

# AUTO TRANS DIAGNOSIS - A-140E

1988 Toyota Celica

AUTOMATIC TRANSMISSIONS  
Toyota A-140E Electronic Controls

## APPLICATION

### APPLICATION TABLE

Vehicle Application	Transmission Model
1988-90 Camry .....	A-140E
1988-89 Celica .....	A-140E

## DESCRIPTION

The center of the Electronically Controlled Transmission/Transaxle (ECT) is the Electronic Controlled Unit (ECU). The ECU receives information from various sensors and switches. Based on information received, the ECU generates output signals to control transmission operation. The ECU system controls shift points and operation of lock-up clutch.

## OPERATION

### \* PLEASE READ THIS FIRST \*

The engine control system consists of an engine ECU, sensors, switches and solenoids. In order for the engine ECU to perform properly, it must be kept constantly informed of engine operating conditions. It is the task of the sensors to supply the engine ECU, via electrical signals, with specific information required to determine engine operating conditions. The engine ECU will then send electrical signals to the ECT ECU to control shift timing, lock-up timing, transfer shift timing (if equipped), self-diagnostic system, fluid temperature warning system and backup system. Individual component operation is as follows.

NOTE: Unless otherwise specified, references in this article to ECU refer to the ECT ECU.

## ECU INPUT SENSORS

### Throttle Position (TP) Sensor

The TP sensor is mounted on side of throttle body. The TP sensor senses throttle movement and position, and transmits an electrical signal to ECU. This signal determines gear shifting points.

### Vehicle Speed Sensor (VSS)

This signal is picked up from a rotor on the output shaft and informs the ECU of road speed. The ECU uses sensor signals to control shift points and lock-up clutch operation.

### Transfer Shift Position Switch (TSPS)

The switch signals the ECU that transfer shift lever has been shifted into "L4". When switch contact points are open, the ECU detects the lever is in "H2" or "H4" position,

### Pattern Select Switch (PSS)

2 shift schedules are programmed into ECU: "Power" and "Normal" modes. The mode used by the ECU is determined by setting driving pattern select switch.

Neutral Start Switch (NSS)

The neutral start switch signals the ECU range selector lever position. Switch contains contacts for both starts; control circuit and shift position indicator. The ECU uses signals from "2" and "L" range.

Brake Light Switch (BLS)

The brake light switch signals the ECU whenever brakes are applied. This signals the ECU whenever brakes are applied. This signals the ECU to disengage torque converter lock-up clutch.

OD Main Switch (ODMS)

This switch causes transmission to shift in and out of overdrive. When OD main switch is "ON", current from battery flows to ECU, causing transmission to be OD enabled. When OD main switch is turned off, current from the battery flows to ground.

Water Temperature Sensor (WTS)

The sensor monitors engine coolant temperature. A signal is transmitted to ECU throughout entire range of operating temperatures.

Fluid Temperature Sensor (FTS)

The fluid temperature sensor sends a signal to ECU that varies with transmission fluid temperatures.

Cruise Control Sensor (CCS)

This sensor signals a Cruise Control ECU which prevents transmission from shifting into OD and prohibits lockup control when vehicle speed drops below the drive set speed parameters.

Kickdown Switch (KS)

This switch signals the ECU if the accelerator pedal is depressed beyond the full throttle valve opening position.

Engine Speed Sensor (ESS)

The engine speed sensor indicates engine RPM and sends a signal to the ECU.

OD Direct Clutch Speed Sensor (ODDCSS)

The sensor senses the input shaft speed from 1-3 gear.

## TESTING

### DIAGNOSTIC PROCEDURE

1) Before testing transmission, ensure fluid level is correct, shift linkage, throttle cable, neutral switch and idle speed are correctly adjusted. Ensure transfer case linkage and transfer switch (if equipped) are correctly adjusted. Battery must be fully charged for accurate testing.

2) To aid in fault diagnosis, determine if fault is hydraulic, electronic or a combination of both.

3) The electronic control is capable of storing self-diagnostic codes. To determine if a fault is electrical, read any stored diagnostic codes. Repair electrical fault associated with the code. See DIAGNOSTIC CODES.

NOTE: Not all electrical faults will cause a diagnostic code to be

stored (i.e. throttle position sensor and brake signal). Farther circuit tests may be required See ELECTRICAL COMPONENTS & CIRCUIT.

4) After repairing electrical faults, or if no codes are stored, proceed to MANUAL SHIFTING TEST. During this test the ECT ECU is disconnected to eliminate the electronic control of shifting.

5) If the transmission passes the MANUAL SHIFTING TEST, an electrical fault remains in the system. Repair as necessary.

6) If the transmission fails the MANUAL SHIFTING TEST, perform a stall test, time lag test and hydraulic pressure test. See TESTING under appropriate transmission article in this section.

## DIAGNOSTIC CODES

CAUTION: Ensure battery is fully charged prior to testing. Low battery voltage will cause faulty diagnostic system operation.

Reading Diagnostic Codes (W/O Super Monitor Display)

1) Turn ignition on with engine off. Ensure overdrive switch is in the ON position. Diagnostic codes can only be read if overdrive switch is in the ON position.

2) Determine terminal connector location. See Fig. 1. Using a jumper wire, connect terminals as specified. See TERMINAL USAGE table.

3) Diagnostic codes are read by counting the number of times the "OD OFF" light flashes on the instrument panel.

### TERMINAL USAGE TABLE

Application	Terminal Used
Camry & Celica .....	E1-To-T1 or E1-To-ECU

4) If transmission electrical system is operating normally the light will blink. See NORMAL OPERATION CODE SIGNAL table.

5) If there is a malfunction in the system, the light will blink. See MALFUNCTION CODE SIGNAL table. The number of blinks will equal the first number of the diagnostic code. After a 1.5 second pause, the second number of the diagnostic code will flash. If there are 2 or more codes, there is a 2.5 second pause between codes.

6) Remove jumper wire. If codes are stored, note code number and repair appropriate circuit. See appropriate DIAGNOSTIC CODES table.

### NORMAL OPERATION CODE SIGNAL TABLE

Application (1)	Flash Time
1988	
Camry A-140E .....	.25 Sec. Every .5 Sec.
Celica A-140E .....	Once Every .25 Sec.
1989	
Camry A-140E .....	Once Every .25 Sec.
Celica A-140E .....	2 Times Per Sec.
1990	
Camry A-140E .....	Once Every .25 Sec.

(1) - Normal operation indicates no codes are stored.

NOTE: If several diagnostic codes are stored, the lowest number code will flash first. Other codes will flash from lowest to

highest number.

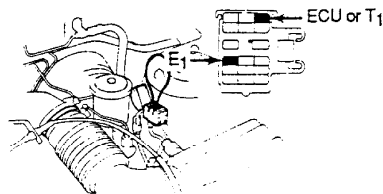
MALFUNCTION CODE SIGNAL TABLE

Application	Flash Time
1988	
Camry A-140E .....	.5 Sec. Every Sec.
Celica A-140E .....	Once Every .5 Sec.
1989	
Camry A-140E .....	Once Every .5 Sec.
Celica A-140E .....	1 Time Per Sec.
1990	
Camry A-140E .....	Once Every .5 Sec.

7) If diagnostic codes 62, 63, 64, 65, 73 or 74 occur an electrical failure in the solenoid is indicated. Mechanical failures such as sticking switches will not appear as diagnostic codes.

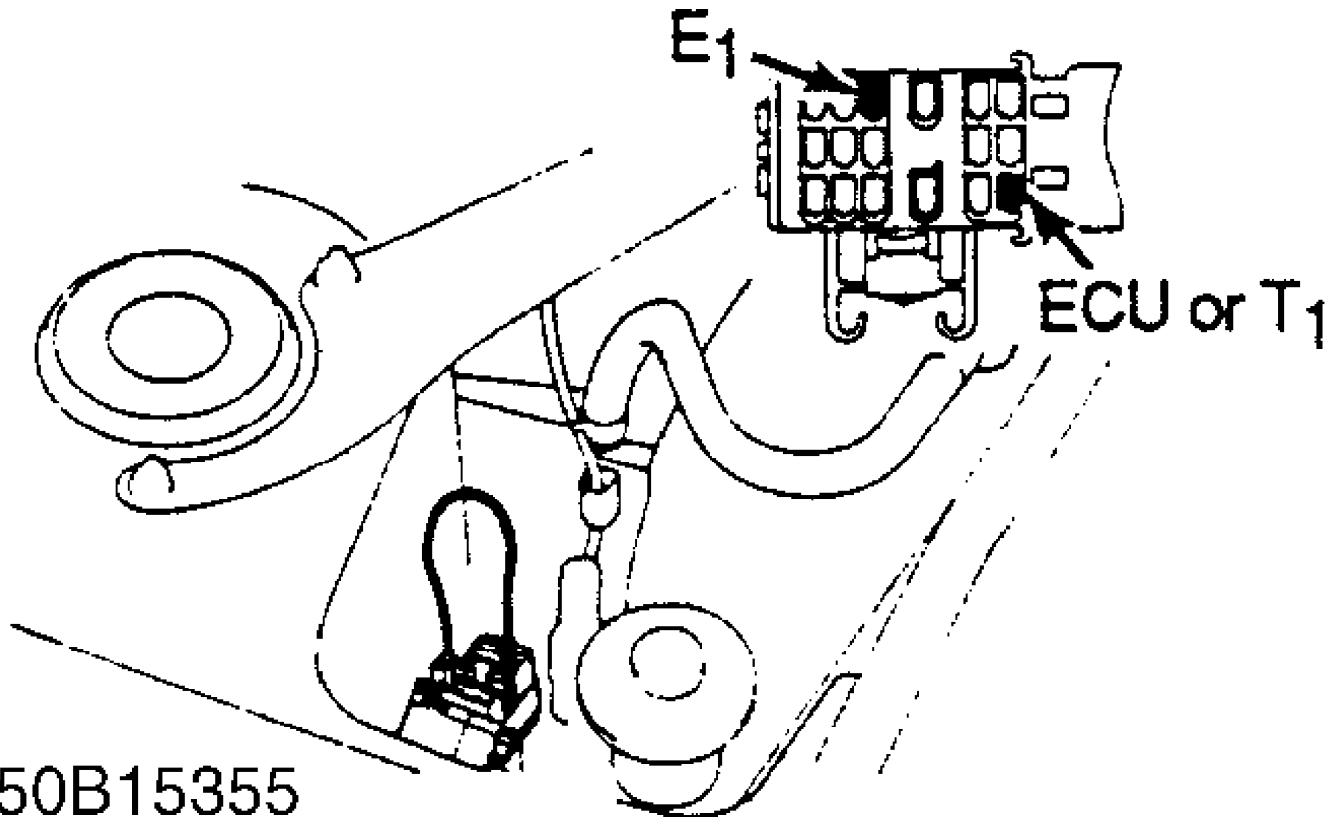
DIAGNOSTIC CODES TABLE

Diagnostic Codes	Trouble Areas
42	Defective No. 1 speed sensor. Severed wire harness or short circuit. Fault ECU.
44	Defective rear wheel speed sensor (in transfer left case). Severed wire harness or short circuit.
61	Defective No. 2 speed sensor. Severed wire harness or short circuit. Faulty ECU.
62	Defective No. 1 solenoid. Severed wire harness or short circuit. Faulty ECU.
63	Defective No. 2 solenoid. Severed wire harness or short circuit. Faulty ECU.
64	Defective lock-up solenoid. Severed wire harness or short circuit.
65	Defective No. 4 solenoid. Severed wire harness or short circuit.



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Fig. 1: Installing Jumper Wire At Connector Terminals (Camry A-140E)  
 Courtesy of Toyota Motor Sales, U.S.A., Inc.



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Fig. 2: Installing Jumper Wire At Connector Terminals (Celica A-140E)  
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

**CANCELING DIAGNOSTIC CODES**

1) After repairing the electrical fault all diagnostic codes must be cleared from the ECU. Cancel the codes by removing the correct fuse for 10 seconds or more with the engine OFF See FUSE APPLICATION table. Fuse may have to be removed for longer period of time depending on ambient temperature.

FUSE APPLICATION TABLE

Application	Fuse Block Marking	Fuse Amp
Camry A-140E .....	EFI .....	15
Celica A-140E .....	DOVE .....	20

2) Diagnostic codes can also be canceled by disconnecting negative battery cable. In this case all memory systems such as the clock, radio and computer control system will also be lost. Diagnostic codes can also be canceled by disconnecting the ECU.

3) If diagnostic codes are not canceled, they will be retained and appear with other codes in the event of further malfunctions.

**MANUAL SHIFTING TEST**

NOTE: Manual shifting test helps to determine if transmission faults are electrical or mechanical.

1) Perform this test to determine if problem is an electrical or mechanical (hydraulic) malfunction. With engine off disconnect ECU connector or solenoid wire. See Figs. 3 and 4. Road test car and ensure gear selector position and transmission gear positions correspond. See TRANSMISSION SHIFT & GEAR POSITION table.

