

AUTO TRANS DIAGNOSIS - A-240E

1993 Toyota Celica

AUTOMATIC TRANSMISSIONS
Toyota A-240 "E" Series Electronic Controls

APPLICATION

APPLICATION

Vehicle	Transmission Model
Geo	
Prizm (LSi)	A-245E
Toyota	
Celica 1.8L (1994)	A-246E
Celica 2.2L (1993)	A-241E
Corolla 1.8L	A-245E
MR2	A-241E
Paseo	A-244E

CAUTION: All models are equipped with a Supplemental Restraint System (SRS). When servicing vehicle, use care to avoid accidental air bag deployment. All SRS electrical connections and wiring harness are covered by Yellow insulation. SRS-related components are located in steering column, center console, instrument panel and lower panel on instrument panel. DO NOT use electrical test equipment on these circuits. If necessary, deactivate SRS before servicing components. See AIR BAG RESTRAINT SYSTEM article in the ACCESSORIES/SAFETY EQUIP section.

DESCRIPTION

The A-240 "E" series automatic transmission is electronically controlled. Transmission shifting and torque converter lock-up are controlled by an Electronic Controlled Transmission (ECT) Electronic Control Unit (ECU). Control unit is referred to as the ECT ECU.

NOTE: ECT ECU is combined with the engine ECU into one unit. This control unit is referred to as the engine and ECT ECU. See Figs. 1-8. In this article, control unit will be referred to as the ECT ECU on all models.

The ECT ECU receives information from various input devices and uses this information to control No. 1 and No. 2 solenoids for transmission shifting and lock-up solenoid for torque converter lock-up.

A pattern select switch is located on center console (1993 Celica 2.2L). Pattern select switch contains a POWER (depressed) and a NORMAL (released) operating position. When pattern select switch is depressed, transmission upshifts and downshifts will occur at a higher vehicle speed than with switch released. An indicator light will indicate the pattern select switch position.

An Overdrive (OD) switch is mounted on the shift lever. See Figs. 1-8. When OD switch is depressed to ON position, transmission will shift into 4th gear when shift lever is in "D" position, and OD OFF light on instrument panel will go off. When OD switch is released to OFF position, transmission will shift into 3rd gear, and OD OFF light on instrument panel will illuminate.

Transmission is equipped with a shift lock and key lock system. Shift lock system prevents shift lever from being moved from Park unless brake pedal is depressed. In case of a malfunction, shift lever can be released by depressing shift lock override button, located near shift lever. Key lock system prevents ignition key from being moved from ACC to LOCK position on ignition switch unless shift lever is in Park. For more information on shift lock and key lock system, see the SHIFT LOCK SYSTEM article.

OPERATION

ELECTRONIC CONTROLLED TRANSMISSION ELECTRONIC CONTROL UNIT (ECT ECU)

1) The ECT ECU receives information from various input devices and uses this information to control No. 1, No. 2 and lock-up solenoids. The ECT ECU contains a self-diagnostic system, which will store code if failure or problem exists in the electronic control system.

2) Code can be retrieved to determine transmission problem area. See SELF-DIAGNOSTIC SYSTEM. On Corolla, Celica, Paseo and Prizm ECU is located near front of center console. See Figs. 1-6. On MR2 models, ECT ECU is located near left rear corner of engine compartment. See Figs. 7-8.

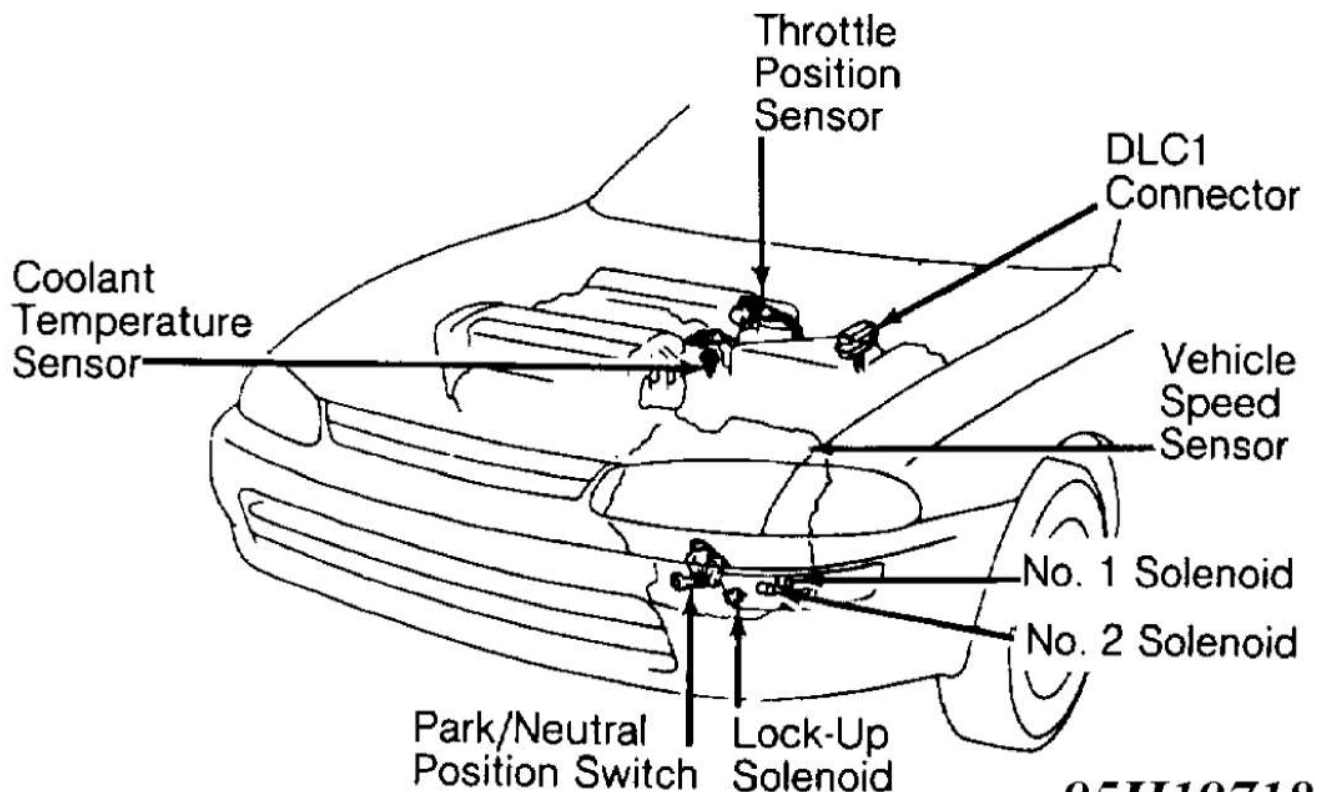
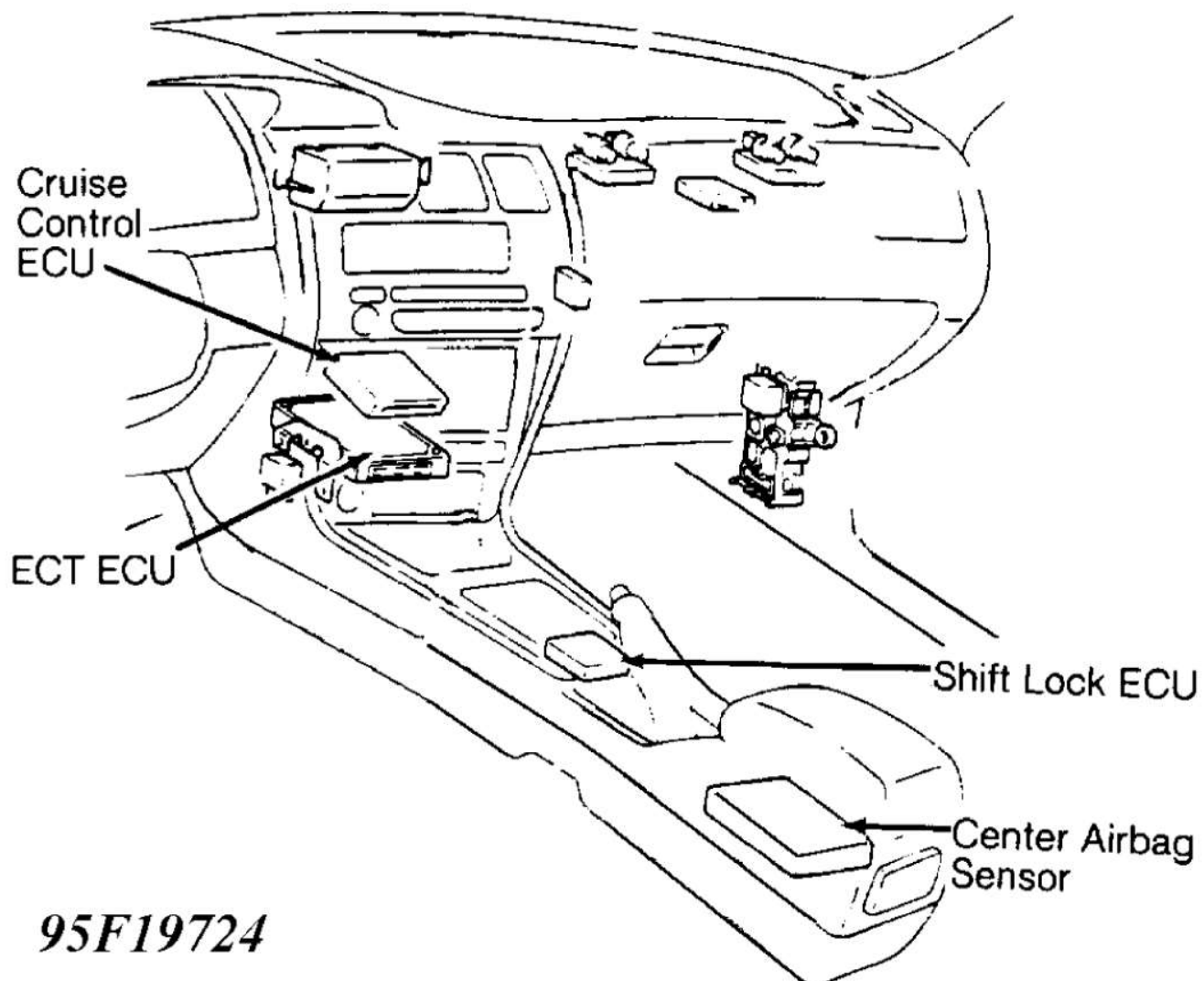
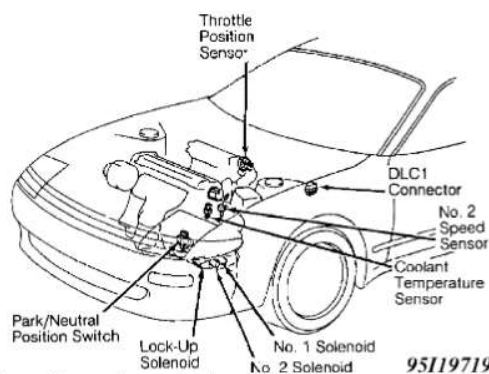


Fig. 1: Input & Output Devices (Corolla Shown, Prizm Is Similar)
Courtesy of Toyota Motor Sales, U.S.A., Inc.



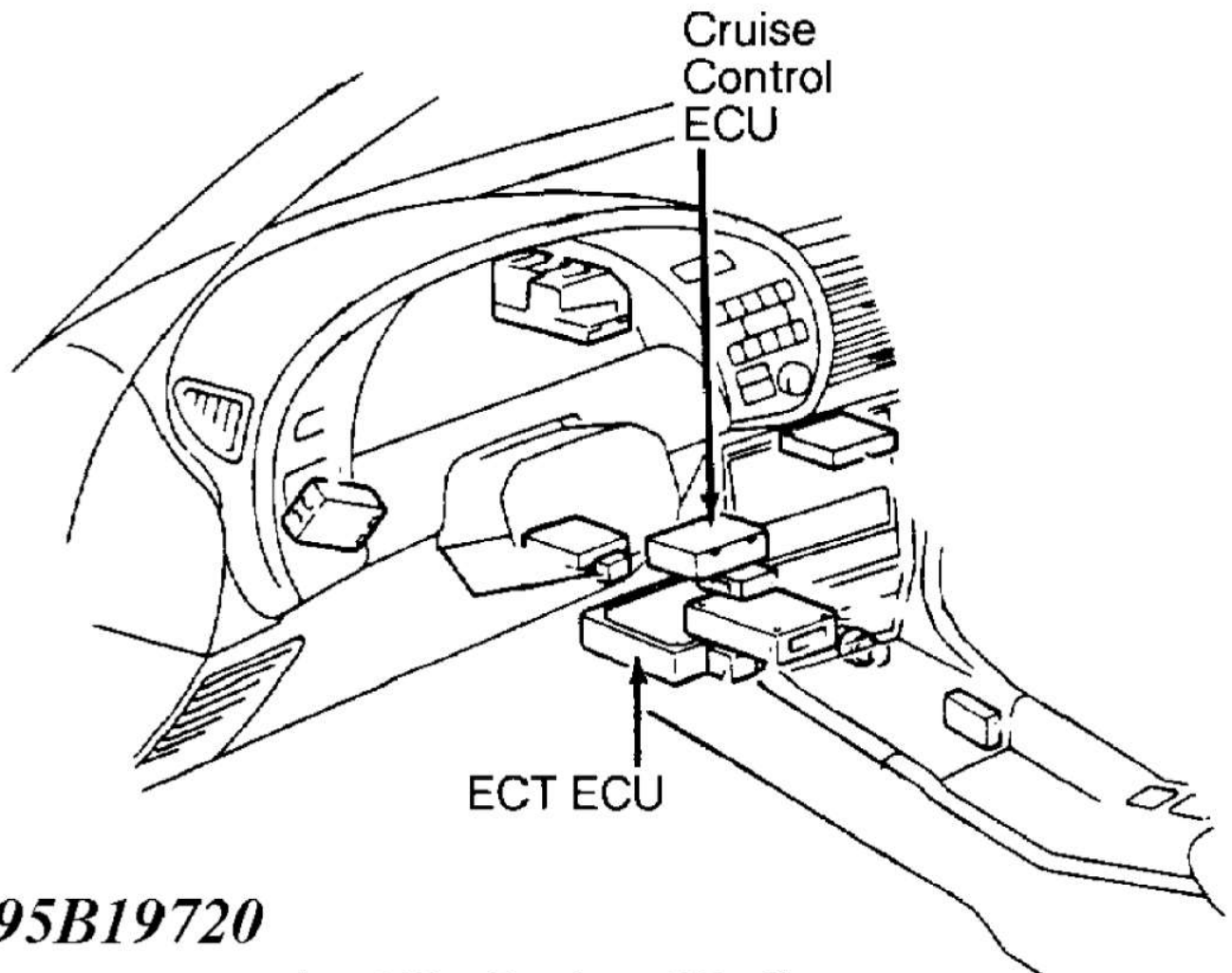
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Fig. 2: Input & Output Devices (Corolla Shown, Prizm Is Similar)
Courtesy of Toyota Motor Sales, U.S.A., Inc.



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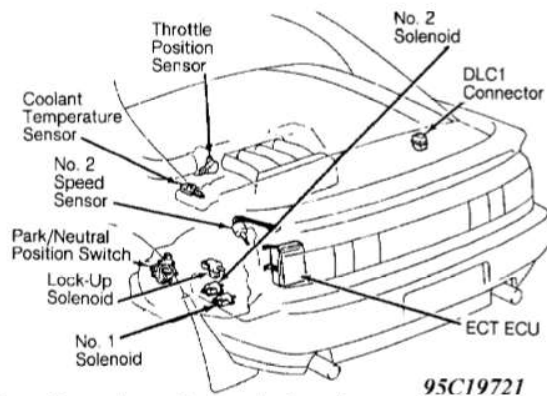
Fig. 3: Input & Output Devices (1993 Celica Shown, 1994 Celica Is Similar)
Courtesy of Toyota Motor Sales, U.S.A., Inc.



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Fig. 4: Input & Output Devices (1993 Celica Shown, 1994 Celica Is Similar)

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



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Fig. 5: Input & Output Devices (MR2)

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

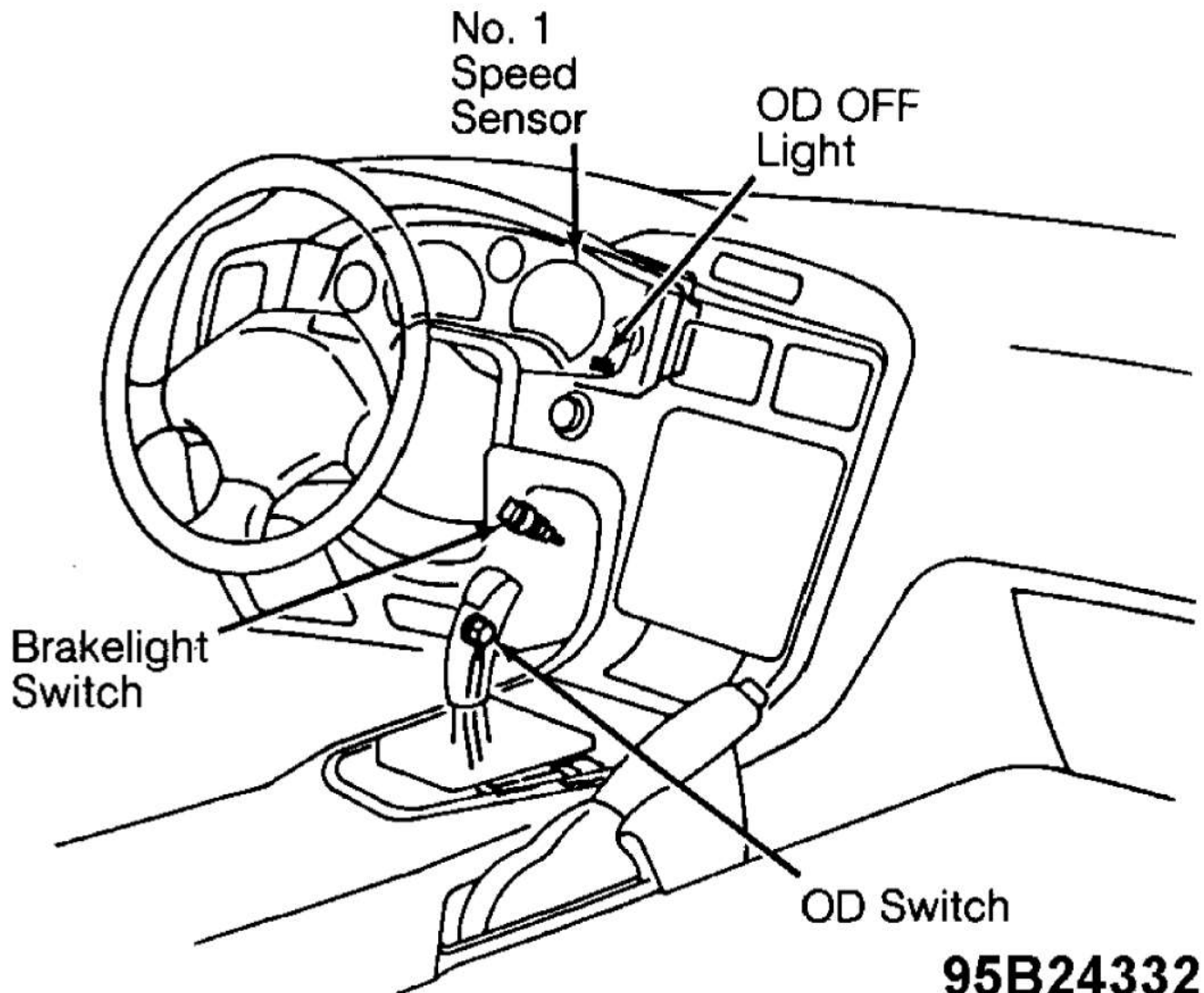


Fig. 6: Input & Output Devices (MR2)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

