2002 ENGINE PERFORMANCE

System & Component Testing - 4-Cylinder

INTRODUCTION

NOTE: Before performing system and component testing procedures, check for any related Technical Service Bulletins (TSBs).

WARNING: On Prius, read service precautions before proceeding with service procedure. See SERVICE PRECAUTIONS .

NOTE: References to California models apply to California emission vehicles, which may be verified by underhood Emission Control label. California emissions may be available in other states.

Before testing separate components or systems, follow proper workflow. See TESTING PROCEDURE under SELF-DIAGNOSTIC SYSTEM in appropriate SELF-DIAGNOSTICS article. If no Diagnostic Trouble Codes (DTC) are present and a no start condition exists, proceed to appropriate BASIC DIAGNOSTIC PROCEDURES article. If no DTCs are present and a driveability condition exists, proceed to **TROUBLE SHOOTING - NO CODES** article for diagnosis by symptom (i.e., ROUGH IDLE, NO START, etc.).

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.

SERVICE PRECAUTIONS

PRIUS

WARNING: When performing any inspection or service procedure on this vehicle, ensure following service precautions are followed to prevent personal injury or death due to the extremely high voltage.

The following service precautions must be followed:

- Ensure ignition is off and ignition key is removed from ignition before performing any inspection or service procedure in engine compartment, as engine may automatically start and shut off when ignition is on and READY light is illuminated. READY light is displayed just above the shift lever position indicator on instrument cluster at center of instrument panel.
- Read all service and warning labels in engine compartment before performing any procedures in engine compartment.

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- All high-voltage wiring harness connectors contain Orange connectors. DO NOT touch any wiring harness that contains Orange connectors.
- High-voltage battery and other high-voltage components may be identified by HIGH VOLTAGE caution labels on them. DO NOT touch these components.
- If necessary to inspect or service high-voltage system, ensure ignition is off. Remove service plug and wait at least 5 minutes to ensure high voltage is fully discharged before touching any high-voltage wiring harness, connectors or components. Service plug is located on service plug assembly at driver's side front corner of trunk compartment, near high-voltage battery. See **Fig. 1** . Ensure service plug is stored in a location in which no one may install service plug while technician is working on the vehicle.
- If necessary to touch any high-voltage wiring harness, connectors or components, ensure service plug is removed and battery voltage or less exists at electrical connector. Use Toyota insulated gloves when touching any high-voltage wiring harness, connectors or components. Ensure insulated gloves are dry and in good condition and that no holes exist in insulated gloves by applying air to insulated glove before touching any high-voltage wiring harness, connectors or components.
- DO NOT wear any metal objects while working on vehicle which may accidently drop and cause a short circuit.
- If any high-voltage wiring harness connector is disconnected, ensure terminal on wiring harness connector is wrapped with tape to prevent wiring harness connector from contacting any surface.
- If servicing high-voltage system, place sign on roof of vehicle to indicate to other technicians that high-voltage system is being serviced.

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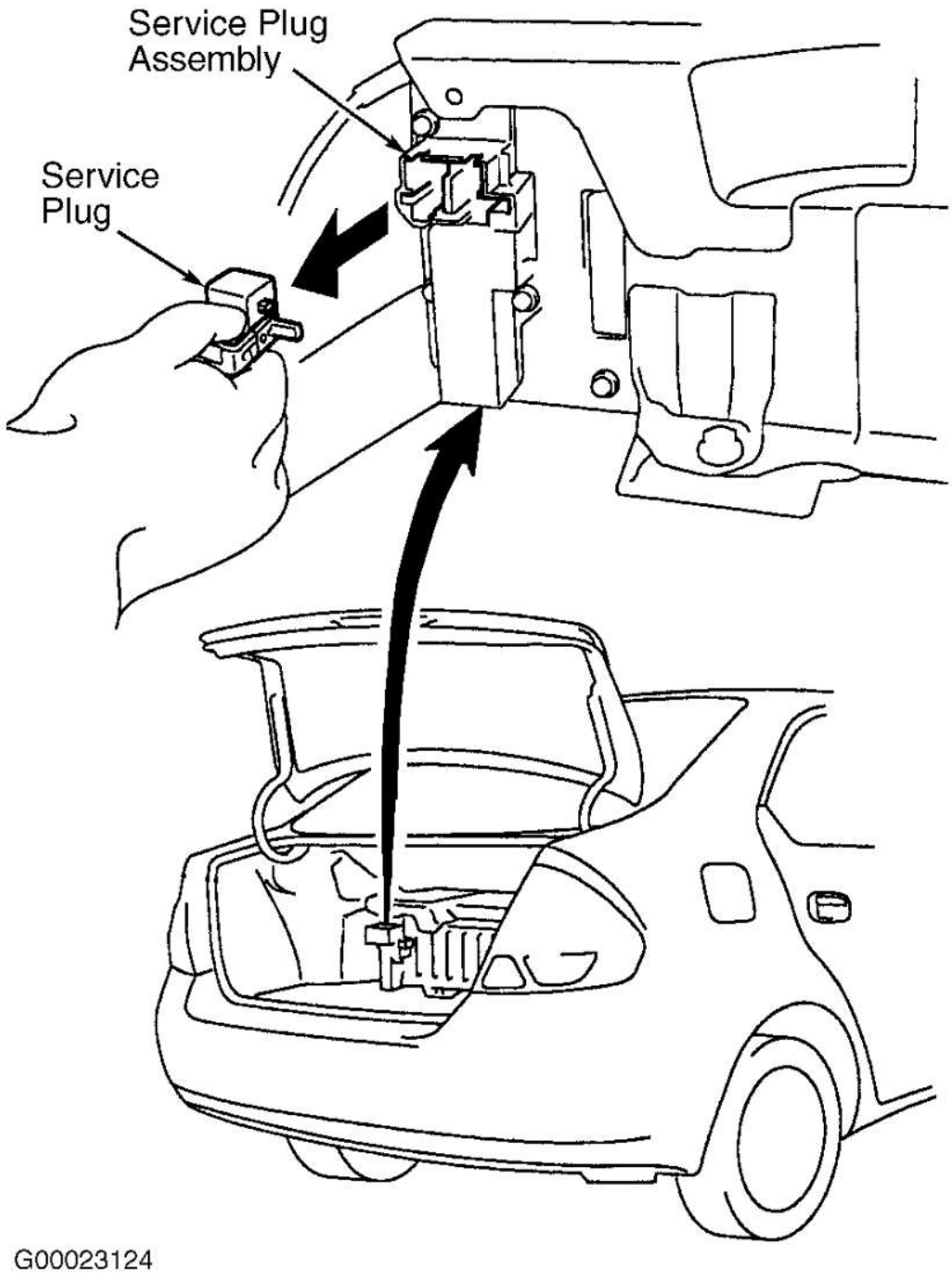


Fig. 1: Locating Service Plug & Service Plug Assembly (Prius)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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PROGRAMMING

POWER SUN ROOF REINITIALIZATION PROCEDURE

Camry

NOTE: Following procedure should be performed if battery is disconnected and reconnected, or battery is discharged and recharged to provide proper automatic operation and jam protection operation of power sun roof.

1. Ensure ignition is on. Depress and hold TILT UP side of power sun roof switch until power sun roof tilts all the way upward and then tilts downward a little. Power sun roof switch is located on headliner, just in front of power sun roof.
2. Check proper operation of open/closing and tilt up/down function for power sun roof using power sun roof switch. Power sun roof should operate anytime ignition is on, or for 43 seconds after ignition is off provided both front doors are closed. It will stop operating if any front door is opened. Depressing SLIDE OPEN side of power sun roof switch for one second should open power sun roof. Depressing TILT UP side of power sun roof switch for one second should close power sun roof. To tilt power sun roof upward, depress and hold TILT UP side of power sun roof switch for one second. To tilt power sun roof downward, depress and hold SLIDE OPEN side of power sun roof switch for one second.

Celica

NOTE: Following procedure should be performed if battery is disconnected and reconnected, or battery is discharged and recharged to provide proper automatic operation and jam protection operation of power sun roof.

Close power sun roof using power sun roof switch and continue to depress power sun roof switch briefly after power sun roof is fully closed. Power sun roof switch is located on headliner, just in front of power sun roof.

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AIR INDUCTION SYSTEMS

ACOUSTIC CONTROL INDUCTION SYSTEM VACUUM SWITCHING VALVE

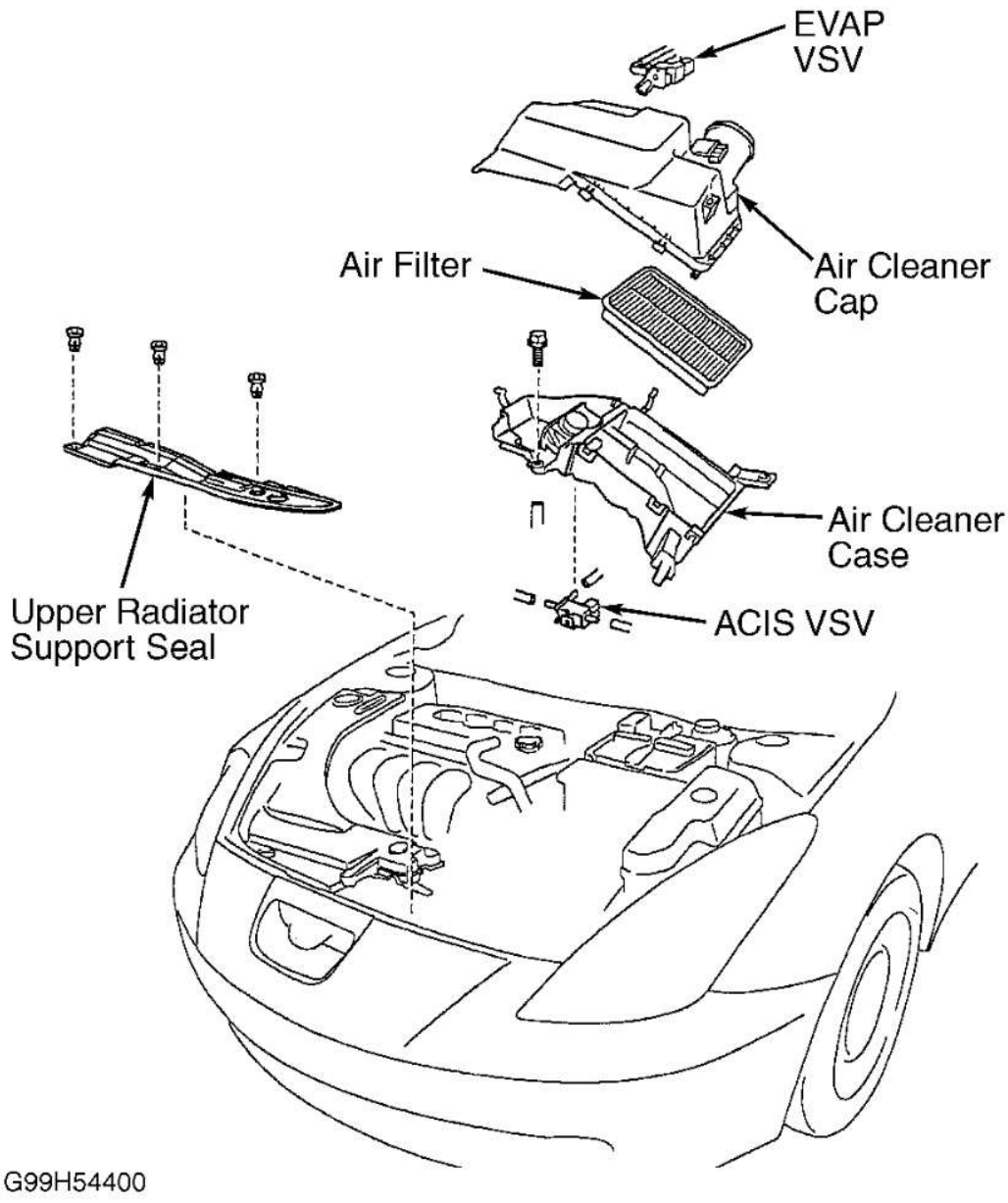
Celica

NOTE: Acoustic Control Induction System (ACIS) Vacuum Switching Valve (VSV) may also be referred to as intake air control valve system VSV.

1. Remove necessary components for access to ACIS VSV. ACIS VSV is located on bottom of air cleaner case. See **Fig. 2** .
2. Remove ACIS VSV. Using ohmmeter, ensure continuity exists between electrical terminals on ACIS VSV and that resistance is 37-44 ohms at 68°F (20°C). Replace ACIS VSV if no continuity exists or resistance is not within specification.
3. Using ohmmeter, ensure no continuity exists between each electrical terminal and body of ACIS VSV.

Replace ACIS VSV if continuity exists between electrical terminal and body of ACIS VSV.

4. To test ACIS VSV operation, apply air pressure to port "E". Ensure air flows from port "G". Perform STEP 1 in illustration. See **Fig. 3** .
5. Apply battery voltage and ground to electrical terminals on ACIS VSV. Apply air pressure to port "E". Ensure air flows from port "F" and not from port "G". Perform STEP 2 in illustration. See **Fig. 3** . Replace ACIS VSV if defective. Reinstall ACIS VSV.



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Fig. 2: Locating Acoustic Control Induction System Vacuum Switching Valve (Celica)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

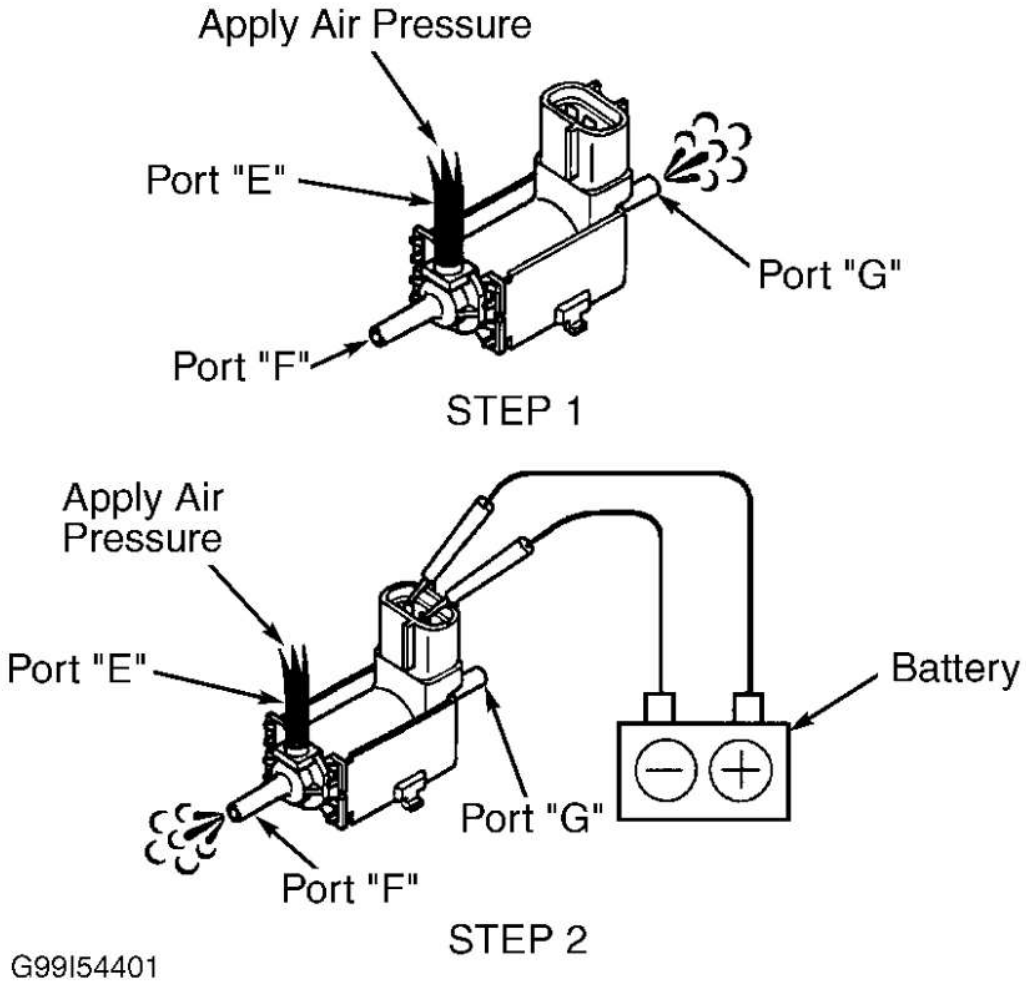


Fig. 3: Testing Acoustic Control Induction System Vacuum Switching Valve (Celica)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ELECTRONIC THROTTLE CONTROL SYSTEM

NOTE: **Electronic Throttle Control System (ETCS) may also be referred to as Electronic Throttle Control System-Intelligent (ETCS-I or ETCS-i).**

Camry, Camry Solara, MR2 With Sequential Manual Transaxle & Prius

For testing of throttle body and components, see **THROTTLE BODY** under IDLE CONTROL SYSTEMS.

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COMPUTERIZED ENGINE CONTROLS

A/C COMPRESSOR LOCK SENSOR CIRCUIT

Camry, Celica & Highlander

Testing information is not available from manufacturer.

Camry Solara With Manual A/C & MR2

CAUTION: If Engine Control Module (ECM) replacement is instructed in the following testing, always ensure ECM wiring harness electrical connector and ground circuit are okay. If either are defective, repair and repeat testing to confirm ECM malfunction.

1. Check A/C compressor drive belt for proper tension. If A/C compressor drive belt has proper belt tension, go to next step. If A/C compressor drive belt does not have proper belt tension, it may be necessary to replace automatic belt tensioner and then go to next step.
2. Start engine and note if A/C compressor locks when blower and A/C switches are in ON position. If A/C compressor does not lock, go to next step. If A/C compressor locks, repair A/C compressor as necessary.
3. Check A/C compressor lock sensor. See **A/C COMPRESSOR LOCK SENSOR** under ENGINE SENSORS & SWITCHES. If A/C compressor lock sensor is okay, go to next step. If A/C compressor lock sensor is defective, replace A/C compressor lock sensor.
4. On Camry Solar, remove glove box for access to Engine Control Module (ECM). For illustration of ECM location, see **THEORY & OPERATION** article. On MR2, remove luggage compartment lids, luggage compartment boxes and quarter trim panels for access to Engine Control Module (ECM). ECM is located on inside of firewall, directly behind driver's seat and luggage compartment. For illustration of ECM location, see **THEORY & OPERATION** article. For additional information on removal of luggage compartment components, see **FUEL PUMP** under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
5. On all models, note ECM electrical connector terminals. See **Fig. 19** and **Fig. 25** . Connect oscilloscope between proper terminals on ECM for A/C compressor lock sensor. See **ECM TERMINAL IDENTIFICATION & CIRCUIT IDENTIFICATION FOR A/C COMPRESSOR LOCK SENSOR** table. These are the LCK1 and E1 terminals at ECM.

ECM TERMINAL IDENTIFICATION & CIRCUIT IDENTIFICATION FOR A/C COMPRESSOR LOCK SENSOR

Application	ECM Connector	ECM Terminal No. (Wire Color)
Camry Solara	E9	(1) 23 (White/Blue)
	E9	(2) 1 (Brown)
MR2	E3	(1) 28 (White/Red)
	E4	(2) 17 (Brown)

(1) This is the A/C compressor lock sensor signal circuit at ECM.

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(2) This is the ground circuit at ECM.

6. Check A/C compressor lock sensor wave pattern on oscilloscope during cranking or with engine idling. A/C compressor lock sensor wave pattern should switch from between zero volts and .2 volts within 20 milliseconds. See **Fig. 4** . If A/C compressor lock sensor wave pattern is as specified, go to next step. If A/C compressor lock sensor wave pattern is not at specified, replace A/C compressor lock sensor.
7. On Camry Solara, go to next step. On MR2, check A/C compressor clutch relay. See **A/C COMPRESSOR CLUTCH RELAY** under MODULES, MOTORS, RELAYS & SOLENOIDS. If A/C compressor clutch relay is okay, go to next step. If A/C compressor clutch relay is defective, replace A/C compressor clutch relay.
8. On all models, check wiring harness and electrical connectors for A/C compressor lock sensor between ECM and A/C compressor lock sensor for any problems. See **ECM TERMINAL IDENTIFICATION & CIRCUIT IDENTIFICATION FOR A/C COMPRESSOR LOCK SENSOR** table. If wiring harness or electrical connector is defective, repair as necessary. If wiring harness and electrical connectors are okay, check ECM ground circuit. See **WIRING DIAGRAMS** article. If ECM ground circuit is defective, repair ground circuit as necessary. If ECM ground circuit is okay, replace ECM. If ECM is replaced and vehicle is equipped with engine immobilizer system, ECM must be programmed with proper ignition key code for engine immobilizer system. Models equipped with engine immobilizer system may be identified by looking at the ignition key. On models equipped with engine immobilizer system, the top of the ignition key is thicker than a standard ignition key, as a transponder chip is incorporated into the top of the ignition key. For programming procedures, see COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION, or appropriate ENGINE IMMOBILIZER SYSTEMS article in ACCESSORIES & EQUIPMENT.

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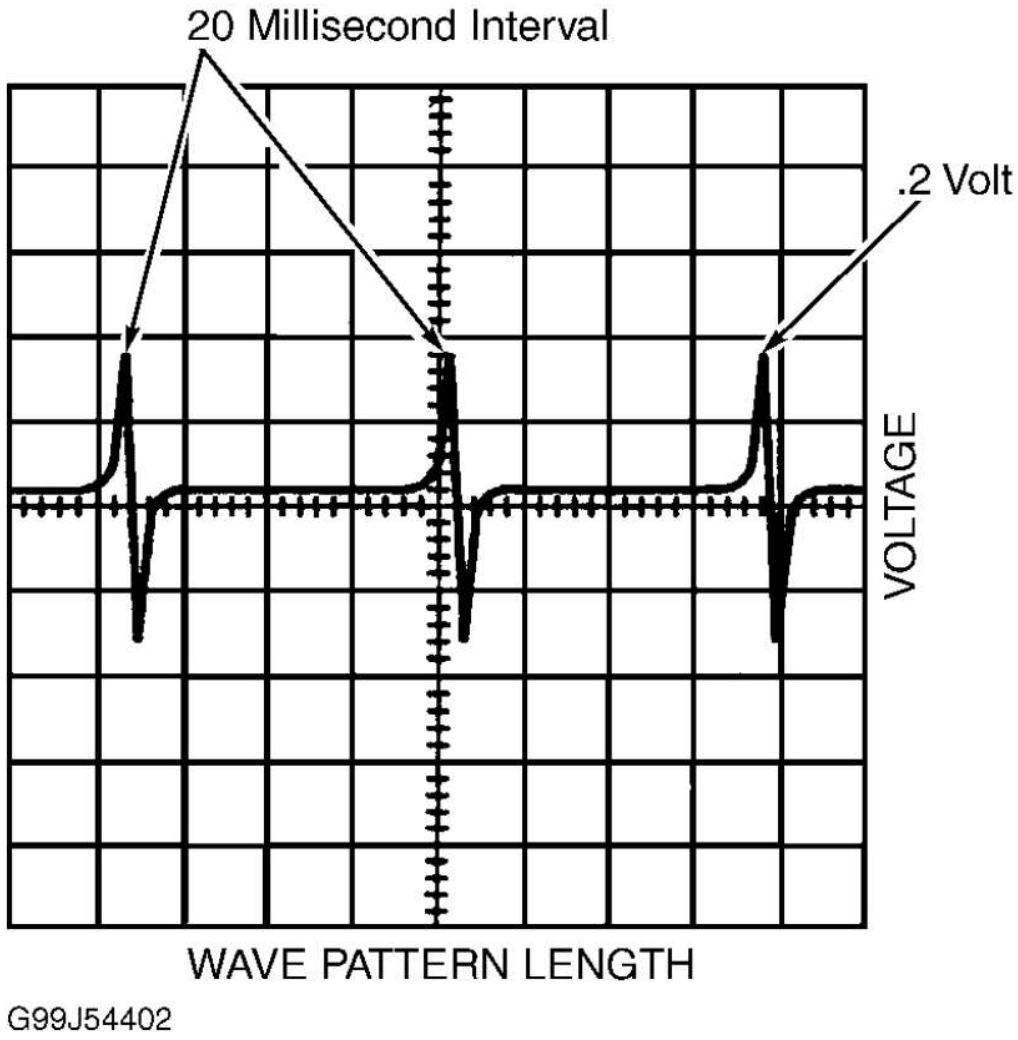


Fig. 4: Identifying A/C Compressor Lock Sensor Wave Pattern (Camry Solara With Manual A/C & MR2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

RAV4

CAUTION: If Engine Control Module (ECM) replacement is instructed in the following testing, always ensure ECM wiring harness electrical connector and ground circuit are okay. If either are defective, repair and repeat testing to confirm ECM malfunction.

1. Remove glove box for access to Engine Control Module (ECM). ECM is located near passenger's side

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kick panel, just below instrument panel. For illustration of ECM location, see **THEORY & OPERATION** article. Note terminals on ECM electrical connector. See **Fig. 27** .

2. Turn ignition on. Using voltmeter, check voltage between body ground and terminal No. 15 (Red/Yellow or White wire) at ECM electrical connector E7. This is the ACMG terminal on ECM. There are 2 different wiring harnesses used. Wire color at designated terminal may vary according to wiring harness used. Voltage should be 9-14 volts. If voltage is within specification, go to next step. If voltage is not within specification, check Red/Yellow or White wire and electrical connector between ECM and terminal No. 3 (Red/Yellow or White wire) at electrical connector 3S on passenger's side junction block Electronic Control Unit (ECU). See **Fig. 5** .
3. Check A/C compressor drive belt for proper tension. If A/C compressor drive belt has proper belt tension, go to next step. If A/C compressor drive belt does not have proper belt tension, it may be necessary to replace automatic belt tensioner and then go to next step.
4. Start engine and note if A/C compressor locks when blower and A/C switches are in ON position. If A/C compressor does not lock, go to next step. If A/C compressor locks, repair A/C compressor as necessary.
5. Check A/C compressor lock sensor. See **A/C COMPRESSOR LOCK SENSOR** under ENGINE SENSORS & SWITCHES. If A/C compressor lock sensor is okay, go to next step. If A/C compressor lock sensor is defective, replace A/C compressor lock sensor.
6. Check wiring harness and electrical connectors between A/C compressor lock sensor, passenger's side junction block ECU, A/C amplifier and ECM. See WIRING DIAGRAMS in appropriate article in AIR CONDITIONING & HEATING. A/C amplifier is located behind center of instrument panel. See **Fig. 5** . If wiring harness or electrical connector is defective, repair as necessary. If wiring harness and electrical connectors are okay, check ECM ground circuit. See **WIRING DIAGRAMS** article. If ECM ground circuit is defective, repair ground circuit as necessary. If ECM ground circuit is okay, replace ECM. On models equipped with engine immobilizer system, if ECM is replaced, ECM must be programmed with proper ignition key code for engine immobilizer system. Models equipped with engine immobilizer system may be identified by looking at the ignition key. On models equipped with engine immobilizer system, the top of the ignition key is thicker than a standard ignition key, as a transponder chip is incorporated into the top of the ignition key. For programming procedures, see COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION, or appropriate ENGINE IMMOBILIZER SYSTEMS article in ACCESSORIES & EQUIPMENT.

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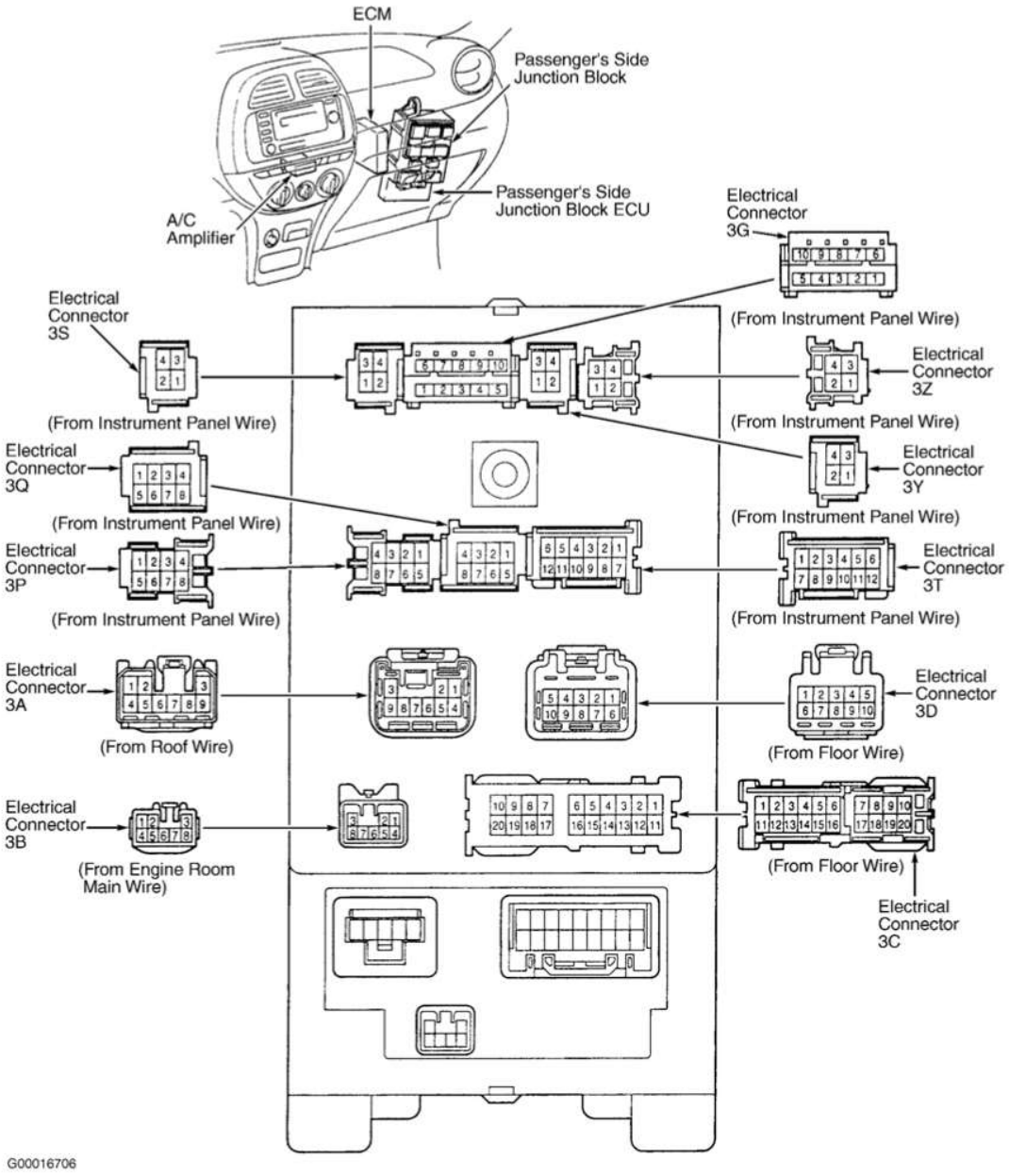


Fig. 5: Locating Passenger's Side Junction Block Electronic Control Unit, A/C Amplifier & Identifying Electrical Connectors (RAV4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

A/C-CUT CONTROL SYSTEM CIRCUIT

Highlander, MR2 & RAV4

Testing information is not available from manufacturer.

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Corolla

1. If Toyota hand-held tester is available, go to next step. If Toyota hand-held tester is not available, go to step 10 .
2. Connect hand-held tester to data link connector No. 3 at driver's side of instrument panel. See **Fig. 11** . Turn ignition on and then turn hand-held tester on. Start engine and turn A/C switch to ON position. Ensure A/C clutch engages.
3. Select ACTIVE TEST MODE on hand-held tester. Check operation of A/C clutch when A/C-cut control is operated by hand-held tester. A/C clutch should turn off (stop operating) when A/C-cut control is operated by hand-held tester. If A/C clutch does not operate properly, go to next step. If A/C clutch operates properly, shut engine off. Remove hand-held tester. Diagnose by symptom. See **TROUBLE SHOOTING - NO CODES** article.
4. Check for open and short in wiring harness and electrical connectors between Engine Control Module (ECM) and A/C amplifier. See WIRING DIAGRAMS in appropriate article in AIR CONDITIONING & HEATING. ECM is located behind stereo on instrument panel, just in front of center console. For illustration of ECM location, see **THEORY & OPERATION** article. A/C amplifier is located behind instrument panel, just above glove box, near center of glove box area. See **Fig. 6** . If wiring harness and electrical connectors are okay, go to next step. If wiring harness or electrical connector is defective, repair as necessary.
5. Remove necessary components for access to ECM. See **ENGINE CONTROL MODULE** under COMPUTERIZED ENGINE CONTROLS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
6. Remove bolts from ECM so electrical connectors can be accessed. Note ECM electrical connector terminals. See **Fig. 21** and **Fig. 22** .
7. Start engine. On 3-speed A/T and M/T models, using voltmeter, check voltage between body ground and terminal No. 21 (Red/Blue wire) at ECM electrical connector E6 while turning A/C switch from ON to OFF positions. See **Fig. 21** . This is the ACT terminal at ECM. On 4-speed A/T models, using voltmeter, check voltage between body ground and terminal No. 12 (Red/Blue wire) at ECM electrical connector E10 while turning A/C switch from ON to OFF positions. See **Fig. 22** . This is the ACT terminal at ECM.
8. On all models, voltage should be 9-14 volts with A/C switch in ON position and less than 1.5 volts with A/C switch in OFF position. If voltage is as specified, go to next step. If voltage is not as specified, check for open and short in wiring harness and electrical connectors between ECM and A/C amplifier. See WIRING DIAGRAMS in appropriate article in AIR CONDITIONING & HEATING. A/C amplifier is located behind instrument panel, just above glove box, near center of glove box area. See **Fig. 6** . If wiring harness and electrical connectors are okay, replace A/C amplifier. If wiring harness or electrical connector is defective, repair as necessary.
9. Check ECM ground circuit. See **WIRING DIAGRAMS** article. If ECM ground circuit is defective, repair ground circuit as necessary. If ECM ground circuit is okay, replace ECM.

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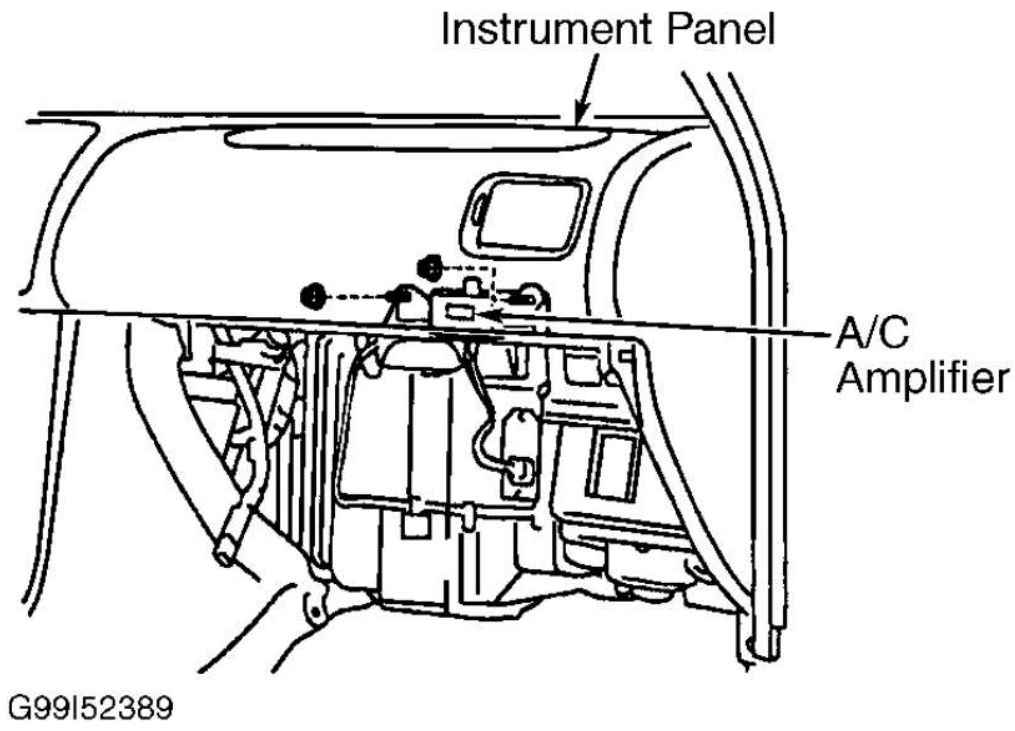


Fig. 6: Locating A/C Amplifier (Corolla)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

10. Remove necessary components for access to Engine Control Module (ECM). See **ENGINE CONTROL MODULE** under COMPUTERIZED ENGINE CONTROLS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
11. Remove bolts from ECM so electrical connectors can be accessed on ECM. Note ECM electrical connector terminals. See **Fig. 21** and **Fig. 22** .
12. Start engine. On 3-speed A/T and M/T models, using voltmeter, check voltage between body ground and terminal No. 21 (Red/Blue wire) at ECM electrical connector E6 while turning A/C switch from ON to OFF positions. This is the ACT terminal at ECM. On 4-speed A/T models, using voltmeter, check voltage between body ground and terminal No. 12 (Red/Blue wire) at ECM electrical connector E10 while turning A/C switch from ON to OFF positions. This is the ACT terminal at ECM.
13. On all models, voltage should be 9-14 volts with A/C switch in ON position and less than 1.5 volts with A/C switch in OFF position. If voltage is not as specified, go to next step. If voltage is as specified, check ECM ground circuit. See **WIRING DIAGRAMS** article. If ECM ground circuit is defective, repair ground circuit as necessary. If ECM ground circuit is okay, replace ECM.
14. Check for open and short in wiring harness and electrical connectors between ECM and A/C amplifier. See WIRING DIAGRAMS in appropriate article in AIR CONDITIONING & HEATING. A/C amplifier is located behind instrument panel, just above glove box, near center of glove box area. See **Fig. 6** . If

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wiring harness and electrical connectors are okay, replace A/C amplifier. If wiring harness or electrical connector is defective, repair as necessary.

Prius

WARNING: Read service precautions before proceeding with service procedure. See SERVICE PRECAUTIONS .

1. If Toyota hand-held tester is available, go to next step. If Toyota hand-held tester is not available, go to step 7 .
2. Connect hand-held tester to data link connector No. 3 at driver's side of instrument panel. See **Fig. 15** . Turn ignition on and then turn hand-held tester on. Start engine and turn A/C switch to ON position. Ensure A/C clutch engages.
3. Select ACTIVE TEST MODE on hand-held tester. Check operation of A/C clutch when A/C-cut control is operated by hand-held tester. A/C clutch should turn off (stop operating) when A/C-cut control is operated by hand-held tester. If A/C clutch does not operate properly, go to next step. If A/C clutch operates properly, shut engine off. Remove hand-held tester. Diagnose by symptom. See **TROUBLE SHOOTING - NO CODES** article.
4. Check for open and short in wiring harness and electrical connectors between Engine Control Module (ECM) and A/C amplifier. See WIRING DIAGRAMS in appropriate article in AIR CONDITIONING & HEATING. ECM is located behind glove box. See **Fig. 7** . A/C amplifier is attached to rear of center cluster module control. See **Fig. 7** . If wiring harness and electrical connectors are okay, go to next step. If wiring harness or electrical connector is defective, repair as necessary.

