



SYSTEM OUTLINE

THE ENGINE CONTROL SYSTEM UTILIZES A MICROCOMPUTER AND MAINTAINS OVERALL CONTROL OF THE ENGINE, TRANSMISSION, ETC. AN OUTLINE OF ENGINE CONTROL IS GIVEN HERE.

1. 1. INPUT SIGNAL

(1) ENGINE COOLANT TEMP. SIGNAL SYSTEM

THE ENGINE COOLANT TEMP. SENSOR DETECTS THE ENGINE COOLANT TEMP. AND HAS A BUILT-IN THERMISTOR WITH A RESISTANCE WHICH VARIES ACCORDING TO THE WATER TEMP. THUS THE WATER TEMP. IS INPUT IN THE FORM OF A CONTROL SIGNAL TO **TERMINAL THW** OF THE ENGINE CONTROL MODULE.

(2) HEATED OXYGEN SENSOR SIGNAL SYSTEM

THE OXYGEN DENSITY IN THE EXHAUST EMISSIONS IS DETECTED AND INPUT AS A CONTROL SIGNAL TO **TERMINAL OX1** OR **OX2** OF THE ENGINE CONTROL MODULE. TO MAINTAIN STABLE DETECTION PERFORMANCE BY THE HEATED OXYGEN SENSOR, A HEATER IS USED FOR WARMING THE SENSOR. THE HEATER IS ALSO CONTROLLED BY THE ENGINE CONTROL MODULE (**HT1** OR **HT2**).

(3) RPM SIGNAL SYSTEM

CRANKSHAFT POSITION AND ENGINE RPM ARE DETECTED BY THE CRANKSHAFT POSITION SENSOR, THEN CRANKSHAFT POSITION AND ENGINE RPM SIGNALS ARE INPUT TO **TERMINALS NE** AND **NE-**.

(4) THROTTLE SIGNAL SYSTEM

THE THROTTLE POSITION SENSOR DETECTS THE THROTTLE VALVE OPENING ANGLE, WHICH IS INPUT AS A CONTROL SIGNAL TO **TERMINAL VTA** OF THE ENGINE CONTROL MODULE.

(5) VEHICLE SPEED SIGNAL SYSTEM

THE VEHICLE SPEED SENSOR, INSTALLED INSIDE THE TRANSMISSION, DETECTS THE VEHICLE SPEED AND INPUTS A CONTROL SIGNAL TO **TERMINAL SP1** OF THE ENGINE CONTROL MODULE.

(6) A/C SW SIGNAL SYSTEM

THE OPERATING VOLTAGE OF THE A/C MAGNETIC CLUTCH IS DETECTED AND INPUT IN THE FORM OF A CONTROL SIGNAL TO **TERMINAL AC1** OF THE ENGINE CONTROL MODULE.

(7) BATTERY SIGNAL SYSTEM

VOLTAGE IS CONSTANTLY APPLIED TO **TERMINAL BATT** OF THE ENGINE CONTROL MODULE. WHEN THE IGNITION SW IS TURNED TO ON, VOLTAGE FOR ENGINE CONTROL MODULE OPERATION IS APPLIED VIA THE EFI RELAY TO **TERMINAL +B** OF THE ENGINE CONTROL MODULE.

(8) INTAKE AIR VOLUME SIGNAL SYSTEM

INTAKE AIR VOLUME IS DETECTED BY THE MASS AIR FLOW METER AND A SIGNAL IS INPUT INTO **TERMINAL VG** OF THE ENGINE CONTROL MODULE AS A CONTROL SIGNAL.

(9) STOP LIGHT SW SIGNAL SYSTEM

THE STOP LIGHT SW IS USED TO DETECT WHETHER OR NOT THE VEHICLE IS BRAKING AND THE INFORMATION IS INPUT AS A CONTROL SIGNAL TO **TERMINAL BK** OF THE ENGINE CONTROL MODULE.

(10) (STARTER SIGNAL SYSTEM

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 CONTROL MODULE.

(11) ENGINE KNOCK SIGNAL SYSTEM

ENGINE KNOCKING IS DETECTED BY THE KNOCK SENSOR AND INPUT AS A CONTROL SIGNAL TO **TERMINAL KNK** OF THE ENGINE CONTROL MODULE.

