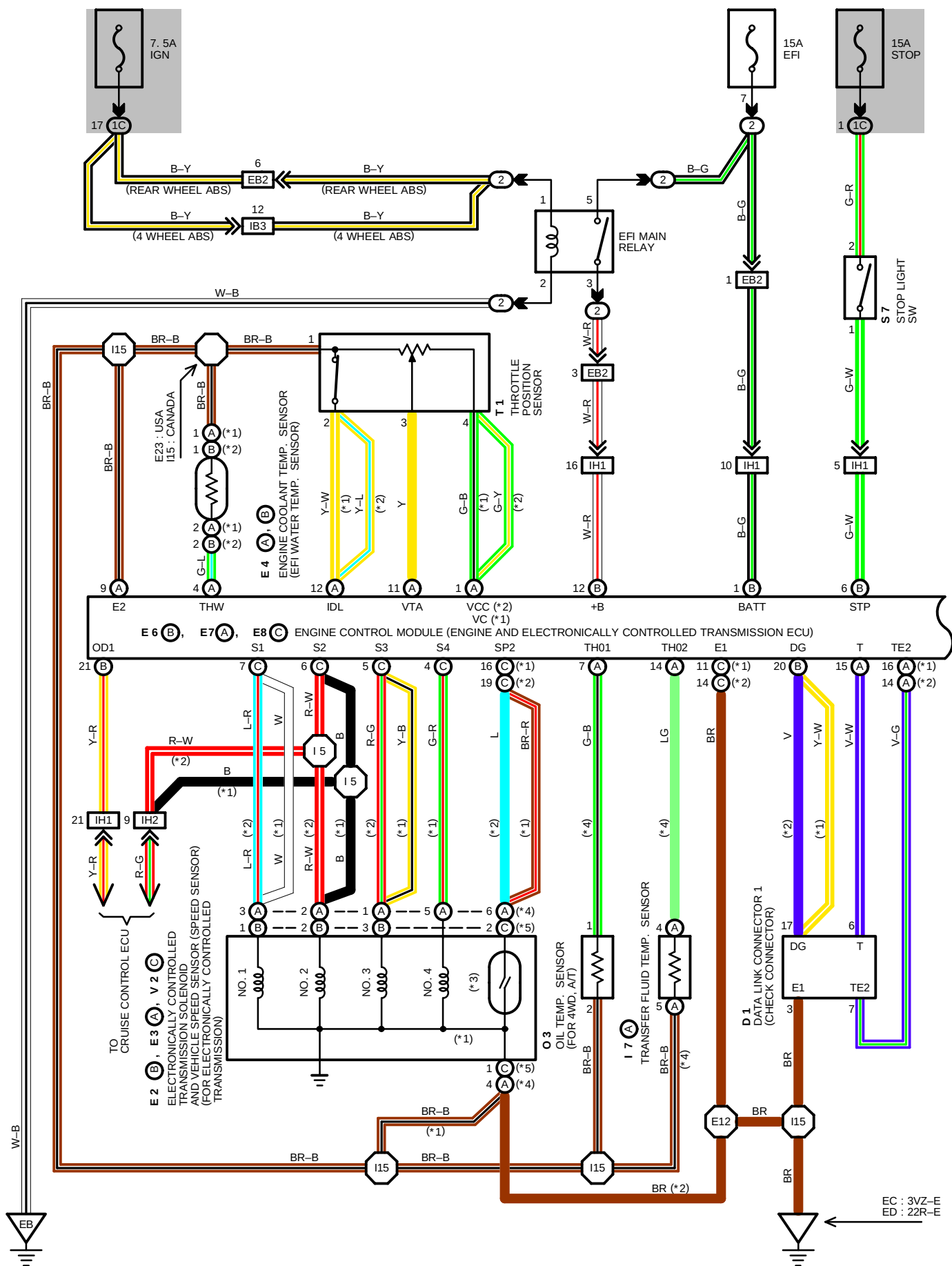
