

I - SYSTEM/COMPONENT TESTS

1994 Toyota Celica

1994 ENGINE PERFORMANCE
Toyota System & Component Testing

Toyota; Celica

INTRODUCTION

Before testing separate components or systems, perform procedures in F - BASIC TESTING article. Since many computer-controlled and monitored components set a diagnostic trouble code if they malfunction, also perform procedures in articles listed below:

- * G - TESTS W/CODES - 1.8L
- * G - TESTS W/CODES - 2.2L

NOTE: Testing individual components does not isolate shorts or opens. Perform all voltage tests with a Digital Volt-Ohmmeter (DVOM) with a minimum 10-megohm input impedance, unless stated otherwise in test procedure. Use ohmmeter to isolate wiring harness shorts or opens.

NOTE: When testing some systems, tachometer may be required. Tachometer must be connected to proper terminals. For tachometer connections, see IDLE SPEED & MIXTURE in the D - ADJUSTMENTS article.

COMPUTERIZED ENGINE CONTROLS

ENGINE CONTROL MODULE

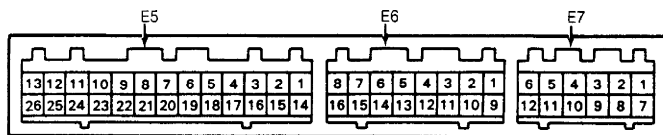
Power & Ground Circuits

For testing of power and ground circuits, see information J - PIN VOLTAGE CHARTS article. See ECM LOCATION table below for identifying ECM mounting locations.

ECM LOCATION

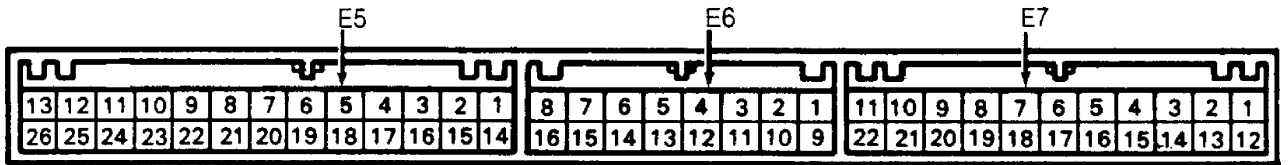
Model	Location
Celica ...	Below Passenger's Side Of Dash Underneath The Carpet

NOTE: Figs. 1 and 2 identify ECM terminals on vehicles which are used for performing tests on various components in this article. For ECM terminal identification on remaining models, see J - PIN VOLTAGE CHARTS article.



94H45812

Fig. 1: Identifying ECM Terminals (1.8L M/T)
Courtesy of Toyota Motor Sales, U.S.A., Inc.



94I45813

Fig. 2: Identifying ECM Terminals (1.8L A/T & 2.2L)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

ENGINE SENSORS & SWITCHES

AIR TEMPERATURE SENSOR

Air temperature sensor may be referred to as intake air temperature sensor. See INTAKE AIR TEMPERATURE SENSOR under ENGINE SENSORS & SWITCHES.

COOLANT TEMPERATURE SENSOR

Coolant temperature sensor may be referred to as engine coolant temperature sensor. See ENGINE COOLANT TEMPERATURE (ECT) SENSOR under ENGINE SENSORS & SWITCHES.

EGR GAS TEMPERATURE SENSOR

NOTE: The EGR gas temperature sensor may be referred to as EGR function sensor.

- 1) Remove EGR gas temperature sensor from side of EGR valve. Place threaded end of sensor and thermometer in container of oil.
- 2) Attach ohmmeter to electrical terminals. Heat oil and note resistance at specified temperature. See EGR GAS TEMPERATURE SENSOR SPECIFICATIONS table. Replace EGR gas temperature sensor if resistance is not within specification.

EGR GAS TEMPERATURE SENSOR SPECIFICATIONS

Temperature °F (°C)	k/ohms
122 (50)	64-97
212 (100)	11-16
302 (150)	2-4

ENGINE COOLANT TEMPERATURE (ECT) SENSOR

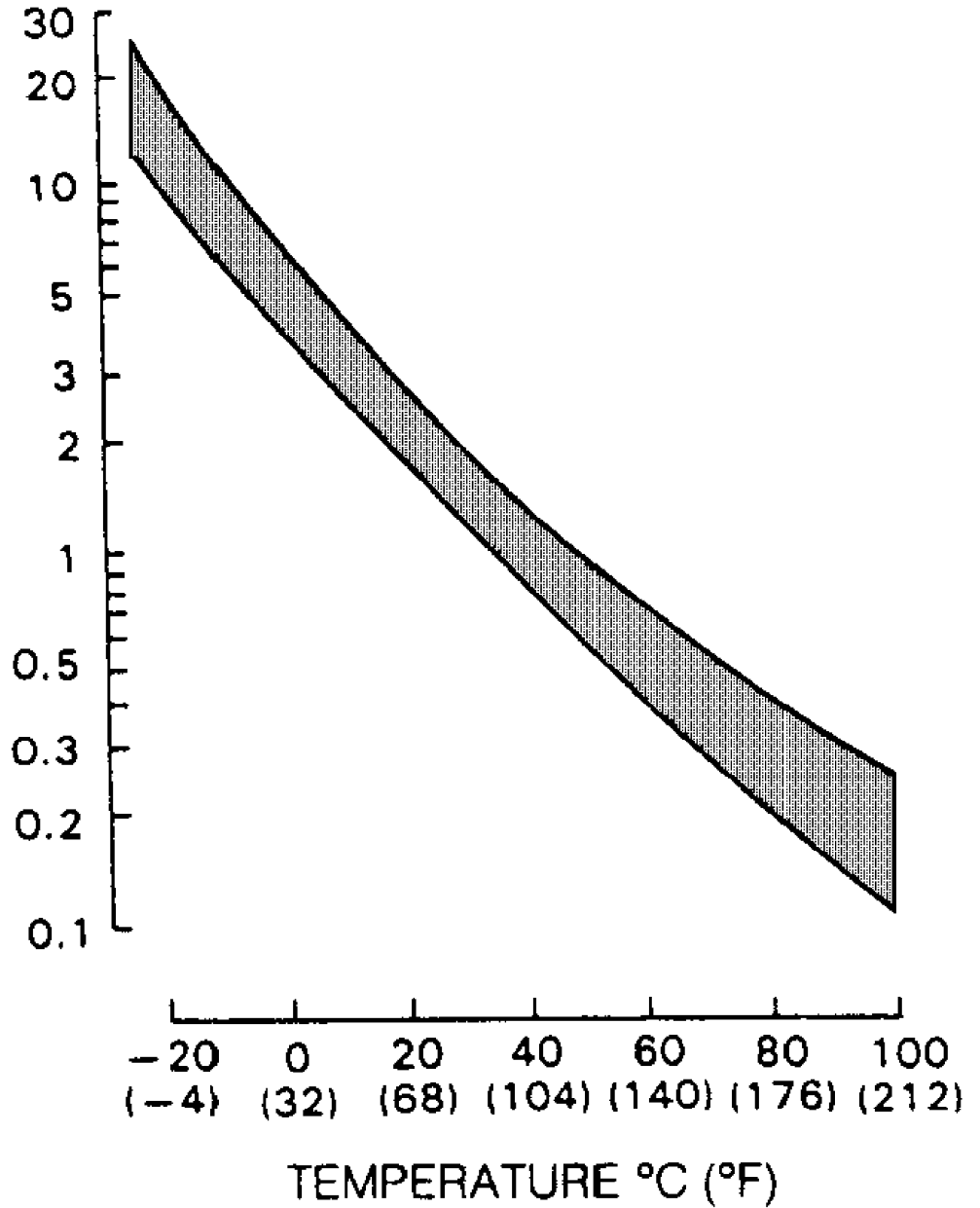
1) Ensure ignition is off. Disconnect electrical connector from ECT sensor. The ECT sensor is located in engine coolant passage near cylinder head or thermostat housing. To verify wire colors for proper identification, see wiring diagram in L - WIRING DIAGRAMS article.

NOTE: The ECT may be also identified using appropriate illustration in E - THEORY/OPERATION article.

2) Using ohmmeter, check resistance between ECT sensor electrical terminals. Resistance should be within specification at designated temperature. See Fig. 3. Replace ECT sensor if resistance

is not within specification.

RESISTANCE
(k/ohms)



94E45827

Fig. 3: Checking Engine Coolant Temperature Sensor
Courtesy of Toyota Motor Sales, U.S.A., Inc.

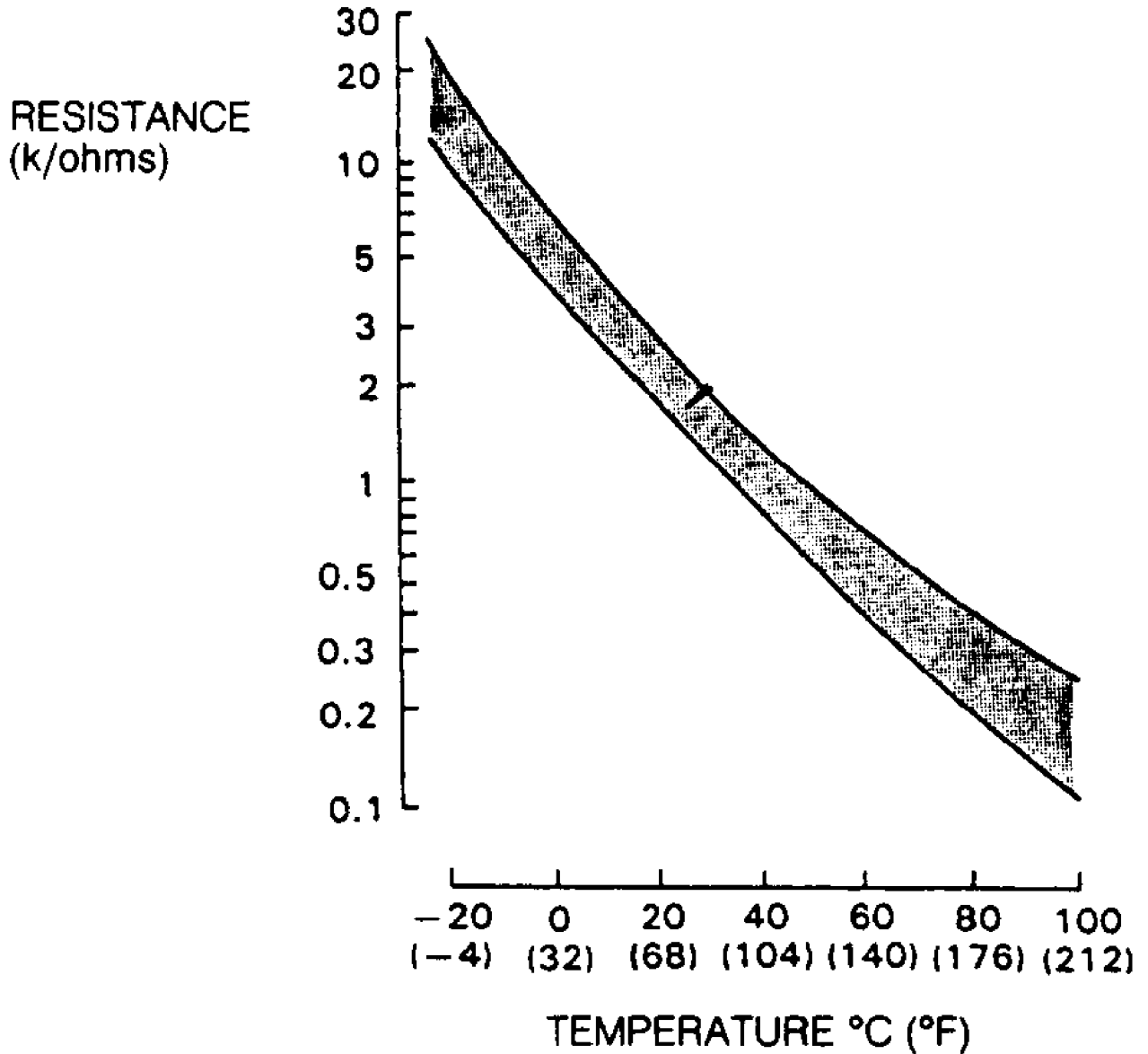
INTAKE AIR TEMPERATURE SENSOR

1) Ensure ignition is off. Disconnect electrical connector from intake air temperature sensor. Intake air temperature sensor is located in air intake, near air filter.

NOTE: Intake air temperature sensor may be also identified using appropriate illustration in E - THEORY/OPERATION article.

2) Remove intake air temperature sensor. Place threaded end of intake air temperature sensor and thermometer in container of water. Attach ohmmeter between intake air temperature sensor electrical terminals.

3) Heat water and note that resistance is within specification in relation to temperature. See Fig. 4. Replace intake air temperature sensor if defective.