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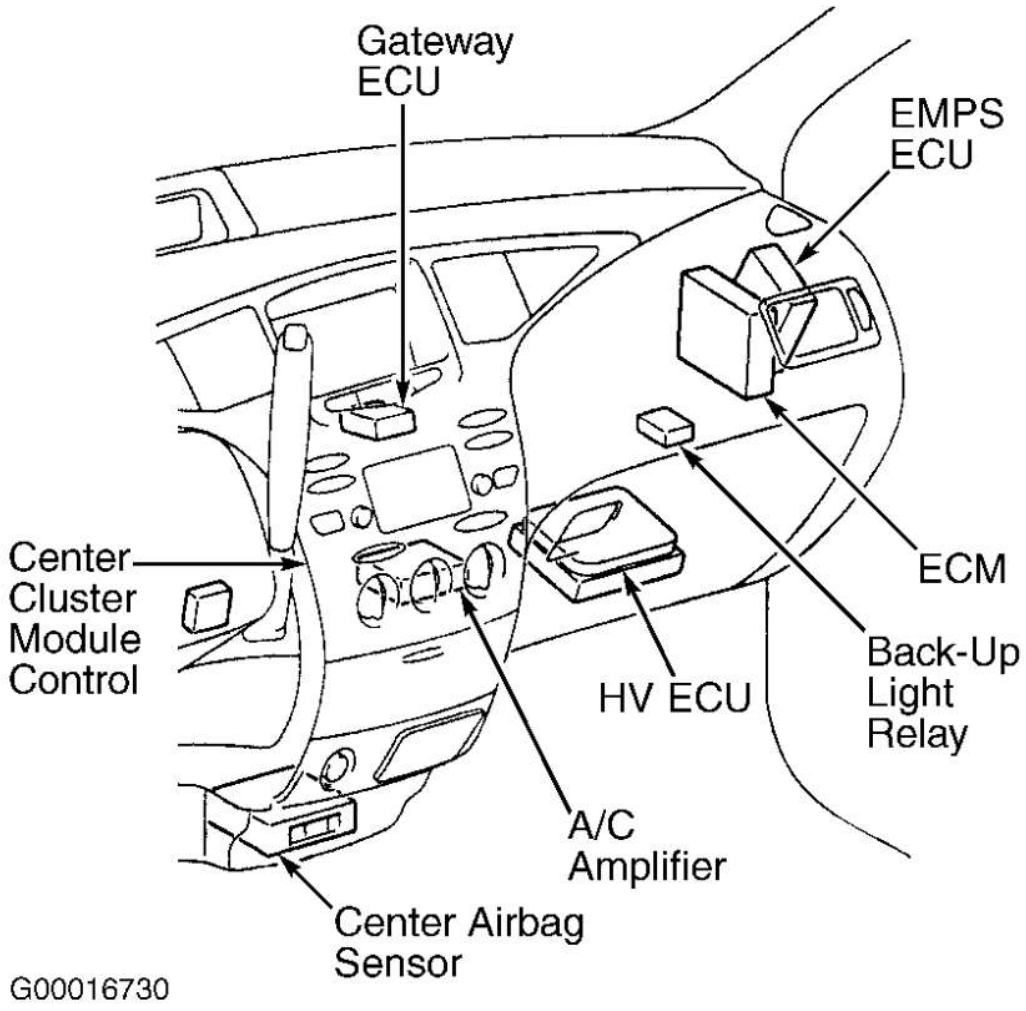


Fig. 7: Locating Engine Control Module & A/C Amplifier (Prius)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. Remove ECM with electrical connectors still attached. See **ENGINE CONTROL MODULE** under COMPUTERIZED ENGINE CONTROLS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
6. Note ECM electrical connector terminals. See **Fig. 26** . Start engine. Using voltmeter, check voltage between body ground and terminal No. 22 (Pink/Green wire) at ECM electrical connector E10 while turning A/C switch from ON to OFF positions. This is the ACT terminal at ECM. Voltage should be 9-14 volts with A/C switch in ON position and less than 1.5 volts with A/C switch in OFF position. If voltage is not as specified, replace A/C amplifier. If voltage is as specified, check ECM ground circuit. See **WIRING DIAGRAMS** article. If ECM ground circuit is defective, repair ground circuit as necessary. If ECM ground circuit is okay, replace ECM.

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7. Remove ECM with electrical connectors still attached. ECM is located behind glove box. See **Fig. 7** . See **ENGINE CONTROL MODULE** under COMPUTERIZED ENGINE CONTROLS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
8. Note ECM electrical connector terminals. See **Fig. 26** . Start engine. Using voltmeter, check voltage between body ground and terminal No. 22 (Pink/Green wire) at ECM electrical connector E10 while turning A/C switch from ON to OFF positions. This is the ACT terminal at ECM. Voltage should be 9-14 volts with A/C switch in ON position and less than 1.5 volts with A/C switch in OFF position. If voltage is not as specified, go to next step. If voltage is as specified, check ECM ground circuit. See **WIRING DIAGRAMS** article. If ECM ground circuit is defective, repair ground circuit as necessary. If ECM ground circuit is okay, replace ECM.
9. Check for open and short in wiring harness and electrical connectors between ECM and A/C amplifier. See WIRING DIAGRAMS in appropriate article in AIR CONDITIONING & HEATING. A/C amplifier is attached to rear of center cluster module control. See **Fig. 7** . If wiring harness and electrical connectors are okay, replace A/C amplifier. If wiring harness or electrical connector is defective, repair as necessary.

A/C EVAPORATOR TEMPERATURE SENSOR CIRCUIT

Camry

Testing information is not available from manufacturer.

Camry Solara With Manual A/C

CAUTION: If Engine Control Module (ECM) replacement is instructed in the following testing, always ensure ECM wiring harness electrical connector and ground circuit are okay. If either are defective, repair and repeat testing to confirm ECM malfunction.

1. Remove glove box for access to Engine Control Module (ECM). For illustration of ECM location, see **THEORY & OPERATION** article. Note ECM electrical connector terminals. See **Fig. 19** .
2. Turn ignition on. Using voltmeter, check voltage between terminal No. 32 (Blue/White wire) at ECM electrical connector E8 and terminal No. 28 (Brown wire) at ECM electrical connector E11. This is the THR and E2 terminals at ECM. Voltage should be 2.2-2.6 volts at 32°F (0°C) and 1.4-1.8 volts at 59°F (15°C). If voltage is not within specification, go to next step. If voltage is within specification, check ECM ground circuit. See **WIRING DIAGRAMS** article. If ECM ground circuit is defective, repair ground circuit as necessary. If ECM ground circuit is okay, replace ECM. If ECM is replaced and vehicle is equipped with engine immobilizer system, ECM must be programmed with proper ignition key code for engine immobilizer system. Models equipped with engine immobilizer system may be identified by looking at the ignition key. On models equipped with engine immobilizer system, the top of the ignition key is thicker than a standard ignition key, as a transponder chip is incorporated into the top of the ignition key. For programming procedures, see COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION, or appropriate ENGINE IMMOBILIZER SYSTEMS article in ACCESSORIES & EQUIPMENT.
3. Check A/C evaporator temperature sensor operation. See **A/C EVAPORATOR TEMPERATURE SENSOR** under ENGINE SENSORS & SWITCHES. If A/C evaporator temperature sensor operates properly, go to next step. If A/C evaporator temperature sensor is defective, replace A/C evaporator

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temperature sensor. For servicing of A/C evaporator temperature sensor, see appropriate article in AIR CONDITIONING & HEATING.

4. Check wiring harness and electrical connectors between ECM and A/C evaporator temperature sensor. See **WIRING DIAGRAMS** article. It may be necessary to see appropriate MANUAL or AUTOMATIC A/C-HEATER SYSTEMS article in AIR CONDITIONING & HEATING for complete wiring diagram. If wiring harness or electrical connector is defective, repair as necessary. If wiring harness and electrical connectors are okay, check ECM ground circuit. See **WIRING DIAGRAMS** article. If ECM ground circuit is defective, repair ground circuit as necessary. If ECM ground circuit is okay, replace ECM. If ECM is replaced and vehicle is equipped with engine immobilizer system, ECM must be programmed with proper ignition key code for engine immobilizer system. Models equipped with engine immobilizer system may be identified by looking at the ignition key. On models equipped with engine immobilizer system, the top of the ignition key is thicker than a standard ignition key, as a transponder chip is incorporated into the top of the ignition key. For programming procedures, see COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION, or appropriate ENGINE IMMOBILIZER SYSTEMS article in ACCESSORIES & EQUIPMENT.

ENGINE CONTROL MODULE POWER SOURCE CIRCUIT

CAUTION: If Engine Control Module (ECM) replacement is instructed in the following testing, always ensure ECM wiring harness electrical connector and ground circuit are okay. If either are defective, repair and repeat testing to confirm ECM malfunction.

NOTE: When performing test for Engine Control Module (ECM) power source circuit, it may be necessary to check wiring harness and components connected to a specified fuse, or check wiring harness and electrical connectors between EFI main relay and battery. For additional wiring information for fuse and power supply circuit, see POWER DISTRIBUTION article in WIRING DIAGRAMS.

Camry

1. Remove glove box for access to Engine Control Module (ECM). For illustration of ECM location, see **THEORY & OPERATION** article. Note ECM electrical connector terminals. See **Fig. 18** .
2. Turn ignition on. Using voltmeter, check voltage between terminals No. 1 (Black/Red wire) at ECM electrical connector E6 and No. 1 (Brown wire) at ECM electrical connector E8. This is the +B and E1 terminals at ECM. Voltage should be 9-14 volts. If voltage is not within specification, go to next step. If voltage is within specification, diagnose by symptom. See **TROUBLE SHOOTING - NO CODES** article.
3. Turn ignition off. Disconnect electrical connector E8 from ECM. Using ohmmeter, check for continuity between body ground and terminal No. 1 (Brown wire) at ECM electrical connector E8. If continuity exists, reinstall electrical connector E8 at ECM and go to next step. If continuity does not exist, repair open in Brown wire between terminal No. 1 at ECM electrical connector E8 and body ground. See **WIRING DIAGRAMS** article.
4. Ensure ignition is off. Check for open and short in Black/Red wire between EFI main relay and terminal No. 1 at ECM electrical connector E6. See **WIRING DIAGRAMS** article. EFI main relay is located in fuse/relay box at driver's side front corner of engine compartment. If wiring is okay, go to next step. If

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wiring is defective, repair as necessary.

5. Turn ignition on. Using voltmeter, check voltage between terminals No. 9 (Black/Orange wire) at ECM electrical connector E6 and No. 1 (Brown wire) at ECM electrical connector E8. This is the IGSW and E1 terminals at ECM. Voltage should be 9-14 volts. If voltage is not within specification, go to next step. If voltage is within specification, go to step 9 .
6. Check for defective IG2 fuse. IG2 fuse is located in fuse/relay box at driver's side front corner of engine compartment. If IG2 fuse is okay, go to next step. If IG2 fuse is defective, repair short in wiring harness and components connected to IG2 fuse. See **WIRING DIAGRAMS** article.
7. Check for defective AM2 fuse. AM2 fuse is located in fuse/relay box at driver's side front corner of engine compartment. If AM2 fuse is okay, go to next step. If AM2 fuse is defective, repair short in wiring harness and components connected to AM2 fuse. See **WIRING DIAGRAMS** article.
8. Check ignition switch. See **IGNITION SWITCH** under ENGINE SENSORS & SWITCHES. If ignition switch is okay, repair wiring harness or electrical connectors between ignition switch and terminal No. 9 (Black/Orange wire) at ECM electrical connector E6. See **WIRING DIAGRAMS** article. If ignition switch is defective, replace ignition switch. See **IGNITION SWITCH** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
9. Ensure ignition is on. Using voltmeter, check voltage between terminals No. 8 (Black/White wire) at ECM electrical connector E6 and No. 1 (Brown wire) at ECM electrical connector E8. This is the MREL and E1 terminals at ECM. Voltage should be 9-14 volts. If voltage is within specification, go to next step. If voltage is not within specification, check ECM ground circuit. See **WIRING DIAGRAMS** article. If ECM ground circuit is defective, repair ground circuit as necessary. If ECM ground circuit is okay, replace ECM. On models equipped with engine immobilizer system, if ECM is replaced, ECM must be programmed with proper ignition key code for engine immobilizer system. For programming procedures, see COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION, or appropriate ENGINE IMMOBILIZER SYSTEMS article in ACCESSORIES & EQUIPMENT.
10. Check for defective EFI fuse. EFI fuse is located in fuse/relay box at driver's side front corner of engine compartment. If EFI fuse is okay, go to next step. If EFI fuse is defective, repair short in wiring harness and components connected to EFI fuse. See **WIRING DIAGRAMS** article.
11. Check operation of EFI main relay. See **EFI MAIN RELAY** under MODULES, MOTORS, RELAYS & SOLENOIDS. If EFI main relay operates properly, go to next step. If EFI main relay is defective, replace EFI main relay.
12. Check for open and short in wiring harness and electrical connectors between terminal No. 8 (Black/White wire) at ECM electrical connector E6 and EFI main relay, and for open in White/Black wire between EFI main relay and body ground. See **WIRING DIAGRAMS** article. If wiring harness and electrical connectors are okay, go to next step. If wiring harness or electrical connector is defective, repair as necessary.
13. Check wiring harness and electrical connectors between battery and EFI fuse. See **WIRING DIAGRAMS** article. Repair wiring harness or and electrical connectors as necessary.

Camry Solara

1. Remove glove box for access to Engine Control Module (ECM). For illustration of ECM location, see **THEORY & OPERATION** article. Note ECM electrical connector terminals. See **Fig. 19** .
2. Turn ignition on. Using voltmeter, check voltage between terminals No. 1 (Red wire) at ECM electrical connector E7 and No. 1 (Brown wire) at ECM electrical connector E9. This is the +B and E1 terminals at

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ECM. Voltage should be 9-14 volts. If voltage is not within specification, go to next step. If voltage is within specification, diagnose by symptom. See **TROUBLE SHOOTING - NO CODES** article.

3. Turn ignition off. Check for open in wiring harness and electrical connectors between body ground and terminal No. 1 (Brown wire) at ECM electrical connector E9. See **WIRING DIAGRAMS** article. If wiring harness and electrical connectors are okay, go to next step. If wiring harness or electrical connector is defective, repair as necessary.
4. Ensure ignition is off. Check for open and short in Red wire between EFI main relay and terminal No. 1 at ECM electrical connector E7. See **WIRING DIAGRAMS** article. EFI main relay is located in fuse/relay box at driver's side front corner of engine compartment. If wiring is okay, go to next step. If wiring is defective, repair as necessary.
5. Turn ignition on. Using voltmeter, check voltage between body ground and terminal No. 9 (Black/Red wire) at ECM electrical connector E7. This is IGSW terminal at ECM. Voltage should be 9-14 volts. If voltage is not within specification, go to next step. If voltage is within specification, go to step 8 .
6. Check for defective IGN fuse. IGN fuse is located in fuse box behind driver's side of instrument panel. If IGN fuse is okay, go to next step. If IGN fuse is defective, repair short in wiring harness and components connected to IGN fuse. See **WIRING DIAGRAMS** article.
7. Check ignition switch. See **IGNITION SWITCH** under ENGINE SENSORS & SWITCHES. If ignition switch is defective, replace ignition switch. See IGNITION SWITCH under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article. If ignition switch is okay, repair wiring harness or electrical connectors between battery and ignition switch, and between ignition switch and terminal No. 9 (Black/Red wire) at ECM electrical connector E7. See **WIRING DIAGRAMS** article. If necessary to check AM2 fuse, AM2 fuse is located in fuse/relay box at driver's side front corner of engine compartment.
8. Ensure ignition is on. Using voltmeter, check voltage between body ground and terminal No. 8 (Black/Red wire) at ECM electrical connector E7. This is the MREL terminal at ECM. Voltage should be 9-14 volts. If voltage is within specification, go to next step. If voltage is not within specification, check ECM ground circuit. See **WIRING DIAGRAMS** article. If ECM ground circuit is defective, repair ground circuit as necessary. If ECM ground circuit is okay, replace ECM. On models equipped with engine immobilizer system, if ECM is replaced, ECM must be programmed with proper ignition key code for engine immobilizer system. For programming procedures, see COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION, or appropriate ENGINE IMMOBILIZER SYSTEMS article in ACCESSORIES & EQUIPMENT.
9. Check for defective EFI fuse. EFI fuse is located in fuse/relay box at driver's side front corner of engine compartment. If EFI fuse is okay, go to next step. If EFI fuse is defective, repair short in wiring harness and components connected to EFI fuse. See **WIRING DIAGRAMS** article.
10. Check operation of EFI main relay. See **EFI MAIN RELAY** under MODULES, MOTORS, RELAYS & SOLENOIDS. If EFI main relay operates properly, go to next step. If EFI main relay is defective, replace EFI main relay.
11. Check for open and short in wiring harness and electrical connectors between terminal No. 8 (Black/Red wire) at ECM electrical connector E7 and EFI main relay, and for open in White/Black wire between EFI main relay and body ground. See **WIRING DIAGRAMS** article. If wiring harness and electrical connectors are okay, go to next step. If wiring harness or electrical connector is defective, repair as necessary.
12. Check wiring harness and electrical connectors between battery and EFI fuse. See **WIRING DIAGRAMS** article. Repair wiring harness or and electrical connectors as necessary.

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Celica

1. Remove cover for access to Engine Control Module (ECM). ECM is located in engine compartment, below cover, just in front of battery, next to driver's side strut tower. For illustration of ECM location, see **THEORY & OPERATION** article. Note ECM electrical connector terminals. See **Fig. 20** .
2. Turn ignition on. Using voltmeter, check voltage between terminals No. 16 (Black/Red wire) at ECM electrical connector E2 and No. 17 (Brown wire) at ECM electrical connector E4. This is the +B and E1 terminals at ECM. Voltage should be 9-14 volts. If voltage is within specification, diagnose by symptom. See **TROUBLE SHOOTING - NO CODES** article. If voltage is not within specification, check for open in wiring harness and electrical connectors between terminal No. 17 (Brown wire) at ECM electrical connector E4 and body ground. See **WIRING DIAGRAMS** article. If wiring harness and electrical connectors are okay, go to next step. If wiring harness or electrical connector is defective, repair as necessary.
3. Ensure ignition is on. Using voltmeter, check voltage between body ground and terminal No. 8 (Black/Orange wire) at ECM electrical connector E2. This is the IGSW terminal at ECM. Voltage should be 9-14 volts. If voltage is not within specification, go to next step. If voltage is within specification, go to step 5 .
4. Check ignition switch. See **IGNITION SWITCH** under ENGINE SENSORS & SWITCHES. If ignition switch is defective, replace ignition switch. See **IGNITION SWITCH** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article. If ignition switch is okay, check for open and short in wiring harness and electrical connectors between battery and ignition switch, and between ignition switch and terminal No. 8 (Black/Orange wire) at ECM electrical connector E2. See **WIRING DIAGRAMS** article. If necessary to check AM2 fuse, AM2 fuse is located in fuse/relay box at driver's side front corner of engine compartment, just in front of strut tower. Repair wiring harness or electrical connectors as necessary.
5. Check operation of EFI main relay. See **EFI MAIN RELAY** under MODULES, MOTORS, RELAYS & SOLENOIDS. If EFI main relay operates properly, go to next step. If EFI main relay is defective, replace EFI main relay.
6. Check for defective EFI fuse. EFI fuse is located in fuse/relay box at driver's side front corner of engine compartment, just in front of strut tower. If EFI fuse is okay, go to next step. If EFI fuse is defective, repair short in wiring harness between battery and EFI fuse. See **WIRING DIAGRAMS** article.
7. Check for defective EFI No. 1 fuse. EFI No. 1 fuse is located in fuse/relay box at driver's side front corner of engine compartment, just in front of strut tower. EFI No. 1 fuse may also be referred to as EFI1 fuse. If EFI No. 1 fuse is okay, go to next step. If EFI No. 1 fuse is defective, repair short in wiring harness and components connected to EFI No. 1 fuse. See **WIRING DIAGRAMS** article.
8. Check for open and short in wiring harness and electrical connectors between terminal No. 21 (Blue/Black wire) at ECM electrical connector E3 and EFI main relay, and for open in White/Black wire between EFI main relay and body ground. See **WIRING DIAGRAMS** article. If wiring harness and electrical connectors are okay, go to next step. If wiring harness or electrical connector is defective, repair as necessary.
9. Check wiring harness and electrical connectors between battery and EFI fuse, and between EFI No. 1 fuse and terminal No. 16 (Black/Red wire) at ECM electrical connector E2. Repair wiring harness or and electrical connectors as necessary.

Corolla

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1. Remove necessary components for access to Engine Control Module (ECM). See **ENGINE CONTROL MODULE** under COMPUTERIZED ENGINE CONTROLS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
2. Remove bolts from ECM so electrical connectors can be accessed on ECM. Note ECM electrical connector terminals. See **Fig. 21** and **Fig. 22** .
3. Turn ignition on. On 3-speed A/T and M/T models, using voltmeter, check voltage between terminals No. 12 (Black wire) at ECM electrical connector E6 and No. 14 (Brown wire) at ECM electrical connector E4. On 4-speed A/T, using voltmeter, check voltage between terminals No. 16 (Black wire) at ECM electrical connector E10 and No. 17 (Brown wire) at ECM electrical connector E8. On all models, this is the +B and E1 terminals at ECM. Voltage should be 9-14 volts. If voltage is within specification, diagnose by symptom. See **TROUBLE SHOOTING - NO CODES** article. If voltage is not within specification, check for open in wiring harness and electrical connectors between terminal No. 14 (Brown wire) at ECM electrical connector E4 and body ground on 3-speed A/T and M/T models, or terminal No. 17 (Brown wire) at ECM electrical connector E8 and body ground on 4-speed A/T models. See **WIRING DIAGRAMS** article. On all models, if wiring harness and electrical connectors are okay, go to next step. If wiring harness or electrical connector is defective, repair as necessary.
4. Check operation of EFI main relay. See **EFI MAIN RELAY** under MODULES, MOTORS, RELAYS & SOLENOIDS. EFI main relay may also be referred to as EFI relay or F-HTR relay. If EFI main relay operates properly, go to next step. If EFI main relay is defective, replace EFI main relay.
5. Check for defective EFI fuse. EFI fuse may also be referred to as F-HTR fuse. EFI fuse is located in fuse/relay box at driver's side front corner of engine compartment, just in front of strut tower. If EFI fuse is okay, go to next step. If EFI fuse is defective, repair short in wiring harness and components connected to EFI fuse. See **WIRING DIAGRAMS** article.
6. Check for open in wiring harness and electrical connectors between EFI main relay and battery, and between EFI main relay and ECM. See **WIRING DIAGRAMS** article. If wiring harness and electrical connectors are okay, go to next step. If wiring harness or electrical connector is defective, repair as necessary.
7. Check for defective IGN fuse. IGN fuse is located in fuse/relay box behind driver's side of instrument panel. If IGN fuse is okay, go to next step. If IGN fuse is defective, repair short in wiring harness and components connected to IGN fuse. See **WIRING DIAGRAMS** article.
8. Check ignition switch. See **IGNITION SWITCH** under ENGINE SENSORS & SWITCHES. If ignition switch is okay, go to next step. If ignition switch is defective, replace ignition switch. See **IGNITION SWITCH** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
9. Check for open in wiring harness and electrical connectors between ignition switch and EFI main relay, and between body ground and EFI main relay. See **WIRING DIAGRAMS** article. If wiring harness and electrical connectors are okay, test is complete. If wiring harness or electrical connector is defective, repair as necessary.

ECHO

1. Remove cover from Engine Control Module (ECM) for access to ECM electrical connectors. ECM is located behind glove box. For illustration of ECM location, see **THEORY & OPERATION** article. Note ECM electrical connector terminals. See **Fig. 23** .
2. Turn ignition on. Using voltmeter, check voltage between terminals No. 12 (Black/Red wire) at ECM

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electrical connector E4 and No. 14 (Brown wire) at ECM electrical connector E7. This is the +B and E1 terminals at ECM. Voltage should be 9-14 volts. If voltage is within specification, diagnose by symptom. See **TROUBLE SHOOTING - NO CODES** article. If voltage is not within specification, check for open in wiring harness and electrical connectors between terminal No. 14 (Brown wire) at ECM electrical connector E7 and body ground. See **WIRING DIAGRAMS** article. If wiring harness and electrical connectors are okay, go to next step. If wiring harness or electrical connector is defective, repair as necessary.

3. Check operation of EFI main relay. See **EFI MAIN RELAY** under MODULES, MOTORS, RELAYS & SOLENOIDS. If EFI main relay operates properly, go to next step. If EFI main relay is defective, replace EFI main relay.
4. Check for defective EFI fuse. EFI fuse is located in fuse/relay box at driver's side front corner of engine compartment, just in front of strut tower, near battery. If EFI fuse is okay, go to next step. If EFI fuse is defective, repair short in wiring harness and components connected to EFI fuse. See **WIRING DIAGRAMS** article.
5. Check for open in wiring harness and electrical connectors between EFI main relay and battery, and between EFI main relay and ECM. See **WIRING DIAGRAMS** article. If wiring harness and electrical connectors are okay, go to next step. If wiring harness or electrical connector is defective, repair as necessary.
6. Check ignition switch. See **IGNITION SWITCH** under ENGINE SENSORS & SWITCHES. If ignition switch is okay, go to next step. If ignition switch is defective, replace ignition switch. See **IGNITION SWITCH** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
7. Check for open in wiring harness and electrical connectors between ignition switch and EFI main relay, and between body ground and EFI main relay. See **WIRING DIAGRAMS** article. If wiring harness and electrical connectors are okay, test is complete. If wiring harness or electrical connector is defective, repair as necessary.

Highlander

1. Remove glove box for access to Engine Control Module (ECM). For illustration of ECM location, see **THEORY & OPERATION** article. Note ECM electrical connector terminals. See **Fig. 24** .
2. Turn ignition on. Using voltmeter, check voltage between terminals No. 16 (White wire) at ECM electrical connector E5 and No. 17 (Brown wire) at ECM electrical connector E8. This is the +B and E1 terminals at ECM. Voltage should be 9-14 volts. If voltage is not within specification, go to next step. If voltage is within specification, diagnose by symptom. See **TROUBLE SHOOTING - NO CODES** article.
3. Turn ignition off. Disconnect electrical connector E8 from ECM. Using ohmmeter, check for continuity between body ground and terminal No. 17 (Brown wire) at ECM electrical connector E8. If continuity exists, reinstall electrical connector E8 at ECM and go to next step. If continuity does not exist, repair open in Brown wire between terminal No. 17 at ECM electrical connector E8 and body ground. See **WIRING DIAGRAMS** article.
4. Ensure ignition is off. Check for open and short in White wire between EFI main relay and terminal No. 16 at ECM electrical connector E5. See **WIRING DIAGRAMS** article. EFI main relay is located in fuse/relay box at driver's side front corner of engine compartment, just in front of strut tower. If wiring is okay, go to next step. If wiring is defective, repair as necessary.

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5. Turn ignition on. Using voltmeter, check voltage between terminals No. 2 (Black/Orange wire) at ECM electrical connector E5 and No. 17 (Brown wire) at ECM electrical connector E8. This is the IGSW and E1 terminals at ECM. Voltage should be 9-14 volts. If voltage is not within specification, go to next step. If voltage is within specification, go to step 10 .
6. Check for defective IGN fuse. IGN fuse is located in fuse box behind driver's side of instrument panel. If IGN fuse is okay, go to next step. If IGN fuse is defective, repair short in wiring harness and components connected to IGN fuse. See **WIRING DIAGRAMS** article.
7. Check for defective AM2 fuse. AM2 fuse is located in fuse/relay box at driver's side front corner of engine compartment, just in front of strut tower. If AM2 fuse is okay, go to next step. If AM2 fuse is defective, repair short in wiring harness and components connected to AM2 fuse. See **WIRING DIAGRAMS** article.
8. Check ignition switch. See **IGNITION SWITCH** under ENGINE SENSORS & SWITCHES. If ignition switch is okay, go to next step. If ignition switch is defective, replace ignition switch. See **IGNITION SWITCH** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
9. Check for open in wiring harness and electrical connectors between battery and ignition switch, and between ignition switch and terminal No. 2 (Black/Orange wire) at ECM electrical connector E5. See **WIRING DIAGRAMS** article. Repair wiring harness or electrical connectors as necessary.
10. Ensure ignition is on. Using voltmeter, check voltage between terminals No. 8 (Pink/Blue wire) at ECM electrical connector E5 and No. 17 (Brown wire) at ECM electrical connector E8. This is the MREL and E1 terminals at ECM. Voltage should be 9-14 volts. If voltage is within specification, go to next step. If voltage is not within specification, check ECM ground circuit. See **WIRING DIAGRAMS** article. If ECM ground circuit is defective, repair ground circuit as necessary. If ECM ground circuit is okay, replace ECM. On models equipped with engine immobilizer system, if ECM is replaced, ECM must be programmed with proper ignition key code for engine immobilizer system. Models equipped with engine immobilizer system may be identified by looking at the ignition key. On models equipped with engine immobilizer system, the top of the ignition key is thicker than a standard ignition key, as a transponder chip is incorporated into the top of the ignition key. For programming procedures, see COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION, or appropriate ENGINE IMMOBILIZER SYSTEMS article in ACCESSORIES & EQUIPMENT.
11. Check for defective EFI fuse. EFI fuse is located in fuse/relay box at driver's side front corner of engine compartment, just in front of strut tower. If EFI fuse is okay, go to next step. If EFI fuse is defective, repair short in wiring harness and components connected to EFI fuse. See **WIRING DIAGRAMS** article.
12. Check operation of EFI main relay. See **EFI MAIN RELAY** under MODULES, MOTORS, RELAYS & SOLENOIDS. If EFI main relay operates properly, go to next step. If EFI main relay is defective, replace EFI main relay.
13. Check for open and short in wiring harness and electrical connectors between terminal No. 8 (Pink/Blue wire) at ECM electrical connector E5 and EFI main relay, and for open in White/Black wire between EFI main relay and body ground. See **WIRING DIAGRAMS** article. If wiring harness and electrical connectors are okay, go to next step. If wiring harness or electrical connector is defective, repair as necessary.
14. Check wiring harness and electrical connectors between battery and EFI fuse. See **WIRING DIAGRAMS** article. Repair wiring harness or and electrical connectors as necessary.

MR2

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1. Remove necessary components for access to Engine Control Module (ECM). ECM is located on inside of firewall, directly behind driver's seat and luggage compartment. See **ENGINE CONTROL MODULE** under COMPUTERIZED ENGINE CONTROLS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
2. Remove bolts and disconnect ECM with electrical connectors from inside of firewall. Note ECM electrical connector terminals. See **Fig. 25** .
3. Turn ignition on. Using voltmeter, check voltage between terminals No. 16 (Black wire) at ECM electrical connector E2 and No. 17 (Brown wire) at ECM electrical connector E4. This is the +B and E1 terminals at ECM. Voltage should be 9-14 volts. If voltage is within specification, diagnose by symptom. See **TROUBLE SHOOTING - NO CODES** article. If voltage is not within specification, check for open in wiring harness and electrical connectors between terminal No. 17 (Brown wire) at ECM electrical connector E4 and body ground. See **WIRING DIAGRAMS** article. If wiring harness and electrical connectors are okay, go to next step. If wiring harness or electrical connector is defective, repair as necessary.
4. Turn ignition off. Check for open and short in Black wire between EFI main relay and terminal No. 16 at ECM electrical connector E2. See **WIRING DIAGRAMS** article. EFI main relay is located in relay box on firewall at driver's side front corner of engine compartment. If wiring is okay, go to next step. If wiring is defective, repair as necessary.
5. Turn ignition on. Using voltmeter, check voltage between body ground and terminal No. 8 (Black/Red wire) at ECM electrical connector E2. This is the IGSW terminal at ECM. Voltage should be 9-14 volts. If voltage is not within specification, go to next step. If voltage is within specification, go to step 11 .
6. Check for defective IG2 fuse. IG2 fuse is located in fuse/relay box at driver's side rear corner of engine compartment, just in front of strut tower. If IG2 fuse is okay, go to next step. If IG2 fuse is defective, repair short in wiring harness and components connected to IGN fuse. See **WIRING DIAGRAMS** article.
7. Check operation of IG2 relay. See **IG2 RELAY** under MODULES, MOTORS, RELAYS & SOLENOIDS. If IG2 relay operates properly, go to next step. If IG2 relay is defective, replace IG2 relay.
8. Check for defective AM2 fuse. AM2 fuse is located in fuse/relay box at driver's side rear corner of engine compartment, just in front of strut tower. If AM2 fuse is okay, go to next step. If AM2 fuse is defective, repair short in wiring harness and components connected to AM2 fuse. See **WIRING DIAGRAMS** article.
9. Check ignition switch. See **IGNITION SWITCH** under ENGINE SENSORS & SWITCHES. If ignition switch is okay, go to next step. If ignition switch is defective, replace ignition switch. See **IGNITION SWITCH** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
10. Check for open in wiring harness and electrical connectors between battery and ignition switch, battery and IG2 relay, ignition switch and IG2 relay, and between IG2 relay and terminal No. 8 (Black/Red wire) at ECM electrical connector E2. See **WIRING DIAGRAMS** article. Repair wiring harness or electrical connectors as necessary.
11. Ensure ignition is on. Using voltmeter, check voltage between body ground and terminal No. 21 (Gray wire) at ECM electrical connector E3. This is the MREL terminal at ECM. Voltage should be 9-14 volts. If voltage is within specification, go to next step. If voltage is not within specification, check ECM ground circuit. See **WIRING DIAGRAMS** article. If ECM ground circuit is defective, repair ground circuit as necessary. If ECM ground circuit is okay, replace ECM. On models equipped with engine immobilizer system, if ECM is replaced, ECM must be programmed with proper ignition key code for

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engine immobilizer system. Models equipped with engine immobilizer system may be identified by looking at the ignition key. On models equipped with engine immobilizer system, the top of the ignition key is thicker than a standard ignition key, as a transponder chip is incorporated into the top of the ignition key. For programming procedures, see COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION, or appropriate ENGINE IMMOBILIZER SYSTEMS article in ACCESSORIES & EQUIPMENT.

12. Check for defective EFI No. 1 fuse. EFI No. 1 fuse is located in fuse/relay box at driver's side rear corner of engine compartment, just in front of strut tower. EFI No. 1 fuse may also be referred to as EFI1 fuse. If EFI No. 1 fuse is okay, go to next step. If EFI No. 1 fuse is defective, repair short in wiring harness and components connected to EFI No. 1 fuse. See **WIRING DIAGRAMS** article.
13. Check operation of EFI main relay. See **EFI MAIN RELAY** under MODULES, MOTORS, RELAYS & SOLENOIDS. If EFI main relay operates properly, go to next step. If EFI main relay is defective, replace EFI main relay.
14. Check for open and short in wiring harness and electrical connectors between terminal No. 21 (Gray wire) at ECM electrical connector E3 and EFI main relay, and for open in White/Black wire between EFI main relay and body ground. See **WIRING DIAGRAMS** article. If wiring harness and electrical connectors are okay, go to next step. If wiring harness or electrical connector is defective, repair as necessary.
15. Check wiring harness and electrical connectors between battery and EFI No. 1 fuse, and between EFI No. 1 fuse and EFI main relay. See **WIRING DIAGRAMS** article. Repair wiring harness or and electrical connectors as necessary.

Prius

WARNING: Read service precautions before proceeding with service procedure. See SERVICE PRECAUTIONS .

1. Remove glove box for access to Engine Control Module (ECM). For illustration of ECM location, see **THEORY & OPERATION** article. Note ECM electrical connector terminals. See **Fig. 26** .
2. Turn ignition on. Using voltmeter, check voltage between terminals No. 4 (Black wire) at ECM electrical connector E8 and No. 17 (Brown wire) at ECM electrical connector E8. This is the +B and E1 terminals at ECM. Voltage should be 9-14 volts. If voltage is within specification, diagnose by symptom. See **TROUBLE SHOOTING - NO CODES** article. If voltage is not within specification, check for open in wiring harness and electrical connectors between terminal No. 17 (Brown wire) at ECM electrical connector E8 and body ground. See **WIRING DIAGRAMS** article. If wiring harness and electrical connectors are okay, go to next step. If wiring harness or electrical connector is defective, repair as necessary.
3. Turn ignition off. Check for open and short in Black wire between EFI main relay and terminal No. 4 at ECM electrical connector E8. See **WIRING DIAGRAMS** article. EFI main relay is located in fuse/relay box at driver's side front corner of engine compartment, just in front of strut tower. If wiring is okay, go to next step. If wiring is defective, repair as necessary.
4. Turn ignition on. Using voltmeter, check voltage between body ground and terminal No. 9 (Black/White wire) at ECM electrical connector E10. This is the IGSW terminal at ECM. Voltage should be 9-14 volts. If voltage is not within specification, go to next step. If voltage is within specification, go to step 8 .
5. Check for defective AM2 fuse. AM2 fuse is located in fuse/relay box at driver's side front corner of

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engine compartment. If AM2 fuse is okay, go to next step. If AM2 fuse is defective, repair short in wiring harness and components connected to AM2 fuse. See **WIRING DIAGRAMS** article.

6. Check ignition switch. See **IGNITION SWITCH** under ENGINE SENSORS & SWITCHES. If ignition switch is okay, go to next step. If ignition switch is defective, replace ignition switch. See **IGNITION SWITCH** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
7. Check for open in wiring harness and electrical connectors between battery and ignition switch and between ignition switch and terminal No. 9 (Black/White wire) at ECM electrical connector E10. See **WIRING DIAGRAMS** article. Repair wiring harness or electrical connectors as necessary.
8. Ensure ignition is on. Using voltmeter, check voltage between body ground and terminal No. 25 (Green/Red wire) at ECM electrical connector E9. This is the MREL terminal at ECM. Voltage should be 9-14 volts. If voltage is within specification, go to next step. If voltage is not within specification, check ECM ground circuit. See **WIRING DIAGRAMS** article. If ECM ground circuit is defective, repair ground circuit as necessary. If ECM ground circuit is okay, replace ECM.
9. Check for defective EFI fuse. EFI fuse is located in fuse/relay box at driver's side front corner of engine compartment. If EFI fuse is okay, go to next step. If EFI fuse is defective, repair short in wiring harness and components connected to EFI fuse. See **WIRING DIAGRAMS** article.
10. Check operation of EFI main relay. See **EFI MAIN RELAY** under MODULES, MOTORS, RELAYS & SOLENOIDS. If EFI main relay operates properly, go to next step. If EFI main relay is defective, replace EFI main relay.
11. Check for open and short in wiring harness and electrical connectors between terminal No. 25 (Green/Red wire) at ECM electrical connector E9 and EFI main relay, and for open in White/Black wire between EFI main relay and body ground. See **WIRING DIAGRAMS** article. If wiring harness and electrical connectors are okay, go to next step. If wiring harness or electrical connector is defective, repair as necessary.
12. Check wiring harness and electrical connectors between battery and EFI fuse, and between EFI fuse and EFI main relay. See **WIRING DIAGRAMS** article. Repair wiring harness or and electrical connectors as necessary.

RAV4

1. Remove glove box for access to Engine Control Module (ECM). ECM is located near passenger's side kick panel, just below instrument panel. For illustration of ECM location, see **THEORY & OPERATION** article. Note ECM electrical connector terminals. See **Fig. 27** .
2. Turn ignition on. Using voltmeter, check voltage between terminals No. 16 (Black/Red or Light Green wire) at ECM electrical connector E8 and No. 17 (Brown wire) at ECM electrical connector E5. There are 2 different wiring harnesses used. Wire color at terminal No. 16 may vary according to wiring harness used. This is the +B and E1 terminals at ECM. Voltage should be 9-14 volts. If voltage is within specification, diagnose by symptom. See **TROUBLE SHOOTING - NO CODES** article. If voltage is not within specification, check for open in wiring harness and electrical connectors between terminal No. 17 (Brown wire) at ECM electrical connector E5 and body ground. See **WIRING DIAGRAMS** article. If wiring harness and electrical connectors are okay, go to next step. If wiring harness or electrical connector is defective, repair as necessary.
3. Turn ignition off. Check for open and short in Black/Red or Light Green wire between EFI main relay and terminal No. 16 at ECM electrical connector E8. See **WIRING DIAGRAMS** article. EFI main relay

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is located in fuse/relay box at driver's side front corner of engine compartment, just in front of strut tower. If wiring is okay, go to next step. If wiring is defective, repair as necessary.

4. Turn ignition on. Using voltmeter, check voltage between body ground and terminal No. 2 (Black/Orange or White wire) at ECM electrical connector E8. This is the IGSW terminal at ECM. Voltage should be 9-14 volts. If voltage is not within specification, go to next step. If voltage is within specification, go to step 9 .
5. Check for defective IG2 fuse. IG2 fuse is located in fuse box behind driver's side of instrument panel. If IG2 fuse is okay, go to next step. If IG2 fuse is defective, repair short in wiring harness and components connected to IG2 fuse. See **WIRING DIAGRAMS** article.
6. Check for defective AM2 fuse. AM2 fuse is located in fuse/relay box at driver's side front corner of engine compartment. If AM2 fuse is okay, go to next step. If AM2 fuse is defective, repair short in wiring harness and components connected to AM2 fuse. See **WIRING DIAGRAMS** article.
7. Check ignition switch. See **IGNITION SWITCH** under ENGINE SENSORS & SWITCHES. If ignition switch is okay, go to next step. If ignition switch is defective, replace ignition switch. See **IGNITION SWITCH** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
8. Check for open in wiring harness and electrical connectors between battery and ignition switch, and between ignition switch and terminal No. 2 (Black/Orange or White wire) at ECM electrical connector E8. See **WIRING DIAGRAMS** article. Repair wiring harness or electrical connectors as necessary.
9. Ensure ignition is on. Using voltmeter, check voltage between body ground and terminal No. 8 (Green/White or White wire) at ECM electrical connector E8. This is the MREL terminal at ECM. Voltage should be 9-14 volts. If voltage is within specification, go to next step. If voltage is not within specification, check ECM ground circuit. See **WIRING DIAGRAMS** article. If ECM ground circuit is defective, repair ground circuit as necessary. If ECM ground circuit is okay, replace ECM. On models equipped with engine immobilizer system, if ECM is replaced, ECM must be programmed with proper ignition key code for engine immobilizer system. Models equipped with engine immobilizer system may be identified by looking at the ignition key. On models equipped with engine immobilizer system, the top of the ignition key is thicker than a standard ignition key, as a transponder chip is incorporated into the top of the ignition key. For programming procedures, see COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION, or appropriate ENGINE IMMOBILIZER SYSTEMS article in ACCESSORIES & EQUIPMENT.
10. Check for defective EFI No. 1 fuse. EFI No. 1 fuse is located in fuse/relay box at driver's side front corner of engine compartment. EFI No. 1 fuse may also be referred to as EFI1 fuse. If EFI No. 1 fuse is okay, go to next step. If EFI No. 1 fuse is defective, repair short in wiring harness and components connected to EFI No. 1 fuse. See **WIRING DIAGRAMS** article.
11. Check operation of EFI main relay. See **EFI MAIN RELAY** under MODULES, MOTORS, RELAYS & SOLENOIDS. If EFI main relay operates properly, go to next step. If EFI main relay is defective, replace EFI main relay.
12. Check for open in wiring harness and electrical connectors between EFI main relay, EFI No. 1 fuse and battery. See **WIRING DIAGRAMS** article. If wiring harness and electrical connectors are okay, go to next step. If wiring harness or electrical connector is defective, repair as necessary.
13. Check for open and short in wiring harness and electrical connectors between terminal No. 8 (Green/White or White wire) at ECM electrical connector E8 and EFI main relay, and for open in White/Black wire between EFI main relay and body ground. See **WIRING DIAGRAMS** article. If wiring harness and electrical connectors are okay, test is complete. If wiring harness or electrical

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connector is defective, repair as necessary.