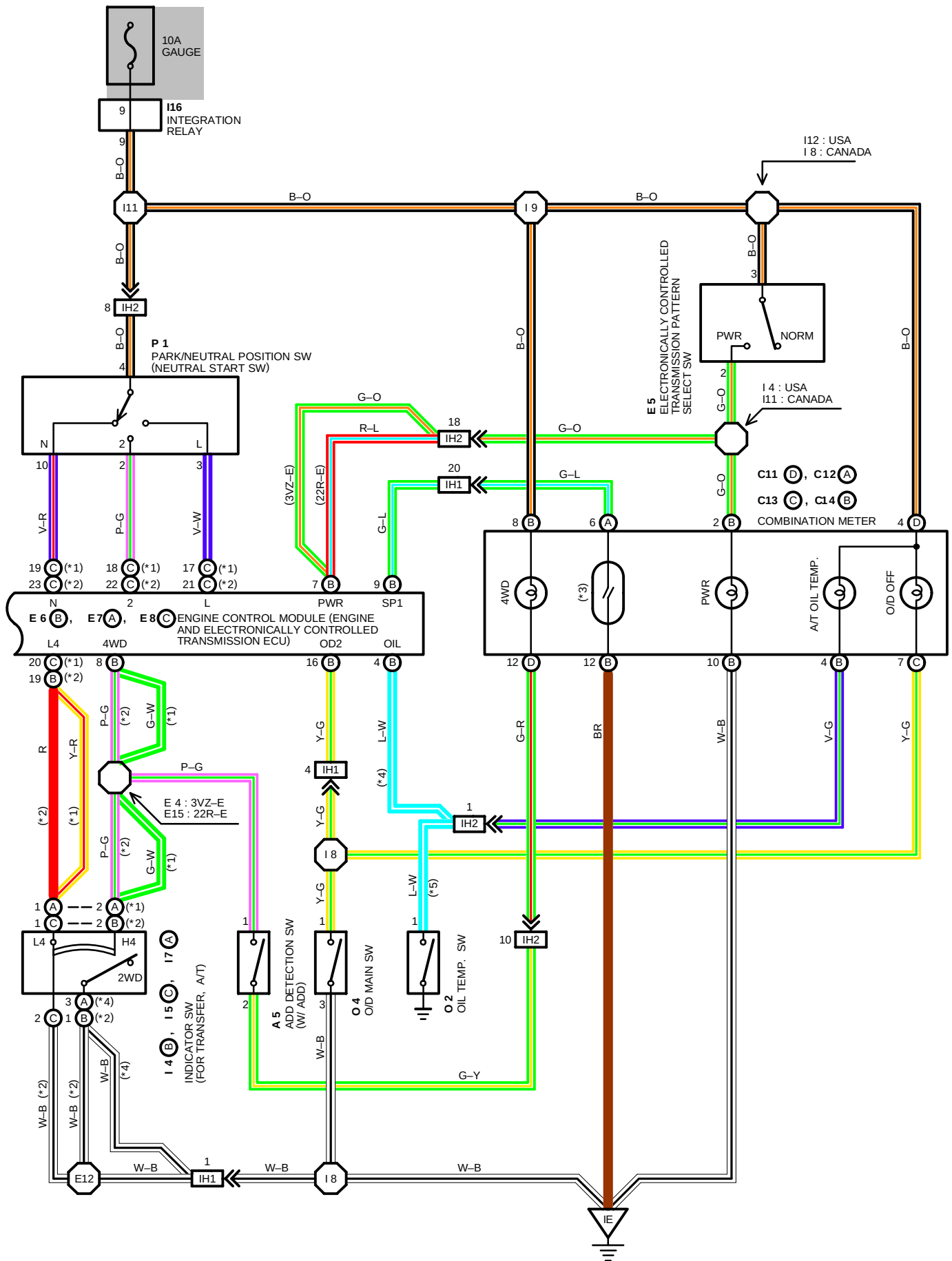