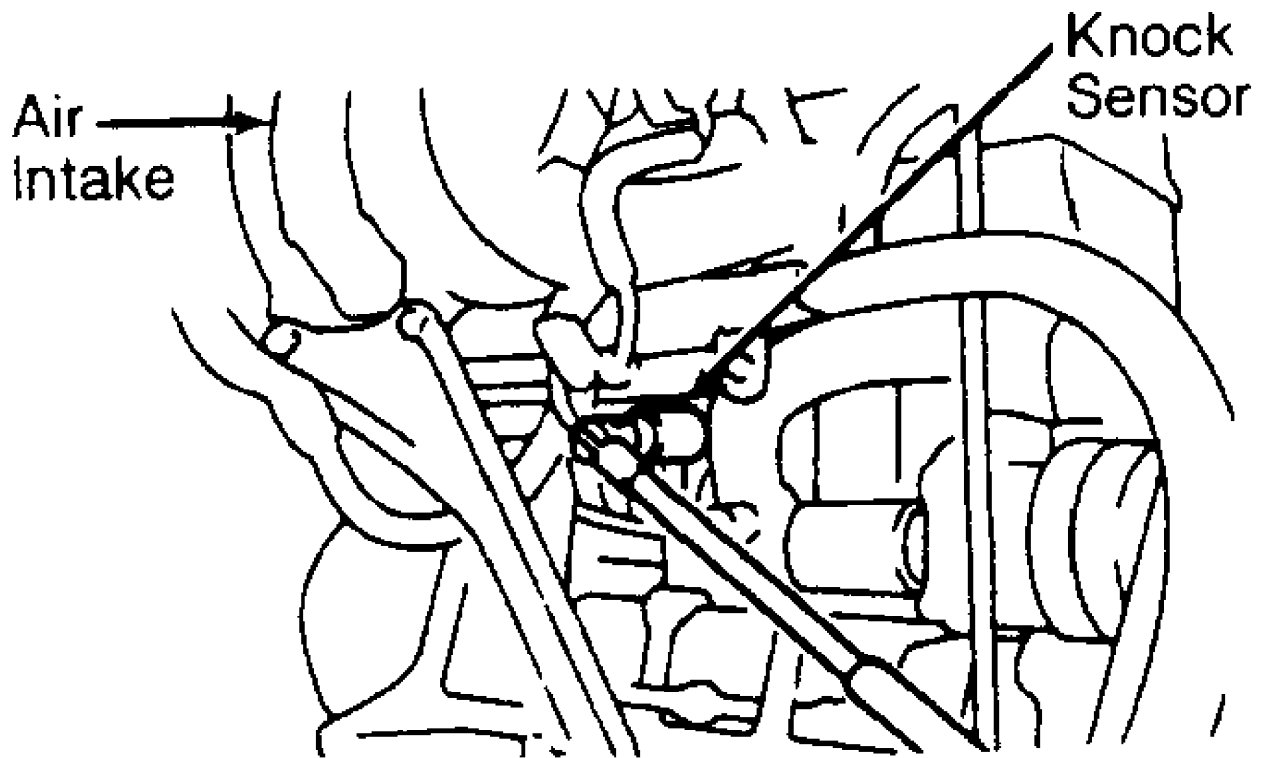
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Fig. 4: Testing Intake Air Temperature Sensor
Courtesy of Toyota Motor Sales, U.S.A., Inc.

KNOCK SENSOR

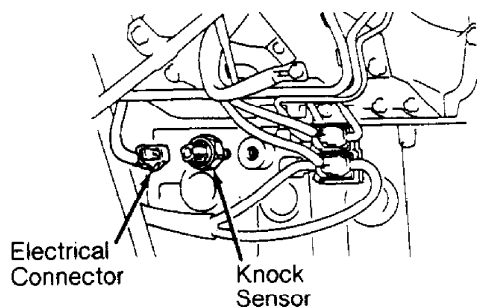
1) Knock sensor(s) are located on the cylinder block. See Figs. 5 and 6. Remove knock sensor from cylinder block before testing. See N - REMOVE/INSTALL/OVERHAUL article.

2) Using ohmmeter, check that no continuity exists between electrical terminal of knock sensor and body of knock sensor. Replace knock sensor if continuity exists.



94A45831

Fig. 5: Identifying Knock Sensors (1.8L)
Courtesy of Toyota Motor Sales, U.S.A., Inc.



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Fig. 6: Identifying Knock Sensors (2.2L)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR

1) Ensure ignition is off. To check MAP sensor supply voltage, disconnect electrical connector from MAP sensor. See MAP SENSOR LOCATIONS table.

NOTE: MAP sensor may also be identified using appropriate illustration in E - THEORY/OPERATION article. The MAP sensor has a vacuum hose connected to it and may be identified by wire colors. See appropriate wiring diagram in L - WIRING DIAGRAMS article.

MAP SENSOR LOCATIONS

Application	Location
Celica	Passenger's Side Of Engine Bay, On Firewall, Near Wiper Motor

2) Turn ignition on. Using voltmeter, measure voltage between terminals VC or VCC and E2 of electrical connector on wiring harness. See Fig. 7. The VC or VCC and E2 terminals are the 2 outer terminals on all models. Voltage should be within specification. See MAP SENSOR SUPPLY VOLTAGE SPECIFICATIONS table.

MAP SENSOR SUPPLY VOLTAGE SPECIFICATIONS

Application	Volts
Celica	4.50-5.50

3) If supply voltage is not within specification, check wiring circuit. See appropriate wiring diagram in L - WIRING DIAGRAMS article. If supply voltage is correct, turn ignition off. Reinstall electrical connector on MAP sensor.

4) To check MAP sensor output voltage, turn ignition on. Disconnect MAP sensor vacuum hose from intake manifold. Connect voltmeter to terminals PIM and E2 of Engine Control Module (ECM). See Figs. 8 and 9. See ECM LOCATION table.

ECM LOCATION

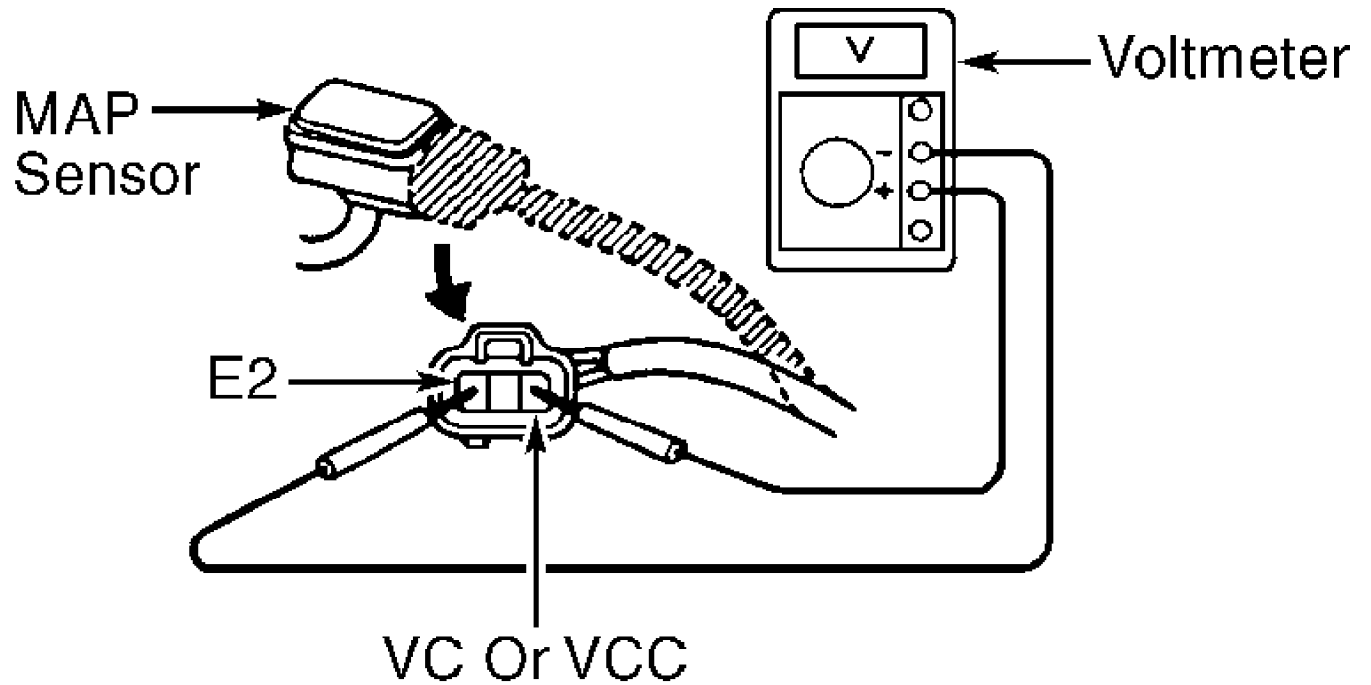
Application	Location
Celica ..	Below Passenger's Side Of Dash Underneath Carpet

5) Measure and record output voltage under ambient atmospheric pressure. Attach vacuum pump to MAP sensor.

6) Apply vacuum in specified increments and measure MAP sensor output voltage drop at each increment. See MAP SENSOR OUTPUT VOLTAGE DROP SPECIFICATIONS table. Replace MAP sensor if output voltage drop is not within specification.

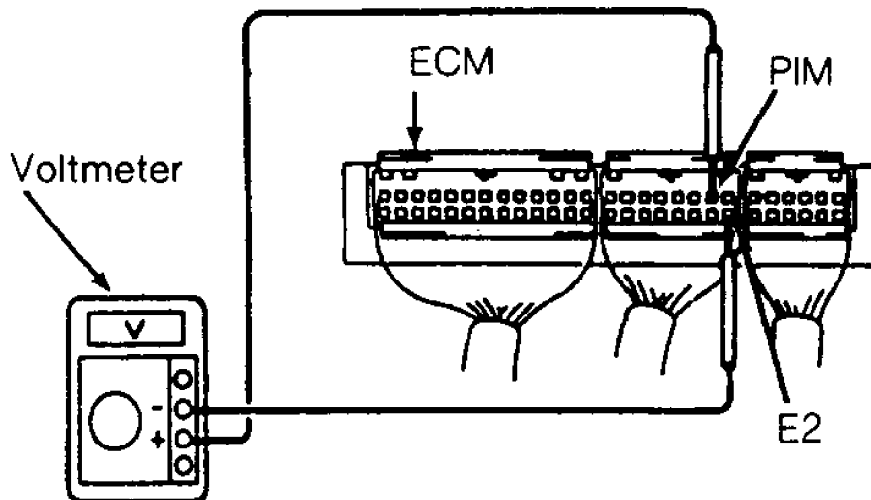
MAP SENSOR OUTPUT VOLTAGE DROP SPECIFICATIONS

Applied Vacuum: In. Hg	Output Voltage Drop
3.943-.5
7.877-.9
11.81	1.1-1.3
15.75	1.5-1.7
19.69	1.9-2.1



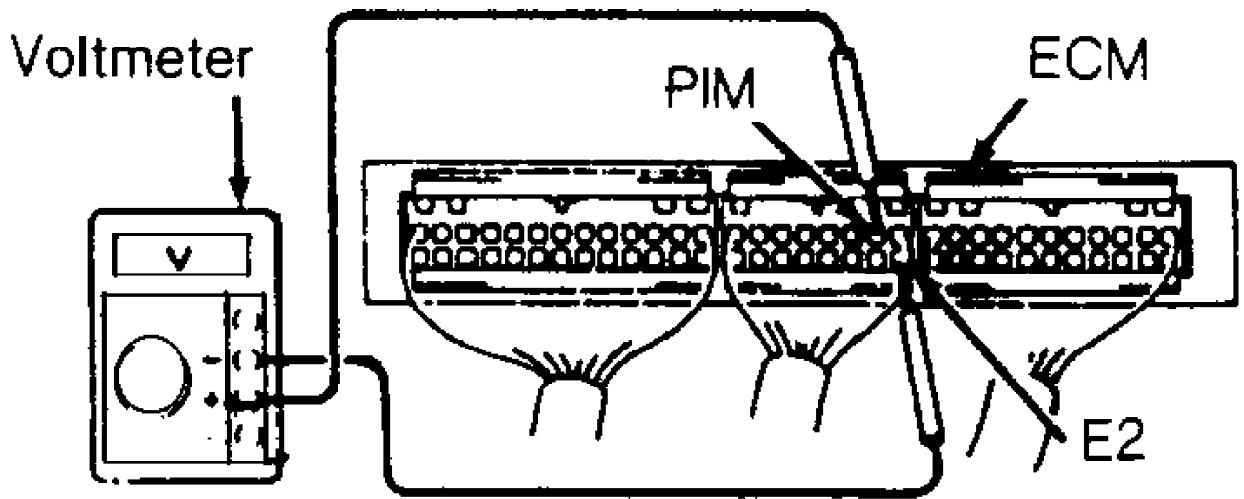
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Fig. 7: Measuring MAP Sensor Supply Voltage (Similar)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.



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Fig. 8: Measuring MAP Sensor Output Voltage (Celica 1.8L M/T)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.



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Fig. 9: Measuring MAP Sensor Output Voltage (Celica 1.8L A/T, 2.2L)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

PARK/NEUTRAL SWITCH CIRCUIT

NOTE: Park/neutral switch may be referred to as Park/Neutral Position (PNP) switch.

1) Check for diagnostic trouble codes while cranking the engine. See articles listed below for accessing diagnostic trouble codes:

- * G - TESTS W/CODES - 1.8L
- * G - TESTS W/CODES - 2.2L

2) With transmission/transaxle in Park, MIL should flash steady indicating normal operation. With transmission/transaxle in Drive, MIL should flash diagnostic trouble Code 51. This indicates park/neutral switch circuit is okay.

3) If diagnostic trouble Code 51 exists with transmission/transaxle in Park and Drive, check wiring harness between park/neutral switch and Engine Control Module (ECM). See ECM LOCATION table. If wiring harness is okay, substitute ECM with another ECM and recheck operation.

ECM LOCATION

Model	Location
Celica	..... Below Passenger's Side Of Dash Underneath The Carpet

4) If normal operation is displayed by MIL with transmission/transaxle in Park and Drive, check park/neutral switch. See PARK/NEUTRAL SWITCH under ENGINE SENSORS & SWITCHES. If park/neutral switch is okay, substitute ECM with another ECM and recheck operation. See ECM LOCATION table.

