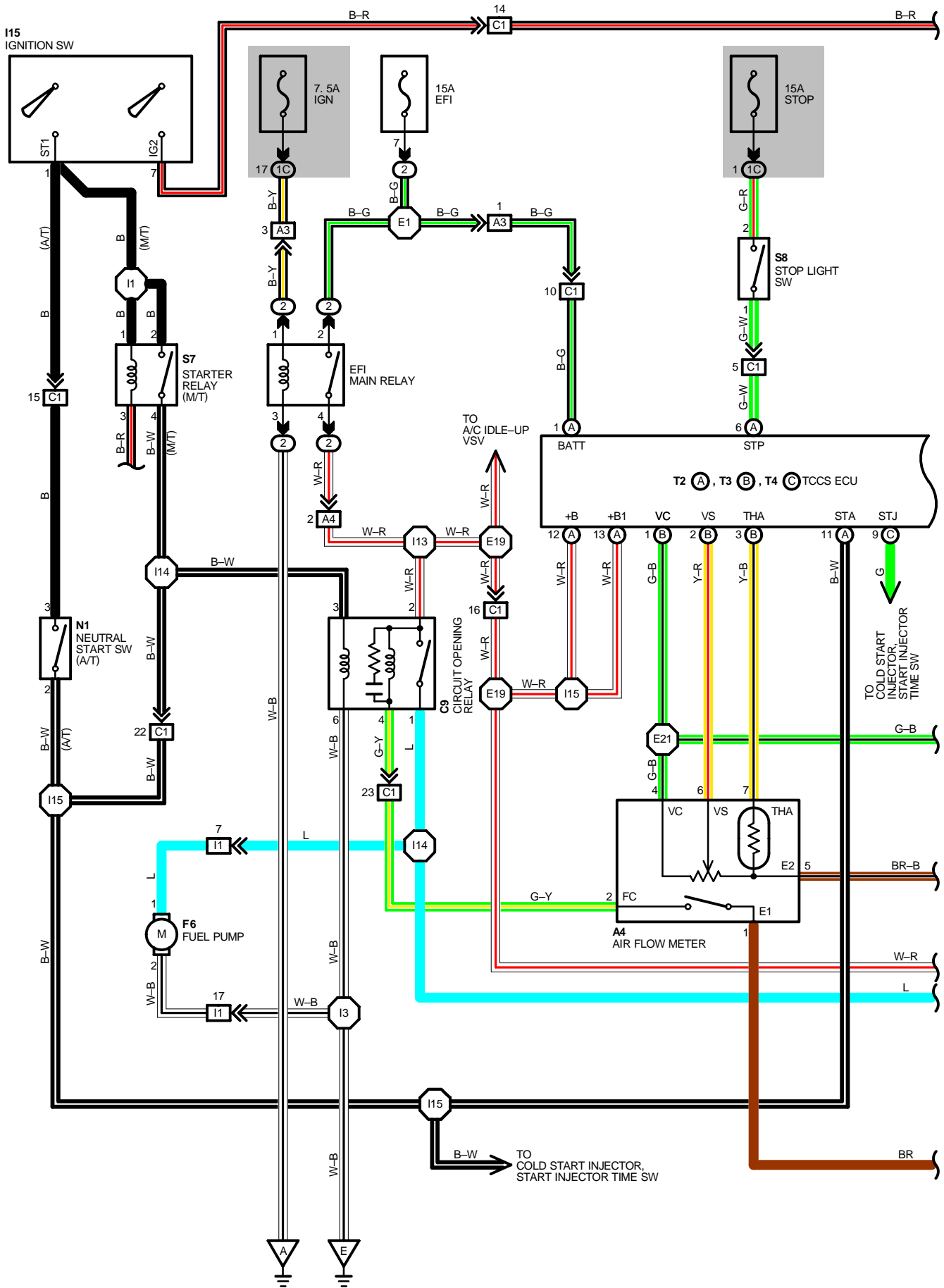