ELECTRONICALLY CONTROLLED TRANSMISSION



*1 : 3VZ-E
 *2 : 22R-E
 *3 : VEHICLE SPEED SENSOR (SPEED SENSOR)

*4 : 3VZ-E (4WD)
 *5 : 3VZ-E (2WD), 22R-E



ELECTRONICALLY CONTROLLED TRANSMISSION

SYSTEM OUTLINE

PREVIOUS AUTOMATIC TRANSMISSIONS HAVE SELECTED EACH GEAR SHIFT USING MECHANICALLY CONTROLLED THROTTLE HYDRAULIC PRESSURE, GOVERNOR HYDRAULIC PRESSURE AND LOCK-UP HYDRAULIC PRESSURE, THE ELECTRONICALLY CONTROLLED TRANSMISSION, HOWEVER, ELECTRICALLY CONTROLS THE LINE PRESSURE AND LOCK-UP PRESSURE ETC, THROUGH THE SOLENOID VALVE, ENGINE CONTROL MODULE (ENGINE AND ELECTRONICALLY CONTROLLED TRANSMISSION ECU) CONTROL OF THE SOLENOID VALVE BASED ON THE INPUT SIGNALS FROM EACH SENSOR MAKES SMOOTH DRIVING POSSIBLE BY SHIFT SELECTION FOR EACH GEAR WHICH IS MOST APPROPRIATE TO THE DRIVING CONDITIONS AT THAT TIME.

1. GEAR SHIFT OPERATION

DURING DRIVING, THE ENGINE CONTROL MODULE (ECU) SELECTS THE SHIFT FOR EACH GEAR WHICH IS MOST APPROPRIATE TO THE DRIVING CONDITIONS, BASED ON INPUT SIGNALS FROM THE ENGINE COOLANT TEMP. SENSOR (EFI WATER TEMP. SENSOR) TO **TERMINAL THW** OF THE ENGINE CONTROL MODULE (ECU), AND ALSO THE INPUT SIGNALS TO **TERMINAL SP2** OF THE ENGINE CONTROL MODULE (ECU) FROM THE VEHICLE SPEED SENSOR (SPEED SENSOR) DEVOTED TO THE ELECTRONICALLY CONTROLLED TRANSMISSION. CURRENT IS THEN OUTPUT TO THE ELECTRONICALLY CONTROLLED TRANSMISSION SOLENOIDS. WHEN SHIFTING TO 1ST SPEED, CURRENT FLOWS FROM **TERMINAL S1** OF THE ENGINE CONTROL MODULE (ECU) → **TERMINAL (A) 3** (3VZ-E 4WD) OR **TERMINAL (B) 1** (3VZ-E 2WD, 22R-E) OF THE ELECTRONICALLY CONTROLLED TRANSMISSION SOLENOIDS → **TERMINAL (C) 1** (3VZ-2 2WD, 22R-E) → **GROUND**, AND CONTINUITY TO THE NO. 1 SOLENOID CAUSES THE SHIFT.

FOR 2ND SPEED, CURRENT FLOWS FROM **TERMINAL S1** OF THE ENGINE CONTROL MODULE (ECU) → **TERMINAL (A) 3** (3VZ-E 4WD) OR **TERMINAL (B) 1** (3VZ-E 2WD, 22R-E) OF THE ELECTRONICALLY CONTROLLED TRANSMISSION SOLENOIDS → **TERMINAL (C) 1** (3VZ-E 2WD, 22R-E) → **GROUND**, AND FROM **TERMINAL S2** OF THE ENGINE CONTROL MODULE (ECU) → **TERMINAL (A) 2** (3VZ-E 4WD) OR **TERMINAL (B) 2** (3VZ-E 2WD, 22R-E) OF THE ELECTRONICALLY CONTROLLED TRANSMISSION SOLENOIDS → **TERMINAL (C) 1** (3VZ-E 2WD, 22R-E) → **GROUND**, AND CONTINUITY TO SOLENOIDS NO. 1 AND NO. 2 CAUSES THE SHIFT.

FOR 3RD SPEED, THERE IS NO CONTINUITY TO NO. 1 SOLENOID, ONLY TO NO. 2 CAUSING THE SHIFT. SHIFTING INTO 4TH SPEED (OVERDRIVE) TAKES PLACE WHEN THERE IS NO CONTINUITY TO EITHER NO. 1 OR NO. 2 SOLENOID.

2. LOCK-UP OPERATION

WHEN THE ENGINE CONTROL MODULE (ECU) JUDGES FROM EACH SIGNAL THAT LOCK-UP OPERATION CONDITIONS HAVE BEEN MET, CURRENT FLOWS FROM **TERMINAL S3** OF THE ENGINE CONTROL MODULE (ECU) → **TERMINAL (A) 1** (3VZ-E 4WD) OR **TERMINAL (B) 3** (3VZ-E 2WD, 22R-E) OF THE LOCK-UP SOLENOID → **TERMINAL (C) 1** (3VZ-E 2WD, 22R-E) → **GROUND**, CAUSING CONTINUITY TO THE LOCK-UP SOLENOID AND CAUSING LOCK-UP OPERATION.