PARK/NEUTRAL SWITCH

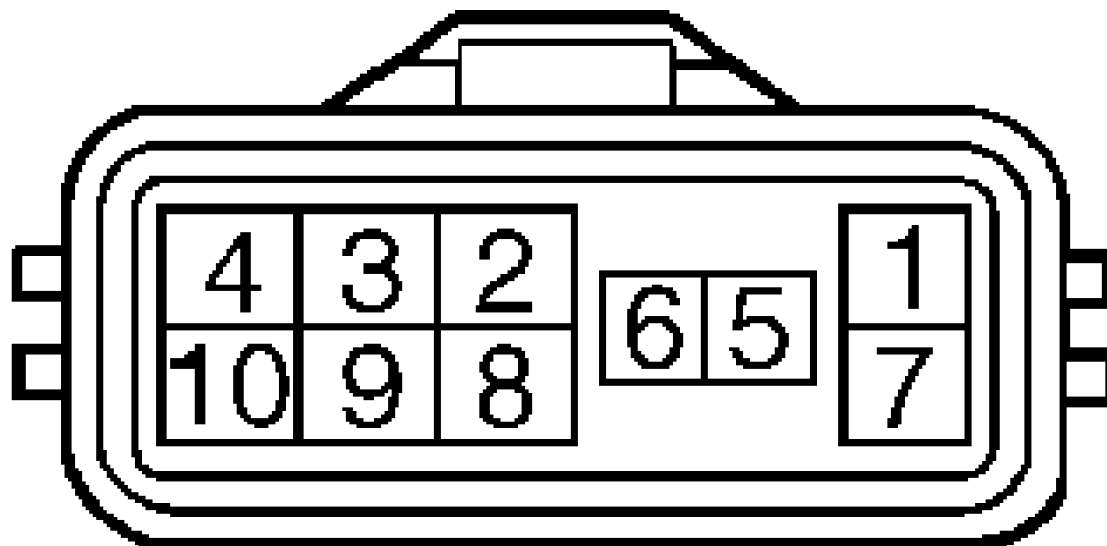
NOTE: Park/neutral switch may be referred to as Park/Neutral Position (PNP) switch.

A/T Models

Disconnect electrical connector from park/neutral switch at transmission or transaxle. Note terminal identification. See Fig. 10. Using ohmmeter, check for continuity at specified terminals with gearshift in proper positions. See PARK/NEUTRAL SWITCH SPECIFICATIONS table. Replace switch if defective.

PARK/NEUTRAL SWITCH SPECIFICATIONS

Application & Gearshift Position	Terminal Continuity
Park	5 & 6, 4 & 7
Reverse	4 & 8
Neutral	5 & 6, 4 & 10
Drive	4 & 9
2	4 & 2
Low	3 & 4



G94E45918

Fig. 10: Park/Neutral Switch Terminal ID
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

1) Warm engine to normal operating temperature. Connect analog voltmeter to terminals VF1 and E1 terminals of Data Link Connector No. 1 (DLC1). See Fig. 11. Perform test procedures listed. See Fig. 12.

2) Depending on model application, some vehicles may be equipped with a main oxygen sensor, sub-oxygen sensor and a sensor heater. See OXYGEN SENSOR APPLICATION table.

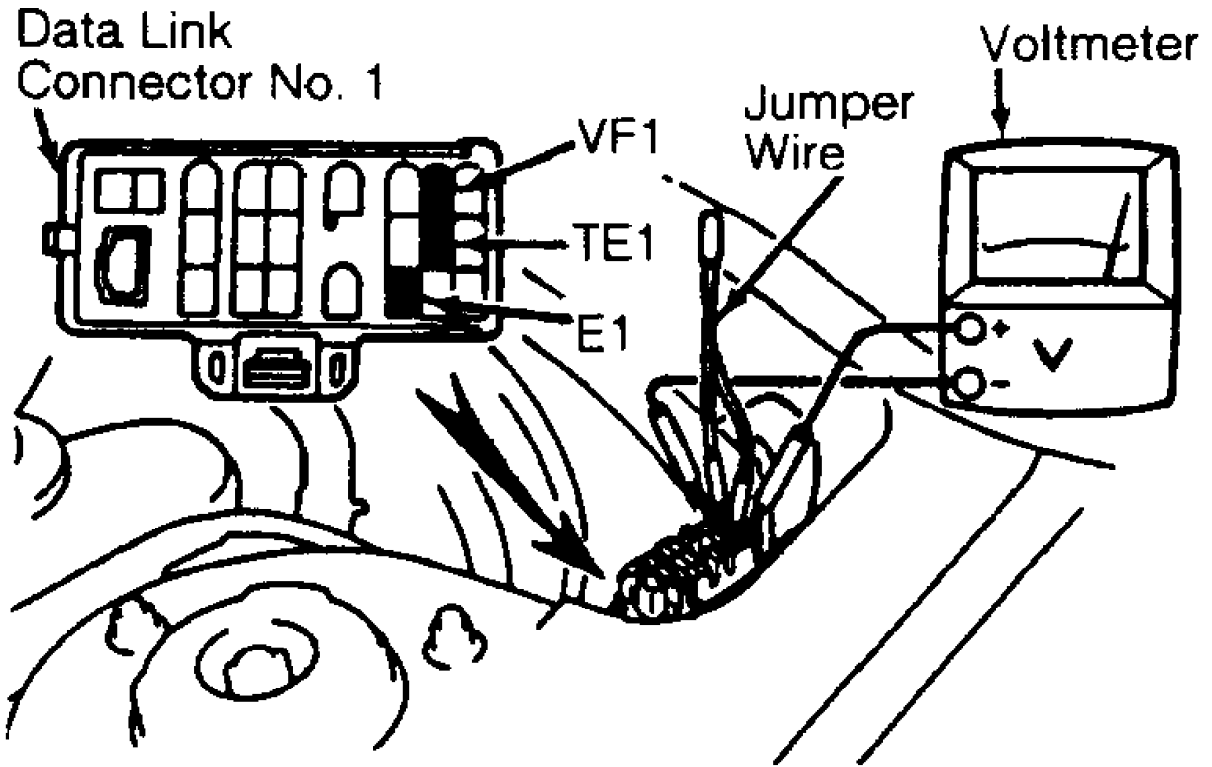
NOTE: Diagnostic trouble Codes 21, 25, 26, 27 and 28 (some models) are oxygen sensor circuit codes. For diagnostic trouble code charts, see articles listed below:

- * G - TESTS W/CODES - 1.8L
- * G - TESTS W/CODES - 2.2L

OXYGEN SENSOR APPLICATION

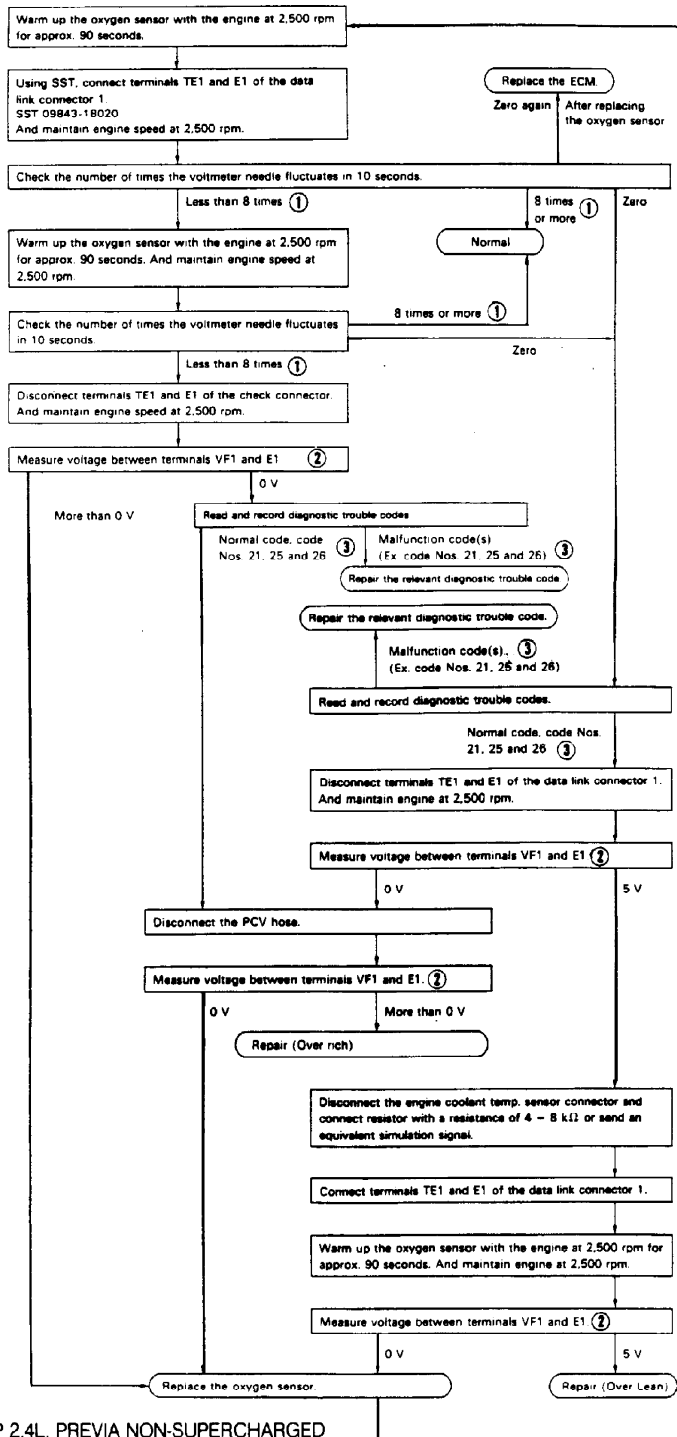
Application Type	Main Oxygen Sensor	Sub-Oxygen Sensor	Sensor Heater
1.8L (7A-FE)	..... X	..... X	N/A
2.2L (5S-FE)	..... X	(1) X	N/A

(1) - Applies to California models.



94D45925

Fig. 11: Using Voltmeter For Testing Oxygen Sensor Feedback Voltage
 Courtesy of Toyota Motor Sales, U.S.A., Inc.



- ① - 6 TIMES ON PICKUP 2.4L, PREVIA NON-SUPERCHARGED AND 4RUNNER 2.4L.
- ② - ALSO CHECK VF2 AND E1 ON LAND CRUISER AND SUPRA NON-TURBO
- ③ - ALSO CHECK FOR TROUBLE CODE 28 ON LAND CRUISER AND SUPRA NON-TURBO.

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Fig. 12: Performing Oxygen Sensor Feedback Voltage Test
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

SUB-OXYGEN SENSOR

NOTE: Sub-oxygen sensor may be used only on California applications on some models. See OXYGEN SENSOR APPLICATION table.

For testing of sub-oxygen sensor, see DETECTION DRIVING PATTERN TEST under TROUBLE CODE 27 in TROUBLE CODE CHARTS in appropriate articles listed below:

- * G - TESTS W/CODES - 1.8L
- * G - TESTS W/CODES - 2.2L

OXYGEN SENSOR HEATER

NOTE: Oxygen sensor heater may be used only on California applications on some models. See OXYGEN SENSOR APPLICATION table.

PICK-UP COILS

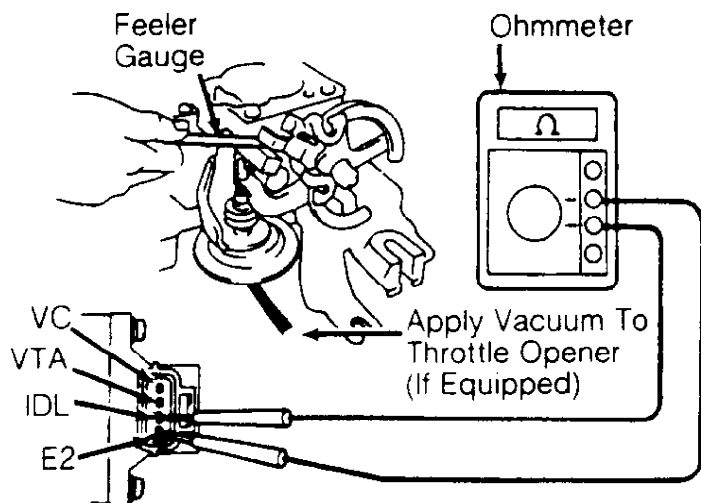
See PICK-UP COIL AIR GAP and PICK-UP COIL RESISTANCE under IGNITION CHECKS in F - BASIC TESTING article.

THROTTLE POSITION SENSOR

1) Turn ignition off. Disconnect electrical connector from Throttle Position Sensor (TPS) on throttle body. Note terminal identification. See Figs. 13 and 14.

NOTE: Some models require that vacuum be applied to throttle opener before checking TPS. See TPS RESISTANCE SPECIFICATIONS table.

2) Insert specified thickness feeler gauge between throttle stop screw and throttle lever and check resistance or continuity. See appropriate TPS RESISTANCE SPECIFICATIONS table. Replace or adjust TPS if not within specification.