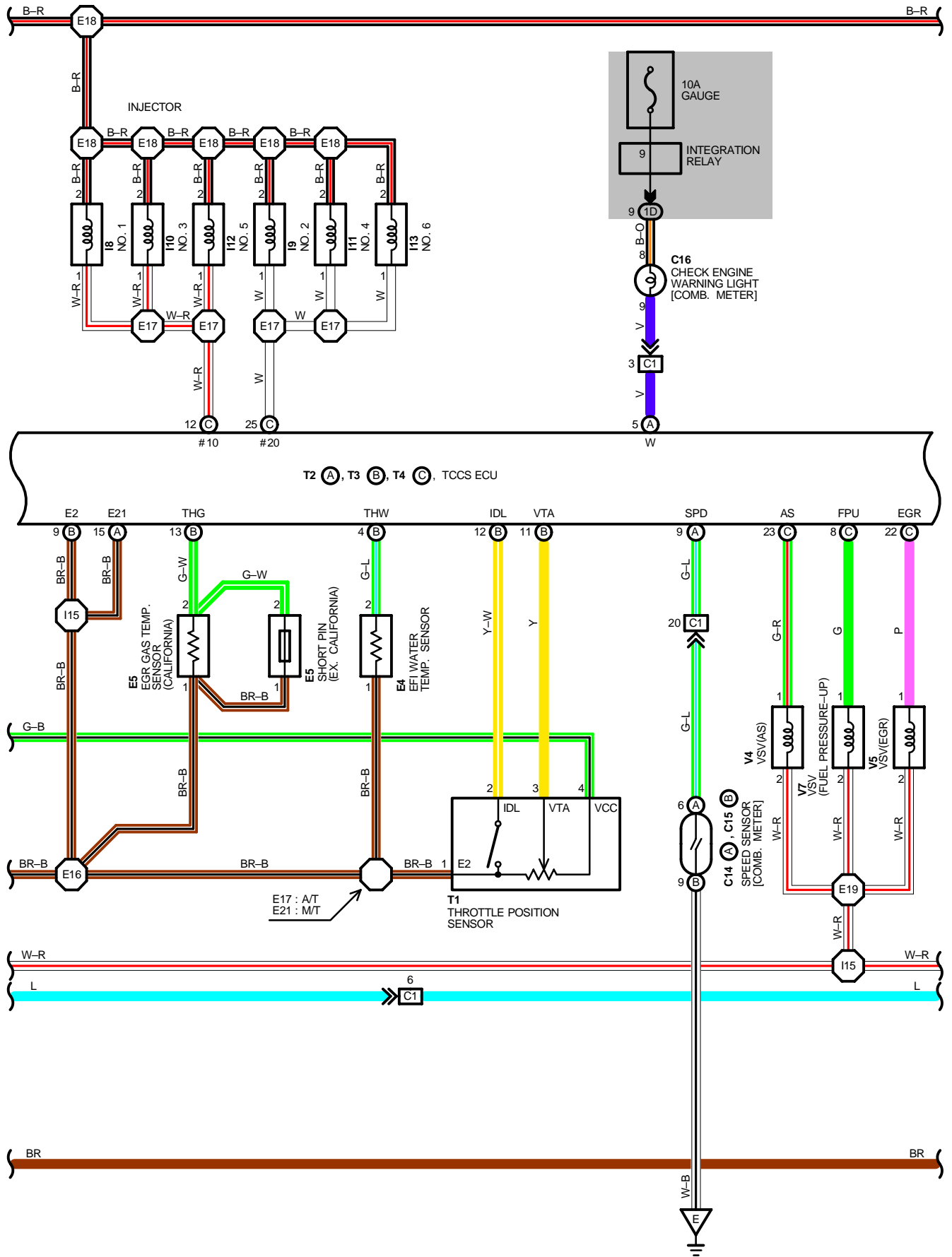