3. TRANSFER SHIFT OPERATION (H4-L4)

WHEN THE TRANSFER SHIFT LEVER IS MOVED TO **H4** POSITION, THE CURRENT FROM THE **GAUGE** FUSE FLOWS TO THE 4WD INDICATOR LIGHT → **TERMINAL 2** OF ADD INDICATOR SW → **TERMINAL 1** → **TERMINAL (A) 2** (3VZ-E 4WD) OR **TERMINAL (B) 2** (22R-E 4WD) OF THE INDICATOR SW → **TERMINAL (A) 3** (3VZ-E 4WD) OR **TERMINAL (B) 1** (22R-E 4WD) → **GROUND** SO THAT THE INDICATOR LIGHT LIGHTS UP AND SHIFT TO H4 OCCURS.

IF THE LEVER IS NEXT MOVED TO **L4** POSITION, THE INDICATOR LIGHT OPERATES THE SAME AS WITH H4, CAUSING THE LIGHT TO CAME ON. AT THE SAME TIME, A SIGNAL IS INPUT TO **TERMINAL L4** OF THE ENGINE CONTROL MODULE (ECU). ACCORDINGLY, WHEN THE ENGINE CONTROL MODULE (ECU) DECIDES THAT DRIVING IN L4 IS POSSIBLE, CURRENT FLOWS FROM **TERMINAL S4** OF THE ENGINE CONTROL MODULE (ECU) → **TERMINAL (A) 5** (3VZ-E 4WD) OF THE ELECTRONICALLY CONTROLLED TRANSMISSION SOLENOID → **GROUND** AND SHIFT TO L4 OCCURS.

4. STOP LIGHT SW CIRCUIT

IF THE BRAKE PEDAL IS DEPRESSED (STOP LIGHT SW ON) WHEN DRIVING IN LOCK-UP CONDITION. A SIGNAL IS INPUT TO **TERMINAL STP** OF THE ENGINE CONTROL MODULE (ECU), THE ENGINE CONTROL MODULE (ECU) OPERATES AND CONTINUITY TO THE LOCK-UP SOLENOID IS CUT.

5. OVERDRIVE CIRCUIT

* O/D MAIN SW ON

WHEN THE O/D MAIN SW IS TURNED ON, A SIGNAL IS INPUT TO **TERMINAL OD2** OF THE ENGINE CONTROL MODULE (ECU) AND ENGINE CONTROL MODULE (ECU) OPERATION CAUSES GEAR SHIFT WHEN THE CONDITIONS FOR OVERDRIVE ARE MET.

* O/D MAIN SW OFF

WHEN THE OVERDRIVE SW IS TURNED TO OFF, THE CURRENT FLOWING THROUGH THE O/D OFF INDICATOR LIGHT FLOWS THROUGH THE O/D MAIN SW TO **GROUND**, CAUSING THE INDICATOR LIGHT TO LIGHT UP. AT THE SAME TIME, A SIGNAL IS INPUT TO **TERMINAL OD2** OF THE ENGINE CONTROL MODULE (ECU) AND ENGINE CONTROL MODULE (ECU) OPERATION PREVENTS SHIFT INTO OVERDRIVE.

6. ELECTRONICALLY CONTROLLED TRANSMISSION PATTERN SELECT SW CIRCUIT

IF THE ELECTRONICALLY CONTROLLED TRANSMISSION PATTERN SELECT SW IS CHANGED FROM NORMAL TO POWER, THE CURRENT FLOWING THROUGH THE POWER INDICATOR FLOWS TO **GROUND**. CURRENT FLOWS TO **TERMINAL PWR** OF THE ENGINE CONTROL MODULE (ECU), THE ENGINE CONTROL MODULE (ECU) OPERATES, AND SHIFT UP AND SHIFT DOWN OCCUR AT HIGHER VEHICLE SPEEDS THAN WHEN THE SW IS IN **NORMAL** POSITION.