94C45940

Fig. 13: Checking Throttle Position Sensor (1.8L)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

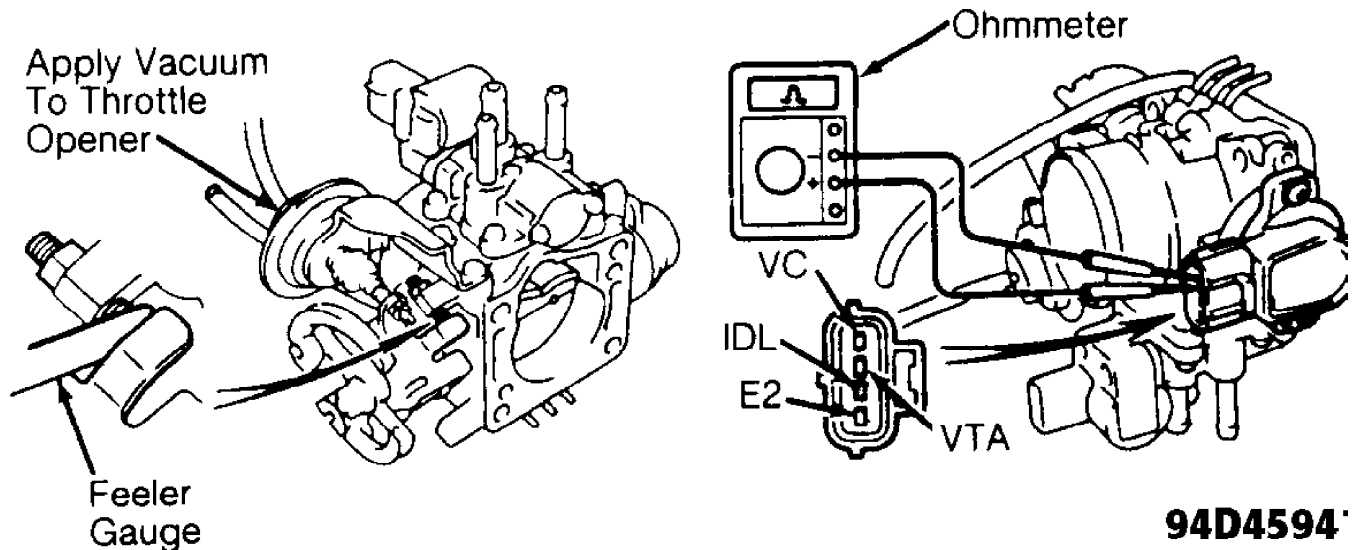


Fig. 14: Checking Throttle Position Sensor (2.2L)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

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TPS RESISTANCE SPECIFICATIONS

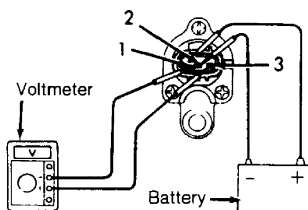
Application Type	Clearance In. (mm)	Terminals Tested	Ohmmeter Reading
1.8L (7A-FE) (1)	0 (0)	VTA & E2	200-5700
"	.016 (.41)	IDL & E2	2300 Or Less
"	.035 (.89)	IDL & E2	No Continuity
"	Fully Open	VTA & E2	2000-10,200
"	"	VC & E2	2500-5900
2.2L (5S-FE) (1)	0 (0)	VTA & E2	200-5700
"	.020 (.51)	IDL & E2	2300 Or Less
"	.028 (.71)	IDL & E2	No Continuity
"	Fully Open	VTA & E2	2000-10,200
"	"	VC & E2	2500-5900

(1) - Apply vacuum to throttle opener before checking TPS.

VEHICLE SPEED SENSOR

1) Vehicle speed sensor is located on transmission/transaxle and contains a 3-wire connector. Connect voltmeter and battery voltage to vehicle speed sensor terminals. See Fig. 15.

2) While rotating vehicle speed sensor shaft, ensure voltage changes from zero to at least 11 volts. Voltage should change 4 times per revolution of the shaft. Replace vehicle speed sensor if voltage does not change as specified.



94H45952

Fig. 15: Testing Vehicle Speed Sensor
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

CONTROL UNITS

FUEL PUMP ELECTRONIC CONTROL UNIT

See FUEL DELIVERY under FUEL SYSTEM.

RELAYS

CIRCUIT OPENING RELAY

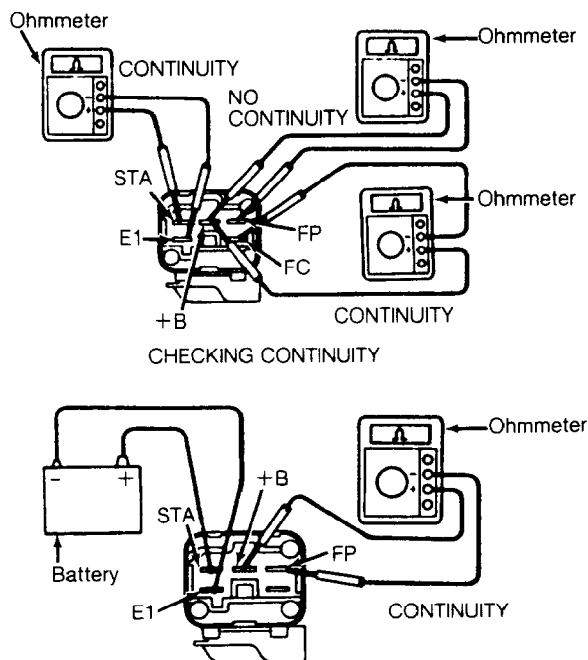
1) Ensure ignition is off. Remove circuit opening relay. See CIRCUIT OPENING RELAY LOCATION table. Using ohmmeter, check continuity between specified terminals. See Figs. 16 and 17.

2) Check circuit opening relay operation by applying battery voltage and checking continuity between specified terminals. See Figs. 16 and 17. Replace circuit opening relay if defective.

NOTE: Circuit opening relay may also be identified using appropriate illustration in E - THEORY/OPERATION article or wire color. See appropriate wiring diagram in L - WIRING DIAGRAMS article.

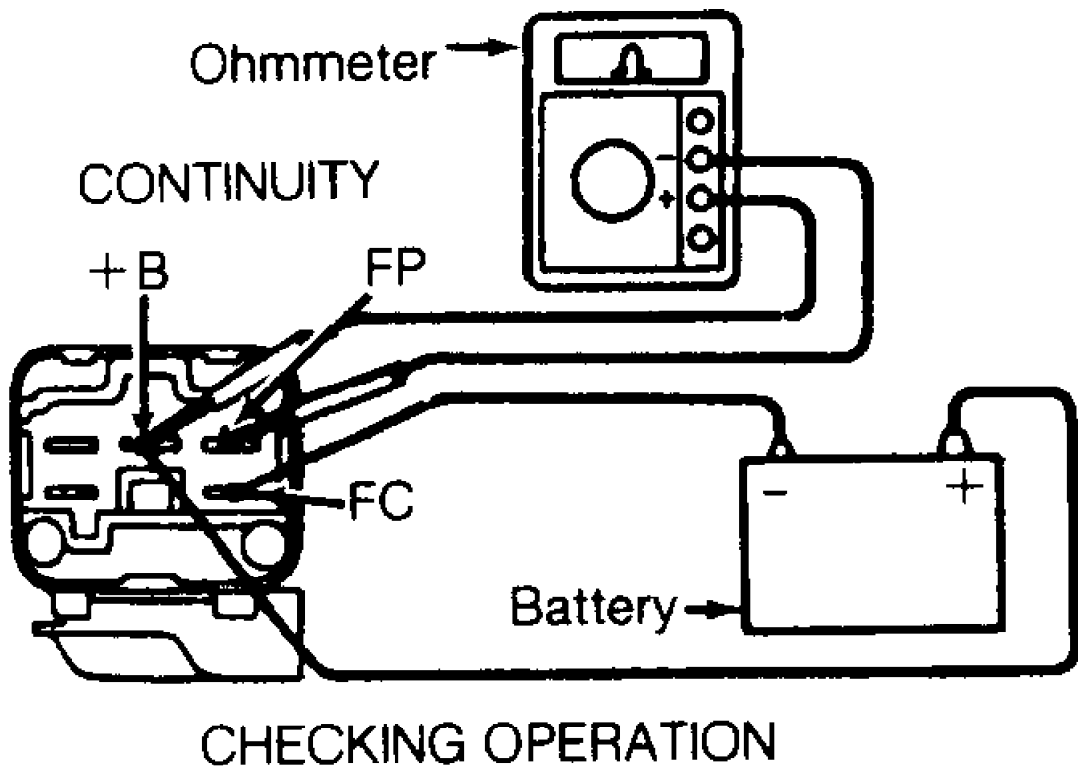
CIRCUIT OPENING RELAY LOCATION

Application	Location
Celica ...	Below Passenger Side Of Dash, Below Carpet On ECM Bracket



94E45959

Fig. 16: Testing Circuit Opening Relay (Continuity)
Courtesy of Toyota Motor Sales, U.S.A., Inc.



94H45960

Fig. 17: Testing Circuit Opening Relay (Operation)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

EFI MAIN RELAY

1) Ensure ignition is off. Remove EFI main relay. See EFI MAIN RELAY LOCATION table. Using ohmmeter, check continuity between specified terminals. See Figs. 18 and 19.

2) Check EFI main relay operation by applying battery voltage and ground and checking continuity between specified terminals. See Figs. 18 and 19. Replace EFI main relay if defective.

NOTE: The EFI main relay may also be identified using appropriate illustration in E - THEORY/OPERATION article or wire color. See appropriate wiring diagram in L - WIRING DIAGRAMS article.

EFI MAIN RELAY LOCATION

Application	Location
Celica	Fuse/Relay Box Near Driver's Side Front Fenderwell

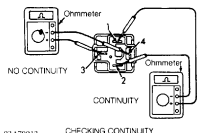
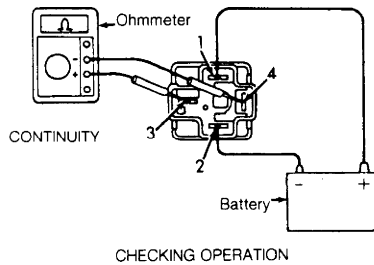


Fig. 18: Testing EFI Main Relay (Continuity)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.



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Fig. 19: Testing EFI Main Relay (Operation)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

IGNITION MAIN RELAY

See IGNITION MAIN RELAY under IGNITION SYSTEM.

FUEL SYSTEM

FUEL DELIVERY

NOTE: For fuel system pressure testing, see F - BASIC TESTING article.

Circuit Opening Relay
 See CIRCUIT OPENING RELAY under RELAYS.

EFI Main Relay
 See EFI MAIN RELAY under RELAYS.

Fuel Pump Relay
 See FUEL PUMP RELAY under RELAYS.

FUEL CONTROL

NOTE: Fuel injector solenoid resistor may also be referred to as MFI resistor, SFI resistor or solenoid resistor.

Fuel Injectors

1) Ensure ignition is off. Disconnect electrical connector at fuel injector. Using ohmmeter, measure resistance between fuel injector electrical terminals. Replace fuel injector if resistance is not within specification. See FUEL INJECTOR RESISTANCE SPECIFICATIONS table.

2) To check fuel injector spray pattern and volume, remove fuel injector. See N - REMOVE/INSTALL/OVERHAUL article. Disconnect fuel hose from fuel filter outlet. Use Delivery Hose (09268-41045) to install fuel injector between fuel filter and fuel pressure regulator. See Figs. 20 and 21.

3) Place fuel injector into a clean graduated container. Place vinyl tube on end of fuel injector to prevent fuel spillage. Install Jumper Wire (SST 09843-18020) between +B and FP terminals of data link connector No. 1. Turn ignition on, with engine off to pressurize fuel system.

NOTE: For proper location of data link connector No. 1 and terminal identification, see F - BASIC TESTING article. Jumper wire is installed in data link connector No. 1 when checking fuel pump operation and fuel pressure.

4) Connect fuel injector tester to fuel injector for 15

seconds. Use Fuel Injector Tester (09842-30070).

5) Measure fuel injector volume and check spray pattern. Test each fuel injector 2-3 times. Replace fuel injector if volume is not as specified. See FUEL INJECTOR VOLUME SPECIFICATIONS table.

NOTE: Ensure difference between fuel injector volume on all fuel injectors is within specification. See FUEL INJECTOR VOLUME SPECIFICATIONS table.

6) Disconnect fuel injector tester. Ensure fuel leakage from end of fuel injector is one drop or less in specified time. See FUEL INJECTOR LEAKAGE SPECIFICATIONS table. Replace fuel injector if leakage exceeds specified amount. Turn ignition off and remove test equipment.

FUEL INJECTOR RESISTANCE SPECIFICATIONS

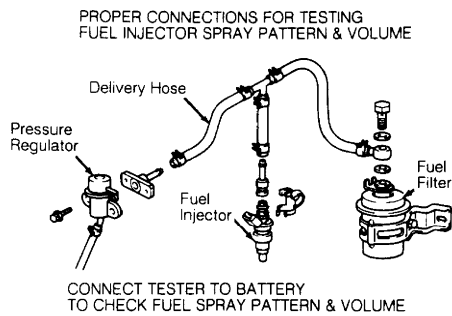
Application	Ohms @ 68°F (20°C)
Celica	13.4-14.2

FUEL INJECTOR VOLUME SPECIFICATIONS

Application	Cu. In. (cc)
1.8L (7A-FE)	2.4-3.1 (40-50)
2.2L (5S-FE)	3.0-3.6 (49-59)
Maximum Difference Between Each Fuel Injector .....	.3 (5)

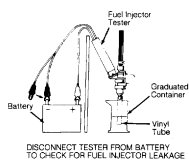
FUEL INJECTOR LEAKAGE SPECIFICATIONS

Application	Leakage Time
Celica	1 Minute



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Fig. 20: Testing Fuel Injector Spray Pattern & Volume (Step 1)
Courtesy of Toyota Motor Sales, U.S.A., Inc.