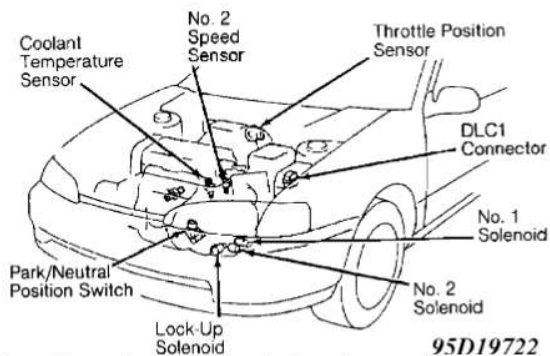
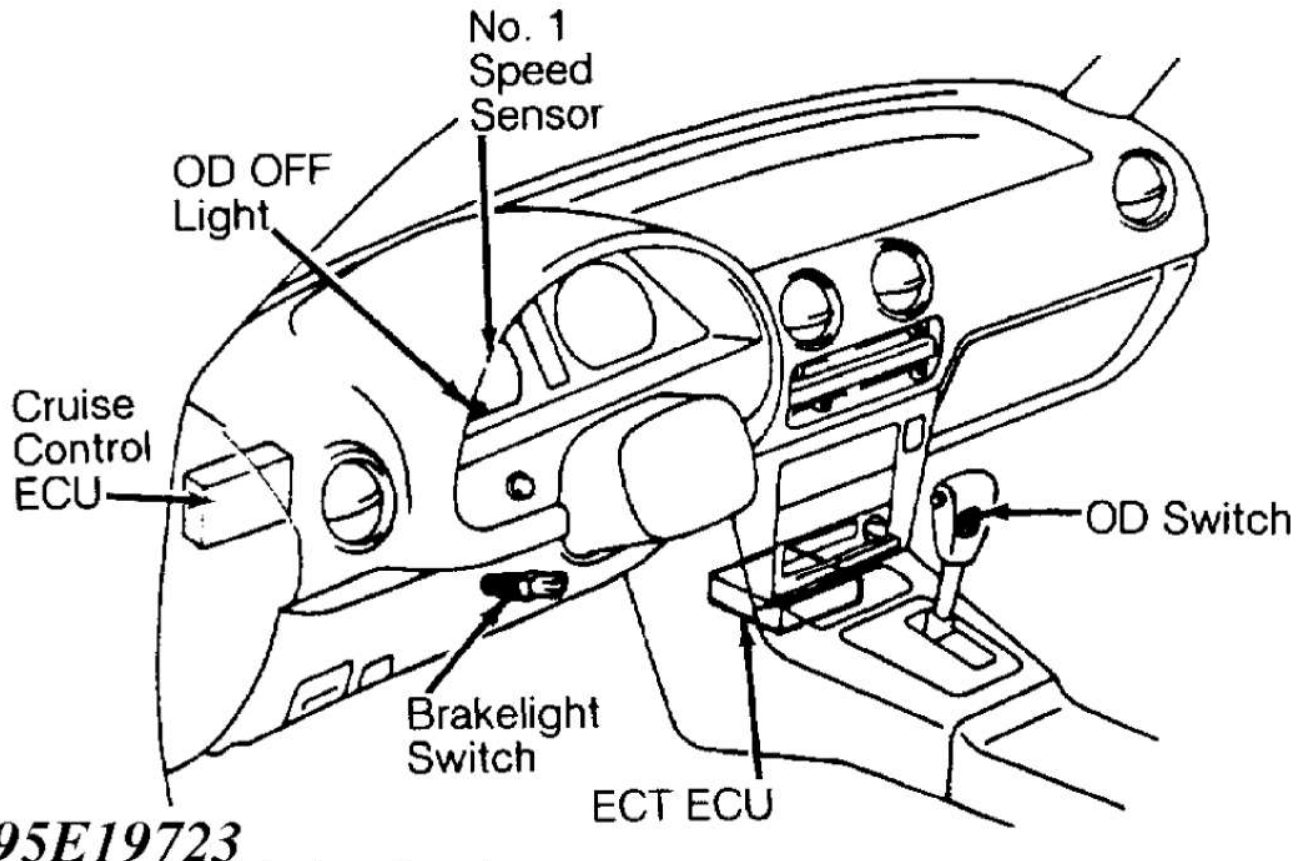


Fig. 7: Input & Output Devices (Paseo)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.



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Fig. 8: Input & Output Devices (Paseo)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

ECT ECU INPUT DEVICES

Pattern Select Switch

Pattern select switch delivers an input signal to ECT ECU to indicate transmission shift points selected by the operator. Pattern select switch is located near shift lever (1993 Celica models).

Park/Neutral Position Switch

Park/Neutral position switch delivers an input signal to ECT ECU to indicate shift lever position. Park/Neutral position switch is located on side of transmission. See Figs. 1-8.

Throttle Position Sensor

Throttle position sensor delivers an input signal to ECT ECU indicating throttle position. Throttle position sensor is located on side of throttle body.

Vehicle Speed Sensor

Vehicle speed signal is delivered to ECT ECU by speed sensors. Speed sensors are located on transmission and in combination meter on some models.

Brakelight Switch

Brakelight switch delivers input signal to ECT ECU, indicating vehicle braking. Brakelight switch is located on brake pedal support.

OD Switch

The OD switch provides an input signal to ECT ECU to indicate when overdrive is selected by the operator. When OD switch is depressed to ON position, transmission will shift into 4th gear when shift lever is in "D" position, and OD OFF light on instrument panel will go off. See Figs. 1-8. When OD switch is released to OFF position, transmission will shift into 3rd gear, and OD OFF light on instrument panel will come on. The OD switch is mounted on the shift lever.

Coolant Temperature Sensor

Coolant temperature sensor delivers input signal to ECT ECU, indicating engine coolant temperature. Coolant temperature sensor is located in thermostat housing or radiator

Cruise Control Electronic Control Unit (ECU)

Cruise control ECU delivers an input signal to control overdrive operation in accordance with vehicle speed when cruise control is operating. When in overdrive with cruise control on, if vehicle speed drops 3 MPH less than the set speed, overdrive is released to prevent reduction in vehicle speed. Once vehicle speed is more than the set speed, the overdrive is resumed. Cruise control ECU is located behind instrument panel on passenger's side. See Figs. 1-8.

NOTE: Cruise control ECU may be referred to as cruise control computer.

ECT ECU OUTPUT DEVICES

No. 1 & No. 2 Solenoids

The ECU controls transmission shifting by delivering an output signal to operate proper solenoid. Solenoids are operated in accordance with shift lever range. See Fig. 9. If a solenoid malfunctions, designated gear may result. See Fig. 9. Solenoids are located on transmission. See Figs. 1-8.

Lock-Up Solenoid

ECU controls torque converter lock-up on all "E" series models by delivering an output signal to lock-up solenoid. Lock-up solenoid is activated when shift lever is in "D" position and vehicle is at specified speed. Lock-up solenoid is located on transmission. See Figs. 1-8.

Range	NORMAL			NO. 1 SOLENOID MALFUNCTIONING			NO. 2 SOLENOID MALFUNCTIONING			BOTH SOLENOID 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 (O/D)	ON	x	1st	x	x	O/D
	ON	ON	2nd	x	ON	3rd	OFF (ON)	x	O/D (1st)	x	x	O/D
	OFF	ON	3rd	x	ON	3rd	OFF	x	O/D	x	x	O/D
	OFF	OFF	O/D	x	OFF	O/D	OFF	x	O/D	x	x	O/D
2 range	ON	OFF	1st	x	ON (OFF)	3rd (O/D)	ON	x	1st	x	x	3rd
	ON	ON	2nd	x	ON	3rd	OFF (ON)	x	3rd (1st)	x	x	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 x: Malfunctions

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Fig. 9: Determining No. 1 & No. 2 Solenoid Operation
Courtesy of Toyota Motor Sales, U.S.A., Inc.

SELF-DIAGNOSTIC SYSTEM

SYSTEM DIAGNOSIS

NOTE: Before testing transmission, ensure fluid level is correct and throttle and shift cables are properly adjusted. Ensure engine starts with shift lever in Park and Neutral to ensure proper adjustment of neutral start switch. Transmission must first be tested by checking for stored codes. Refer to RETRIEVING CODES.

ECT ECU monitors transmission operation and contains a self-diagnostic system which stores code if transmission electronic control system failure or problem exists. If a problem exists in No. 1 or No. 2 solenoids or speed sensors and code is set, ECT ECU blinks OD OFF light on instrument panel to warn driver.

OD OFF light on instrument panel will not blink to warn driver if a problem exists or code is stored for lock-up solenoid, or problem exists with brakelight switch signal or throttle position sensor signal.

RETRIEVING CODES

NOTE: Before retrieving codes, ensure proper battery voltage exists for proper self-diagnosis system operation. Perform diagnostic circuit check before retrieving codes to ensure proper operation of OD OFF light. See DIAGNOSTIC CIRCUIT CHECK heading below.

Diagnostic Circuit Check

1) Turn ignition on. Release OD switch on shift lever to OFF position. Ensure OD OFF light on instrument panel turns on. If OD OFF light does not illuminate, check OD switch and wiring circuit.

2) Depress OD switch to ON position. Ensure OD OFF light on instrument panel goes off. If OD OFF light remains on, check OD switch and wiring circuit. If OD OFF light is blinking, check for stored codes. See ECT ECU CODES heading below.

ECT ECU Codes

1) Turn ignition on. DO NOT start engine. Depress OD switch on shift lever to ON position.

NOTE: Codes can only be retrieved with OD switch on. If OD switch is off, OD OFF light will be on continuously and will not blink the code.

2) Install jumper wire between terminals TE1 and E1 of DLC1 connector. See Figs. 10-11.

3) Note number of flashes from OD OFF light on instrument panel. If normal system operation exists, OD OFF light will flash once every .25 second. See Fig. 12-13.

4) If system is operating correctly and no code exists, turn ignition off and remove jumper wire. Perform MANUAL SHIFTING TEST under TRANSMISSION SHIFT TESTING to determine if problem is a electrical or mechanical transmission problem. Check system by the symptom. See appropriate symptom under SYMPTOM TROUBLE SHOOTING.

5) If code exists, OD OFF light will blink once every .5 second. Number of blinks equals first digit of code. After a pause of 1.5 seconds, second digit will be displayed. See Figs. 12-13.

6) If more than one code exists, next code will be displayed after pause of 2.5 seconds. See Figs. 12-13. Smallest number code will display first and system will progress to largest code. Codes will be repeated.

7) Once code is obtained, determine probable cause and

symptom. See CODE IDENTIFICATION table. For diagnosis and repair of codes, see DIAGNOSTIC TESTING. Turn ignition off and remove jumper wire.

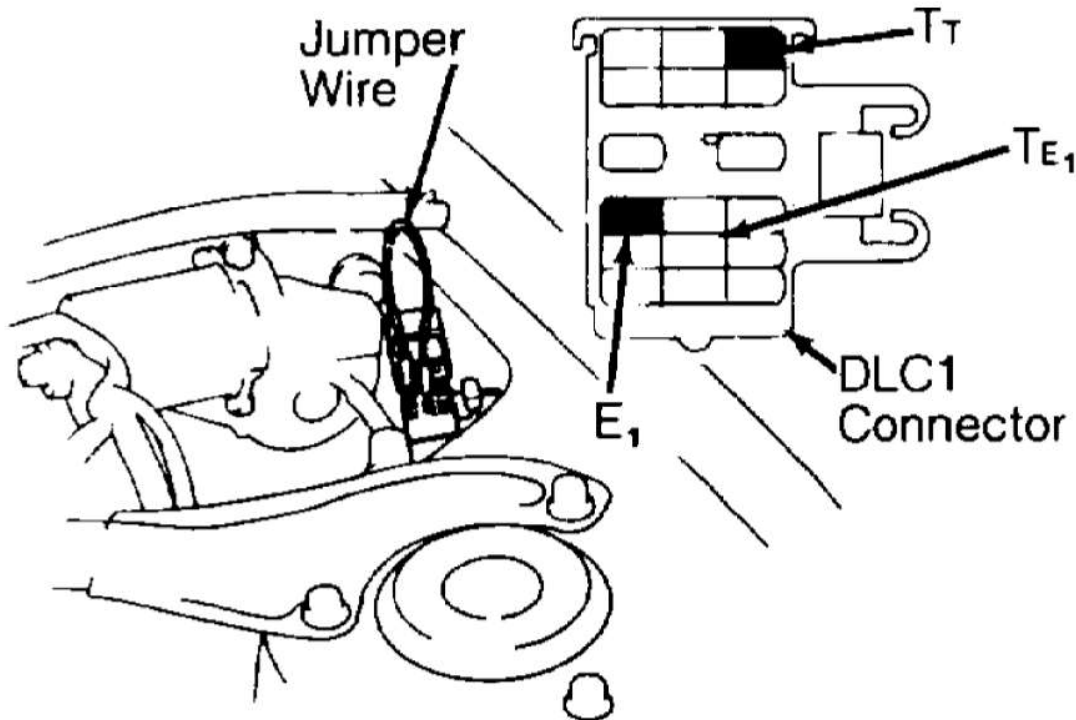
NOTE: Once repairs have been performed, codes must be cleared from ECT ECU memory. See CLEARING FAULT CODES.

CODE IDENTIFICATION

Fault Code		(1) Probable Cause
42	.....	(2) Defective No. 1 Speed Sensor
61	.....	(2) Defective No. 2 Speed Sensor
62	.....	Defective No. 1 Solenoid
63	.....	Defective No. 2 Solenoid
64	.....	Defective Lock-Up Solenoid

(1) - Check listed component for probable cause. Also check wiring and connections of specified component.

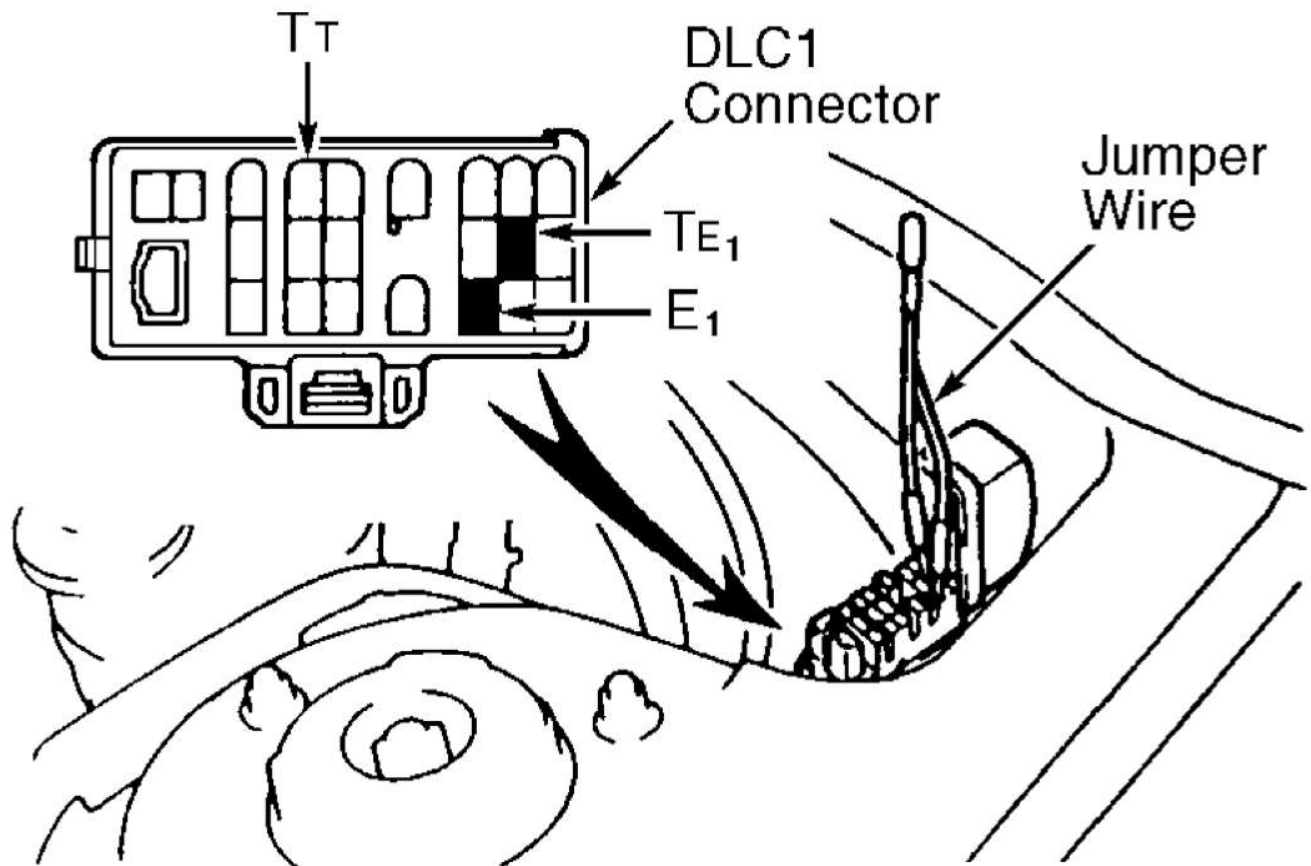
(2) - If both No. 1 and No. 2 speed sensors fail simultaneously, fault code will not exist, but transmission will not upshift from 1st gear with shift lever in "D" position.



CELICA (1993), MR2 (CONNECTOR ONLY) & PASEO

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Fig. 10: DLC1 Connector Terminals
Courtesy of Toyota Motor Sales, U.S.A., Inc.



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Fig. 11: DLC1 Connector Terminals
Courtesy of Toyota Motor Sales, U.S.A., Inc.

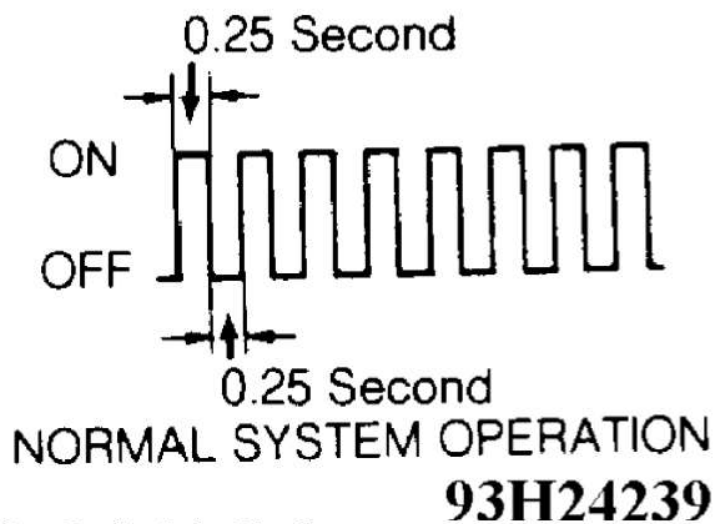


Fig. 12: Fault Code Displays
Courtesy of Toyota Motor Sales, U.S.A., Inc.