TRANSMISSION SHIFT & GEAR POSITION TABLE

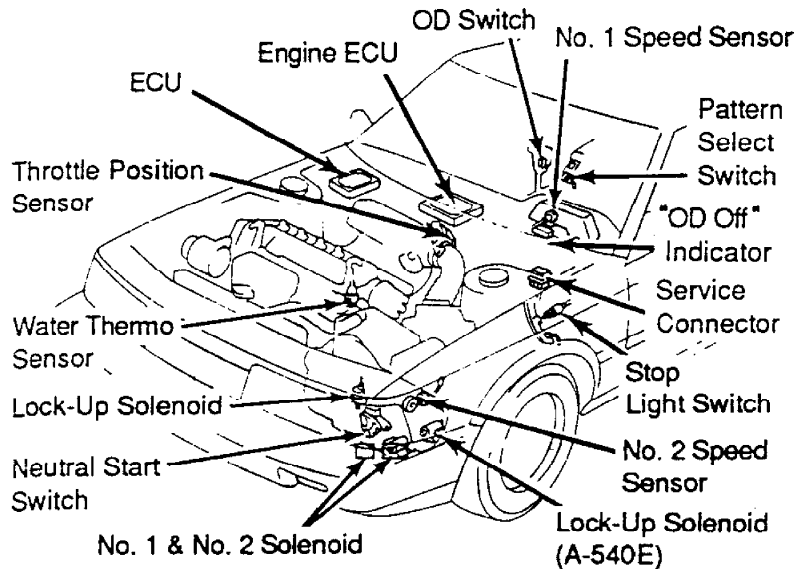
Gear Selector Position	Transmission Gear
Transmission	
"D" .....	OD
"2" .....	3rd
"L" .....	1st
"R" .....	Reverse
"P" .....	Pawl Lock
Transfer Case	
"H2" .....	High Gear 2WD
"H4" .....	High Gear 4WD
"L4" .....	Low Gear 4WD

2) If transmission fails any test, perform hydraulic pressure, stall and time lag test. See TESTING in appropriate transmission overhaul article. Transmission has an internal fault. Install ECT connector or solenoid wire.

ECU TERMINAL VOLTAGE TEST

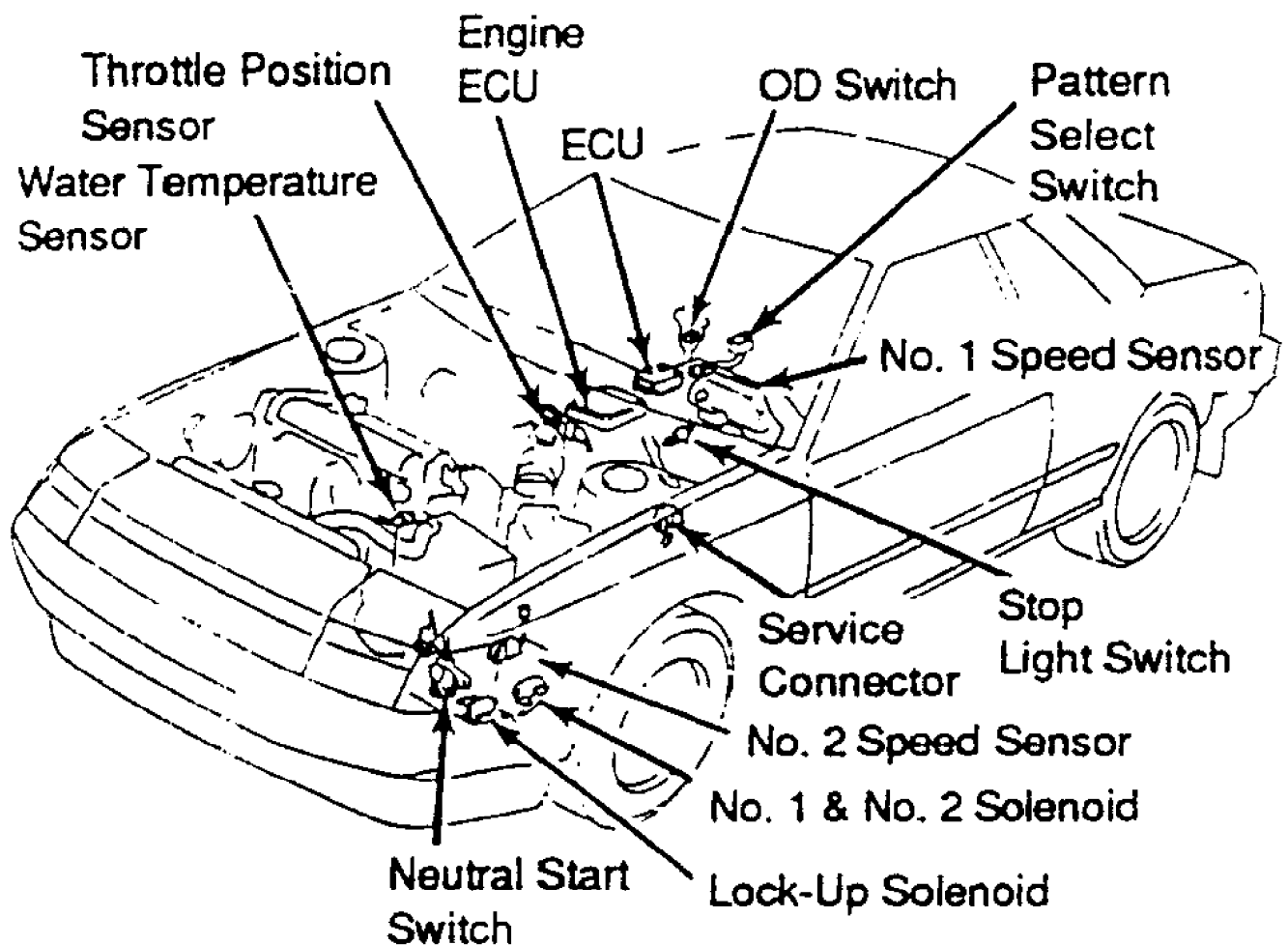
Test Procedure

Turn ignition switch to ON position. DO NOT start engine. Voltmeter will be connected during these tests.



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Fig. 3: Locating Electronic Components (Camry A-140E)  
 Courtesy of Toyota Motor Sales U.S.A., Inc.



## 50A15370

Fig. 4: Locating Electronic Components (Celica A-140E)  
 Courtesy of Toyota Motor Sales U.S.A., Inc.

### Throttle Position Sensor

Connect voltmeter to terminal TT or ECU and E1. While slowly depressing accelerator pedal, check that TT terminal voltage rises in 8 even steps to 8 volts. If voltage does not change in proportion to throttle opening angle, check for faulty throttle position sensor or circuit.

### Brake Signal

- 1) Depress accelerator pedal until T1 or ECU terminal indicates 8 volts. Depress brake pedal and check voltage readings.
- 2) Voltage should be 8 volts with brake pedal released and zero volts with pedal depressed. If voltages are not as indicated, check for faulty stop light switch or circuit.

### Upshift Position Signals

- 1) Engine must be at normal operating temperature. Place OD switch on gear selector to the ON position.
- 2) Place pattern select switch in the NORM position and gear selector in "D". Road test vehicle above 6 MPH and ensure voltage on all other models is as specified. See ECU TERMINAL VOLTAGE table.

NOTE: Voltage may rise to 0-8 volts before vehicle reaches 6 MPH.

3) If the voltage rises from 0-8 volts as specified, the control system is operating properly.

#### ECU TERMINAL VOLTAGE TABLE

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Voltage	(1) Gear Position
0	1st
2	2nd
3	2nd Lock-Up
4	3rd
5	3rd Lock-Up
6	Overdrive
7 or 8	Overdrive Lock-Up

(1) - Voltage measured during road test above 6 MPH.

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4) Determine gear position by a light shock or change in engine RPM when shifting. Lock-up clutch will turn on infrequently during normal 2nd or 3rd gear operation. To trigger this action, press accelerator pedal to 50 percent or more of its stroke. At less than 50 percent, voltage may change in sequence; 2, 4, 6, 7 or 8 volts.

#### ECU PIN VOLTAGES

Voltage must be checked at ECU connector at terminals. See Fig. 5. Turn on ignition switch with engine off. Using voltmeter, measure voltage at specified terminals. See Figs. 6 and 7. See ECT/ECU wiring diagrams. See Figs. 8 and 9.

#### ELECTRICAL FAULT DIAGNOSIS

##### "OD OFF" Indicator Light Blinks While Driving

1) Check for any stored diagnostic codes. If codes 42 or 61 are stored, check for faulty No. 1 or 2 speed sensors. If code 44 is stored, check for faulty rear wheel speed sensor.

2) If code 62, 63, 64 or 65 is stored, disconnect ECU connector. There is no warning for diagnostic code 64. Using ohmmeter check for 11-15 ohms resistance between connector terminals S1, S2, SL and GND. If resistance is not within specification, check for faulty circuit or solenoid. If circuits are correct, try another ECU.

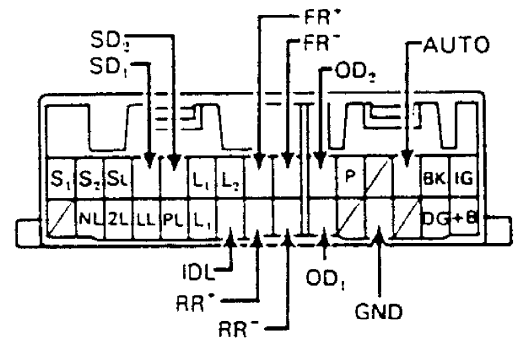
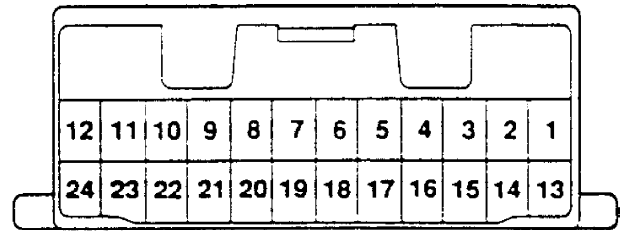
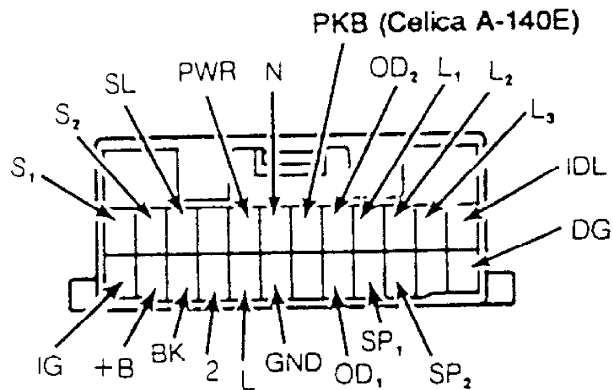
##### No Shifts

1) Engine must be at normal operating temperature. Check for any stored diagnostic codes. If codes are stored, use diagnostic procedure under OD OFF INDICATOR LIGHT BLINKS WHILE DRIVING.

2) If no codes are stored determine terminal connector location for proper model. See Fig. 1. Using a jumper wire, connect proper terminals. See TERMINAL USAGE table.

3) Operate throttle and note voltage reading. If voltage does not vary with changes in throttle opening, proceed to the next step. If voltage varies with changes in throttle opening, proceed to step 5) and attach voltmeter.





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Fig. 5: Identifying ECU Connector Terminals (Camry & Celica)  
 Courtesy of Toyota Motor Sales, U.S.A., Inc

4) If voltage did not vary with throttle opening attach voltmeter leads across ECU terminals. See ECU TERMINAL THROTTLE OPENING VOLTAGE CHECK table.

ECU TERMINAL THROTTLE OPENING VOLTAGE CHECK TABLE (1)

Application	Brake Pedal Released Volts	Brake Pedal Depressed Volts	Terminals Used
Camry A-140E .....	0 .....	10-14 .....	BK & GND
Celica A-140E .....	0 .....	12 .....	BK & GND

(1) - With transmission in "D" range.

5) If voltage is not correct, check for faulty brake signal. If brake pedal voltage is correct check for the following: faulty ECU power source and ground, faulty throttle position signal or a defective ECU terminal or circuit.

