

ENGINE CONTROL

SYSTEM OUTLINE

THIS SYSTEM UTILIZES AN 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 WHICH VARIES ACCORDING TO THE WATER TEMP. THE WATER TEMP. IS INPUT INTO **TERMINAL THW** OF ENGINE CONTROL ECU AS A CONTROL SIGNAL.
- (2) INTAKE AIR TEMP. SIGNAL CIRCUIT
THE INTAKE AIR TEMP. SENSOR IS INSTALLED IN THE AIR FLOW METER AND DETECTS THE INTAKE AIR TEMP., WHICH IS INPUT AS A CONTROL SIGNAL TO **TERMINAL THA** OF ENGINE CONTROL ECU.
- (3) OXYGEN SENSOR SIGNAL CIRCUIT
THE OXYGEN DENSITY IN THE EXHAUST EMISSION IS DETECTED AND INPUT AS A CONTROL SIGNAL FROM THE OXYGEN SENSOR NO. 1 AND NO. 2 TO **TERMINALS OX1, OX2** OF THE ECU AND FROM THE OXYGEN SENSOR SUB (FOR CALIFORNIA) TO **TERMINAL OX3** OF THE ECU.
TO STABILIZE DETECTION PERFORMANCE BY THE OXYGEN SENSOR SUB (FOR CALIFORNIA) IS WARMED. THIS HEATER IS ALSO CONTROLLED BY THE ECU (HT).
- (4) RPM SIGNAL CIRCUIT
CRANKSHAFT POSITION IS DETECTED BY THE PICK-UP COIL INSTALLED INSIDE THE DISTRIBUTOR. CRANKSHAFT POSITION IS INPUT AS A CONTROL SIGNAL TO **TERMINALS G1 AND G2** OF THE ECU, AND RPM IS INPUT TO **TERMINAL NE**.
- (5) THROTTLE SIGNAL CIRCUIT
THE THROTTLE POSITION SENSOR DETECTS THE THROTTLE VALVE OPENING ANGLE AS A CONTROL SIGNAL, WHICH IS INPUT INTO **TERMINAL VTA1** OF THE ECU. WHEN THE VALVE IS COMPLETELY CLOSED, THE CONTROL SIGNAL IS INPUT INTO **TERMINAL IDL1**.
- (6) VEHICLE SPEED CIRCUIT
THE VEHICLE SPEED IS DETECTED BY SPEED SENSOR NO. 1 INSTALLED IN THE TRANSMISSION AND THE SIGNAL IS INPUT TO **TERMINAL SPD** OF THE ECU VIA THE COMB. METER.
- (7) NEUTRAL START SIGNAL CIRCUIT
THE NEUTRAL START SW DETECTS WHETHER THE SHIFT POSITION IS IN NEUTRAL OR NOT, AND THE SIGNAL IS INPUT INTO **TERMINAL NSW** OF THE ECU.
- (8) AIRCONDITIONING SW SIGNAL CIRCUIT
THE OPERATING VOLTAGE OF THE A/C MAGNETIC CLUTCH IS DETECTED AND THE SIGNAL IS INPUT INTO **TERMINAL ACMG** OF ECU AS A CONTROL SIGNAL.
- (9) BATTERY SIGNAL CIRCUIT
VOLTAGE IS CONSTANTLY APPLIED TO **TERMINAL BATT** OF THE ECU. WITH THE IGNITION SW TURNED ON, THE VOLTAGE FOR ECU START-UP POWER SUPPLY IS APPLIED TO **TERMINALS +B AND +B1** OF ECU VIA EFI MAIN RELAY.
THE CURRENT FLOWING THROUGH THE **IGN** FUSE FLOWS TO **TERMINAL IGSW** OF THE ECU.
- (10) INTAKE AIR VOLUME SIGNAL CIRCUIT
INTAKE AIR VOLUME IS DETECTED BY THE AIR FLOW METER AND THE SIGNAL IS INPUT TO **TERMINAL KS** OF THE ECU AS A CONTROL SIGNAL.
- (11) STOP LIGHT SW SIGNAL CIRCUIT
THE STOP LIGHT SW IS USED TO DETECT WHETHER OR NOT THE VEHICLE IS BRAKING AND THE SIGNAL IS INPUT INTO **TERMINAL STP** OF THE ECU AS A CONTROL SIGNAL.
- (12) STA SIGNAL CIRCUIT
TO CONFIRM WHETHER THE ENGINE IS CRANKING, THE VOLTAGE APPLIED TO THE STARTER MOTOR DURING CRANKING IS DETECTED AND THE SIGNAL IS INPUT INTO **TERMINAL STA** OF THE ECU AS A CONTROL SIGNAL.
- (13) ENGINE KNOCK SIGNAL CIRCUIT
ENGINE KNOCKING IS DETECTED BY KNOCK SENSOR NO. 1 AND NO. 2 AND THE SIGNAL IS INPUT INTO **TERMINALS KNK1 AND KNK2** AS A CONTROL SIGNAL.

2. CONTROL SYSTEM

* EFI (ELECTRONIC FUEL INJECTION) SYSTEM

THE EFI SYSTEM MONITORS THE ENGINE CONDITION THROUGH THE SIGNALS INPUT FROM EACH SENSOR (INPUT SIGNALS FROM (1) TO (13) ETC.) TO THE ECU. THE BEST FUEL INJECTION TIMING IS DECIDED BASED ON THIS DATA AND THE PROGRAM MEMORIZED BY THE ECU, AND THE CONTROL SIGNAL IS OUTPUT TO **TERMINALS #10, #20, #30, #40, #50 AND #60** OF THE ECU TO OPERATE THE INJECTOR. (INJECT THE FUEL). THE EFI SYSTEM PRODUCES CONTROL OF FUEL INJECTION OPERATION BY THE ECU IN RESPONSE TO THE DRIVING CONDITIONS.