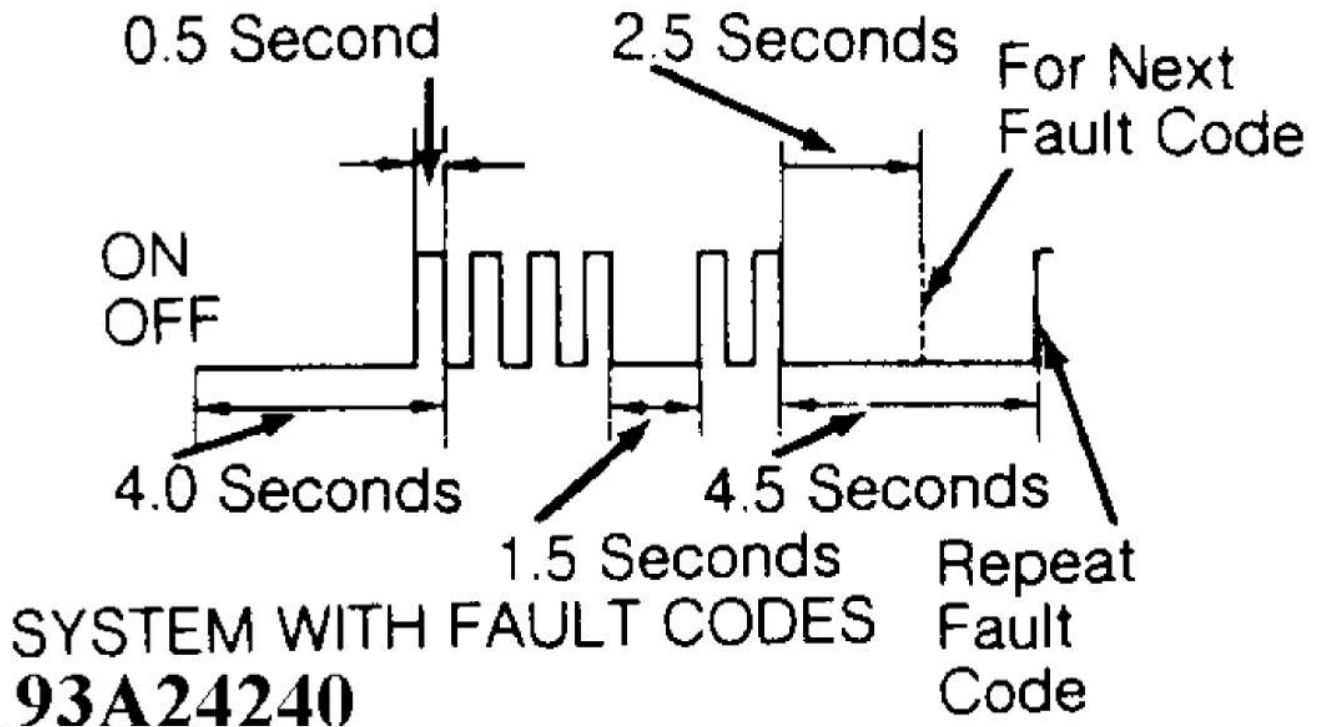


Fig. 13: Fault Code Displays
Courtesy of Toyota Motor Sales, U.S.A., Inc.

CLEARING FAULT CODES

- 1) Once repairs have been performed, fault codes must be cleared from ECU memory. Remove EFI fuse (15-amp) from engine compartment fuse box for 10 seconds to clear memory in ECU.
- 2) On MR2, engine compartment fuse box is located on driver's side of engine compartment. On Celica, Corolla and Paseo, engine compartment fuse box is located near the battery in engine compartment.
- 3) Fuse may need to be removed for more than 10 seconds in cold ambient temperatures. Reinstall fuse.

NOTE: Fault codes may also be cleared by disconnecting negative battery cable, but memory for electronic components will be also be canceled.

DIAGNOSTIC TESTING

When trouble shooting transmission, first check for stored codes and repair as necessary. If no codes exist, perform manual shifting test to determine if problem area is in electrical circuits or a mechanical transmission problem. See MANUAL SHIFTING TEST under TRANSMISSION SHIFT TESTING.

CODE NO. 42 (NO. 1 VEHICLE SPEED SENSOR (VSS))

Celica (1993) & Paseo

- 1) Determine if speedometer is operating properly. Inspect and repair speedometer drive gear, cable and combination meter as needed.
- 2) Turn ignition off. Access ECT ECU harness connector. See

Figs. 3-4 and 8-9. Lift and support front wheels of vehicle. Backprobing ECT ECU harness connector with DVOM. Check voltage between SPD terminal and vehicle ground while turning front wheel.

3) If voltage pulses as wheel is turned, replace ECT ECU and retest. If pulse is not present, turn ignition off. Remove combination meter. Connect ohmmeter to test terminals and rotate meter shaft. See Figs. 14-15. If ohmmeter pulses, inspect and repair circuits between combination meter and ECT ECU. See appropriate wiring diagram in WIRING DIAGRAMS. If ohmmeter does not pulse, replace combination meter and retest.

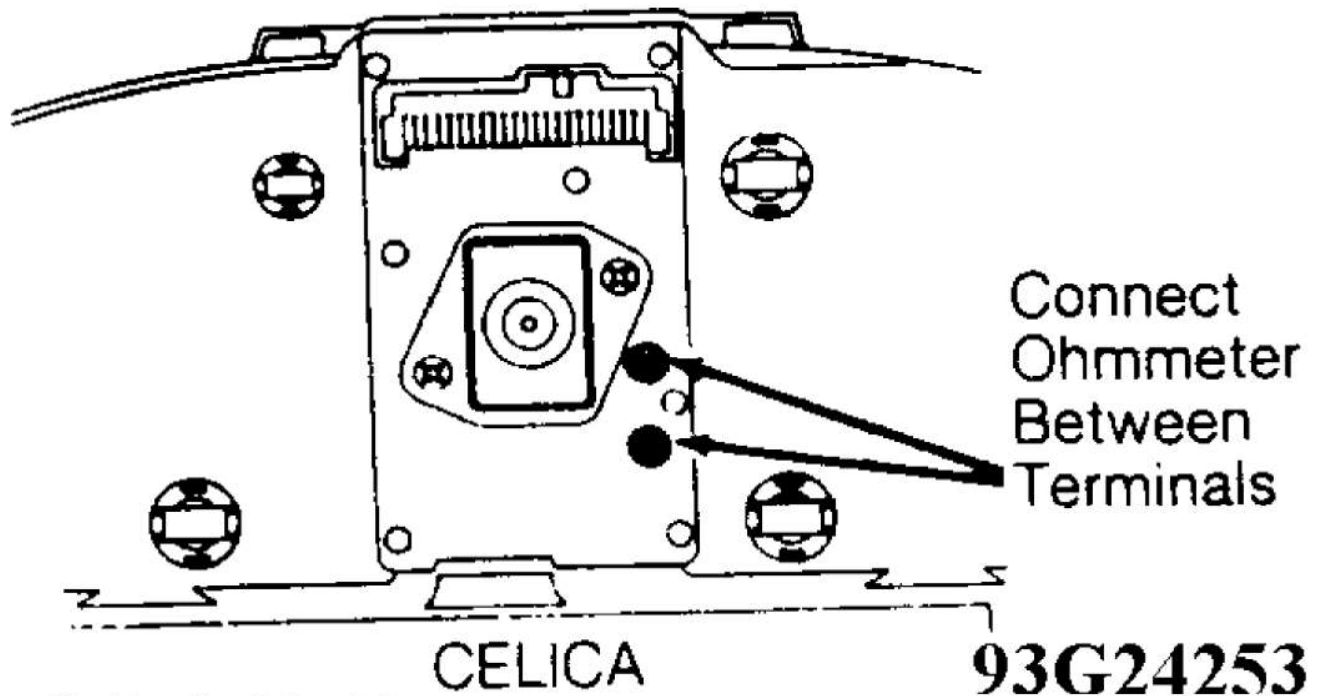


Fig. 14: Checking No. 1 Speed Sensor
Courtesy of Toyota Motor Sales, U.S.A., Inc.

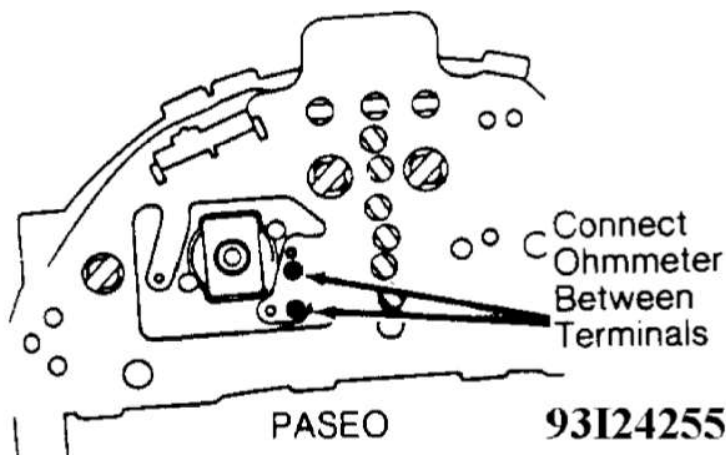


Fig. 15: Checking No. 1 Speed Sensor
Courtesy of Toyota Motor Sales, U.S.A., Inc.

Celica (1994), Corolla, MR2 & Prizm

1) Lift and support vehicle. Disconnect cruise control ECU.

See Figs. 1-8. Remove combination meter. Turn ignition on. Using DVOM, measure voltage between SPD terminal of combination meter connector and ground. Refer to the SPD CIRCUIT IDENTIFICATION table. Also, see Figs. 16-20. Rotate front wheel.

SPD CIRCUIT IDENTIFICATION

Application	Terminal No.
Corolla	9
Celica	3
MR2	10
Prizm	12

2) If voltage pulses 0-5 volts, check continuity between ECT ECU harness connector E1 terminal and ground. If continuity does not exist, inspect and repair circuit as needed. If continuity does exist, replace ECT ECU and retest. If no voltage is present, go to next step. If voltage is 4-6 volts and remains unchanged, go to step 5).

3) Turn ignition off. Disconnect ECT ECU harness connector. See Figs. 1-8. Using ohmmeter, check continuity between combination meter harness connector SPD terminal and ECU SPD terminal. Refer to the Fig. 21. If continuity exists, go to next step. If continuity does not exist, inspect and repair circuit as needed.

4) Check continuity of 2 circuits between combination meter and VSS. See appropriate wiring diagram in WIRING DIAGRAMS. If continuity does not exist, inspect and repair circuit(s) as needed. If continuity exists, inspect VSS. See NO. 1 VEHICLE SPEED SENSOR under COMPONENT TESTING. Replace as needed.

5) Disconnect VSS harness connector. Turn ignition on. Measure voltage between VSS harness connector terminal No. 1 (Red/Blue wire) and ground. If battery voltage is not present, inspect and repair circuit as needed. If battery voltage is present, replace combination meter and retest.

6) Turn ignition off. Disconnect ECT ECU harness connector. Refer to the Fig. 1-8. Using ohmmeter, check continuity between combination meter harness connector SPD terminal and ECT ECU SPD terminal. See Fig. 21. If continuity exists, replace combination meter and retest. If continuity does not exist, inspect and repair circuit as needed.

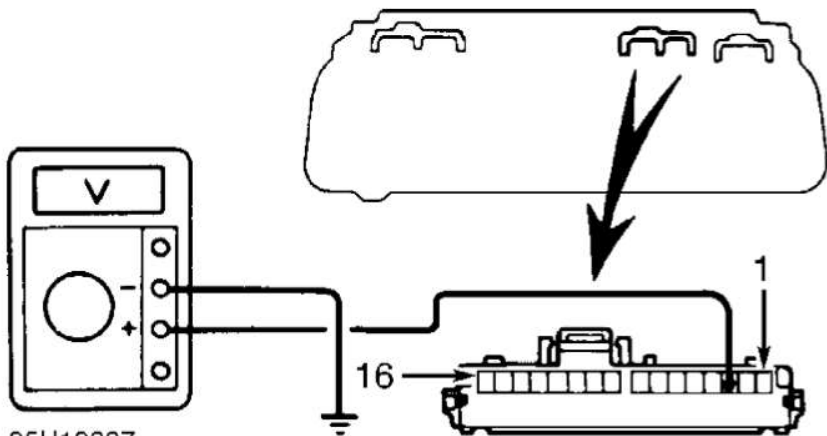


Fig. 16: Combination Meter Harness Connector
Courtesy of Toyota Motor Sales, U.S.A., Inc.

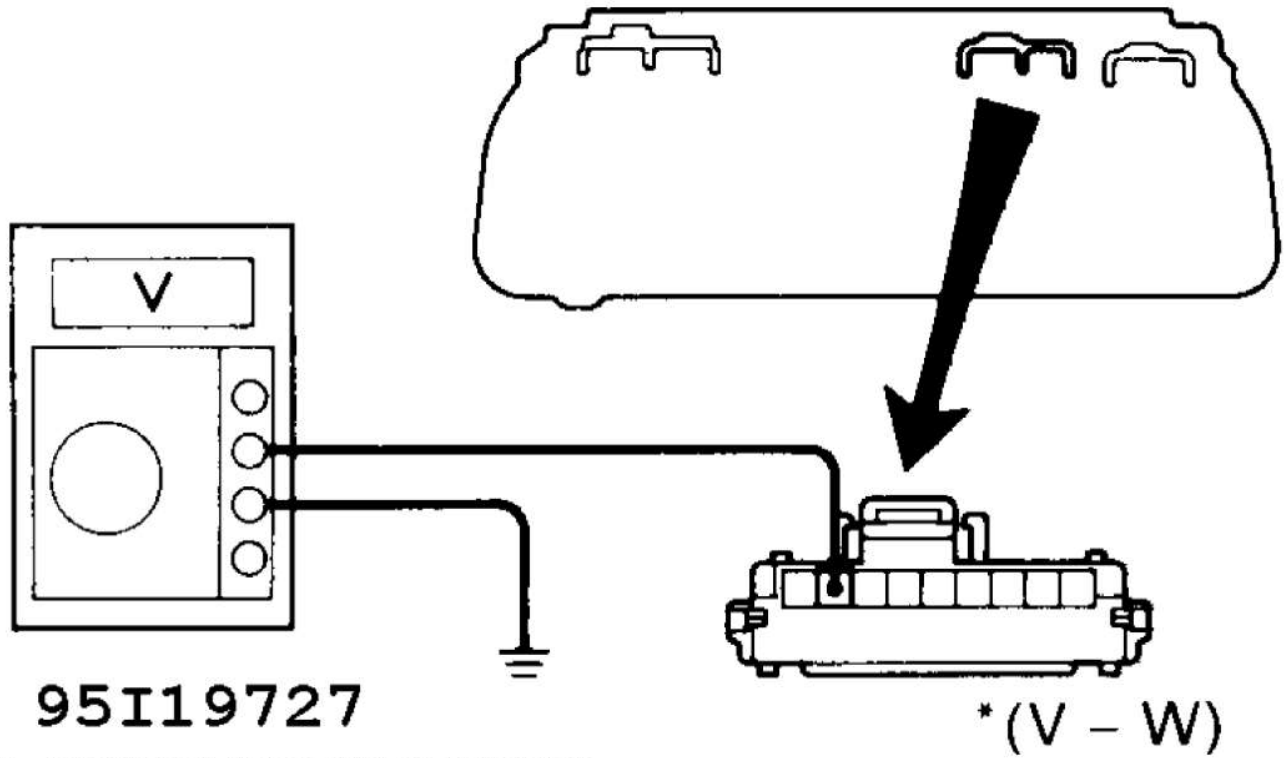


Fig. 17: Combination Meter Harness Connector
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

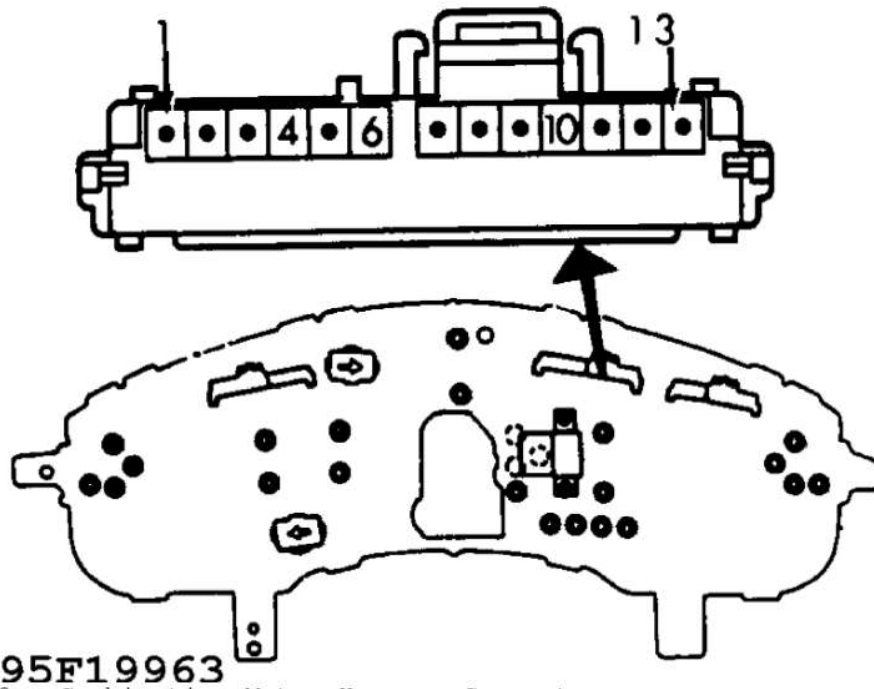


Fig. 18: Combination Meter Harness Connector
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

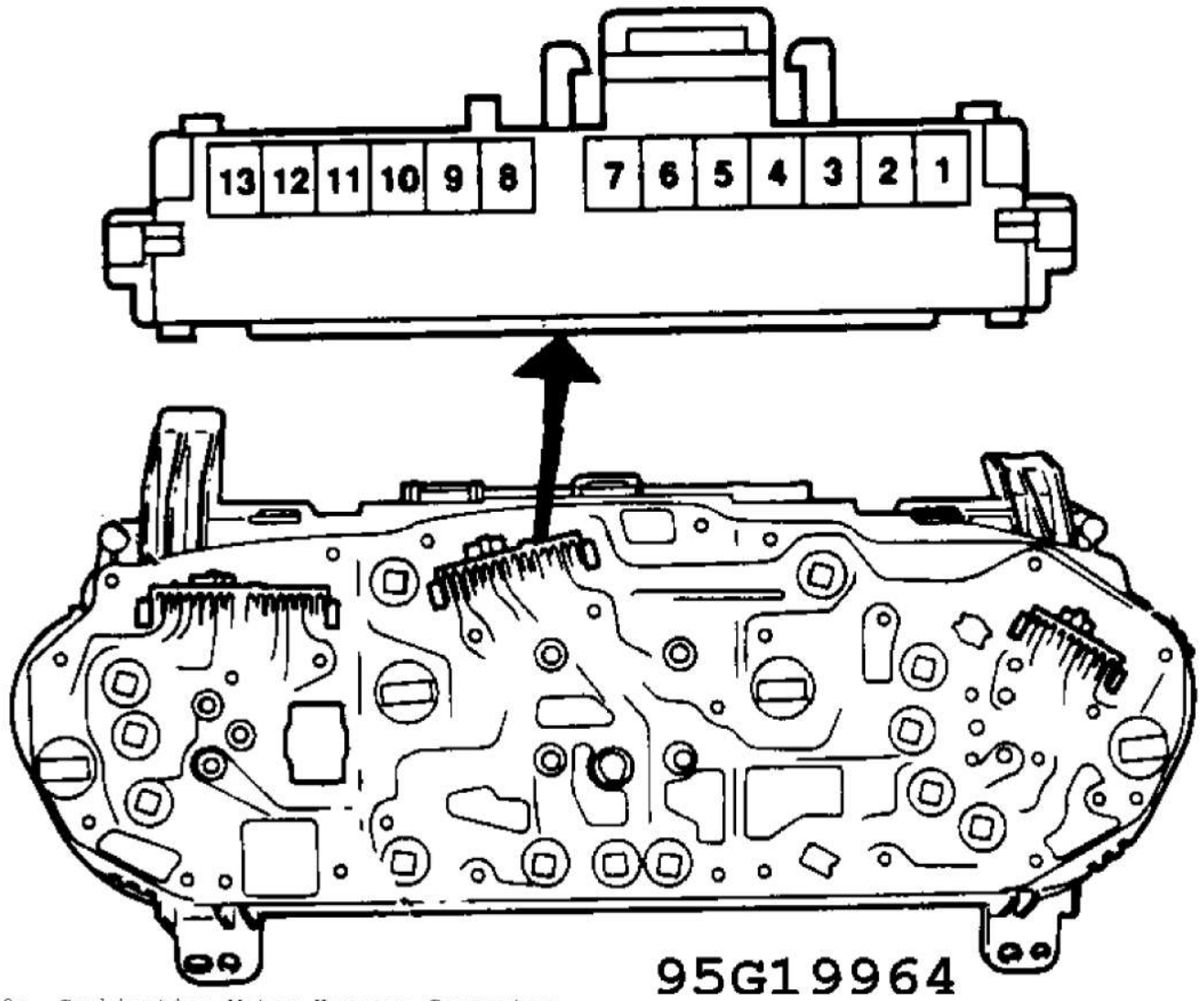


Fig. 19: Combination Meter Harness Connector
Courtesy of Toyota Motor Sales, U.S.A., Inc.