Terminal	Measuring Condition	Voltage (V)	
		DENSO Type Computer	AISIN Type Computer
L <sub>1</sub> - GND	Throttle valve fully closed	5	12
	Throttle valve fully closed to fully open	5 to 0	12 to 0
	Throttle valve fully open	0	0
L <sub>2</sub> - GND	Throttle valve fully closed	5	12
	Throttle valve fully closed to fully open	5 to 0 to 5	12 to 0 to 12
	Throttle valve fully open	5	12
L <sub>3</sub> - GND	Throttle valve fully closed	5	12
	Throttle valve fully closed to fully open	5 to 0 to 5 to 0 to 5	12 to 0 to 12 to 0 to 12
	Throttle valve fully open	5	12
IDL - GND	Throttle valve fully closed	0	0
	Throttle valve opening above 1.5 <sup>2</sup>	12	12
SP <sub>1</sub> - GND	Standing still	5 or 0	12 or 0
	Vehicle moving	2.5	6
BK - GND	When brake pedal is depressed	12	12
	When brake pedal is not depressed	0	0
2 - GND	2 range	10 - 16	10 - 16
	Except 2 range	0 - 2	0 - 2
L - GND	L range	10 - 16	10 - 16
	Except L range	0 - 2	0 - 2
N - GND	N range	10 - 16	10 - 16
	Except N range	0 - 2	0 - 2
S <sub>1</sub> - GND		12	12
S <sub>2</sub> , SL - GND		0	0
OD <sub>1</sub> - GND	Coolant temp. 1 2 3 4	0	0
	Coolant temp. 1 2 3 4	5	12
OD <sub>2</sub> - GND	OD main switch turned ON	12	12
	OD main switch turned OFF	0	0
IG - GND	Standing still	12	12
SP <sub>2</sub> - GND	Standing still	5 or 0	5 or 0
	Vehicle moving	4	4
PWR - GND	PWR pattern	12	12
	NORM pattern	0 to 2	0 to 2
+B - GND		12	12
5 PKB - GND	Engine running, PKB lever pulled	0	0
	Engine running, PKB lever released	12	12

1 CELICA A-140E  
Denso & Aisin type Computers.  
Coolant Temperature Below 158°F (70°C).  
Coolant Temperature Above 158°F (70°).

3 COROLLA FX/FX16 A-240E  
Aisin Type Computer.  
Coolant Temperature Below 122°F (50°C).  
Coolant Temperature Above 122°F (50°C).

5 CELICA A-140E ONLY.

2 GEO NOVA A-240E  
Aisin Type Computer.  
Coolant Temperature Below 122°F (50°C).  
Coolant Temperature Above 122°F (50°C).

4 SUPRA A-340E  
Aisin Type Computer.  
Coolant Temperature Below 140°F (60°C).  
Coolant Temperature Above 140°F (60°C).

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Fig. 6: Identifying ECU Connector Voltages (Celica)  
Courtesy of Toyota Motor Sales, U.S.A., Inc

Terminal	Measuring Condition	Voltage (V)	
		DENSO Type Computer	AISIN Type Computer
L <sub>1</sub> - GND	Throttle valve fully closed	5	10 - 14
	Throttle valve fully closed to fully open	5 to 0	10 - 14 to 0
	Throttle valve fully open	0	--
L <sub>2</sub> - GND	Throttle valve fully closed	5	10 - 14
	Throttle valve fully closed to fully open	5 to 0 to 5	10 - 14 to 0 to 10 - 14
	Throttle valve fully open	5	10 - 14
L <sub>3</sub> - GND	Throttle valve fully closed	5	10 - 14
	Throttle valve fully closed to fully open	5 to 0 to 5 to 0 to 5	10 - 14 to 0 to 10 - 14 to 0 to 10 - 14
	Throttle valve fully open	5	10 - 14
IDL - GND	Throttle valve fully closed	0	0
	Throttle valve opening above 1.5°	10 - 14	10 - 14
SP <sub>1</sub> - GND	Standing still (Cruise control OFF)	5 or 0	5 or 10
BK - GND	When brake pedal is depressed	10 - 14	10 - 14
	When brake pedal is not depressed	0	0
2 - GND	2 range	10 - 16	10 - 16
	Except 2 range	0 - 2	0 - 2
L - GND	L range	10 - 16	10 - 16
	Except L range	0 - 2	0 - 2
N - GND	N range	10 - 16	10 - 16
	Except N range	0 - 2	0 - 2
S <sub>1</sub> - GND	--	10 - 14	10 - 14
S <sub>2</sub> , S <sub>L</sub> - GND	--	0	0
OD <sub>1</sub> - GND	Coolant temp. 1 2	0	0
	Coolant temp. 1 2	5 10 - 14	10 - 14
OD <sub>2</sub> - GND	OD main switch turned ON	5	10 - 14
	OD main switch turned OFF	0	0
IG - GND	Ignition switch ON	10 - 14	10 - 14
SP <sub>2</sub> - GND	Standing still	5 or 0	5 or 0
	Vehicle moving	4	4
PWR - GND	PWR pattern	10 - 14	10 - 14
	NORM pattern	0 to 2	0 to 2
+B - GND	--	10 - 14	10 - 14

1 MR2 A-240E & A-241E  
 Denso & Aisin Type Computers.  
 Coolant Temperature Below 122°F (50°C).  
 Coolant Temperature Above 122°F (50°C).

2 CAMRY A-140E  
 Denso Type Computer.  
 Coolant Temperature Below 122°F (50°C).  
 Coolant Temperature Above 122°F (50°C).

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Fig. 7: Identifying ECU Connector Voltages (Camry)  
 Courtesy of Toyota Motor Sales, U.S.A., Inc

6) If ECU and E1 terminal voltage varies with throttle positions disconnect solenoid wire connector and road test vehicle. The transmission must operate in overdrive with gear selector in "D", 3rd gear with selector in "2" and 1st gear with selector in "L".

7) If transmission does not perform as described in step 6)

transmission is faulty. Repair as necessary. If transmission performs correctly connect solenoid wire connector. Proceed to next step.

8) Road test vehicle and ensure ECU terminal voltage rises from 0-7 volts. If voltage rises to 7 volts a faulty solenoid or transmission exists.

9) If voltage rises to 5 volts (4 volts on Celica A-241E) proceed to NO UP-SHIFT TO OVERDRIVE (AFTER WARM-UP). If voltage rises to 3 volts (2 volts on Celica A-241E) check for voltage between ECU terminal No 2 and GND or E1 with transmission in "D" range. See ECU TERMINAL NO. 2 & GND OR E1 3-VOLT CHECK table. See Fig. 5.

ECU TERMINAL NO. 2 & GND OR E1 3-VOLT CHECK TABLE (1)

Application	Terminals Used
Camry A-140E .....	2-GND
Celica A-140E .....	2-GND

(1) - With transmission in "D" range.

10) If voltage is 0-3 volts, check for faulty neutral start switch or starter wiring circuit. If voltage is not 0-3 volts, try another ECU.

11) If no voltage exists in step 8), check for voltage between ECU terminals L and GND or E1 with transmission "D" range. See ECU TERMINAL L & GND OR E1 0-VOLT CHECK table. See Fig. 5.

12) Try another ECU if no voltage exists. If voltage is correct, check for faulty neutral start switch or starter switch circuit.

ECU TERMINAL L & GND OR E1 0-VOLT CHECK TABLE (1)

Application	Voltage	Terminals Used
Camry A-140E .....	12 .....	L-GND
Celica A-140E .....	12 .....	L-GND

(1) - With transmission in "D" range.

No Shift Diagnosis (A-140E)

TSB No. 038 (02/01/91)

1) Turn ignition switch to ON. Set OD switch to OFF.

2) Ensure OD OFF lamp on dash comes on. OD OFF lamp comes on. Switch OD switch to ON. OD OFF lamp goes off.

3) If codes are stored, use diagnostic procedure under OD OFF INDICATOR LIGHT BLINKS WHILE DRIVING.

4) If light goes off, disconnect Throttle Position Switch (TPS) and see if it shifts. Adjust or replace TPS if vehicle shifts when TPS is disconnected.

5) Check the neutral start switch by disconnecting the switch wire harness and check for shifting. If the vehicle shifts with neutral start switch disconnected adjust or replace the switch.

6) Disconnect wiring harness at transaxle. Using a wishbone lead with 20 amp fuse, attach the single lead to positive battery terminal. Shift through the different ranges by connecting appropriate wires with the wishbone jumper lead. See TRANSAXLE WIRING HARNESS QUICK CHECK table.

TRANSAXLE WIRING HARNESS QUICK CHECK TABLE

Gear Position	White Wire	Black Wire
1st .....	Connected .....	Disconnected
2nd .....	Connected .....	Connected
3rd .....	Disconnected .....	Connected
4th .....	Disconnected .....	Disconnected

7) If transaxle shifts correctly, the no shift condition is external. Check pin voltage. See Fig. 8. If transaxle doesn't shift, valve body or solenoids are faulty.

#### Shift Points Too High Or Too Low

1) Engine must be at normal operating temperature. Check for any stored diagnostic codes. If codes are stored, use diagnostic procedure under OD OFF INDICATOR LIGHT BLINKS WHILE DRIVING.

2) If no codes are stored, determine terminal connector location to proper model. See Fig. 1. Connect voltmeter to proper terminals at specified area. See TERMINAL USAGE table.

3) Operate throttle and note voltage reading. If voltage varies, proceed to step 6). If voltage does not vary proceed to the next step.

4) If voltage does not vary with changes in the throttle opening, attach voltmeter leads across ECU terminals. See ECU TERMINAL THROTTLE OPENING VOLTAGE CHECK table.

5) If voltage is not correct, check for faulty brake signal. If brake pedal voltage is correct check for the following: faulty ECU power source and ground, faulty throttle position signal or a defective ECU terminal or circuit.

#### ECU TERMINAL PWR & GND OR E1 PATTERN SELECT SWITCH CHECK TABLE (1)

Application	Power Pattern Volts	Normal Pattern Volts	Terminals Used
Camry A-140E .....	10-14 .....	1 .....	PWR & GND
Camry A-140E .....	12 .....	1 .....	PWR & GND

(1) - With pattern select switch in "PWR" position and "NORM" position.

6) If ECU and E1 terminal voltage varies with throttle positions, check for voltage between ECU terminals PWR and GND or E1 with pattern select switch in PWR position and NORM position. See ECU TERMINAL PWR & GND OR E1 PATTERN SELECT SWITCH CHECK table. See Fig. 5.

7) If voltage readings in step 6) are correct, check for faulty ECU or transmission. If voltage is not correct, check for faulty pattern select switch system. See ELECTRICAL COMPONENTS & CIRCUITS.

#### No Upshift To Overdrive (After Warm-Up)

1) Disconnect solenoid wire connector with ignition off. Road test vehicle. Note if an overdrive upshift occurs in the "D" range when changing from "L" to "2" to "D".

2) If transmission fails to shift, transmission is defective. If transmission shifts correctly connect solenoid wire connector. Drive vehicle and note ECU terminal voltage.

3) If voltage increases from zero to 7 volts, a faulty solenoid or transmission exists. If voltage only increases to 5 volts, proceed to step 7).

4) If voltage increases to 3 volts, check for voltage between ECU terminals No. 2 and GND or E1 with transmission in "D" range. See ECU TERMINAL NO. 2 & GND OR E1 3-VOLT CHECK table. See Fig. 5.

5) If voltage is correct (zero to 3 volts), check for faulty neutral switch or starter wiring circuit. If voltage is not correct, try another ECU.

6) If no voltage exists in step 3), check for voltage between ECU terminal L and GND or E1 with transmission in "D" range. See ECU TERMINAL L & GRD OR 0-VOLT CHECK table. See Fig. 5. If no voltage exists try another ECU. If voltage is correct check for faulty neutral start switch or start switch wiring circuit.

7) If voltage rises only 5 volts in step 3), check for voltage between ECU terminals OD2 and GND or E1 with overdrive switch ON and OFF. See ECU TERMINAL OD2 & GND OR E1 OD SWITCH 5-VOLT CHECK table. See Fig. 5.

ECU TERMINAL OD2 & GND OR E1 OD SWITCH 5-VOLT CHECK TABLE

Application	OD Switch		Terminals Used
	ON	OFF	
Camry A-140E .....	10-14 .....	0 .....	OD2 & GND
Celica A-140E .....	12 .....	0 .....	OD2 & GND

(1) - With overdrive switch ON and OFF

NOTE: Vehicle may be fitted with either Aisin or Denso ECU.

8) If voltage is not correct when operating overdrive switch, check for the following: faulty overdrive switch, faulty overdrive wire harness or "OD OFF" light open.

9) If voltage is correct when operating overdrive switch, check voltage between ECU terminals OD1 and GND or E1. See ECU TERMINAL OD1 & GND OR E1 CRUISE CONTROL VOLTAGE CHECK table. See Fig. 5. Voltage should be within specification at minimum coolant temperature.