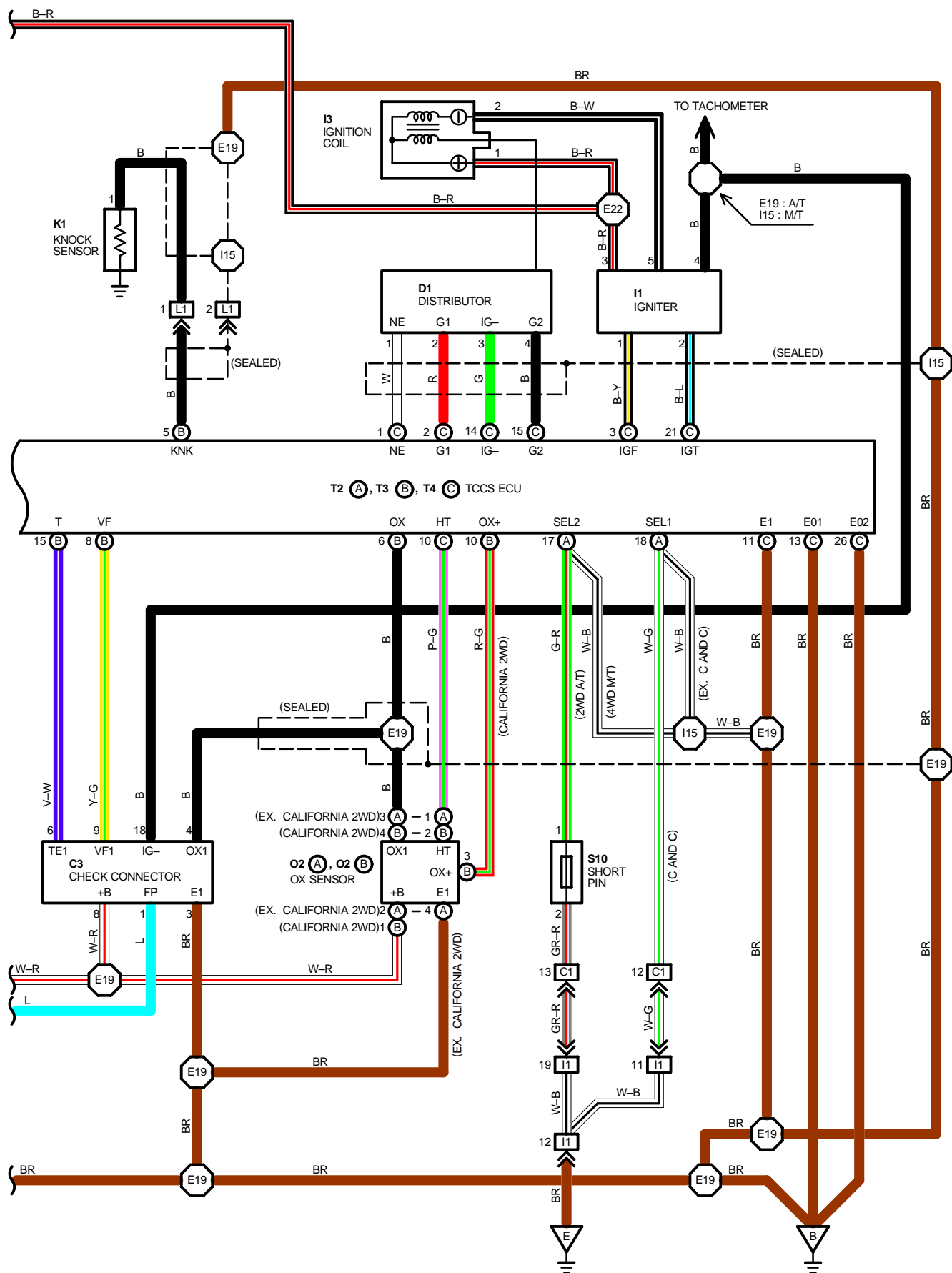