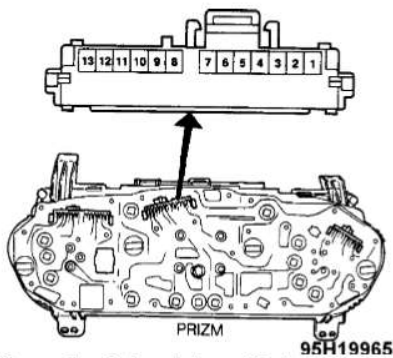


Fig. 20: Combination Meter Harness Connector
Courtesy of Toyota Motor Sales, U.S.A., Inc.

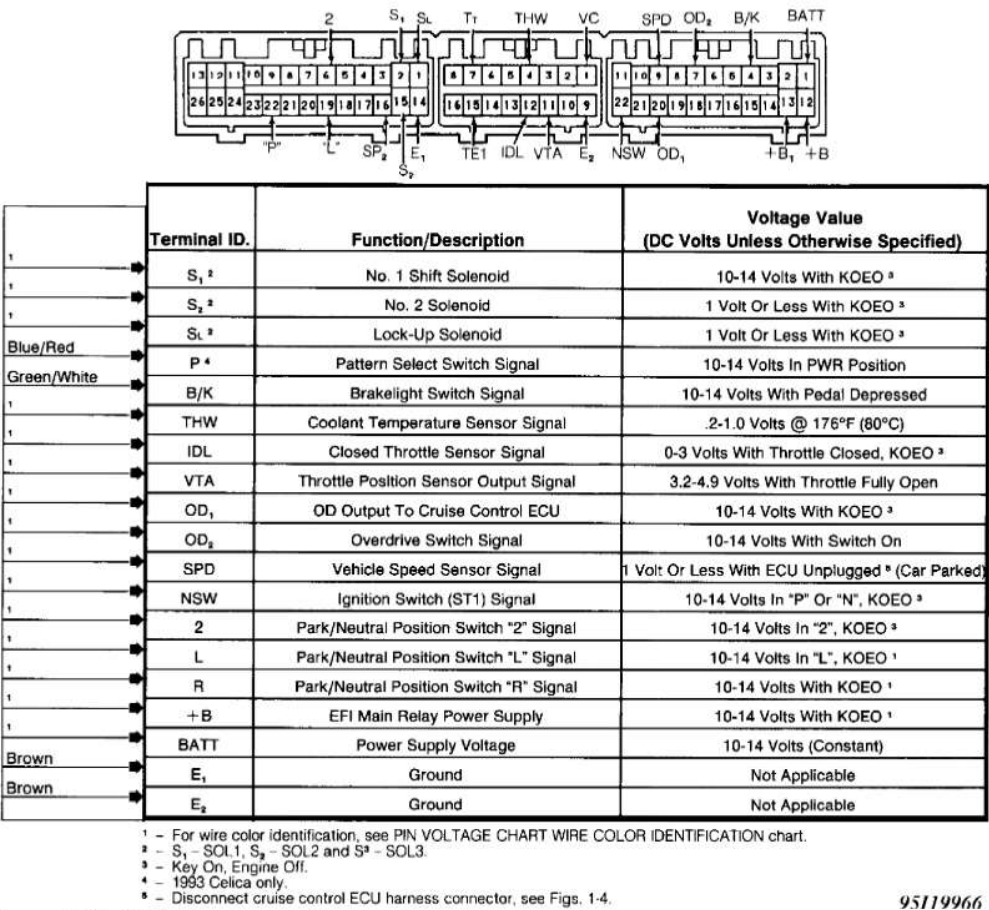


Fig. 21: ECT ECU Harness Connector

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

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CODE NO. 61 (NO. 2 VEHICLE SPEED SENSOR (VSS))

Celica (1993), MR2 & Paseo

1) Obtain access to ECT ECU, located near glove box. See Figs. 1-8. Using ohmmeter, check for continuity between terminal SP2 of ECT ECU connector and body ground. See Fig. 21.

2) If continuity exists, replace ECT ECU. If continuity does not exist, check No. 2 speed sensor. See NO. 2 SPEED SENSOR under COMPONENT TESTING.

3) Replace No. 2 speed sensor if defective. If No. 2 speed sensor is okay, check wiring between ECT ECU and No. 2 speed sensor. See appropriate wiring diagram in WIRING DIAGRAMS.

CODE NO. 62 (NO. 1 SOLENOID)

1) Access ECT ECU. See Figs. 1-8. Using ohmmeter, check resistance between terminal S1 and body ground with connector removed from ECT ECU. See Fig. 21.

2) Resistance should be 11-15 ohms. If resistance is okay, replace ECT ECU. If resistance is not within specification, remove oil pan. Disconnect electrical connector (Pink wire on Paseo, White wire on all others) at No. 1 solenoid.

3) Check resistance between electrical terminal on No. 1 solenoid and body ground. Replace No. 1 solenoid if resistance is not 11-15 ohms. If resistance is 11-15 ohms, inspect and repair wiring

between No. 1 solenoid and ECT ECU.

CODE NO. 63 (NO. 2 SOLENOID)

1) Access ECT ECU. See Figs. 1-8. Using ohmmeter, check resistance between terminal S2 and body ground with connector removed from ECT ECU. See Fig. 21.

2) Resistance should be 11-15 ohms. If resistance is okay, replace ECT ECU. If resistance is not within specification, remove oil pan. Disconnect electrical connector (Pink/Green wire on Paseo, Black wire on all others) at No. 1 solenoid.

3) Check resistance between electrical terminal on No. 1 solenoid and body ground. Replace No. 1 solenoid if resistance is not 11-15 ohms. If resistance is 11-15 ohms, inspect and repair wiring between No. 1 solenoid and ECT ECU.

CODE NO. 64 (LOCK-UP SOLENOID)

NOTE: Lock-up solenoid terminal SL, may also be known as solenoid No. 3 (SOL 3) terminal.

1) Access ECT ECU. See Figs. 1-8. Using ohmmeter, check resistance between terminal SL and body ground with connector removed from ECT ECU. See Figs. 27-29.

2) Resistance should be 11-15 ohms. If resistance is okay, replace ECT ECU. If resistance is not within specification, disconnect electrical connector at lock-up solenoid.

3) Check resistance between electrical terminal on lock-up solenoid and body ground. Replace lock-up solenoid if resistance is not 11-15 ohms. If resistance is 11-15 ohms, inspect and repair wiring between lock-up solenoid and ECT ECU.

TRANSMISSION SHIFT TESTING

MANUAL SHIFTING TEST

NOTE: Perform manual shifting test if no fault codes exist. Manual shifting test determines if problem area is in electrical circuits or a mechanical transmission problem.

1) With ignition off, disconnect electrical connector from solenoids on transmission. Electrical connector is located near neutral start switch on transmission.

2) Road test vehicle and ensure transmission gear changes corresponds with shift lever position. See GEAR APPLICATION table. If abnormality exists, a mechanical transmission problem exists.

3) If all gears are correct, perform trouble shooting in accordance with the symptom. See SYMPTOM TROUBLE SHOOTING. Turn ignition off.

4) Reconnect electrical connector. Clear fault codes from ECU memory. See CLEARING FAULT CODES.

GEAR APPLICATION

Shift Lever Position	Transmission Gear
D	Overdrive
2	3rd Gear
L	1st Gear
R	Reverse
P	Park

TORQUE CONVERTER LOCK-UP

NOTE: Refer to appropriate SHIFT SPEED SPECIFICATION table in the appropriate AUTO TRANS OVERHAUL article for lock-up shift speed. Refer to the following:

- * For A-241E, A-241H, A241L & A-243E transaxles, see:
AUTO TRANS OVERHAUL - A-241E/H/L & A-243E
- * For A-240E, A-240L, A244L & A-245E transaxles, see:
AUTO TRANS OVERHAUL - A-240E/L, A-244L & A-245E

Road test vehicle. Increase vehicle speed until lock-up should occur. To confirm lock-up operation, very lightly depress brake pedal with left foot and release while maintaining constant speed. Monitor vehicle tachometer. Torque converter should release and then return to lock-up once brake pedal is released.

SYMPTOM TROUBLE SHOOTING

NOTE: If problem area is not listed under symptom trouble shooting, check throttle position sensor signal, brake signal, gear signal and ECT ECU voltages.

TRANSMISSION WILL NOT SHIFT

1) Warm engine to normal operating temperature. Connect voltmeter between terminals TT and E1 of DLC1 connector. Refer to the Figs. 10-11. Turn ignition on. Note that voltage changes as throttle pedal is depressed.

2) If voltage changes with throttle opening, go to step 6). If voltage does not change with throttle opening, go to next step. Access ECT ECU. See Figs. 1-8.

3) Connect voltmeter between terminals B/K and E1 on ECT ECU connector. See Figs. 21. No voltage should exist with brake pedal released. Approximately 10-14 volts should exist with brake pedal depressed.

4) If voltage is not as specified, check for defective brakelight switch. If brakelight switch is okay, inspect and repair circuit between brakelight switch and ECT ECU. See appropriate wiring diagram in WIRING DIAGRAMS.

5) If voltage is as specified, check for defective ECT ECU power source or ground connections. Check for short or open circuit in wire to TT terminal of DLC connector. Check for defective throttle position sensor or wiring. See THROTTLE POSITION SENSOR under COMPONENT TESTING.

6) Perform MANUAL SHIFTING TEST under TRANSMISSION SHIFT TESTING. If transmission does not perform correctly, disassemble and inspect transmission. If transmission operates correctly, road test vehicle and ensure voltage at terminal TT increases from zero to 7 volts. See GEAR SIGNAL under INPUT & OUTPUT SIGNAL TESTING.

7) If no voltage exists, go to step 9). If voltage increases from zero to 7 volts, transmission or solenoids are faulty. If voltage increases from zero to 4 volts, perform NO UPSHIFT TO OVERDRIVE under SYMPTOM TROUBLE SHOOTING.

8) If voltage increases from zero to 2 volts, check for 10-14 volts between terminals 2 and E1 on ECT ECU with connector connected and shift lever in "D" position. See Fig. 21. If 10-14 volts exist, check for defective park/neutral position switch. If switch is okay, inspect and repair circuit(s) between switch and ECT ECU. See appropriate wiring diagram in WIRING DIAGRAMS. If 10-14 volts does not

exist, replace ECT ECU.

9) Check for 10-14 volts between terminals "L" and E1 on the ECT ECU with the connector connected and shift lever in "D" position. See Fig. 21. If 10-14 volts exist, check for defective park/neutral position switch. If switch is okay, inspect and repair circuit(s) between switch and ECT ECU. Refer to the appropriate wiring diagram in WIRING DIAGRAMS. If 10-14 volts do not exist, replace ECT ECU.

SHIFT POINTS TOO HIGH OR LOW

1) Warm engine to normal operating temperature. Connect voltmeter between terminals TT and E1 of DLC1 connector. Refer to the Figs. 10-11.

2) Turn ignition on. Depress and release throttle pedal. Note if voltage changes with throttle opening. If voltage changes with throttle opening, go to step 6). If voltage does not change with throttle opening, go to next step.

3) Access ECT ECU. See Figs. 1-8. Connect voltmeter between terminals B/K and E1 on ECT ECU with connector connected. See Fig. 21.

4) No voltage should exist with brake pedal released. Approximately 10-14 volts should exist with brake pedal depressed. If voltage is not as specified, check for defective brakelight switch or wiring circuit.

5) If voltage is as specified, check for defective ECT ECU power source or ground connections. See appropriate wiring diagram in WIRING DIAGRAMS. Check for short or open circuit in wire to TT terminal of DLC connector. See THROTTLE POSITION SENSOR SIGNAL under INPUT & OUTPUT SIGNAL TESTING and the appropriate wiring diagram under WIRING DIAGRAMS. Check for defective throttle position sensor or wiring.

6) On 1993 Celica, connect voltmeter between terminals P and E1 on ECT ECU with connector connected. See Figs. 21. Check voltage with pattern select switch in POWER (depressed) and NORMAL (released) operating positions (if applicable).

7) Voltage should be 10-14 volts with switch in POWER position and one volt with switch in NORMAL position. If voltage is as specified, ECT ECU or transmission is defective. If voltage is not as specified, check for defective pattern select switch or wiring circuit. See PATTERN SELECT SWITCH under COMPONENT TESTING.

NO UPSHIFT TO OVERDRIVE

1) Warm engine to normal operating temperature. With ignition off, disconnect solenoid harness connector from transmission. Electrical connectors are located near park/neutral position switch on transmission.

2) Road test vehicle and note if transmission upshifts to overdrive. Reconnect harness connector. Clear codes from ECU memory, as disconnecting electrical connectors may set codes. Refer to CLEARING FAULT CODES. If no overdrive upshift exists, disassemble and inspect transmission. If overdrive upshift exists, go to next step.

3) Connect voltmeter between terminals TT and E1 of DLC connector. See Figs. 10-11. Road test vehicle and ensure voltage at terminal TT increases from zero to 7 volts. See GEAR SIGNAL under INPUT & OUTPUT SIGNAL TESTING.

4) If no voltage exists, check for 10-14 volts between terminals L and E1 on ECT ECU with the connector connected, the shift lever in the "D" position and with ignition on. See Fig. 21. If 10-14 volts exist, check for defective park/neutral position switch. Refer to PARK/NEUTRAL POSITION (PNP) SWITCH under COMPONENT TESTING.

5) If switch is okay, inspect and repair circuit(s) between switch and ECT ECU. See appropriate wiring diagram in WIRING DIAGRAMS. If 10-14 volts does not exist, replace ECT ECU.

6) If voltage increases from zero to 2 volts, check for 10-14 volts between terminals 2 and E1 on ECT ECU with connector connected, shift lever in "D" position and ignition on.

7) If 10-14 volts exist, check for defective park/neutral position switch. If switch is okay, inspect and repair circuit(s) between switch and ECT ECU. See appropriate wiring diagram in WIRING DIAGRAMS. If 10-14 volts does not exist, replace ECT ECU.

8) If voltage increases from zero to 7 volts between terminals L and E1, solenoids may be faulty. See SOLENOIDS under COMPONENT TESTING. If solenoids are okay, disassemble and inspect transmission. If voltage increases from zero to 4 volts between terminals L and E1, connect voltmeter between terminals OD2 and E1 on ECT ECU with connector connected. See Fig. 21.

9) Turn ignition on. Check voltage with OD switch on the shift lever released (OFF position) and depressed (ON position). No voltage should exist with switch released and 10-14 volts should exist with switch depressed.

10) If voltage is correct, go to next step. If voltage is not as specified, check for defective OD switch or wiring circuit.

11) Check voltage between terminals OD1 and E1 on ECT ECU with connector connected and ignition on. Voltage should be approximately 5 volts. If voltage is correct, replace ECT ECU. If voltage is not correct, go to next step.

12) Disconnect electrical connector from cruise control ECU. See Figs. 1-8. Check voltage between terminals OD1 and E1 on ECT ECU with connector connected and with ignition on. If voltage is approximately 5 volts, replace cruise control ECU. If voltage is not within specification 5 volts, inspect and repair circuit(s) between cruise control ECU and ECT ECU. See appropriate wiring diagram in WIRING DIAGRAMS. If wiring is okay, replace ECT ECU.

NO LOCK-UP

1) Warm engine to normal operating temperature. Connect voltmeter between terminals TT and E1 of DLC connector. Refer to the Figs. 10-11.

2) Road test vehicle and ensure voltage at terminal TT is 7 volts in lock-up range. See GEAR SIGNAL under INPUT & OUTPUT SIGNAL TESTING. If voltage is correct, lock-up solenoid, torque converter or transmission is defective.

3) If voltage is not as specified, access ECT ECU. Refer to the Figs. 1-8. Connect voltmeter between terminals B/K and E1 on ECT ECU with connector connected. See Fig. 21.

4) No voltage should exist with brake pedal released. Approximately 10-14 volts should exist with brake pedal depressed. If voltage is not as specified, check for defective brakelight switch or wiring circuit.

5) If voltage is as specified, check for defective ECT ECU power source or ground connections. See appropriate wiring diagram in WIRING DIAGRAMS. Check for short or open circuit in wire to TT terminal of check connector. Check for defective throttle position sensor or wiring. Refer to THROTTLE POSITION SENSOR (TPS) under COMPONENT TESTING.

INPUT & OUTPUT SIGNAL TESTING

NOTE: All voltage checks are made with ignition switch in ON position unless otherwise stated.

THROTTLE POSITION SENSOR SIGNAL

1) Locate DLC1 connector in engine compartment. Refer to the

Figs. 10-11. Connect voltmeter between terminals TT and E1 of DLC connector. See Figs. 10-11.

2) Turn ignition on. Note that voltage gradually increases as accelerator is depressed. Voltage should gradually increase to about 6 volts with throttle fully open.

3) If voltage does not change with throttle opening, check throttle position sensor. See THROTTLE POSITION SENSOR (TPS) under COMPONENT TESTING. If throttle position sensor is okay, check wiring circuit for throttle position sensor.

BRAKE SIGNAL

1) Locate check connector in engine compartment. Refer to the Figs. 1-2. Connect voltmeter between terminals TT and E1 of check connector. See Figs. 7-8.

2) Depress accelerator pedal until 6 volts exists. Depress brake pedal and note that voltage decreases to no voltage. Release brake pedal and note that voltage increases to 6 volts.

3) If voltage is not as specified, check brakelight switch. See BRAKELIGHT SWITCH under COMPONENT TESTING. If brakelight switch is okay, check wiring circuit for brakelight switch.

GEAR SIGNAL

1) Warm engine to normal operating temperature. On Celica models, place pattern select switch in NORMAL (released position). Pattern select switch is located near shift lever.

2) On all models, depress OD switch, mounted on shift lever, to the ON position. Locate check connector in engine compartment. See Figs. 1-2. Connect voltmeter between terminals TT and E1 of check connector. See Figs. 10-11.

3) Road test the vehicle with the shift lever in the "D" position and with vehicle speed greater than 6 MPH. Voltage should increase as specified in accordance with transmission gear position. See the GEAR SIGNAL VOLTAGES table.

4) If voltages are as specified, electronic control system is operating correctly. If voltages are not as specified, system must be checked.

