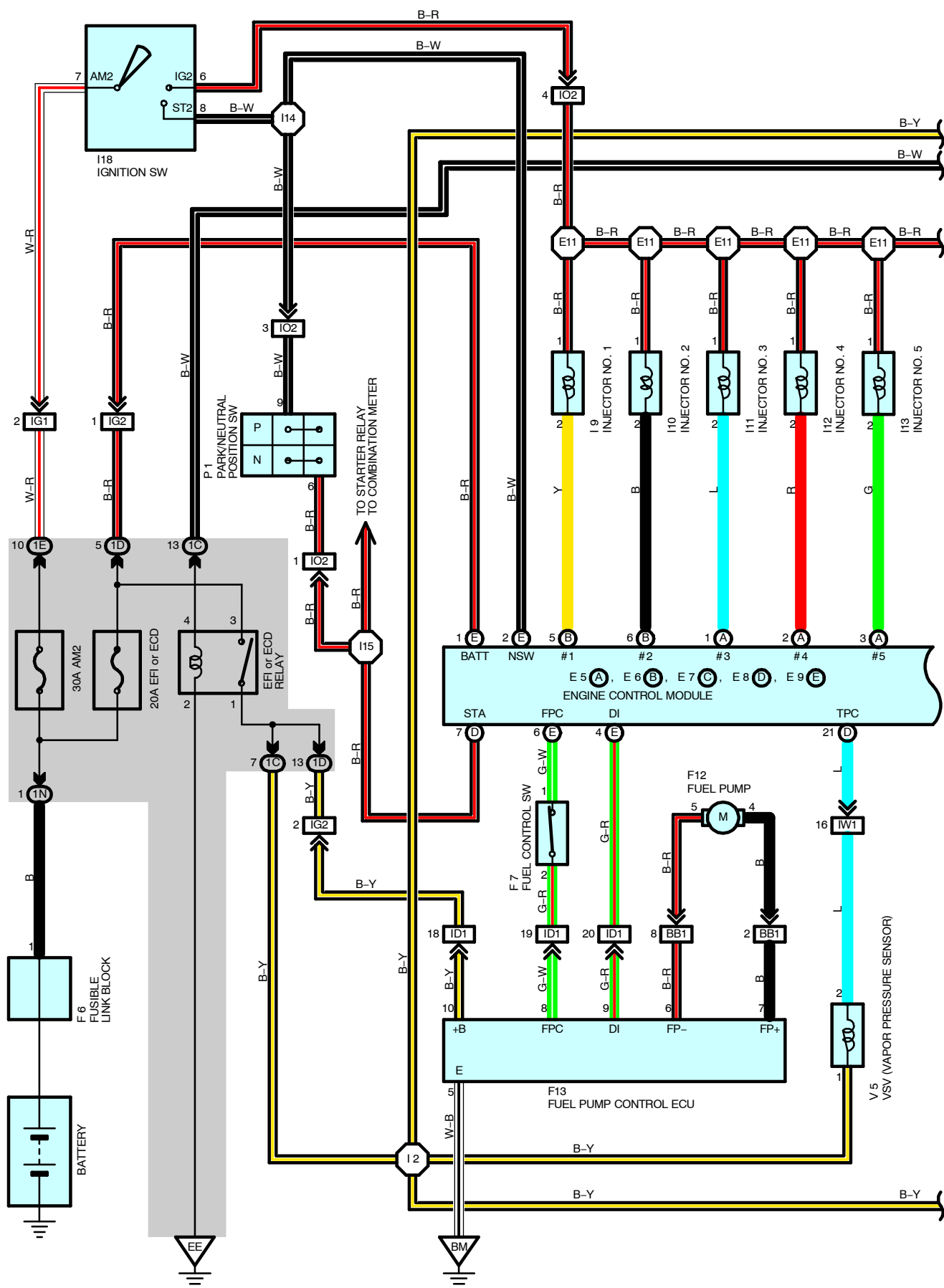
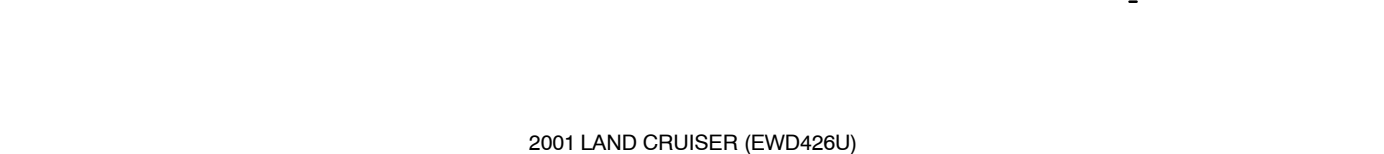
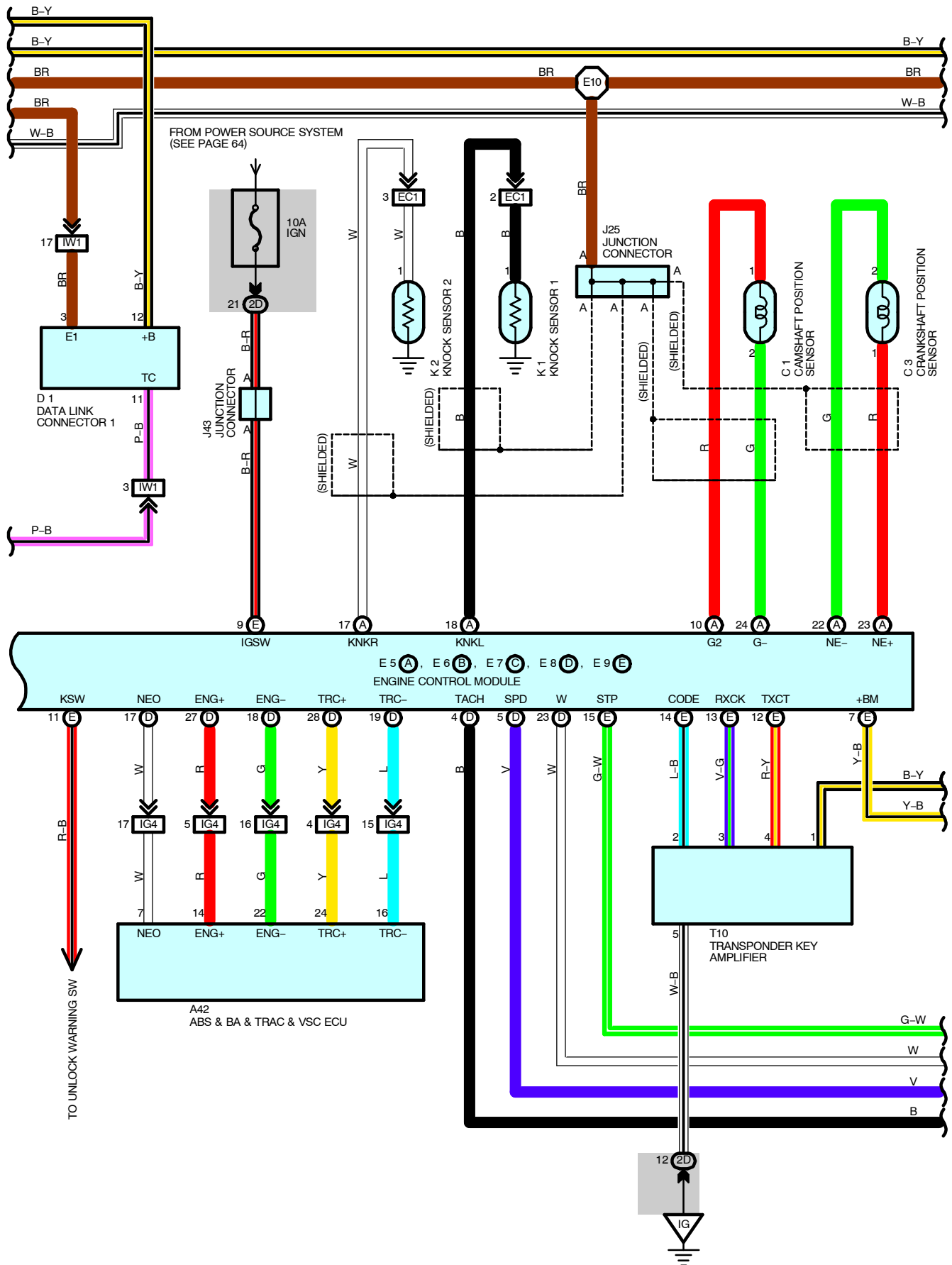