* ESA (ELECTRONIC SPARK ADVANCE) SYSTEM

THE ESA SYSTEM MONITORS THE ENGINE CONDITION THROUGH THE SIGNALS INPUT TO THE ECU FROM EACH SENSOR (INPUT SIGNALS FROM (1), (2), (4) TO (13) ETC.). THE BEST IGNITION TIMING IS DECIDED ACCORDING TO THIS DATA AND THE MEMORIZED DATA IN THE ECU AND THE CONTROL SIGNAL IS OUTPUT TO **TERMINAL IGT** THIS SIGNAL CONTROLS THE IGNITER TO PROVIDE THE BEST IGNITION TIMING FOR THE DRIVING CONDITIONS.

* OXYGEN SENSOR HEATER CONTROL SYSTEM (USA SPEC.)

THE OXYGEN SENSOR HEATER CONTROL SYSTEM TURNS THE HEATER ON WHEN THE INTAKE AIR VOLUME IS LOW (TEMP. OF EXHAUST EMISSIONS IS LOW), AND WARMS UP THE OXYGEN SENSOR TO IMPROVE DETECTION PERFORMANCE OF THE SENSOR.

THE ECU EVALUATES THE SIGNALS FROM EACH SENSOR (INPUT SIGNALS FROM (1), (2), (4), (9) TO (11) ETC.) AND OUTPUTS CURRENT TO **TERMINAL HT** TO CONTROL THE HEATER.

* ISC (IDLE SPEED CONTROL) SYSTEM

THE ISC SYSTEM (STEP MOTOR TYPE) INCREASES THE RPM AND PROVIDES IDLING STABILITY FOR FAST IDLE-UP WHEN THE ENGINE IS COLD, AND WHEN THE IDLE SPEED HAS DROPPED DUE TO ELECTRICAL LOAD AND SO ON. THE ECU EVALUATES THE SIGNALS FROM EACH SENSOR (INPUT SIGNALS FROM (1), (4), (5), (8), (9), (11) ETC.), OUTPUTS CURRENT TO **TERMINAL ISC1, ISC2, ISC3 AND ISC4** TO CONTROL ISC VALVE.

* EGR CONTROL SYSTEM

THE EGR CONTROL SYSTEM DETECTS THE SIGNAL FROM EACH SENSOR (INPUT SIGNALS FROM (1), (4), (9), (10) ETC.), AND OUTPUTS CURRENT TO **TERMINAL EGR** TO CONTROL THE EGR VALVE.

* FUEL PUMP CONTROL SYSTEM

THE COMPUTER OUTPUTS CURRENT TO **TERMINAL FPC** AND CONTROLS THE FUEL PUMP ECU AND FUEL PUMP DRIVE SPEED IN RESPONSE TO CONDITIONS.

* ACIS (ACOUSTIC CONTROL INDUCTION SYSTEM)

ACIS INCLUDES A VALVE IN THE BULKHEAD SEPARATING THE SURGE TANK INTO TWO PARTS. THIS VALE 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.

THE ECU JUDGES THE VEHICLE SPEED BY THE SIGNALS ((4), (5)) FROM EACH SENSOR AND OUTPUTS SIGNALS TO THE **TERMINAL ACIS** TO CONTROL THE VSV (FOR OPENING AND CLOSING THE INTAKE CONTROL VALVE).

3. DIAGNOSIS SYSTEM

WITH THE DIAGNOSIS SYSTEM, WHEN THERE IS A MALFUNCTION IN THE ECU SIGNAL SYSTEM, THE MALFUNCTIONING SYSTEM IS RECORDED IN THE MEMORY. THE MALFUNCTIONING SYSTEM CAN BE FOUND BY READING THE CODE DISPLAYED BY THE CHECKING ENGINE WARNING LIGHT.

4. FAIL-SAFE SYSTEM

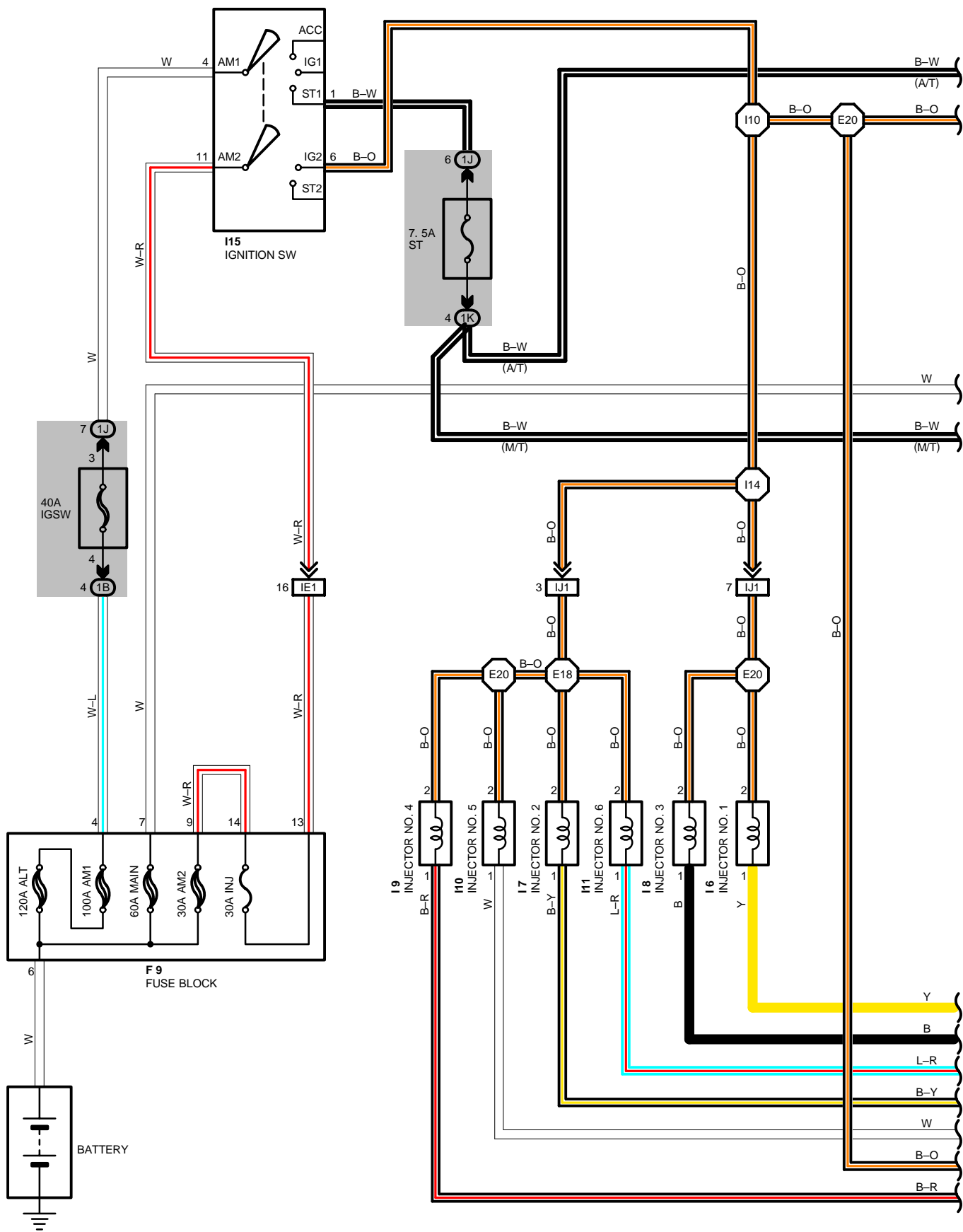
WHEN A MALFUNCTION HAS OCCURRED IN ANY SYSTEM, IF THERE IS A POSSIBILITY OF ENGINE TROUBLE BEING CAUSED BY CONTINUED CONTROL BASED ON THE SIGNALS FROM THAT SYSTEM, THE FAIL-SAFE SYSTEM EITHER CONTROLS THE SYSTEM BY USING DATA (STANDARD VALUES) RECORDED IN THE ECU MEMORY OR ELSE STOPS THE ENGINE.