93F79935

Fig. 21: Testing Fuel Injector Spray Pattern & Volume (Step 2)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

NOTE: Fuel pressure control system may also be referred to as fuel

pressure-up system.

Fuel Pressure Control System (2.2L CA)

1) Fuel pressure control system uses a fuel pressure control Vacuum Switching Valve (VSV). Fuel pressure control VSV is supplied voltage through EFI main relay.

2) Engine Control Module (ECM) will activate VSV by controlling ground circuit for approximately 90 seconds when restarting engine at normal operating temperature. Locate and remove fuel pressure control VSV. See FUEL PRESSURE CONTROL VSV LOCATION table.

NOTE: Fuel pressure control VSV may also be identified using appropriate illustration in E - THEORY/OPERATION article or wire color. See appropriate wiring diagram in L - WIRING DIAGRAMS article.

FUEL PRESSURE CONTROL VSV LOCATION

Application	Location
Celica 2.2L 5S-FE Calif.	Below Intake Manifold

3) Using ohmmeter, check resistance and for continuity between fuel pressure control VSV electrical terminals. Replace fuel pressure control VSV if no continuity exists or resistance is not within specification. See FUEL PRESSURE CONTROL VSV RESISTANCE SPECIFICATIONS table.

4) Ensure no continuity exists between each electrical terminal and fuel pressure control VSV body. Replace fuel pressure control VSV if continuity exists between electrical connector and fuel pressure control VSV body.

5) Check fuel pressure control VSV operation by applying air pressure to designated area and checking air passage, and then applying battery voltage and ground and retesting. See Fig. 22. Replace fuel pressure control VSV if defective.

FUEL PRESSURE CONTROL VSV RESISTANCE SPECIFICATIONS

Application	Ohms
Celica 2.2L 5S-FE Calif.	33-39

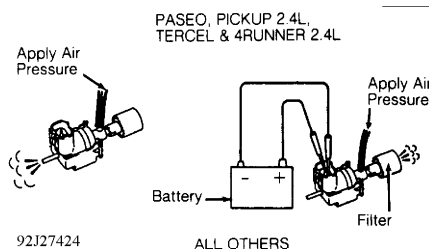


Fig. 22: Testing Fuel Pressure Control VSV
Courtesy of Toyota Motor Sales, U.S.A., Inc.

Fuel Cut System

1) Install tachometer. Tachometer must be connected to proper terminals. See IDLE SPEED & MIXTURE in D - ADJUSTMENTS article.

CAUTION: Some tachometers may not be compatible with ignition system. Consult tachometer manufacturer before connecting

tachometer to system. To avoid possible damage to ignitor and/or coil, DO NOT allow tachometer terminal to become grounded.

2) Start engine and warm to normal operating temperature. Ensure all accessories are off. Gradually increase engine RPM to maintain at least specified engine speed. See FUEL CUT SYSTEM TESTING SPECIFICATION table.

FUEL CUT SYSTEM TESTING SPECIFICATION

Application	Engine RPM
1.8L (7A-FE)	3500
2.2L (5S-FE)	2500

3) Using stethoscope, check for fuel injector operating sound. Ensure when throttle lever is released, fuel injector stops operating momentarily (fuel cut RPM) and then resumes operating (fuel return RPM).

4) Ensure fuel cut RPM (if available) and fuel return RPM are within specification. See FUEL CUT SYSTEM SPECIFICATIONS table. Shut engine off. Disconnect tachometer.

FUEL CUT SYSTEM SPECIFICATIONS (1)

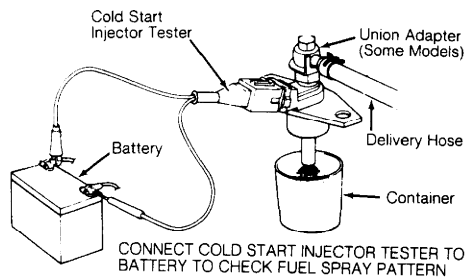
Application	Fuel Cut RPM	Fuel Return RPM
1.8L (7A-FE)	(2)	1400
2.2L (5S-FE)	(2)	1500

(1) - Check with A/C off.

(2) - Fuel cut specification is not available from manufacturer.

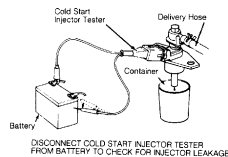
Cold Start Injector Time Switch

For test procedures, see COLD START INJECTOR TIME SWITCH under ENGINE SENSORS & SWITCHES.



93179937

Fig. 23: Testing Cold Start Injector (Step 1)
Courtesy of Toyota Motor Sales, U.S.A., Inc.



93179938

Fig. 24: Testing Cold Start Injector (Step 2)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

IDLE CONTROL SYSTEM

A/C IDLE-UP VALVE

1) Remove A/C idle-up valve. See A/C IDLE-UP VALVE LOCATIONS table.

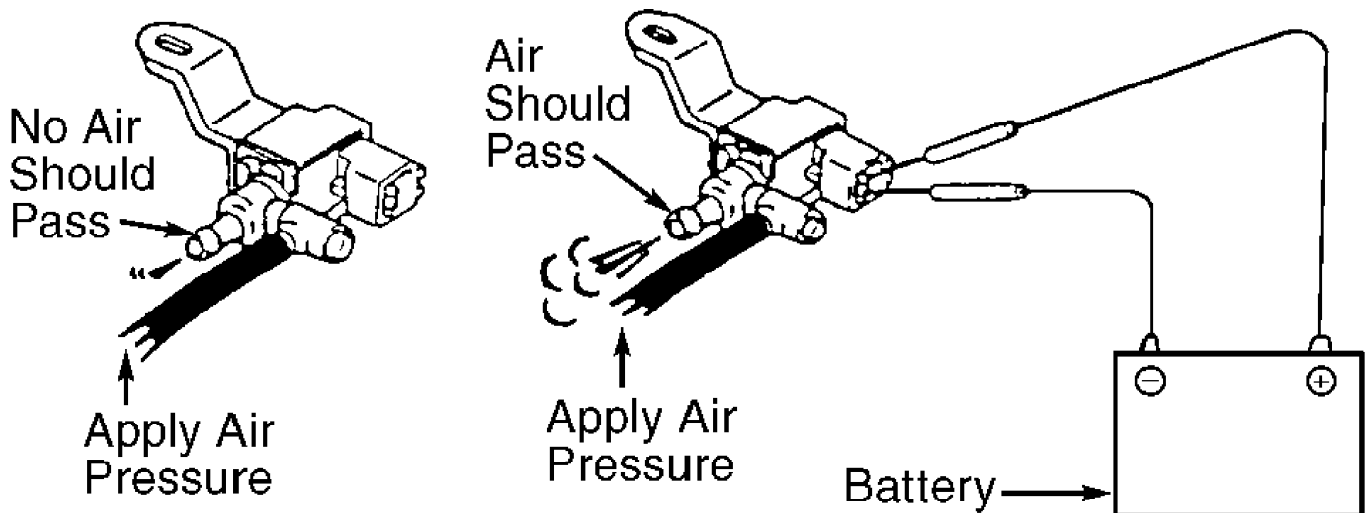
NOTE: The A/C idle-up valve may also be identified using appropriate illustration in E - THEORY/OPERATION article or wire color. See appropriate wiring diagram in L - WIRING DIAGRAMS article.

A/C IDLE-UP VALVE LOCATIONS

Application	Location
1.8L (7A-FE)	Center Of Firewall
2.2L (5S-FE)	End Of Intake Manifold On Passenger's Side

2) Using ohmmeter, check resistance between A/C idle-up valve electrical terminals. Replace A/C idle-up valve if resistance is not 30-34 ohms.

3) Ensure no continuity exists between each electrical terminal and body of A/C idle-up valve. To check A/C idle-up valve operation, apply air pressure to designated area and checking air passage, and then applying battery voltage and ground and retesting. See Fig. 25. Replace A/C idle-up valve if defective.



93H80124

Fig. 25: Testing Typical A/C Idle-Up Valve
Courtesy of Toyota Motor Sales, U.S.A., Inc.

IDLE AIR CONTROL (IAC) VALVE

1) Warm engine to normal operating temperature. Ensure idle speed is correct. See D - ADJUSTMENTS article.

2) Apply parking brake and place transmission/transaxle in Neutral. Install Jumper Wire (SST 09843-18020) between terminals TE1 and E1 of data link connector No. 1. See Fig. 26. Start engine and note engine RPM.

NOTE: Data link connector No. 1 is located in engine compartment.

3) Engine RPM should increase to specified engine RPM for 5 seconds, and then return to idle. See IAC VALVE ENGINE SPEED TESTING SPECIFICATIONS table.

IAC VALVE ENGINE SPEED TESTING SPECIFICATIONS

Application	Engine RPM
Celica	900-1300

4) If engine RPM is not as specified, check IAC valve resistance and operation. If engine RPM is within specification, remove jumper wire. Turn ignition off.

5) To check IAC valve resistance, ensure ignition is off. Disconnect electrical connector from IAC valve located on lower area of throttle body. Using ohmmeter, measure resistance between terminal B+ and each remaining terminal. See Figs. 27 and 28.

6) Replace IAC valve if resistance is not within specification. See IAC VALVE RESISTANCE SPECIFICATIONS table.

7) To check IAC valve operation, remove IAC valve from throttle body. Connect battery voltage and ground to proper terminals and ensure valve opens and closes. See Figs. 29 and 30. Replace IAC valve if defective.

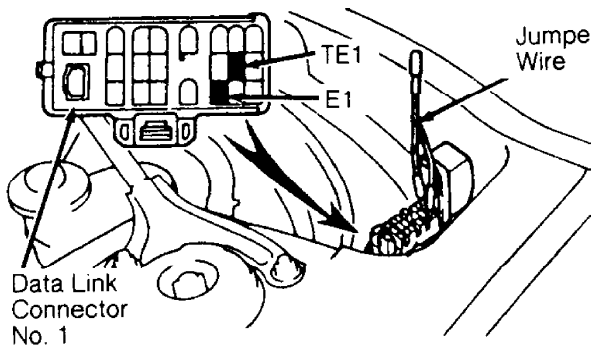
8) If IAC valve resistance is correct and operates correctly, check wiring circuit between Engine Control Module (ECM) and IAC valve. See ECM LOCATION table. See appropriate wiring diagram in L - WIRING DIAGRAMS article.