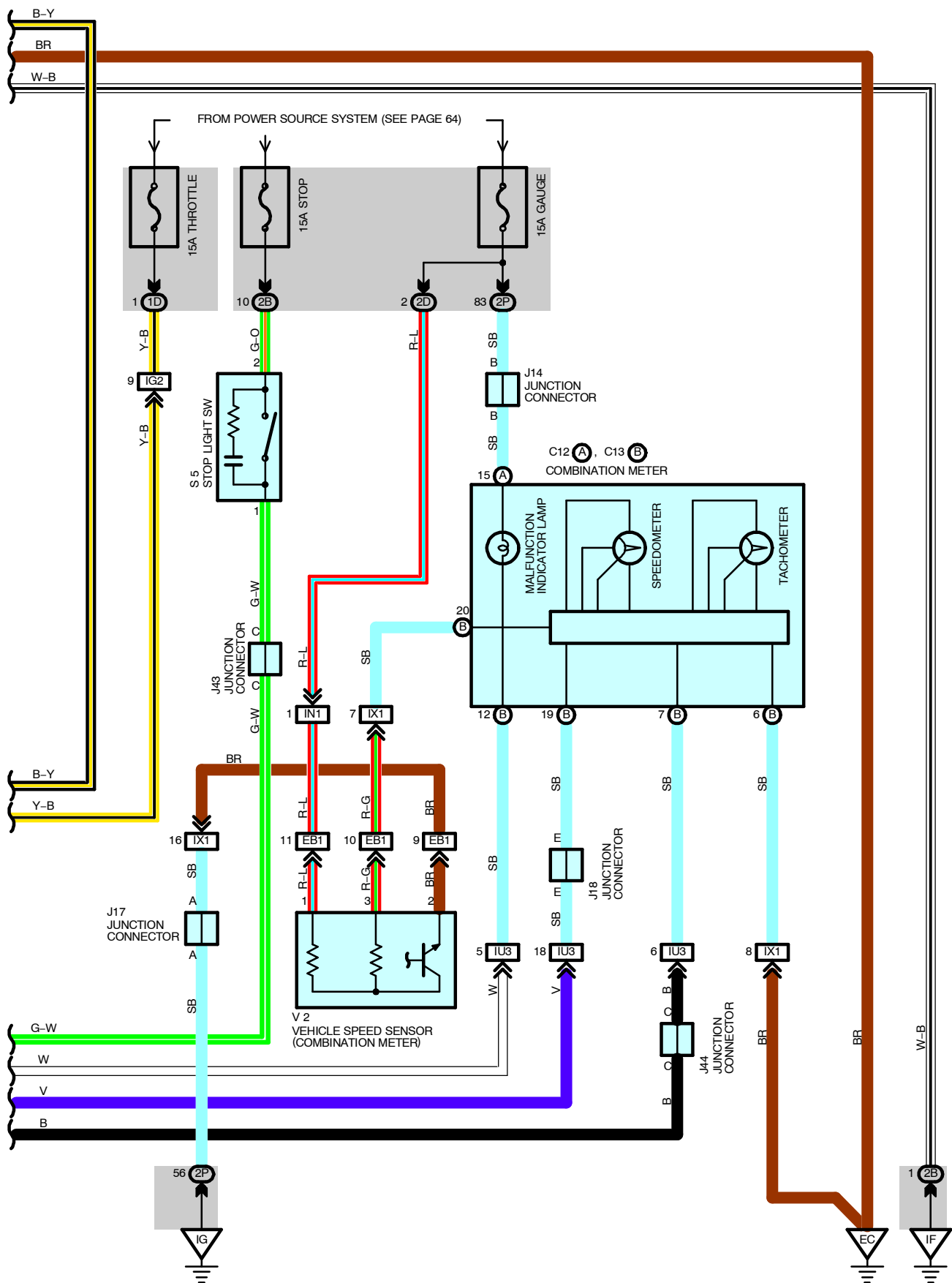
ENGINE CONTROL AND ENGINE IMMOBILISER SYSTEM