# ENGINE CONTROL (3VZ-E)

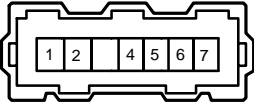




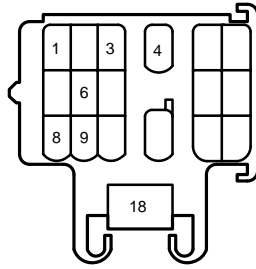
# ENGINE CONTROL (3VZ-E)



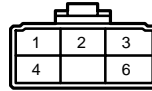
A4 BLACK



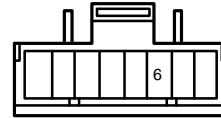
C3 DARK GRAY



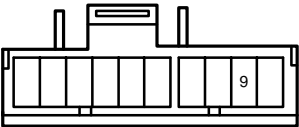
C9 DARK GRAY



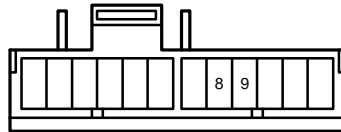
C14 (A)



C15 (B) GRAY



C16



D1 DARK GRAY



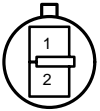
E4 DARK GRAY



E5 DARK GRAY



F6 DARK GRAY



I1 BLACK



I3 BLACK

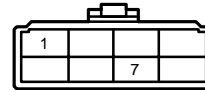


I8, I9, I10, I11, I12, I13



GRAY

I15 BLACK



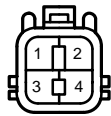
K1 DARK GRAY



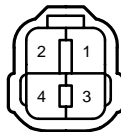
N1



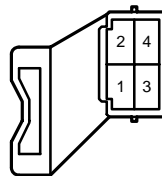
O2 (A) DARK GRAY



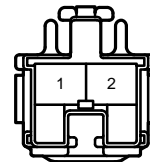
O2 (B) DARK GRAY



S7 GREEN



S8 BLACK



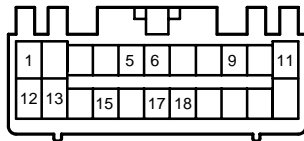
S10



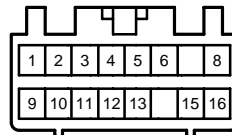
T1



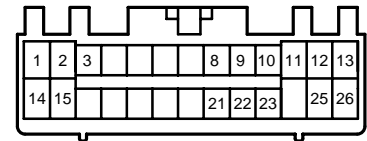
T2 (A) DARK GRAY



T3 (B) DARK GRAY



T4 (C) DARK GRAY



V4 BLUE



V5 GREEN



V7 BROWN



# ENGINE CONTROL (3VZ-E)

## 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. INPUT SIGNAL

- (1) WATER TEMP. SIGNAL SYSTEM  
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. THUS THE WATER TEMP. IS INPUT IN THE FORM OF A CONTROL SIGNAL TO TERMINAL THW OF THE TCCS ECU.
- (2) INTAKE AIR TEMP. SIGNAL SYSTEM  
THE INTAKE AIR TEMP. SENSOR IS INSTALLED INSIDE THE AIR FLOW METER AND DETECTS THE INTAKE AIR TEMP., WHICH IS INPUT AS A CONTROL SIGNAL TO TERMINAL THA OF THE ECU.
- (3) OXYGEN SENSOR SIGNAL SYSTEM  
THE OXYGEN DENSITY IN THE EXHAUST EMISSIONS IS DETECTED AND INPUT AS A CONTROL SIGNAL TO TERMINAL OX OF THE ECU. TO MAINTAIN STABLE DETECTION PERFORMANCE BY THE OXYGEN SENSOR, A HEATER IS USED FOR WARMING THE SENSOR. THE HEATER IS ALSO CONTROLLED BY THE ECU (HT).
- (4) RPM SIGNAL SYSTEM  
CRANKSHAFT POSITION AND ENGINE RPM ARE DETECTED BY THE PICK-UP COIL INSTALLED INSIDE THE DISTRIBUTOR, CRANKSHAFT POSITION IS INPUT AS CONTROL SIGNAL TO TERMINALS G1 AND G2 OF THE ECU, AND RPM IS INPUT TO TERMINAL NE.
- (5) 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 ECU, OR WHEN THE VALVE IS FULLY CLOSED, TO TERMINAL IDL.
- (6) VEHICLE SPEED SIGNAL SYSTEM  
THE SPEED SENSOR, INSTALLED INSIDE THE COMBINATION METER, DETECTS THE VEHICLE SPEED AND INPUT A CONTROL SIGNAL TO TERMINAL SPD OF THE ECU.
- (7) A/C SW SIGNAL SYSTEM  
THE OPERATING VOLTAGE OF THE A/C MAGNET CLUTCH IS DETECTED AND INPUT IN THE FORM OF A CONTROL SIGNAL TO TERMINAL A/C OF THE ECU.
- (8) BATTERY SIGNAL SYSTEM  
VOLTAGE IS CONSTANTLY APPLIED TO TERMINAL BATT OF THE ECU. WHEN THE IGNITION SW IS TURNED TO ON, VOLTAGE FOR ECU OPERATION IS APPLIED VIA THE EFI MAIN RELAY TO TERMINALS +B1 AND B1 OF THE ECU.
- (9) INTAKE AIR VOLUME SIGNAL SYSTEM  
INTAKE AIR VOLUME IS DETECTED BY THE POTENTIOMETER INSTALLED INSIDE THE AIR FLOW METER AND IS INPUT AS A CONTROL SIGNAL TO TERMINAL VS OF THE ECU. INSIDE THE AIR FLOW METER THERE IS ALSO A SW FOR FUEL PUMP OPERATION, AND WHEN THE MEASURING PLATE OPENS (AIR INTAKE OCCURS), THIS SW TURNS ON AND CURRENT FLOWS TO THE FUEL PUMP TO OPERATE IT.
- (10) 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 STP OF THE ECU.
- (11) STA 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 ECU.
- (12) ENGINE KNOCK SIGNAL SYSTEM  
ENGINE KNOCKING IS DETECTED BY THE KNOCK SENSOR AND INPUT AS A CONTROL SIGNAL TO TERMINAL KNK OF THE ECU.
- (13) 4WD SIGNAL SYSTEM  
WHETHER OR NOT THE VEHICLE IS OPERATING IN 4WD MODE IS DETERMINED, AND A CONTROL SIGNAL IS INPUT TO TERMINAL 4WD OF THE ECU.