(12) 4WD SIGNAL SYSTEM (4WD)

WHETHER OR NOT THE VEHICLE IS OPERATING IN 4WD MODE IS DETERMINED, AND A CONTROL SIGNAL IS INPUT TO **TERMINAL 4WD** OF THE ENGINE CONTROL MODULE.

(13) 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 INTO **TERMINAL THA** OF THE ENGINE CONTROL MODULE.

2. CONTROL SYSTEM

* SFI SYSTEM

THE SFI SYSTEM MONITORS THE ENGINE CONDITIONS THROUGH THE SIGNALS EACH SENSOR (INPUT SIGNALS (1 TO 12)) INPUTS TO THE ENGINE CONTROL MODULE. BASED ON THIS DATA AND THE PROGRAM MEMORIZED IN THE ENGINE CONTROL MODULE, THE MOST APPROPRIATE FUEL INJECTION TIMING IS DECIDED AND CURRENT IS OUTPUT TO **TERMINALS #10, #20, #30 AND #40** OF THE ENGINE CONTROL MODULE, CAUSING THE INJECTORS TO OPERATE (TO INJECT FUEL). IT IS THIS SYSTEM WHICH, THROUGH THE WORK OF THE ENGINE CONTROL MODULE, FINELY CONTROLS FUEL INJECTION IN RESPONSE TO DRIVING CONDITIONS.

* ELECTRONIC SPARK ADVANCE SYSTEM

THE ELECTRONIC SPARK ADVANCE SYSTEM MONITORS THE ENGINE CONDITIONS USING THE SIGNALS (INPUT SIGNALS (1, 4, 5 TO 7, 9, 11,12)) INPUT TO THE ENGINE CONTROL MODULE FROM EACH SENSOR. BASED ON THIS DATA AND THE PROGRAM MEMORIZED IN THE ENGINE CONTROL MODULE, THE MOST APPROPRIATE IGNITION TIMING IS DECIDED AND CURRENT IS OUTPUT TO **TERMINAL IGT1 AND IGT2** OF THE ENGINE CONTROL MODULE. THIS OUTPUT CONTROLS THE IGNITION COIL AND IGNITER NO.1 AND NO.2 TO PRODUCE THE MOST APPROPRIATE IGNITION TIMING FOR THE DRIVING CONDITIONS.

* HEATED OXYGEN SENSOR HEATER CONTROL SYSTEM

THE HEATED OXYGEN SENSOR HEATER CONTROL SYSTEM TURNS THE HEATER TO ON WHEN THE INTAKE AIR VOLUME IS LOW (TEMP. OF EXHAUST EMISSIONS LOW), AND WARMS UP THE HEATED OXYGEN SENSOR TO IMPROVE DETECTION PERFORMANCE OF THE SENSOR. THE ENGINE CONTROL MODULE EVALUATES THE SIGNALS FROM EACH SENSOR (INPUT SIGNALS (1, 4, 8, 9, 11)), CURRENT IS OUTPUT TO **TERMINAL HT1 OR HT2** AND CONTROLS THE HEATER.

* EGR CUT CONTROL SYSTEM

THE EGR CUT CONTROL SYSTEM CONTROLS THE VSV (EGR) BY EVALUATING THE SIGNALS FROM EACH SENSOR INPUT TO THE ENGINE CONTROL MODULE (INPUT SIGNALS (1, 9)) AND BY SENDING OUTPUT TO **TERMINAL EGR** OF THE ENGINE CONTROL MODULE.