ECU TERMINAL OD1 & GND OR E1 CRUISE CONTROL VOLTAGE CHECK TABLE

Application	Voltage	Coolant Temperature		Terminals Used
		°F	(°C)	
Camry A-140E				
Denso .....	5 .....	158 (70) .....		OD1 & GND
Celica A-140E				
Aisin .....	12 .....	158 (70) .....		OD1 & GND
Denso .....	5 .....	158 (70) .....		OD1 & GND

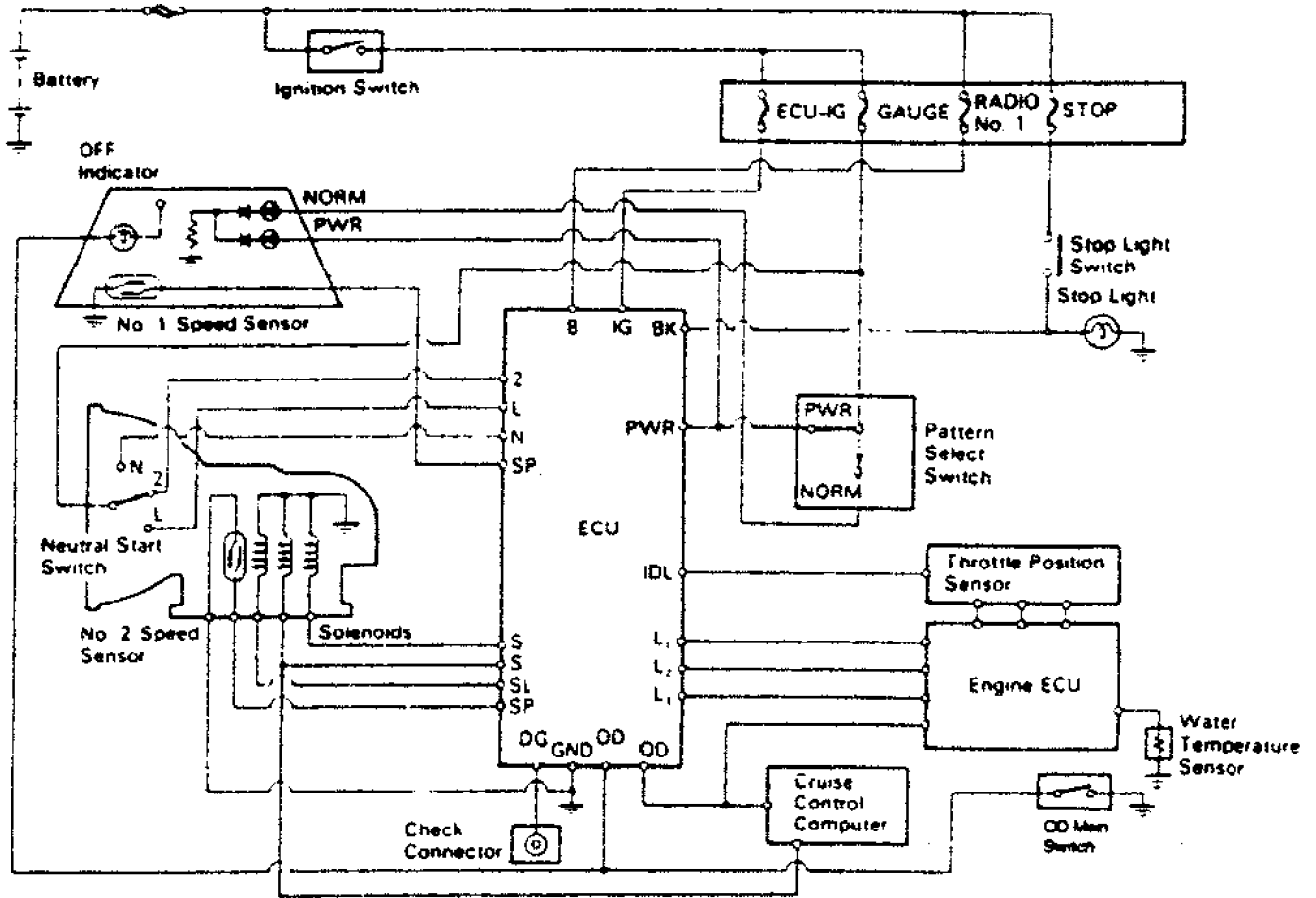
10) If voltage at ECU terminals is correct, try another ECU. If not within specification, check this voltage again with cruise control computer disconnected.

11) If voltage is correct with cruise control computer disconnected replace cruise control computer. If voltage is not correct, check for faulty ECU, cruise control wire harness, short circuit in ECU wiring harness or faulty EFI temperature sensor.

No Lock-Up (After Warm-Up)

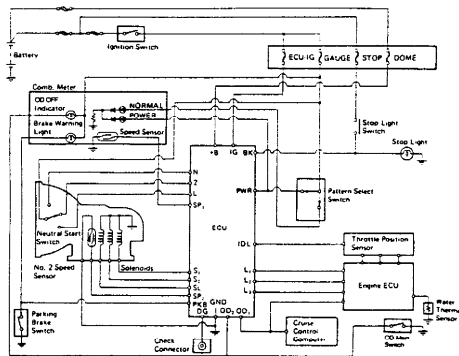
1) Engine must be at normal operating temperature. Check if any diagnostic codes are stored. If codes are stored, use diagnostic procedure under OD OFF INDICATOR LIGHT BLINKS WHILE DRIVING.

2) If no codes are stored, determine terminal connector location for proper model. See Figs. 8 and 9. Connect voltmeter to proper terminals at specified area. See TERMINAL USAGE table.



### 50G15400

Fig. 8: Transmission ECU Wiring Diagrams (Camry A-140E)  
 Courtesy of Toyota Motor Sales, U.S.A., Inc



### 50J15403

Fig. 9: Transmission ECU Wiring Diagram (Celica A-140E)  
 Courtesy of Toyota Motor Sales, U.S.A., Inc

3) Test drive vehicle and note voltage. Voltage should be 7, 5 or 3 volts in lock-up range while driving. If voltage is correct,

check for the following: faulty transmission, seized lock-up solenoid or faulty lock-up mechanism.

4) If there is not 7, 5 or 3 volts in lock-up range while driving, check for voltage between ECU terminals BK or STP or TT and GND or E1 with brake pedal depressed. See

ECU TERMINAL THROTTLE OPENING VOLTAGE CHECK table.

5) If voltages are incorrect when operating brake pedal check for faulty brake signal. On all models except Pickup and 4Runner A-340H, if voltages are correct when operating brake pedal check for faulty ECU power source and ground or faulty throttle position signal.

## ELECTRICAL COMPONENTS & CIRCUITS

CAUTION: Ensure cruise control is off while testing voltages. Some models may use Aisin or Denso type ECU computer.

### Transmission Solenoid Circuit

1) Ensure engine is not punning. Disconnect connector from engine ECU. Measure resistance between terminals S1, S2, SL and ground of ECU connector.

2) Resistance should be 11-15 ohms. This checks the solenoids and solenoid wiring. Apply battery voltage to the solenoid circuits. An audible click should be heard when the solenoid engages.

CAUTION: If solenoid is blocked with dirt; there will be no fluid control even though solenoid operates with battery voltage applied.

3) Apply 71 psi (5 kg/cm<sup>2</sup>) of compressed air and check that solenoid valves do not leak air.

4) Proper solenoids must be applied or released in the correct gear application. See Fig. 10.

### Neutral Start Switch

Determine neutral start switch terminal identification. See Fig. 11. Check for continuity at specified terminals in appropriate gear position. See NEUTRAL START SWITCH CONTINUITY table.

#### NEUTRAL START SWITCH CONTINUITY TABLE

Gear Shift Position	Continuity Between Terminals
Camry A-140E	
"N" Range	NL & C
"2" Range	2L & C
"L" Range	LL & C
Celica A-140E	
"P" Range	B & N/C & PL
"R" Range	C & RL
"N" Range	B & N/C & NL
"D" Range	C & DL
"2" Range	C & 2L
"L" Range	C & LL

### Throttle Position Sensor

1) With engine off, unplug throttle position sensor. Note terminal identification. See Fig. 12. Check resistance readings at specified terminals. See THROTTLE POSITION SENSOR CIRCUIT RESISTANCE table.



THROTTLE POSITION SENSOR CIRCUIT RESISTANCE TABLE

Application & Terminal	Throttle Position	Resistance ohms
Camry A-140E		
Celica A-140E		
IDL/E2	Fully Closed	0-1
	Open	Infinity
VC/E2	(1)	3-7
VTA/E2	Fully Closed	.2-.8
	Fully Open	3.3-10.0

(1) - Reading does not depend on throttle position.

Brake Signal

Ensure brake light illuminates when brake pedal is depressed. Repair as necessary if brake light does not illuminate.

No. 2 Speed Sensor

1) Jack up one drive wheel and support vehicle. Disconnect speed sensor. Note amount of terminals in connector. If connector is a single terminal type connect ohmmeter between connector and ground. See Fig. 13.

2) If connector is a double terminal type connect ohmmeter between both terminals. See Fig. 13. Spin wheel and note reading. Reading should switch from zero to infinity.

Range	NORMAL			NO. 1 SOLENOID MALFUNCTIONING			NO. 2 SOLENOID MALFUNCTIONING			BOTH SOLENOIDS MALFUNCTIONING		
	Solenoid valve		Gear Position	Solenoid valve		Gear Position	Solenoid valve		Gear Position	Solenoid valve		Gear Position
	No. 1	No. 2		No. 1	No. 2		No. 1	No. 2		No. 1	No. 2	
"D" Range	ON	OFF	1st	X	ON (OFF)	3rd (OD)	ON	X	1st	X	X	OD
	ON	ON	2nd	X	ON	3rd	OFF (ON)	X	OD (1st)	X	X	OD
	OFF	ON	3rd	X	ON	3rd	OFF	X	OD	X	X	OD
	OFF	OFF	OD	X	OFF	OD	OFF	X	OD	X	X	OD
"2" Range	ON	OFF	1st	X	ON (OFF)	3rd (OD)	ON	X	1st	X	X	3rd
	ON	ON	2nd	X	ON	3rd	OFF (ON)	X	3rd (1st)	X	X 1	3rd
	OFF	ON	3rd	X	ON	3rd	OFF	X	3rd	X	X	3rd
"L" Range	ON	OFF	1st	X	OFF	1st	ON	X	1st	X	X	1st
	ON	ON	2nd	X	ON	2nd	ON	X	1st	X	X	1st

( ): No Fail-Safe Function

1 Does Not Apply To Corolla FX/FX16 A-240E Models.

X: Malfunctions

50F15433

Fig. 10: Solenoid Valve Application Chart  
Courtesy of Toyota Motor Sales, U.S.A., Inc.

Pattern Select Switch

CAUTION: Ensure proper terminals of pattern select switch are checked. Switch contains diodes and damage will occur if wrong terminals are checked.

Disconnect pattern select switch on center console. Note terminal identification. See Fig. 15. Using an ohmmeter check continuity between proper terminals in specified switch position. See PATTERN SELECT SWITCH TESTING table.

PATTERN SELECT SWITCH TESTING TABLE

Application	Switch Position	Test Terminals
Camry A-140E .....	PWR .....	6 & 4
	NORM .....	6 & 5
Celica A-140E .....	PWR .....	5 & 3
	NORM .....	5 & 4

Overdrive Switch

1) Check that continuity exists between terminals No. 1 and 3 with the switch in the OFF position. See Fig. 17.

No. 1 Speed Sensor (Analog Type)

1) Remove combination meter from instrument cluster. Connect ohmmeter between proper terminals. See Fig. 18. See NO. 1 SPEED SENSOR TEST TERMINALS (ANALOG TYPE) table for proper terminals. Rotate meter shaft and note reading. Ohmmeter should deflect from zero to infinity ohms as shaft is rotated.

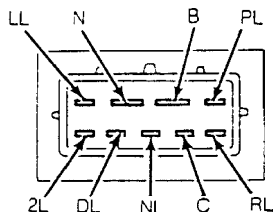
NO. 1 SPEED SENSOR TEST TERMINALS (ANALOG TYPE) TABLE

Application	Test Terminals
Camry A-140E .....	A & B
Celica A-140E .....	SPD (+) & SPD (-)

No. 1 Speed Sensor (Digital Type)

1) Note terminal identification. See Fig. 20. Connect voltmeter between proper terminals. See NO. 1 SPEED SENSOR TEST TERMINALS (DIGITAL TYPE) table for proper terminals. It may be necessary to remove combination meter.