IAC VALVE RESISTANCE SPECIFICATIONS

Application	Ohms
Celica	19.3-22.3

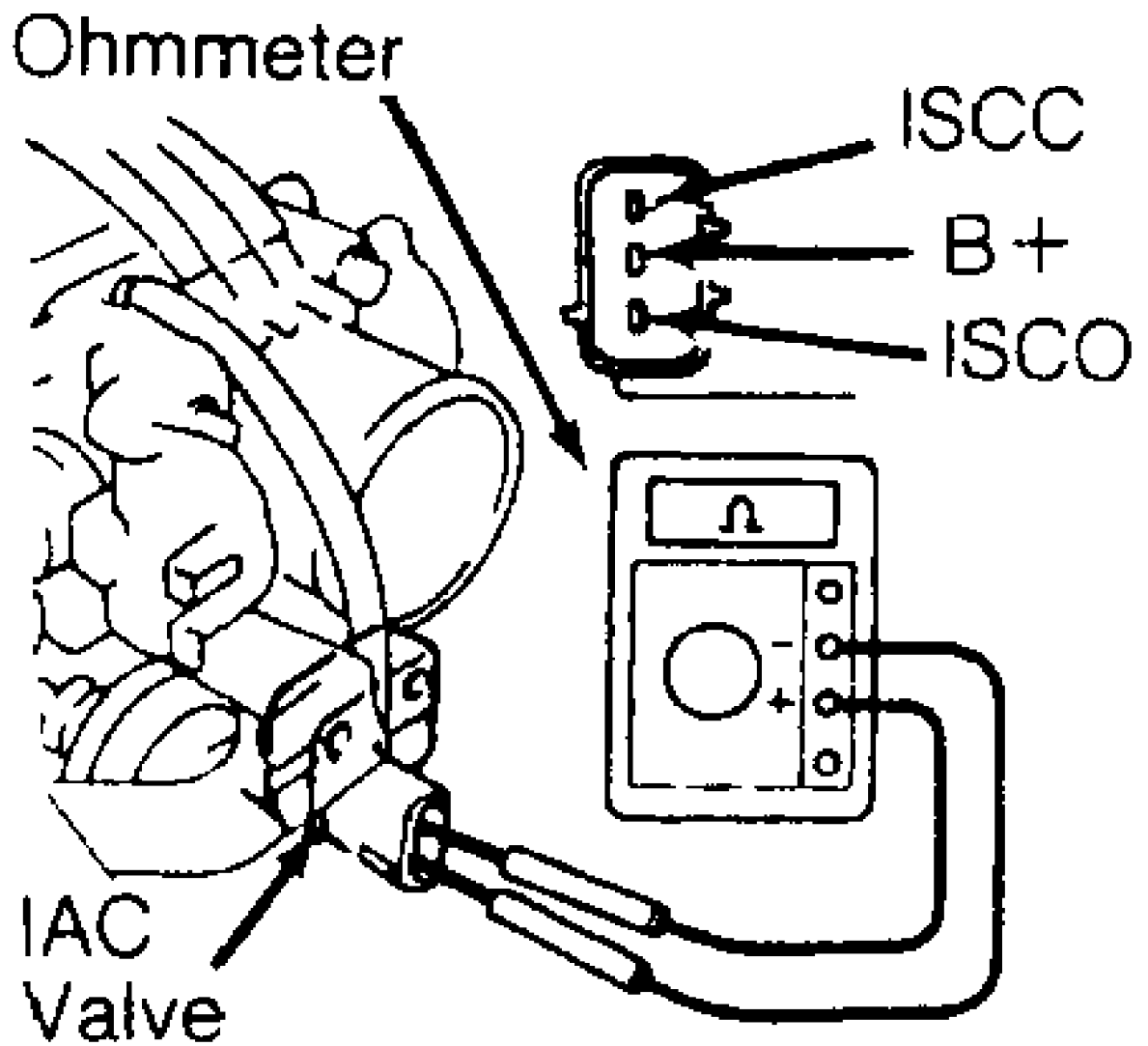
ECM LOCATION

Model	Location
Celica	Below Passenger's Side Of Dash Underneath The Carpet



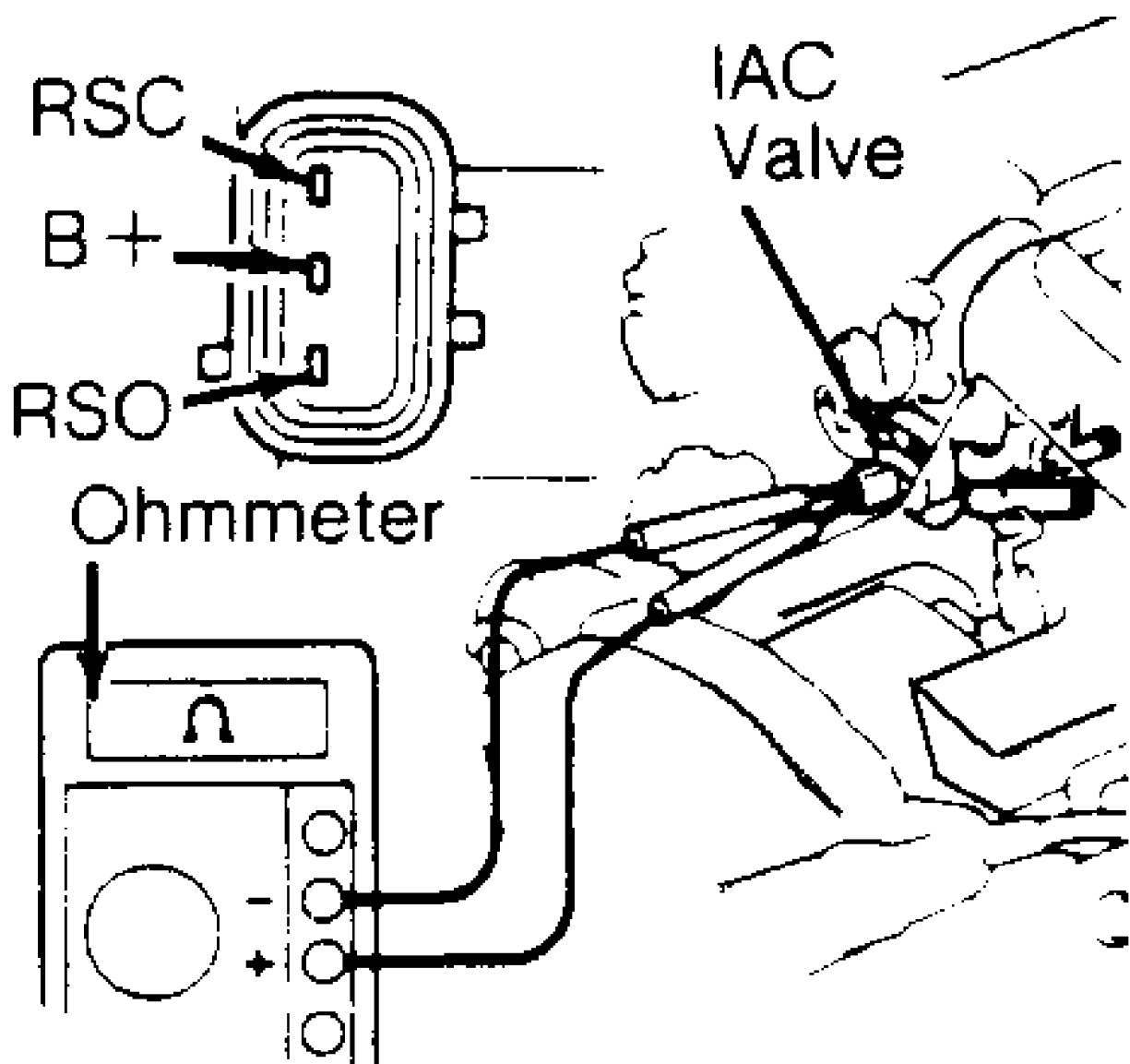
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Fig. 26: Installing Jumper Wire In Data Link Connector No. 1
 Courtesy of Toyota Motor Sales, U.S.A., Inc.



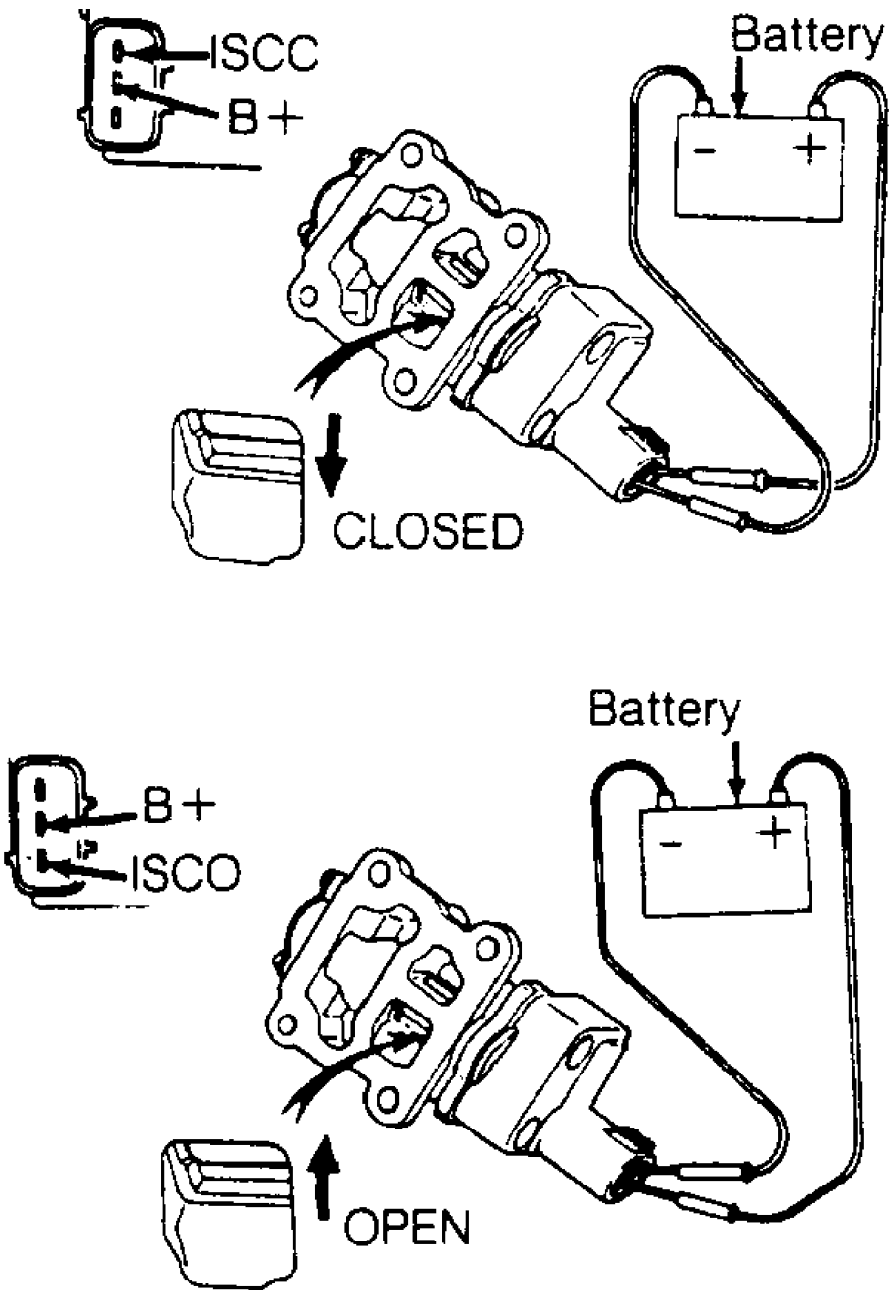
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Fig. 27: Checking IAC Valve Resistance (2.2L)
Courtesy of Toyota Motor Sales, U.S.A., Inc.



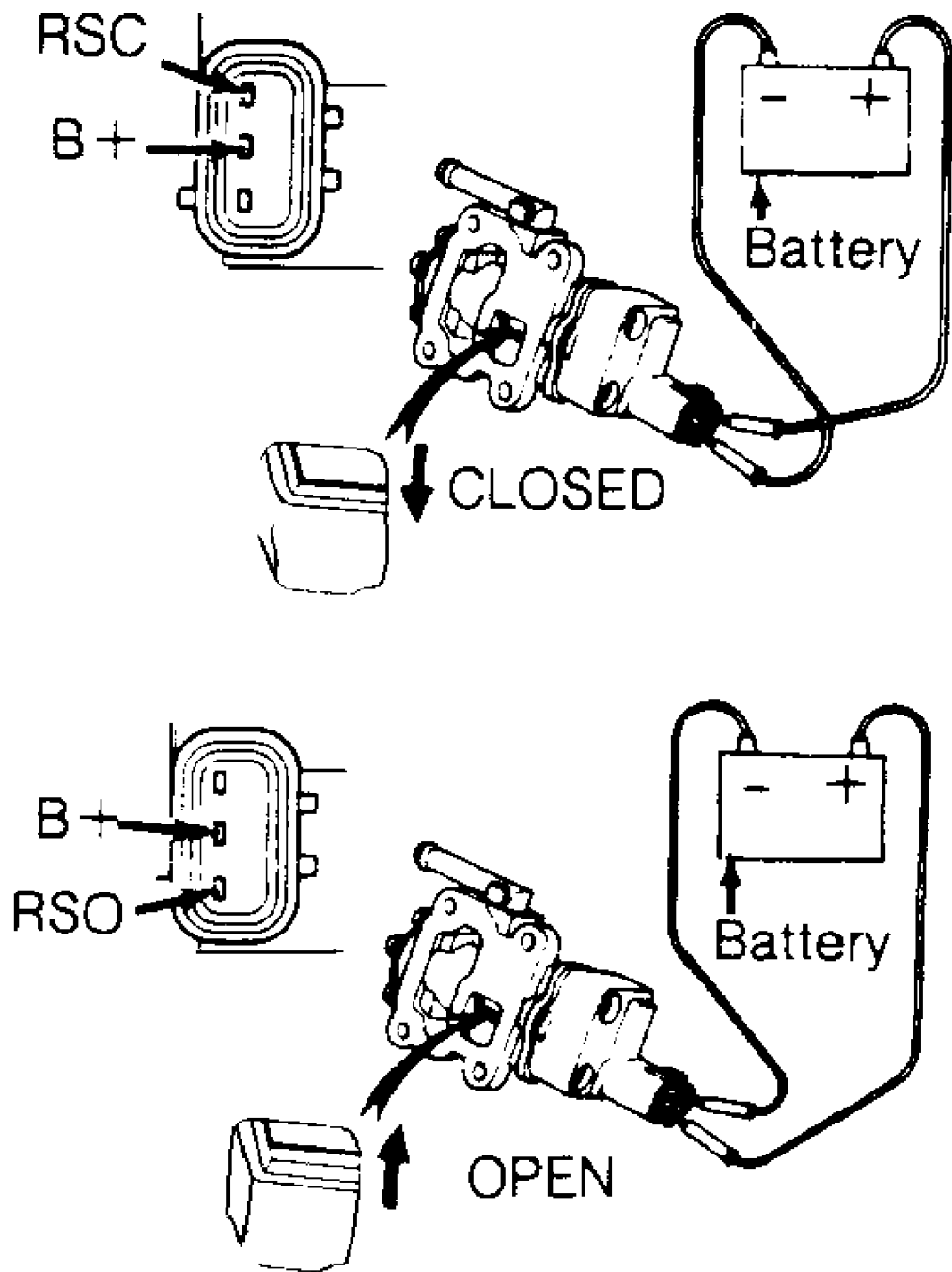
94145979

Fig. 28: Checking IAC Valve Resistance (1.8L)
Courtesy of Toyota Motor Sales, U.S.A., Inc.



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Fig. 29: Checking IAC Valve Operation (2.2L)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.



94E45983

Fig. 30: Checking IAC Valve Operation (1.8L)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

NOTE: For basic ignition checks, see F - BASIC TESTING article.

TIMING CONTROL SYSTEMS

Knock Sensor

See KNOCK SENSOR under ENGINE SENSORS & SWITCHES.

EMISSION SYSTEMS & SUB-SYSTEMS

EXHAUST GAS RECIRCULATION (EGR) SYSTEM TEST

NOTE: EGR systems contain different components and have different operating parameters depending on application. See Figs. 34-39. When testing EGR system and components, use proper illustration to determine component location.

2.2L

- 1) Ensure EGR vacuum modulator filter is clean and in good condition. Clean filter with compressed air (if necessary).
- 2) Using "T" connector, install vacuum gauge in vacuum line to EGR valve. Start engine. Ensure engine runs idles smoothly to ensure proper seating of EGR valve.
- 3) Install Jumper Wire (SST 09843-18020) between terminals TE1 and E1 of data link connector No. 1, located in engine compartment. See Fig. 26.