3. DIAGNOSIS SYSTEM

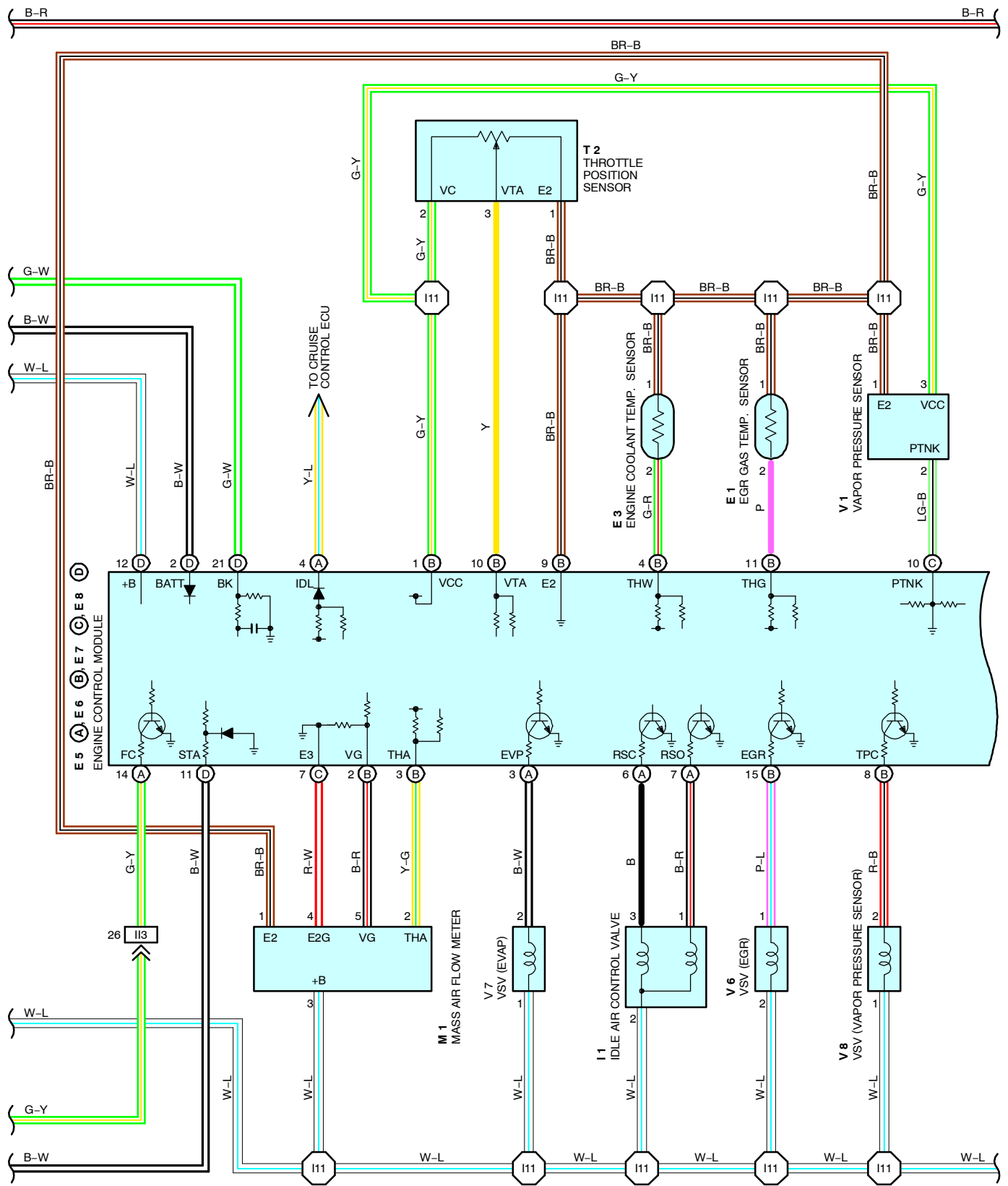
WITH THE DIAGNOSIS SYSTEM, WHEN THERE IS A MALFUNCTION IN THE ECU SIGNAL SYSTEM, THE MALFUNCTIONING SYSTEM IS RECORDED IN THE MEMORY. THE MALFUNCTIONING SYSTEM CAN THEN BE FOUND BY READING THE DISPLAY (CODE) OF THE MALFUNCTION INDICATOR LAMP.

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 CONTROL MODULE MEMORY OR ELSE STOPS THE ENGINE.