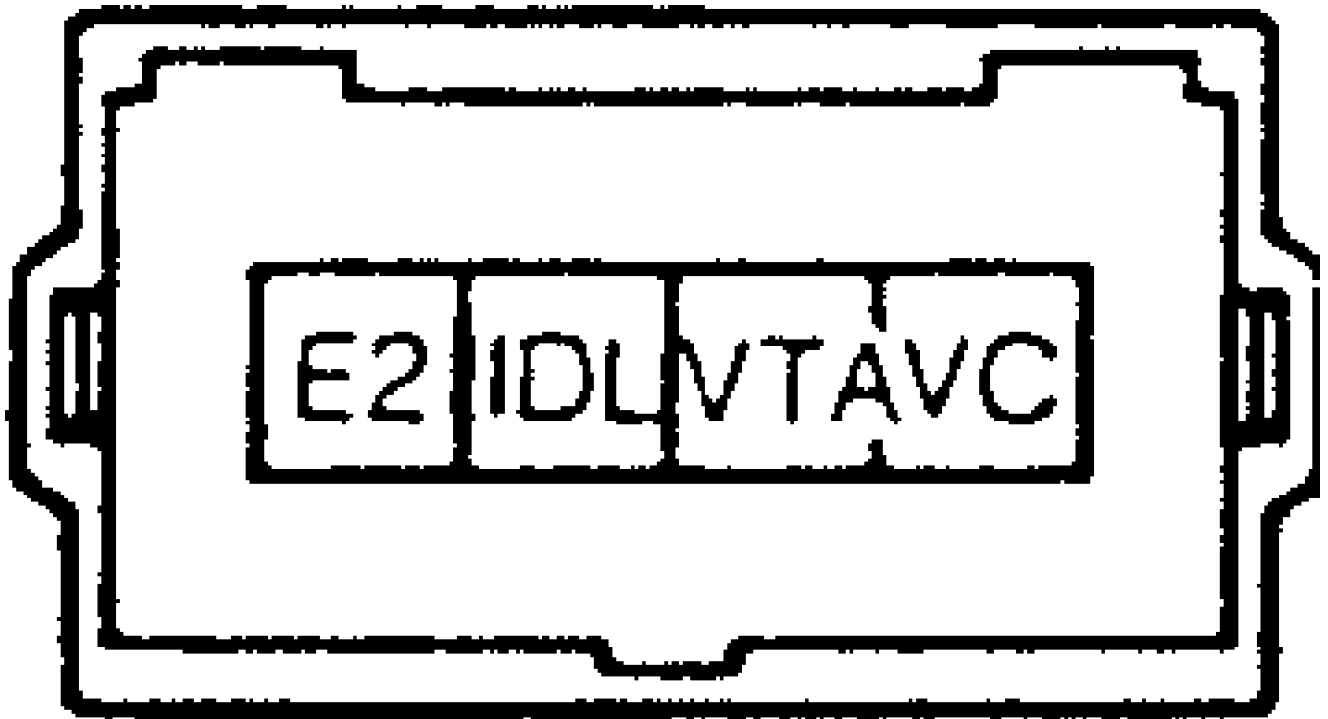
2) Turn ignition on, with engine off. Voltmeter should deflect between specified voltage as meter shaft is rotated. See NO. 1 SPEED SENSOR TEST TERMINALS (DIGITAL TYPE) table.



50G15434

Fig. 11: Identifying Neutral Start Switch Terminals (Camry A-140E, Celica A-140E)

Courtesy of Toyota Motor Sales, U.S A., Inc.



# 50E15440

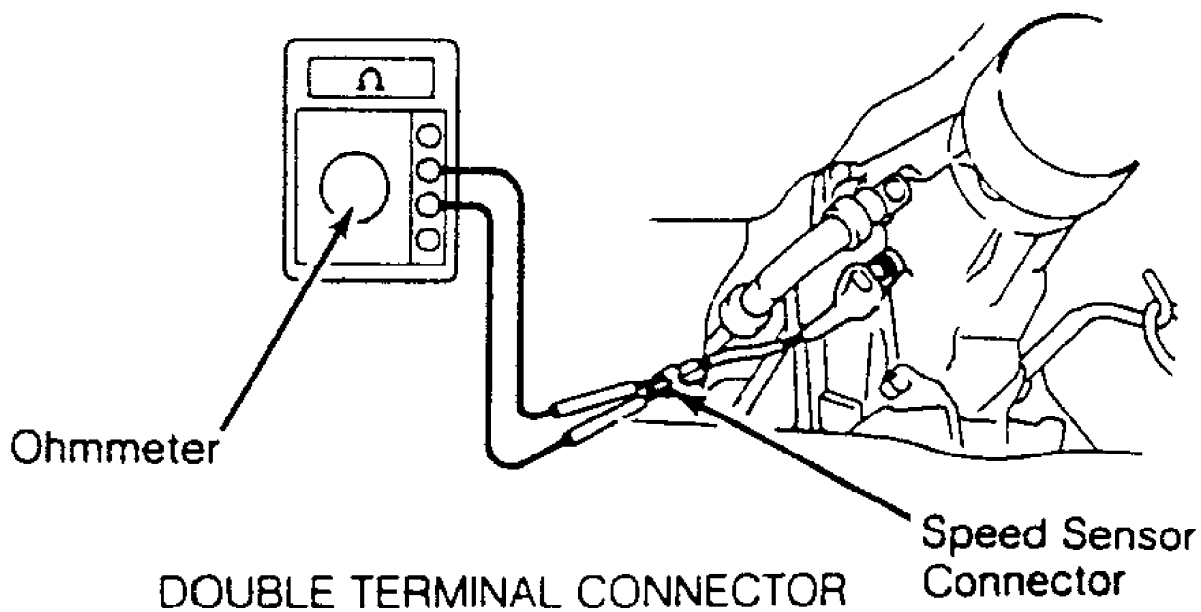
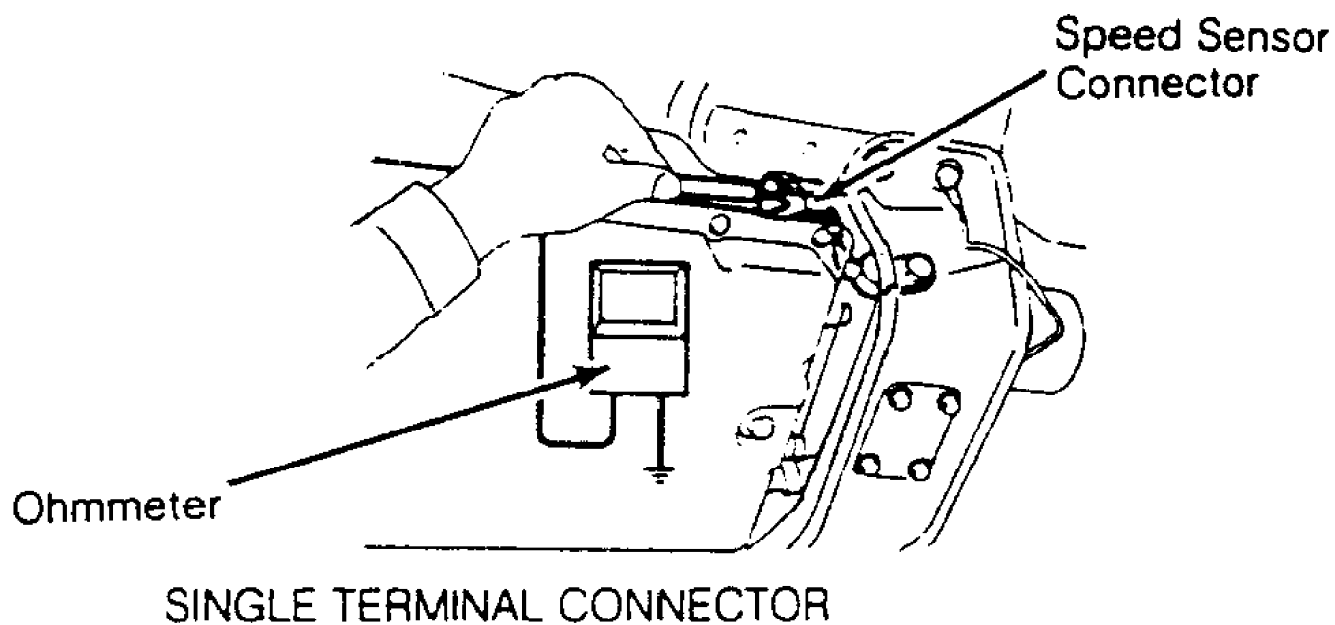
Fig. 12: Identifying Throttle Position Sensor Terminal  
 Courtesy of Toyota Motor Sales, U.S A., Inc.

3) Using voltmeter, check for voltage between proper terminals. See NO. 1 SPEED SENSOR TEST TERMINALS (DIGITAL TYPE) table for proper terminals. Voltage should be within specification as meter shaft is rotated. Replace sensor if voltage is not within specification.

NO. 1 SPEED SENSOR TEST TERMINALS (DIGITAL TYPE) TABLE

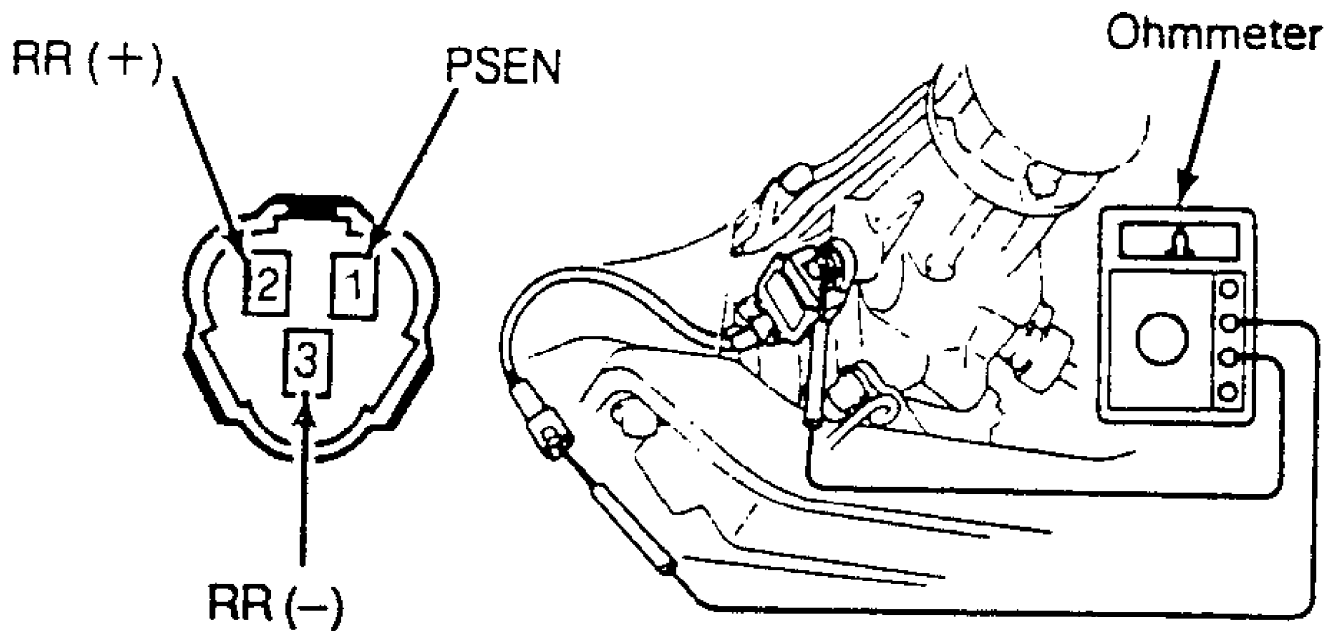
Application	Test Terminals	Volt Reading
Camry A-140E .....	A-9 & A-11 .....	(1) 5

(1) - Voltage should occur 4 times per meter shaft rotation.



50F15441

Fig. 13: Checking No. 2 Speed Sensor  
Courtesy of Toyota Motor Sales, U.S.A., Inc.



## 50G15442

Fig. 14: Checking Rear Speed Sensor (W/ABS)  
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

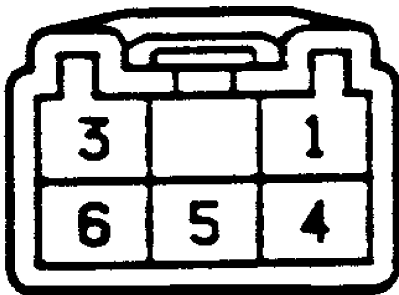
### Lock-Up Mechanism

1) Engine and transmission must be at normal operating temperature. Determine terminal connector location for proper model. See Fig. 1. Connect voltmeter to proper terminals at specified area. See TERMINAL USAGE table.

2) Install tachometer. Place pattern select switch in NORM position. Drive vehicle at the following speeds until 7, 5 or 3 volts appear on voltmeter. This indicates lock-up range.