7. A/T. OIL TEMP. WARNING

* TRANSMISSION SIDE

WHEN THE OIL TEMP. SENSOR AFFIXED TO THE TRANSMISSION CASE DETECTS THAT THE FLUID TEMP. IS **150°C (302°F)** OR MORE, THE ENGINE CONTROL MODULE (ECU) OPERATES AND THE CURRENT FLOWING THROUGH THE **GAUGE** FUSE FLOWS TO THE A/T. OIL TEMP. WARNING LIGHT → **TERMINAL OIL** OF THE ENGINE CONTROL MODULE (ECU) → **GROUND** SO THAT THE WARNING LIGHT LIGHTS UP, INFORMING THAT THE FLUID TEMP. IS HIGH. WHEN THE FLUID TEMP. DROPS TO **120°C (248°F)** OR LESS, THE ENGINE CONTROL MODULE (ENGINE AND ELECTRONICALLY CONTROLLED TRANSMISSION ECU) STOPS OPERATING AND THE WARNING LIGHT GOES OUT.

* TRANSMISSION SIDE (22R-E)

WHEN THE OIL TEMP. SENSOR AFFIXED TO THE TRANSMISSION CASE DETECTS THAT THE FLUID TEMP. IS **150°C (302°F)** OR MORE, THE TCCS ECU OPERATES AND THE CURRENT FLOWING THROUGH THE **GAUGE** FUSE FLOWS TO THE A/T. OIL TEMP. WARNING LIGHT → **TERMINAL 1** OF THE OIL TEMP. SW → **GROUND** SO THAT THE WARNING LIGHT LIGHTS UP, INFORMING THAT THE FLUID TEMP. IS HIGH. WHEN THE FLUID TEMP. DROPS TO **120°C (248°F)** OR LESS, THE ENGINE CONTROL MODULE (ENGINE AND ELECTRONICALLY CONTROLLED TRANSMISSION ECU) STOPS OPERATING AND THE WARNING LIGHT GOES OUT.

* TRANSFER SIDE (FOR 3VZ-E)

WHEN THE TRANSFER FLUID TEMP. SENSOR AFFIXED TO THE TRANSFER CHAIN CASE DETECTS THAT THE FLUID TEMP. IS **125°C (257°F)** OR HIGHER, THE ENGINE CONTROL MODULE (ECU) OPERATES AND THE CURRENT FLOWING THROUGH THE **GAUGE** FUSE FLOWS TO THE A/T. OIL TEMP. WARNING LIGHT → **TERMINAL OIL** OF THE ENGINE CONTROL MODULE (ECU) → **GROUND** SO THAT THE WARNING LIGHT LIGHTS UP, INFORMING THAT THE FLUID TEMP. IS HIGH. WHEN THE FLUID TEMP. DROPS TO **115°C (239°F)** OR LESS, THE ENGINE CONTROL MODULE (ECU) STOPS OPERATING AND THE WARNING LIGHT GOES OUT.

SERVICE HINTS

E 6(B), E 7(A), E 8(C) ENGINE CONTROL MODULE (ENGINE AND ELECTRONICALLY CONTROLLED TRANSMISSION ECU)