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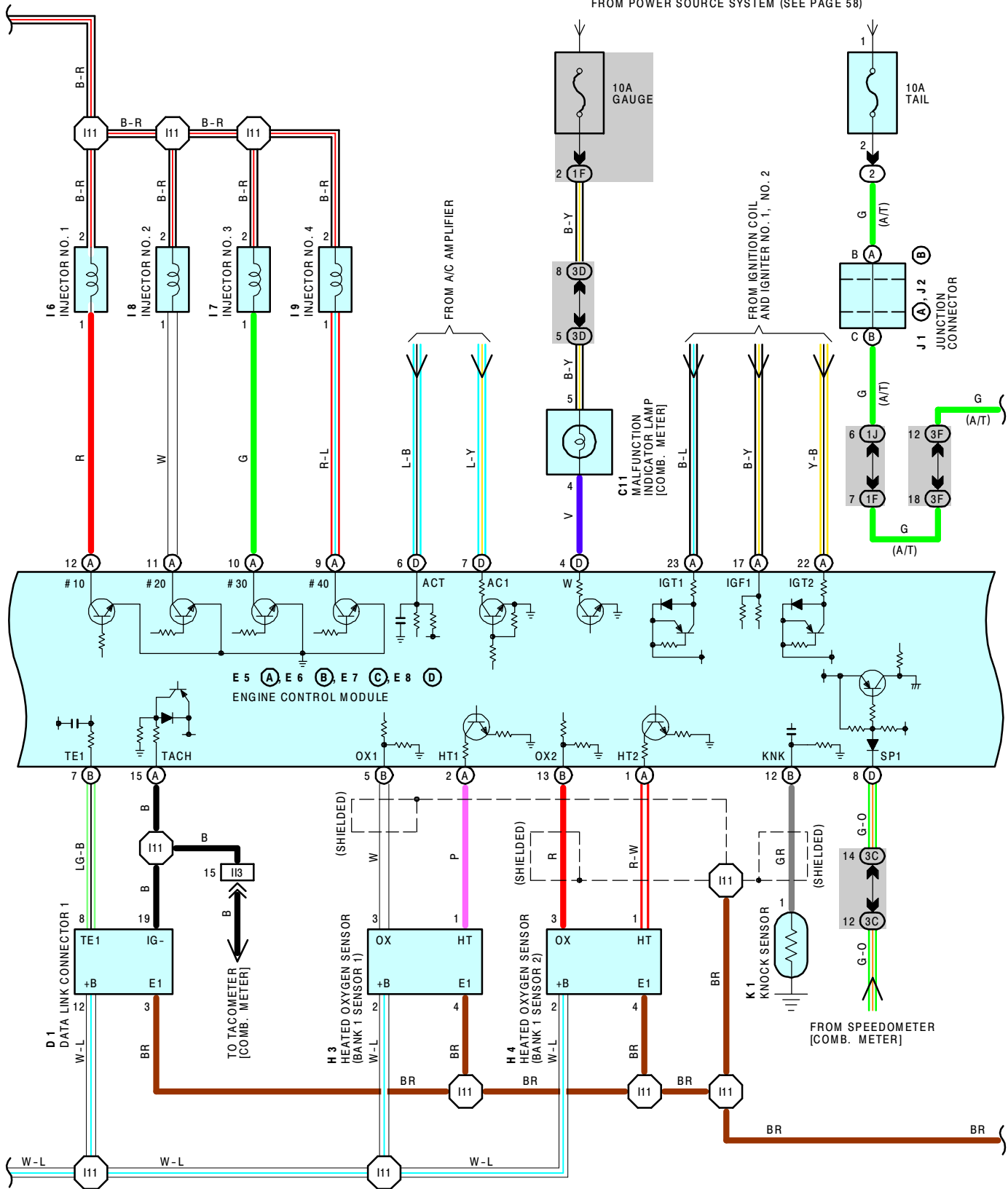