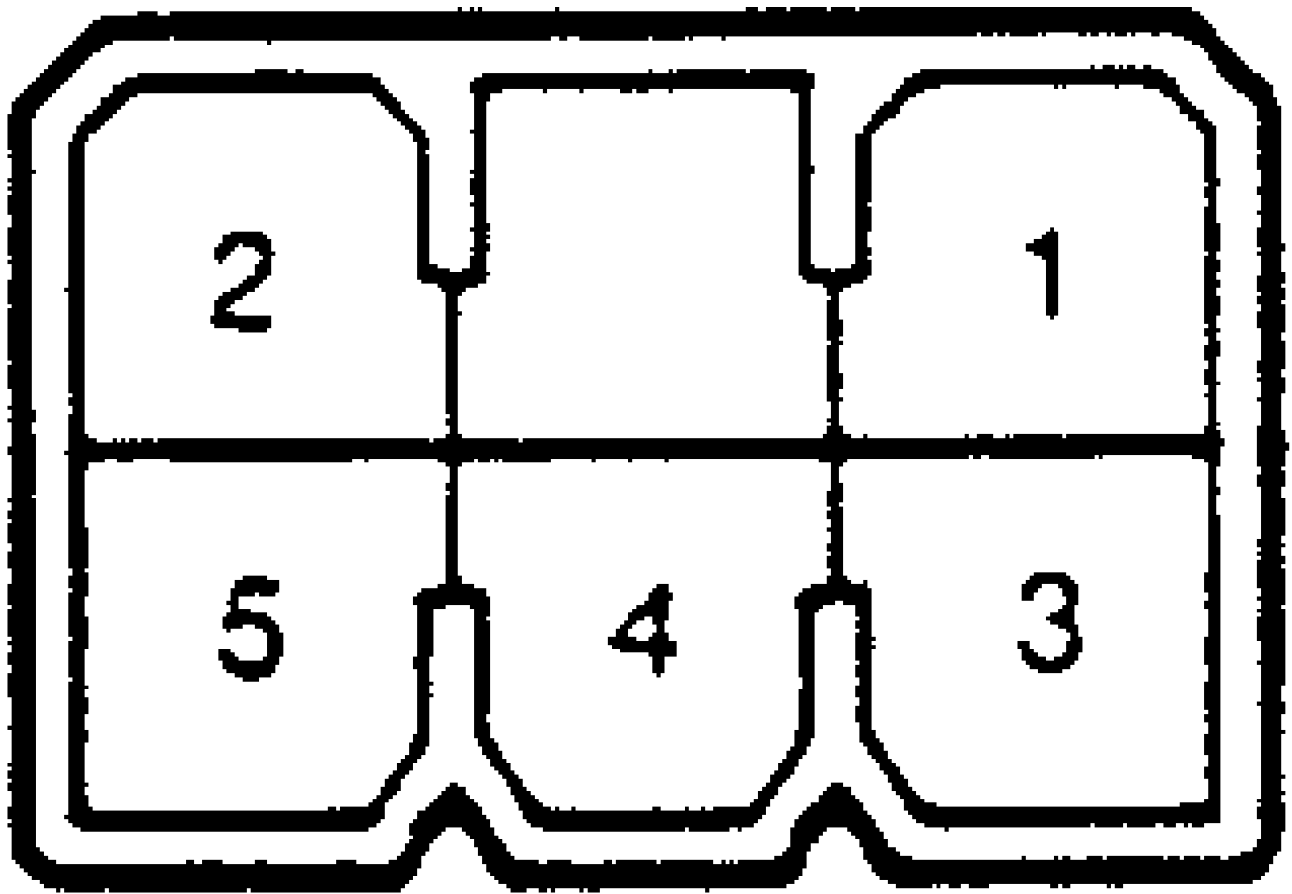
- \* Camry A-140E at 31 MPH.
- \* Celica A-140E at 43 MPH.

3) Depress accelerator pedal and read tachometer. If engine speed rises sharply, lock-up is not functioning.



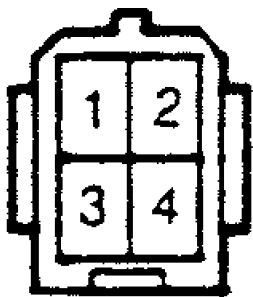
## 50H15443

Fig. 15: Identifying Pattern Select Switch Terminals (Camry A-140E)  
 Courtesy of Toyota Motor Sales, U.S.A., Inc.



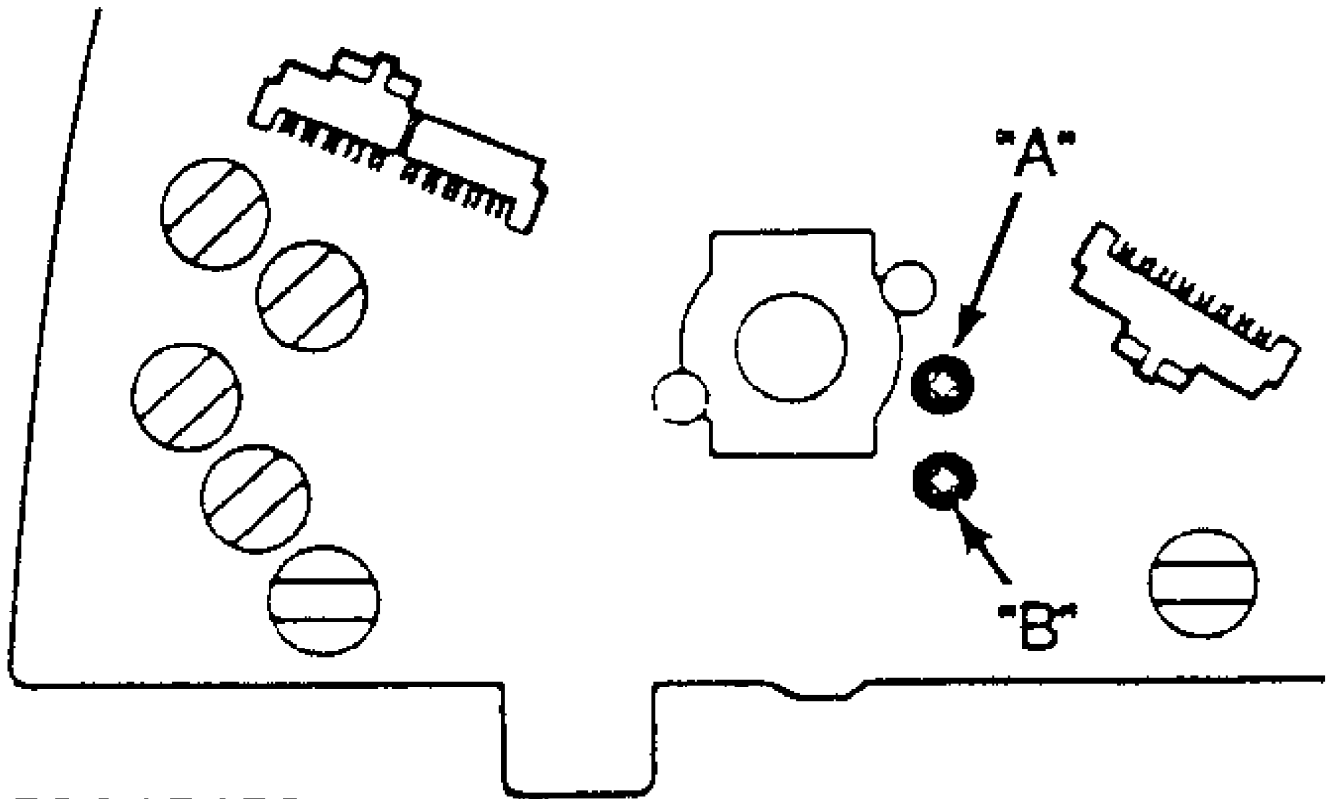
50115444

Fig. 16: Identifying Pattern Select Switch Terminals (Celica A-140E)  
 Courtesy of Toyota Motor Sales, U.S.A., Inc.



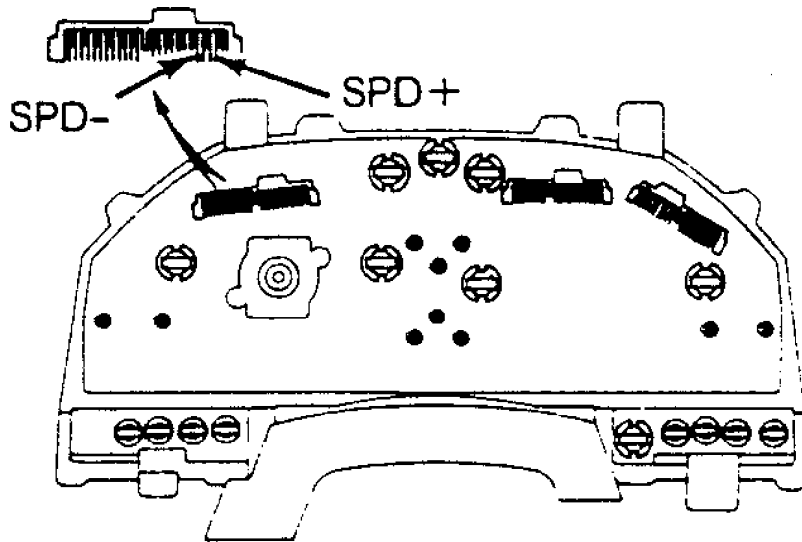
50D15449

Fig. 17: Identifying Overdrive Switch Terminals  
 Courtesy of Toyota Motor Sales, U.S.A., Inc.



### 50A15453

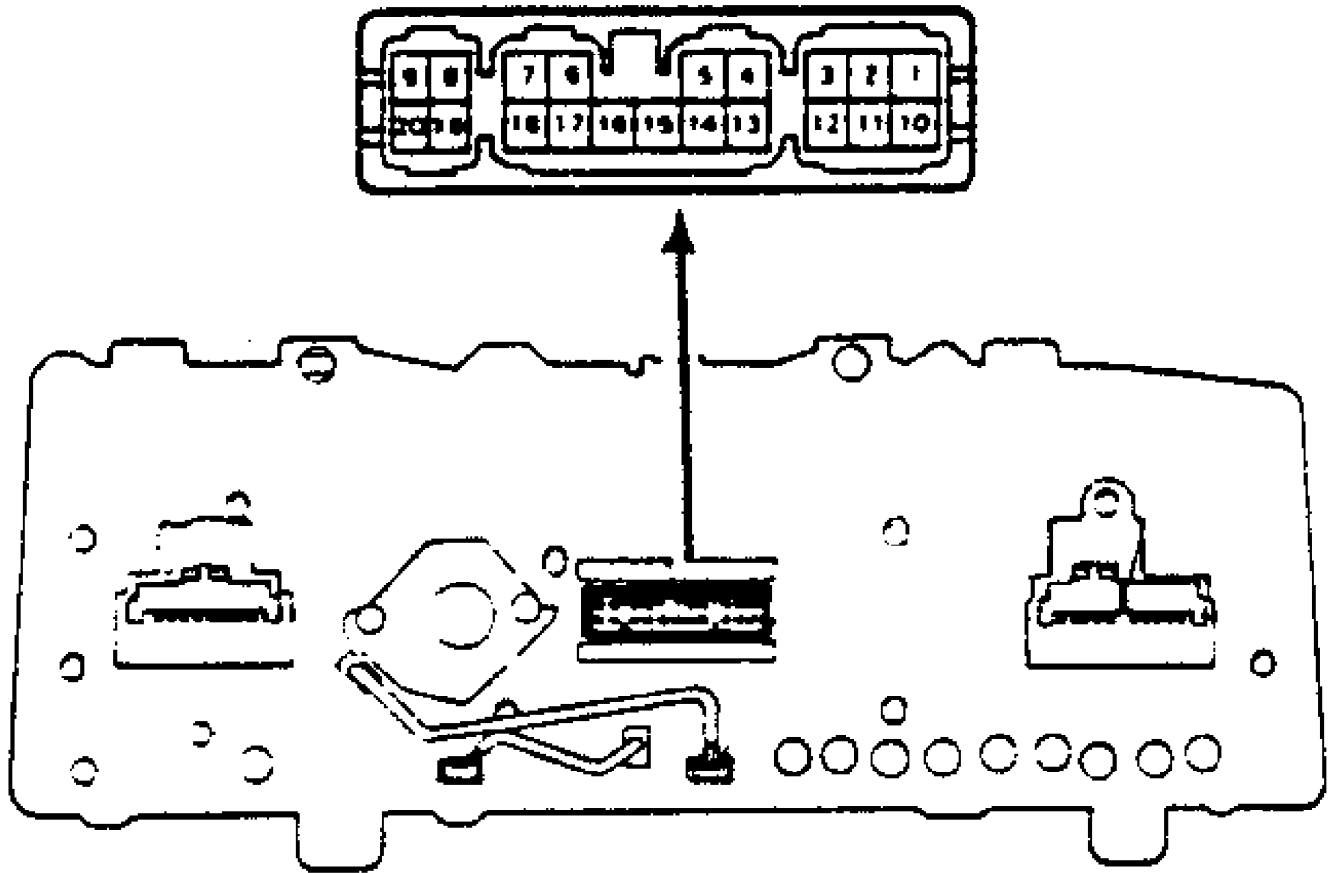
Fig. 18: Identifying No. 1 Speed Sensor Terminal (Analog Type - Camry A-140E)  
 Courtesy of Toyota Motor Sales, U.S.A., Inc.