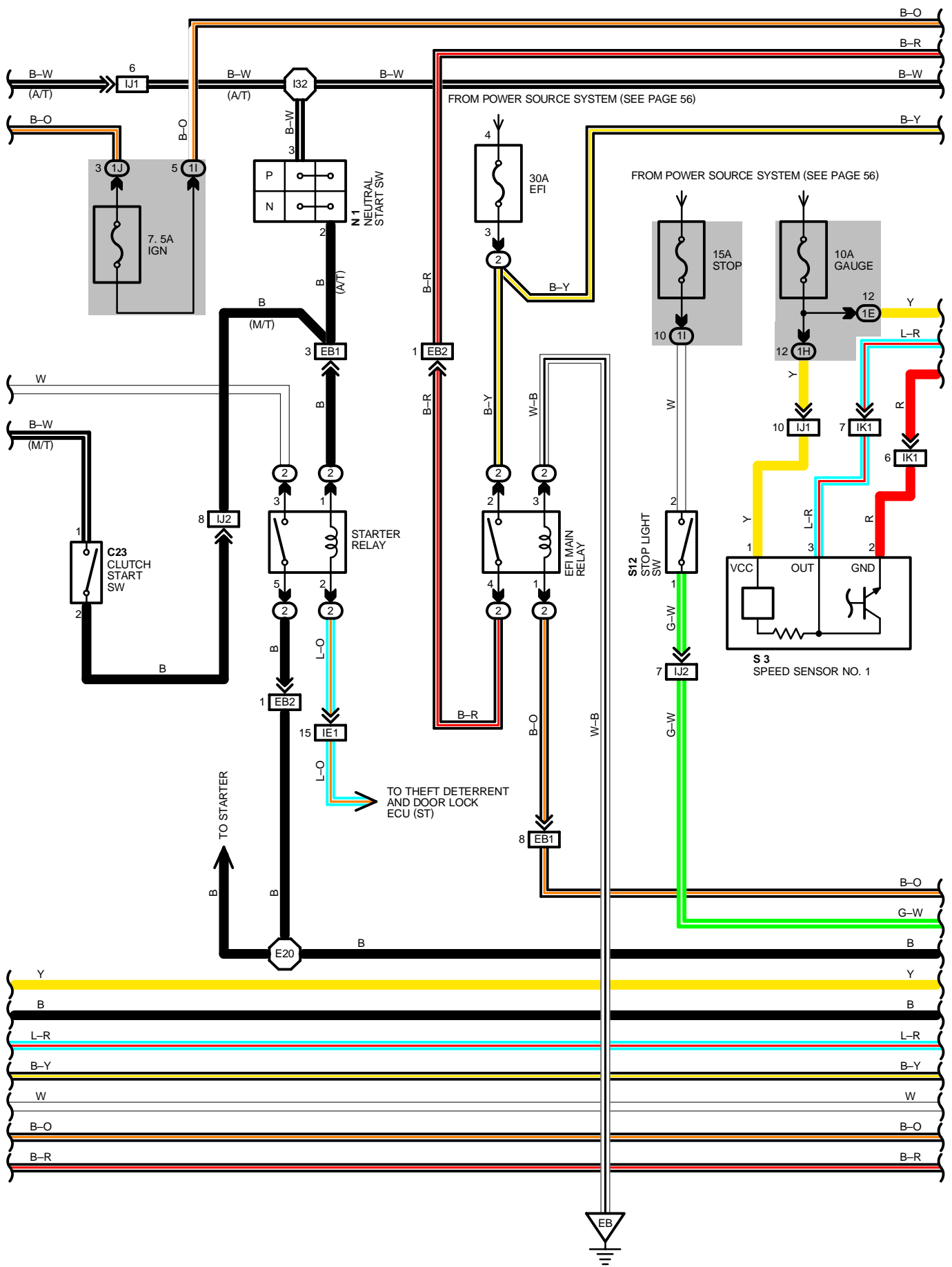
NOTE: THE SPECIFICATION DESCRIPTIONS "**USA SPEC.**" AND "**EXC. USA SPEC.**" USED IN THIS SECTION INDICATE THE FOLLOWING SPECIFICATIONS.