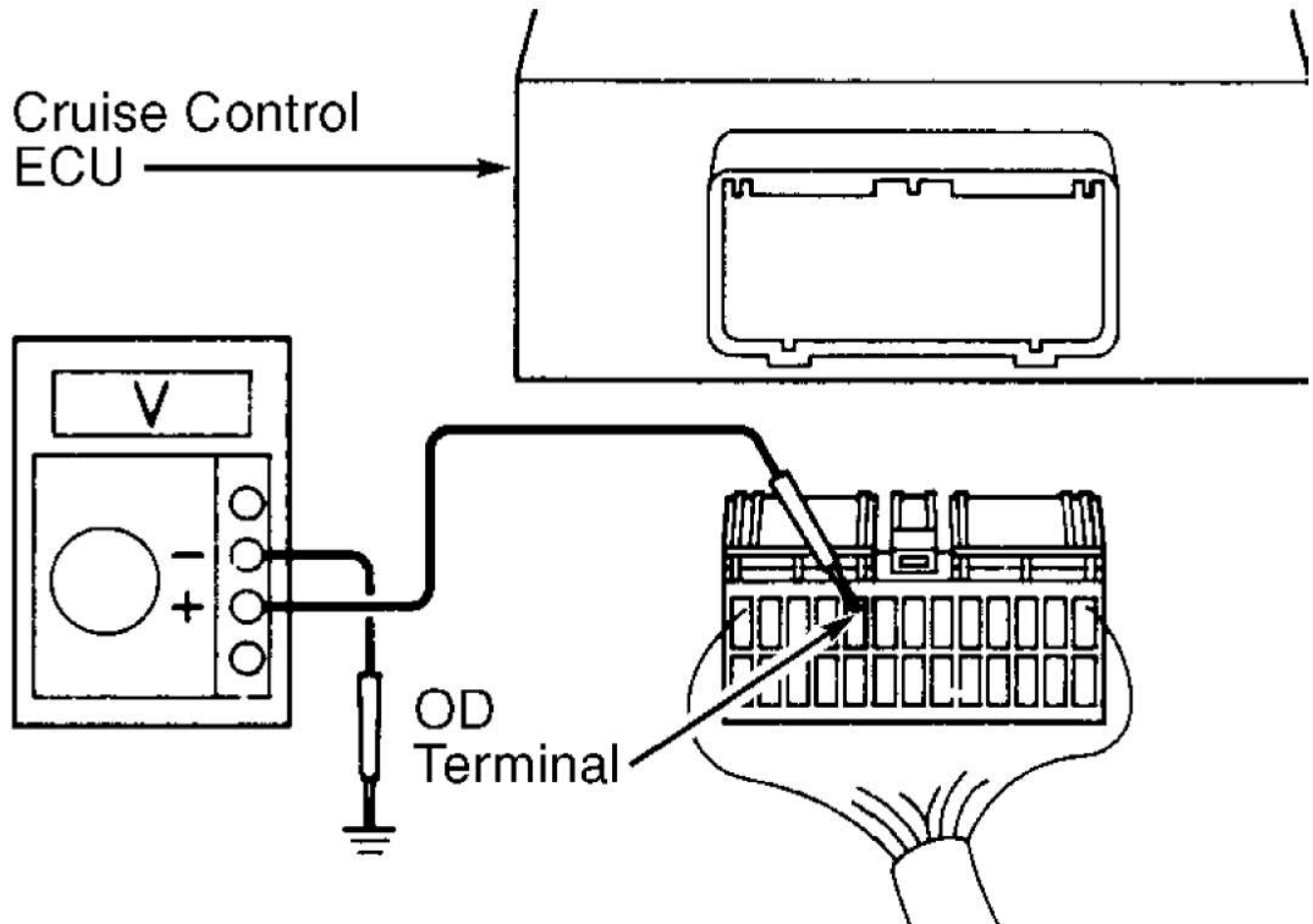
GEAR SIGNAL VOLTAGES

Gear Position		Voltage (Approximate)
1st Gear	.....	0
2nd Gear	.....	2
3rd Gear	.....	4
Overdrive	.....	6
Overdrive With Lock-Up	.....	7

OVERDRIVE CANCEL SIGNAL

1) Access ECT ECU. See Figs. 1-8. Turn ignition on. Measure voltage (backprobe) between terminal OD1 of ECT ECU harness connector and ground. If battery voltage is present, substitute known good ECU and retest. If battery voltage is not present, go to next step.

2) Turn ignition off. Disconnect cruise control ECU harness connector. See Figs. 1-8. Turn ignition on. Measure voltage between terminal OD and ground. See Fig. 22. If battery voltage is present, replace cruise control ECU and retest. If battery voltage is not present, inspect and repair circuit between cruise control ECU and ECT ECU.



95J19389

Fig. 22: Cruise Control ECU Terminals
Courtesy of Toyota Motor Sales, U.S.A., Inc.

ECT ECU VOLTAGES

Access ECT ECU. See Figs. 1-8. Turn ignition on. Using voltmeter, backprobe ECT ECU harness connector. Check voltage between selected terminal and E1 or E2 terminal. Voltage should be as specified. See Fig. 21.

COMPONENT TESTING

SOLENOIDS COMPONENT TEST

NOTE: Lock-up solenoid terminal SL, may also be referred to as solenoid No. 3 (SOL 3) terminal.

1) Access ECT ECU. See Figs. 1-8. Ensure ignition is off. Disconnect ECT ECU harness connector. Using ohmmeter, measure resistance between SL, S1 and S2 terminal and ground for appropriate proper solenoid. See Fig. 21.

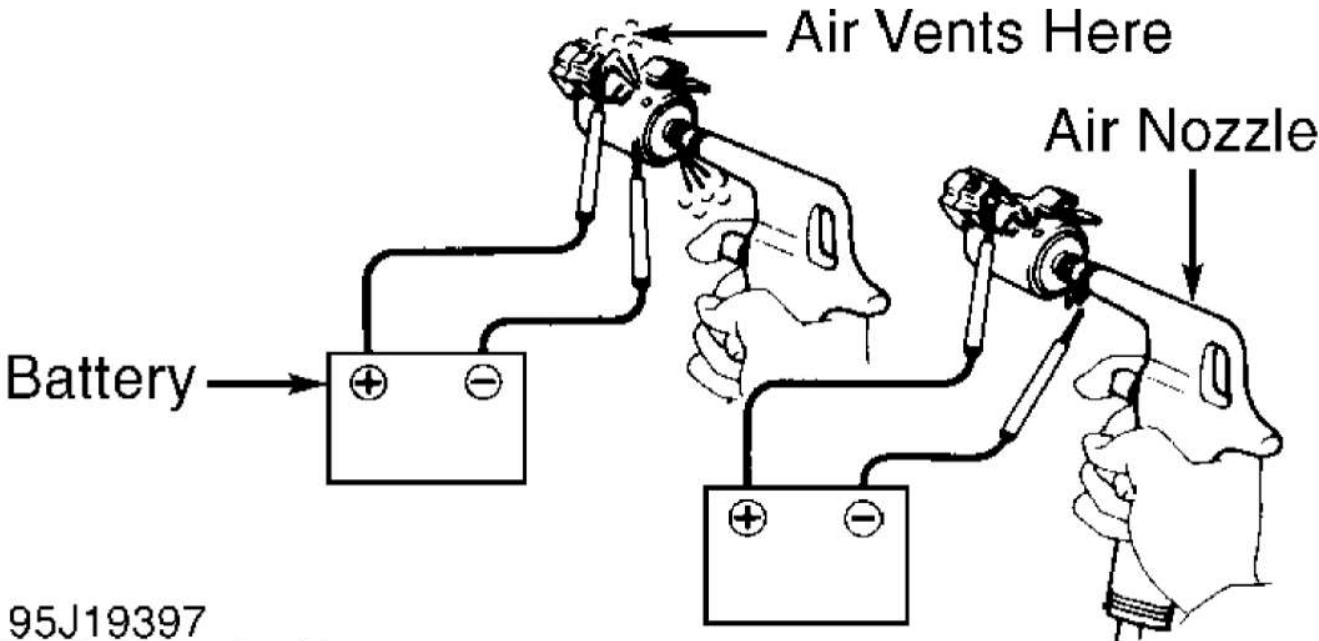
2) Replace solenoid if resistance is not 11-15 ohms. To check solenoid operation, apply battery voltage to SL, S1 or S2 terminal of ECT ECU connector for appropriate solenoid. Ensure operating sound can

be heard when battery voltage is connected. Replace solenoid if operating sound cannot be heard.

3) To check solenoid seals, remove suspect solenoid. Connect battery voltage to solenoid. Apply 71 psi (5 kg/cm²) to solenoid with battery voltage connected. See Fig. 23.

4) With battery voltage applied, air should pass through solenoid No. 1 and 2 solenoids. Disconnect voltage to solenoid. Ensure air does not pass through solenoid. Replace solenoid if defective.

5) With battery voltage applied, air should not pass through lock-up solenoid. Disconnect voltage to solenoid. Ensure air passes through solenoid. Replace solenoid if defective.

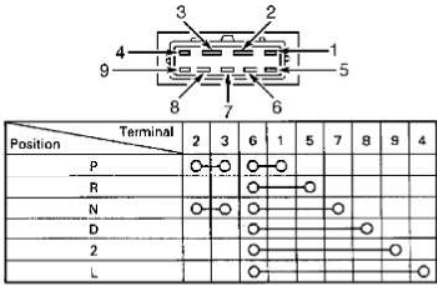


95J19397

Fig. 23: Checking Solenoids
Courtesy of Toyota Motor Sales, U.S.A., Inc.

PARK/NEUTRAL POSITION (PNP) SWITCH COMPONENT TEST

Disconnect harness connector at park/neutral position switch. Switch is located on side of transmission. Using ohmmeter, check for continuity between specified terminals in accordance with shift lever position. See Figs. 24-26. Replace PNP switch if defective.



95F19393

Fig. 24: Testing Park/Neutral Position Switch
(1993 Celica, MR2 & Paseo)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

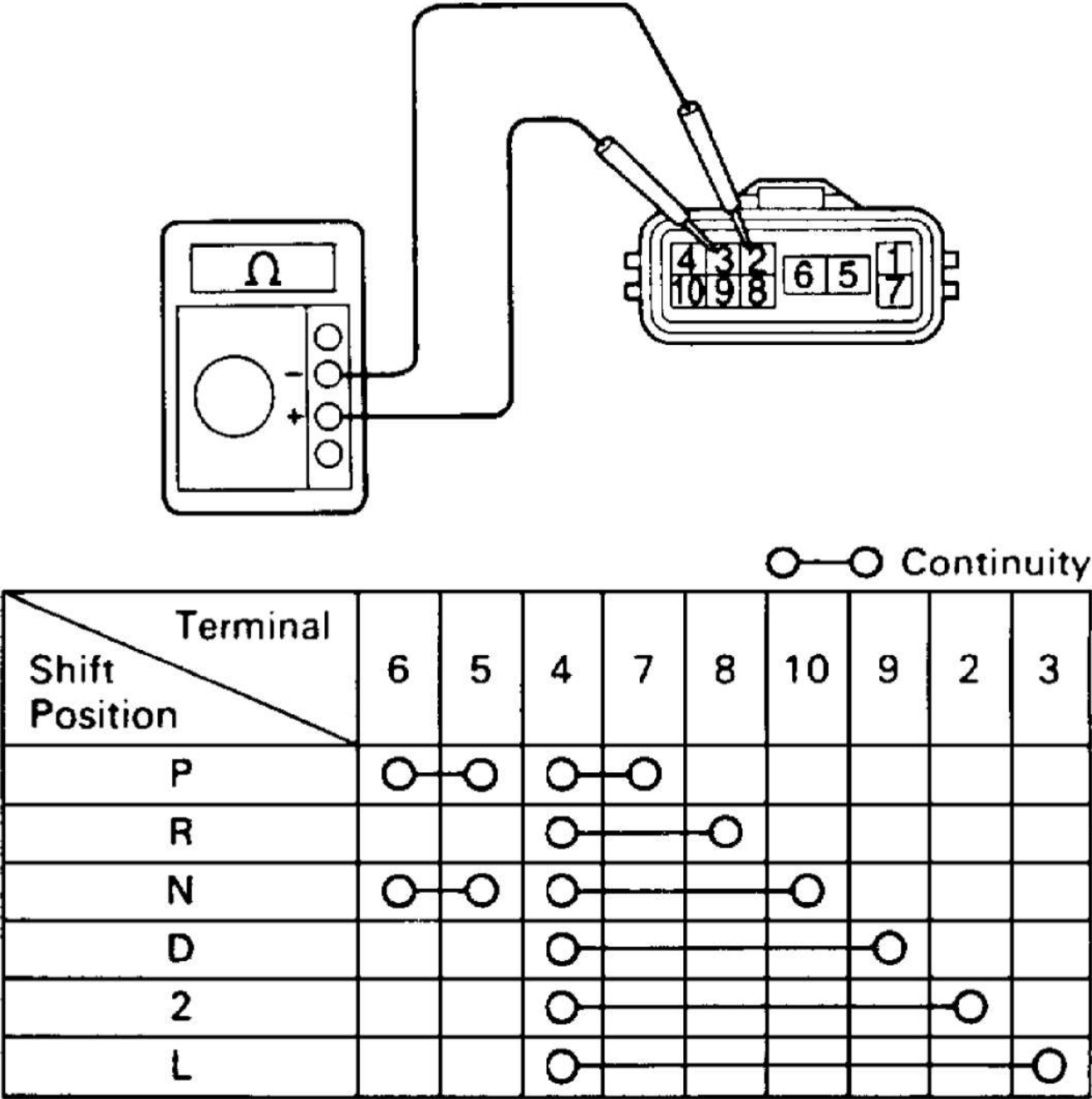
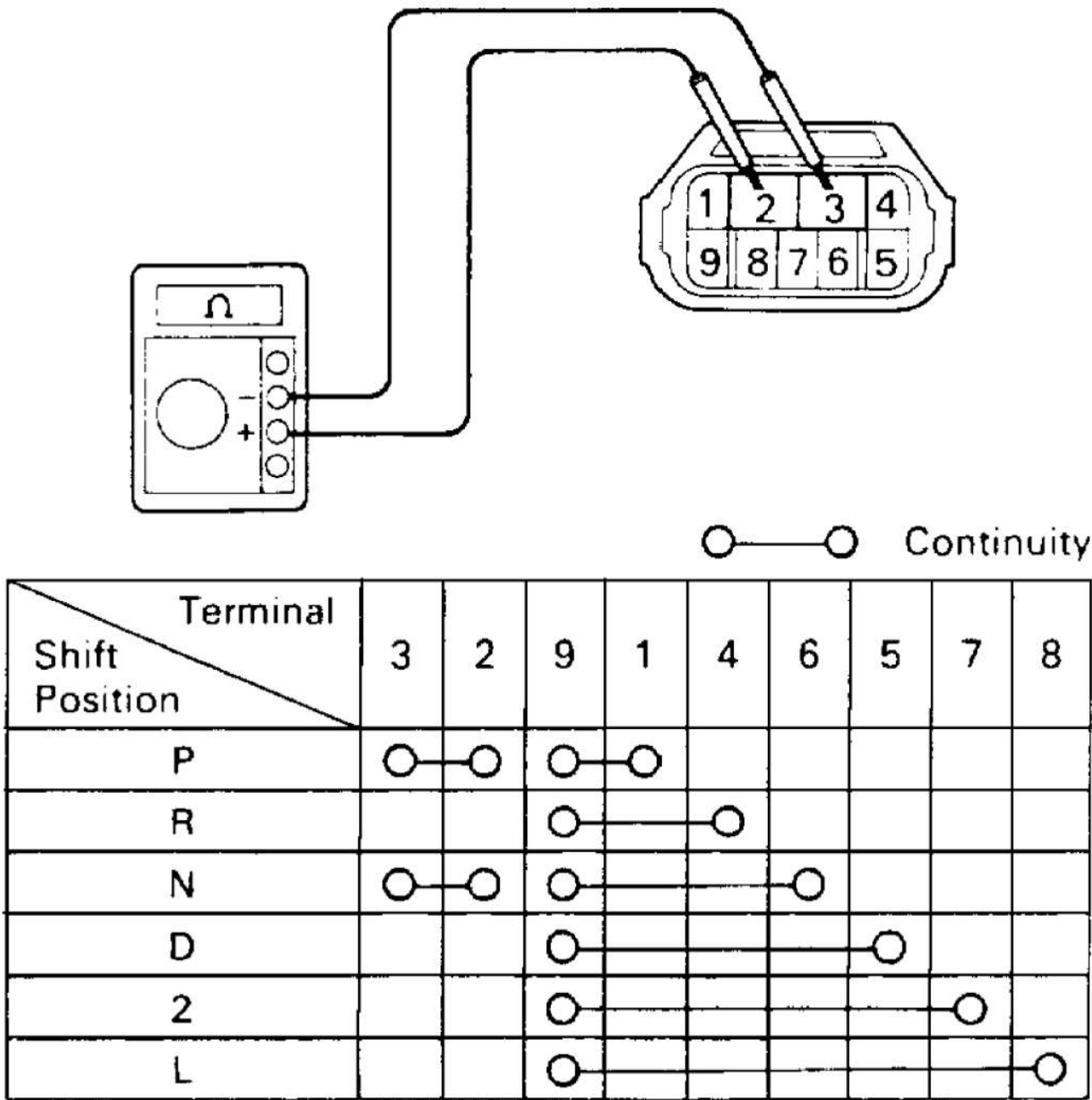


Fig. 25: Testing Park/Neutral Position Switch
(1994 Celica & Prizm)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

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Fig. 26: Testing Park/Neutral Position Switch (Corolla)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

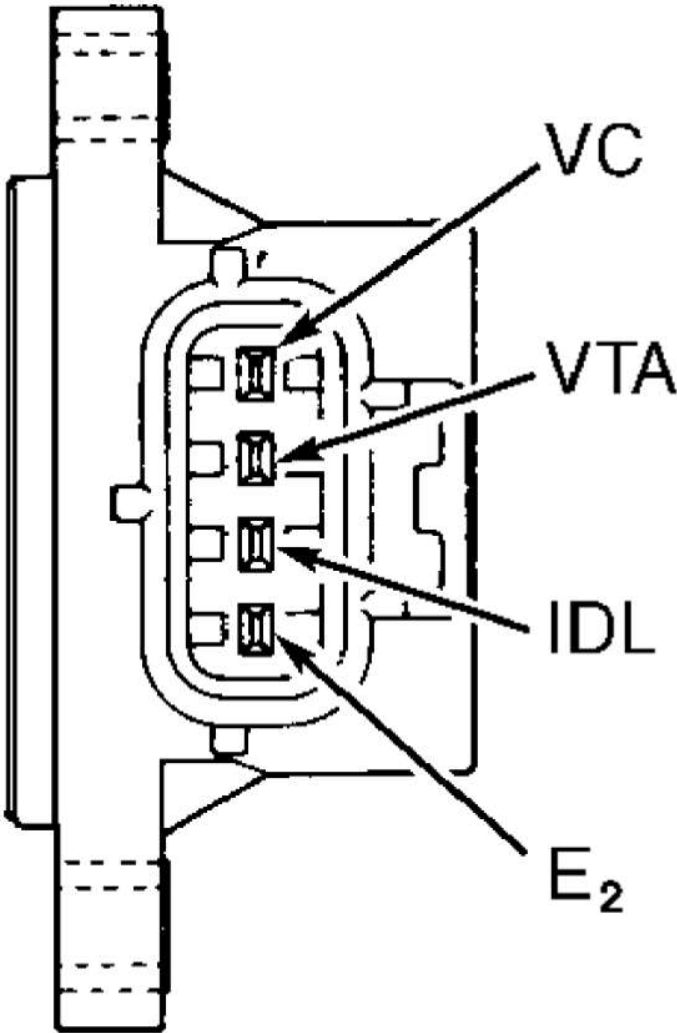
THROTTLE POSITION SENSOR (TPS) COMPONENT TEST

- 1) Disconnect electrical connector at TPS, located on side of throttle body. Note TPS terminal identification. See Fig. 27.
- 2) Using an ohmmeter, check resistance between specified terminals in relation to specific throttle position(s). Refer to the TPS RESISTANCE SPECIFICATIONS table. Replace TPS if resistance is not

as specified.