Tacoma

1. Remove glove box for access to ECM. For illustration of ECM location, see **THEORY & OPERATION** article. Note ECM electrical connector terminals. See **Fig. 28** .
2. Turn ignition on. Using voltmeter, check voltage between terminals No. 16 (White/Red wire) at ECM electrical connector E5 and No. 17 (Brown wire) at ECM electrical connector E7. This is the +B and E1 terminals at ECM. Voltage should be 9-14 volts. If voltage is within specification, diagnose by symptom. See **TROUBLE SHOOTING - NO CODES** article. If voltage is not within specification, check for open in wiring harness and electrical connectors between terminal No. 17 (Brown wire) at ECM electrical connector E7 and body ground. See **WIRING DIAGRAMS** article. If wiring harness and electrical connectors are okay, go to next step. If wiring harness or electrical connector is defective, repair as necessary.
3. Check operation of EFI main relay. See **EFI MAIN RELAY** under MODULES, MOTORS, RELAYS & SOLENOIDS. If EFI main relay operates properly, go to next step. If EFI main relay is defective, replace EFI main relay.
4. Check for defective EFI fuse. EFI fuse is located in fuse/relay box at driver's side front corner of engine compartment, next to battery. If EFI fuse is okay, go to next step. If EFI fuse is defective, repair short in wiring harness and components connected to EFI fuse. See **WIRING DIAGRAMS** article.
5. Check for open in wiring harness and electrical connectors between EFI main relay and battery, and between EFI main relay and terminals No. 16 (White/Red wire) at ECM electrical connector E5. See **WIRING DIAGRAMS** article. If wiring harness and electrical connectors are okay, go to next step. If wiring harness or electrical connector is defective, repair as necessary.
6. Check for defective IGN fuse. IGN fuse is located in fuse/relay box behind driver's side of instrument panel. If IGN fuse is okay, go to next step. If IGN fuse is defective, repair short in wiring harness and components connected to IGN fuse. See **WIRING DIAGRAMS** article.
7. Check ignition switch. See **IGNITION SWITCH** under ENGINE SENSORS & SWITCHES. If ignition switch is okay, go to next step. If ignition switch is defective, replace ignition switch. See **IGNITION SWITCH** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
8. Check for open in wiring harness and electrical connectors between ignition switch and EFI main relay, and for open in White/Black wire between EFI main relay and body ground. See **WIRING DIAGRAMS** article. If wiring harness and electrical connectors are okay, test is complete. If wiring harness or electrical connector is defective, repair as necessary.

FUEL PUMP CONTROL CIRCUIT

CAUTION: If Engine Control Module (ECM) replacement is instructed in the following testing, always ensure ECM wiring harness electrical connector and ground circuit are okay. If either are defective, repair and repeat testing to confirm ECM malfunction.

Camry, Camry Solara, Celica, Corolla, ECHO, Highlander, MR2, Prius, RAV4 & Tacoma

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WARNING: On Prius, read service precautions before proceeding with service procedure. See SERVICE PRECAUTIONS .

1. If Toyota hand-held tester is available, go to next step. If Toyota hand-held tester is not available, go to step 3 .
2. Check operation of fuel pump by using Toyota hand-held tester. See **FUEL PUMP OPERATION** under FUEL SYSTEMS in BASIC DIAGNOSTIC PROCEDURES - 4-CYLINDER article. If fuel pump does not operate when using hand-held tester, go to step 5 . If fuel pump operates when using hand-held tester, diagnose by symptom. See **TROUBLE SHOOTING - NO CODES** article.
3. Remove necessary components for access to Engine Control Module (ECM). See **ENGINE CONTROL MODULE LOCATION** table.
4. Note ECM terminals. See **Fig. 18** -**Fig. 28** . Turn ignition on. Momentarily connect jumper wire between body ground and FC terminal at ECM and listen for fuel pump operating sound. See **ECM IDENTIFICATION FOR FUEL PUMP FC TERMINAL** table. On Camry, Celica, Corolla, ECHO, Highlander, MR2, Prius and RAV4, feel for fuel pressure in fuel inlet line at end of fuel rail when fuel inlet line is pinched closed. On Camry Solara, feel for fuel pressure in fuel inlet line at fuel filter when fuel inlet line is pinched closed. On Tacoma, feel for fuel pressure in fuel return line from fuel pressure regulator when fuel return line is pinched closed. On all models, if fuel pump does not operate when jumper wire was connected, go to next step. If fuel pump operates when jumper wire was connected, diagnose by symptom. See **TROUBLE SHOOTING - NO CODES** article.
5. Check ECM power source circuit. See **ENGINE CONTROL MODULE POWER SOURCE CIRCUIT** . If ECM power source circuit is okay, go to next step. If ECM power source circuit is defective, repair as necessary.
6. Check circuit opening relay. See **CIRCUIT OPENING RELAY** under MODULES, MOTORS, RELAYS & SOLENOIDS. If circuit opening relay is okay, go to next step. If circuit opening relay is defective, replace circuit opening relay.
7. Remove necessary components for access to ECM if not previously done. See **ENGINE CONTROL MODULE LOCATION** table.

ENGINE CONTROL MODULE LOCATION

Model	(1) Location
Camry & Camry Solara	Behind Glove Box
Celica	In Engine Compartment, Below Cover, Just In Front Of Battery, Next To Driver's Side Strut Tower
Corolla	Behind Stereo On Instrument Panel, Just In Front Of Center Console
ECHO & Highlander	Behind Glove Box
MR2	On Inside Of Firewall, Directly Behind Driver's Seat & Luggage Compartment
Prius	Behind Glove Box
RAV4	Near Passenger's Side Kick Panel, Just Below Instrument Panel
Tacoma	Behind Glove Box

(1) For illustration of ECM location, see **THEORY & OPERATION** article.

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8. Note ECM terminals. See **Fig. 18** -**Fig. 28** . Turn ignition on. Using voltmeter, check voltage between body ground and FC terminal at ECM. See **ECM IDENTIFICATION FOR FUEL PUMP FC TERMINAL** table.

ECM IDENTIFICATION FOR FUEL PUMP FC TERMINAL

Application	ECM Connector	ECM Terminal No. (Wire Color)
Camry	E6	10 (Green/Red)
Camry Solara	E7	10 (Green/Red)
Celica	E2	3 (Green/Red)
Corolla		
3-Speed A/T & M/T	E6	14 (Green/Red)
4-Speed A/T	E10	3 (Green/Red)
ECHO	E4	14 (Green)
Highlander	E5	3 (Green/Red)
MR2	E2	3 (Green/Red)
Prius	E8	9 (Green/Red)
RAV4	E8	(1) 3 (Green/Red Or White)
Tacoma	E6	6 (White/Blue)

(1) There are 2 different wiring harnesses used. Wire color at designated terminal may vary according to wiring harness used.

9. Voltage should be 9-14 volts. If voltage is within specification, go to next step. On Camry, Camry Solara, Highlander, MR2, RAV4 and Tacoma, if voltage is not within specification, check for open in wiring harness and connectors between ECM and circuit opening relay, and between ignition switch and circuit opening relay. See **WIRING DIAGRAMS** article. On Celica, Corolla, ECHO and Prius, if voltage is not within specification, check for open in wiring harness and connectors between ECM and circuit opening relay, and between EFI main relay and circuit opening relay. See **WIRING DIAGRAMS** article. For EFI main relay location, see **EFI MAIN RELAY** under MODULES, MOTORS, RELAYS & SOLENOIDS. On all models, if wiring harness or electrical connector is defective, repair as necessary.
10. Check fuel pump resistance and operation. See **FUEL DELIVERY** under FUEL SYSTEMS. If fuel pump resistance is within specification and fuel pump operates, go to next step. If fuel pump resistance is not within specification or fuel pump does not operate, replace fuel pump. See **FUEL PUMP** under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
11. Check for open in wiring harness and electrical connectors between circuit opening relay and fuel pump, and between fuel pump and body ground. See **WIRING DIAGRAMS** article. On Camry, Camry Solara, Highlander, MR2, RAV4 and Tacoma, also check for open in wiring harness and electrical connectors between circuit opening relay and EFI main relay. See **WIRING DIAGRAMS** article. For EFI main relay location, see **EFI MAIN RELAY** under MODULES, MOTORS, RELAYS & SOLENOIDS. On all models, if wiring harness and electrical connectors are okay, go to next step. If wiring harness or electrical connector is defective, repair as necessary.
12. Check ECM ground circuit. See **WIRING DIAGRAMS** article. If ECM ground circuit is defective, repair ground circuit as necessary. If ECM ground circuit is okay, replace ECM. On Camry, Camry Solara, Highlander, MR2 and RAV4, if ECM is replaced and vehicle is equipped with engine

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immobilizer system, ECM must be programmed with proper ignition key code for engine immobilizer system. Models equipped with engine immobilizer system may be identified by looking at the ignition key. On models equipped with engine immobilizer system, the top of the ignition key is thicker than a standard ignition key, as a transponder chip is incorporated into the top of the ignition key. For programming procedures, see COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION, or appropriate ENGINE IMMOBILIZER SYSTEMS article in ACCESSORIES & EQUIPMENT.

STARTER SIGNAL CIRCUIT

NOTE: Starter signal circuit is mainly used to increase fuel injection volume during engine starting. Starter signal circuit test is based on the premise that engine cranks normally. If engine will not crank, diagnose by symptom. See TROUBLE SHOOTING - NO CODES article.

CAUTION: If Engine Control Module (ECM) replacement is instructed in the following testing, always ensure ECM wiring harness electrical connector and ground circuit are okay. If either are defective, repair and repeat testing to confirm ECM malfunction.

NOTE: When performing starter signal circuit test, it may be necessary to consult the starter wiring diagram for the entire wiring circuit. For starter wiring diagram, see WIRING DIAGRAMS in appropriate STARTERS article in STARTING & CHARGING SYSTEMS.

Camry & Camry Solara

1. If Toyota hand-held tester is available, go to next step. If Toyota hand-held tester is not available, go to step 5 .
2. Connect hand-held tester to data link connector No. 3 at driver's side of instrument panel. See **Fig. 8** and **Fig. 9** . Turn ignition on and then turn hand-held tester on. Read STA signal display on hand-held tester with ignition on, and with ignition switch in START position and engine cranking. STA signal display should read OFF with ignition on, and ON with ignition switch in START position. If STA signal display is not as specified, go to next step. If STA signal display is as specified, diagnose by symptom. See **TROUBLE SHOOTING - NO CODES** article.
3. Check for open in Black/White wire (Camry) or Gray wire (Camry Solara) and electrical connectors between STA terminal at Engine Control Module (ECM) and park/neutral position switch (A/T) or clutch start switch (M/T). See **WIRING DIAGRAMS** article. Park/neutral position switch is located on side of transaxle and clutch start switch is located near top of clutch pedal. See **ECM TERMINAL IDENTIFICATION FOR STARTER SIGNAL (CAMRY & CAMRY SOLARA)** table. ECM is located behind glove box. For illustration of ECM location, see THEORY & OPERATION article. For ECM electrical connector terminal identification, see **Fig. 18** and **Fig. 19** .
4. If wiring harness or electrical connector is defective, repair as necessary. If wiring harness and electrical connectors are okay, check ECM ground circuit. See **WIRING DIAGRAMS** article. If ECM ground circuit is defective, repair ground circuit as necessary. If ECM ground circuit is okay, replace ECM. On

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models equipped with engine immobilizer system, if ECM is replaced, ECM must be programmed with proper ignition key code for engine immobilizer system. Models equipped with engine immobilizer system may be identified by looking at the ignition key. On models equipped with engine immobilizer system, the top of the ignition key is thicker than a standard ignition key, as a transponder chip is incorporated into the top of the ignition key. For programming procedures, see COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION, or appropriate ENGINE IMMOBILIZER SYSTEMS article in ACCESSORIES & EQUIPMENT.

5. Remove glove box for access to Engine Control Module (ECM). For illustration of ECM location, see **THEORY & OPERATION** article. Note ECM electrical connector terminals. See **Fig. 18** and **Fig. 19** . Using voltmeter, check voltage between body ground and STA terminal (starter signal wire) at ECM with ignition switch in START position and engine cranking. See **ECM TERMINAL IDENTIFICATION FOR STARTER SIGNAL (CAMRY & CAMRY SOLARA)** table.

ECM TERMINAL IDENTIFICATION FOR STARTER SIGNAL (CAMRY & CAMRY SOLARA)

Application	ECM Connector	ECM Terminal No. (Wire Color)
Camry	E9	9 (Black/White)
Camry Solara	E10	9 (Gray)

6. Voltage should be 6 volts or more. If voltage is not within specification, go to next step. If voltage is within specification, diagnose by symptom. See **TROUBLE SHOOTING - NO CODES** article.
7. Check for open in Black/White wire (Camry) or Gray wire (Camry Solara) and electrical connectors between STA terminal at ECM and park/neutral position switch (A/T) or clutch start switch (M/T). See **WIRING DIAGRAMS** article. Park/neutral position switch is located on side of transaxle and clutch start switch is located near top of clutch pedal. If wiring harness and electrical connectors are okay, go to next step. If wiring harness or electrical connector is defective, repair as necessary. If ECM ground circuit is okay, replace ECM. On models equipped with engine immobilizer system, if ECM is replaced, ECM must be programmed with proper ignition key code for engine immobilizer system. Models equipped with engine immobilizer system may be identified by looking at the ignition key. On models equipped with engine immobilizer system, the top of the ignition key is thicker than a standard ignition key, as a transponder chip is incorporated into the top of the ignition key. For programming procedures, see COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION, or appropriate ENGINE IMMOBILIZER SYSTEMS article in ACCESSORIES & EQUIPMENT.

Celica & ECHO

Testing information is not available from manufacturer.

Corolla

1. If Toyota hand-held tester is available, go to next step. If Toyota hand-held tester is not available, go to step 5 .
2. Connect hand-held tester to data link connector No. 3 at driver's side of instrument panel. See **Fig. 11** . Turn ignition on and then turn hand-held tester on. Read STA signal display on hand-held tester with ignition on, and with ignition switch in START position and engine cranking. STA signal display should read OFF with ignition on, and ON with ignition switch in START position. If STA signal display is not

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as specified, go to next step. If STA signal display is as specified, diagnose by symptom. See **TROUBLE SHOOTING - NO CODES** article.

3. Check for open in Black/White wire (starter signal wire) and electrical connectors between starter relay and terminal No. 11 at Engine Control Module (ECM) electrical connector E6 on 3-speed A/T and M/T models, or terminal No. 11 at ECM electrical connector E9 on 4-speed A/T models. See **WIRING DIAGRAMS** article. ECM is located behind stereo on instrument panel, just in front of center console. For illustration of ECM location, see **THEORY & OPERATION** article. Starter relay is located in fuse/relay box at driver's side front corner of engine compartment, just in front of strut tower and may be marked as ST relay. For ECM electrical connector terminal identification, see **Fig. 21** and **Fig. 22** .
4. If wiring harness or electrical connector is defective, repair as necessary. If wiring harness and electrical connectors are okay, check ECM ground circuit. See **WIRING DIAGRAMS** article. If ECM ground circuit is defective, repair ground circuit as necessary. If ECM ground circuit is okay, replace ECM.
5. Remove necessary components for access to Engine Control Module (ECM). See **ENGINE CONTROL MODULE** under COMPUTERIZED ENGINE CONTROLS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article. Remove bolts from ECM so electrical connectors can be accessed on ECM.
6. Note ECM electrical connector terminals. See **Fig. 21** and **Fig. 22** . On 3-speed A/T and M/T models, using voltmeter, check voltage between body ground and terminal No. 11 (Black/White wire) at ECM electrical connector E6 with ignition switch in START position and engine cranking. On 4-speed A/T models, using voltmeter, check voltage between body ground and terminal No. 11 (Black/White wire) at ECM electrical connector E9 with ignition switch in START position and engine cranking. On all models, this is the STA terminal at ECM.
7. On all models, voltage should be 6 volts or more. If voltage is not within specification, go to next step. If voltage is within specification, diagnose by symptom. See **TROUBLE SHOOTING - NO CODES** article.
8. Check for open and short in Black/White wire and electrical connectors between starter relay and terminal No. 11 at ECM electrical connector E6 on 3-speed A/T and M/T models, or terminal No. 11 at ECM electrical connector E9 on 4-speed A/T models. See **WIRING DIAGRAMS** article. This is the starter signal wire. Starter relay is located in fuse/relay box at driver's side front corner of engine compartment, just in front of strut tower and may be marked as ST relay.
9. If wiring harness or electrical connector is defective, repair as necessary. If wiring harness and electrical connectors are okay, check ECM ground circuit. See **WIRING DIAGRAMS** article. If ECM ground circuit is defective, repair ground circuit as necessary. If ECM ground circuit is okay, replace ECM.

Highlander

1. If Toyota hand-held tester is available, go to next step. If Toyota hand-held tester is not available, go to step 5 .
2. Connect hand-held tester to data link connector No. 3 at driver's side of instrument panel. See **Fig. 13** . Turn ignition on and then turn hand-held tester on. Read STA signal display on hand-held tester with ignition on, and with ignition switch in START position and engine cranking. STA signal display should read OFF with ignition on, and ON with ignition switch in START position. If STA signal display is not as specified, go to next step. If STA signal display is as specified, diagnose by symptom. See **TROUBLE SHOOTING - NO CODES** article.
3. Check for open and short in White/Red wire between starter relay and starter fuse, defective starter fuse,

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and for open and short in Blue wire and electrical connectors between starter fuse and terminal No. 16 at Engine Control Module (ECM) electrical connector E7. This is the starter signal circuit between starter relay and ECM. See **WIRING DIAGRAMS** article. Starter relay and starter fuse are located in fuse/relay box at driver's side front corner of engine compartment, just in front of strut tower. ECM is located behind glove box. For illustration of ECM location, see **THEORY & OPERATION** article. For ECM electrical connector terminal identification, see **Fig. 24** .

4. If starter fuse, wiring harness or electrical connector is defective, replace fuse or repair wiring harness or electrical connector as necessary. If starter fuse, wiring harness and electrical connectors are okay, check ECM ground circuit. See **WIRING DIAGRAMS** article. If ECM ground circuit is defective, repair ground circuit as necessary. If ECM ground circuit is okay, replace ECM. On models equipped with engine immobilizer system, if ECM is replaced, ECM must be programmed with proper ignition key code for engine immobilizer system. Models equipped with engine immobilizer system may be identified by looking at the ignition key. On models equipped with engine immobilizer system, the top of the ignition key is thicker than a standard ignition key, as a transponder chip is incorporated into the top of the ignition key. For programming procedures, see COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION, or appropriate ENGINE IMMOBILIZER SYSTEMS article in ACCESSORIES & EQUIPMENT.
5. Remove glove box for access to Engine Control Module (ECM). For illustration of ECM location, see **THEORY & OPERATION** article.
6. Note ECM electrical connector terminals. See **Fig. 24** . Using voltmeter, check voltage between body ground and terminal No. 16 (Blue wire) at ECM electrical connector E7 with ignition switch in START position and engine cranking. See **Fig. 24** . This is the STA terminal at ECM. Voltage should be 6 volts or more. If voltage is not within specification, go to next step. If voltage is within specification, diagnose by symptom. See **TROUBLE SHOOTING - NO CODES** article.
7. Check for open and short in White/Red wire between starter relay and starter fuse, defective starter fuse, and for open and short in Blue wire and electrical connectors between starter fuse and terminal No. 16 at ECM electrical connector E7. This is the starter signal circuit between starter relay and ECM. See **WIRING DIAGRAMS** article. Starter relay and starter fuse are located in fuse/relay box at driver's side front corner of engine compartment, just in front of strut tower.
8. If starter fuse, wiring harness or electrical connector is defective, replace fuse or repair wiring harness or electrical connector as necessary. If starter fuse, wiring harness and electrical connectors are okay, check ECM ground circuit. See **WIRING DIAGRAMS** article. If ECM ground circuit is defective, repair ground circuit as necessary. If ECM ground circuit is okay, replace ECM. On models equipped with engine immobilizer system, if ECM is replaced, ECM must be programmed with proper ignition key code for engine immobilizer system. Models equipped with engine immobilizer system may be identified by looking at the ignition key. On models equipped with engine immobilizer system, the top of the ignition key is thicker than a standard ignition key, as a transponder chip is incorporated into the top of the ignition key. For programming procedures, see COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION, or appropriate ENGINE IMMOBILIZER SYSTEMS article in ACCESSORIES & EQUIPMENT.

MR2

1. If Toyota hand-held tester is available, go to next step. If Toyota hand-held tester is not available, go to step 5 .
2. Connect hand-held tester to data link connector No. 3 at driver's side of instrument panel. See **Fig. 14** .

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Turn ignition on and then turn hand-held tester on. Read STA signal display on hand-held tester with ignition on, and with ignition switch in START position and engine cranking. STA signal display should read OFF with ignition on, and ON with ignition switch in START position. If STA signal display is not as specified, go to next step. If STA signal display is as specified, diagnose by symptom. See **TROUBLE SHOOTING - NO CODES** article.

3. Check for open and short in Black wire between starter relay and starter fuse, defective starter fuse, and for open and short in Black wire and electrical connectors between starter fuse and terminal No. 11 at Engine Control Module (ECM) electrical connector E3. This is the starter signal circuit between starter relay and ECM. See **WIRING DIAGRAMS** article. Starter relay and starter fuse are located in fuse/relay box at driver's side rear corner of engine compartment, just in front of strut tower and may be marked as ST relay and ST fuse. ECM is located on inside of firewall, directly behind driver's seat and luggage compartment. For illustration of ECM location, see THEORY & OPERATION article. To remove components for access to ECM, see **ENGINE CONTROL MODULE** under COMPUTERIZED ENGINE CONTROLS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article. For ECM electrical connector terminal identification, see **Fig. 25** .
4. If starter fuse, wiring harness or electrical connector is defective, replace fuse or repair wiring harness or electrical connector as necessary. If starter fuse, wiring harness and electrical connectors are okay, check ECM ground circuit. See **WIRING DIAGRAMS** article. If ECM ground circuit is defective, repair ground circuit as necessary. If ECM ground circuit is okay, replace ECM. On models equipped with engine immobilizer system, if ECM is replaced, ECM must be programmed with proper ignition key code for engine immobilizer system. Models equipped with engine immobilizer system may be identified by looking at the ignition key. On models equipped with engine immobilizer system, the top of the ignition key is thicker than a standard ignition key, as a transponder chip is incorporated into the top of the ignition key. For programming procedures, see COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION, or appropriate ENGINE IMMOBILIZER SYSTEMS article in ACCESSORIES & EQUIPMENT.
5. Remove necessary components for access to Engine Control Module (ECM). ECM is located on inside of firewall, directly behind driver's seat and luggage compartment. See **ENGINE CONTROL MODULE** under COMPUTERIZED ENGINE CONTROLS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article. Remove bolts and disconnect ECM with electrical connectors from inside of firewall.
6. Note ECM electrical connector terminals. See **Fig. 25** . Using voltmeter, check voltage between body ground and terminal No. 11 (Black wire) at ECM electrical connector E3 with ignition switch in START position and engine cranking. This is the STA terminal at ECM. Voltage should be 6 volts or more. If voltage is not within specification, go to next step. If voltage is within specification, diagnose by symptom. See **TROUBLE SHOOTING - NO CODES** article.
7. Check for open and short in Black wire between starter relay and starter fuse, defective starter fuse, and for open and short in Black wire and electrical connectors between starter relay and terminal No. 11 at ECM electrical connector E3. This is the starter signal circuit between starter relay and ECM. See **WIRING DIAGRAMS** article. Starter relay and starter fuse are located in fuse/relay box at driver's side rear corner of engine compartment, just in front of strut tower and may be marked as ST relay and ST fuse.
8. If starter fuse, wiring harness or electrical connector is defective, replace fuse or repair wiring harness or electrical connector as necessary. If starter fuse, wiring harness and electrical connectors are okay, check ECM ground circuit. See **WIRING DIAGRAMS** article. If ECM ground circuit is defective, repair ground circuit as necessary. If ECM ground circuit is okay, replace ECM. On models equipped with

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engine immobilizer system, if ECM is replaced, ECM must be programmed with proper ignition key code for engine immobilizer system. Models equipped with engine immobilizer system may be identified by looking at the ignition key. On models equipped with engine immobilizer system, the top of the ignition key is thicker than a standard ignition key, as a transponder chip is incorporated into the top of the ignition key. For programming procedures, see COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION, or appropriate ENGINE IMMOBILIZER SYSTEMS article in ACCESSORIES & EQUIPMENT.

Prius

Testing information is not available from manufacturer.

RAV4

1. If Toyota hand-held tester is available, go to next step. If Toyota hand-held tester is not available, go to step 5 .
2. Connect hand-held tester to data link connector No. 3 at driver's side of instrument panel. See **Fig. 16** . Turn ignition on and then turn hand-held tester on. Read STA signal display on hand-held tester with ignition on, and with ignition switch in START position and engine cranking. STA signal display should read OFF with ignition on, and ON with ignition switch in START position. If STA signal display is not as specified, go to next step. If STA signal display is as specified, diagnose by symptom. See **TROUBLE SHOOTING - NO CODES** article.
3. Check for open and short in Black/White wire between starter relay and starter fuse, defective starter fuse, and for open and short in Black/Red or White wire and electrical connectors between starter fuse and terminal No. 7 (Black/Red or White wire) at Engine Control Module (ECM) electrical connector E8. There are 2 different wiring harnesses used. Wire color at between starter fuse and terminal No. 7 at ECM may vary according to wiring harness used. This is the starter signal circuit between starter relay and ECM. See **WIRING DIAGRAMS** article. Starter relay and starter fuse are located in fuse/relay box at driver's side front corner of engine compartment and may be marked as ST relay and ST fuse. ECM is located near passenger's side kick panel, just below instrument panel. For illustration of ECM location, see **THEORY & OPERATION** article. For ECM electrical connector terminal identification, see **Fig. 27** .
4. If starter fuse, wiring harness or electrical connector is defective, replace fuse or repair wiring harness or electrical connector as necessary. If starter fuse, wiring harness and electrical connectors are okay, check ECM ground circuit. See **WIRING DIAGRAMS** article. If ECM ground circuit is defective, repair ground circuit as necessary. If ECM ground circuit is okay, replace ECM. On models equipped with engine immobilizer system, if ECM is replaced, ECM must be programmed with proper ignition key code for engine immobilizer system. Models equipped with engine immobilizer system may be identified by looking at the ignition key. On models equipped with engine immobilizer system, the top of the ignition key is thicker than a standard ignition key, as a transponder chip is incorporated into the top of the ignition key. For programming procedures, see COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION, or appropriate ENGINE IMMOBILIZER SYSTEMS article in ACCESSORIES & EQUIPMENT.
5. Remove glove box for access to Engine Control Module (ECM). For illustration of ECM location, see **THEORY & OPERATION** article.
6. Note ECM electrical connector terminals, see **Fig. 27** . Using voltmeter, check voltage between body

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ground and terminal No. 7 (Black/Red or White wire) at ECM electrical connector E8 with ignition switch in START position and engine cranking. There are 2 different wiring harnesses used. Wire color at terminal No. 7 at ECM may vary according to wiring harness used. This is the STA terminal at ECM. Voltage should be 6 volts or more. If voltage is not within specification, go to next step. If voltage is within specification, diagnose by symptom. See **TROUBLE SHOOTING - NO CODES** article.

7. Check for open and short in Black/White wire between starter relay and starter fuse, defective starter fuse, and for open and short in Black/Red or White wire and electrical connectors between starter fuse and terminal No. 7 at ECM electrical connector E8. This is the starter signal circuit between starter relay and ECM. See **WIRING DIAGRAMS** article. Starter relay and starter fuse are located in fuse/relay box at driver's side front corner of engine compartment and may be marked as ST relay and ST fuse.
8. If starter fuse, wiring harness or electrical connector is defective, replace fuse or repair wiring harness or electrical connector as necessary. If starter fuse, wiring harness and electrical connectors are okay, check ECM ground circuit. See **WIRING DIAGRAMS** article. If ECM ground circuit is defective, repair ground circuit as necessary. If ECM ground circuit is okay, replace ECM. On models equipped with engine immobilizer system, if ECM is replaced, ECM must be programmed with proper ignition key code for engine immobilizer system. Models equipped with engine immobilizer system may be identified by looking at the ignition key. On models equipped with engine immobilizer system, the top of the ignition key is thicker than a standard ignition key, as a transponder chip is incorporated into the top of the ignition key. For programming procedures, see COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION, or appropriate ENGINE IMMOBILIZER SYSTEMS article in ACCESSORIES & EQUIPMENT.

Tacoma

1. If Toyota hand-held tester is available, go to next step. If Toyota hand-held tester is not available, go to step 5 .
2. Connect hand-held tester to data link connector No. 3 at driver's side of instrument panel. See **Fig. 17** . Turn ignition on and then turn hand-held tester on. Read STA signal display on hand-held tester with ignition on, and with ignition switch in START position and engine cranking. STA signal display should read OFF with ignition on, and ON with ignition switch in START position. If STA signal display is not as specified, go to next step. If STA signal display is as specified, diagnose by symptom. See **TROUBLE SHOOTING - NO CODES** article.
3. Check for open in Black/White wire between park/neutral position switch (A/T) or clutch start switch (M/T) and terminal No. 7 at Engine Control Module (ECM) electrical connector E5. This is the starter signal circuit to ECM. See **WIRING DIAGRAMS** article. ECM is located behind glove box. For illustration of ECM location, see **THEORY & OPERATION** article. For ECM electrical connector terminal identification, see **Fig. 28** . Park/neutral position switch is located on side of transmission and clutch start switch is located near top of clutch pedal.
4. If wiring harness or electrical connector is defective, repair as necessary. If wiring harness and electrical connectors are okay, check ECM ground circuit. See **WIRING DIAGRAMS** article. If ECM ground circuit is defective, repair ground circuit as necessary. If ECM ground circuit is okay, replace ECM.
5. Remove glove box for access to Engine Control Module (ECM). For illustration of ECM location, see **THEORY & OPERATION** article.
6. Note ECM electrical connector terminals. See **Fig. 28** . Using voltmeter, check voltage body ground and terminal No. 7 (Black/White wire) at ECM electrical connector E5 with ignition switch in START position and engine cranking. This is the STA terminal at ECM. Voltage should be 6 volts or more. If

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voltage is not within specification, go to next step. If voltage is within specification, diagnose by symptom. See **TROUBLE SHOOTING - NO CODES** article.

7. Check for open in Black/White wire between park/neutral position switch (A/T) or clutch start switch (M/T) and terminal No. 7 at ECM electrical connector E5. This is the starter signal circuit to ECM. See **WIRING DIAGRAMS** article. Park/neutral position switch is located on side of transmission and clutch start switch is located near top of clutch pedal.
8. If wiring harness or electrical connector is defective, repair as necessary. If wiring harness and electrical connectors are okay, check ECM ground circuit. See **WIRING DIAGRAMS** article. If ECM ground circuit is defective, repair ground circuit as necessary. If ECM ground circuit is okay, replace ECM.

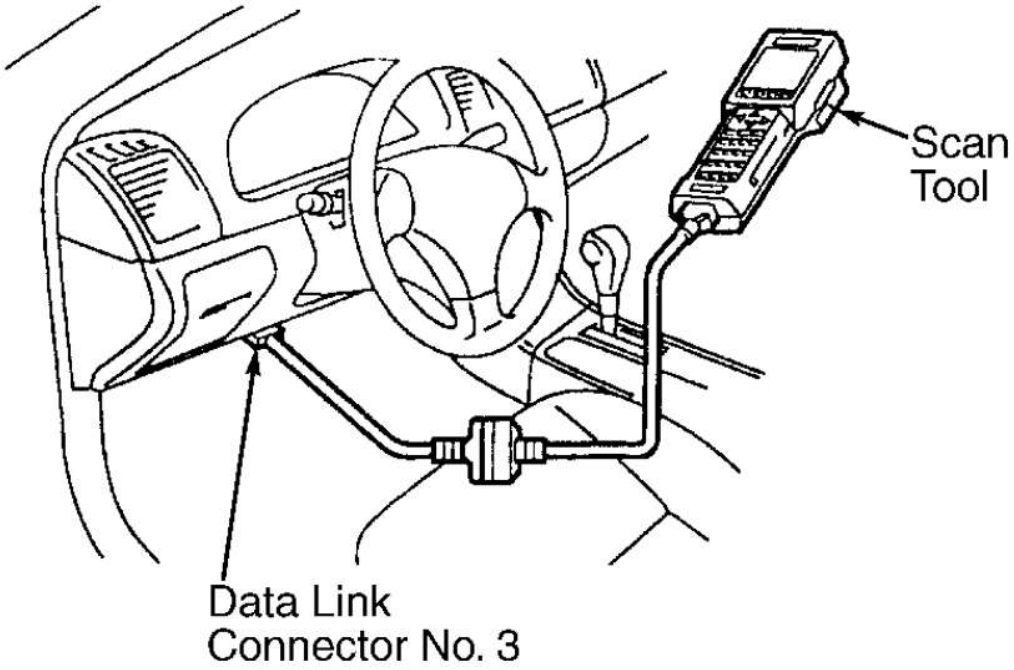


Fig. 8: Locating Data Link Connector No. 3 (Camry)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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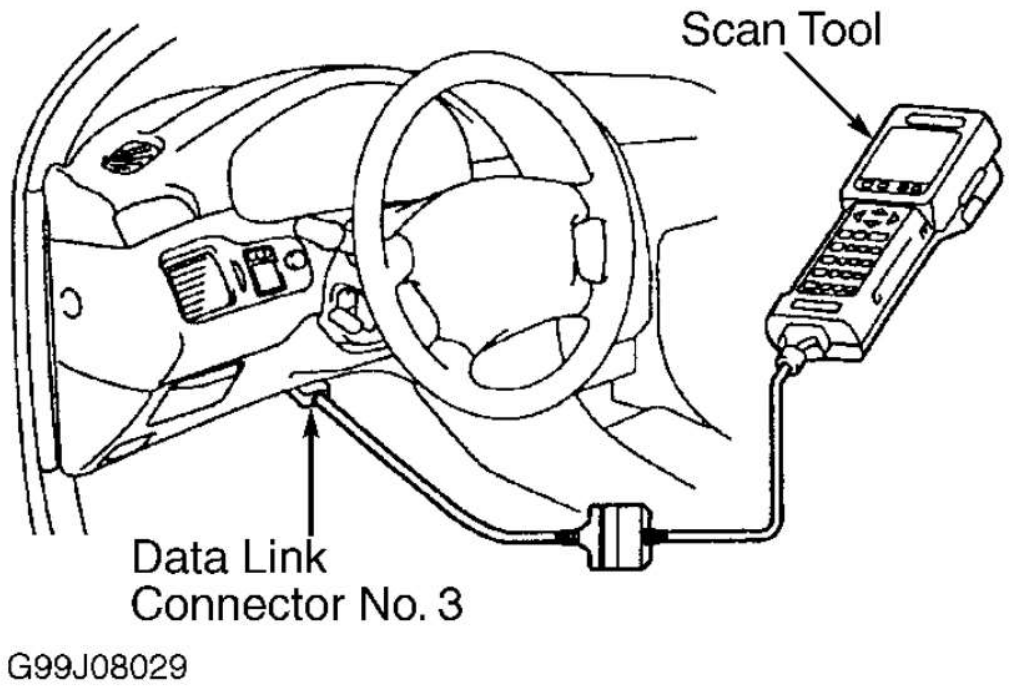


Fig. 9: Locating Data Link Connector No. 3 (Camry Solara)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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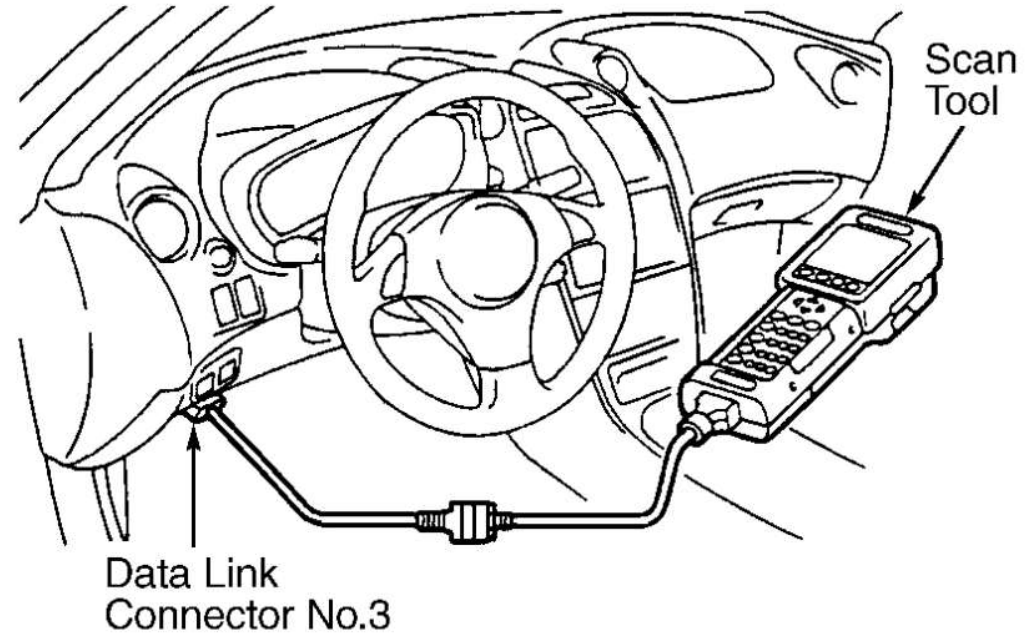


Fig. 10: Locating Data Link Connector No. 3 (Celica)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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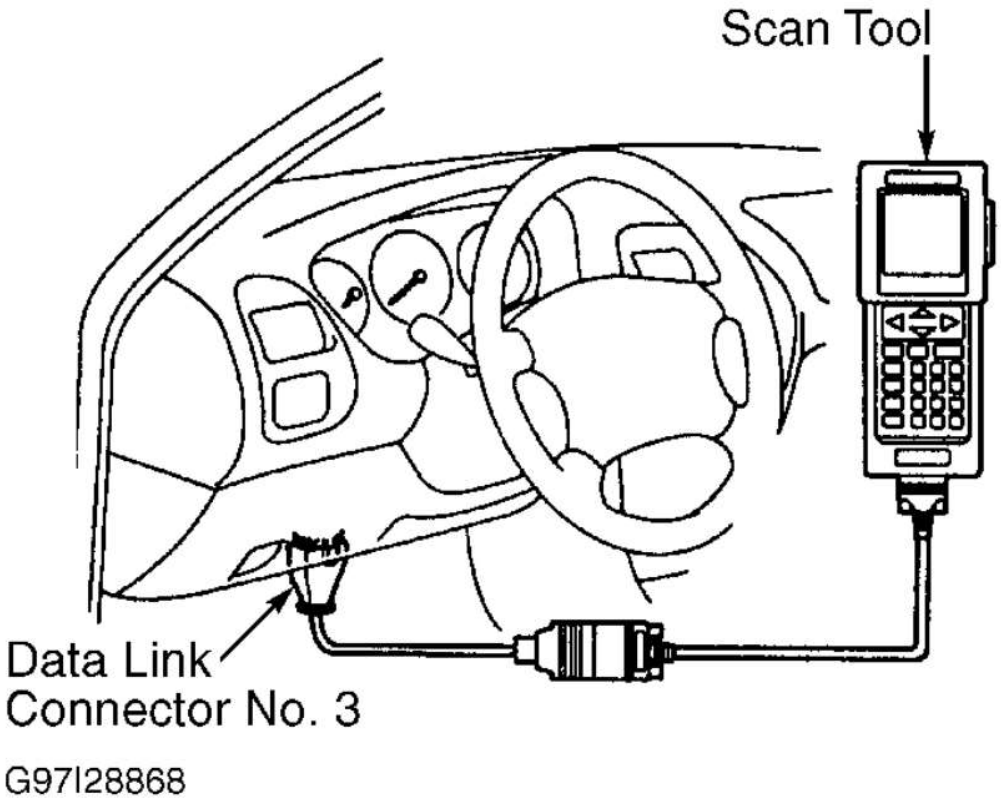