USA SPEC. : USA (50 STATES) SPECIFICATIONS

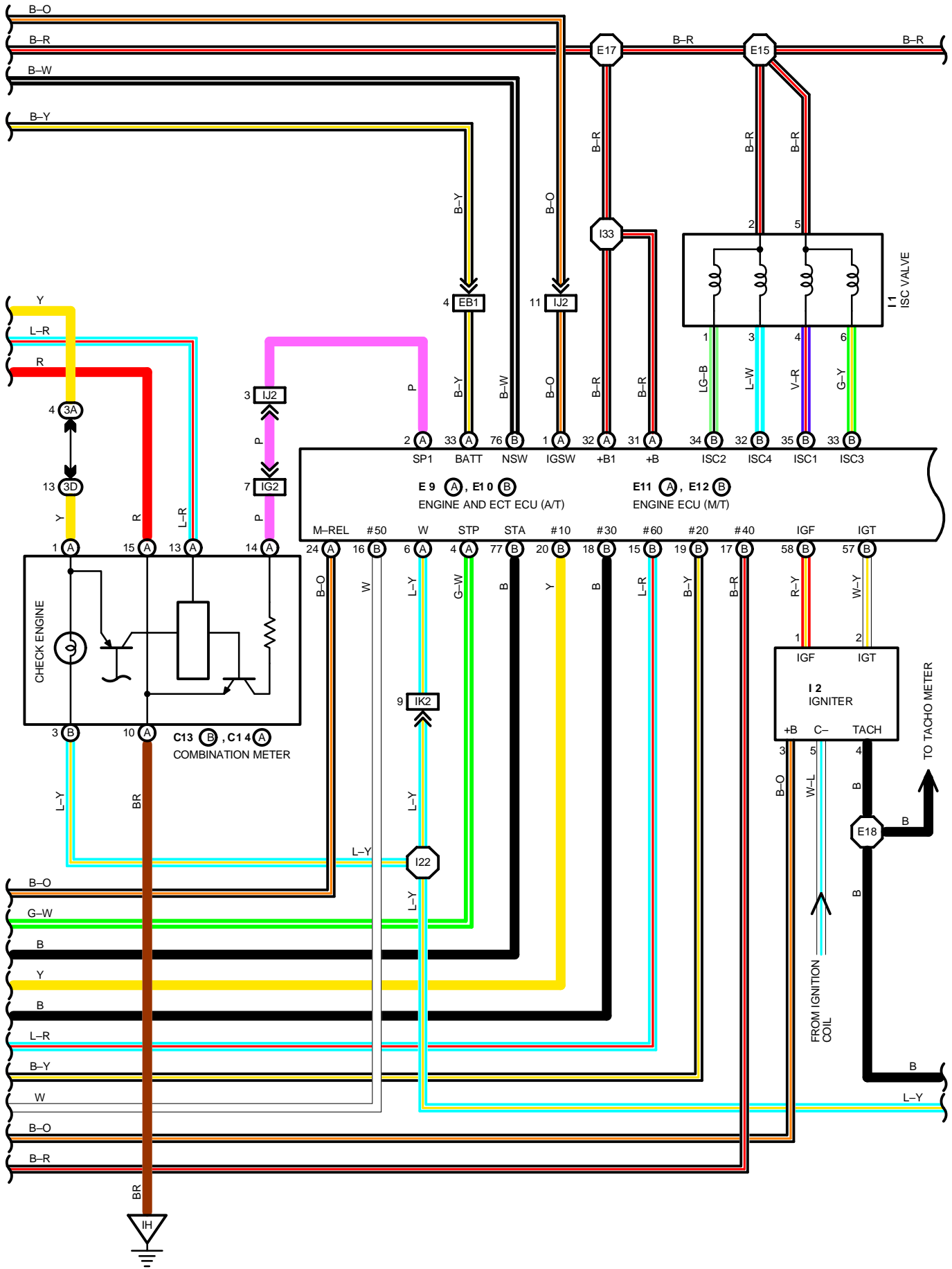
EXC. USA SPEC. : USA (EXCEPT CALIFORNIA) AND CANADIAN SPECIFICATIONS.