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## **2. CONTROL SYSTEM**

### **\* EFI (ELECTRONIC FUEL INJECTION) SYSTEM**

THE EFI SYSTEM MONITORS THE ENGINE CONDITIONS THROUGH THE SIGNALS EACH SENSOR (INPUT SIGNALS (1 TO 11, 13)) INPUTS TO THE ECU. BASED ON THIS DATA AND THE PROGRAM MEMORIZED IN THE ECU, THE MOST APPROPRIATE FUEL INJECTION TIMING IS DECIDED AND CURRENT IS OUTPUT TO TERMINALS #10 AND #20 OF THE ECU. CAUSING THE INJECTORS TO OPERATE (TO INJECT FUEL). IT IS THIS SYSTEM WHICH, THROUGH THE WORK OF THE ECU, FINELY CONTROLS FUEL INJECTION IN RESPONSE TO DRIVING CONDITIONS.

### **\* ESA (ELECTRONIC SPARK ADVANCE) SYSTEM**

THE ESA SYSTEM MONITORS THE ENGINE CONDITIONS USING THE SIGNALS (INPUT SIGNALS (1, 4, 5 TO 7, 9, 11, 12)) INPUT TO THE ECU FROM EACH SENSOR. BASED ON THIS DATA AND THE PROGRAM MEMORIZED IN THE ECU, THE MOST APPROPRIATE IGNITION TIMING IS DECIDED AND CURRENT IS OUTPUT TO TERMINAL IGT OF THE ECU. THIS OUTPUT CONTROLS THE IGNITER TO PRODUCE THE MOST APPROPRIATE IGNITION TIMING FOR THE DRIVING CONDITIONS.

### **\* FUEL PRESSURE CONTROL SYSTEM**

THE FUEL PRESSURE UP SYSTEM CAUSES THE VSV (FOR FUEL PRESSURE UP, A/C IDLE-UP) TO COME ON FOR HIGH TEMP. STARTS AND FOR ABOUT 180 SECONDS AFTER STARTING IN ORDER TO INCREASE THE FUEL PRESSURE, IMPROVE STARTABILITY AT HIGH TEMPERATURES AND PROVIDE STABLE IDLING. THE ECU EVALUATES THE INPUT SIGNALS FROM EACH SENSOR (1, 2, 4 AND 11), OUTPUTS CURRENT TO TERMINAL FPU AND CONTROLS THE VSV.

### **\* OXYGEN SENSOR HEATER CONTROL SYSTEM**

THE 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 OXYGEN SENSOR TO IMPROVE DETECTION PERFORMANCE OF THE SENSOR. THE ECU EVALUATES THE SIGNALS FROM EACH SENSOR (INPUT SIGNALS (1, 4, 8, 9, 11)), CURRENT IS OUTPUT TO TERMINAL HT AND CONTROLS THE HEATER.