Fig. 11: Locating Data Link Connector No. 3 (Corolla)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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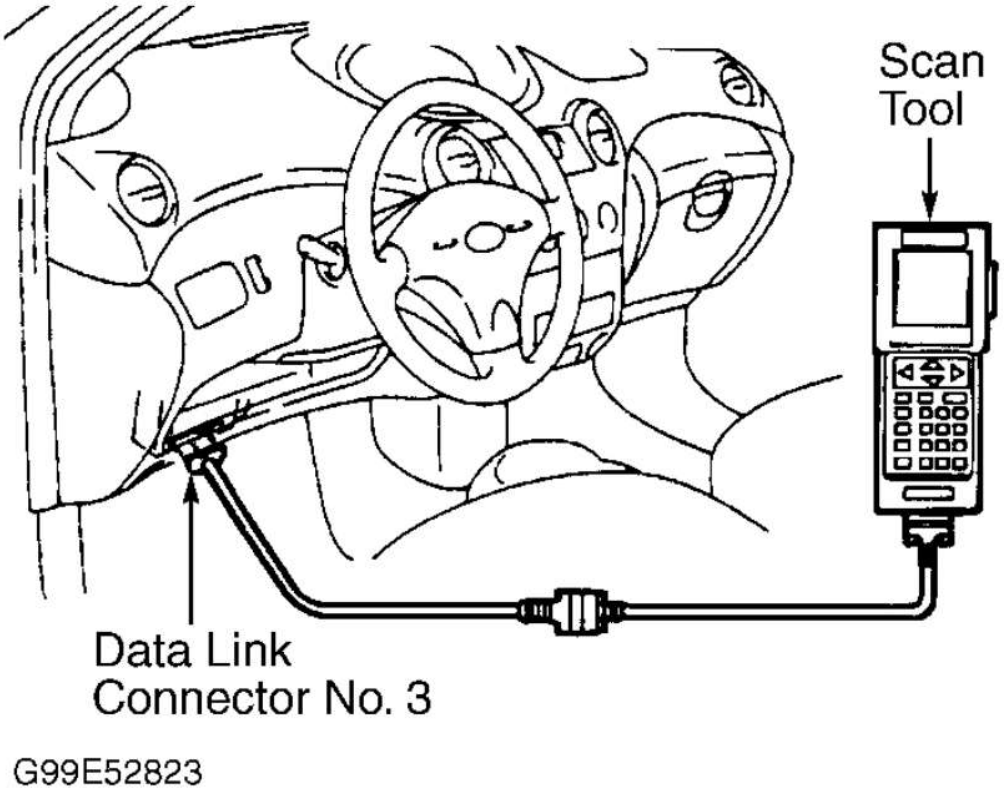


Fig. 12: Locating Data Link Connector No. 3 (ECHO)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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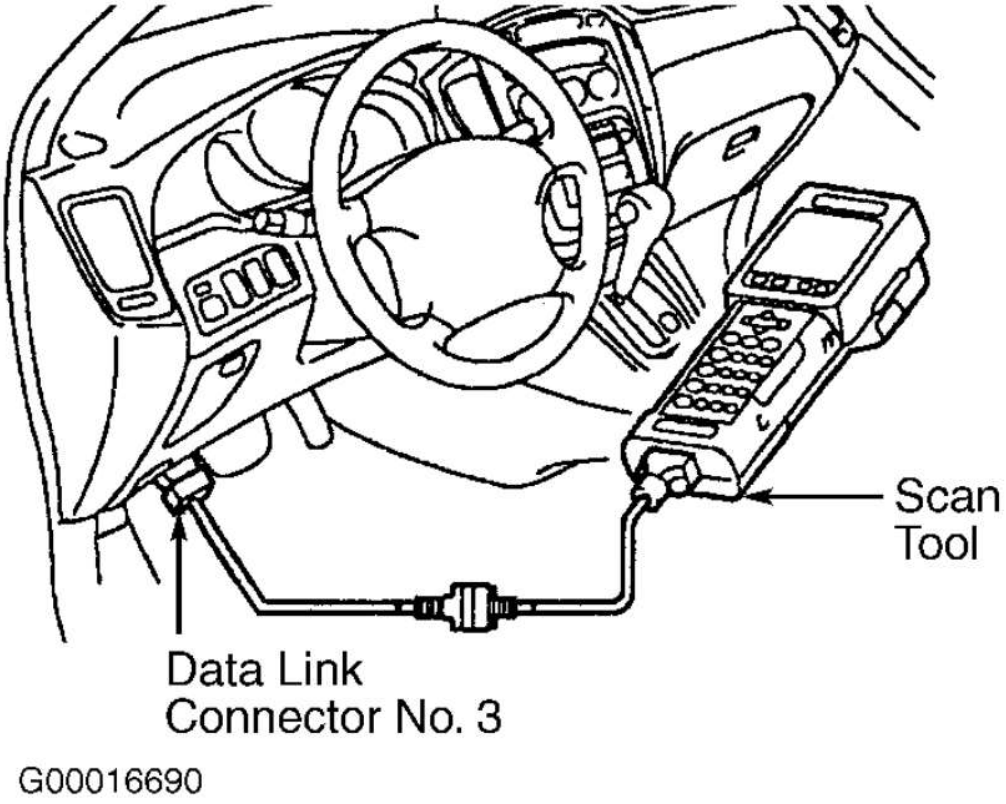


Fig. 13: Locating Data Link Connector No. 3 (Highlander)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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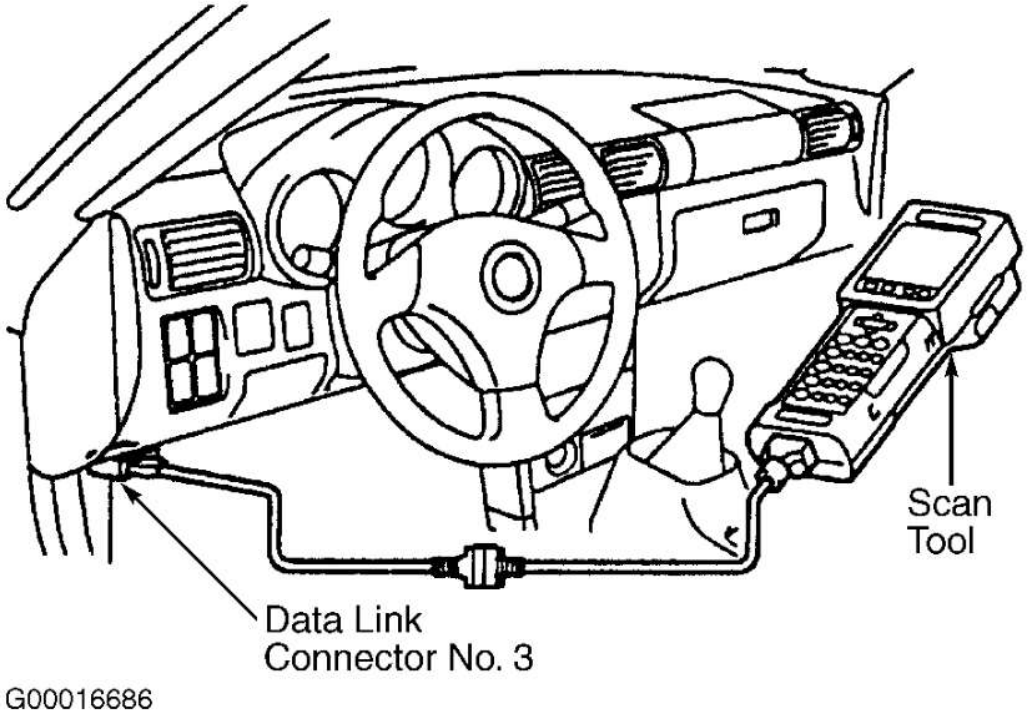


Fig. 14: Locating Data Link Connector No. 3 (MR2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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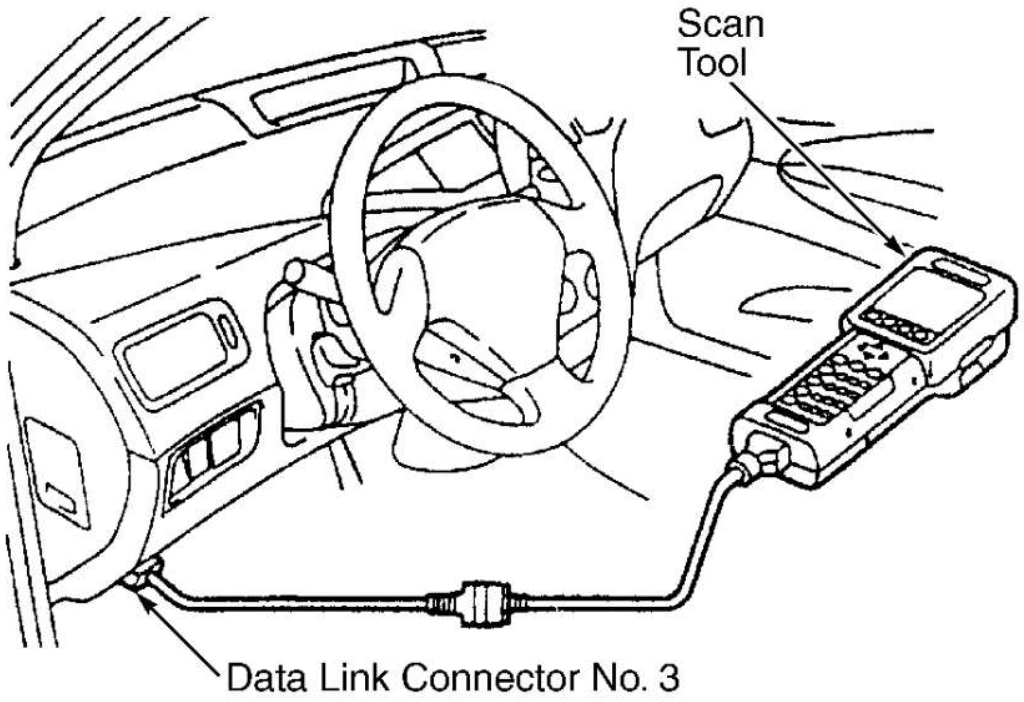


Fig. 15: Locating Data Link Connector No. 3 (Prius)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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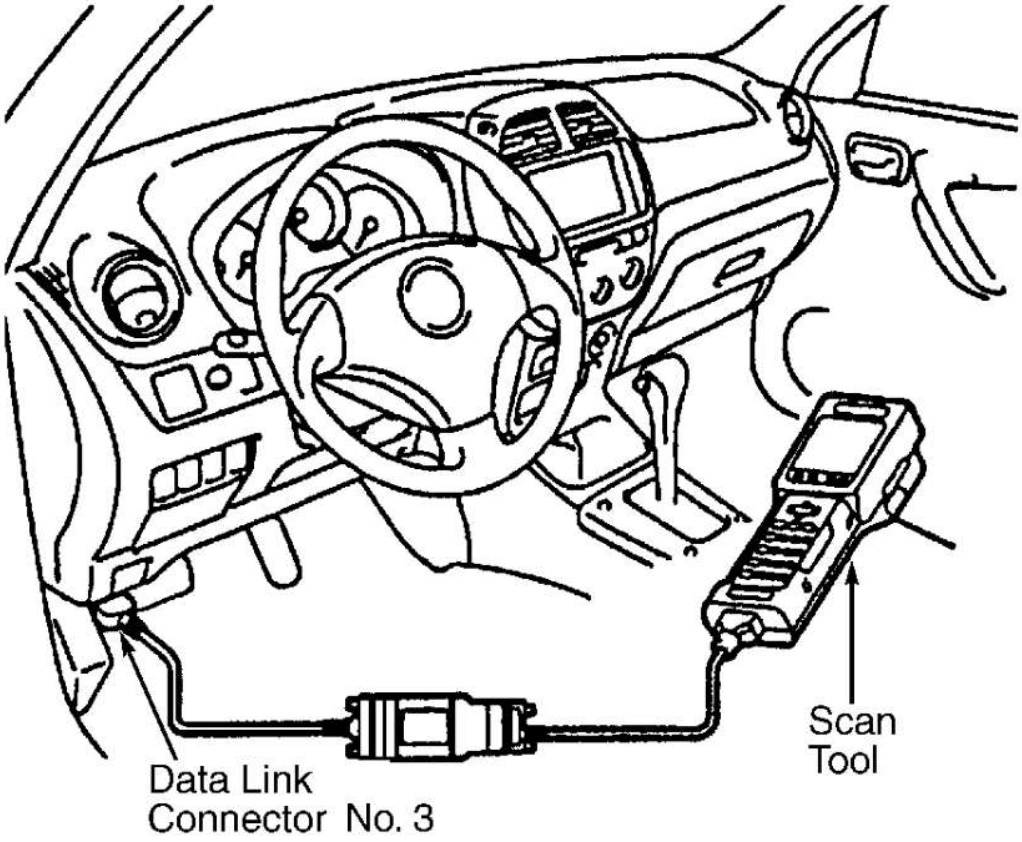


Fig. 16: Locating Data Link Connector No. 3 (RAV4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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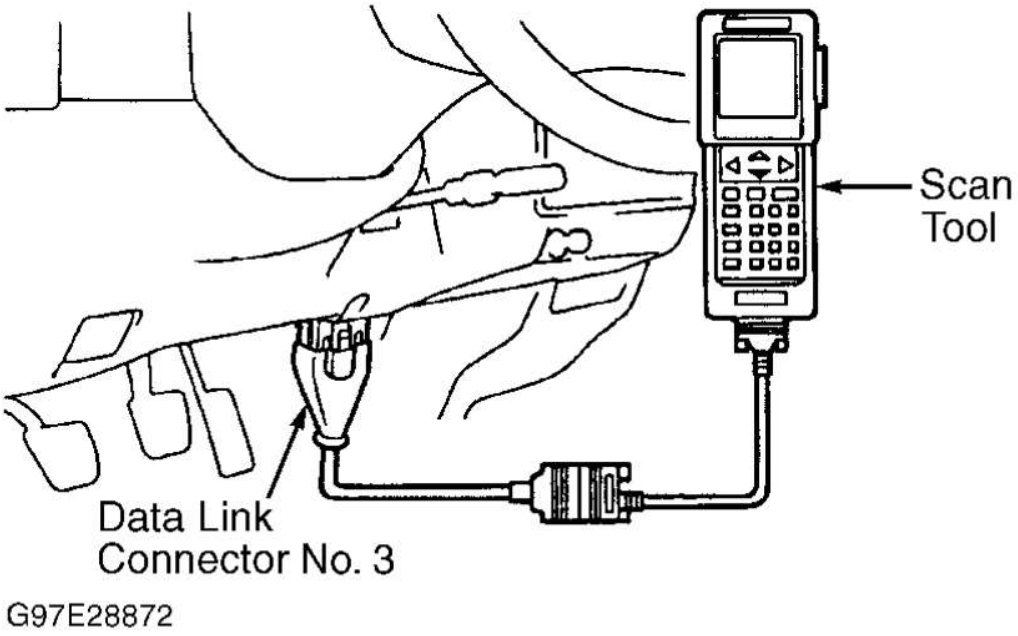


Fig. 17: Locating Data Link Connector No. 3 (Tacoma)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ENGINE CONTROL MODULE

Power & Ground Circuits

For testing of Engine Control Module (ECM) power and ground circuits, see **ENGINE CONTROL MODULE POWER SOURCE CIRCUIT** . Also see PIN VOLTAGE CHARTS article. For illustration of ECM location, see **THEORY & OPERATION** article. For identification of ECM electrical connector terminals. See **Fig. 18** - **Fig. 28** .

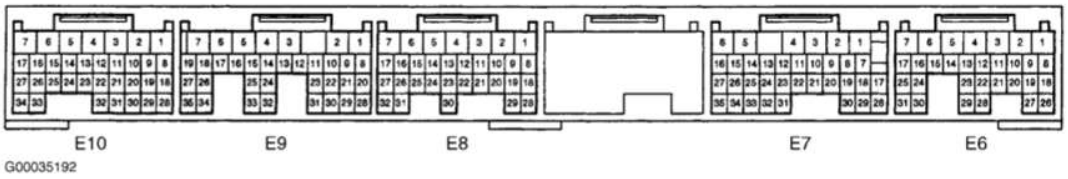


Fig. 18: Identifying Engine Control Module Electrical Connector Terminals (Camry)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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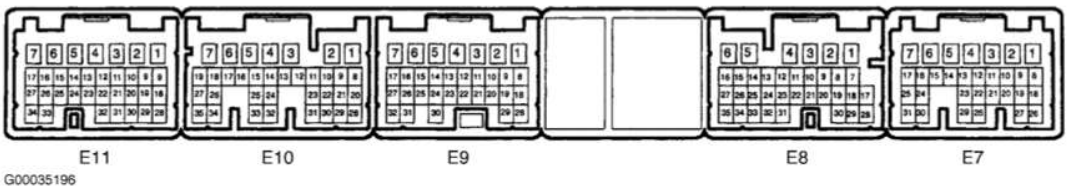


Fig. 19: Identifying Engine Control Module Electrical Connector Terminals (Camry Solara)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

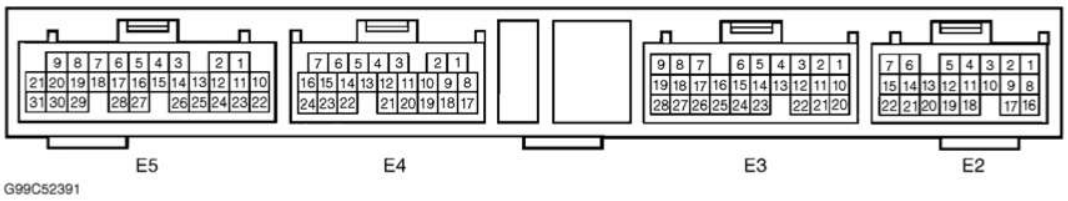


Fig. 20: Identifying Engine Control Module Electrical Connector Terminals (Celica)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

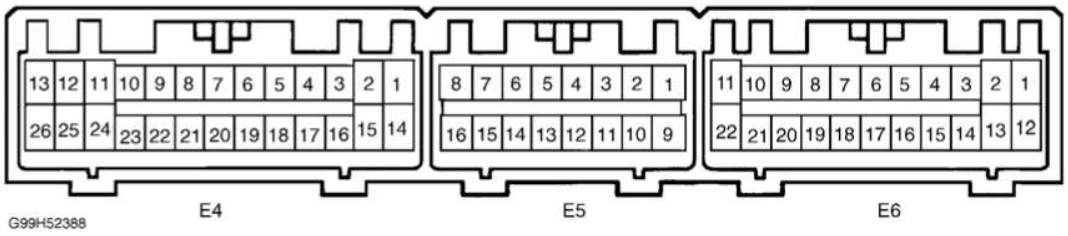


Fig. 21: Identifying Engine Control Module Electrical Connector Terminals (Corolla With 3-Speed A/T Or M/T)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

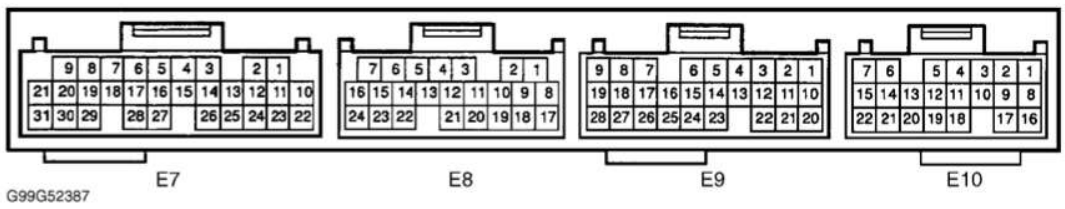


Fig. 22: Identifying Engine Control Module Electrical Connector Terminals (Corolla With 4-Speed A/T)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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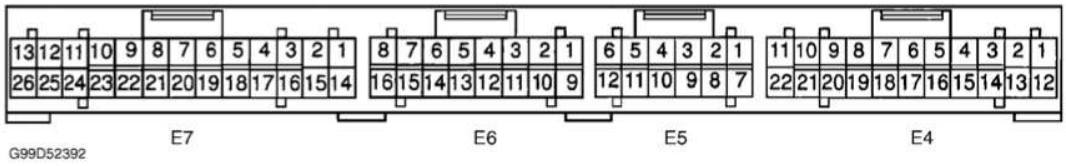


Fig. 23: Identifying Engine Control Module Electrical Connector Terminals (ECHO)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

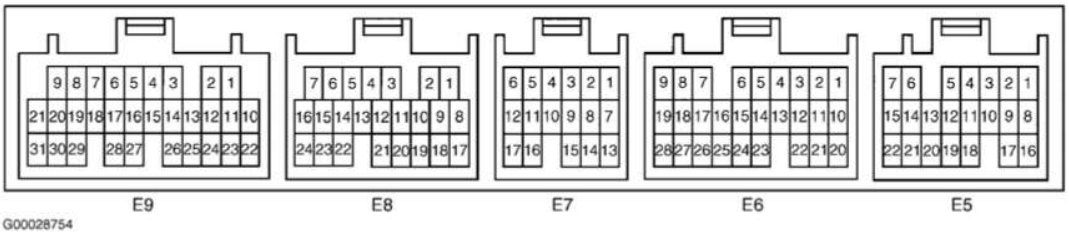


Fig. 24: Identifying Engine Control Module Electrical Connector Terminals (Highlander)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

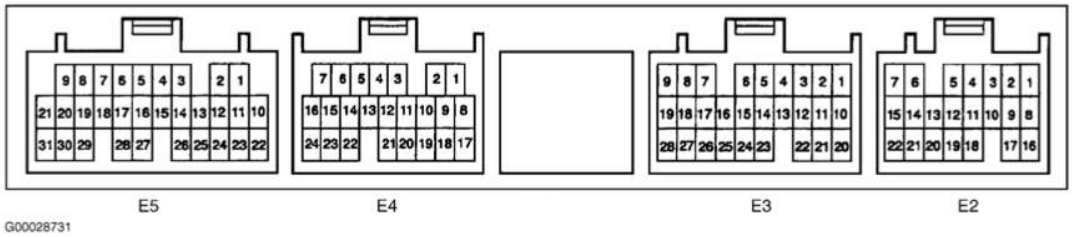


Fig. 25: Identifying Engine Control Module Electrical Connector Terminals (MR2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

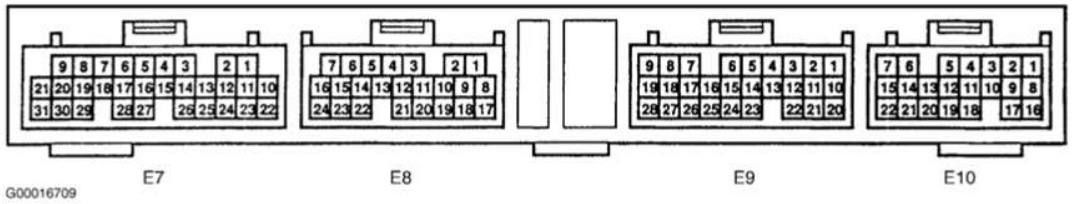


Fig. 26: Identifying Engine Control Module Electrical Connector Terminals (Prius)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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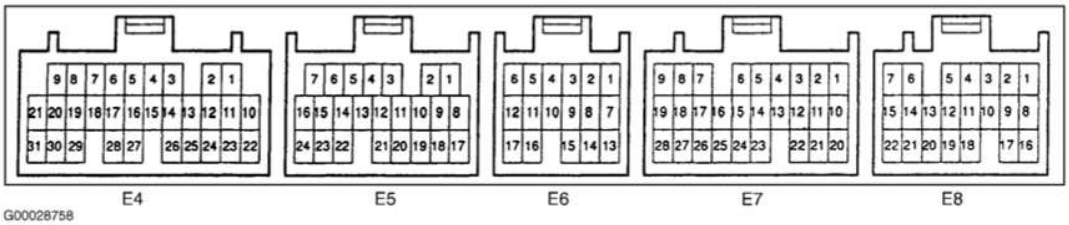


Fig. 27: Identifying Engine Control Module Electrical Connector Terminals (RAV4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

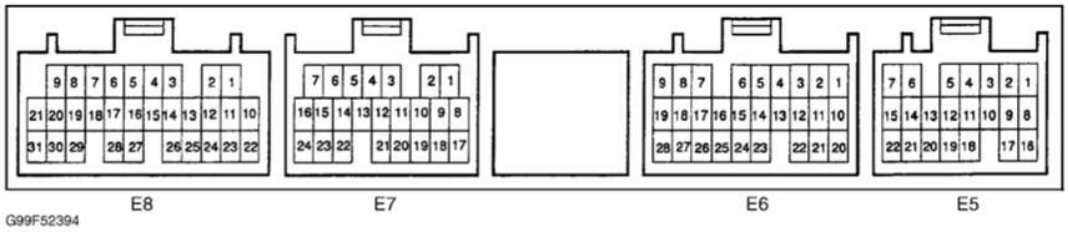


Fig. 28: Identifying Engine Control Module Electrical Connector Terminals (Tacoma)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ENGINE SENSORS & SWITCHES

ACCELERATOR PEDAL POSITION SENSOR

Camry & Camry Solara

1. Disconnect electrical connector at accelerator pedal position sensor. Accelerator pedal position sensor is located near top of accelerator pedal. See **Fig. 29** .
2. Using ohmmeter, check that resistance is within specification between specified terminals on accelerator pedal position sensor. See **ACCELERATOR PEDAL POSITION SENSOR RESISTANCE** table. See **Fig. 29** . Replace accelerator pedal position sensor if resistance is not within specification. See **ACCELERATOR PEDAL POSITION SENSOR** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.

ACCELERATOR PEDAL POSITION SENSOR RESISTANCE

Application	Terminals	Ohms
Camry	VPA1 & EP2	5000 Or Less
	VPA2 & EP1	5000 Or Less
	VCP1 & EP1	2250-4750
	VCP2 & EP2	2250-4750
Camry Solara	VCP1 & EP1	(1) 2250-4750

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VCP2 & EP2	(1) 2250-4750

(1) Resistance at 68°F (20°C).

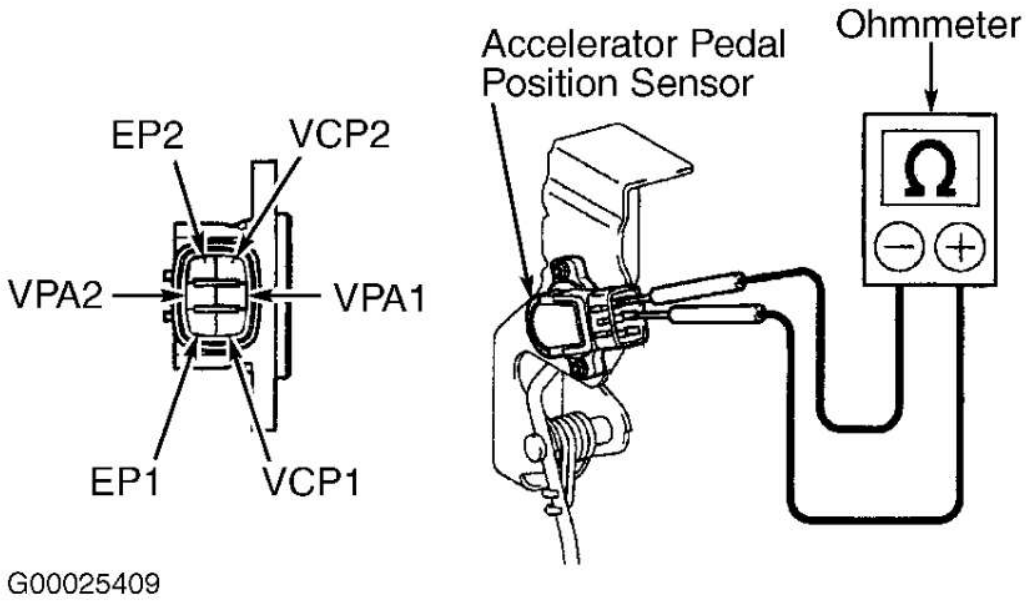


Fig. 29: Locating & Testing Accelerator Pedal Position Sensor (Camry & Camry Solara)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

MR2 With Sequential Manual Transaxle

There are 2 types of manual transaxles used. Sequential manual transaxle may be identified by shift lever pattern which consists of "R", "N", "S" and "+" in place of the conventional type shift lever pattern and there is no clutch pedal. For testing of accelerator pedal position sensor, see **THROTTLE BODY** under IDLE CONTROL SYSTEMS.

Prius

WARNING: Read service precautions before proceeding with service procedure. See SERVICE PRECAUTIONS .

1. Disconnect electrical connector at accelerator pedal position sensor. Accelerator pedal position sensor is located near top of accelerator pedal. See **Fig. 30** .
2. Using ohmmeter, check resistance between VCP1 and EP1 terminals, and between VCP2 and EP2 terminals on accelerator pedal position sensor. See **Fig. 30** . Resistance should be 1500-6000 ohms at 68° F (20°C). Replace accelerator pedal position sensor if resistance is not within specification. See

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ACCELERATOR PEDAL POSITION SENSOR under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.

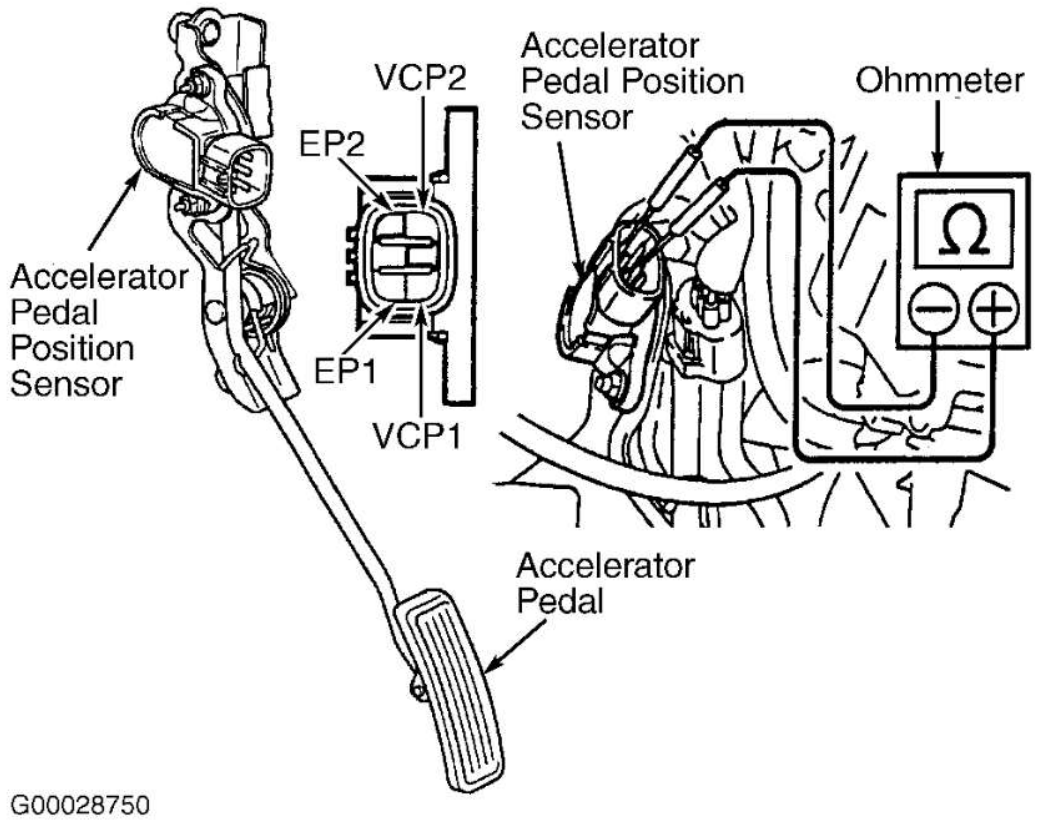


Fig. 30: Locating & Testing Accelerator Pedal Position Sensor (Prius)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

A/C COMPRESSOR LOCK SENSOR

Camry, Camry Solara With Manual A/C, Celica, Highlander, MR2 & RAV4

1. Disconnect electrical connector for A/C compressor lock sensor and magnetic clutch on front of A/C compressor. This is the electrical located near front of A/C compressor.
2. Using ohmmeter, check resistance between terminals No. 1 and 2 on electrical connector for A/C compressor lock sensor and magnetic clutch. See **Fig. 31** -**Fig. 35** . Ensure resistance is within specification. See **A/C COMPRESSOR LOCK SENSOR RESISTANCE** table. Replace A/C compressor lock sensor if resistance is not within specification. It may be necessary to replace A/C compressor along with A/C compressor lock sensor as an assembly. Consult parts department for parts availability.

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A/C COMPRESSOR LOCK SENSOR RESISTANCE

Application	Ohms @ 68°F (20°C)
Camry	165-205
Camry Solara	65-125
Celica, Highlander, MR2 & RAV4	165-205

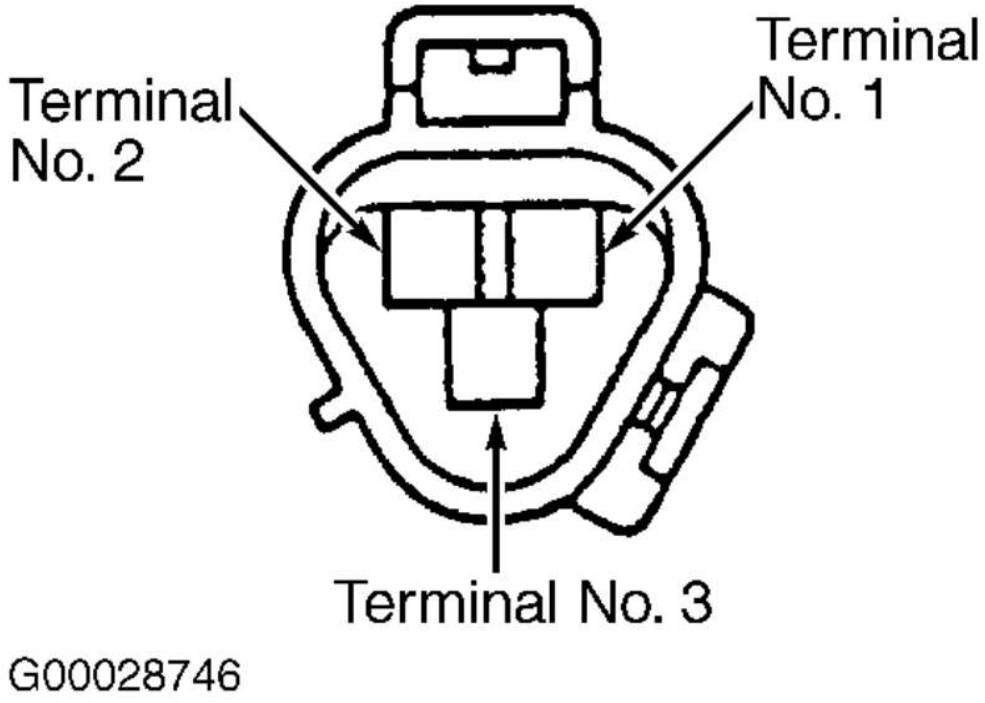


Fig. 31: Identifying Terminals On A/C Compressor Lock Sensor & Magnetic Clutch Electrical Connector (Camry & Highlander)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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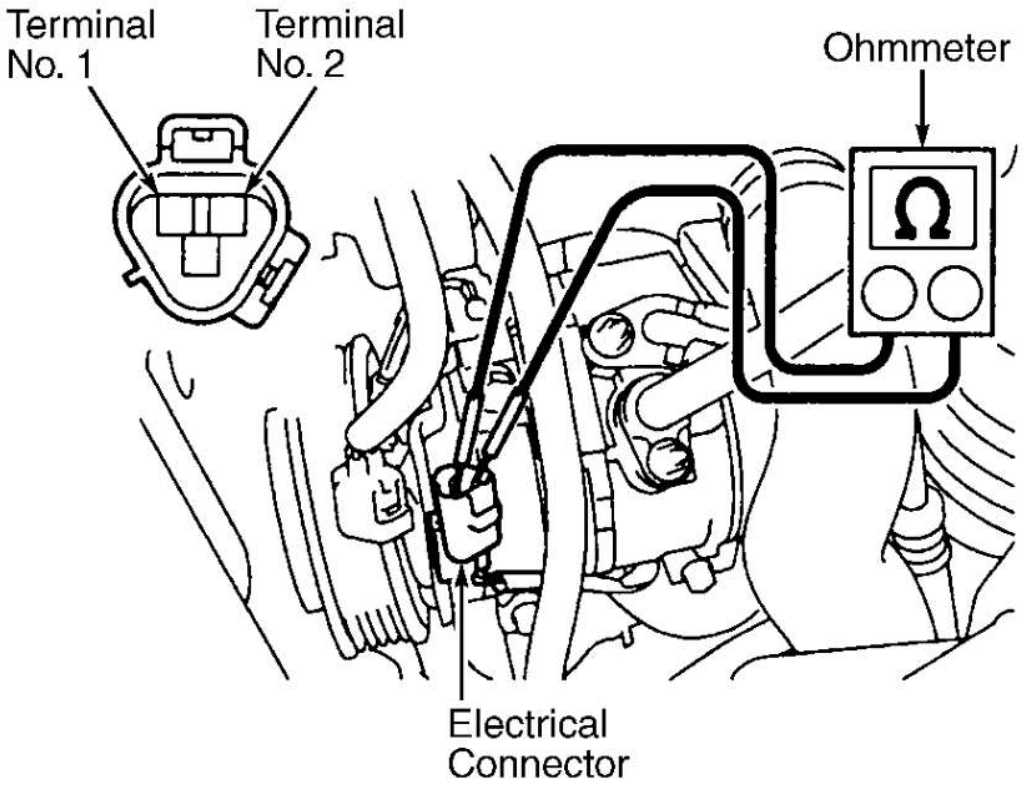


Fig. 32: Testing A/C Compressor Lock Sensor (Camry Solara With Manual A/C)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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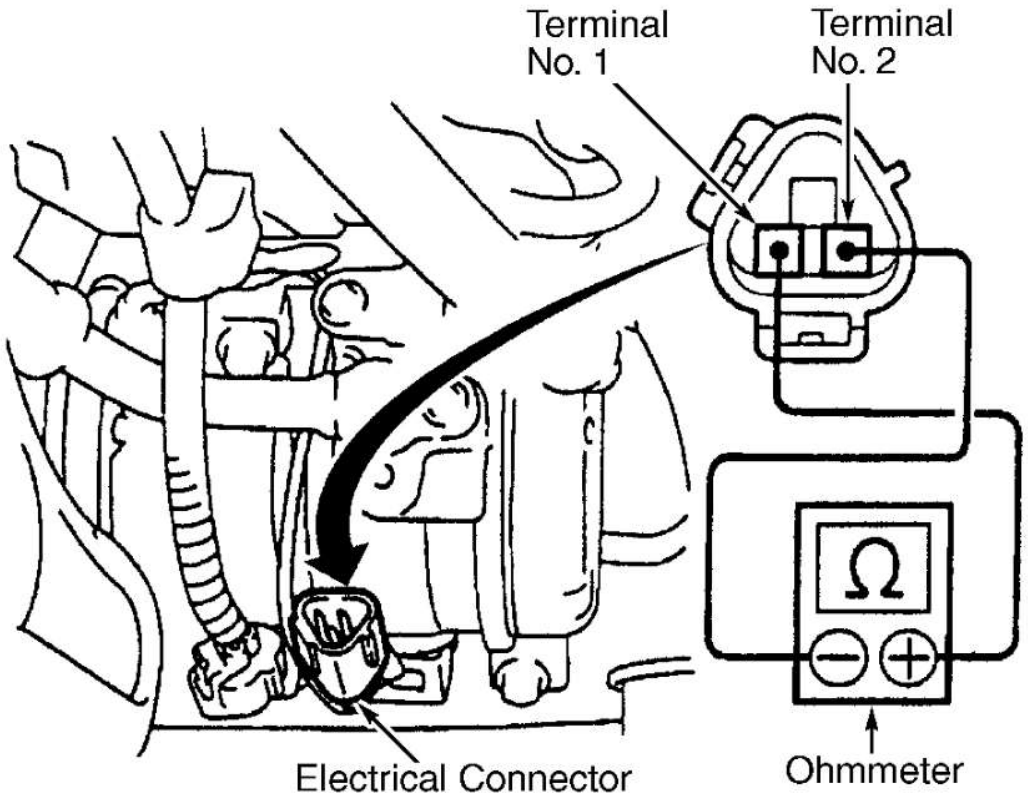