S1	-E1:	9.0-14.0 VOLTS
S4	-E1:	0 VOLTS WITH TRANSFER GEAR AT H2 OR H4 POSITION 9.0-14.0 VOLTS WITH TRANSFER SHIFT AT L4 POSITION
PWR	-E1:	7.5-14.0 VOLTS WITH PATTERN SELECT SW AT PWR POSITION BELOW 1.5 VOLTS WITH PATTERN SELECT SW AT NORM POSITION
STP	-E1:	7.5-14.0 VOLTS WITH BRAKE PEDAL DEPRESSED BELOW 1.5 VOLTS WITH BRAKE PEDAL RELEASED
THW	-E2:	0.2-1.0 VOLTS WITH COOLANT TEMP. 80°C (176°F)
THO1	-E2, THO2	-E2: 4-5 VOLTS WITH FLUID TEMP. 20°C (68°F)
IDL	-E2:	BELOW 1.5 VOLTS WITH THROTTLE VALVE FULLY CLOSED 9.0-14.0 VOLTS WITH THROTTLE VALVE OPEN
VTA	-E2:	0.3-0.8 VOLTS WITH THROTTLE VALVE FULLY CLOSED 3.2-4.9 VOLTS WITH THROTTLE VALVE FULLY OPEN
VCC	-E2:	4.5-5.5 VOLTS WITH IGNITION SW ON
OD1	-E1:	4.5-5.5 VOLTS WITH IGNITION SW ON
OD2	-E1:	9.0-14.0 VOLTS O/D MAIN SWITCH TURNED ON BELOW 3.0 VOLTS O/D MAIN SWITCH TURNED OFF
N	-E1:	7.5-14.0 VOLTS WITH SHIFT LEVER AT N POSITION BELOW 1.5 VOLTS WITH SHIFT LEVER AT EXCEPT N POSITION
2	-E1:	7.5-14.0 VOLTS WITH SHIFT LEVER AT 2 POSITION BELOW 1.5 VOLTS WITH SHIFT LEVER AT EXCEPT 2 POSITION
L	-E1:	7.5-14.0 VOLTS WITH SHIFT LEVER AT L POSITION BELOW 1.5 VOLTS WITH SHIFT LEVER AT EXCEPT L POSITION
L4	-E1:	7.5-14.0 VOLTS WITH TRANSFER SHIFT AT H2 OR H4 POSITION BELOW 1.5 VOLTS WITH TRANSFER SHIFT AT L4 POSITION
OIL	-E1:	9.0-14.0 VOLTS
+B	-E1:	9.0-14.0 VOLTS
BATT	-E1:	9.0-14.0 VOLTS

ELECTRONICALLY CONTROLLED TRANSMISSION

SERVICE HINTS

E 3 ELECTRONICALLY CONTROLLED TRANSMISSION SOLENOID

1,2,3,5-GROUND: APPROX. **11–15 Ω** (3VZ–E)

1,2,3-GROUND : APPROX. **11–15 Ω** (22R–E)

E 5 ELECTRONICALLY CONTROLLED TRANSMISSION PATTERN SELECT SW

3-GROUND : APPROX. **12 VOLTS** WITH IGNITION SW AT **ON** POSITION

P 1 PARK/NEUTRAL POSITION SW (NEUTRAL START SW)

9-GROUND : APPROX. **12 VOLTS** WITH IGNITION SW AT **ON** POSITION

O 4 O/D MAIN SW

3-1: OPEN WITH O/D MAIN SW AT **ON** POSITION

CLOSED WITH O/D MAIN SW AT **OFF** POSITION

S 7 STOP LIGHT SW

1-2: CLOSED WITH BRAKE PEDAL DEPRESSED

○ : PARTS LOCATION

CODE	SEE PAGE	CODE	SEE PAGE	CODE	SEE PAGE
A 5	24 (3VZ–E)	E 4	A 24 (3VZ–E)	O 3	25 (3VZ–E)
	26 (22R–E)		B 26 (22R–E)	O 4	28
C11	D 28	E 5 28		P 1	25 (3VZ–E)
C12	A 28	E 6	B 28		27 (22R–E)
C13	C 28	E 7	A 28	S 7	28
C14	B 28	E 8	C 28	T 1	25 (3VZ–E)
D 1	24 (3VZ–E)	I 4	B 27 (22R–E)		27 (22R–E)
	26 (22R–E)	I 5	C 27 (22R–E)	V 2	25 (3VZ–E)
E 2	24 (3VZ–E)	I 7	A 25 (3VZ–E)		27 (22R–E)
	26 (22R–E)	I16	28		
E 3	A 24 (3VZ–E)	O 2	27 (22R–E)		

○ : RELAY BLOCKS

CODE	SEE PAGE	RELAY BLOCKS (RELAY BLOCK LOCATION)
2	22	R/B NO. 2 (ENGINE COMPARTMENT RIGHT)

○ : JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

CODE	SEE PAGE	JUNCTION BLOCK AND WIRE HARNESS (CONNECTOR LOCATION)
1C	20	COWL WIRE AND J/B NO. 1 (LEFT KICK PANEL)

□ : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

CODE	SEE PAGE	JOINING WIRE HARNESS AND WIRE HARNESS (CONNECTOR LOCATION)
EB2	30 (3VZ–E)	COWL WIRE AND ENGINE ROOM MAIN WIRE (R/B NO. 2)
	32 (22R–E)	
IB3	34	ENGINE ROOM MAIN WIRE AND COWL WIRE (LEFT KICK PANEL)
IH1	34	ENGINE WIRE AND COWL WIRE (RIGHT KICK PANEL)
IH2		

▽ : GROUND POINTS

CODE	SEE PAGE	GROUND POINTS LOCATION
EB	30 (3VZ–E)	LEFT FENDER
	32 (22R–E)	
EC	30 (3VZ–E)	RH CYLINDER HEAD COVER REAR
ED	32 (22R–E)	INTAKE MANIFOLD
IE	34	LEFT KICK PANEL

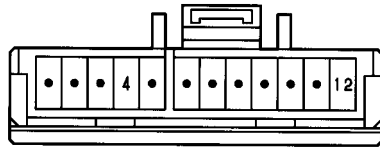
○ : SPLICE POINTS

CODE	SEE PAGE	WIRE HARNESS WITH SPLICE POINTS	CODE	SEE PAGE	WIRE HARNESS WITH SPLICE POINTS
E 4	30 (3VZ–E)	ENGINE WIRE	I 8	34	COWL WIRE
E12	32 (22R–E)		I 9		
E15			I11		
E23			I12		
I 4	34		I15	34	ENGINE WIRE
I 5	34	COWL WIRE			

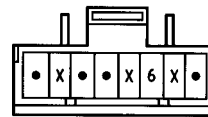
A 5 DARK GRAY



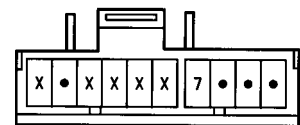
C11 ④ BLUE



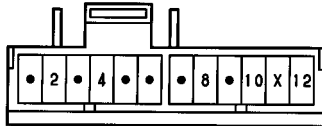
C12 ①



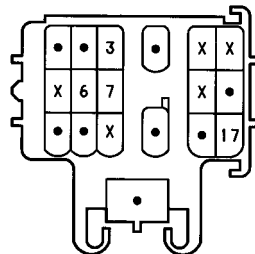
C13 ③ GRAY



C14 ⑤



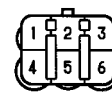
D 1 DARK GRAY



E 2 ② BLACK



E 3 ①



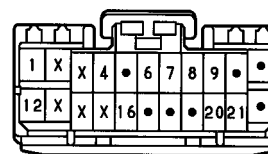
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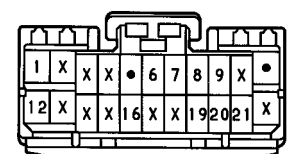
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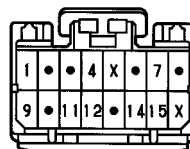
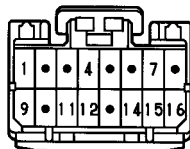
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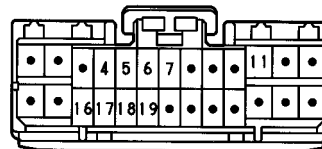
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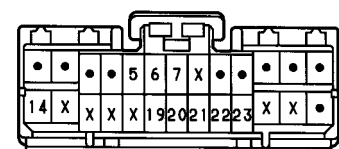
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(3VZ-E) E 8 ③ DARK GRAY



(22R-E) E 8 ③ DARK GRAY



I 4 ② GRAY



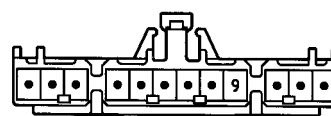
I 5 ③ BLUE



I 7 ① BLUE



I16



O 2 DARK GRAY



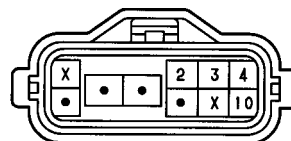
O 3 BLACK



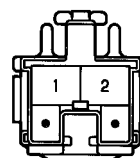
O 4 BLUE



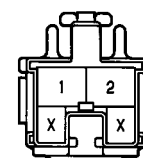
P 1 GRAY



(W/ CRUISE S 7 ① CONTROL)



(W/O CRUISE S 7 ② BLACK CONTROL)



T 1 BLACK



V 2 ③ BLACK