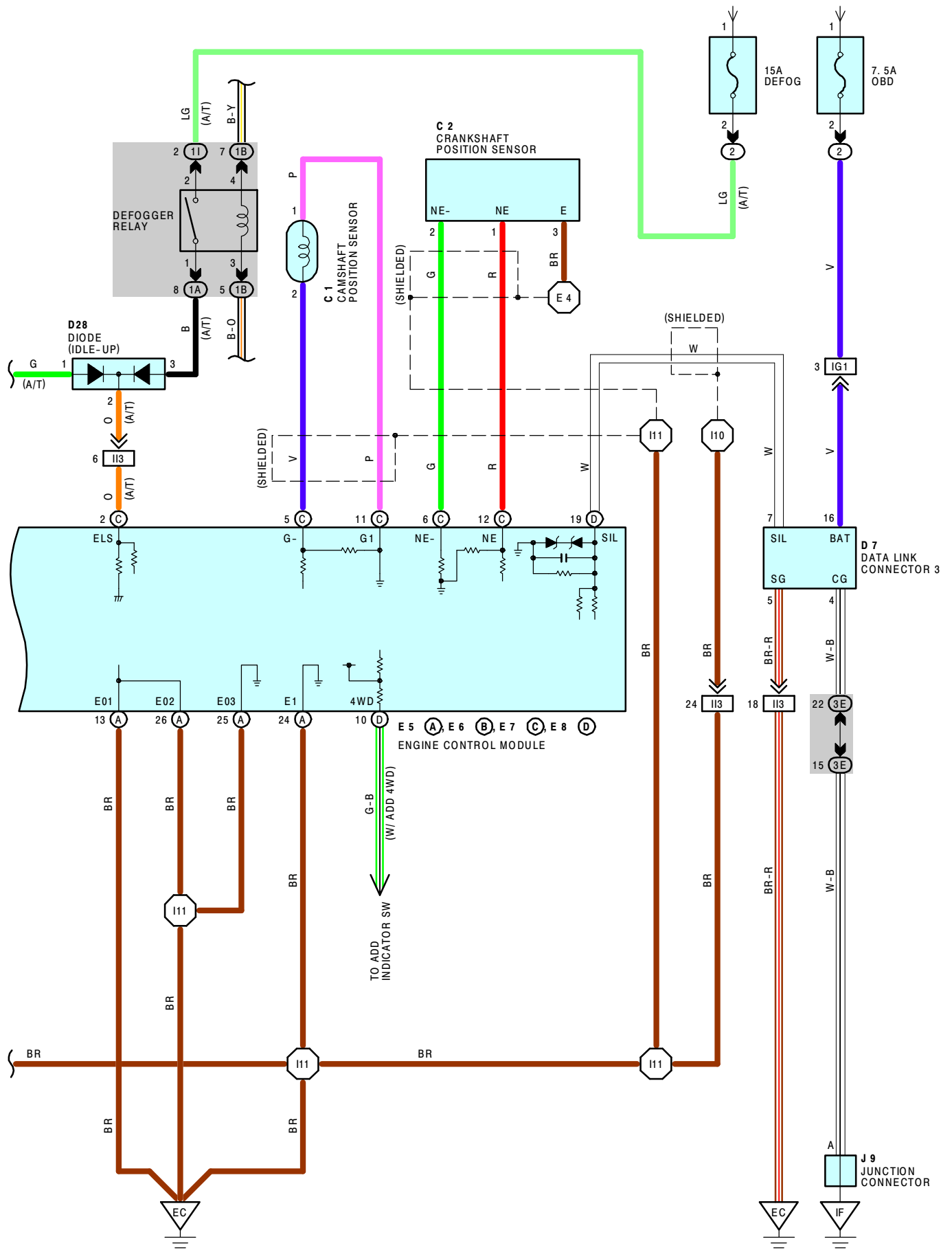




ENGINE CONTROL (3RZ-FE)

FROM POWER SOURCE SYSTEM (SEE PAGE 58)







ENGINE CONTROL (3RZ-FE)

SERVICE HINTS

EFI RELAY

(2) 5- (2) 3 : CLOSED WITH IGNITION SW AT **ON** OR **ST** POSITION

C6 CIRCUIT OPENING RELAY

5-3 :CLOSED WITH STARTER RUNNING OR IGNITION SW AT **ON** POSITION

I 6, I 7, I 8, I 9

INJECTOR

1-2 :13.4-14.2 Ω

T2 THROTTLE POSITION SENSOR

3-4 :2.3 K Ω OR LESS WITH CLEARANCE BETWEEN LEVER AND STOP SCREW 0.50 MM (0.0197 IN.)

INFINITY WITH CLEARANCE BETWEEN LEVER AND STOP SCREW 0.77 MM (0.0303 IN.)

2-4 :3.3-10 K Ω WITH THROTTLE VALVE FULLY OPEN

E3 ENGINE COOLANT TEMP. SENSOR

1-2 :10-20 K Ω (-20°C, -4°F)

4-7 K Ω (0°C, 32°F)

2-3 K Ω (20°C, 68°F)

0.9-1.3 K Ω (40°C, 104°F)

0.4-0.7 K Ω (60°C, 140°F)

0.2-0.4 K Ω (80°C, 176°F)

E5 (A), E6 (B), E7 (C), E8 (D) ENGINE CONTROL MODULE

VOLTAGE AT ENGINE CONTROL MODULE WIRING CONNECTORS

+B-E1 : 9-14 VOLTS (IGNITION SW ON)

BATT-E1 : 9-14 VOLTS (ALWAYS)

VCC-E2 : 4.5-5.5 VOLTS (IGNITION SW ON)