### **\* AS CONTROL SYSTEM**

THE AS CONTROL SYSTEM TURNS ON THE VSV (FOR AS) WHEN THE ENGINE IS COLD AND DURING DECELERATION, PREVENTING OVERHEATING OF THE TWC (THREE-WAY CATALYTIC CONVERTER) AND REDUCING HC AND CO EMISSIONS. THE ECU EVALUATES THE SIGNALS FROM EACH SENSOR (INPUT SIGNALS (1, 4, 8, 9, 11)), THEN SENDS OUTPUT TO TERMINAL AS AND CONTROLS THE VSV.

### **\* EGR CUT CONTROL SYSTEM**

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

## **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 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 ECU MEMORY OR ELSE STOPS THE ENGINE.

# ENGINE CONTROL (3VZ-E)

## SERVICE HINTS

### EFI MAIN RELAY

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

### A4 AIR FLOW METER

1-2 : CLOSED WITH STARTER RUNNING OR MEASURING PLATE OPEN

4-5 : **200-400**  $\Omega$

5-6 : **200-600**  $\Omega$  (MEASURING PLATE FULLY CLOSED)

**20-1200**  $\Omega$  (MEASURING PLATE FULLY OPEN)

5-7 : **10-20** K $\Omega$  (**-20**°C, **-4**°F)

**4-7** K $\Omega$  (**0**°C, **32**°F)

**2-3** K $\Omega$  (**20**°C, **68**°F)

**0.9-1.3** K $\Omega$  (**40**°C, **104**°F)

**0.4-0.7** K $\Omega$  (**60**°C, **140**°F)

### C9 CIRCUIT OPENING RELAY

1-2 : CLOSED WITH STARTER RUNNING OR MEASURING PLATE (AIR FLOW METER) OPEN

### I8, I9, I10, I11, I12, I13 INJECTOR

1-2 : **13.4-14.2**  $\Omega$

### N1 NEUTRAL START SW (A/T)

2-3 : CLOSED WITH A/T SHIFT LEVER IN **P** OR **N** POSITION

### T1 THROTTLE POSITION SENSOR

2-4 : **0.2- 0.8** K $\Omega$  WITH CLEARANCE BETWEEN LEVER AND STOP SCREW **0** MM (**0** IN.)

3-4 : **2.3** K $\Omega$  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 $\Omega$  WITH THROTTLE VALVE FULLY OPEN

1-4 : **4-9** K $\Omega$

### W3 WATER TEMP. SENSOR

1-2 : **10-20** K $\Omega$  (**-20**°C, **-4**°F)