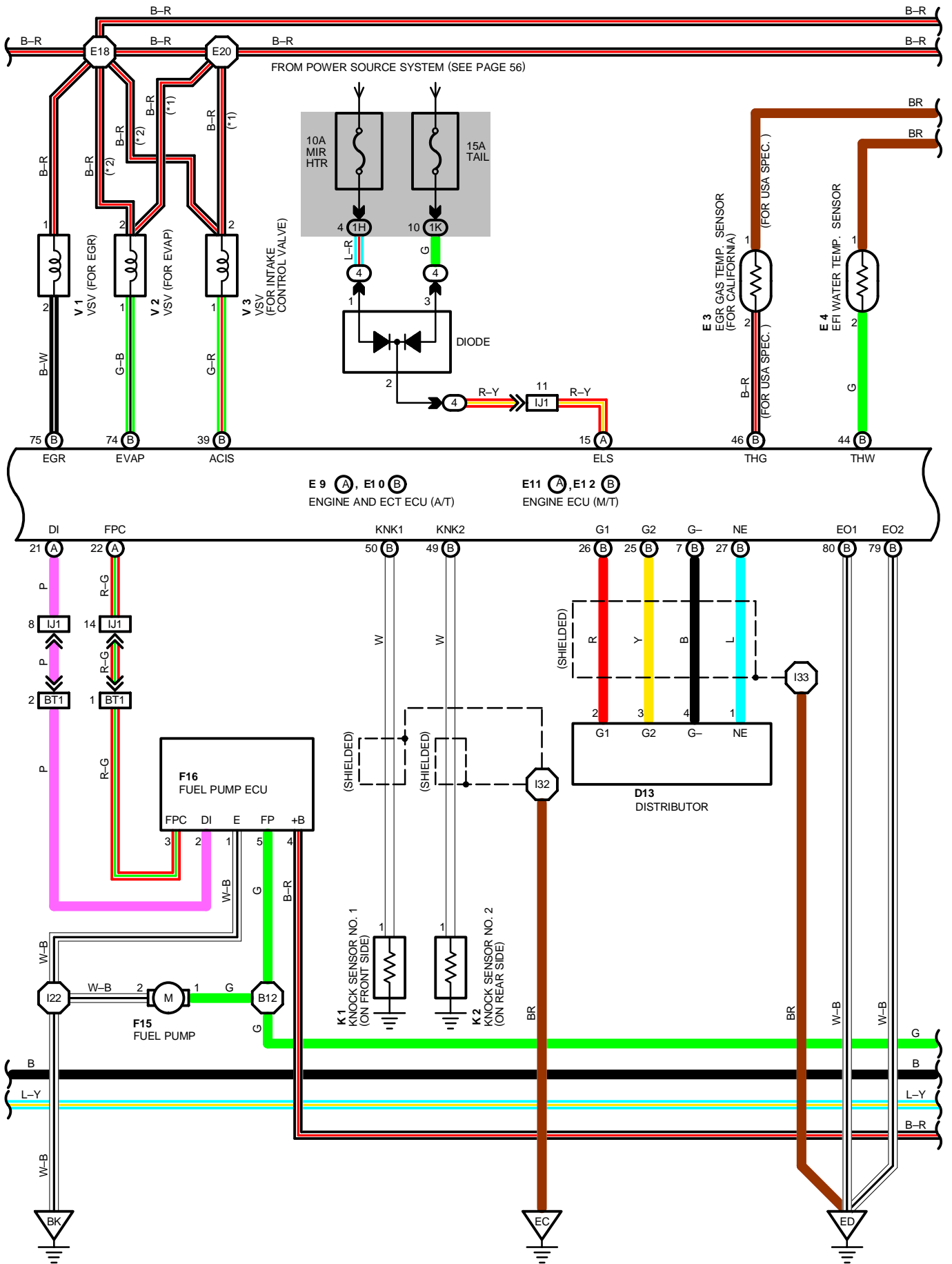
ENGINE CONTROL



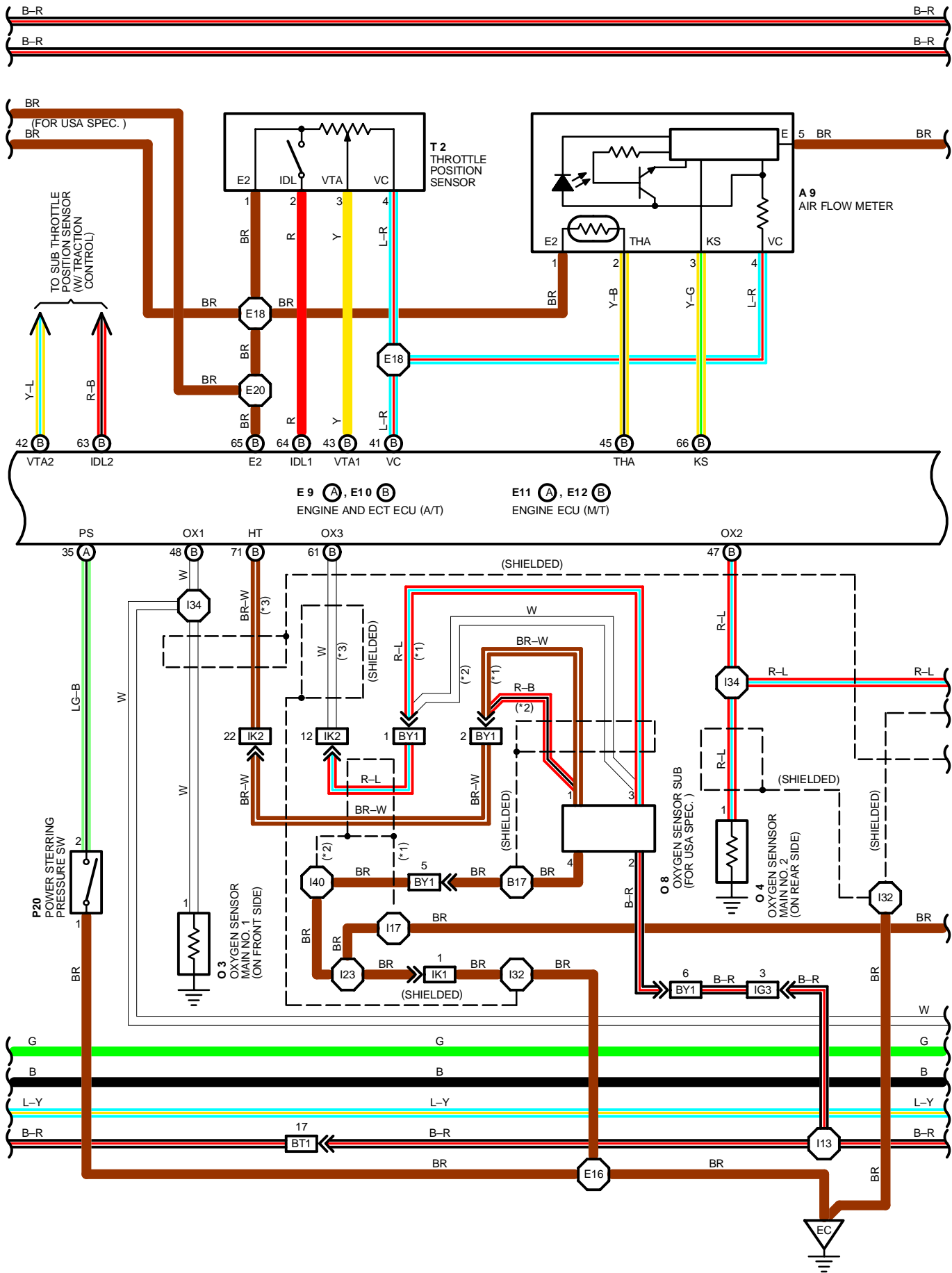


ENGINE CONTROL

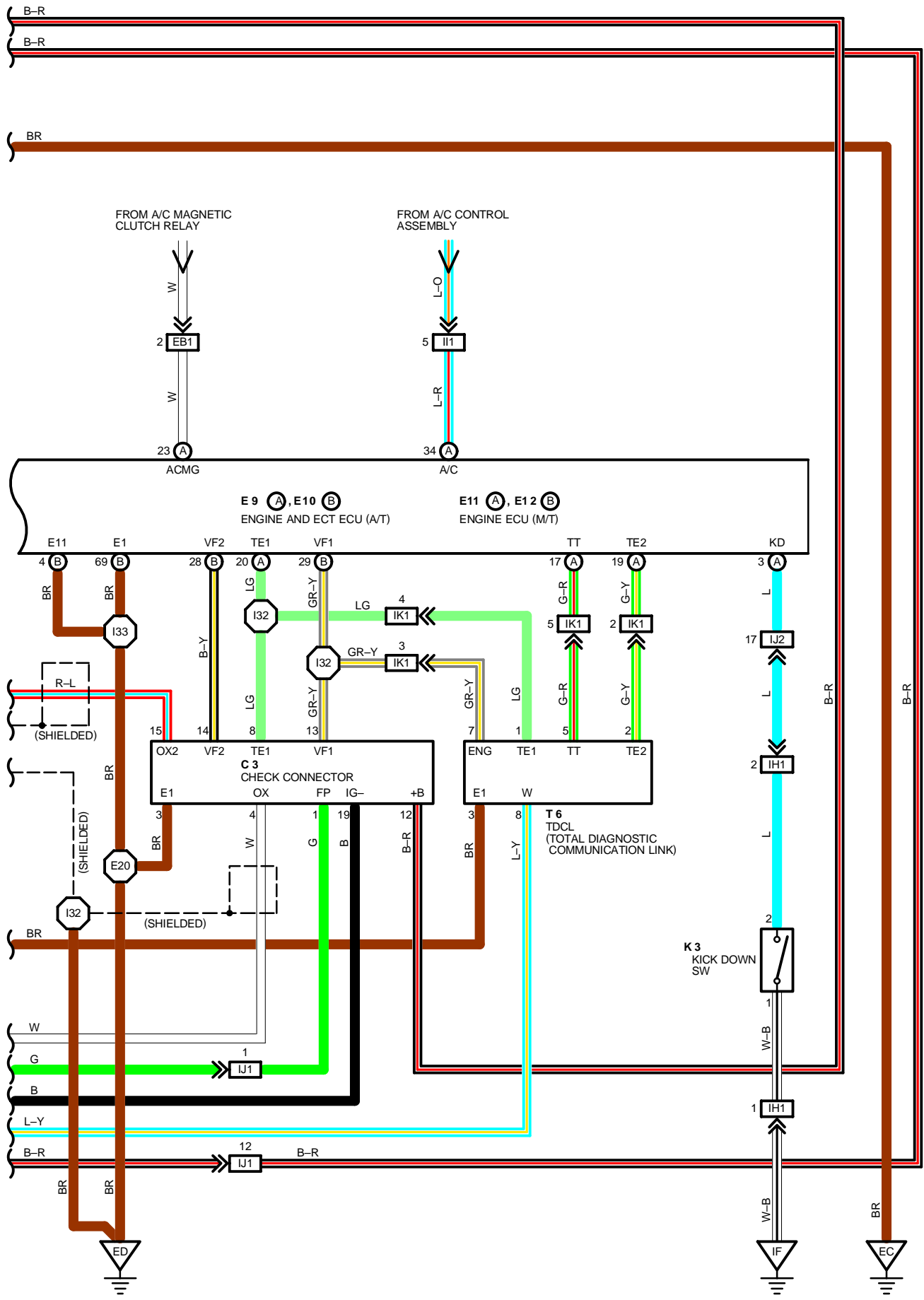




ENGINE CONTROL



*1 : W/ CD PLAYER
 *2 : W/O CD PLAYER
 *3 : FOR USA SPEC.



ENGINE CONTROL

SERVICE HINTS

EFI MAIN RELAY

2-4: CLOSED WITH IGNITION SW AT **ON** OR **ST** POSITION

W 4 WATER TEMP. SENSOR

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

E 3 EGR GAS TEMP. SENSOR (FOR USA SPEC.)

1-2: APPROX. **78.30K Ω** (**50°C, 122°F**)
APPROX. **13.06K Ω** (**100°C, 212°F**)
APPROX. **3.16K Ω** (**150°C, 302°F**)

E 9(A), E10(B) ENGINE AND ECT ECU, E11(A), E12(B) ENGINE ECU

(VOLTAGE AT ENGINE AND ECT ECU WIRING CONNECTORS)