TPS RESISTANCE SPECIFICATIONS

Terminals	Ohms
IDL & E2	
Throttle Fully Closed	0-100
Throttle Fully Open	Infinity
VC & E2	3000-7000
VTA & E2	
Throttle Fully Closed	200-800
Throttle Fully Open	3200-10,000



93C24150

Fig. 27: Throttle Position Sensor (TPS) Terminals
Courtesy of Toyota Motor Sales, U.S.A., Inc.

NO. 1 SPEED SENSOR COMPONENT TEST

1993 Celica & Paseo

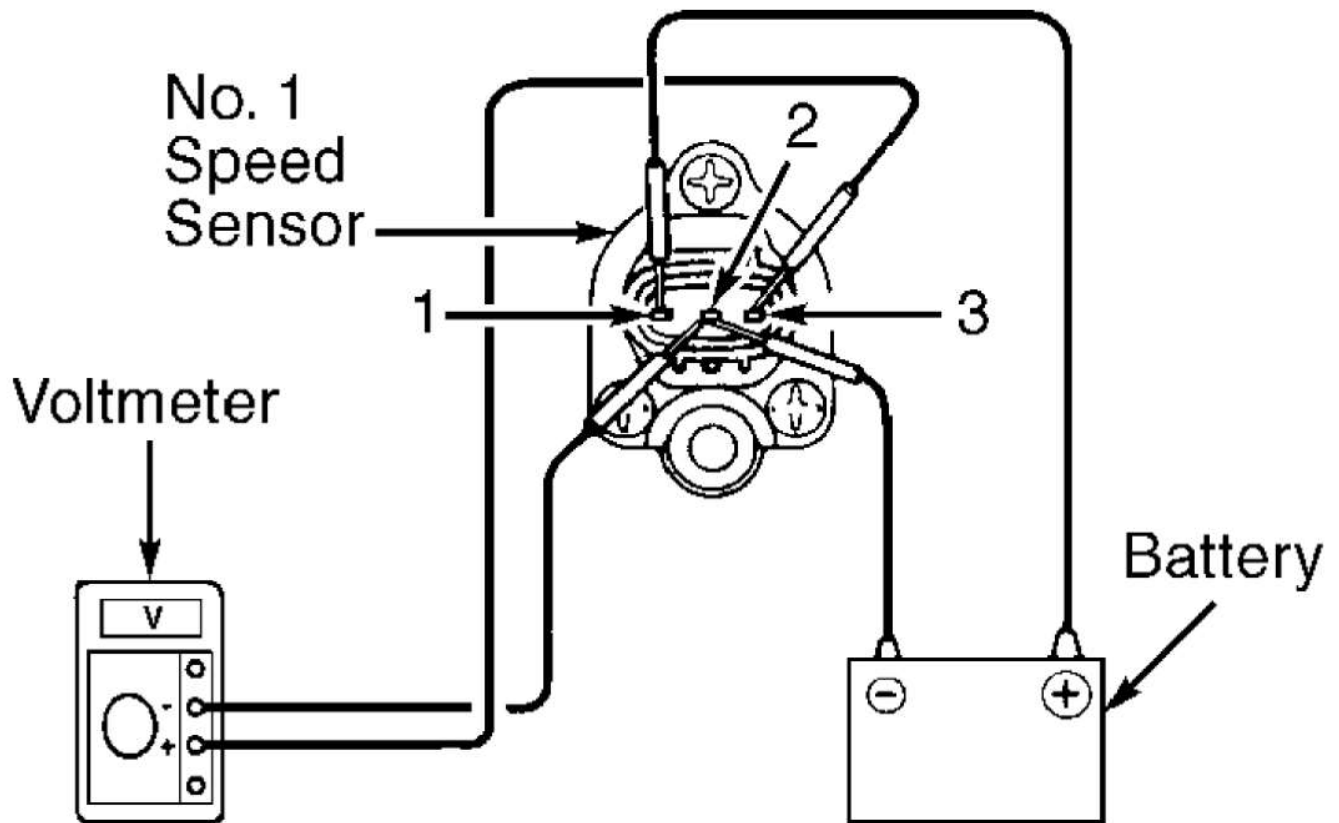
1) Remove instrument panel. Connect ohmmeter between terminals on rear of instrument panel. See Figs. 14-15.

2) Rotate speedometer cable shaft on instrument panel. Note that ohmmeter needle fluctuates from continuity to no continuity. If reading does not fluctuate correctly, replace speedometer or speed sensor as necessary.

1994 Celica, Corolla, MR2 & Prizm

1) Disconnect electrical connector from No. 1 VSS, located on top of transmission. See Figs. 1-8. Connect positive battery lead to terminal No. 1 and negative lead to terminal No. 2. Connect positive lead of voltmeter to terminal No. 3 and negative lead to terminal No. 2. See Fig. 28.

2) Rotate speedometer cable shaft on speed sensor. Ensure voltage changes from zero to 11 volts. Voltage should change 4 times per each revolution of speedometer cable shaft. Replace speed sensor if voltage does not change as specified.



93G24154

Fig. 28: Checking No. 1 Vehicle Speed Sensor
Courtesy of Toyota Motor Sales, U.S.A., Inc.

NO. 2 SPEED SENSOR COMPONENT TEST

1) Disconnect electrical connector from No. 2 speed sensor, located on transmission. Raise and support vehicle so front wheels can rotate. Connect ohmmeter between terminals of No. 2 speed sensor.

2) Rotate front wheel. Note that ohmmeter needle fluctuates

from continuity to no continuity. If reading does not fluctuate correctly, remove No. 2 speed sensor from transmission.

3) Connect ohmmeter between terminals of No. 2 speed sensor. Note that ohmmeter needle fluctuates from continuity to no continuity when shaft is rotated.

4) Replace speed sensor if reading does not fluctuate. If reading fluctuates correctly, components in transmission for speed sensor must be replaced.

PATTERN SELECT SWITCH (1993 CELICA ONLY) COMPONENT TEST

1) Disconnect electrical connector from pattern select switch, located near shift lever. See Figs. 1-2. Note terminal identification on pattern select switch. See Fig. 29.

2) Using ohmmeter, ensure continuity exists between terminals No. 2 and 3 with switch in POWER (depressed) position, and no continuity exists with switch in NORMAL (released) position. Replace switch if defective.

Terminal No. 2 Terminal No. 3

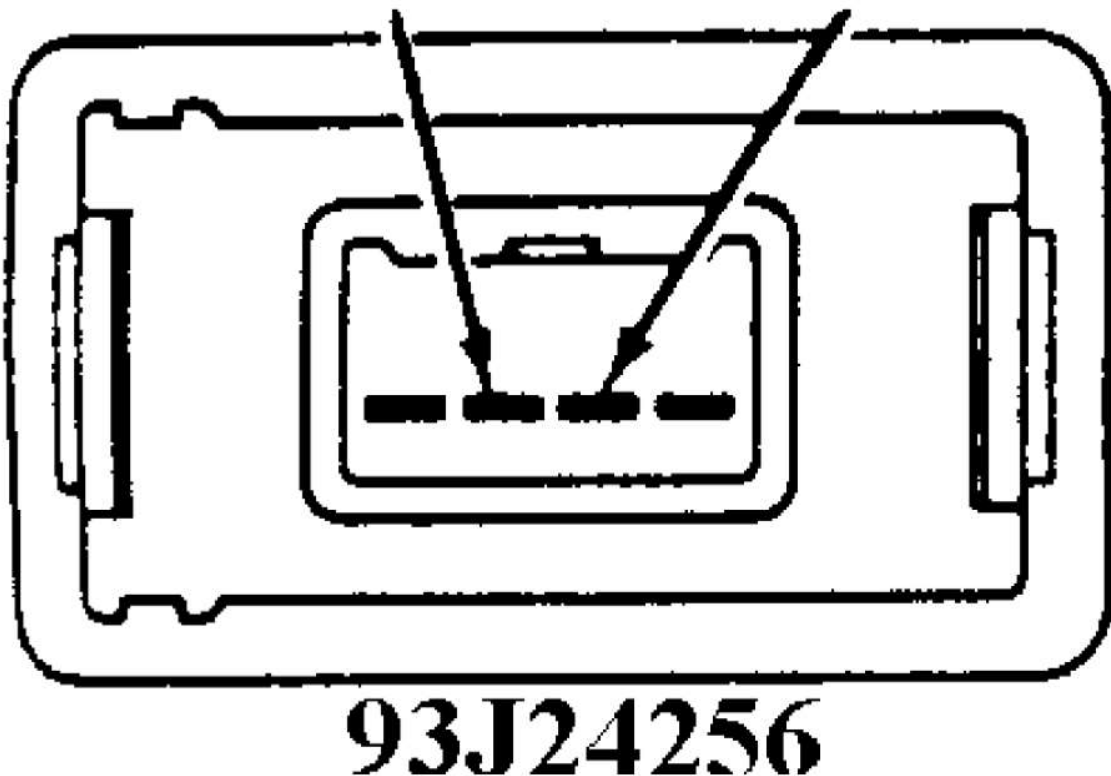


Fig. 29: Pattern Select Switch Terminals
Courtesy of Toyota Motor Sales, U.S.A., Inc.

OVERDRIVE (OD) SWITCH COMPONENT TEST

1) Disconnect electrical connector from OD switch, located on shift lever. Note terminal identification on OD switch. See Fig. 30.

2) Using ohmmeter, ensure continuity exists between terminals No. 1 and 3 with switch released (OFF position).

3) Ensure no continuity exists between terminals No. 1 and 3 with switch depressed (ON position). Replace switch if defective.

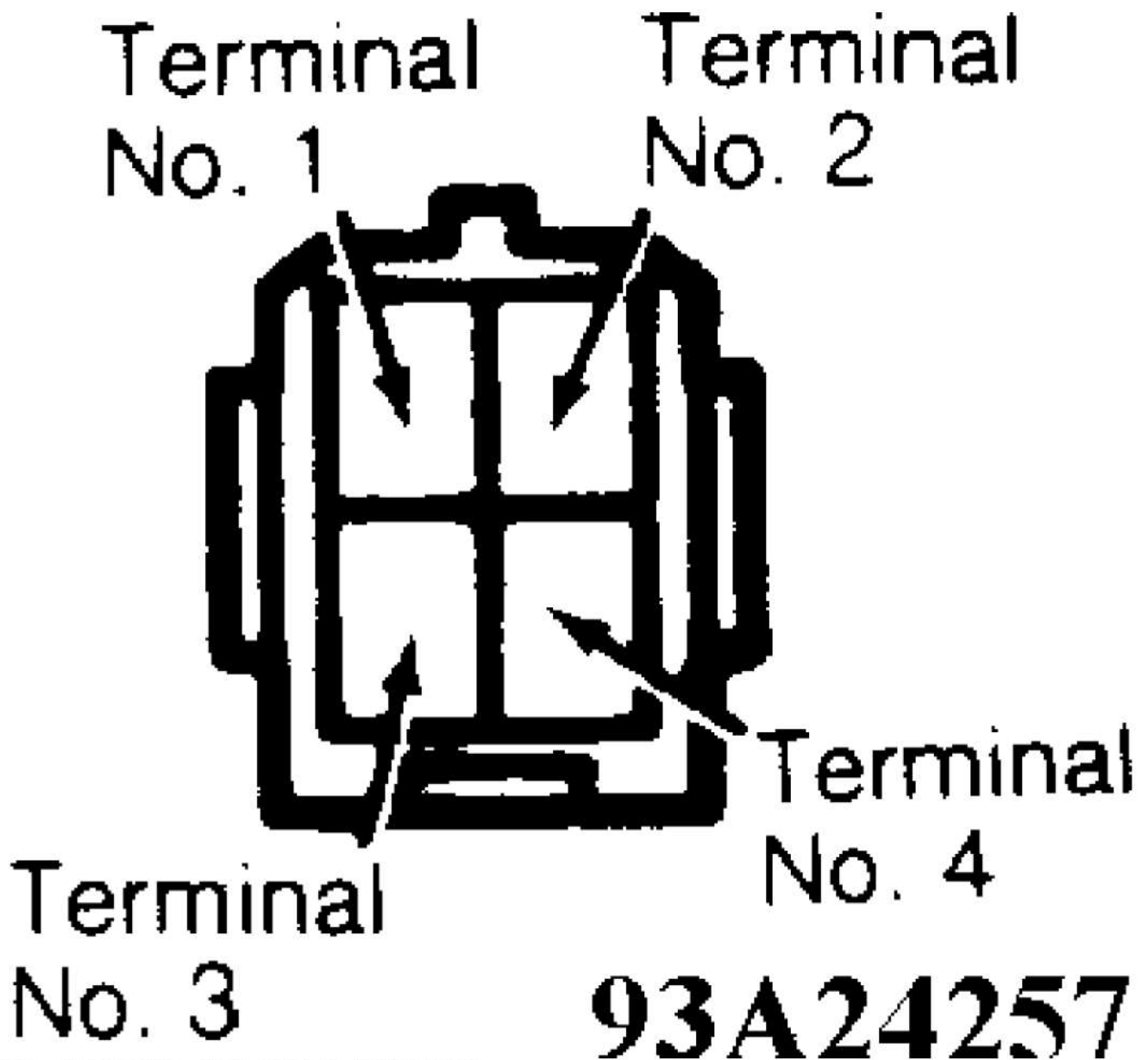


Fig. 30: Overdrive (OD) Switch Terminals
Courtesy of Toyota Motor Sales, U.S.A., Inc.

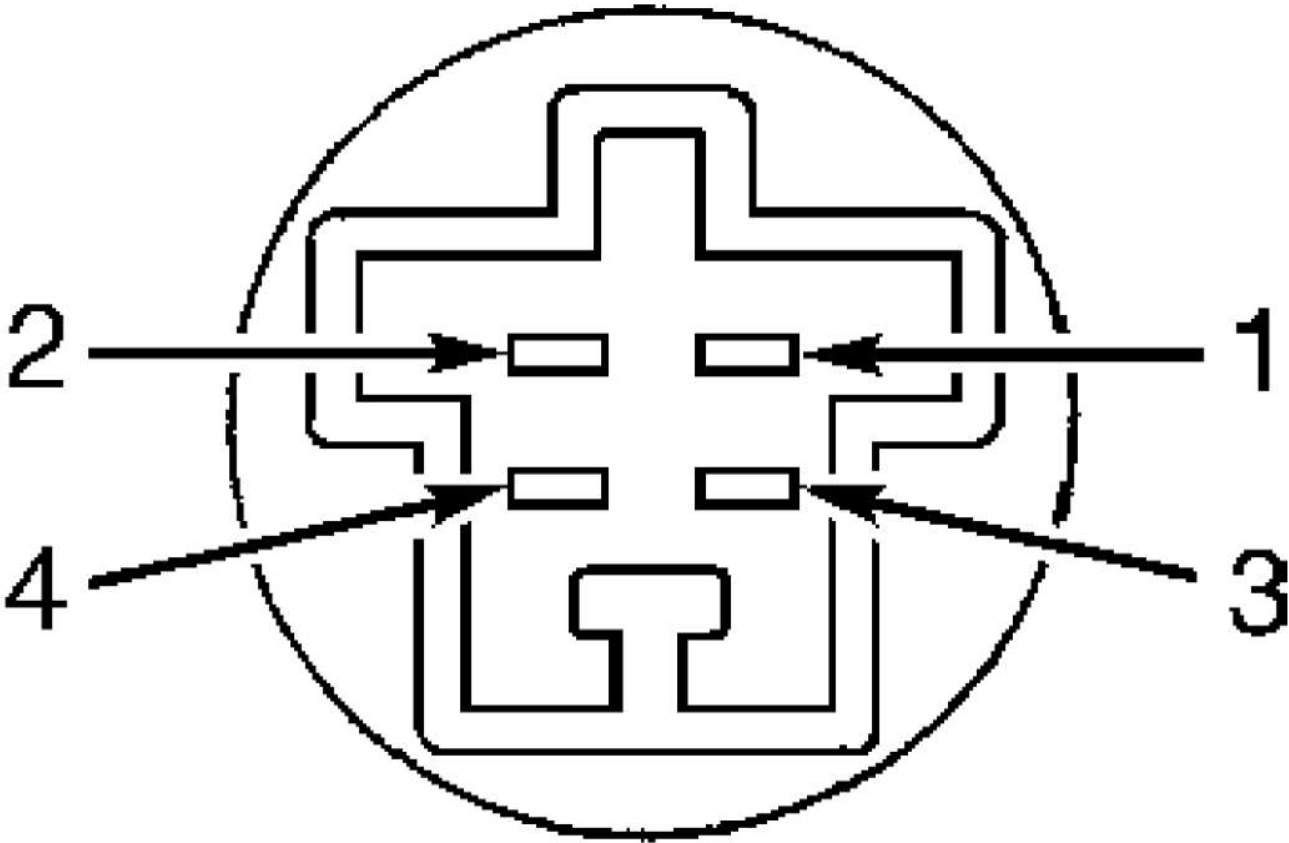
BRAKELIGHT SWITCH COMPONENT TEST

1) Disconnect electrical connector from brakelight switch, located near brake pedal. Note brakelight switch terminal identification. See Fig. 31.

2) Using ohmmeter, ensure no continuity exists between terminals No. 1 and 3 with brake pedal released. Replace brakelight switch if continuity exists.

3) Using ohmmeter, ensure continuity exists between terminals No. 1 and 3 with brake pedal depressed. If continuity does not exist, ensure brake pedal is properly adjusted so brakelight switch has proper travel for switch operation. If proper brakelight switch travel

exists, replace brakelight switch.



93E24160

Fig. 31: Brakelight Switch Terminals
Courtesy of Toyota Motor Sales, U.S.A., Inc.

COOLANT TEMPERATURE SENSOR (CTS) COMPONENT TEST

Disconnect electrical connector from CTS. See CTS LOCATION table. Using ohmmeter, check resistance between terminals of coolant temperature sensor. Resistance should be as specified in accordance with coolant temperature. See Fig. 32. Replace sensor if resistance is not within specification.