Fig. 33: Testing A/C Compressor Lock Sensor (Celica)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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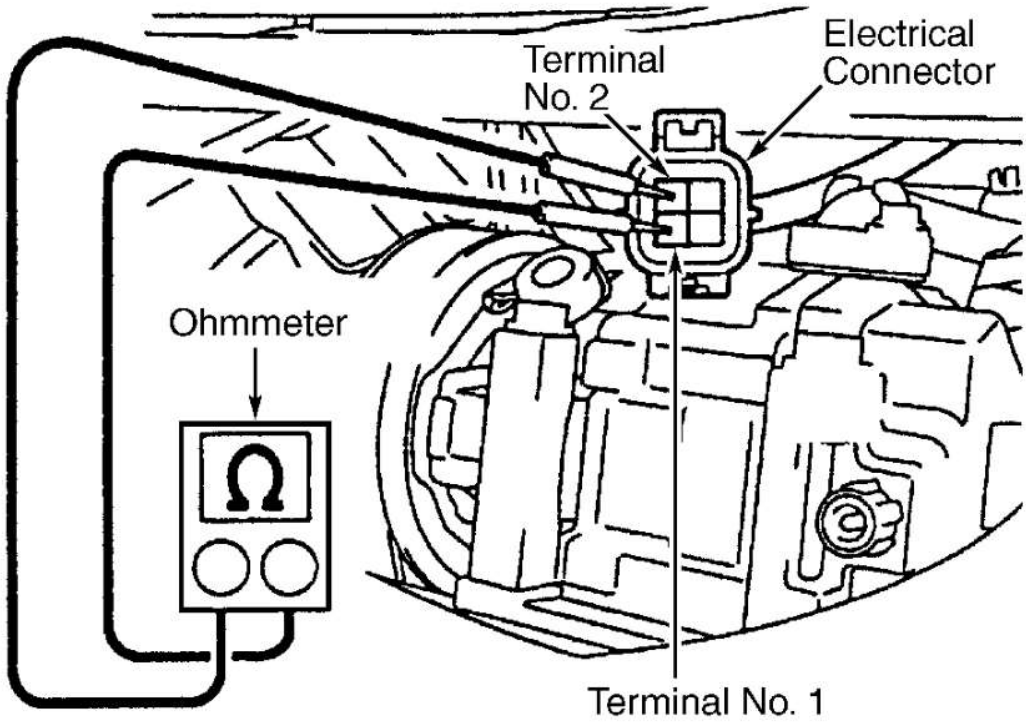


Fig. 34: Testing A/C Compressor Lock Sensor (MR2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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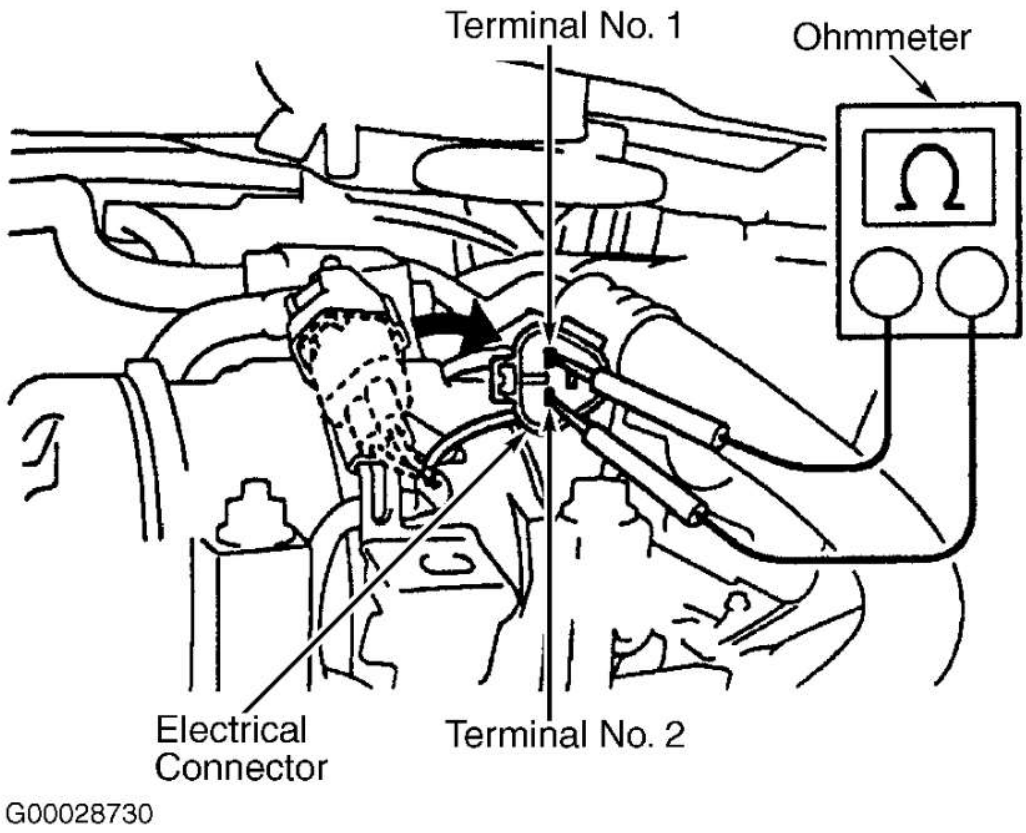


Fig. 35: Testing A/C Compressor Lock Sensor (RAV4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

A/C EVAPORATOR TEMPERATURE SENSOR

Camry Solara With Manual A/C

1. Remove A/C evaporator temperature sensor. A/C evaporator temperature sensor is located in evaporator case, next to evaporator core. For servicing of A/C evaporator temperature sensor, see appropriate article in AIR CONDITIONING & HEATING.
2. Place probe end of A/C evaporator temperature sensor with thermometer in container of water. Using ohmmeter, check resistance between electrical terminals on A/C evaporator temperature sensor while using ice to cool water. Ensure ice does not contact A/C evaporator temperature sensor.
3. Check that resistance is within specification in relation to water temperature. See **Fig. 36** . Replace A/C evaporator temperature sensor if resistance is not within specification at specified temperature. For servicing of A/C evaporator temperature sensor, see appropriate article in AIR CONDITIONING & HEATING.

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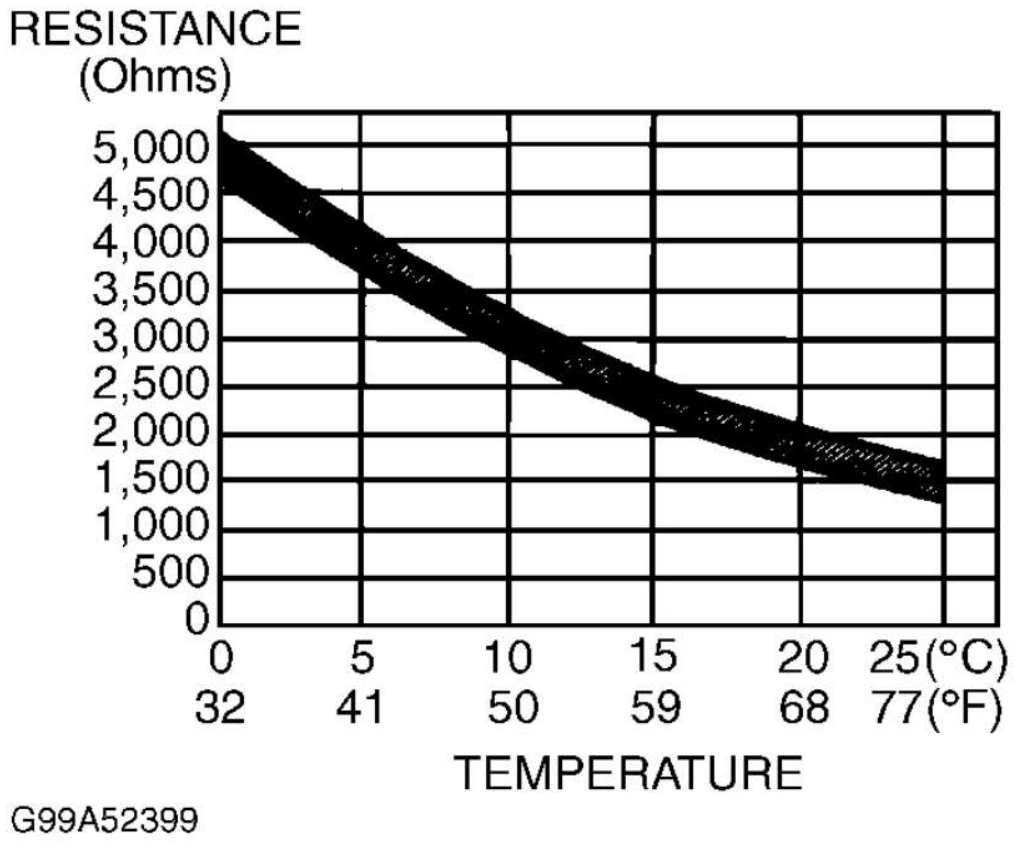


Fig. 36: Testing A/C Evaporator Temperature Sensor (Camry Solara With Manual A/C)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

AIR/FUEL SENSOR

NOTE: Air/Fuel (A/F) sensor may also be referred to as Air/Fuel (A/F) ratio sensor.

Camry

1. Heated A/F sensor is mounted on exhaust manifold above catalytic converter. If problem exists in A/F sensor, heater or wiring circuit, a Diagnostic Trouble Code (DTC) may be stored in Engine Control Module (ECM). See TESTING PROCEDURE under SELF-DIAGNOSTIC SYSTEM in appropriate SELF-DIAGNOSTICS article for retrieving of DTCs.
2. To test heater resistance on A/F sensor, disconnect electrical connector for A/F sensor. Using ohmmeter, check resistance between +B and HT terminals on electrical connector. See **Fig. 37** . Replace A/F sensor if resistance is not within specification. See **A/F SENSOR HEATER RESISTANCE** table. See **AIR/FUEL SENSOR** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL &

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INSTALLATION - 4-CYLINDER article.

3. To check that heater is not shorted, using ohmmeter, check that no continuity exists between E1 and HT terminals on electrical connector. See **Fig. 37** . Replace A/F sensor if continuity exists. See **AIR/FUEL SENSOR** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.

Camry Solara

1. Heated A/F sensor is mounted on exhaust manifold above catalytic converter. If problem exists in A/F sensor, heater or wiring circuit, a Diagnostic Trouble Code (DTC) may be stored in Engine Control Module (ECM). See TESTING PROCEDURE under SELF-DIAGNOSTIC SYSTEM in appropriate SELF-DIAGNOSTICS article for retrieving of DTCs.
2. To test heater resistance on A/F sensor, disconnect electrical connector for A/F sensor. Using ohmmeter, check resistance between +B and HT terminals on electrical connector. See **Fig. 38** . Replace A/F sensor if resistance is not within specification. See **A/F SENSOR HEATER RESISTANCE** table. See **AIR/FUEL SENSOR** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.

Highlander & RAV4

1. Two heated A/F sensors are used. Heated A/F sensors are mounted on exhaust manifold above catalytic converters. A/F sensor for cylinders No. 1 and 4 is referred to as bank No. 1 sensor No. 1. A/F sensor for cylinders No. 2 and 3 is referred to as bank No. 2 sensor No. 1. If problem exists in A/F sensor, heater or wiring circuit, a Diagnostic Trouble Code (DTC) may be stored in Engine Control Module (ECM). See TESTING PROCEDURE under SELF-DIAGNOSTIC SYSTEM in appropriate SELF-DIAGNOSTICS article for retrieving of DTCs.
2. To test heater resistance on A/F sensor, disconnect electrical connector for A/F sensor. Using ohmmeter, check resistance between +B and HT terminals on electrical connector. See **Fig. 39** and **Fig. 40** . Replace A/F sensor if resistance is not within specification. See **A/F SENSOR HEATER RESISTANCE** table. See **AIR/FUEL SENSOR** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.

Tacoma

1. Heated A/F sensor is mounted on exhaust pipe in front of catalytic converter. If problem exists in A/F sensor, heater or wiring circuit, a Diagnostic Trouble Code (DTC) may be stored in Engine Control Module (ECM). See TESTING PROCEDURE under SELF-DIAGNOSTIC SYSTEM in appropriate SELF-DIAGNOSTICS article for retrieving of DTCs.
2. To test heater resistance on A/F sensor, disconnect electrical connector for A/F sensor. Using ohmmeter, check resistance between +B and HT terminals on electrical connector. See **Fig. 41** . Replace A/F sensor if resistance is not within specification. See **A/F SENSOR HEATER RESISTANCE** table. See **AIR/FUEL SENSOR** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.

A/F SENSOR HEATER RESISTANCE

Application & Temperature	Ohms

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Camry	
68°F (20°C)	1.8-3.4
932°F (500°C)	5.0-7.5
Camry Solara	
68°F (20°C)	.8-1.4
Highlander	
68°F (20°C)	1.8-3.4
932°F (500°C)	5.0-7.5
RAV4	
68°F (20°C)	.8-1.4
1472°F (800°C)	1.8-3.2
Tacoma	
68°F (20°C)	.8-1.4
1472°F (800°C)	1.8-3.2

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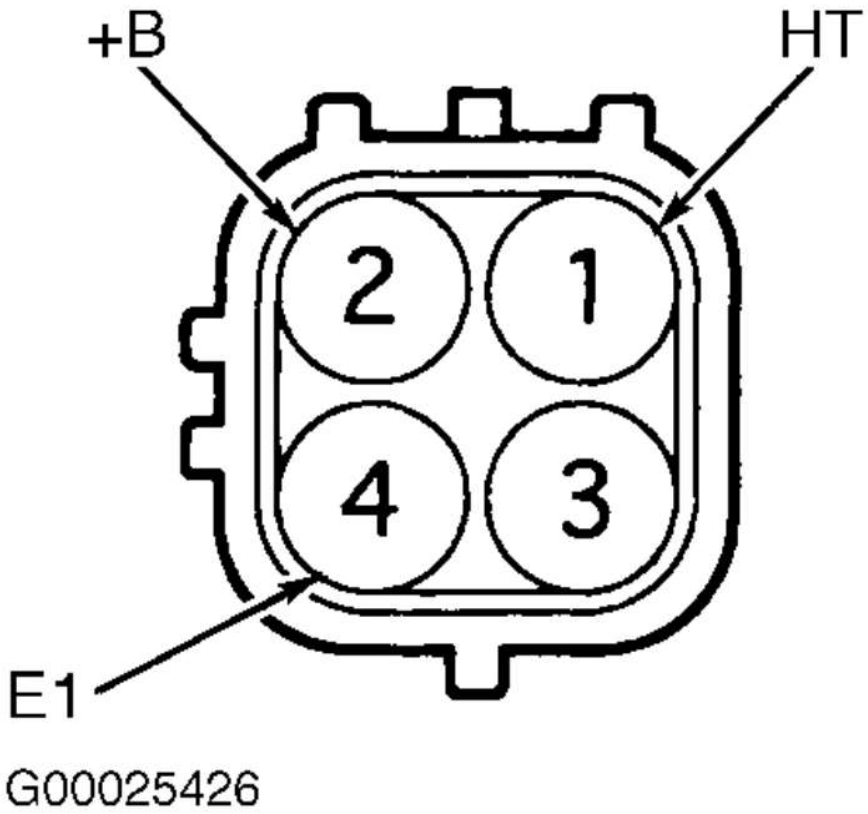


Fig. 37: Identifying Air/Fuel Sensor Electrical Connector Terminals (Camry)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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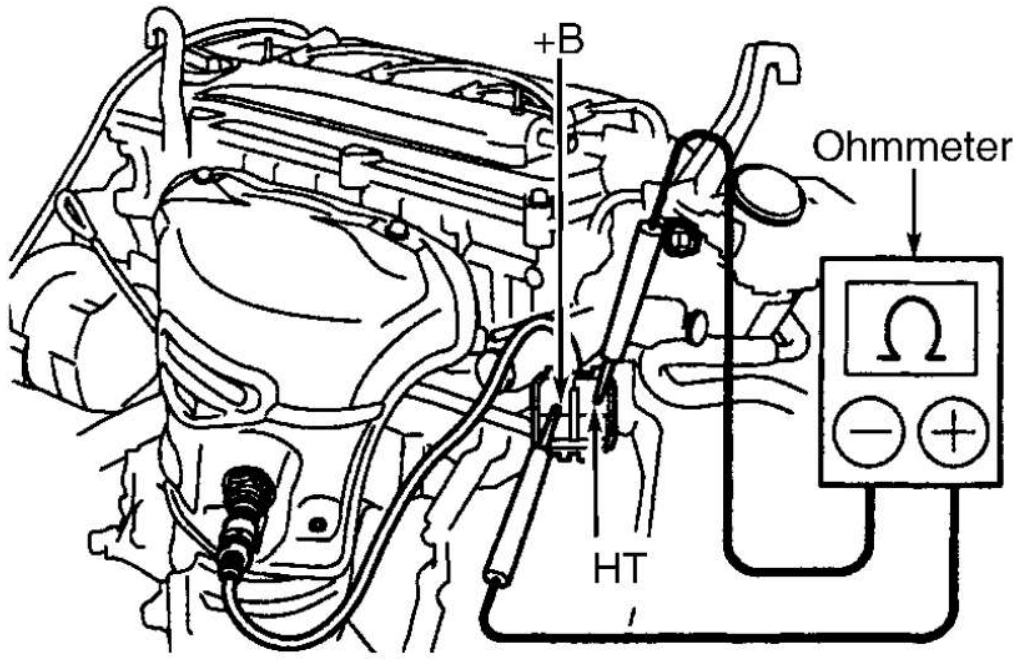


Fig. 38: Testing Heater On Air/Fuel Sensor (Camry Solara)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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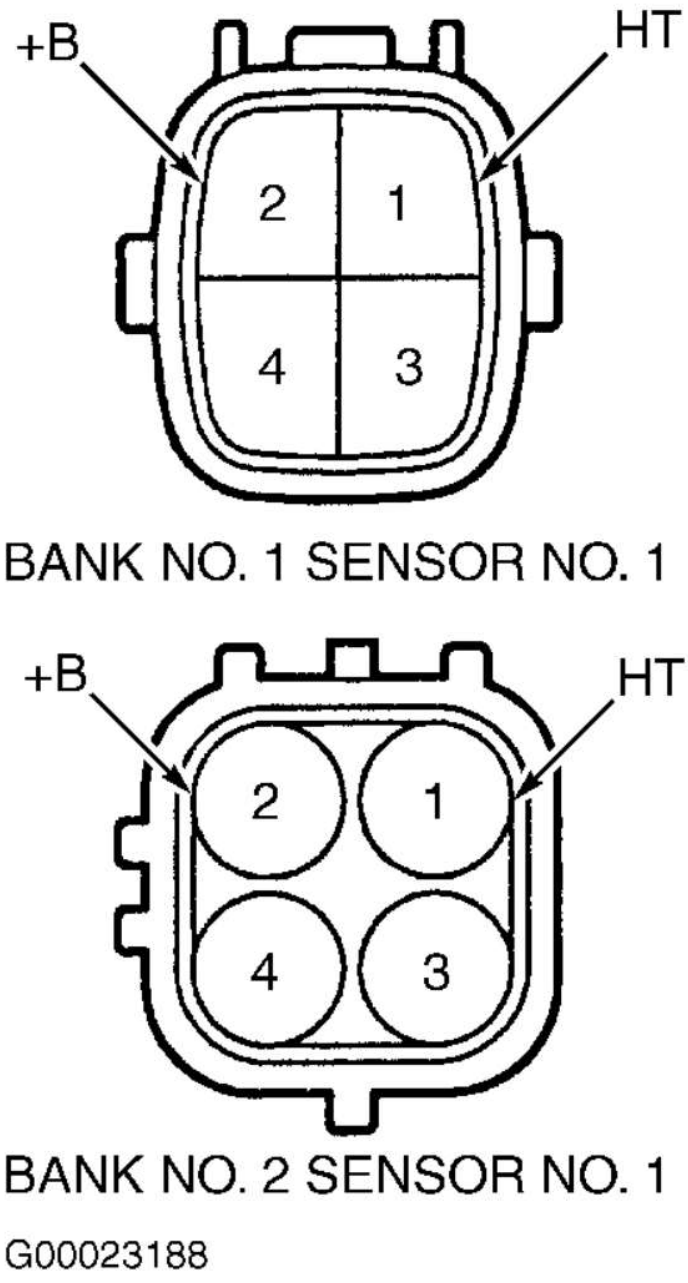
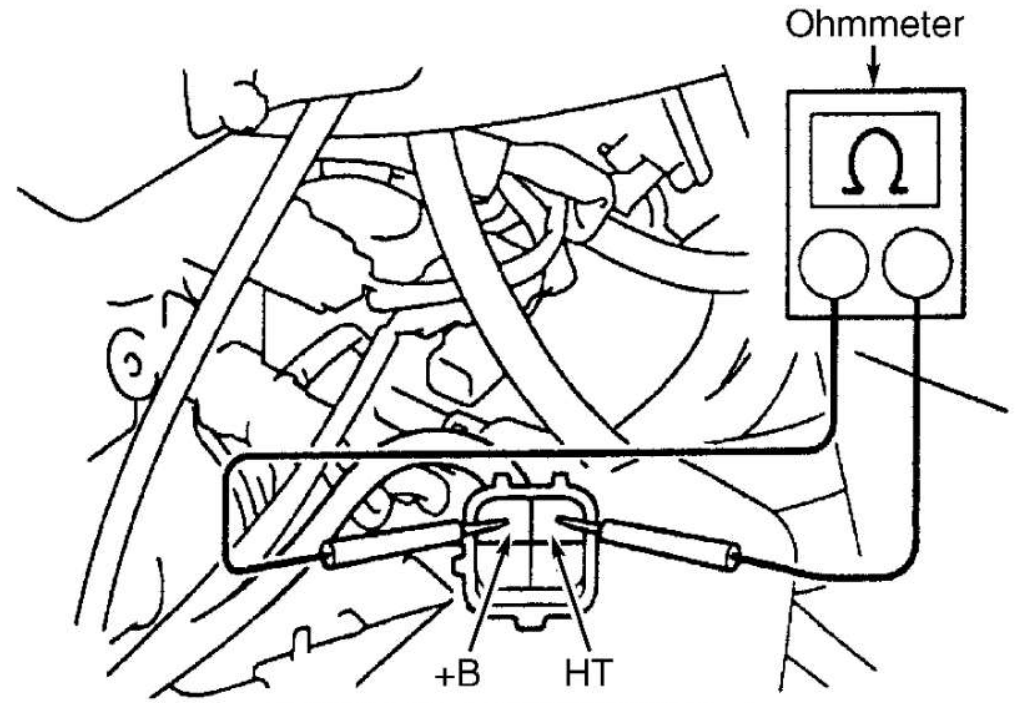
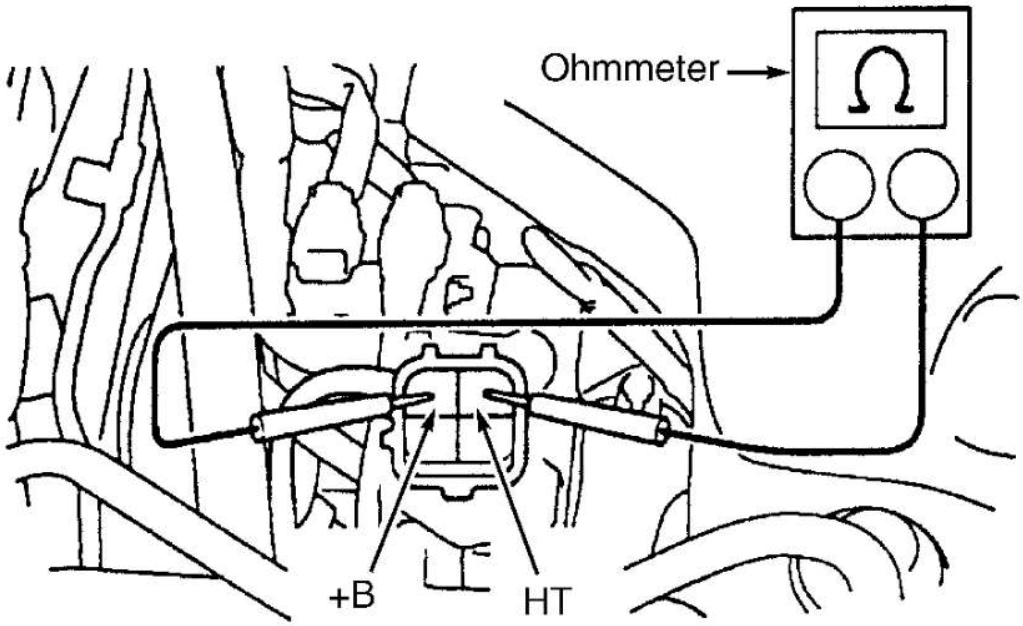


Fig. 39: Identifying Air/Fuel Sensor Electrical Connector Terminals (Highlander)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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BANK NO. 1 SENSOR NO. 1



BANK NO. 2 SENSOR NO. 1

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Fig. 40: Testing Heater On Air/Fuel Sensor (RAV4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

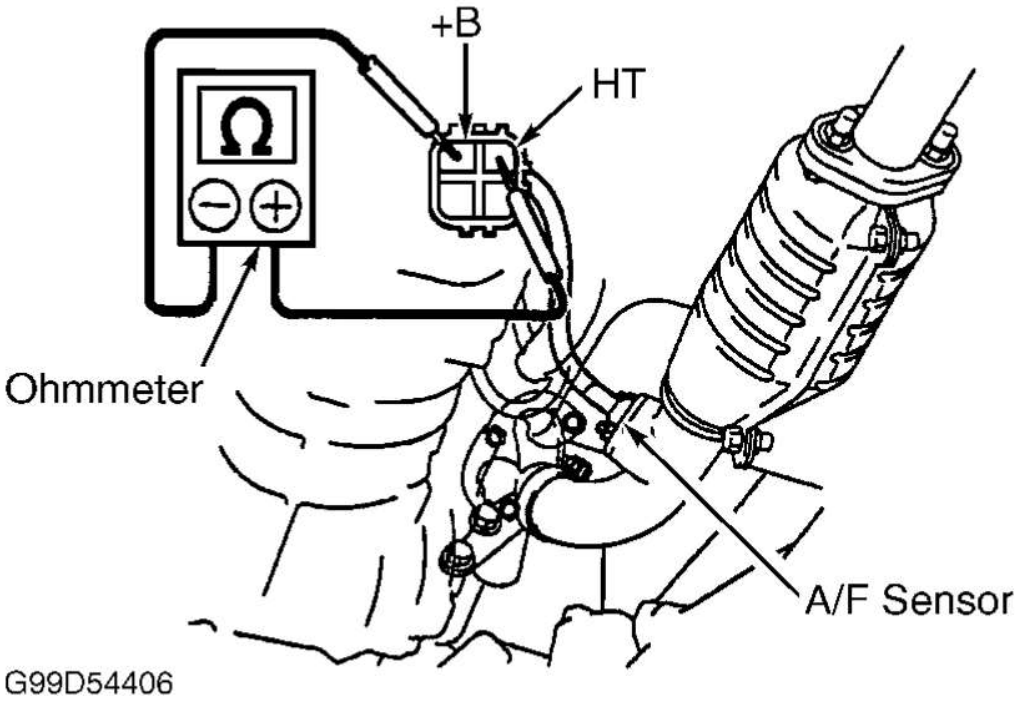


Fig. 41: Testing Heater On Air/Fuel Sensor (Tacoma)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

AIRFLOW METER

NOTE: Airflow meter may also be referred to as Mass Airflow (MAF) meter.

WARNING: On Prius, read service precautions before proceeding with service procedure. See SERVICE PRECAUTIONS .

1. Remove airflow meter. See **AIRFLOW METER** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
2. Using ohmmeter, check resistance between terminals E2 and THA on airflow meter. See **Fig. 42** -**Fig. 45** . Resistance should be within specification in relation to temperature. See **AIRFLOW METER RESISTANCE** table. Replace airflow meter if resistance is not within specification.

AIRFLOW METER RESISTANCE

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Application & Temperature	Ohms
Camry	
-4°F (-20°C)	13,600-18,400
68°F (20°C)	2210-2690
140°F (60°C)	493-667
Camry Solara, Celica & ECHO	
-4°F (-20°C)	13,600-18,400
68°F (20°C)	2210-2690
140°F (60°C)	490-670
Corolla	
-4°F (-20°C)	13,600-18,400
68°F (20°C)	2200-2700
140°F (60°C)	500-700
Highlander	
-4°F (-20°C)	13,600-18,400
68°F (20°C)	2210-2690
140°F (60°C)	493-667
MR2, Prius & RAV4	
-4°F (-20°C)	13,600-18,400
68°F (20°C)	2210-2690
140°F (60°C)	490-670
Tacoma	
-4°F (-20°C)	10,000-20,000
32°F (0°C)	4000-7000
68°F (20°C)	2000-3000
104°F (40°C)	900-1300
140°F (60°C)	400-700
176°F (80°C)	200-400

3. Airflow meter operation should be checked. On Camry and Highlander, go to next step. On Camry Solara, Celica, Corolla, ECHO, MR2, Prius, RAV4 and Tacoma, go to step 5 .
4. Apply battery voltage to +B terminal on airflow meter and battery ground to E2G terminal on airflow meter. See **Fig. 42** . Connect voltmeter leads to proper terminals on airflow meter. See **Fig. 42** . Apply air into designated area on airflow meter and note voltage reading. See **Fig. 42** . While air is being applied, voltage reading should fluctuate. Replace airflow meter if voltage does not fluctuate.
5. Install electrical connector on airflow meter. Connect voltmeter leads to proper terminals on airflow meter with electrical connector installed. See **Fig. 46** -**Fig. 48** . Turn ignition on. Apply air into designated area on airflow meter and note voltage reading. See **Fig. 42** and **Fig. 46** -**Fig. 48** . While air is being applied, voltage reading should fluctuate. Replace airflow meter if voltage does not fluctuate. Turn ignition off. Remove voltmeter.

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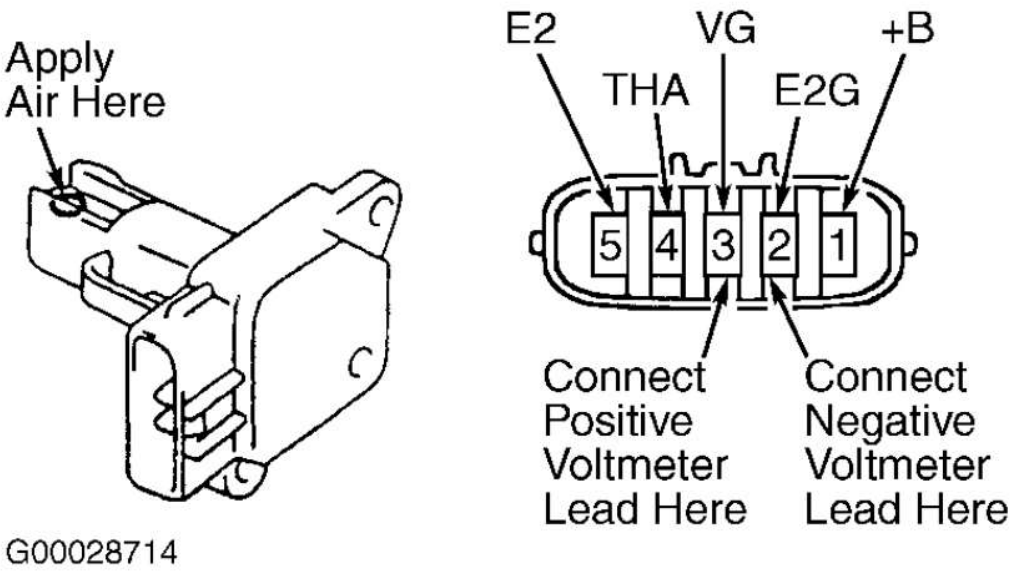


Fig. 42: Identifying Airflow Meter Terminals, Air Application Area & Voltmeter Connections (Camry & Highlander)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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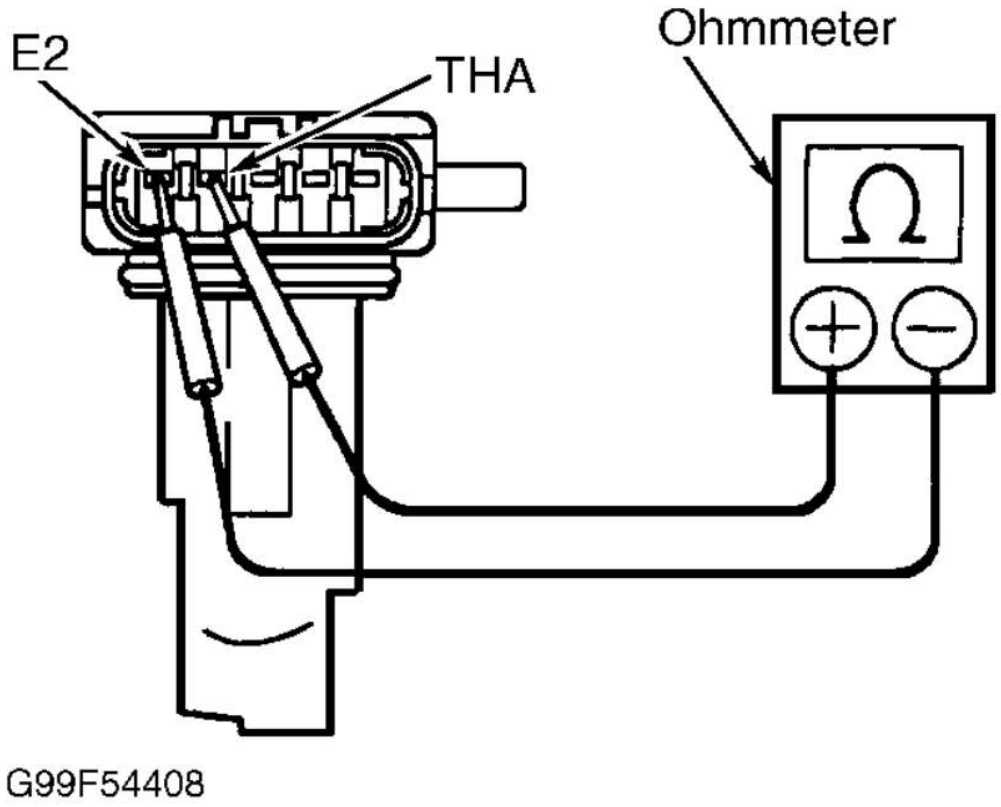


Fig. 43: Testing Airflow Meter Resistance (Camry Solara, Celica, ECHO, MR2, Prius & RAV4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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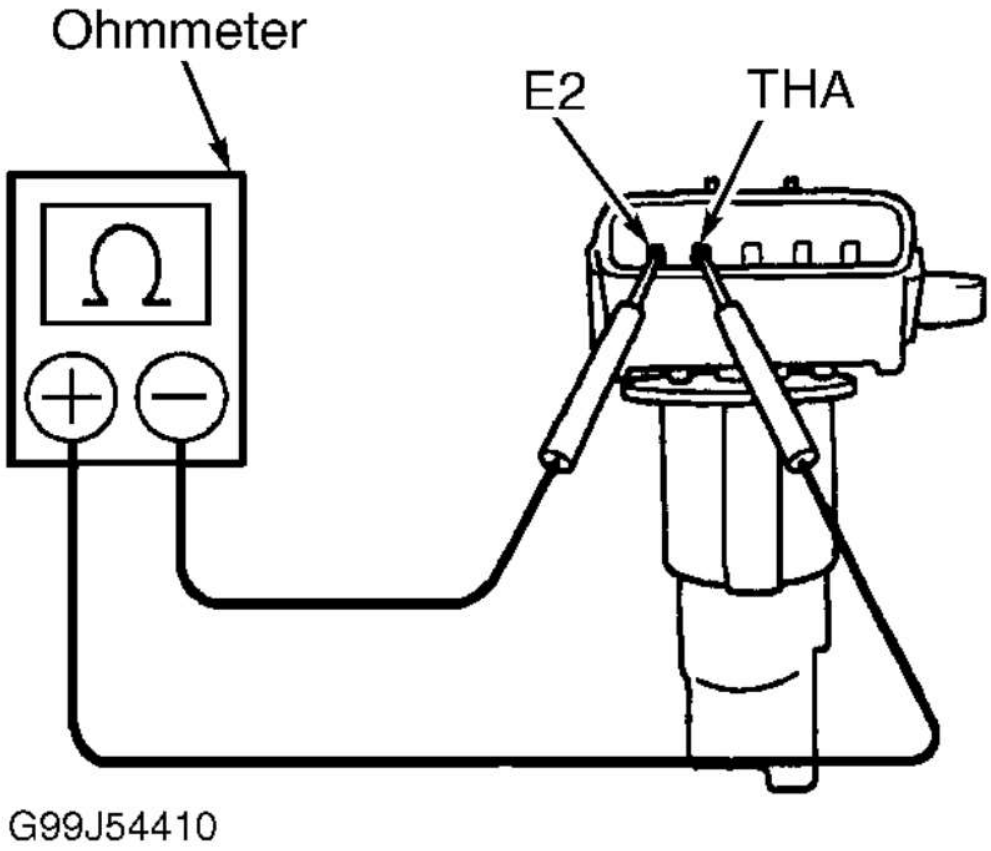


Fig. 44: Testing Airflow Meter Resistance (Corolla)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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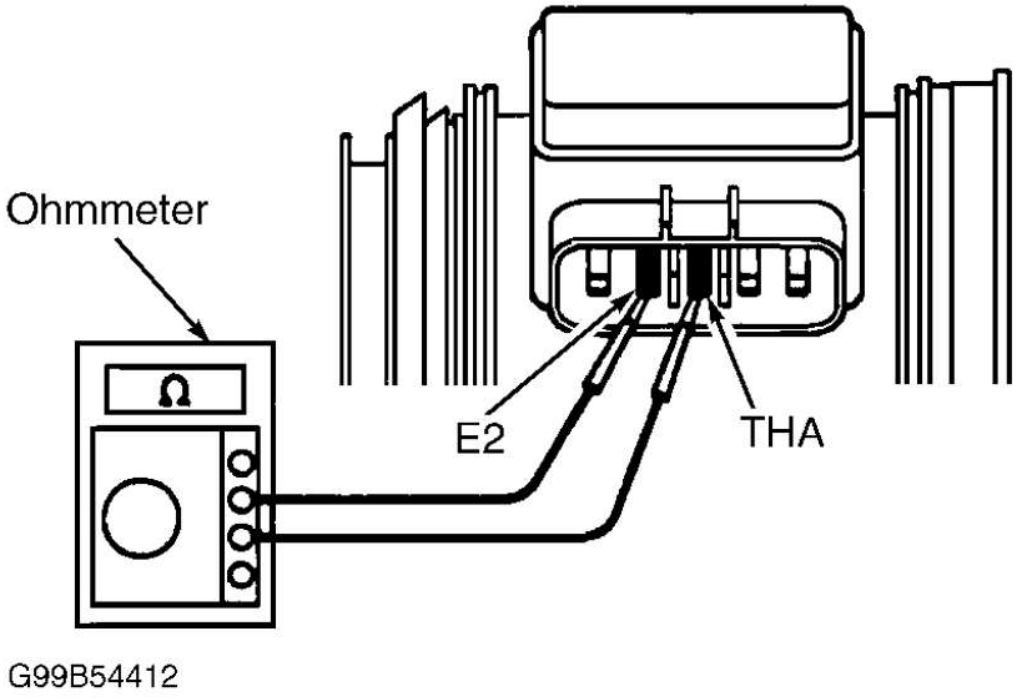


Fig. 45: Testing Airflow Meter Resistance (Tacoma)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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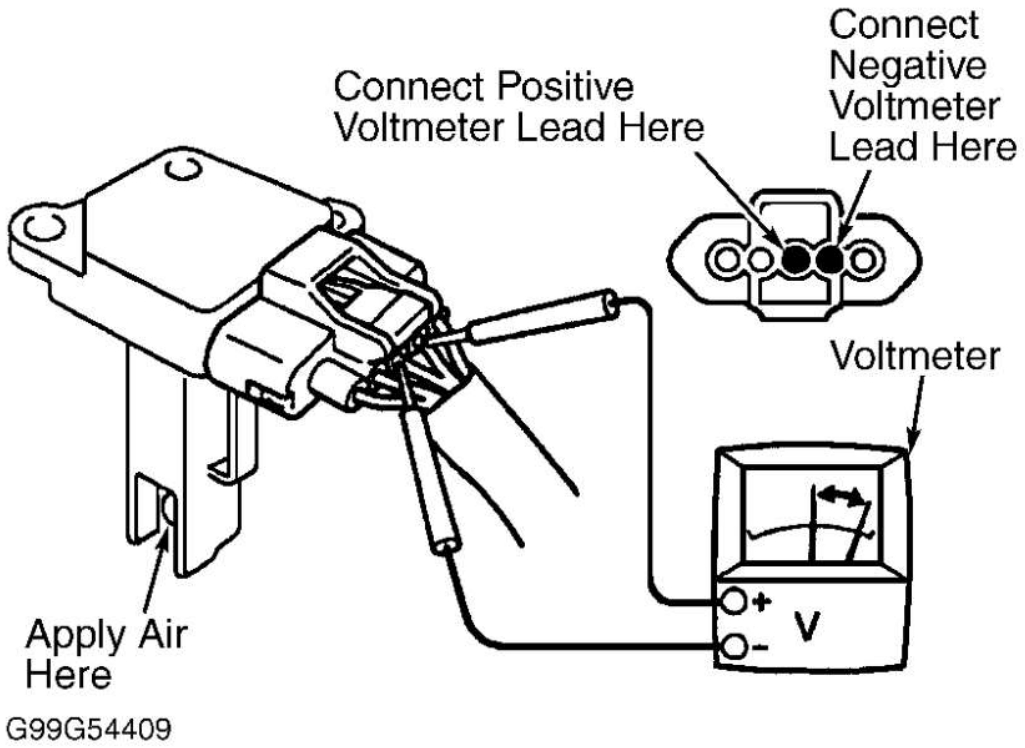


Fig. 46: Testing Airflow Meter Operation (Camry Solara, Celica, ECHO, MR2, Prius & RAV4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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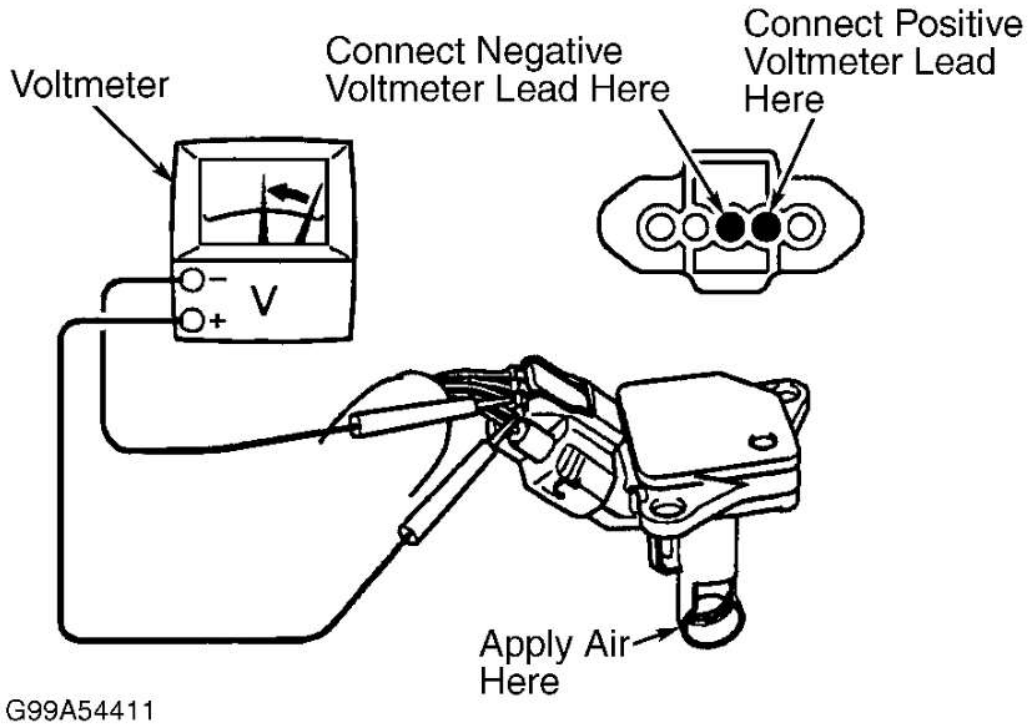


Fig. 47: Testing Airflow Meter Operation (Corolla)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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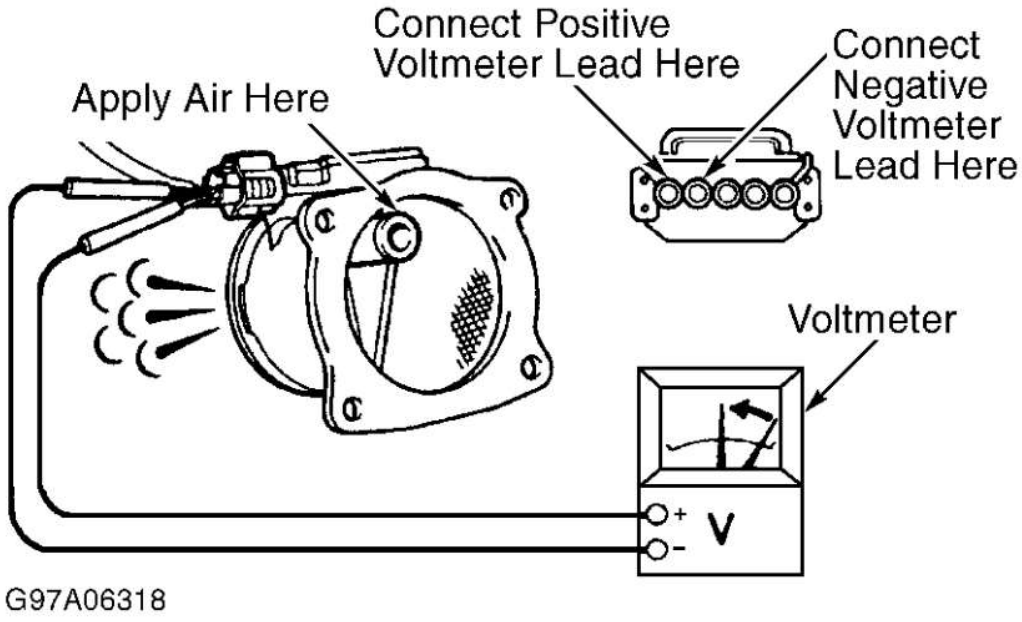


Fig. 48: Testing Airflow Meter Operation (Tacoma)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

BRAKELIGHT SWITCH

NOTE: Brakelight switch may also be referred to as stoplight switch.