IDL-E2 : 9-14 VOLTS (IGNITION SW ON AND THROTTLE VALVE OPEN)

VTA-E2 : 0.3-0.8 VOLTS (IGNITION SW ON AND THROTTLE VALVE FULLY CLOSED)

3.2-4.9 VOLTS (IGNITION SW ON AND THROTTLE VALVE FULLY OPEN)

STA-E1 : 6 VOLTS OR MORE (IGNITION SW AT ST POSITION)

W-E1 : 9-14 VOLTS (NO TROUBLE AND ENGINE RUNNING)

THA-E2 : 0.5-3.4 VOLTS (IGNITION SW ON AND INTAKE AIR TEMP. 20°C, 68°F)

THW-E2 : 0.2-1.0 VOLTS (IGNITION SW ON AND COOLANT TEMP. 80°C, 176°F)

SP1-E1 : PULSE GENERATION WITH VEHICLE MOVING

BK-E1 : 7.5-14 VOLTS (STOP LIGHT SW ON)

IGT1, IGT2-E1 : PULSE GENERATION (CRANKING OR IDLING)

#10, #20, #30, #40-E1 : 9-14 VOLTS (IGNITION SW ON)

RESISTANCE AT ECU WIRING CONNECTOR

(DISCONNECT WIRING CONNECTOR)

IDL-E2 : INFINITY (THROTTLE VALVE OPEN)

0-100 Ω (THROTTLE VALVE FULLY CLOSED)

VTA-E2 : 3.3-10 K Ω (THROTTLE VALVE FULLY OPEN)

0.2-0.8 K Ω (THROTTLE VALVE FULLY CLOSED)

THA-E2 : 2-3 K Ω (INTAKE AIR TEMP. 20°C, 68°F)

THW-E2 : 0.2-0.4 K Ω (COOLANT TEMP. 80°C, 176°F)

NE-E1 : 140-180 Ω

 : PARTS LOCATION

CODE	SEE PAGE	CODE	SEE PAGE	CODE	SEE PAGE
C 1	28 (3RZ-FE)	E 8	D 31	J 4	31
C 2	28 (3RZ-FE)	F10	32	J 9	31
C 6	30	H 3	28 (3RZ-FE)	J12	32
C11	30	H 4	28 (3RZ-FE)	K 1	29 (3RZ-FE)
D 1	28 (3RZ-FE)	I 1	29 (3RZ-FE)	N 1	29 (3RZ-FE)
D 7	30	I 6	29 (3RZ-FE)	S 4	31
D28	30	I 7	29 (3RZ-FE)	T 2	29 (3RZ-FE)
E 1	28 (3RZ-FE)	I 8	29 (3RZ-FE)	V 1	29 (3RZ-FE)
E 3	28 (3RZ-FE)	I 9	29 (3RZ-FE)	V 6	29 (3RZ-FE)
E 5	A 31	I14	31	V 7	29 (3RZ-FE)
E 6	B 31	J 1	A 29 (3RZ-FE)	V 8	29 (3RZ-FE)
E 7	C 31	J 2	B 29 (3RZ-FE)		

 : RELAY BLOCKS

CODE	SEE PAGE	RELAY BLOCKS (RELAY BLOCK LOCATION)
2	20 (USA)	ENGINE ROOM R/B (ENGINE COMPARTMENT LEFT)
	21 (CANADA)	

 : JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

CODE	SEE PAGE	JUNCTION BLOCK AND WIRE HARNESS (CONNECTOR LOCATION)
1A	22	COWL WIRE AND DRIVER SIDE J/B (LOWER FINISH PANEL)
1B		
1F		
1I	22	ENGINE ROOM MAIN WIRE AND DRIVER SIDE J/B (LOWER FINISH PANEL)
1H		
1J		
3A	24	COWL WIRE AND CENTER J/B (NEAR THE STEERING COLUMN TUBE)
3C		
3D		
3E		
3F		

 : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

CODE	SEE PAGE	JOINING WIRE HARNESS AND WIRE HARNESS (CONNECTOR LOCATION)
IE2	40	COWL WIRE AND FLOOR NO.2 WIRE (LEFT KICK PANEL)
IG1	40	ENGINE ROOM MAIN WIRE AND COWL WIRE (LEFT KICK PANEL)
II3	40	ENGINE WIRE AND COWL WIRE (ON THE GLOVE BOX)