CTS LOCATION

Application	Location
Celica	
1993	Radiator
1994	Thermostat Housing
Corolla	Thermostat Housing
MR2	Radiator
Paseo	N/A
Prizm	Thermostat Housing

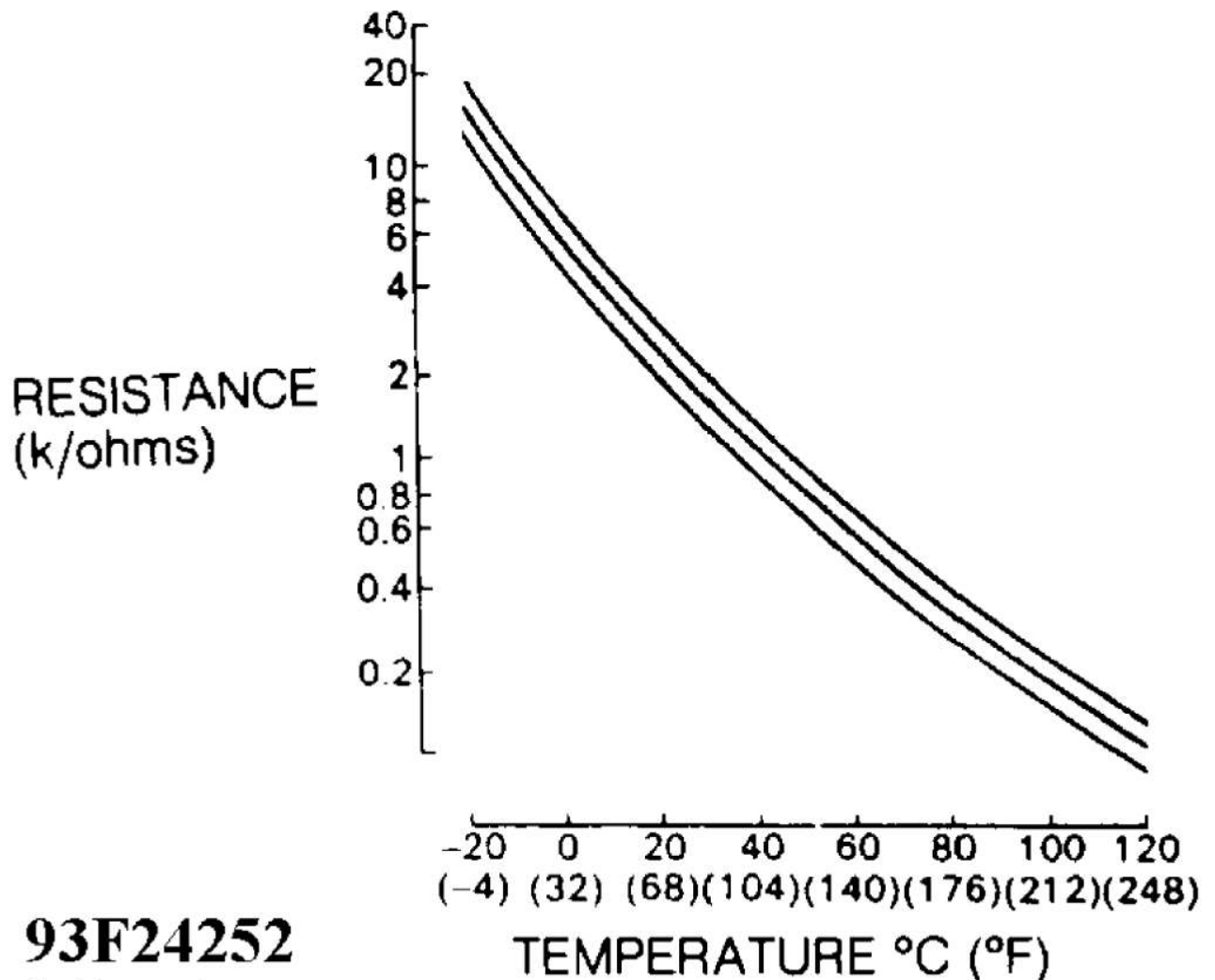


Fig. 32: Checking Coolant Temperature Sensor
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

REMOVAL & INSTALLATION

BRAKELIGHT SWITCH R & I

Removal & Installation

1) Disconnect electrical connector. Remove lock nut, and unscrew brakelight switch. To install, screw brakelight switch inward until brakelight plunger contacts brake pedal.

2) Install and tighten lock nut on brakelight switch. Install electrical connector. Ensure brakelights and cruise control (if equipped) operate properly.

COOLANT TEMPERATURE SENSOR (MR2) R & I

Removal

Coolant temperature sensor is located in radiator. Drain cooling system. Remove coolant temperature sensor.

Installation

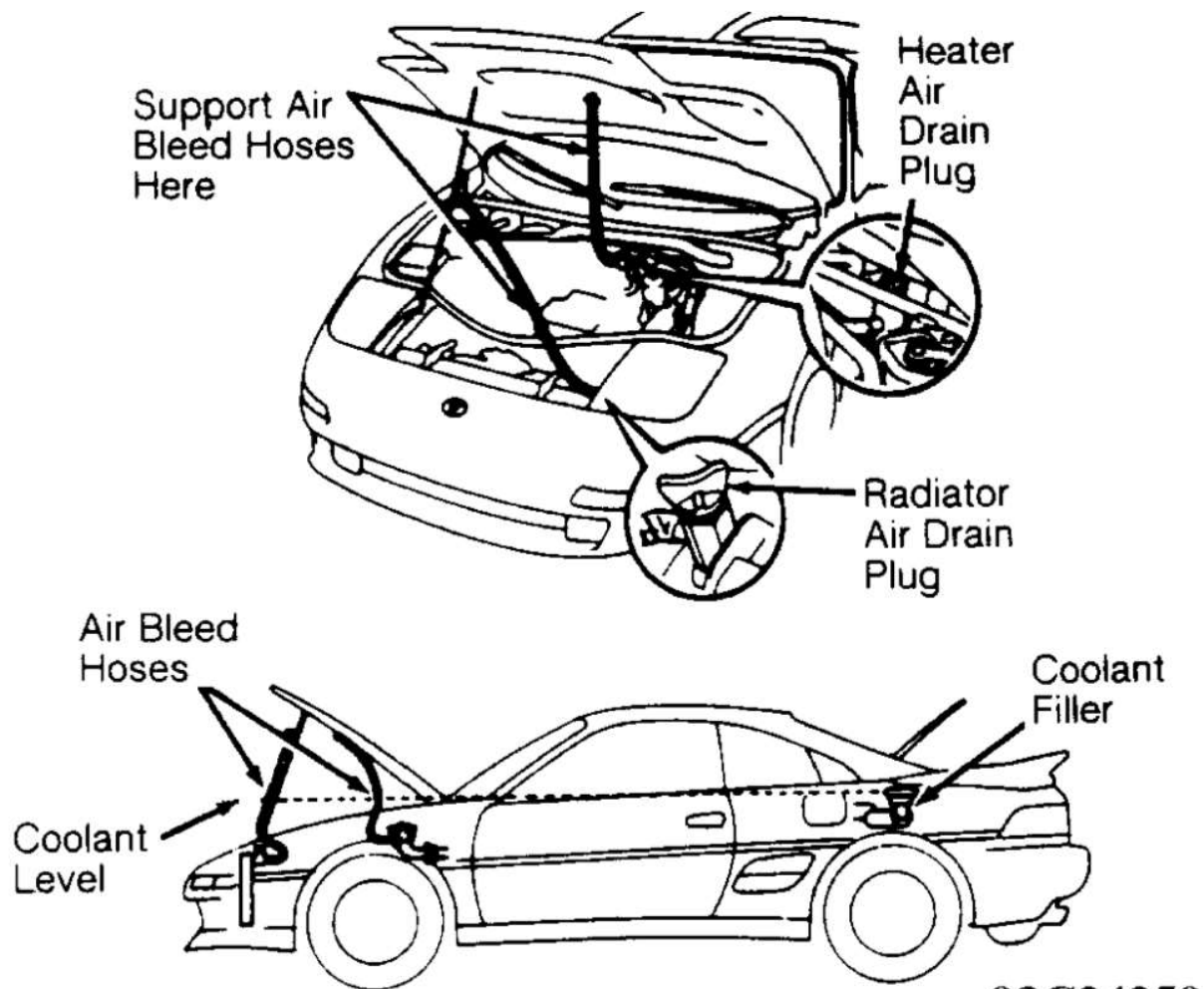
1) To install, reverse removal procedure. Proper cooling system bleeding procedure must be followed.

2) Remove spare tire, front luggage compartment trim and upper radiator support seal. Connect air bleed hoses to heater and radiator air drain plugs. Attach and support opposite end of hoses to hood or hood support. See Fig. 33. Ensure hoses are not pinched.

3) Place heater control lever on instrument panel to warmest position. Open heater and radiator air drain plugs at least 3 turns.

4) Slowly add coolant through coolant filler. Air will bleed from hoses on heater and radiator air drain plugs. Ensure coolant in air bleed hoses and coolant filler are at the same level.

5) If coolant level in air bleed hoses is lower than level in coolant filler, air still exists in cooling system. Check for pinched or restriction in air bleed hoses. If necessary, repeat step 4). When proper coolant level is obtained in air bleed hoses, close air drain plugs. Remove air bleed hoses.



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Fig. 33: Installing Air Bleed Hoses (MR2)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

SHIFT SOLENOIDS R & I

Removal & Installation

Solenoids are located on the valve body. Remove bolt, solenoid and "O" ring from valve body. To install, reverse removal procedure using NEW "O" ring.

PARK/NEUTRAL POSITION (PNP) SWITCH R & I

Removal

1) Neutral start switch is located on side of transmission. Remove lock nut, washer and manual lever from control shaft. Refer to the Figs. 34-35

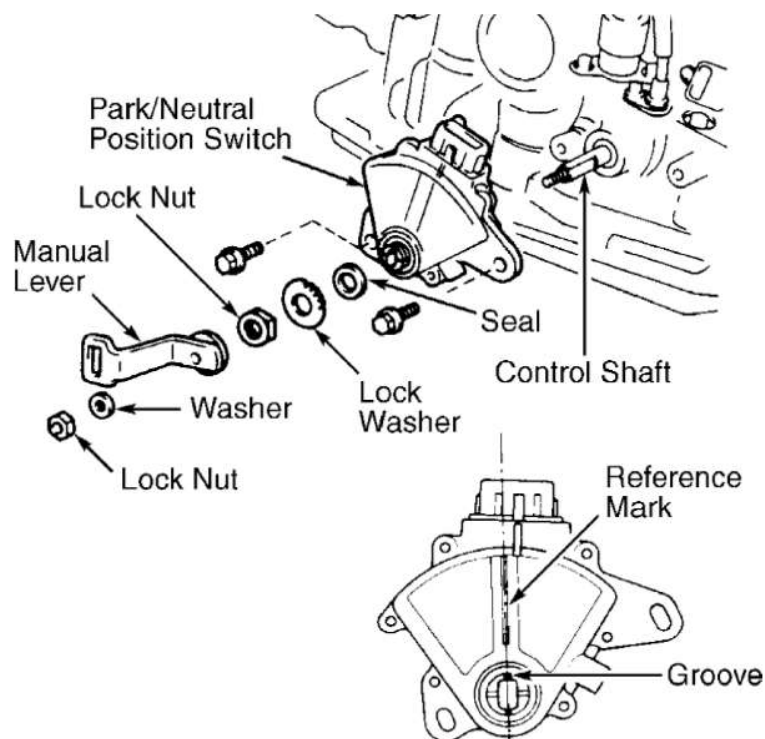
2) Bend up tabs on lock washer. Remove lock nut, lock washer and seal from control shaft. Remove retaining bolts and neutral start switch.

Installation

1) Install switch on control shaft. Loosely install neutral start switch retaining bolts. Install seal and lock washer. Install lock nut and tighten to specification. See TORQUE SPECIFICATIONS. Bend tabs on lock washer over against lock nut.

2) Ensure parking brake is applied. Temporarily install manual lever on control shaft. Place shift lever in Neutral. Remove manual lever. Rotate switch and align reference mark on PNP switch with groove. See Figs. 34-35

3) Hold neutral switch in this position. Tighten retaining bolts to specification. To install remaining components, reverse removal procedure.



93F24161

Fig. 34: Removing & Installing PNP Switch
Courtesy of Toyota Motor Sales, U.S.A., Inc.

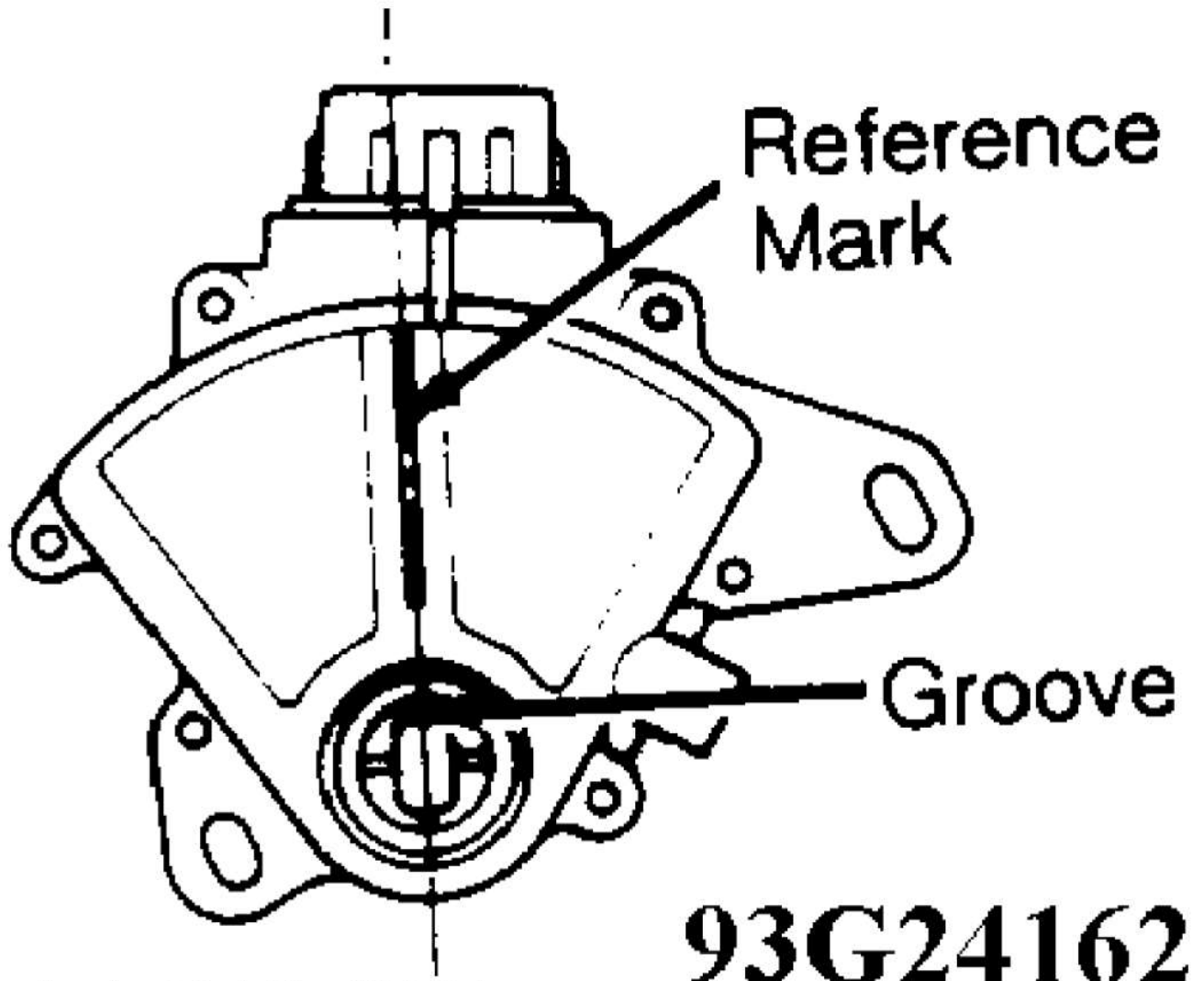


Fig. 35: Removing & Installing PNP Switch
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

OVERDRIVE (OD) SWITCH R & I

Overdrive (OD) switch is mounted on the shift lever.
 Replacement information not available from manufacturer.

PATTERN SELECT SWITCH R & I

Pattern select switch is located on center console.
 Replacement information not available from manufacturer.

THROTTLE POSITION SENSOR (TPS) R & I

Removal

Ensure ignition is off. Disconnect electrical connector from TPS. TPS is located on throttle body. Remove screws and TPS.

Installation

1) Install TPS on throttle body with screws loosely installed. TPS must be adjusted. Connect ohmmeter leads to IDL and E2

terminals of TPS. See Fig. 16.

2) Apply vacuum to throttle opener on valve body. Insert a .024" (.60 mm) feeler gauge between throttle stop screw and stop lever. Gradually rotate TPS until ohmmeter deflects, and tighten retaining screws.

3) Remove feeler gauge. Insert a .020" (.50 mm) feeler gauge between throttle stop screw and stop lever. Ensure continuity now exists between IDL and E2 terminals. Remove feeler gauge.

4) Insert a .028" (.70 mm) feeler gauge between throttle stop screw and stop lever. Ensure no continuity now exists between IDL and E2 terminals. Remove feeler gauge.

NO. 1 SPEED SENSOR R & I

The No. 1 speed sensor is mounted on rear of instrument panel. See Fig. 1. Replacement information not available from manufacturer.

NO. 2 SPEED SENSOR R & I

Removal

Disconnect electrical connector from No. 2 speed sensor, located on transmission. See Fig. 1. Remove bolt, retaining plate and No. 2 speed sensor. Remove "O" ring from No. 2 speed sensor.

Installation

To install, reverse removal procedure using NEW "O" ring. Coat "O" ring with ATF before installing No. 2 speed sensor. Tighten retaining bolt to specification. See TORQUE SPECIFICATIONS.

WIRING DIAGRAMS

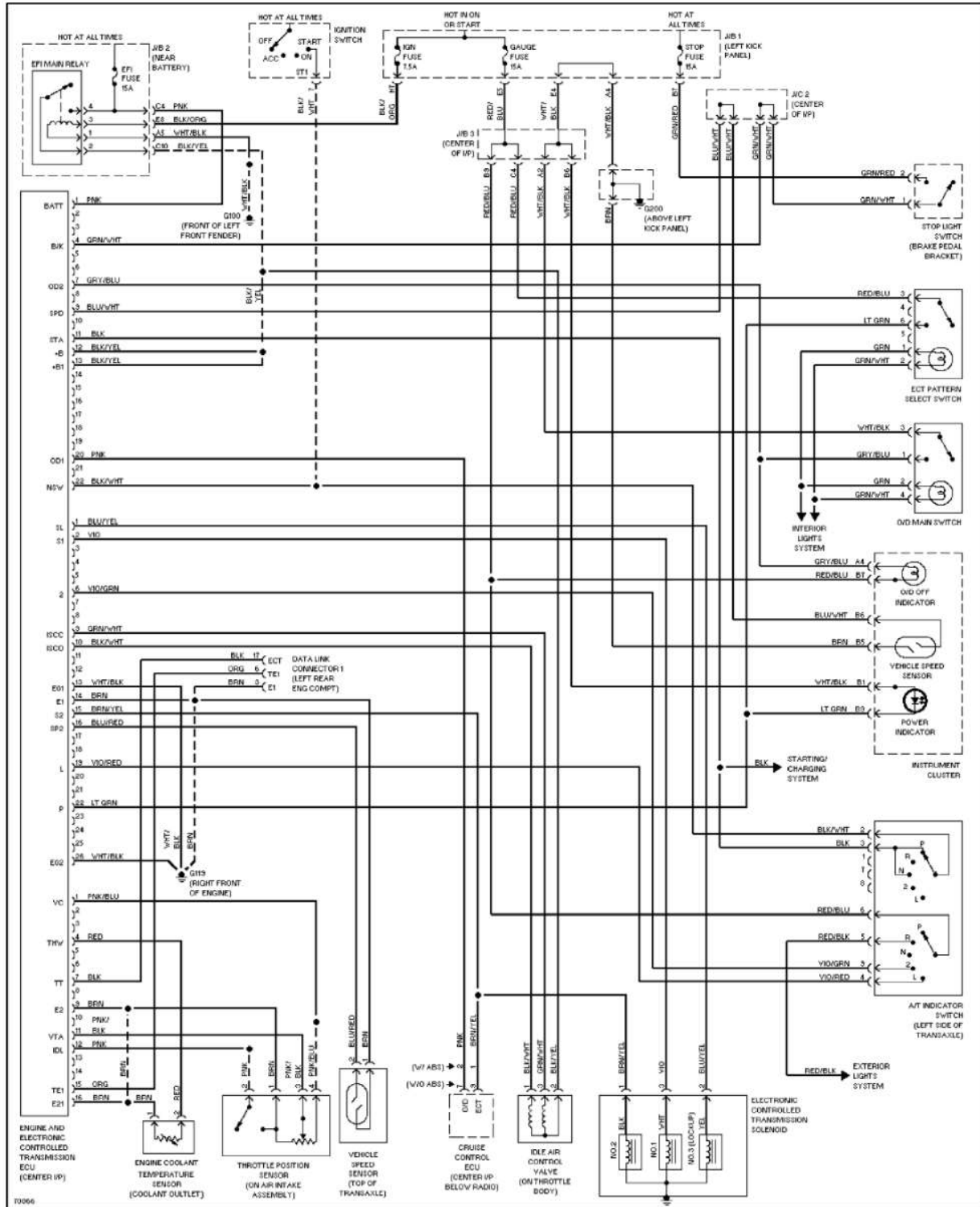


Fig. 36: Transmission Wiring Diagram (1993 Celica 2.2L)