Camry, Camry Solara & Highlander

1. Disconnect electrical connector at brakelight switch. Brakelight switch is located near top of brake pedal. Note terminal identification on brakelight switch. See **Fig. 49** .
2. Using ohmmeter, check that continuity exists between terminals No. 1 and 2 with brake pedal depressed so pin on brakelight switch is extended. Check that no continuity exists between terminals No. 1 and 2 with brake pedal released so pin on brakelight switch is pushed in.
3. Check that no continuity exists between terminals No. 3 and 4 with brake pedal depressed so pin on brakelight switch is extended. Check that continuity exists between terminals No. 3 and 4 with brake pedal released so pin on brakelight switch is pushed in. Adjust or replace brakelight switch if operation is not as described. See **BRAKELIGHT SWITCH** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.

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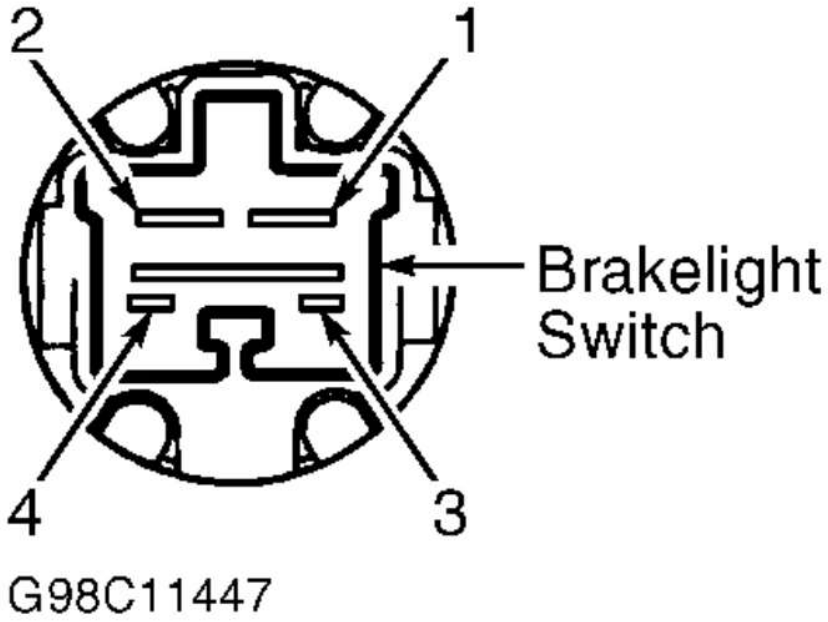


Fig. 49: Identifying Brakelight Switch Terminals (Camry, Camry Solara & Highlander)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Celica, Corolla, MR2, RAV4 & Tacoma

1. Disconnect electrical connector at brakelight switch. Brakelight switch is located near top of brake pedal. Note terminal identification on brakelight switch. See **Fig. 50** .
2. On models without cruise control, using ohmmeter, check that no continuity exists between terminals No. 1 and 2 with brake pedal released so pin on brakelight switch is pushed in. Check that continuity exists between terminals No. 1 and 2 with brake pedal depressed so pin on brakelight switch is extended. Adjust or replace brakelight switch if operation is not as described. See **BRAKELIGHT SWITCH** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
3. On models with cruise control, using ohmmeter, check that no continuity exists between terminals No. 1 and 2 with brake pedal released so pin on brakelight switch is pushed in. Check that continuity exists between terminals No. 1 and 2 with brake pedal depressed so pin on brakelight switch is extended.
4. Check that no continuity exists between terminals No. 3 and 4 with brake pedal depressed so pin on brakelight switch is extended. Check that continuity exists between terminals No. 3 and 4 with brake pedal released so pin on brakelight switch is pushed in. Adjust or replace brakelight switch if operation is not as described. See **BRAKELIGHT SWITCH** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.

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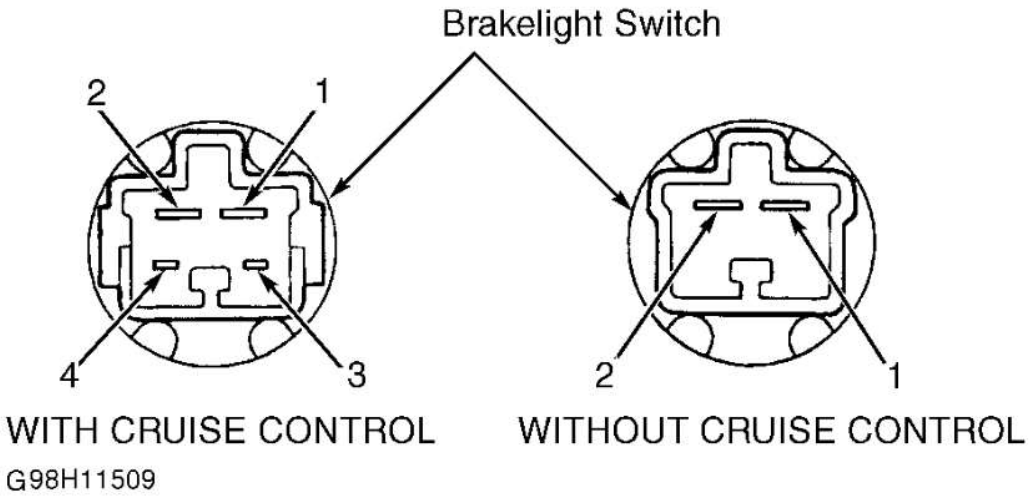


Fig. 50: Identifying Brakelight Switch Terminals (Celica, Corolla, MR2, RAV4 & Tacoma)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ECHO

1. Disconnect electrical connector at brakelight switch. Brakelight switch is located near top of brake pedal. Note terminal identification on brakelight switch. See **Fig. 51** .
2. Using ohmmeter, check that continuity exists between terminals No. 1 and 2 with brake pedal depressed so pin on brakelight switch is extended. Check that no continuity exists between terminals No. 1 and 2 with brake pedal released so pin on brakelight switch is pushed in. Adjust or replace brakelight switch if operation is not as described. See **BRAKELIGHT SWITCH** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.

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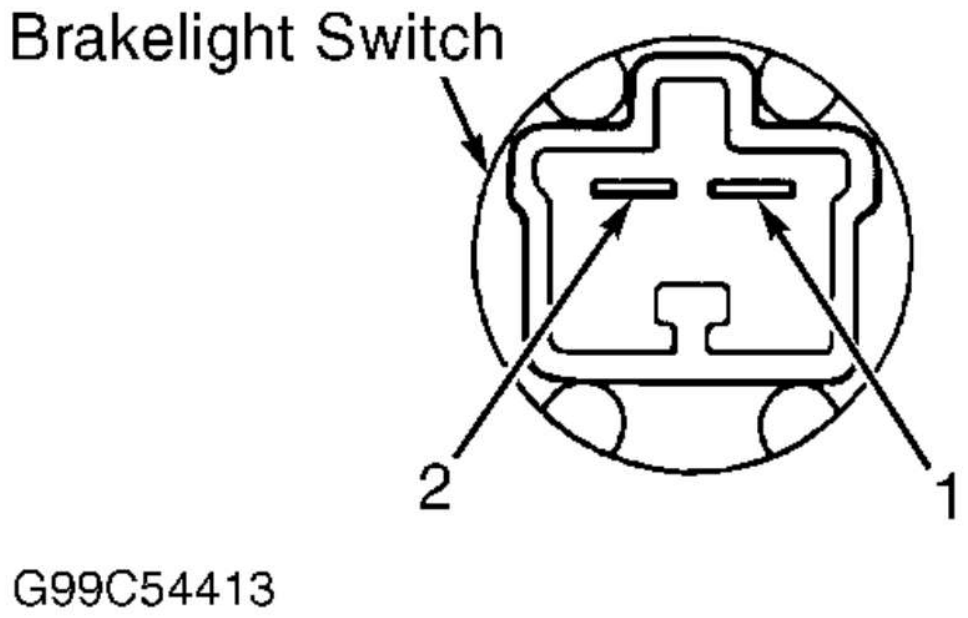


Fig. 51: Identifying Brakelight Switch Terminals (ECHO)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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CAMSHAFT POSITION SENSOR

For testing camshaft position sensor, see **CAMSHAFT POSITION SENSOR** under IGNITION SYSTEMS in BASIC DIAGNOSTIC PROCEDURES - 4-CYLINDER article.

CRANKSHAFT POSITION SENSOR

For testing crankshaft position sensor, see **CRANKSHAFT POSITION SENSOR** under IGNITION SYSTEMS in BASIC DIAGNOSTIC PROCEDURES - 4-CYLINDER article.

EGR GAS TEMPERATURE SENSOR

Tacoma 2.7L 3RZ-FE

1. EGR gas temperature sensor is located near EGR valve. Remove EGR gas temperature sensor. See **EGR GAS TEMPERATURE SENSOR** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
2. Place threaded end of EGR gas temperature sensor and thermometer in container of oil. Attach ohmmeter

between electrical terminals on EGR gas temperature sensor.

3. Heat oil and note resistance at specified temperature. See **EGR GAS TEMPERATURE SENSOR RESISTANCE** table. Replace EGR gas temperature sensor if resistance is not within specification. Reinstall EGR gas temperature sensor.

EGR GAS TEMPERATURE SENSOR RESISTANCE

Temperature	Ohms
122°F (50°C)	64,000-97,000
212°F (100°C)	11,000-16,000
302°F (150°C)	2000-4000

ENGINE COOLANT TEMPERATURE SENSOR

Camry, Camry Solara, Celica, Corolla & ECHO

1. Ensure ignition is off. Disconnect electrical connector from Engine Coolant Temperature (ECT) sensor. See **ENGINE COOLANT TEMPERATURE SENSOR LOCATION** table. Remove ECT sensor. See **ENGINE COOLANT TEMPERATURE SENSOR** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
2. Place probe end of ECT sensor and thermometer in container of water. Attach ohmmeter between electrical terminals No. 1 and 2 on ECT sensor. See **Fig. 52** and **Fig. 53** . Heat water and note that resistance is within specification in relation to temperature. See **Fig. 54** . Replace ECT sensor if resistance is not within specification.

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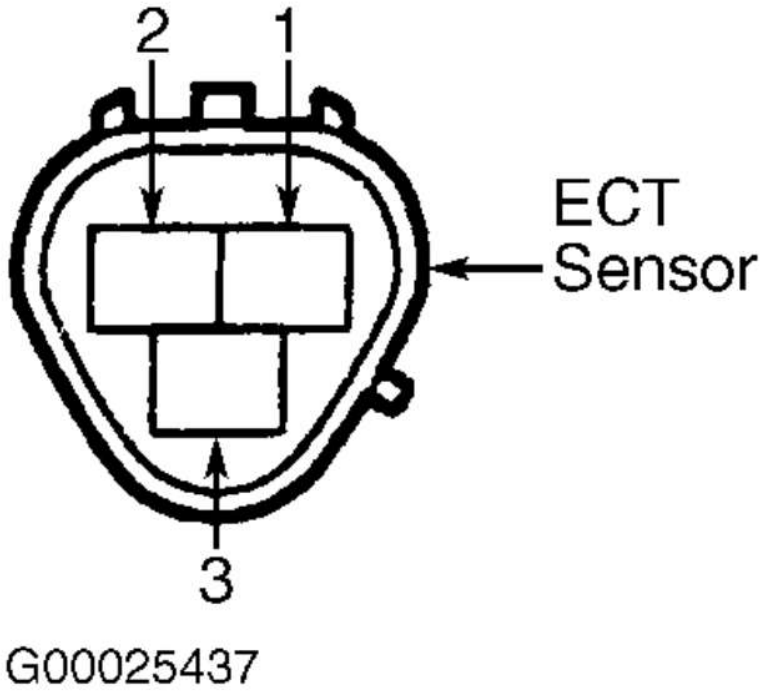


Fig. 52: Identifying Engine Coolant Temperature Sensor Electrical Terminals (Camry)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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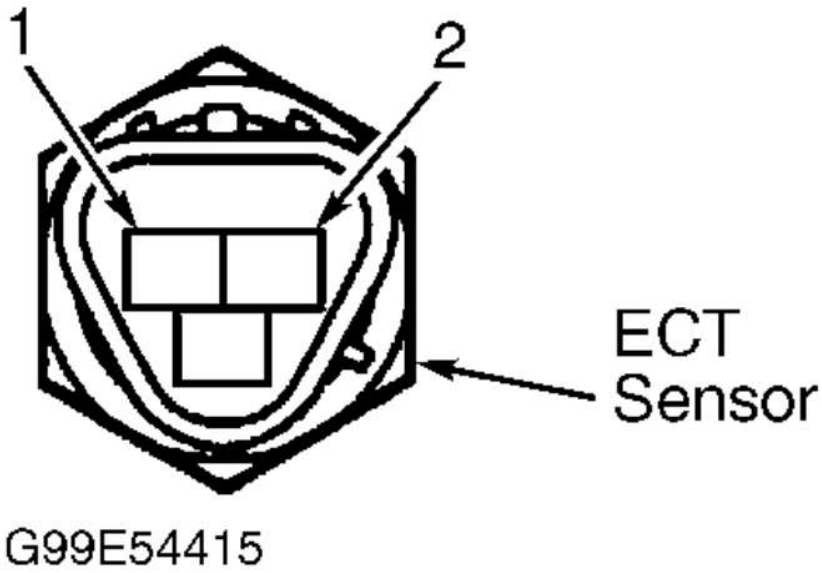
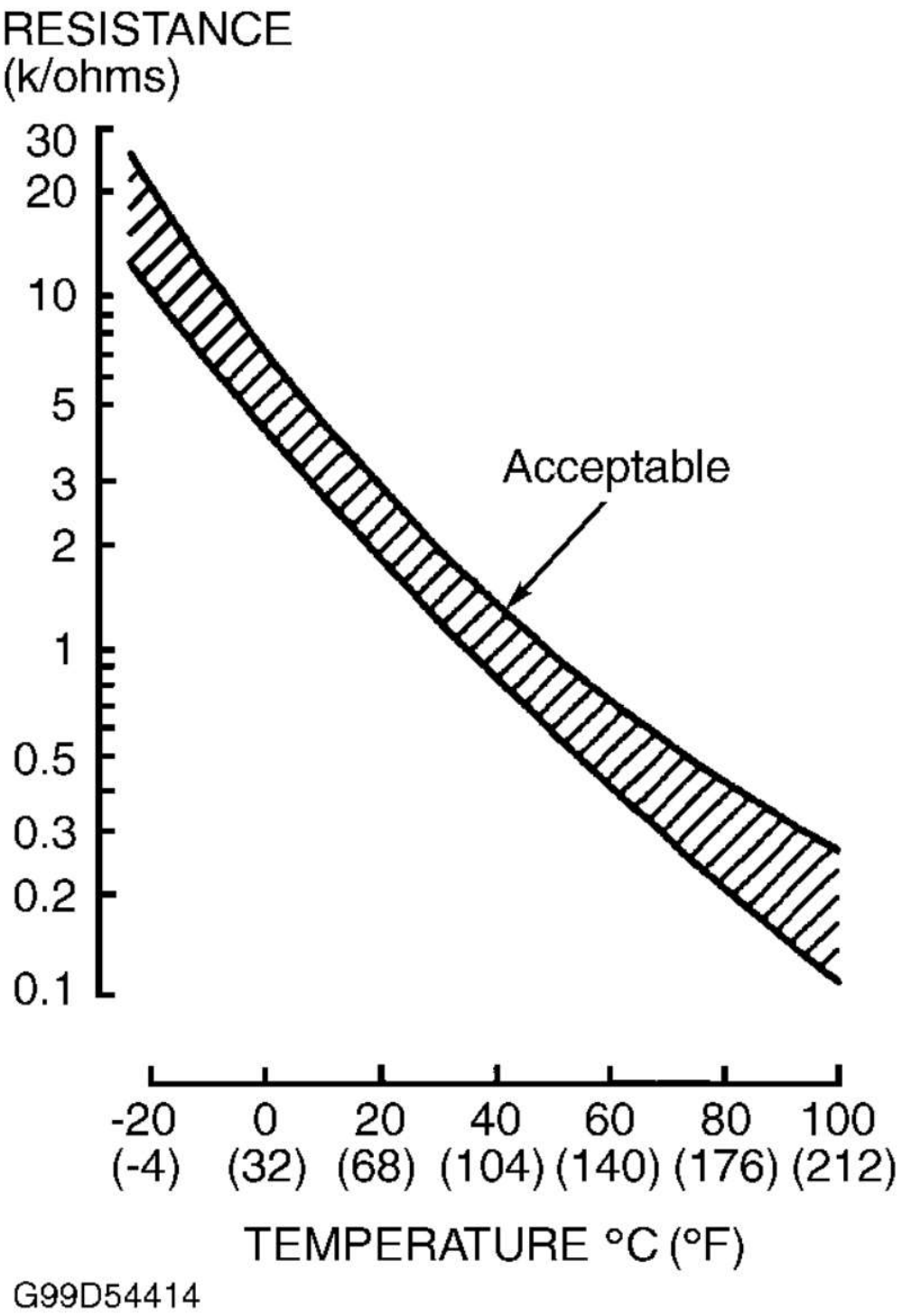


Fig. 53: Identifying Engine Coolant Temperature Sensor Electrical Terminals (Camry Solara, Celica, Corolla & ECHO)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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Fig. 54: Testing Engine Coolant Temperature Sensor
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Highlander, MR2, Prius, RAV4 & Tacoma

WARNING: On Prius, read service precautions before proceeding with service procedure. See SERVICE PRECAUTIONS .

1. Ensure ignition is off. Disconnect electrical connector from Engine Coolant Temperature (ECT) sensor. See **ENGINE COOLANT TEMPERATURE SENSOR LOCATION** table. Remove ECT sensor. See **ENGINE COOLANT TEMPERATURE SENSOR** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
2. Place probe end of ECT sensor and thermometer in container of water. Attach ohmmeter between electrical terminals on ECT sensor. Heat water and note that resistance is within specification in relation to temperature. See **Fig. 54** . Replace ECT sensor if resistance is not within specification.

ENGINE COOLANT TEMPERATURE SENSOR LOCATION

Model	Location
Camry & Camry Solara	On Flywheel End Of Cylinder Head & Contains Dark Gray Electrical Connector With Green/Yellow & Brown Wires
Celica	On Flywheel End Of Cylinder Head & Contains Gray Electrical Connector With Green & Brown Wires
Corolla	On Flywheel End Of Cylinder Head & Contains Dark Gray Electrical Connector With White & Brown Wires
ECHO	On Flywheel End Of Cylinder Head & Contains Gray Electrical Connector With Red/Blue & Brown Wires
Highlander	On Flywheel End Of Cylinder Head & Contains Dark Gray 2-Pin Electrical Connector With White/Blue & White Wires
MR2	On Flywheel End Of Cylinder Head & Contains Dark Gray 2-Pin Electrical Connector With Red/Blue & Brown Wires
Prius	On Flywheel End Of Cylinder Head & Contains Dark Gray 2-Pin Electrical Connector With White & Brown Wires
RAV4	On Flywheel End Of Cylinder Head & Contains Dark Gray 2-Pin Electrical Connector With White & Brown Wires
Tacoma	On Coolant Housing At Rear Of Cylinder Head & Contains Dark Gray 2-Pin Electrical Connector With Green/Red & Blue/Black Wires

HEATED OXYGEN SENSOR

Camry

1. A heated A/F sensor is mounted on exhaust manifold above catalytic converter. For testing of A/F sensor, see **AIR/FUEL SENSOR** . Another heated oxygen sensor is mounted on exhaust pipe after catalytic converter. This heated oxygen sensor is referred to as bank No. 1 sensor No. 2.

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2. To test heater resistance on heated oxygen sensor, disconnect electrical connector for heated oxygen sensor. Using ohmmeter, check resistance between +B and HT terminals on electrical connector. See **Fig. 55** . Replace heated oxygen sensor if resistance is not 11-16 ohms at 68°F (20°C). See **HEATED OXYGEN SENSOR** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
3. To check that heater is not shorted, using ohmmeter, check that no continuity exists between E1 and HT terminals on electrical connector. See **Fig. 55** . Replace heated oxygen sensor if continuity exists. See **HEATED OXYGEN SENSOR** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
4. If problem exists in heated oxygen sensor, heater or wiring circuit, a Diagnostic Trouble Code (DTC) may be stored in Engine Control Module (ECM). See TESTING PROCEDURE under SELF-DIAGNOSTIC SYSTEM in appropriate SELF-DIAGNOSTICS article for retrieving of DTCs.

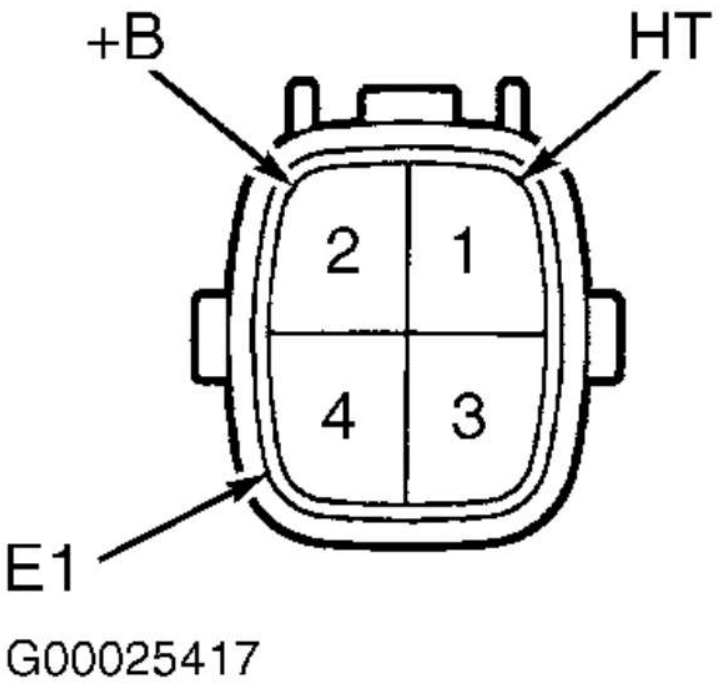


Fig. 55: Identifying Terminals On Electrical Connector For Heated Oxygen Sensor (Camry)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Camry Solara

1. A heated A/F sensor is mounted on exhaust manifold above catalytic converter. For testing of A/F sensor,

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see **AIR/FUEL SENSOR** . Another heated oxygen sensor is mounted on exhaust pipe after catalytic converter. This heated oxygen sensor is referred to as bank No. 1 sensor No. 2.

2. To test heater resistance on heated oxygen sensor, disconnect electrical connector for heated oxygen sensor. Using ohmmeter, check resistance between +B and HT terminals on electrical connector. See **Fig. 56** . Replace heated oxygen sensor if resistance is not 11-16 ohms at 68°F (20°C). See **HEATED OXYGEN SENSOR** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
3. If problem exists in heated oxygen sensor, heater or wiring circuit, a Diagnostic Trouble Code (DTC) may be stored in Engine Control Module (ECM). See TESTING PROCEDURE under SELF-DIAGNOSTIC SYSTEM in appropriate SELF-DIAGNOSTICS article for retrieving of DTCs.

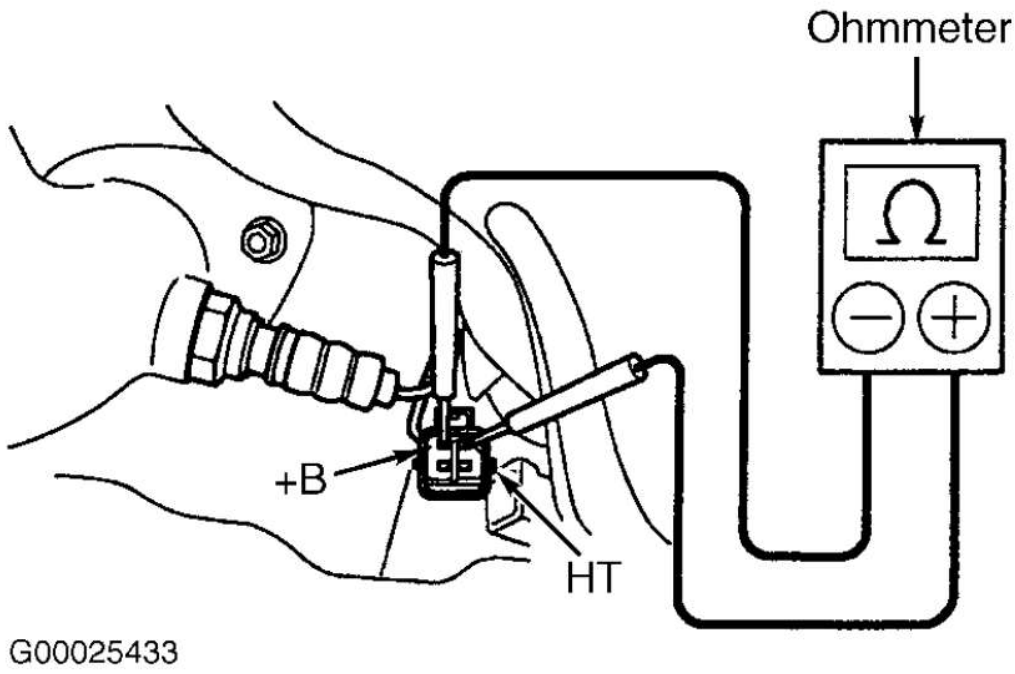


Fig. 56: Locating Electrical Connector & Testing Heated Oxygen Sensor Bank No. 1 Sensor No. 2 (Camry Solara)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Celica

1. Two heated oxygen sensors are used. One heated oxygen sensor is mounted on exhaust pipe in front of front catalytic converter. This heated oxygen sensor is referred to as bank No. 1 sensor No. 1, or front oxygen sensor. Another heated oxygen sensor is mounted on exhaust pipe behind catalytic converter. This heated oxygen sensor is referred to as bank No. 1 sensor No. 2, or rear oxygen sensor.
2. To test heater resistance on heated oxygen sensor, disconnect electrical connector for appropriate heated

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oxygen sensor. Electrical connector for bank No. 1 sensor No. 1 is a 4-pin electrical connector located near front of center console. See **Fig. 57** . Electrical connector for bank No. 1 sensor No. 2 is a Gray 4-pin electrical connector located below passenger's side front seat and carpet, near center console. See **Fig. 58** .

3. Using ohmmeter, check resistance between +B and HT terminals on electrical connector. See **Fig. 57** and **Fig. 58** . Replace heated oxygen sensor if resistance is not 11-16 ohms at 68°F (20°C). See **HEATED OXYGEN SENSOR** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
4. If problem exists with either heated oxygen sensor, heater or wiring circuit, a Diagnostic Trouble Code (DTC) may be stored in Engine Control Module (ECM). See TESTING PROCEDURE under SELF-DIAGNOSTIC SYSTEM in appropriate SELF-DIAGNOSTICS article for retrieving of DTCs.

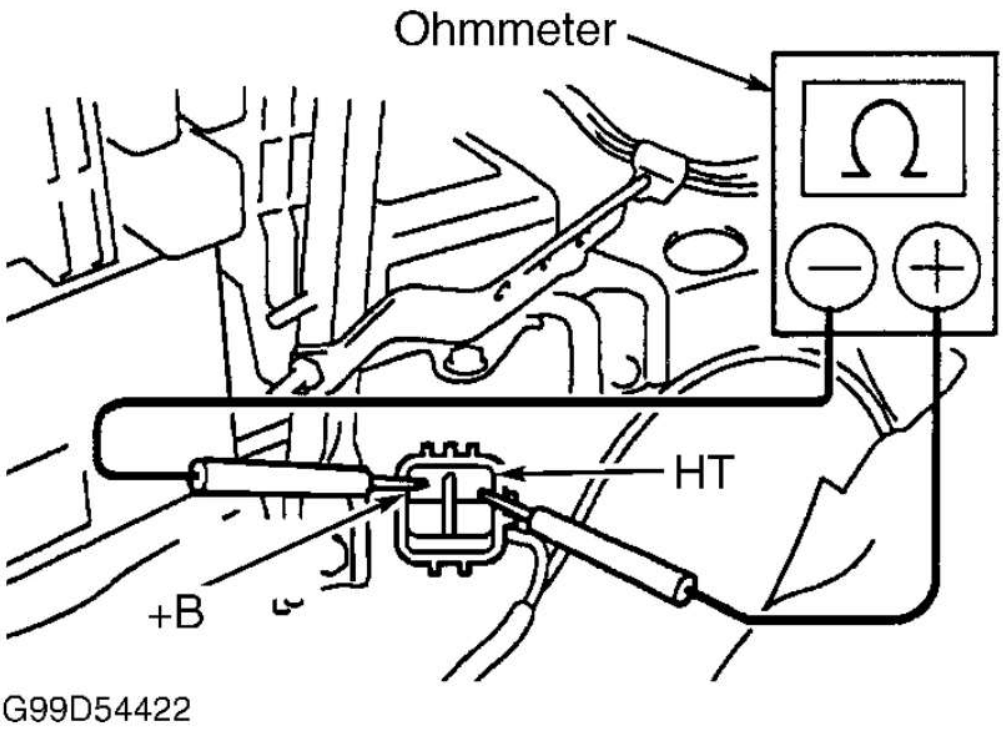


Fig. 57: Locating Electrical Connector & Testing Heated Oxygen Sensor Bank No. 1 Sensor No. 1 (Celica)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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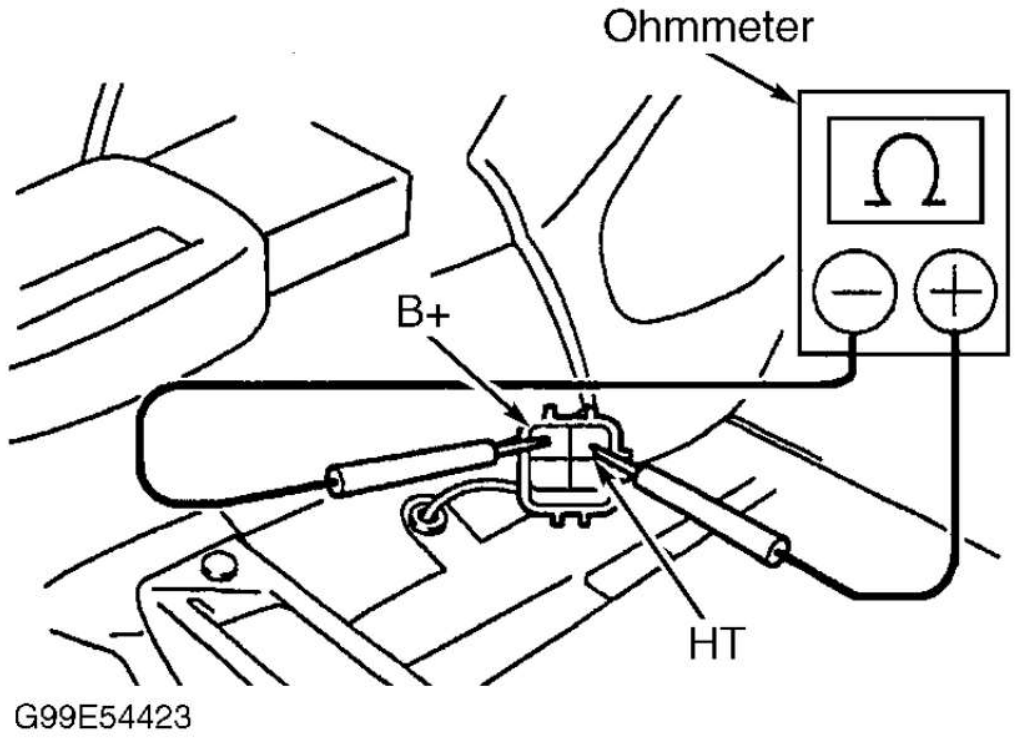


Fig. 58: Locating Electrical Connector & Testing Heated Oxygen Sensor Bank No. 1 Sensor No. 2 (Celica)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Corolla

1. A heated oxygen sensor is mounted on exhaust pipe in front of catalytic converter. This heated oxygen sensor is referred to as bank No. 1 sensor No. 1, or front oxygen sensor. Another heated oxygen sensor is mounted on exhaust pipe behind catalytic converter. This heated oxygen sensor is referred to as bank No. 1 sensor No. 2, or rear oxygen sensor.
2. To test heater resistance on heated oxygen sensor, disconnect electrical connector for appropriate heated oxygen sensor. Electrical connector for bank No. 1 sensor No. 1 is a Dark Gray 4-pin electrical connector located near exhaust manifold. See **Fig. 59** . Electrical connector for bank No. 1 sensor No. 2 is a Dark Gray 4-pin electrical connector located below passenger's side front seat and carpet, near center console. See **Fig. 60** .
3. Using ohmmeter, check resistance between +B and HT terminals on electrical connector. See **Fig. 59** and **Fig. 60** . Replace heated oxygen sensor if resistance is not 11-16 ohms at 68°F (20°C) and 23-32 ohms at 1472°F (800°C). See **HEATED OXYGEN SENSOR** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
4. If problem exists with either heated oxygen sensor, heater or wiring circuit, a Diagnostic Trouble Code

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(DTC) may be stored in Engine Control Module (ECM). See TESTING PROCEDURE under SELF-DIAGNOSTIC SYSTEM in appropriate SELF-DIAGNOSTICS article for retrieving of DTCs.