 : GROUND POINTS

CODE	SEE PAGE	GROUND POINTS LOCATION
EB	38 (3RZ-FE)	FRONT LEFT FENDER
EC	38 (3RZ-FE)	INTAKE MANIFOLD
IE	40	COWL SIDE PANEL LH
IF	40	COWL SIDE PANEL RH

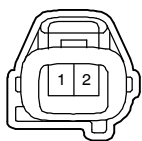
 : SPLICE POINTS

CODE	SEE PAGE	WIRE HARNESS WITH SPLICE POINTS	CODE	SEE PAGE	WIRE HARNESS WITH SPLICE POINTS
E 4	38 (3RZ-FE)	ENGINE WIRE	I 5	40	COIL WIRE
I 2	40	COWL WIRE	I10		
I 3	40	ENGINE ROOM MAIN WIRE	I11	40	ENGINE WIRE

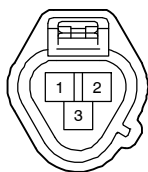


ENGINE CONTROL (3RZ-FE)

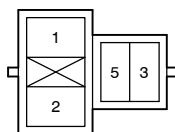
C 1 BLACK



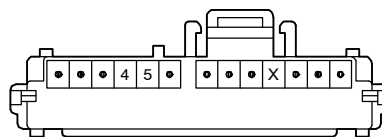
C 2 GRAY



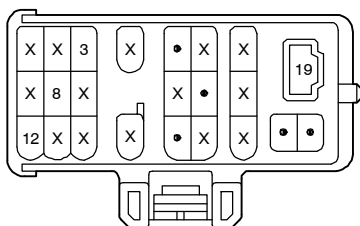
C 6



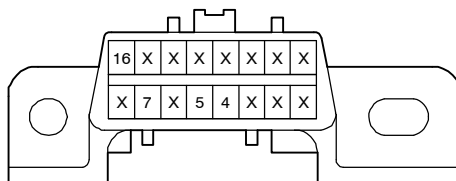
C11 BLUE



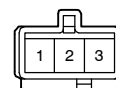
D 1 BLACK



D 7 BLACK



D28



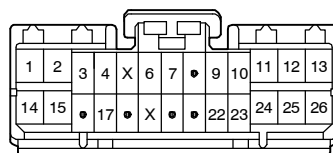
E 1 DARK GRAY



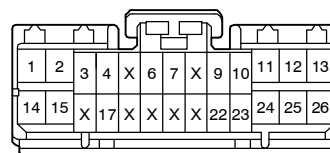
E 3 DARK GRAY



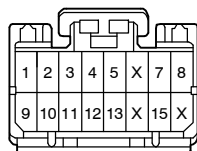
(A/T) E 5 **A**



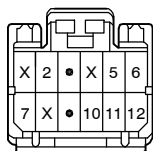
(M/T) E 5 **A**



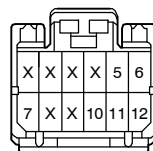
E 6 **B**



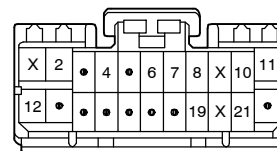
(A/T) E 7 **C**



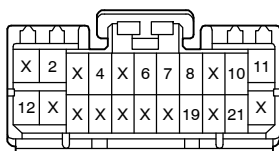
(M/T) E 7 **C**



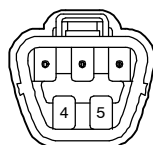
(A/T) E 8 **D**



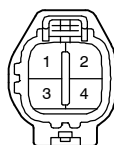
(M/T) E 8 **D** GRAY



F10 DARK GRAY



H 3, H 4 DARK GRAY



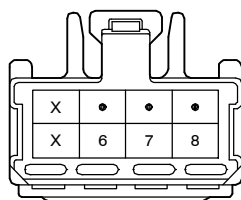
I 1 GRAY



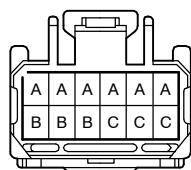
I 6, I 7, I 8, I 9 BROWN



I14

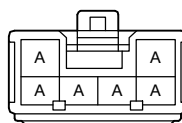


J 1 **A** , J 2 **B** GRAY



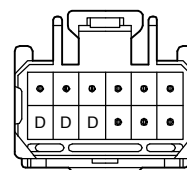
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J 4, J 9



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J12 BLACK



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