### 50B15454

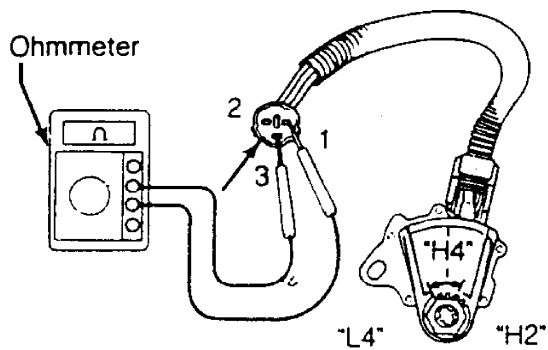
Fig. 19: Identifying No. 1 Speed Sensor Terminal (Analog Type - Celica A-140E)  
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

# Connector



## 50A15461

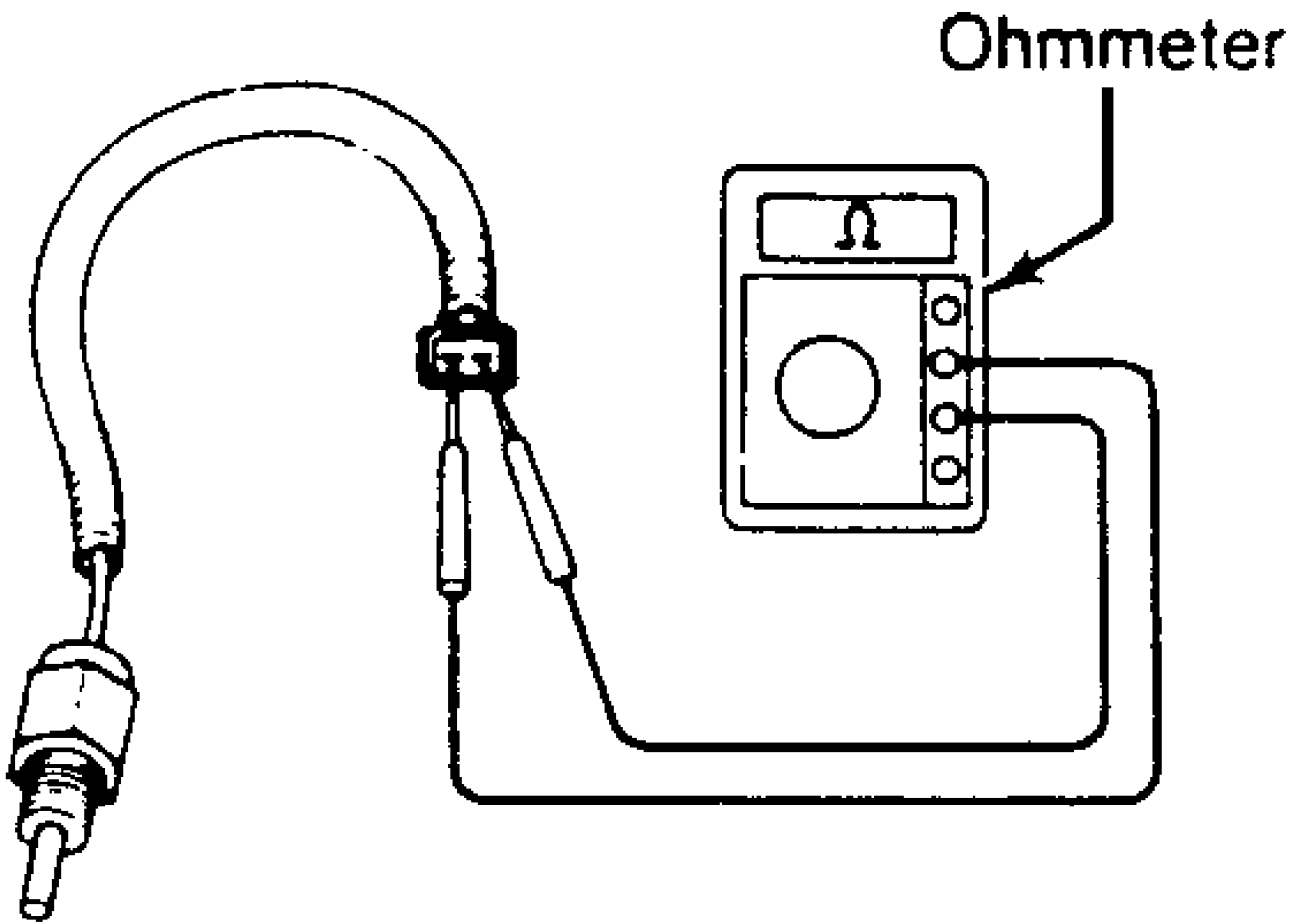
Fig. 20: Identifying No. 1 Speed Sensor Terminal (Digital Type - Camry A-140E)  
Courtesy of Toyota Motor Sales, U.S.A., Inc.



## 50C15463

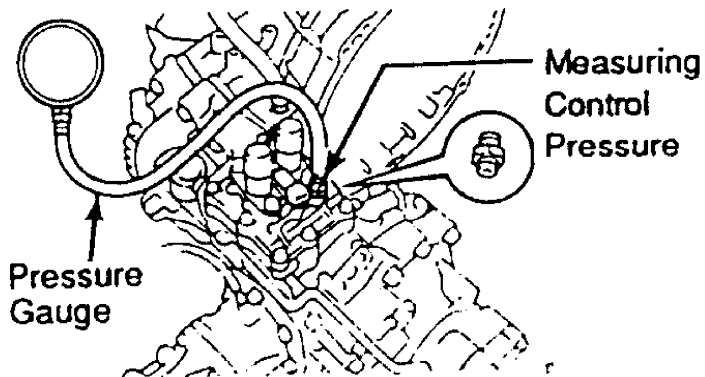
Fig. 21: Checking Transfer Position Switch  
Courtesy of Toyota Motor Sales, U.S.A., Inc.





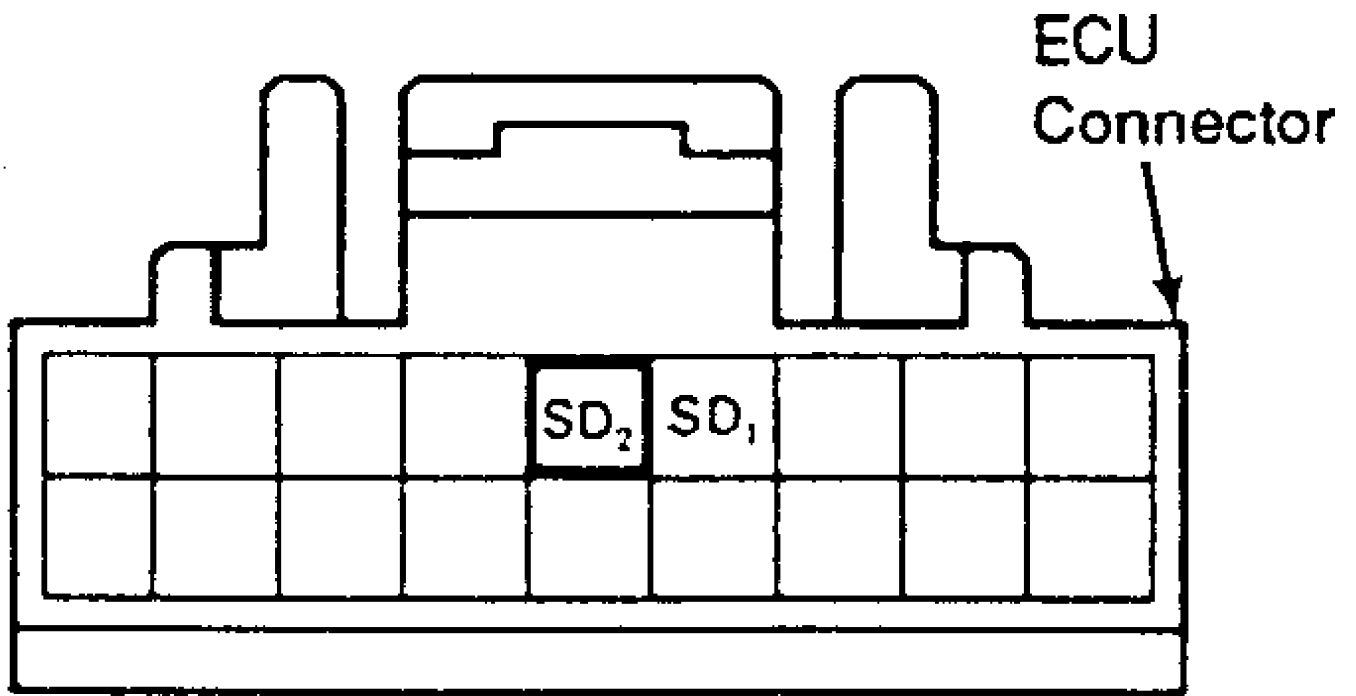
## 50D15464

Fig. 22: Checking Transmission & Transfer Fluid Temp. Sensor  
 Courtesy of Toyota Motor Sales, U.S.A., Inc.



## 50E15465

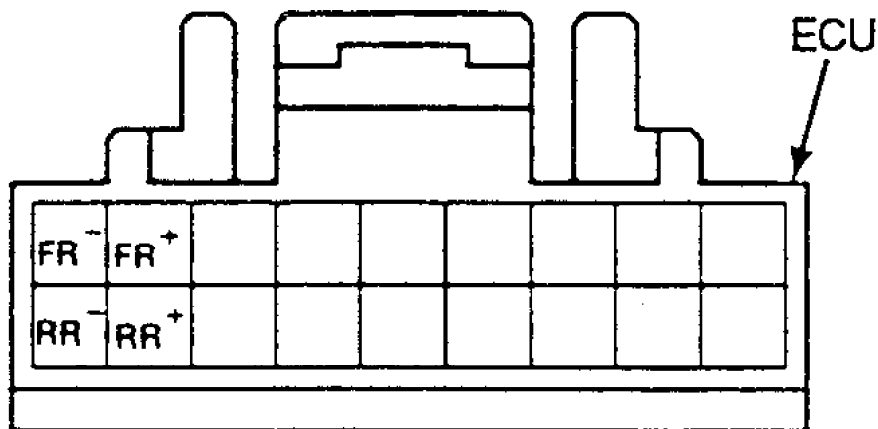
Fig. 23: Locating Control Pressure Test Connection  
 Courtesy of Toyota Motor Sales, U.S.A., Inc.



## Wire Harness Side

50F15466

Fig. 24: Identifying Differential Control Solenoid ECU Connector Terminals  
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