BATT - E1 : ALWAYS APPROX. **12 VOLTS**
IGSW - E1 : APPROX. **12 VOLTS** WITH IGNITION SW ON
+B, +B1 - E1 : APPROX. **12 VOLTS** WITH IGNITION SW ON
VC - E2 : **4-6 VOLTS** WITH IGNITION SW ON
IDL1, IDL2 - E2 : **0-1 VOLTS** WITH IGNITION SW ON AND THROTTLE VALVE FULLY CLOSED
: **10-14 VOLTS** WITH IGNITION SW ON AND THROTTLE VALVE FULLY OPEN
VTA1, VTA2 - E2 : **0.1-1.0 VOLTS** WITH IGNITION SW ON AND THROTTLE VALVE FULLY CLOSED
: **3-6 VOLTS** WITH IGNITION SW ON AND THROTTLE VALVE FULLY OPEN
THA - E2 : **1-3 VOLTS** WITH IGNITION SW ON AND INTAKE AIR TEMP. **20°C (68°F)**
THW - E2 : **0.1-1.0 VOLTS** WITH IGNITION SW ON AND COOLANT TEMP. **80°C (176°F)**
STA - E1 : **6-14 VOLTS** WITH ENGINE CRANKING
#10, #20, #30, #40, #50, #60 - E1 : APPROX. **12 VOLTS** WITH IGNITION SW ON
IGF - E1 : **0-1 VOLTS** WITH ENGINE IDLING
MREL - E1 : APPROX. **12 VOLTS** WITH IGNITION SW ON
DI - E1 : **7.5-14 VOLTS** WITH ENGINE IDLING
ISC1, ISC2, ISC3, ISC4 - E1 : APPROX. **12 VOLTS** WITH IGNITION SW ON
HTL1, HTR1, HTL2, HTR2 - E01: **0-2 VOLTS** WITH ENGINE IDLING
EGR - E1 : APPROX. **12 VOLTS** WITH ENGINE IDLING
NSW - E1 : **0-1 VOLTS** WITH IGNITION SW ON AND SHIFT LEVER **P** OR **N** RANGE
: **10-14 VOLTS** WITH IGNITION SW ON AND SHIFT EXCEPT **P** OR **N** RANGE
TE1 - E1 : APPROX. **12 VOLTS** WITH IGNITION SW ON
TE2 - E2 : APPROX. **12 VOLTS** WITH IGNITION SW ON
W - E1 : APPROX. **12 VOLTS** WITH ENGINE IDLING
: **0-2 VOLTS** WITH IGNITION SW ON
A/C - E1 : **0-2 VOLTS** WITH AIR CONDITIONER ON
: **10-14 VOLTS** WITH AIR CONDITIONER OFF
ACMG - E1 : **0-2 VOLTS** WITH AIR CONDITIONER ON
: **10-14 VOLTS** WITH AIR CONDITIONER OFF
TR - E1 : APPROX. **12 VOLTS** WITH IGNITION SW ON
VTA1, VTA2 - E2 : **0-1 VOLTS** WITH IGNITION SW ON AND THROTTLE VALVE FULLY CLOSED
: **3-5.5 VOLTS** WITH IGNITION SW ON AND THROTTLE VALVE FULLY OPEN
NE - E1 : **4-6 VOLTS** WITH IGNITION SW ON

(RESISTANCE OF ENGINE AND ECT ECU WIRING CONNECTORS)

+B, +B1 - #10, #20, #30, #40, #50, #60 : **13.2-14.2 Ω**
+B, +B1, ISC1, ISC2, ISC3, ISC4 : **10-30 Ω**
+B, +B1 -EGR: **33-39 Ω**
+B, +B1, HT : **5.1-6.3 Ω**
+B, +B1 -EVAP : **30-34 Ω**
IDL1, IDL2 E2 : INFINITY WITH THROTTLE VALVE OPEN
: **0-0.5 Ω** WITH THROTTLE VALVE FULLY CLOSED
VTA1, VTA2 E2 : **2.4-10.7 Ω** WITH THROTTLE VALVE FULLY OPEN
: **0.3-5.9 Ω** WITH THROTTLE VALVE FULLY CLOSED
VCC - E2 : **3-7K Ω**
THW - E2 : **200-400 Ω** WITH COOLANT TEMP. **80°C (176°F)**
THA - E2 : **2-3K Ω** WITH INTAKE AIR TEMP. **20°C (68°F)**
THG - E2 : **69.4-88.5K Ω** WITH EGR GAS TEMP. **50°C (112°F)**
G1, G2 -G- : **0.835-13.5K Ω**
NE- G- : **0.835-13.5K Ω**

I 1 ISC VALVE

4, 6-5 : APPROX. **21.3Ω**

1, 3-2 : APPROX. **21.3Ω**

I 6, I 7, I 8, I 9, I 10, I 11 INJECTOR

1 - 2 : APPROX. **13.8Ω**

O 8 OXYGEN SENSOR SUB (FOR USA SPEC.)

1 - 2 : APPROX. **5.6Ω (20°C, 68°F)**

T 2 THROTTLE POSITION SENSOR

1 - 4 : APPROX. **3-7KΩ**

1 - 3 : **2.4-10.7KΩ** WITH THROTTLE VALVE FULLY **OPENED** POSITION

0.3-5.9KΩ WITH CLEARANCE BETWEEN LEVER AND STOP SCREW **0MM (0 IN.)**

1 - 2 : LESS THAN **0.5KΩ** WITH CLEARANCE BETWEEN LEVER AND STOP SCREW **0.4 MM (0.0157 IN.)**

INFINITY WITH CLEARANCE BETWEEN LEVER AND STOP SCREW **0.85MM (0.0335 IN.)**

ENGINE CONTROL

: PARTS LOCATION

CODE	SEE PAGE	CODE	SEE PAGE	CODE	SEE PAGE
A 9	26	F15	30	K 3	29
C 3	26	F16	30	N 1	27
C13	B 28	I 1	27	O 3	27
C14	A 28	I 2	27	O 4	27
C23	28	I 6	27	O 8	31
D13	26	I 7	27	P20	27
E 2	26	I 8	27	S 3	27
E 3	26	I 9	27	S12	29
E 9	A 28	I10	27	T 2	27
E10	B 28	I11	27	T 6	29
E11	A 28	I15	29	V 1	27
E12	B 28	K 1	27	V 2	27
F 9	26	K 2	27	V 3	27

: RELAY BLOCKS

CODE	SEE PAGE	RELAY BLOCKS (RELAY BLOCK LOCATION)
2	19	ENGINE COMPARTMENT LEFT
4	23	LEFT KICK PANEL (J/B NO.1 LEFT)

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

CODE	SEE PAGE	JUNCTION BLOCK AND WIRE HARNESS (CONNECTOR LOCATION)
1B	20	ENGINE ROOM MAIN WIRE
1E	20	INSTRUMENT PANEL WIRE
1H	20	COWL WIRE
1I		
1J		
1K		
3A	23	INSTRUMENT PANEL WIRE
3D		