NOTE: The EGR system components can be checked with engine coolant temperature less than minimum temperature and engine at specified engine RPM.

4) Operate engine with engine coolant temperature less than minimum temperature and at specified RPM. See EGR TESTING SPECIFICATIONS table. No vacuum reading should be obtained.

5) Warm engine to normal operating temperature. Operate engine at specified engine RPM again. See EGR TESTING SPECIFICATIONS table. Ensure a low vacuum reading is now obtained.

6) Disconnect vacuum hose from port "R" of EGR vacuum modulator. See Fig. 31. Using additional hose, connect port "R" of EGR vacuum modulator directly to intake manifold. High vacuum reading should be obtained at specified engine RPM. See EGR TESTING SPECIFICATIONS table.

NOTE: Engine should misfire due to large amounts of exhaust gas being injected into intake manifold.

7) Remove vacuum hose and reconnect original vacuum hose to EGR vacuum modulator. To check EGR valve operation, remove vacuum hose from EGR valve.

8) Using vacuum pump, apply vacuum directly to EGR valve with engine idling. Engine should run rough or stall. If EGR system does not operate as described, each individual component should be tested. Shut engine off. Remove jumper wire from data link connector No. 1.

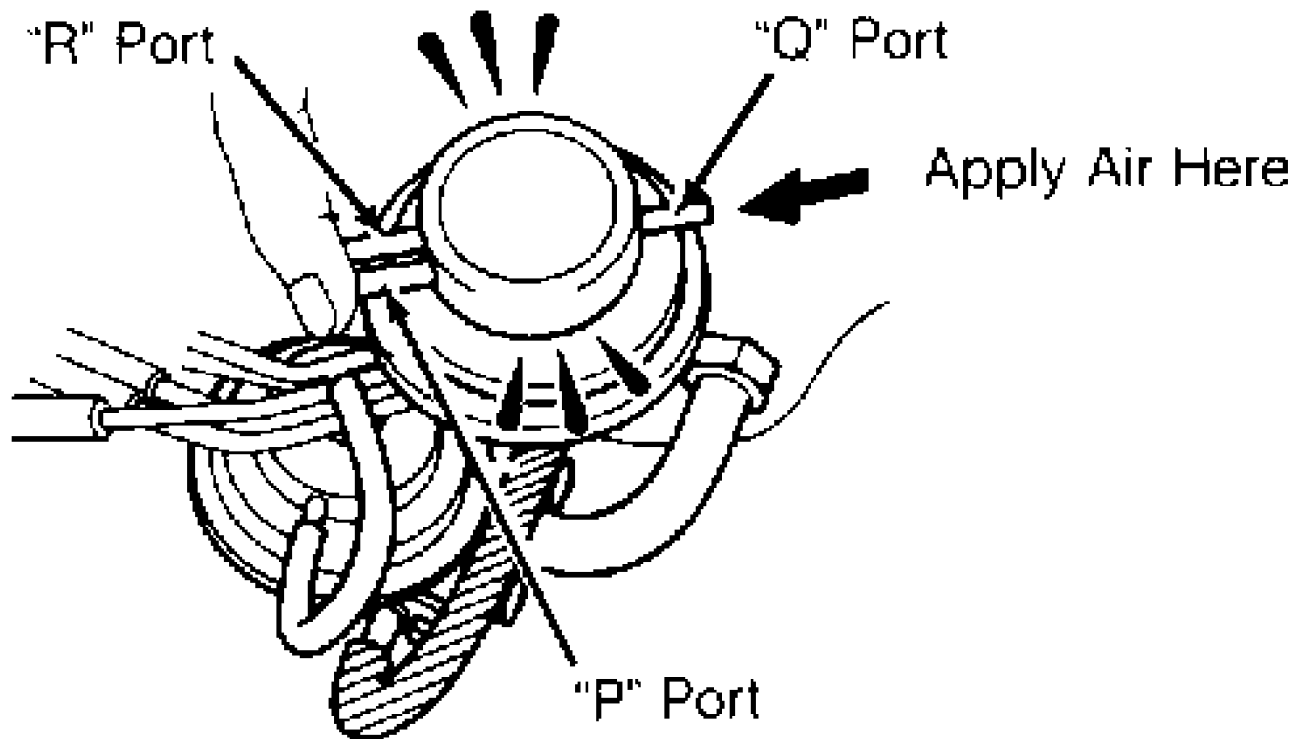


Fig. 31: Identifying Ports & Testing EGR Vacuum Modulator
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

1.8L

- 1) Ensure EGR vacuum modulator filter is clean and in good condition. Clean filter with compressed air (if necessary).
- 2) Using "T" connector, install vacuum gauge in vacuum line to EGR valve. Start engine. Ensure engine runs idles smoothly to ensure proper seating of EGR valve.
- 3) Install Jumper Wire (SST 09843-18020) between terminals TE1 and E1 of data link connector No. 1, located in engine compartment. See Fig. 26.

NOTE: The EGR system components can be checked with engine coolant temperature less than minimum temperature and engine at specified engine RPM.

4) Operate engine with engine coolant temperature less than minimum temperature and at specified RPM. See EGR TESTING SPECIFICATIONS table. No vacuum reading should be obtained.

5) Warm engine to normal operating temperature. Operate engine at specified engine RPM again. See EGR TESTING SPECIFICATIONS table. Ensure a low vacuum reading is now obtained.

6) To check EGR valve operation, remove vacuum hose from EGR valve. Using vacuum pump, apply vacuum directly to EGR valve with engine idling. Engine should run rough or stall.

7) If EGR system does not operate as described, each individual component should be tested. Shut engine off. Remove jumper wire from data link connector No. 1.

EGR TESTING SPECIFICATIONS

Application	Minimum Temperature	Engine RPM
-------------	---------------------	------------

1.8L (7A-FE)	.....	117°F (47°C)	.....	2500
2.2L (5S-FE)	.....	131°F (55°C)	.....	2500

EGR VACUUM MODULATOR

1) Mark locations and disconnect vacuum hoses from EGR vacuum modulator. Block ports "P" and "R" of EGR vacuum modulator. See Fig. 31.

NOTE: Ports "P" and "R" are the double ports on side of EGR vacuum modulator. Port "Q" is the single port on side of EGR vacuum modulator.

2) Apply air pressure to port "Q". See Fig. 31. Air should pass freely through air filter side of EGR vacuum modulator.

3) Start and operate engine at specified RPM. See EGR VACUUM MODULATOR TESTING SPECIFICATIONS table. Repeat test procedures in steps 1) and 2). Strong resistance of airflow should be felt. Replace EGR vacuum modulator if resistance is not felt. Reconnect vacuum hoses to proper locations.

EGR VACUUM MODULATOR TESTING SPECIFICATIONS

Application	Engine RPM
Celica	2500

EGR VACUUM SWITCHING VALVE (VSV)

NOTE: When testing EGR VSV, use proper illustration to determine component location. See Figs. 32-39. The EGR VSV may be referred to as the VSV.

2.2L

1) Disconnect electrical connector from EGR VSV. Using ohmmeter, check resistance between EGR VSV electrical terminals.

2) Replace EGR VSV if resistance is not within specification. See EGR VSV RESISTANCE SPECIFICATIONS table. Ensure no continuity exists between each electrical terminal and EGR VSV body. Replace EGR VSV if continuity exists between any electrical terminal and VSV body.

3) Apply air pressure to port "E" (without battery connected). See Figs. 32 and 33. Air pressure should flow from port "G". Connect battery voltage and ground to EGR VSV electrical terminals. See Figs. 32 and 33. Apply air pressure to port "E". Air pressure should flow through the air filter. Replace EGR VSV if defective.

1.8L

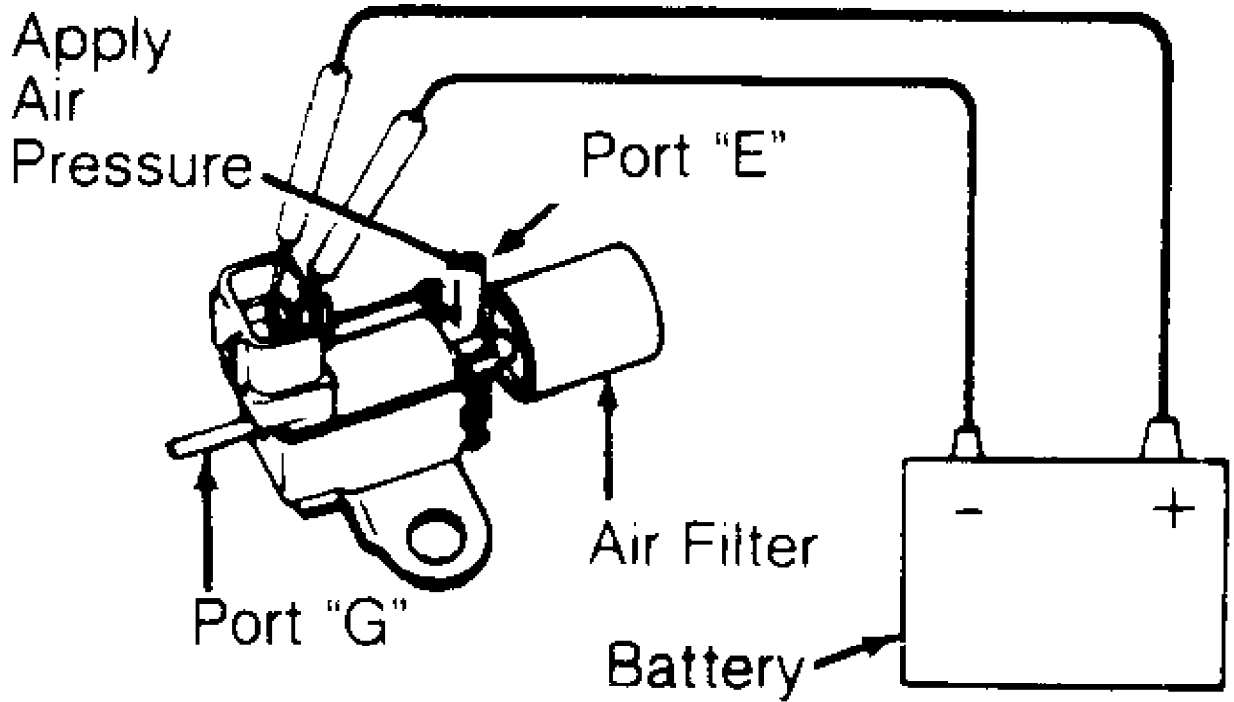
1) Disconnect electrical connector from EGR VSV. Using ohmmeter, check resistance between EGR VSV electrical terminals.

2) Replace EGR VSV if resistance is not within specification. See EGR VSV RESISTANCE SPECIFICATIONS table. Ensure no continuity exists between each electrical terminal and EGR VSV body. Replace EGR VSV if continuity exists between any electrical terminal and VSV body.

3) Apply air pressure to port "E" (without battery connected). See Figs. 32 and 33. Air pressure should flow through the air filter. Connect battery voltage and ground to EGR VSV electrical terminals. See Figs. 32 and 33. Apply air pressure to port "E". Air pressure should not flow through the air filter. Replace EGR VSV if defective.

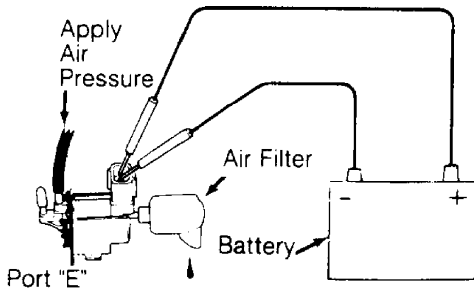
EGR VSV RESISTANCE SPECIFICATIONS

Application	Ohms
1.8L (7A-FE)	37-44
2.2L (5S-FE)	33-39



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Fig. 32: Testing EGR VSV Operation (2.2L)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.