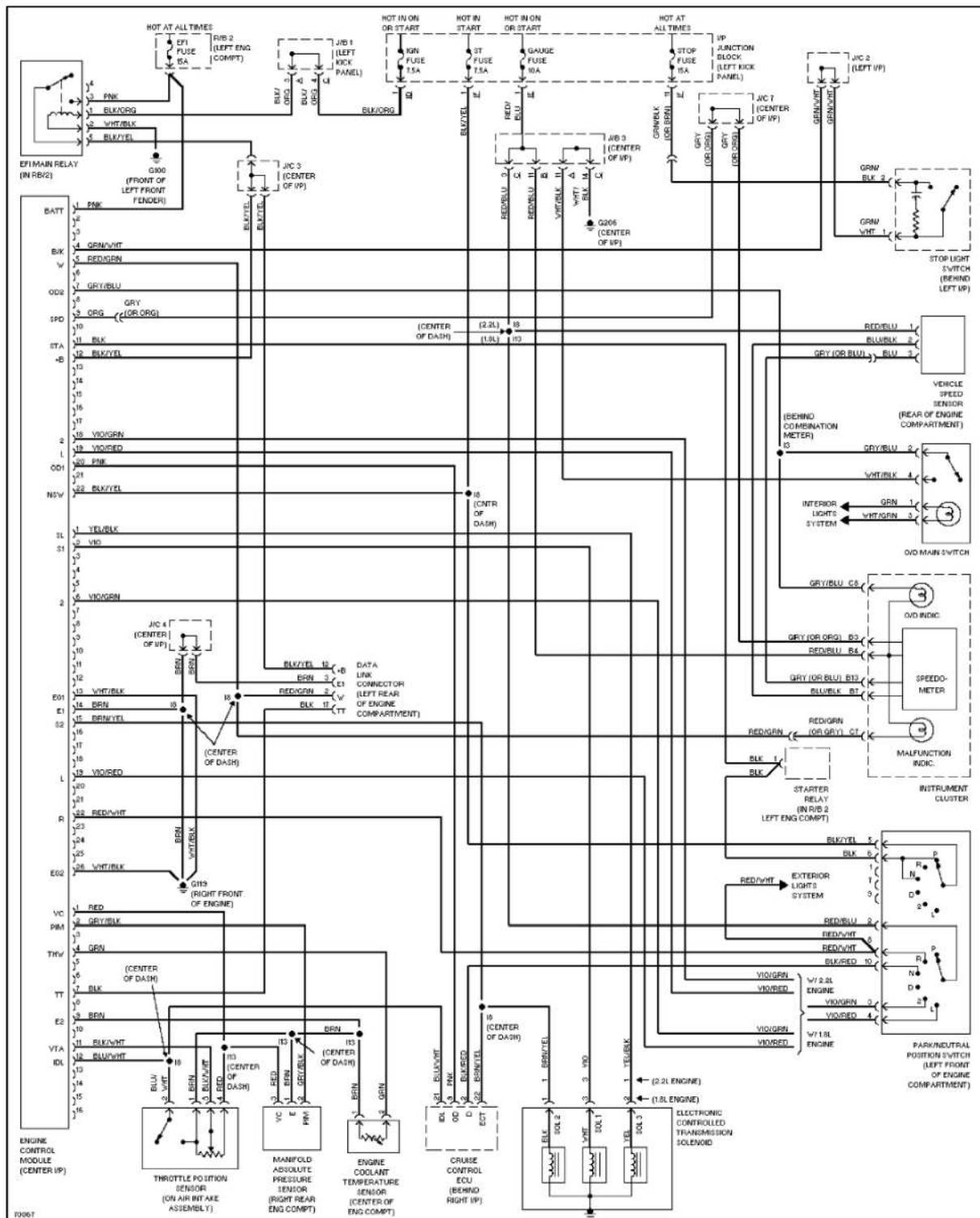
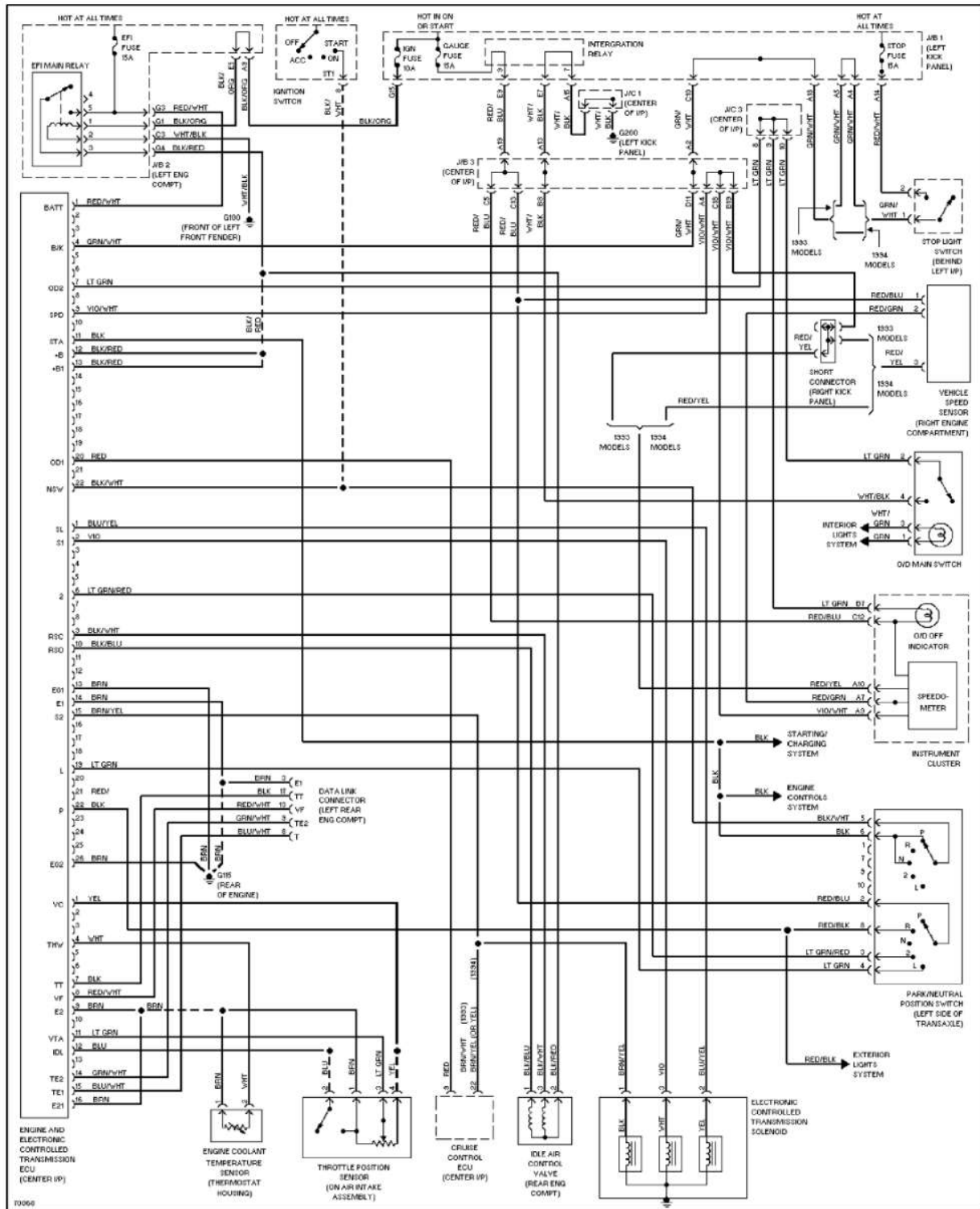


Fig. 37: Transmission Wiring Diagram (1994 Celica 1.8L)



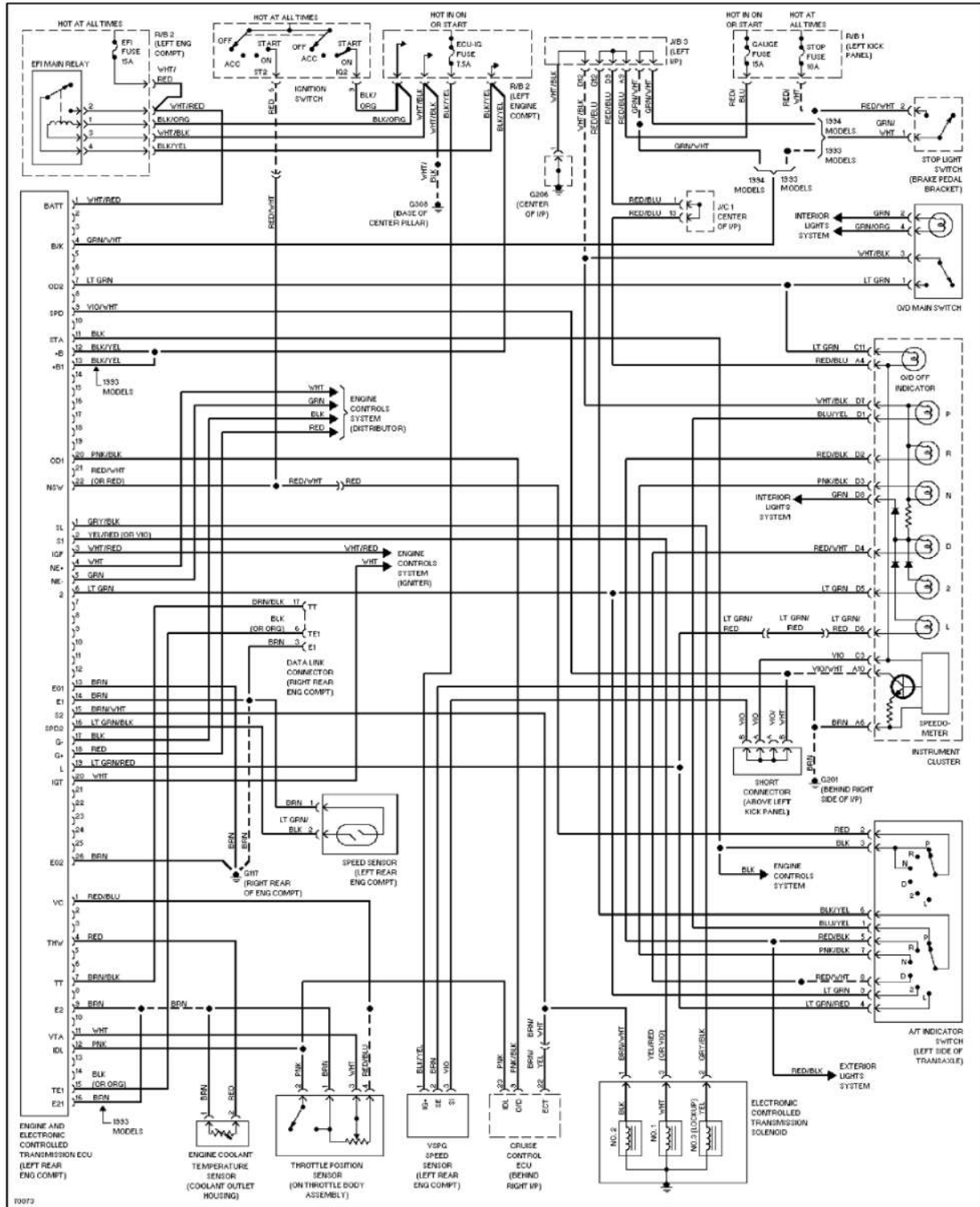
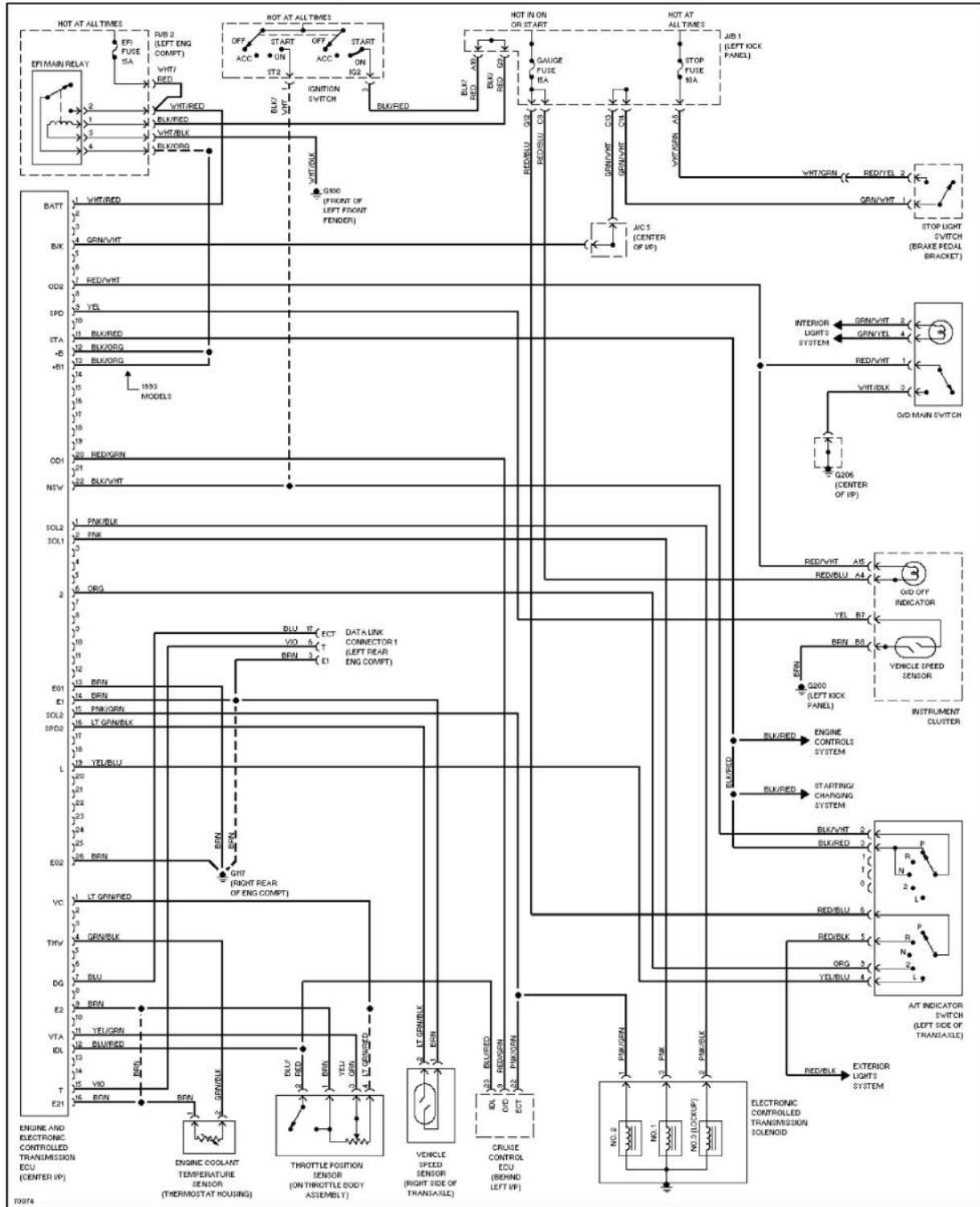
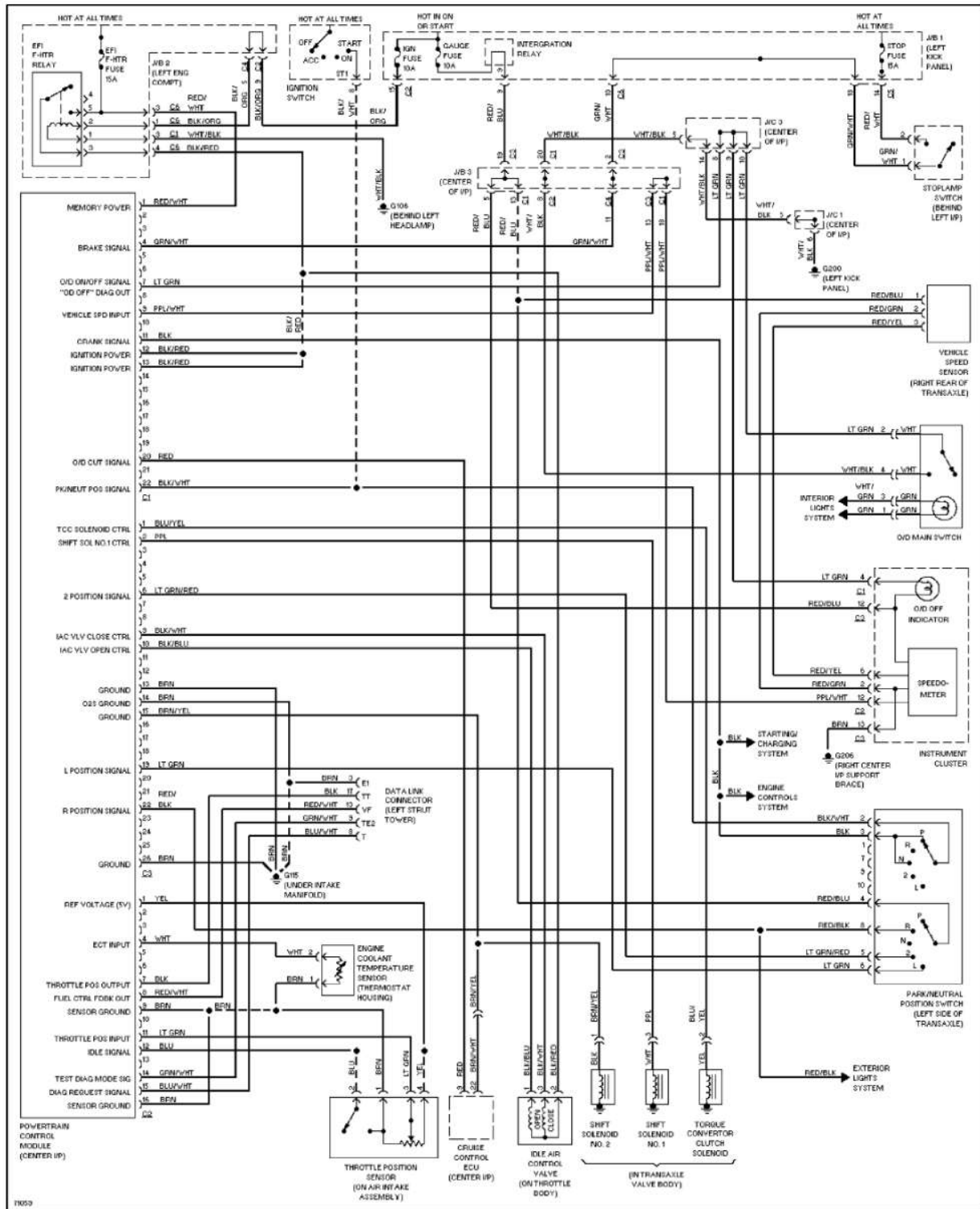


Fig. 39: Transmission Wiring Diagram (1993-94 MR2)





TORQUE SPECIFICATIONS

Application	INCH Lbs. (N.m)
Park/Neutral Position Switch Bolt	48 (5)
Park/Neutral Position Switch Lock Nut	62 (7)
Speed Sensor Bolt	89 (10)