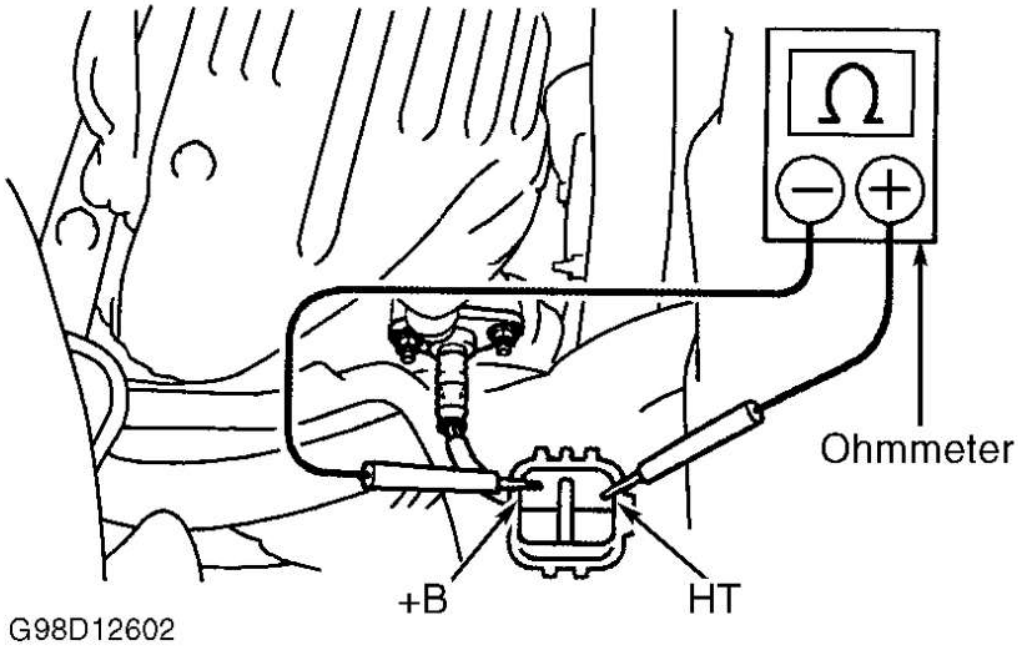


Fig. 59: Locating Electrical Connector & Testing Heated Oxygen Sensor Bank No. 1 Sensor No. 1 (Corolla)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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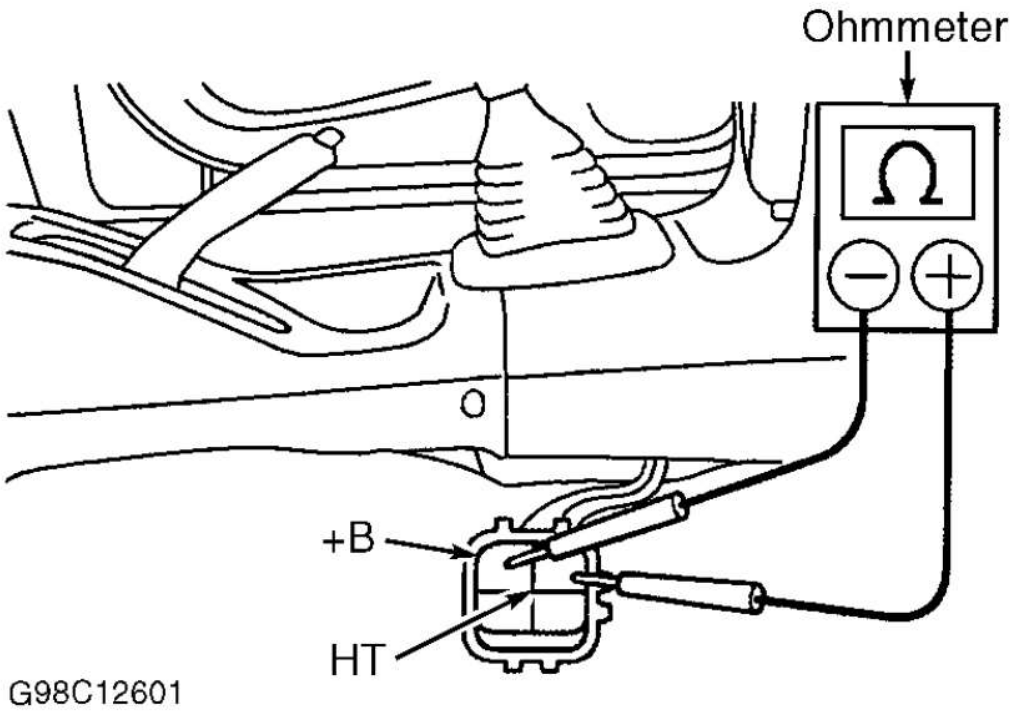


Fig. 60: Locating Electrical Connector & Testing Heated Oxygen Sensor Bank No. 1 Sensor No. 2 (Corolla)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ECHO

1. A heated oxygen sensor is mounted on exhaust pipe in front of catalytic converter. This heated oxygen sensor is referred to as bank No. 1 sensor No. 1, or front oxygen sensor. Another heated oxygen sensor is mounted on exhaust pipe behind catalytic converter. This heated oxygen sensor is referred to as bank No. 1 sensor No. 2, or rear oxygen sensor.
2. To test heater resistance on heated oxygen sensor, disconnect electrical connector for appropriate heated oxygen sensor. Electrical connector for bank No. 1 sensor No. 1 is a Gray 4-pin electrical connector located near exhaust pipe. See **Fig. 61** . Electrical connector for bank No. 1 sensor No. 2 is a Gray 4-pin electrical connector located below passenger's side front seat and carpet, near center console. See **Fig. 62** .
3. Using ohmmeter, check resistance between +B and HT terminals on electrical connector. See **Fig. 61** and **Fig. 62** . Replace heated oxygen sensor if resistance is not 11-16 ohms at 68°F (20°C). See **HEATED OXYGEN SENSOR** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
4. If problem exists with either heated oxygen sensor, heater or wiring circuit, a Diagnostic Trouble Code (DTC) may be stored in Engine Control Module (ECM). See TESTING PROCEDURE under SELF-

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DIAGNOSTIC SYSTEM in appropriate SELF-DIAGNOSTICS article for retrieving of DTCs.

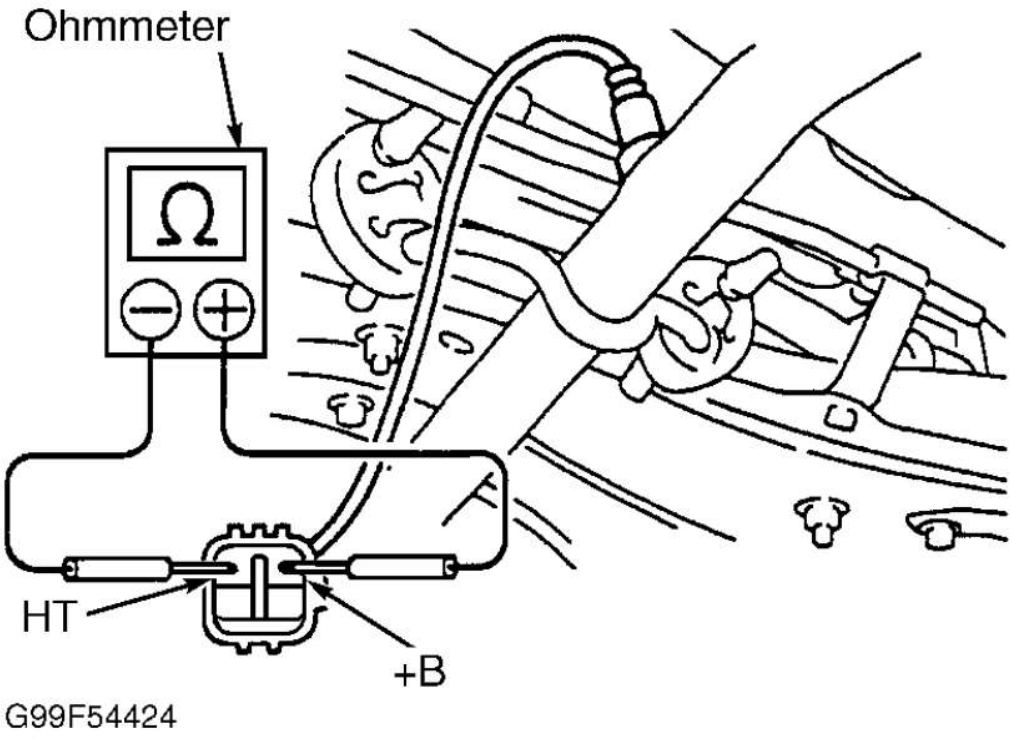


Fig. 61: Locating Electrical Connector & Testing Heated Oxygen Sensor Bank No. 1 Sensor No. 1 (ECHO)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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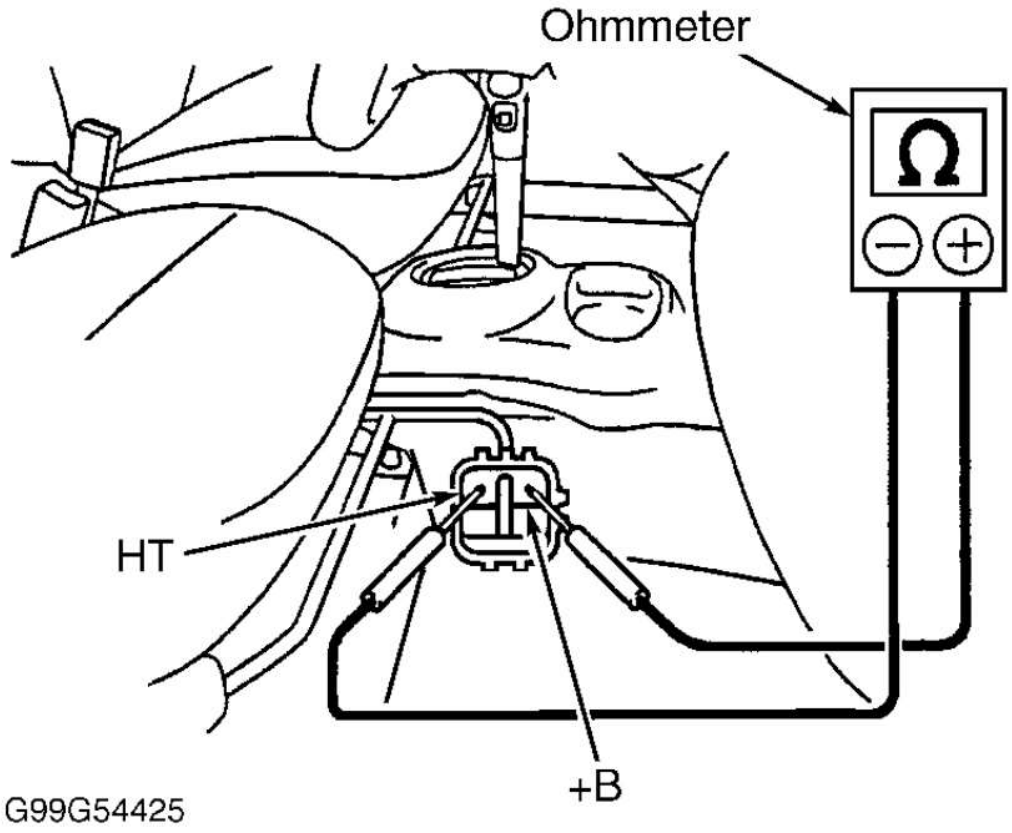


Fig. 62: Locating Electrical Connector & Testing Heated Oxygen Sensor Bank No. 1 Sensor No. 2 (ECHO)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Highlander

1. Two heated Air/Fuel (A/F) sensors are used. Heated A/F sensors are mounted on exhaust manifold above catalytic converter. For testing of A/F sensors, see **AIR/FUEL SENSOR** . Two heated oxygen sensors are also used. Heated oxygen sensors are mounted on exhaust manifold below catalytic converters. Heated oxygen sensor for cylinders No. 1 and 4 is referred to as bank No. 1 sensor No. 2. Heated oxygen sensor for cylinders No. 2 and 3 is referred to as bank No. 2 sensor No. 2.
2. To test heater resistance on heated oxygen sensor, disconnect electrical connector for heated oxygen sensor. Using ohmmeter, check resistance between +B and HT terminals on electrical connector. See **Fig. 63** . Replace heated oxygen sensor if resistance is not 11-16 ohms at 68°F (20°C). See **HEATED OXYGEN SENSOR** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
3. If problem exists in either heated oxygen sensor, heater or wiring circuit, a Diagnostic Trouble Code (DTC) may be stored in Engine Control Module (ECM). See TESTING PROCEDURE under SELF-

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DIAGNOSTIC SYSTEM in appropriate SELF-DIAGNOSTICS article for retrieving of DTCs.

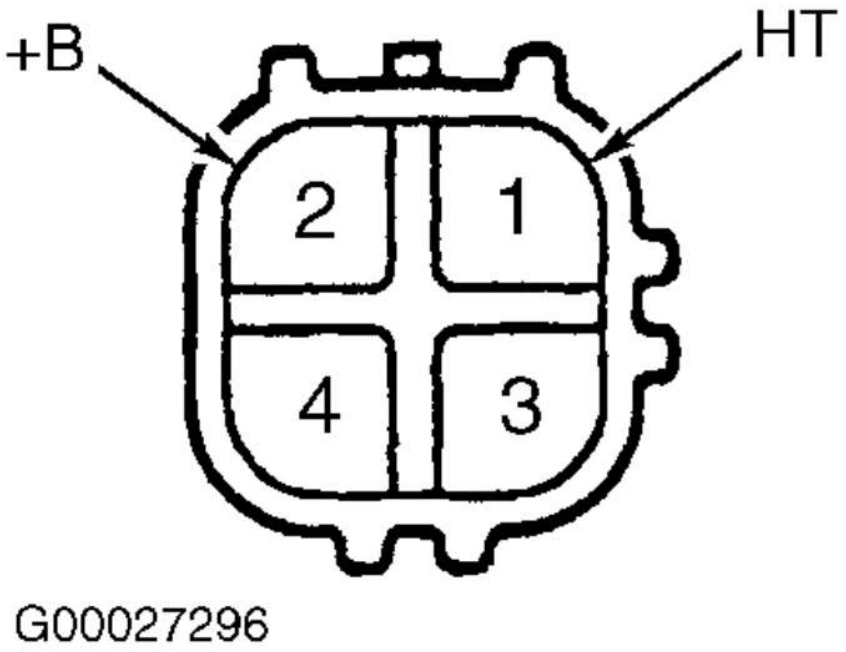


Fig. 63: Identifying Terminals On Electrical Connector For Heated Oxygen Sensor (Highlander)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

MR2

1. Three heated oxygen sensors are used with 2 being mounted on exhaust manifold, above catalytic converters, and one on exhaust pipe behind catalytic converters. Heated oxygen sensor for cylinders No. 1 and 4 is referred to as bank No. 1 sensor No. 1. Heated oxygen sensor for cylinders No. 2 and 3 is referred to as bank No. 2 sensor No. 1. Heated oxygen sensor mounted on exhaust pipe is referred to as bank No. 1 sensor No. 2.
2. To test heater resistance on heated oxygen sensor, disconnect electrical connector for appropriate heated oxygen sensor. See **Fig. 64** -**Fig. 66** . Using ohmmeter, check resistance between +B and HT terminals on electrical connector. See **Fig. 64** -**Fig. 66** . Replace heated oxygen sensor if resistance is not 11-16 ohms at 68°F (20°C) and 23-32 ohms at 1472°F (800°C). See **HEATED OXYGEN SENSOR** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
3. If problem exists with any heated oxygen sensor, heater or wiring circuit, a Diagnostic Trouble Code (DTC) may be stored in Engine Control Module (ECM). See TESTING PROCEDURE under SELF-DIAGNOSTIC SYSTEM in appropriate SELF-DIAGNOSTICS article for retrieving of DTCs.

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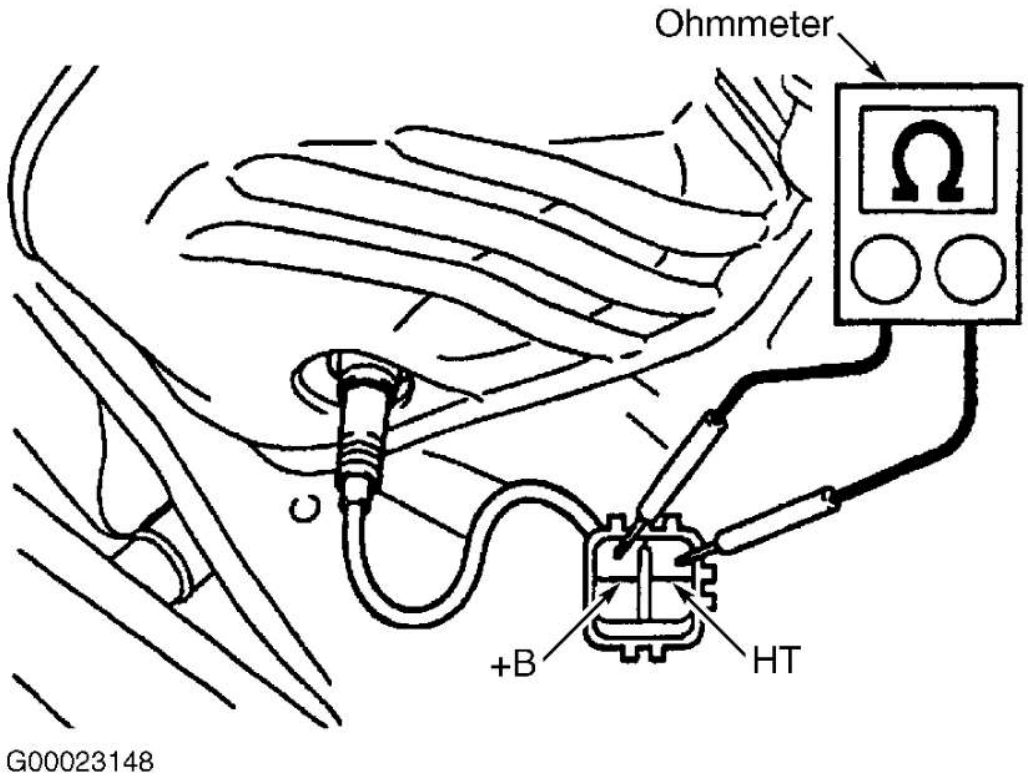


Fig. 64: Locating Electrical Connector & Testing Heated Oxygen Sensor Bank No. 1 Sensor No. 1 (MR2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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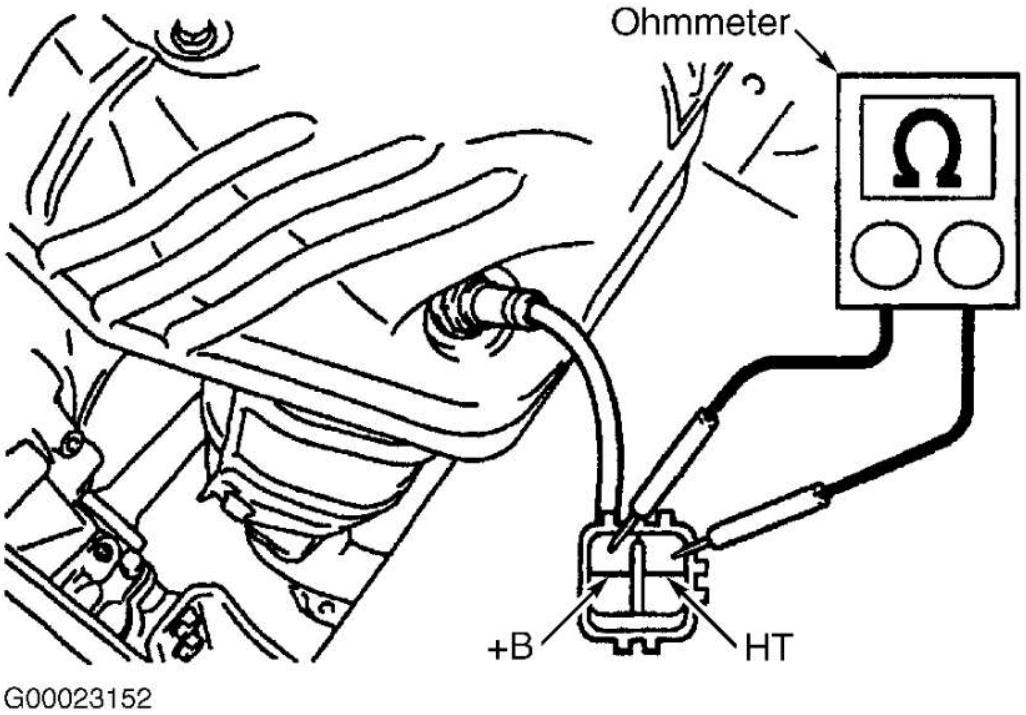


Fig. 65: Locating Electrical Connector & Testing Heated Oxygen Sensor Bank No. 2 Sensor No. 1 (MR2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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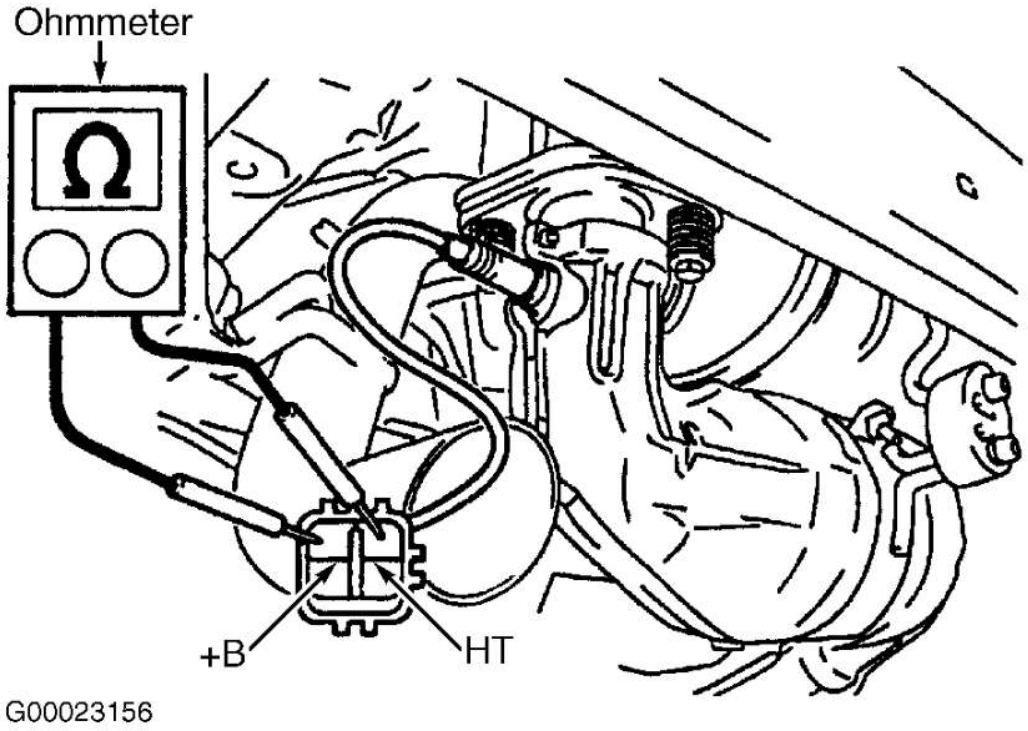


Fig. 66: Locating Electrical Connector & Testing Heated Oxygen Sensor Bank No. 1 Sensor No. 2 (MR2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Prius

WARNING: Read service precautions before proceeding with service procedure. See SERVICE PRECAUTIONS .

1. A heated oxygen sensor is mounted on exhaust pipe in front of catalytic converter. This heated oxygen sensor is referred to as bank No. 1 sensor No. 1, or front oxygen sensor. Another heated oxygen sensor is mounted on exhaust pipe behind catalytic converter. This heated oxygen sensor is referred to as bank No. 1 sensor No. 2, or rear oxygen sensor.
2. To test heater resistance on heated oxygen sensor, disconnect electrical connector for appropriate heated oxygen sensor. Electrical connector for bank No. 1 sensor No. 1 is a Dark Gray 4-pin electrical connector located near exhaust manifold. See **Fig. 67** . Electrical connector for bank No. 1 sensor No. 2 is a Dark Gray 4-pin electrical connector located below passenger's side carpet, near center console. See **Fig. 68** .
3. Using ohmmeter, check resistance between +B and HT terminals on electrical connector. See **Fig. 67** and **Fig. 68** . Replace heated oxygen sensor if resistance is not 11-16 ohms at 68°F (20°C). See **HEATED OXYGEN SENSOR** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.

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4. If problem exists with either heated oxygen sensor, heater or wiring circuit, a Diagnostic Trouble Code (DTC) may be stored in Engine Control Module (ECM). See TESTING PROCEDURE under SELF-DIAGNOSTIC SYSTEM in appropriate SELF-DIAGNOSTICS article for retrieving of DTCs.

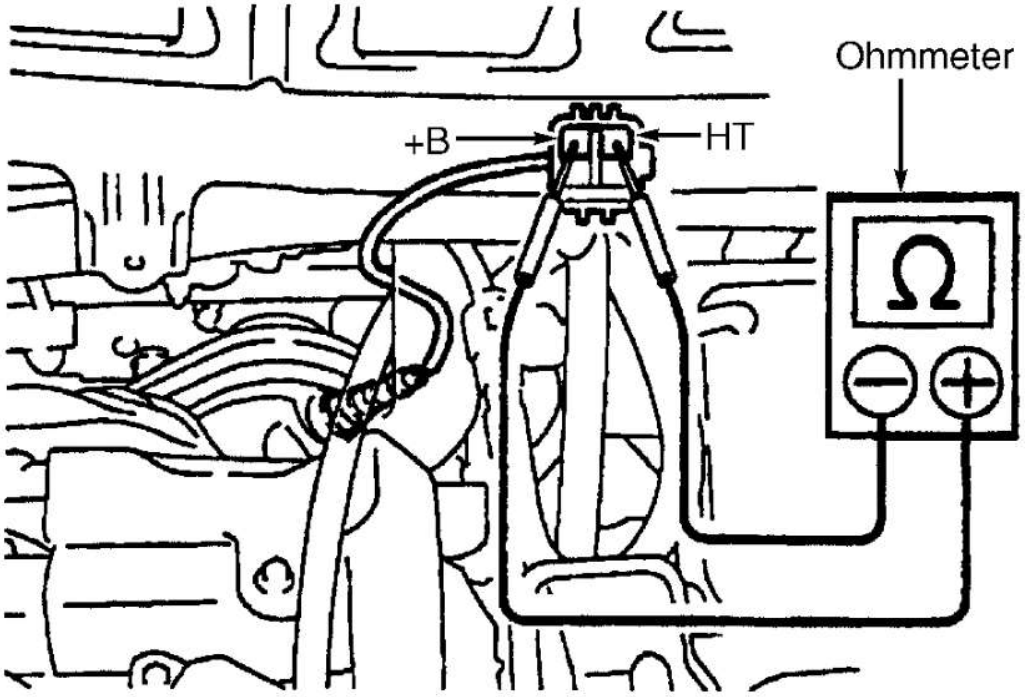


Fig. 67: Locating Electrical Connector & Testing Heated Oxygen Sensor Bank No. 1 Sensor No. 1 (Prius)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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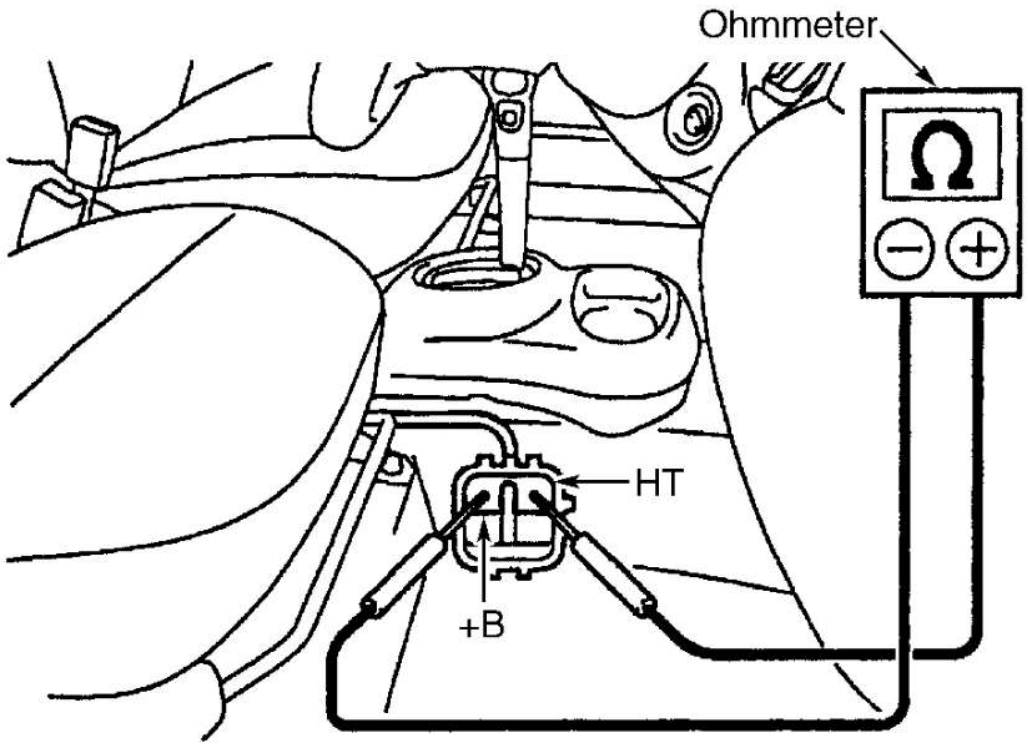


Fig. 68: Locating Electrical Connector & Testing Heated Oxygen Sensor Bank No. 1 Sensor No. 2 (Prius)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

RAV4

1. Two heated Air/Fuel (A/F) sensors are used. Heated A/F sensors are mounted on exhaust manifold above catalytic converter. For testing of A/F sensors, see **AIR/FUEL SENSOR** . Two heated oxygen sensors are also used. Heated oxygen sensors are mounted on exhaust manifold below catalytic converters. Heated oxygen sensor for cylinders No. 1 and 4 is referred to as bank No. 1 sensor No. 2. Heated oxygen sensor for cylinders No. 2 and 3 is referred to as bank No. 2 sensor No. 2.
2. To test heater resistance on heated oxygen sensor, disconnect electrical connector for heated oxygen sensor. See **Fig. 69** and **Fig. 70** . Using ohmmeter, check resistance between +B and HT terminals on electrical connector. See **Fig. 69** and **Fig. 70** . Replace heated oxygen sensor if resistance is not 11-16 ohms at 68°F (20°C) and 23-32 ohms at 1472°F (800°C). See **HEATED OXYGEN SENSOR** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
3. If problem exists in either heated oxygen sensor, heater or wiring circuit, a Diagnostic Trouble Code (DTC) may be stored in Engine Control Module (ECM). See TESTING PROCEDURE under SELF-DIAGNOSTIC SYSTEM in appropriate SELF-DIAGNOSTICS article for retrieving of DTCs.

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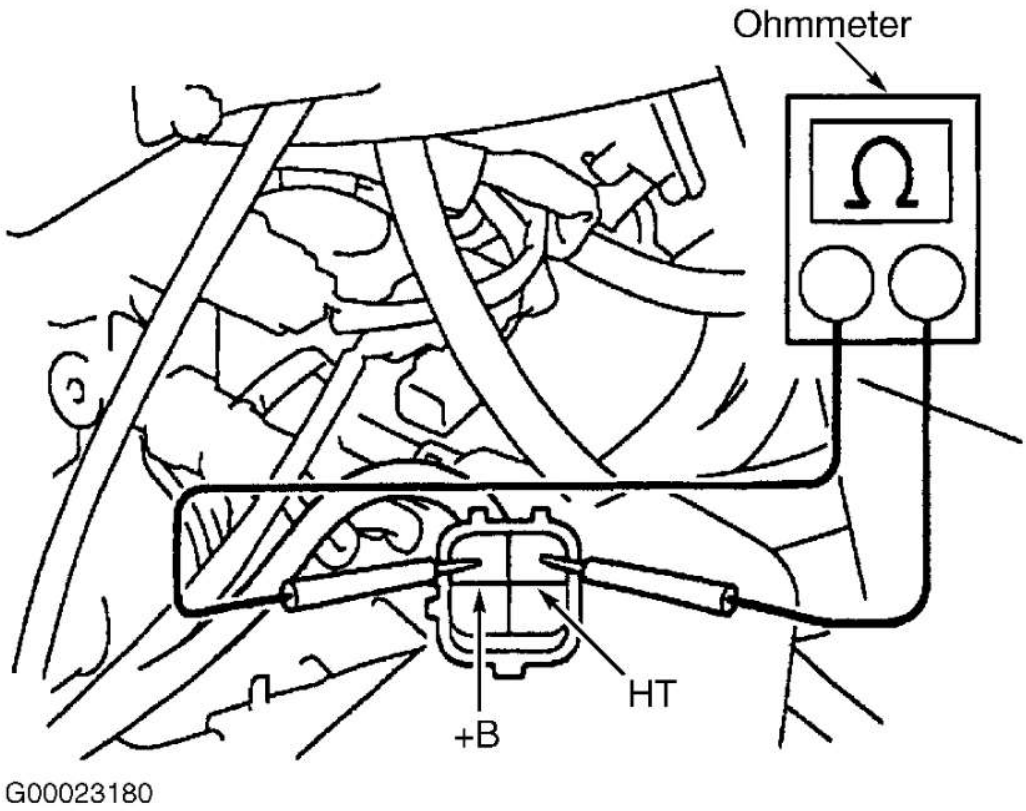


Fig. 69: Locating Electrical Connector & Testing Heated Oxygen Sensor Bank No. 1 Sensor No. 2 (RAV4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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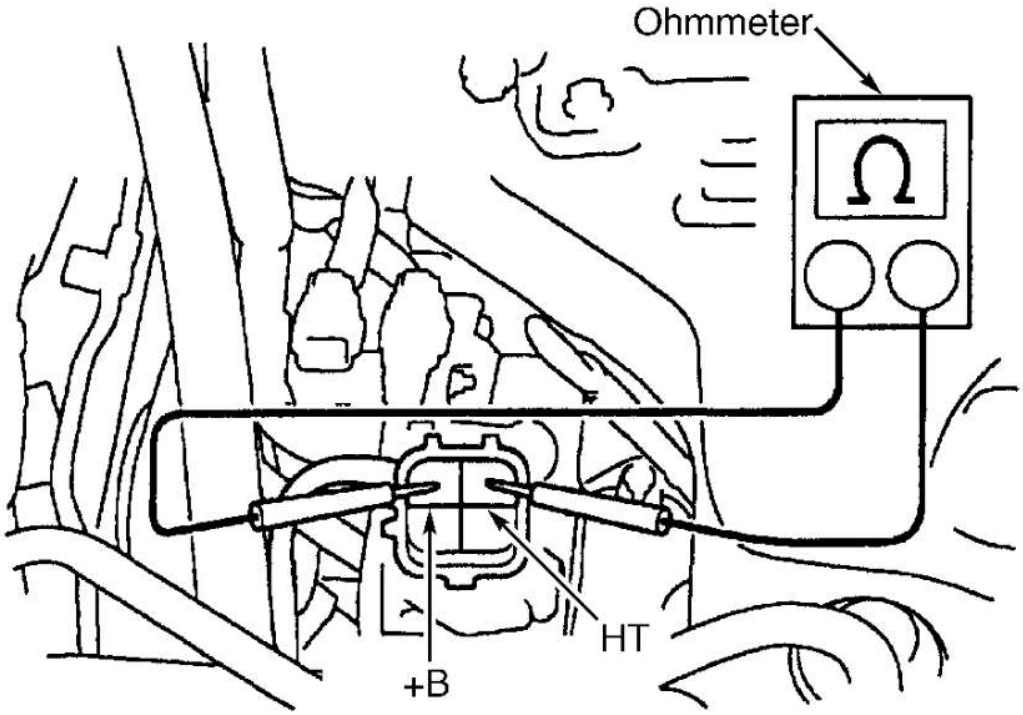


Fig. 70: Locating Electrical Connector & Testing Heated Oxygen Sensor Bank No. 2 Sensor No. 2 (RAV4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Tacoma

1. A heated Air/Fuel (A/F) sensor is mounted on exhaust pipe in front of catalytic converter. For testing of A/F sensor, see **AIR/FUEL SENSOR** . A heated oxygen sensor is mounted on exhaust pipe behind catalytic converter. This oxygen sensor is referred to as bank No. 1 sensor No. 2, or rear oxygen sensor.
2. To test heater resistance on heated oxygen sensor, disconnect electrical connector for heated oxygen sensor. Using ohmmeter, check resistance between +B and HT terminals on electrical connector. See **Fig. 71** . Replace heated oxygen sensor if resistance is not 11-16 ohms at 68°F (20°C) and 23-32 ohms at 1472°F (800°C). See **HEATED OXYGEN SENSOR** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
3. If problem exists in either heated oxygen sensor, heater or wiring circuit, a Diagnostic Trouble Code (DTC) may be stored in Engine Control Module (ECM). See TESTING PROCEDURE under SELF-DIAGNOSTIC SYSTEM in appropriate SELF-DIAGNOSTICS article for retrieving of DTCs.

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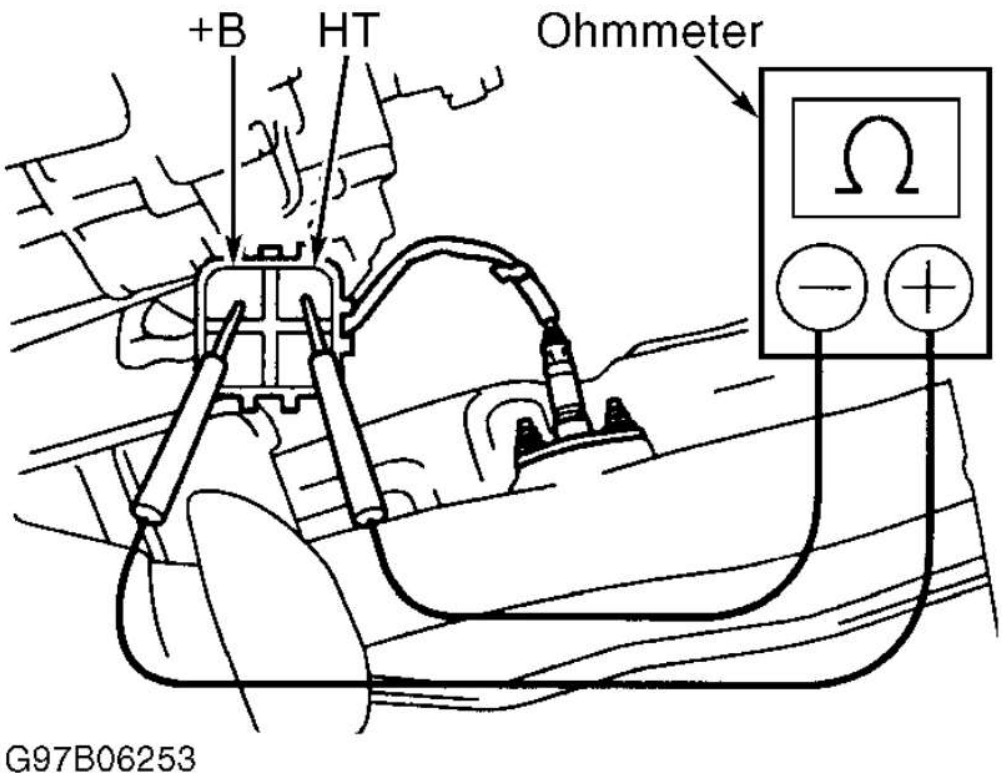


Fig. 71: Locating Electrical Connector & Testing Heated Oxygen Sensor Bank No. 1 Sensor No. 2 (Tacoma)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

IGNITION SWITCH

1. Disconnect electrical connector from ignition switch on bottom of upper steering column bracket. See **Fig. 72** . Note ignition switch electrical terminals and ignition lock cylinder positions. See **Fig. 73** -**Fig. 75** .
2. Using ohmmeter, check that continuity is as specified between indicated ignition switch electrical terminals in relation to ignition lock cylinder position. See **IGNITION SWITCH CONTINUITY** table. Replace ignition switch if defective. See **IGNITION SWITCH** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.

IGNITION SWITCH CONTINUITY

Application	Ign. Lock Cylinder Position	Ign. Switch Terminals	Specification
Camry, Camry Solara & Corolla, Prius &	LOCK	(1)	(1)

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Tacoma			
ACC		2 & 3	Continuity
ON		2, 3 & 4; 6 & 7	Continuity
START		1, 2 & 4; 6, 7 & 8	Continuity
Celica, ECHO, Highlander, MR2 & RAV4	LOCK	(1)	(1)
ACC		1 & 3	Continuity
ON		1, 2 & 3; 5 & 6	Continuity
START		1 & 2; 4, 5 & 6	Continuity
(1) There should be no continuity between any terminals.			