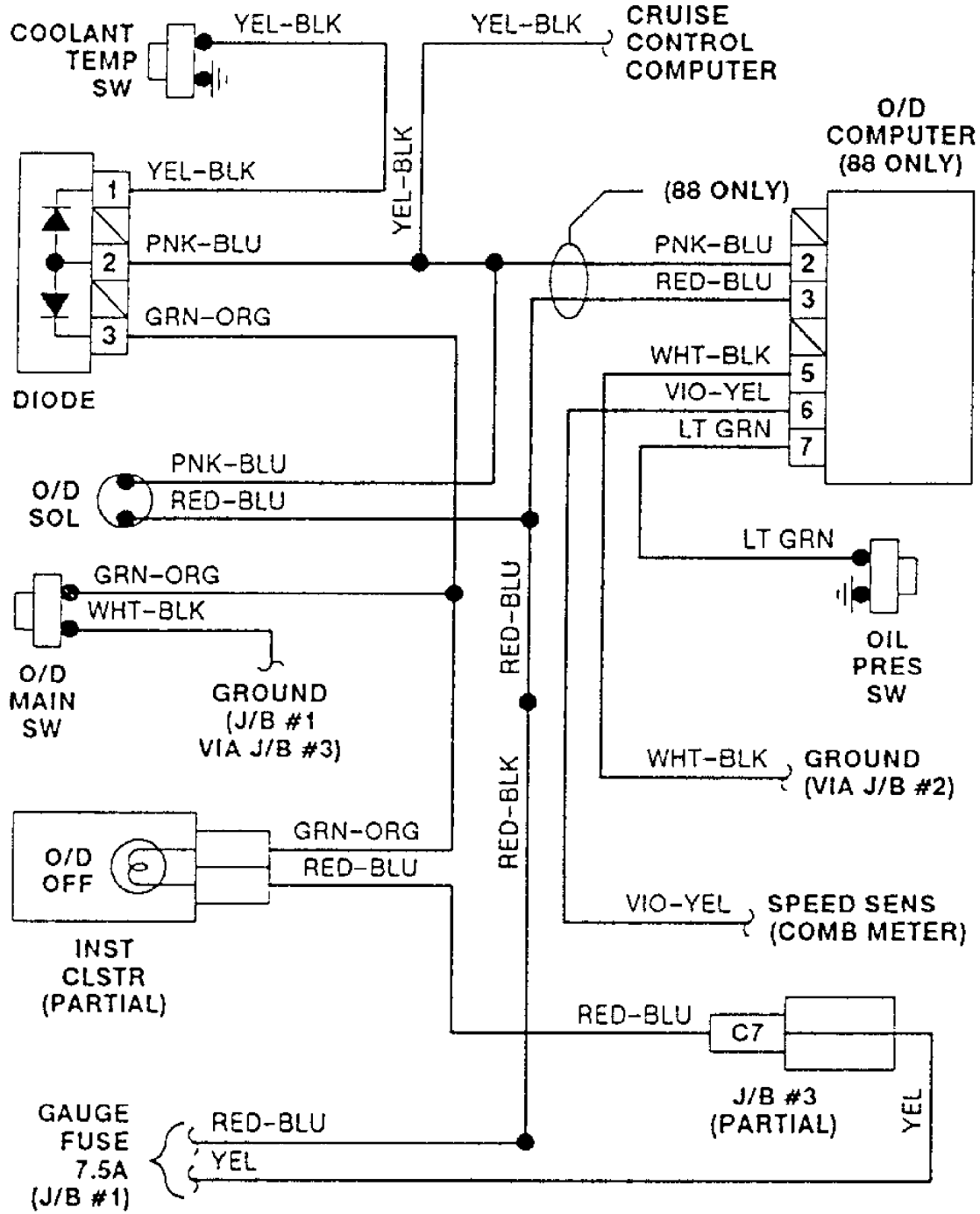


## Wire Harness Side

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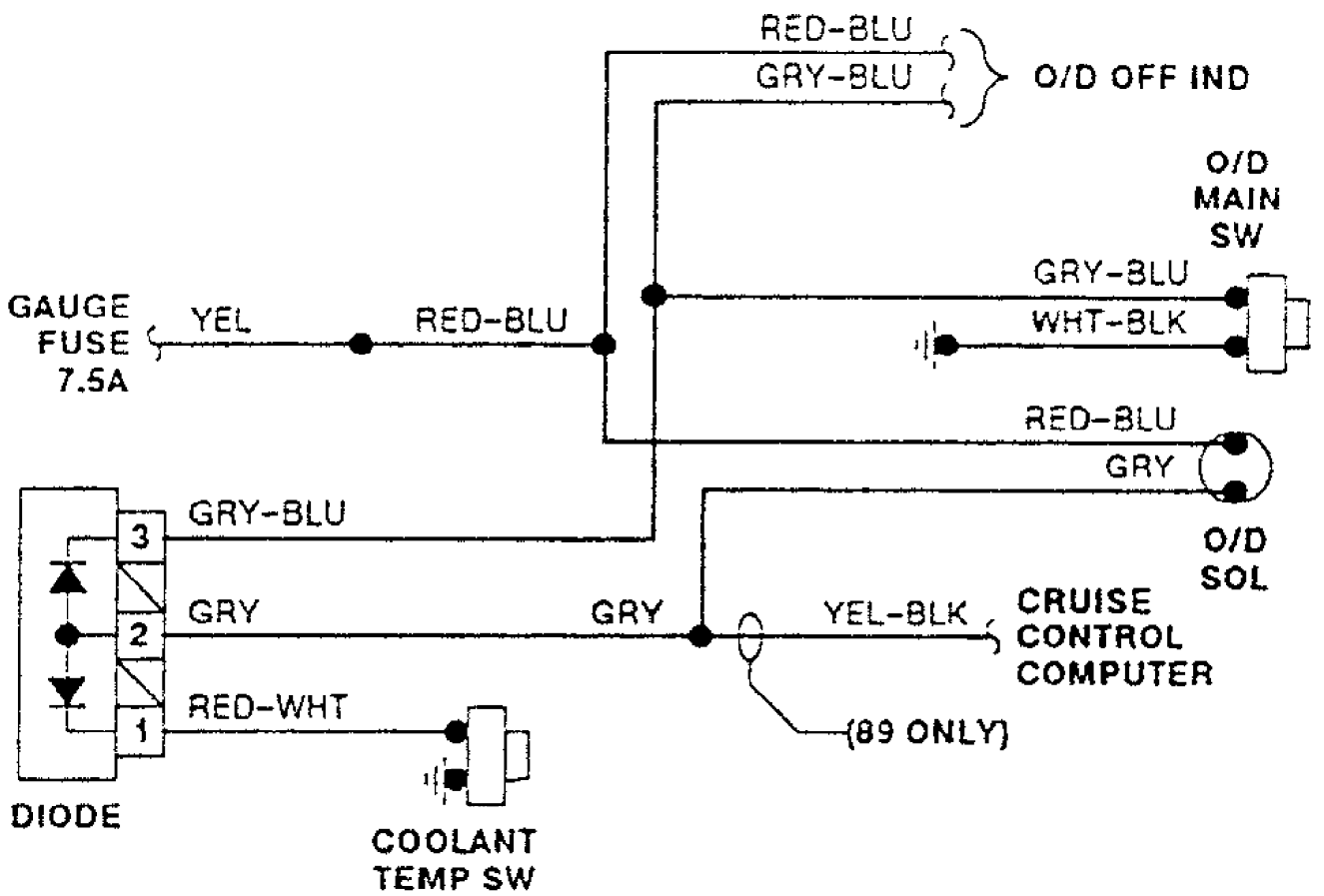
Fig. 25: Identifying Vehicle & Rear Wheel Speed Sensor ECU Connector Terminals  
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

WIRING DIAGRAMS



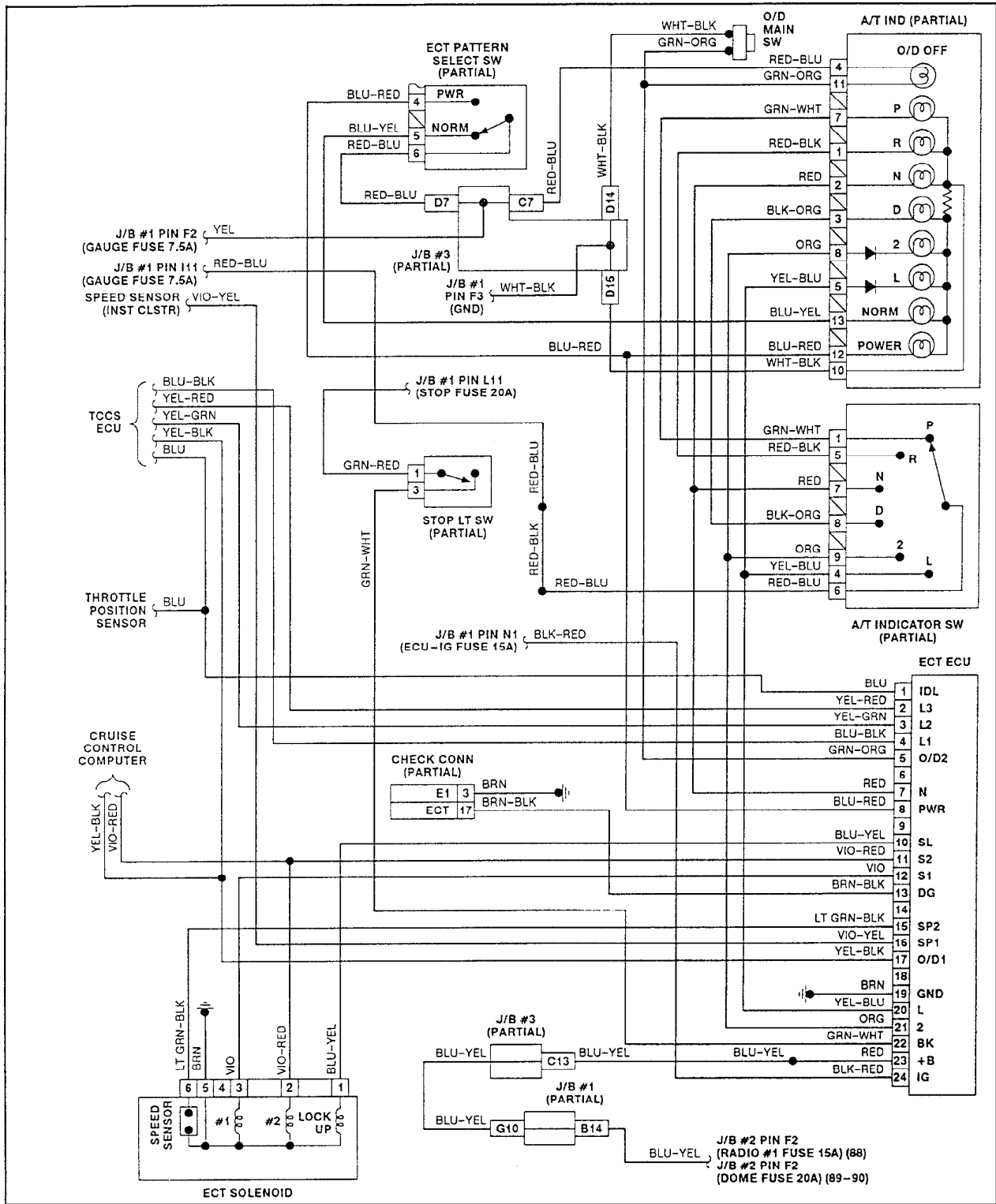
50H15476

Fig. 26: 1988-90 Camry Wiring Diagram (A-140L)



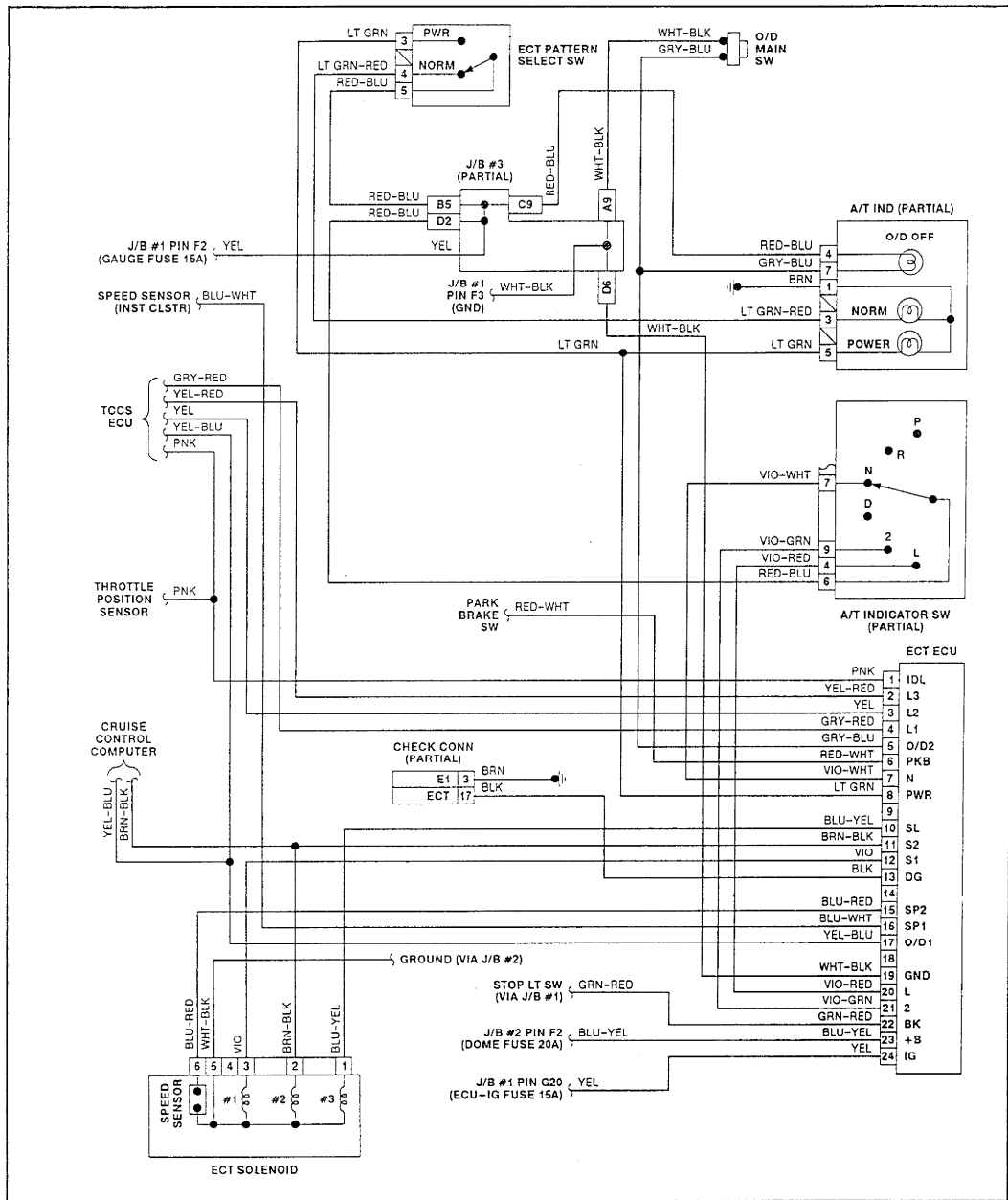
50A15479

Fig. 27: 1988-89 Celica Wiring Diagram (A-140L)



50H15484

Fig. 28: 1988-90 Camry Wiring Diagram (A-140E)



50A15487

Fig. 29: 1988-90 Celica Wiring Diagram (A-140E)