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Fig. 33: Testing EGR VSV Operation (1.8L)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

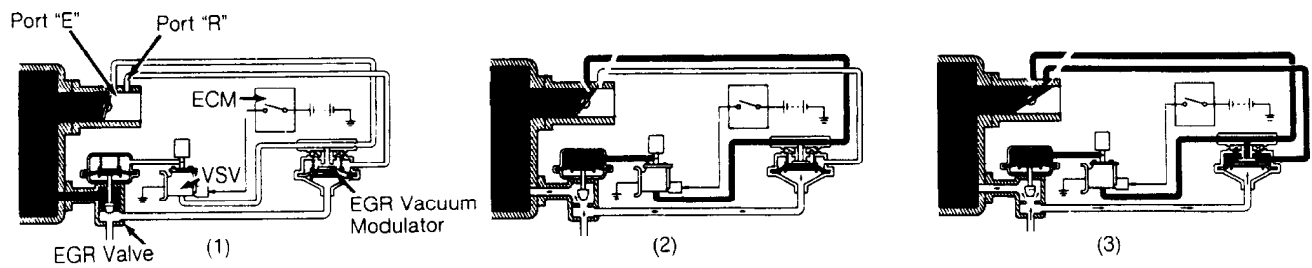
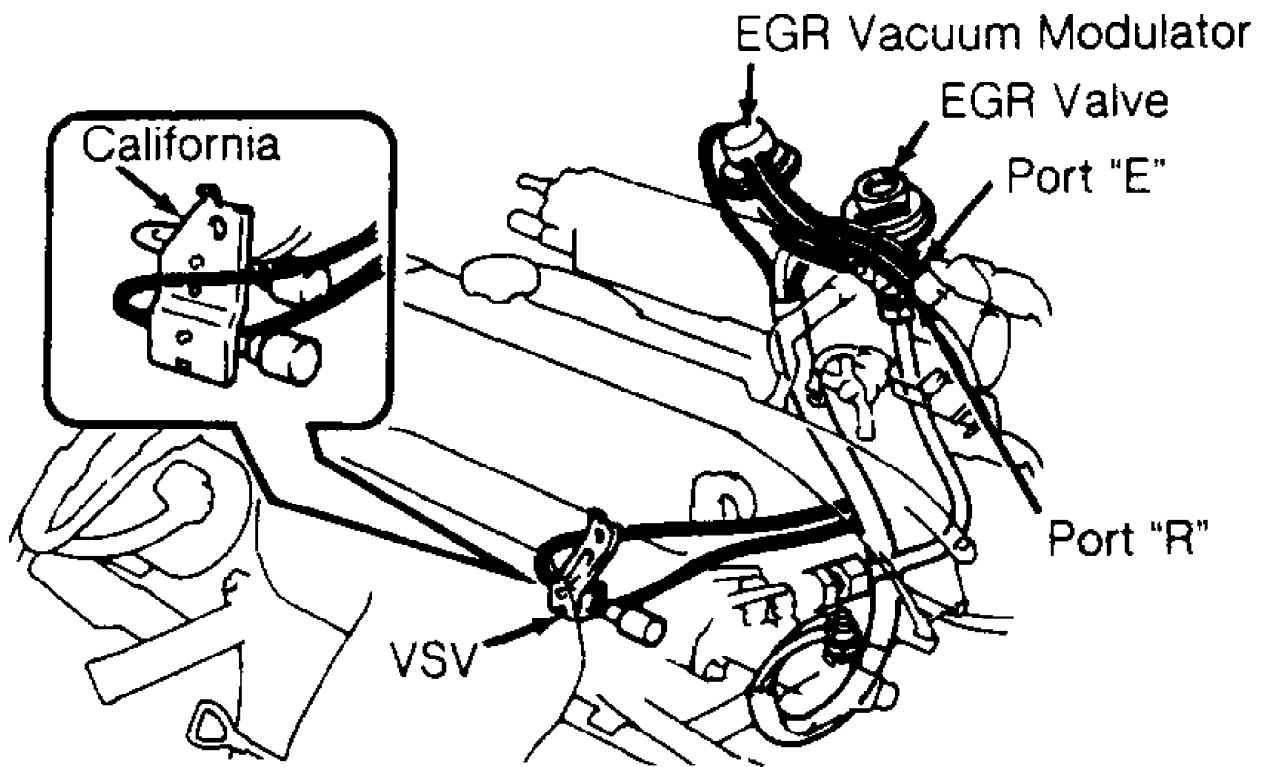


Fig. 34: EGR System Diagram (2.2L)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

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Fig. 35: EGR System Components (2.2L)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

ECT	RPM	PIM (ECM)	VSV	Throttle Valve Opening Angle	Pressure the EGR Valve Pressure Chamber	EGR Vacuum Modulator	EGR Valve	Exhaust Gas
Below 55°C (131°F)	-	-	CLOSED	-	-	-	CLOSED	Not Recirculated
Above 60°C (140°F)	Below 4,000 rpm	OFF	CLOSED	Position below port E	(1)	-	CLOSED	Not Recirculated
			CLOSED	Position below port E	(1)	-	CLOSED	Not Recirculated
	ON	OPEN	Position below port E and port R	(2) HIGH	*	CLOSES passage to atmosphere	OPEN	Recirculated
		OPEN	Position above port R	(3) HIGH	**	CLOSES passage to atmosphere	OPEN	Recirculated (increase)
	Above 4,000 rpm	OFF	CLOSED	-	-	-	CLOSED	Not Recirculated

* Pressure increases → Modulator closes → EGR valve opens → Pressure drops

** EGR valve closes → Modulator opens

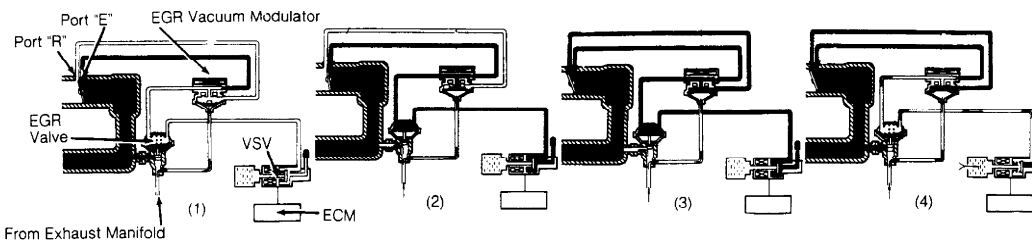
*** When the throttle valve is positioned above port R, the EGR vacuum modulator will close the atmosphere passage and open the EGR valve to increase the exhaust gas, even if the exhaust pressure is insufficiently low.

**** If terminals TE1 and E1 of the data link connector 1 are connected, the VSV switches ON.

NOTE: ECT is engine coolant temperature.

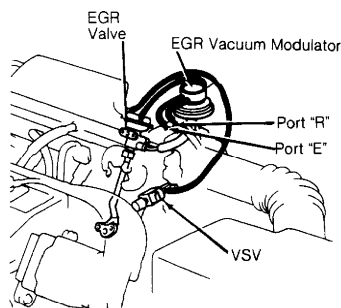
94D45990

Fig. 36: EGR System Operating Parameters (2.2L)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.



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Fig. 37: EGR System Diagram (1.8L)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.



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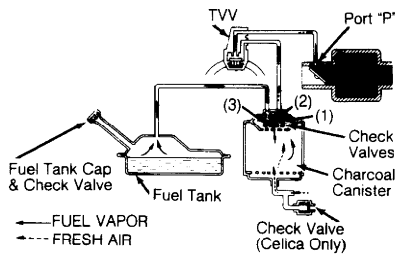
Fig. 38: EGR System Components (1.8L)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

ECT	RPM	VSV	Throttle Position	Pressure in the EGR Valve Pressure Chamber	EGR Vacuum Modulator	EGR Valve	Exhaust Gas
Below 47°C (117°F)	-	****	-	-	-	CLOSED	Not recirculated
Above 53°C (127°F)	Below 4,000 rpm	OFF	-	-	-	CLOSED	Not recirculated
		ON	Below port E	-	-	CLOSED	Not recirculated
			Between port E and port R	(1) LOW * Pressure constantly alternating between low and high	OPENS passage to atmosphere	CLOSED	Not recirculated
			Above port R	(2) HIGH **	CLOSES passage to atmosphere	OPEN	Recirculated
	Above 4,000 rpm	(4) OFF	-	-	-	CLOSED	Not recirculated

Remarks: * Pressure increase → Modulator closes → EGR valve opens → Pressure drops
 ** When the throttle valve is positioned above port R, the EGR vacuum modulator will close the atmosphere passage and open the EGR valve to increase the exhaust gas, even if the exhaust pressure is insufficiently low.
 *** VSV switched ON when product of engine speed multiplied by vacuum sensor valve exceeds a specified value.
 **** If terminals TE1 and E1 of data link connector 1 are connected, the VSV switches ON.

NOTE: ECT is engine coolant temperature.

Fig. 39: EGR System Operating Parameters (1.8L)
 Courtesy of Toyota Motor Sales, U.S.A., Inc.



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Fig. 40: Fuel Evaporation System Components
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

PICKUP 3.0L & 4RUNNER 3.0L

Engine Coolant Temp.	TVV	Throttle Valve Opening	Canister Check Valve			Check Valve in Cap	Evaporated Fuel (HC)
			(1)	(2)	(3)		
Below 35°C (95°F)	CLOSED	-	-	-	-	-	HC from tank is absorbed into the canister
Above 54°C (129°F)	OPEN	Positioned below port P	CLOSED	-	-	-	
		Positioned above port P	OPEN	-	-	-	HC from canister is led into air intake chamber.
High pressure in tank	-	-	-	OPEN	CLOSED	CLOSED	HC from tank is absorbed into the canister.
High vacuum in take	-	-	-	CLOSED	OPEN	OPEN	Air is led into the fuel tank.

93H80504

Fig. 41: Fuel Evaporation Operating Parameters
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

NOTE: The EVAP Thermal Vacuum Valve (TVV) may be referred to as EVAP Thermal Valve (TV).

EVAP Thermal Vacuum Valve

1) Drain cooling system. Remove TVV, located in coolant passage and contains 2 vacuum hoses which go to the charcoal canister and throttle body.

2) Use cool water to cool threaded end of TVV to less than 95°F (35°C). Apply air pressure to top port on TVV. Ensure TVV is closed and no air will pass through lower port.

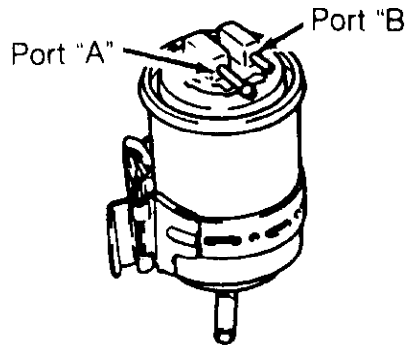
3) Heat water to greater than 129°F (54°C). Apply air pressure to top port on TVV. Ensure TVV is open and air passes through lower port. Replace TVV if defective. Apply thread sealant to threads of TVV and reinstall. Fill cooling system.

Charcoal Canister

1) Disconnect hoses from charcoal canister. Check for clogged filter and/or stuck check valve by applying low air pressure to port "A". See Fig. 42. Ensure air flows freely from other ports on charcoal canister.

2) Apply low air pressure to port "B". See Fig. 42. Ensure no air flows from any other ports on charcoal canister. Replace charcoal canister if defective.

3) To clean charcoal canister filter, apply 43 psi (3 kg/cm²) air pressure to port "A" while holding port "B" closed. Ensure no activated carbon comes out of charcoal canister. DO NOT attempt to wash out charcoal canister.



94H46018

Fig. 42: Identifying Charcoal Canister Ports
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

Check Valve

1) Remove check valve from lower hose on charcoal canister.

Apply air pressure to Blue or Yellow side of check valve. Air should pass through check valve.

2) Apply air pressure to Black side of check valve. Air should not pass through check valve. Replace check valve if defective.

POSITIVE CRANKCASE VENTILATION (PCV)

1) Remove PCV valve. Attach hose to PCV valve. Blow air from cylinder head side of PCV valve. Ensure air passes easily through PCV valve.

2) Blow air from intake manifold side of PCV valve. Ensure air passes through PCV valve with some restriction. Replace PCV valve if valve does not function as described.

THROTTLE CONTROLS

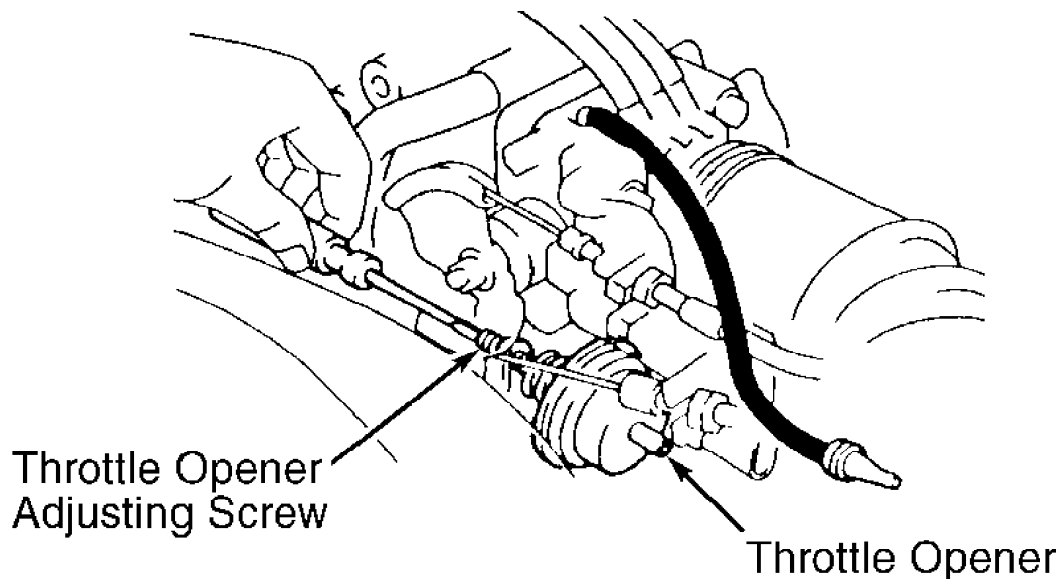
NOTE: When testing throttle control systems, tachometer may be required. Ensure tachometer is connected to proper terminals. For tachometer connections, see IDLE SPEED & MIXTURE in D - ADJUSTMENTS article.

THROTTLE OPENER

1) Warm engine to normal operating temperature. Ensure idle speed is correct. See IDLE SPEED & MIXTURE in D - ADJUSTMENTS article.

2) Disconnect and plug vacuum hose at throttle opener, located on side of throttle body. Start engine. Maintain engine speed at 2500 RPM. Release throttle and note engine speed. Engine speed should be within specification. See THROTTLE OPENER SPECIFICATIONS table.

3) If engine speed is not within specification, rotate throttle opener adjusting screw until correct engine speed is obtained. See Fig. 43. Reinstall vacuum hose on throttle opener.



93180547

Fig. 43: Adjusting Throttle Opener (Similar)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

THROTTLE OPENER SPECIFICATIONS

Application (1) RPM

Celica 1300-1500

(1) - With electric cooling fan turned off (if equipped).