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

CODE	SEE PAGE	JOINING WIRE HARNESS AND WIRE HARNESS (CONNECTOR LOCATION)
EB1	34	ENGINE WIRE AND ENGINE ROOM MAIN WIRE (FRONT SIDE OF R/B NO.2)
EB2		
IE1	36	ENGINE ROOM MAIN WIRE AND COWL WIRE (R/B NO. 4)
IG2	36	INSTRUMENT PANEL WIRE AND COWL WIRE (R/B NO. 5)
IG3	38	INSTRUMENT PANEL WIRE AND COWL WIRE (RIGHT KICK PANEL)
IH1	36	COWL NO. 2 WIRE AND COWL WIRE (BEHIND COMBINATION METER)
II1	36	ENGINE WIRE AND A/C WIRE (BEHIND GLOVE BOX)
IJ1	36	ENGINE WIRE AND COWL WIRE (RIGHT KICK PANEL)
IJ2		
IK1	36	ENGINE WIRE AND INSTRUMENT PANEL WIRE (RIGHT KICK PANEL)
IK2		
BT1	40	FLOOR WIRE AND COWL WIRE (LEFT KICK PANEL)
BY1	40	INSTRUMENT PANEL WIRE AND FLOOR NO.3 WIRE (RIGHT KICK PANEL)

: GROUND POINTS

CODE	SEE PAGE	GROUND POINTS LOCATION
EB	34	FRONT SIDE OF LEFT FENDER
EC	34	FRONT SIDE OF INTAKE MANIFOLD
ED	34	REAR SIDE OF CYLINDER HEAD RH
IF	36	LEFT KICK PANEL
IH	36	UNDER THE ASHTRAY LH
BK	40	UNDER THE CENTER PILLAR LH

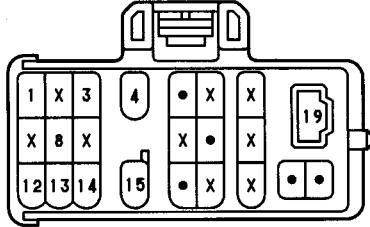
 : SPLICE POINTS

CODE	SEE PAGE	WIRE HARNESS WITH SPLICE POINTS	CODE	SEE PAGE	WIRE HARNESS WITH SPLICE POINTS
E15	34	ENGINE WIRE	I22	38	INSTRUMENT PANEL WIRE
E16			I23		
E17			I32		
E18			I33	38	ENGINE WIRE
E20			I34		
I10	38	COWL WIRE	I40	38	INSTRMENT PANEL WIRE
I13			B12	40	FLOOR MAIN WIRE
I14			B17	40	FLOOR NO.3 WIRE
I17			38	INSTRUMENT PANEL WIRE	

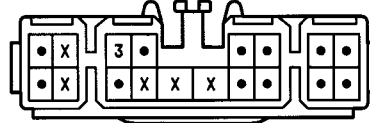
A 9 BLACK



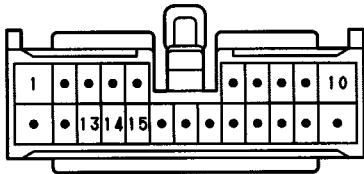
C 3 BLACK



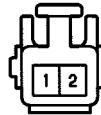
C13 (B)



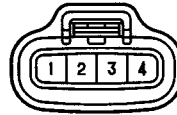
C14 (A)



C23



D13 BLACK



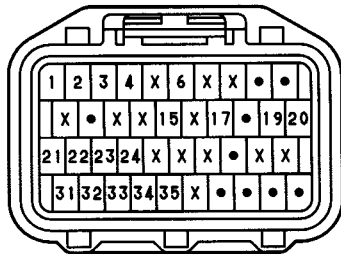
E 2 DARK GREEN



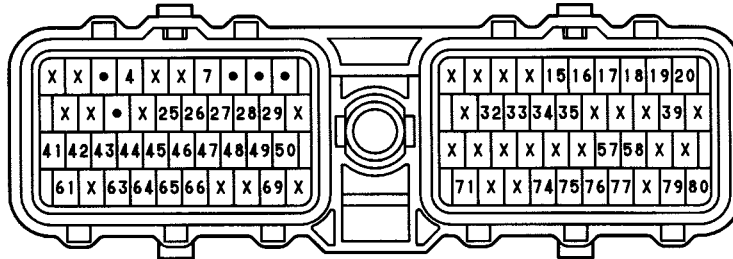
E 3 DARK GRAY



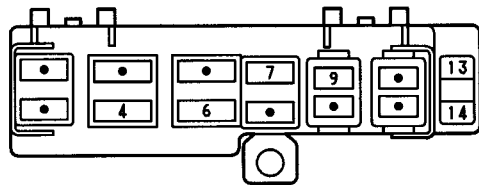
E 9, E11 (A) DARK GRAY



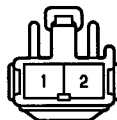
E10, E12 (B) DARK GRAY



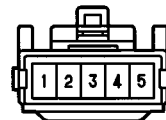
F 9 BLACK



F15 DARK GRAY



F16 BLACK



I 1 DARK GRAY



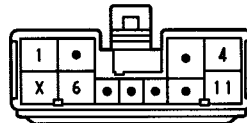
I 2 BLACK



I 6, I 7, I 8, I 9, I 10, I 11 GRAY



I15 BLACK



K 1, K 2 DARK GRAY

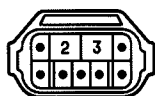


K 3 BLACK



ENGINE CONTROL

N 1 GRAY



O 3,0 4 DARK GRAY



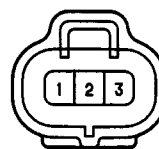
O 8 DARK GRAY



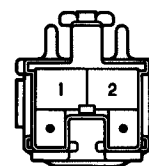
P20 DARK GRAY



S 3 GRAY



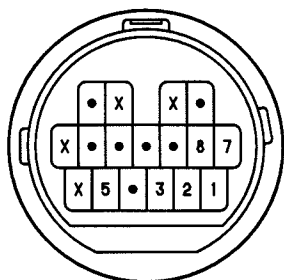
S12



T 2 BLACK



T 6 DARK GRAY



V 1 BLUE



V 2 BLUE



V 3 BLUE