**4-7** K $\Omega$  (**0**°C, **32**°F)

**2-3** K $\Omega$  (**20**°C, **68**°F)

**0.9-1.3** K $\Omega$  (**40**°C, **104**°F)

**0.4-0.7** K $\Omega$  (**60**°C, **140**°F)

**0.2-0.4** K $\Omega$  (**80**°C, **176**°F)

### T2, T3, T4 TCCS ECU

VOLTAGE AT ECU CONNECTORS

**+B** -E1 : **10-14** VOLTS (IGNITION SW ON)

**BATT** -E1 : **10-14** VOLTS (ALWAYS)

**VC** -E2 : **4-6** VOLTS (IGNITION SW ON)

**IDL** -E2 : **8-14** VOLTS (IGNITION SW ON AND THROTTLE VALVE OPEN)

**VTA** -E2 : **0.1-1.0** VOLTS (IGNITION SW ON AND THROTTLE VALVE FULLY CLOSED)

**3-5** VOLTS (IGNITION SW ON AND THROTTLE VALVE FULLY OPEN)

**IGT** -E1 : **0.7-1.0** VOLTS (CRANKING OR IDLING)

**STA** -E1 : **6-12** VOLTS (IGNITION SW AT **ST** POSITION)

**+B1** -E1 : **10-14** VOLTS (IGNITION SW ON)

**#10, #20**-E1 : **10-14** VOLTS (IGNITION SW ON)

**W** -E1 : **10-14** VOLTS (NO TROUBLE AND ENGINE RUNNING)

**VS** -E2 : **3.7-4.3** VOLTS (IGNITION SW ON AND MEASURING PLATE FULLY CLOSED)

**0.2-0.5** VOLTS (IGNITION SW ON AND MEASURING PLATE FULLY OPEN)

**2.3-2.8** VOLTS (IDLING)

**0.3-1.0** VOLTS (**3000** RPM)

**THA** -E2 : **1-3** VOLTS (IGNITION SW ON AND INTAKE AIR TEMP. **20**°C, **68**°F)

**THW** -E2 : **0.1-1.0** VOLTS (IGNITION SW ON AND COOLANT TEMP. **80**°C, **176**°F)

**SPD** -E1 : **6-12** VOLTS (IGNITION SW AT **ST** POSITION AND COOLANT TEMP. **80**°C, **176**°F)

**STP** -E1 : **8-14** VOLTS (STOP LIGHT SW ON)

### RESISTANCE AT ECU WIRING CONNECTOR

(DISCONNECT WIRING CONNECTOR)

**IDL** -E2 : INFINITY (THROTTLE VALVE OPEN)

**0-100**  $\Omega$  (THROTTLE VALVE FULLY CLOSED)

**VTA** -E2 : **3.3-10** K $\Omega$  (THROTTLE VALVE FULLY OPEN)

**0.2-0.8** K $\Omega$  (THROTTLE VALVE FULLY CLOSED)

**THA** -E2 : **2-3** K $\Omega$  (INTAKE AIR TEMP. **20**°C, **68**°F)

**THW** -E2 : **0.2-0.4** K $\Omega$  (COOLANT TEMP. **80**°C, **176**°F)

**+B** -E2 : **0.2-0.4** K $\Omega$

**VS** -E2 : **0.02-0.1** K $\Omega$  (MEASURING PLATE FULLY CLOSED)

**0.02-1.0** K $\Omega$  (MEASURING PLATE FULLY OPEN)

**NE** -E1 : **140-180**  $\Omega$

**STJ** -E1 : INFINITY

 : PARTS LOCATION

CODE	SEE PAGE	CODE	SEE PAGE	CODE	SEE PAGE
A4	22	I3	22	S7	24
C3	22	I8	22	S8	22
C9	24	I9	22	S10	22
C14	A 24	I10	22	T1 22	
C15	B 24	I11	22	T2	A 24
C16	24	I12	22	T3	B 24
D1	22	I13	22	T4	C 24
E4	22	I15	24	V4	22
E5	22	K1	22	V5	22
F6	25	N1	22	V7	22
I1	22	O2	22		

 : RELAY BLOCKS

CODE	SEE PAGE	RELAY BLOCKS (RELAY BLOCK LOCATION)
2	17	R/B NO.2 (ENGINE COMPARTMENT RIGHT)

 : JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

CODE	SEE PAGE	JUNCTION BLOCK AND WIRE HARNESS (CONNECTOR LOCATION)
1C	18	COWL WIRE AND J/B NO.1 (LEFT KICK PANEL)
1D		

 : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

CODE	SEE PAGE	JOINING WIRE HARNESS AND WIRE HARNESS (CONNECTOR LOCATION)
A3	26	COWL WIRE AND ENGINE ROOM MAIN WIRE (R/B NO.2)
A4		
C1	30	ENGINE WIRE AND COWL WIRE (RIGHT KICK PANEL)
I1	32	FRAME WIRE AND COWL WIRE (UNDER PASSENGER'S SEAT)
L1	26	SENSOR WIRE AND ENGINE WIRE (ON THE HEAD COVER)

 : GROUND POINTS

CODE	SEE PAGE	GROUND POINTS LOCATION
A	26	LEFT FENDER
B	26	CAMSHAFT BEARING CAP
E	30	LEFT KICK PANEL

 : SPLICE POINTS

CODE	SEE PAGE	WIRE HARNESS WITH SPLICE POINTS	CODE	SEE PAGE	WIRE HARNESS WITH SPLICE POINTS
E1	26 (3VZ-E)	ENGINE ROOM MAIN WIRE	E22	30	COWL WIRE
E16	26	ENGINE WIRE	I1		
E17			I3		
E18			I13		
E19			I14		
E21			I15	30	ENGINE WIRE