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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 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 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 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 ENGINE 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
 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		38	F6		38	J17		41
A42		40	F7		40	J18		41
C1		38	F12		42	J21		41
C3		38	F13		42	J22		41
C6	A	40	H5		39	J24		41
C7	B	40	H6		39	J25		41
C9	D	40	H7		39	J43		41
C12	A	40	H8		39	J44		41
C13	B	40	I9		39	K1		39
C20	E	40	I10		39	K2		39
C22	G	40	I11		39	M1		39
C24	I	40	I12		39	P1		39
D1		38	I13		39	S5		41
D7		40	I14		39	T2		39
E2		38	I15		39	T3		39
E5	A	40	I16		39	T10		41
E6	B	40	I18		40	V1		39
E7	C	40	J7		41	V2		39
E8	D	40	J14		41	V4		39
E9	E	40	J16		41	V5		39

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1C	23	Engine Room No.2 Wire and Engine Room J/B (Engine Compartment Left)
1D		
1E		
1N	23	Engine Room No.3 Wire and Engine Room J/B (Engine Compartment Left)
2B	26	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2D		
2P	28	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	46	Engine Wire and Transmission Wire (On the Transmission)
EB3		
EC1	46	Engine No.2 Wire and Engine Wire (On the Transmission)
ID1	48	Dash Wire and Floor Wire (Left Kick Panel)
IG1	50	Engine Room No.2 Wire and Dash Wire (Behind the Combination Meter)
IG2		
IG3		
IG4		
IJ1	50	Dash Wire and Detector Wire (Instrument Panel Center)
IN1	52	Engine Wire and Dash Wire (Behind the Glove Box)
IO2		
IU3	52	Instrument Panel Integration Wire and Dash Wire (Behind the Glove Box)
IW1	54	Engine Room No.2 Wire and Dash Wire (Behind the Glove Box)
IX1	54	Instrument Panel Integration Wire and Engine Wire (Behind the Glove Box)
BB1	56	Floor Wire and Fuel Tank Wire (Near the Fuel Tank)

: GROUND POINTS

Code	See Page	Ground Points Location
EC	46	Rear Bank of Right Cylinder Head
EE	46	Front Left Side of Fender Apron
IF	48	Set Bolt of Cowl Side J/B LH
IG		
BM	56	Left Rear Side Quarter Panel

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E4	46	Engine Room No.2 Wire	E11	46	Engine Wire
E7	46	Engine Wire	I2	50	Engine Room No.2 Wire
E8	46	Transmission Wire	I5	50	Dash Wire
E9			I14		
E10	46	Engine Wire	I15		