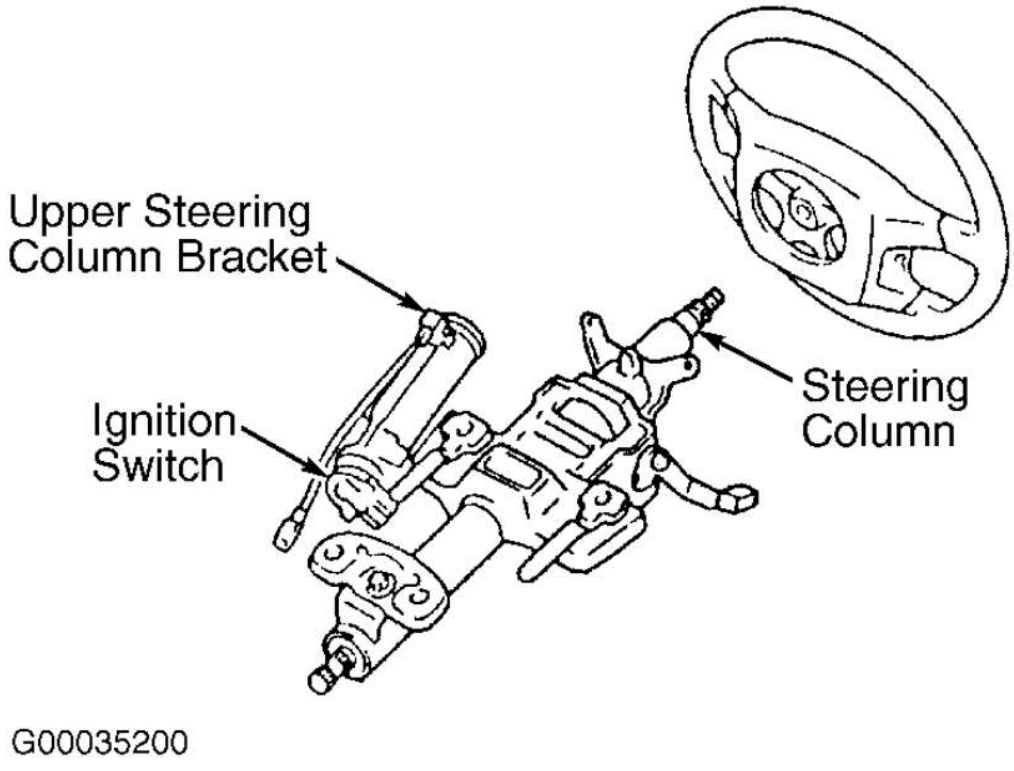


Fig. 72: Locating Typical Ignition Switch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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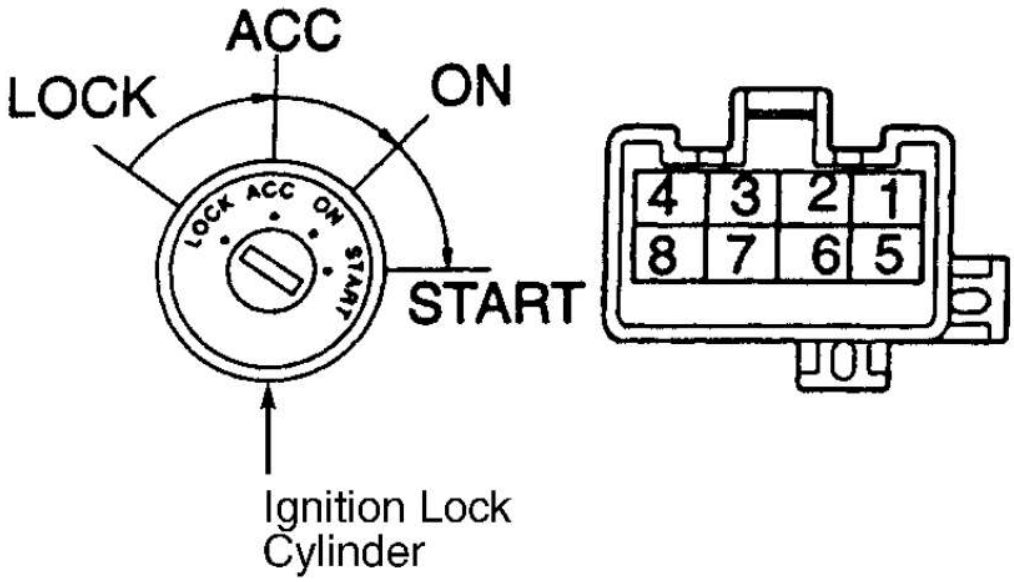


Fig. 73: Identifying Ignition Switch Electrical Terminals & Ignition Lock Cylinder Positions (Camry, Camry Solara, Corolla & Prius)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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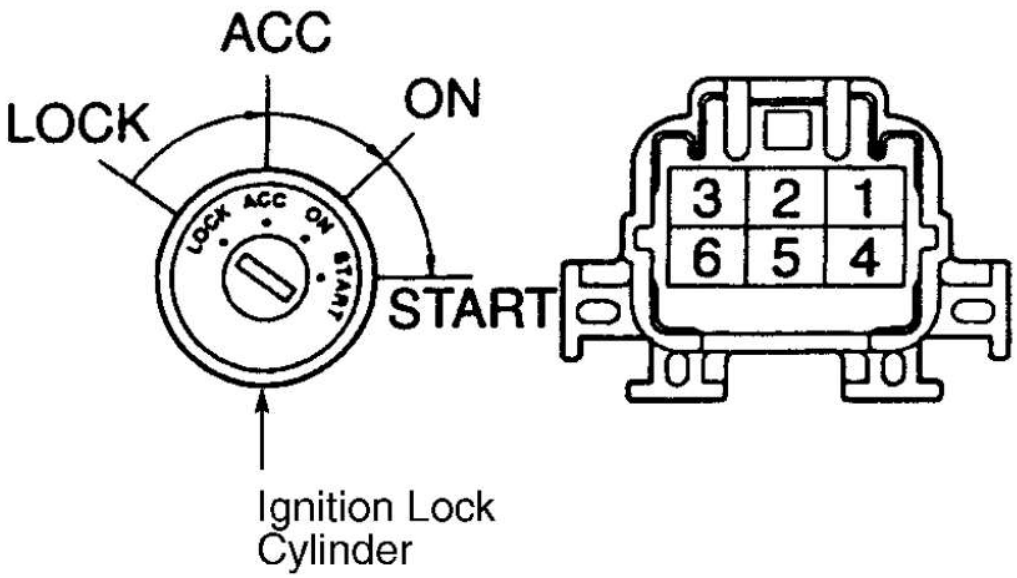


Fig. 74: Identifying Ignition Switch Electrical Terminals & Ignition Lock Cylinder Positions (Celica, ECHO, Highlander, MR2 & RAV4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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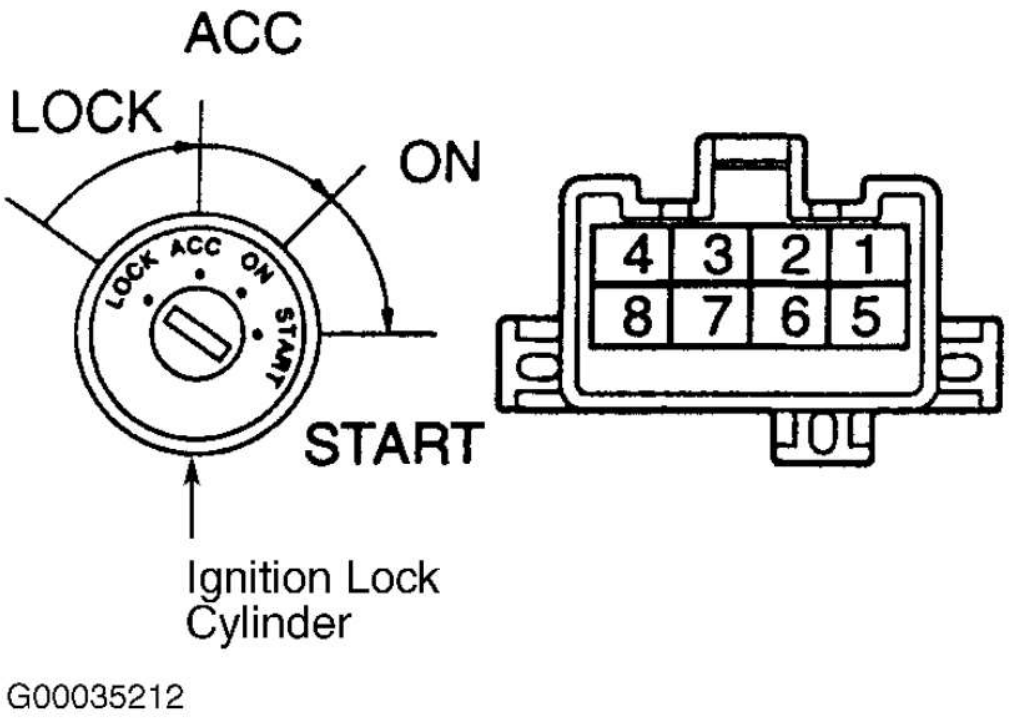


Fig. 75: Identifying Ignition Switch Electrical Terminals & Ignition Lock Cylinder Positions (Tacoma)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INTAKE AIR TEMPERATURE SENSOR

Intake air temperature sensor is incorporated with airflow meter. See **AIRFLOW METER** .

KNOCK SENSOR

NOTE: Knock sensor may also be referred to as knock sensor No. 1.

Camry, Camry Solara, Celica 1.8L 1ZZ-FE, Corolla, ECHO, Highlander, MR2, Prius, RAV4 & Tacoma

1. Knock sensor is located on side of cylinder block. Manufacturer recommends removing knock sensor from cylinder block before testing. See **KNOCK SENSOR** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
2. Using ohmmeter, check that no continuity exists between electrical terminal on knock sensor and body of knock sensor. Replace knock sensor if continuity exists.

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Celica 1.8L 2ZZ-GE

1. Knock sensor is located on side of cylinder block. Manufacturer recommends removing knock sensor from cylinder block before testing. See **KNOCK SENSOR** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
2. Using ohmmeter, check resistance between electrical terminals on knock sensor. Replace knock sensor if resistance is no 120,000-280,000 ohms at 68°F (20°C).

PARK/NEUTRAL POSITION SWITCH

Camry, Camry Solara, Celica, Corolla, ECHO, Highlander, RAV4 & Tacoma

NOTE: Park/Neutral Position (PNP) switch is used only on A/T models.

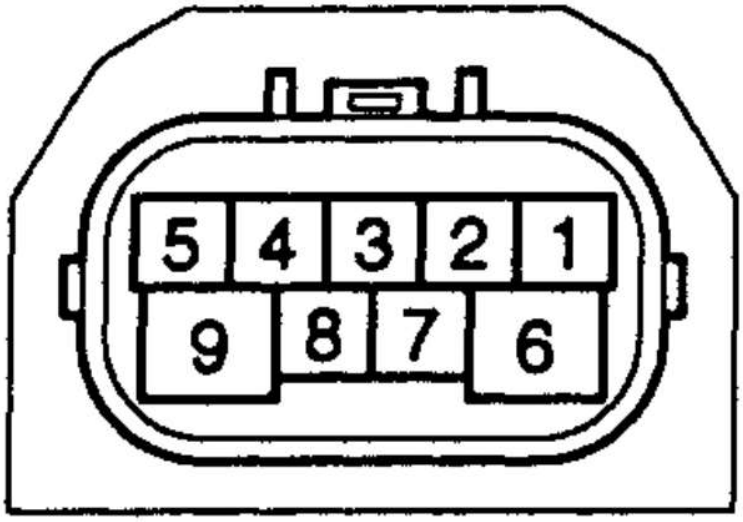
1. Disconnect electrical connector from Park/Neutral Position (PNP) switch. PNP switch is mounted on side of transmission/transaxle. Note terminal identification. See **Fig. 76** -**Fig. 79** .
2. Using ohmmeter, check for continuity between specified terminals with shift lever in proper positions. See **PARK/NEUTRAL POSITION SWITCH SPECIFICATIONS** table.
3. If proper continuity does not exist, adjust or replace PNP switch as necessary. For adjustment or replacement of PNP switch, see **PARK/NEUTRAL POSITION SWITCH** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.

PARK/NEUTRAL POSITION SWITCH SPECIFICATIONS

Application & Shift Lever Position	Continuity Between Terminals No.
Camry	
Park	1 & 3; 6 & 9
Reverse	2 & 3
Neutral	3 & 5; 6 & 9
Drive	3 & 7
2	3 & 4
Low	3 & 8
Camry Solara, Celica, Corolla, Highlander & RAV4	
Park	1 & 3; 6 & 9
Reverse	2 & 3
Neutral	3 & 5; 6 & 9
Drive	3 & 7
2	3 & 4
Low	3 & 8
ECHO	
Park	3 & 5; 6 & 9
Reverse	2 & 3
Neutral	1 & 3; 6 & 9
Drive	3 & 7

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2	3 & 4
Low	3 & 8
Tacoma	
With A44D Transmission	
Park	4 & 7; 5 & 6
Reverse	4 & 8
Neutral	4 & 10; 5 & 6
Drive	4 & 9
2	2 & 4
Low	3 & 4
With A340E Or A340F Transmission	
Park	1 & 3; 6 & 9
Reverse	2 & 3
Neutral	3 & 5; 6 & 9
Drive	3 & 7
2	3 & 4
Low	3 & 8



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Fig. 76: Identifying Park/Neutral Position Switch Terminals (Camry)

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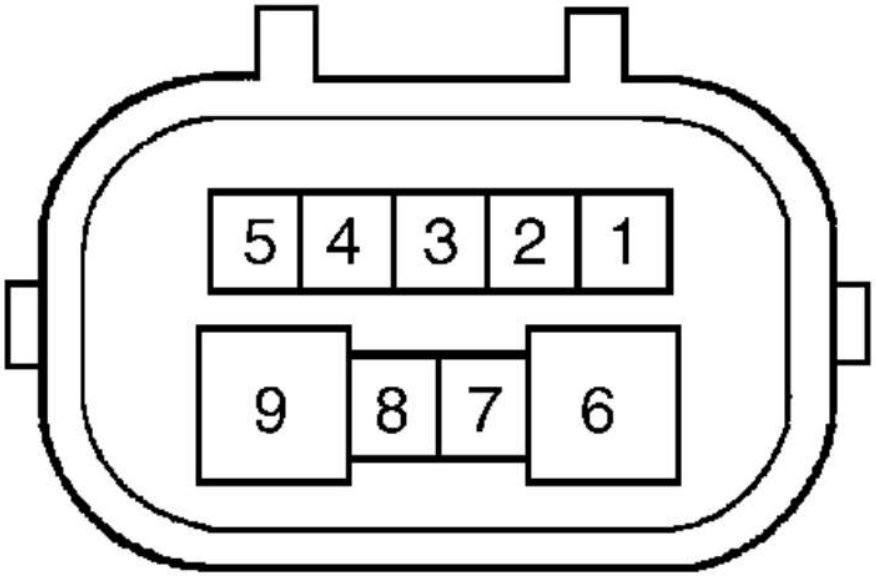


Fig. 77: Identifying Park/Neutral Position Switch Terminals (Camry Solara, Celica With 1.8L 2ZZ-GE, Corolla, RAV4 & Tacoma With A340E Or A340F Transmission)
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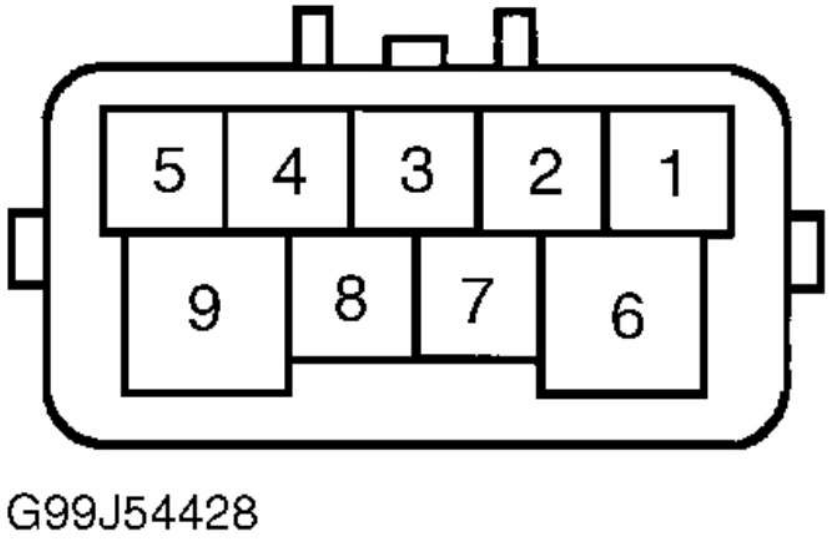


Fig. 78: Identifying Park/Neutral Position Switch Terminals (Celica With 1.8L 1ZZ-FE, ECHO & Highlander)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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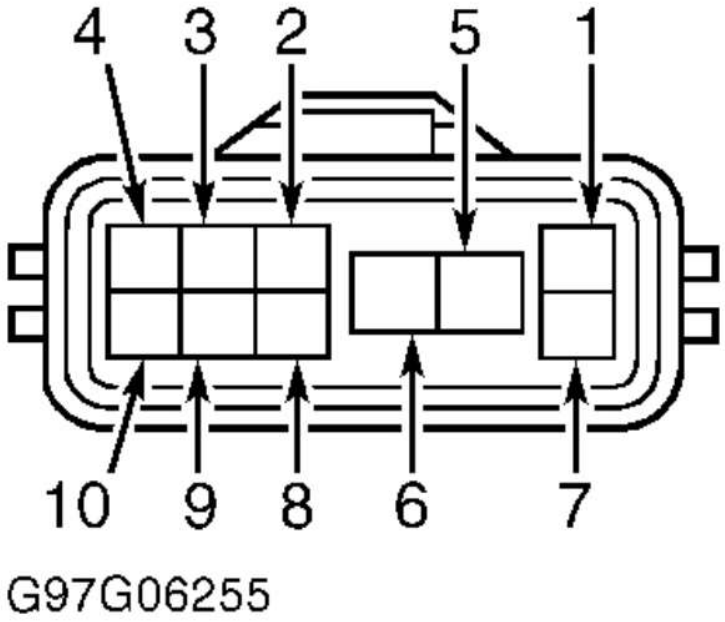


Fig. 79: Identifying Park/Neutral Position Switch Terminals (Tacoma With A44D Transmission)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

POSITIVE TEMPERATURE COEFFICIENT HEATER

ECHO

1. Remove Positive Temperature Coefficient (PTC) heater along with heater core. See appropriate HEATER SYSTEMS article in AIR CONDITIONING & HEATING.
2. To test PTC heater for continuity, using ohmmeter, check that continuity exists between each electrical terminal and ground terminal on PTC heater. See **Fig. 80** . Replace PTC heater if continuity does not exist between any electrical terminal and ground terminal.
3. To test PTC heater resistance, remove PTC heater from heater core. Place probe end of PTC heater and thermometer in container of water. Attach ohmmeter between electrical terminals on PTC heater.
4. Heat water and note that resistance is within specification in relation to temperature. See **PTC HEATER RESISTANCE** table. Replace PTC heater if resistance is not within specification.

PTC HEATER RESISTANCE

Temperature	Ohms
77°F (25°C)	4800-5200

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104°F (40°C)	2550-2850
212°F (100°C)	260-340

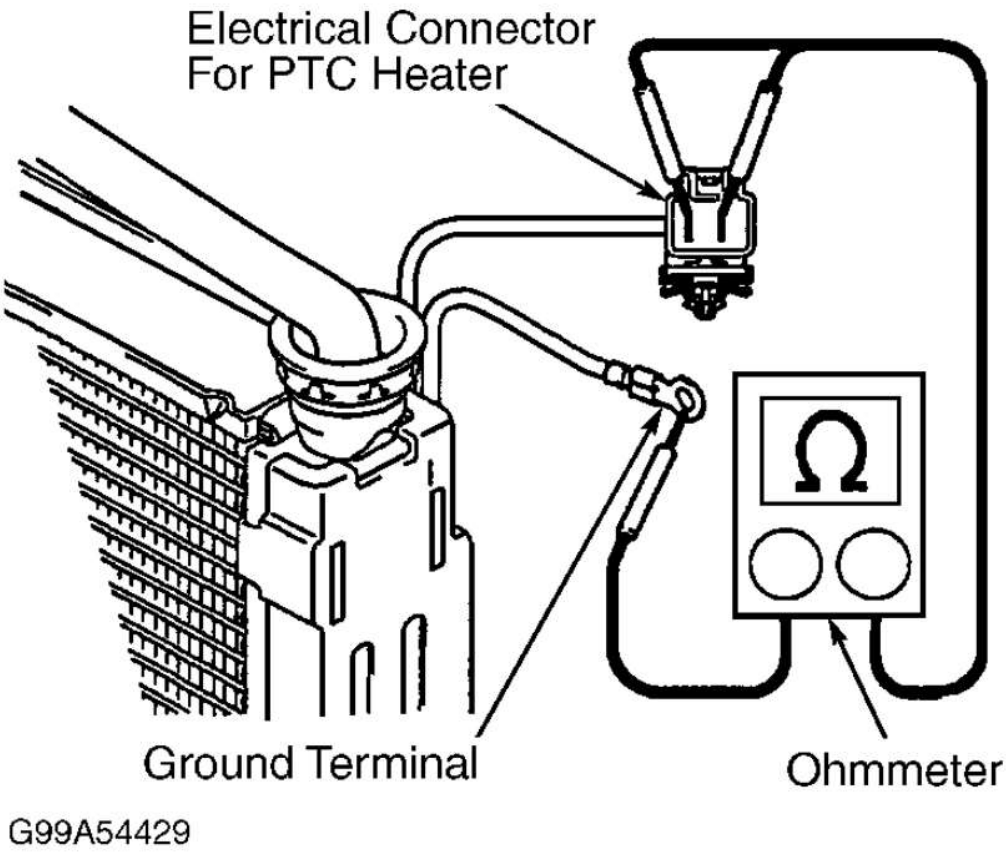


Fig. 80: Checking PTC Heater Continuity (ECHO)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

POWER STEERING PRESSURE SENSOR

NOTE: Power steering pressure sensor may also be referred to as power steering oil pressure sensor.

ECHO

Power steering pressure sensor is located on side of power steering pump. Testing information is not available from manufacturer. If problem exists with power steering pressure sensor, a Diagnostic Trouble Code (DTC) may be stored in Engine Control Module (ECM). See TESTING PROCEDURE under SELF-DIAGNOSTIC

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SYSTEM in appropriate SELF-DIAGNOSTICS article for retrieving of DTCs.

POWER STEERING PRESSURE SWITCH

NOTE: Power steering pressure switch may also be referred to as power steering oil pressure switch.

Camry, Camry Solara, Celica, Corolla, RAV4 & Tacoma

Power steering pressure switch is located on power steering pump or near pressure hose at power steering pump. Testing information is not available from manufacturer.

Highlander

1. Remove glove box for access to Engine Control Module (ECM). For illustration of ECM location, see **THEORY & OPERATION** article. Note ECM electrical connector terminals. See **Fig. 24** .
2. Start engine and allow engine to idle. Using voltmeter, check voltage between terminals No. 11 (Green/Yellow wire) at ECM electrical connector E7 and No. 17 (Brown wire) at ECM electrical connector E8. This is the PSW and E1 terminals at ECM. Check voltage with steering wheel at stationary position with engine idling, and while turning steering wheel with engine idling. Voltage should be 9-14 volts with steering wheel at stationary position and 0-3 volts while turning the steering wheel. If voltage is within specification, test is complete. If voltage is not within specification, go to next step.
3. Check wiring harness and electrical connectors between ECM and power steering pressure switch. See **WIRING DIAGRAMS** article. Power steering pressure switch is located on power steering pump. If wiring harness or electrical connector is defective, repair as necessary. If wiring harness and electrical connectors are okay, replace power steering pressure switch. See **POWER STEERING PRESSURE SWITCH** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.

THROTTLE POSITION SENSOR

Camry & Camry Solara

For testing of throttle position sensor, see **THROTTLE BODY** under IDLE CONTROL SYSTEMS.

Celica, Corolla, ECHO, Highlander, RAV4 & Tacoma

1. Ensure ignition is off. Disconnect electrical connector from Throttle Position (TP) sensor on throttle body. Note terminal identification on TP sensor. See **Fig. 81** -**Fig. 87** .
2. On Tacoma, disconnect vacuum hose and apply vacuum to throttle opener. See **Fig. 87** . On all models, using ohmmeter, check resistance between specified terminals in relation to throttle position. See **THROTTLE POSITION SENSOR RESISTANCE** table. Replace components as necessary if resistance is not within specification.

MR2

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1. There are 2 types of throttle bodies and TP sensors used depending on type of transaxle used. On models with a standard type manual transaxle, the driver operates the clutch and shifts the transaxle. On models with sequential manual transaxle, the transaxle is electronically controlled and the clutch is operated and transaxle is shifted hydraulically by moving the shift lever forward or backward. Sequential manual transaxle may be identified by shift lever pattern which consists of "R", "N", "S" and "+" in place of the conventional type shift lever pattern and no clutch pedal is used.
2. For models with standard type manual transaxle, go to next step. For models with sequential manual transaxle, see **THROTTLE BODY** under IDLE CONTROL SYSTEMS for testing of TP sensor.
3. Ensure ignition is off. Disconnect electrical connector from TP sensor on throttle body. Note terminal identification on TP sensor. See **Fig. 85** .
4. Using ohmmeter, check resistance between specified terminals in relation to throttle position. See **THROTTLE POSITION SENSOR RESISTANCE** table. Replace components as necessary if resistance is not within specification.

Prius

For testing of throttle position sensor, see **THROTTLE BODY** under IDLE CONTROL SYSTEMS.

THROTTLE POSITION SENSOR RESISTANCE

Application	Throttle Position	Terminals	Ohms
Celica, Corolla & ECHO	Fully Closed	VTA & E2	200-5700
Fully Open		VTA & E2	2000-10,200
	VC & E2	2500-5900	
Highlander	Fully Closed	VTA & E2	200-5700
Fully Open		VTA & E2	2000-10,200
	VC & E2	2500-5000	
MR2 & RAV4	Fully Closed	VTA & E2	200-5700
Fully Open		VTA & E2	2000-10,200
	VC & E2	2500-5900	
Tacoma (1)	Fully Closed	VTA & E2	200-5700
Fully Open		VTA & E2	2000-10,200
	VC & E2	2500-5900	

(1) Apply vacuum to throttle opener before checking TP sensor.

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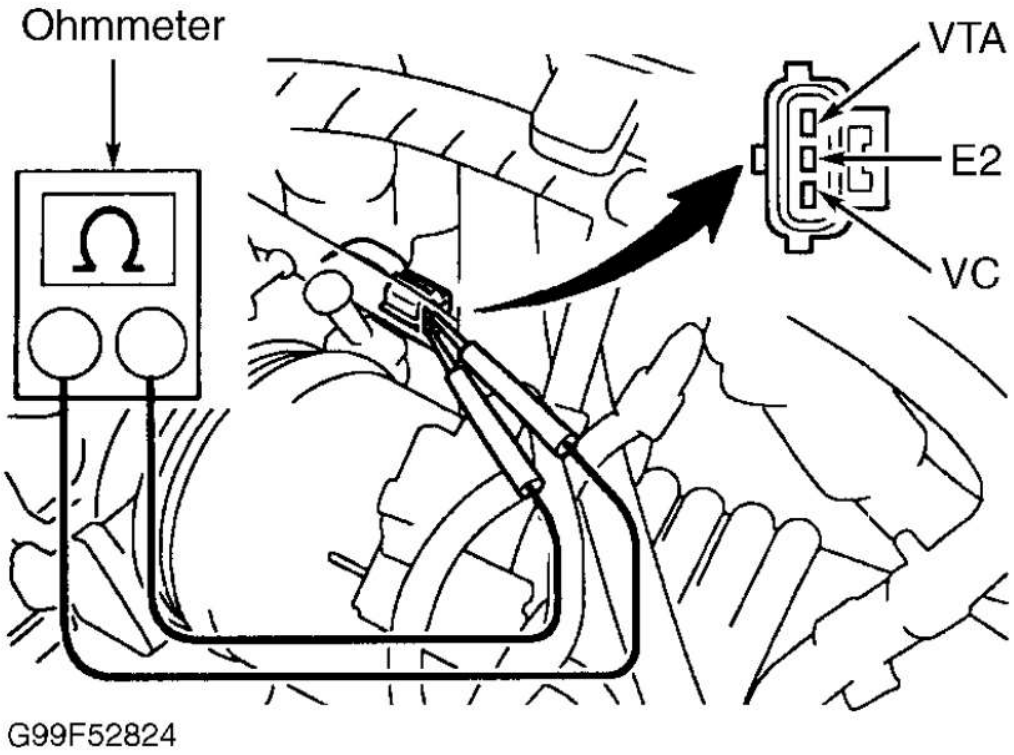


Fig. 81: Identifying Throttle Position Sensor Terminals (Celica)
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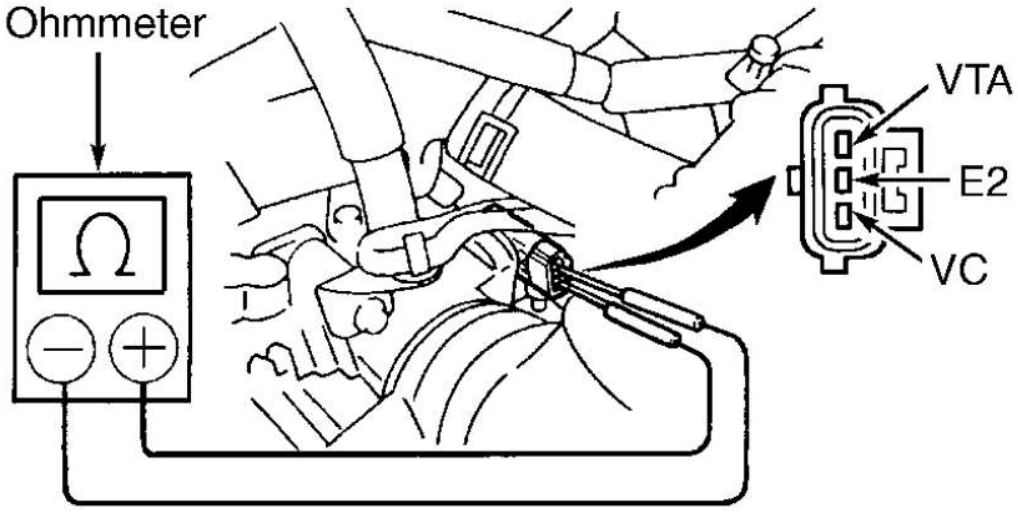
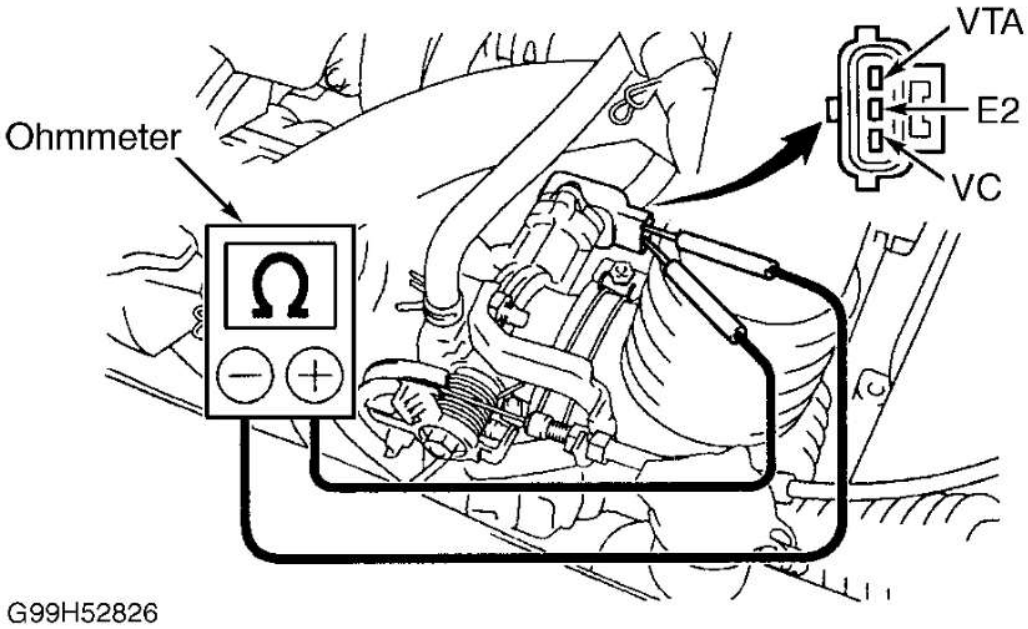


Fig. 82: Identifying Throttle Position Sensor Terminals (Corolla)
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Fig. 83: Identifying Throttle Position Sensor Terminals (ECHO)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

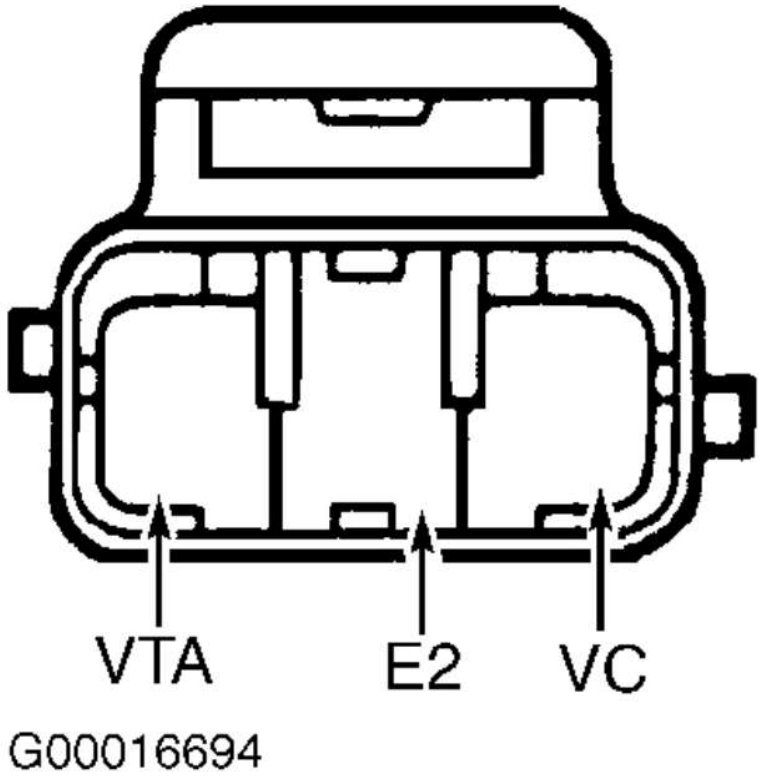


Fig. 84: Identifying Throttle Position Sensor Terminals (Highlander)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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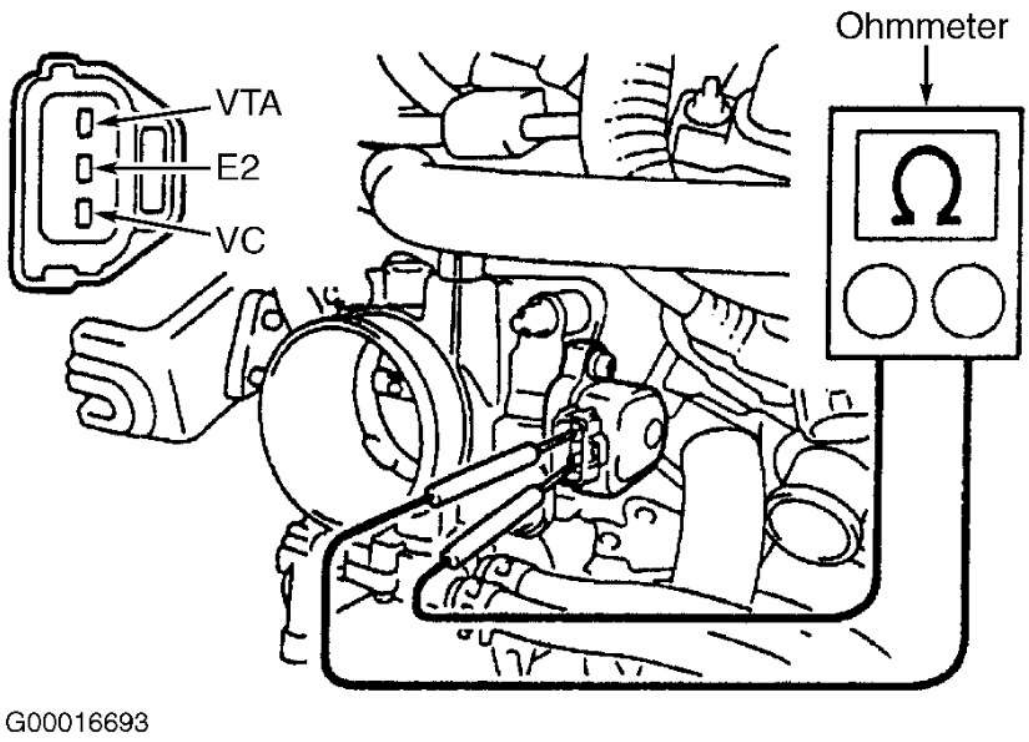


Fig. 85: Identifying Throttle Position Sensor Terminals (MR2 With Standard Type Manual Transaxle)
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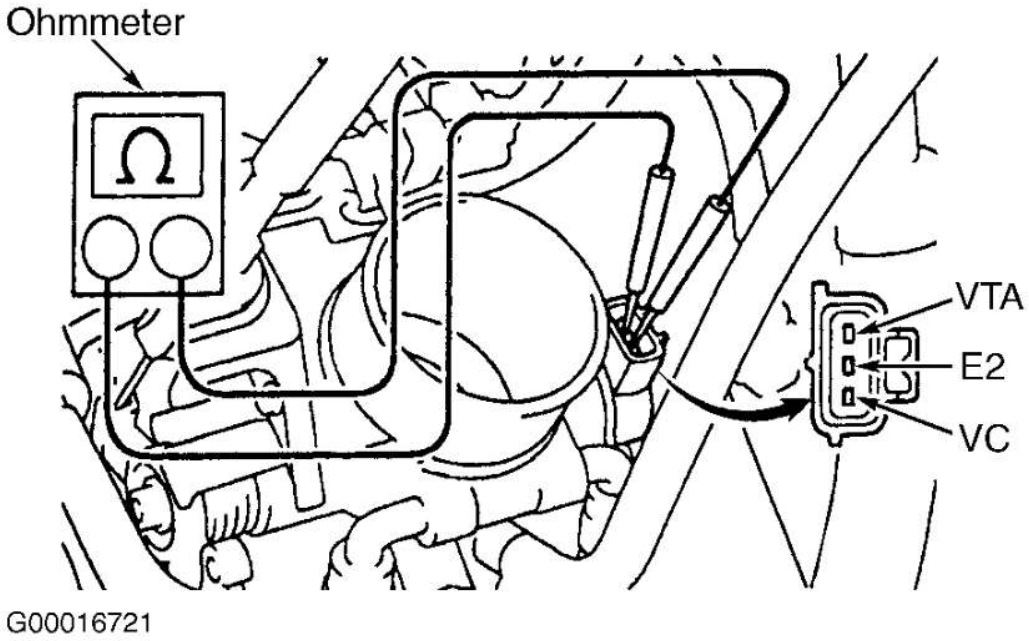


Fig. 86: Identifying Throttle Position Sensor Terminals (RAV4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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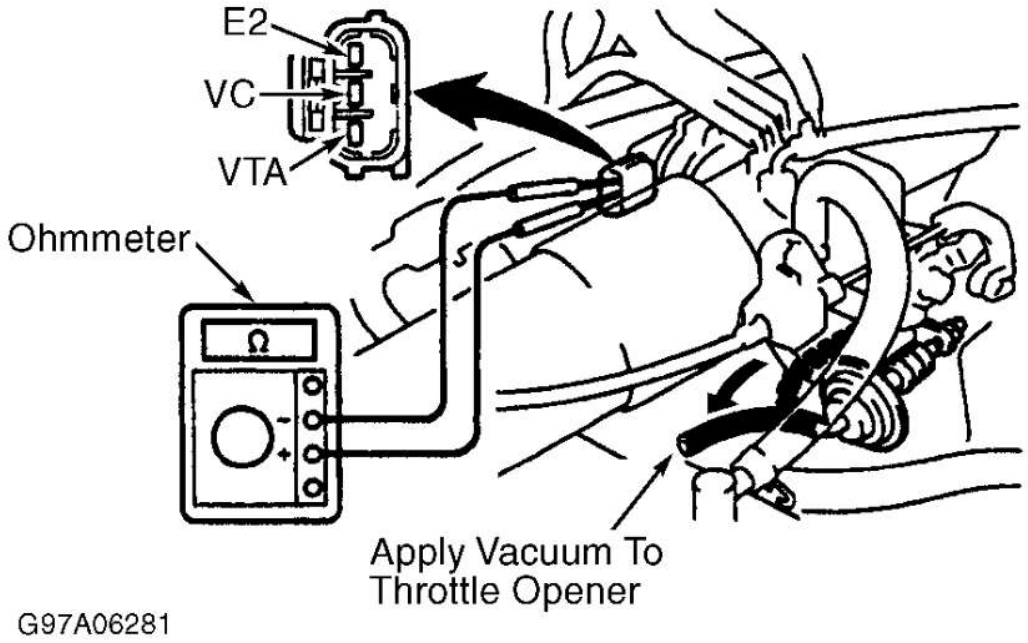


Fig. 87: Identifying Throttle Position Sensor Terminals (Tacoma)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

VACUUM SENSOR FOR HYDROCARBON ADSORBER CATALYST SYSTEM

Prius

NOTE: Hydrocarbon adsorber catalyst system may also be referred to as HCAC system.

WARNING: Read service precautions before proceeding with service procedure. See SERVICE PRECAUTIONS .

1. Ensure ignition is off. To test vacuum sensor supply voltage, disconnect electrical connector from vacuum sensor. Vacuum sensor is located at passenger's side front corner of engine and contains Black 3-pin electrical connector with Brown, Violet/White and Yellow/Red wires. See **Fig. 88** .
2. Turn ignition on. Using voltmeter, check vacuum sensor supply voltage between terminals E2 and VC on wiring harness side of electrical connector for vacuum sensor. See **Fig. 89** . E2 and VC terminals are the 2 outer terminals. DO NOT use center terminal.
3. Vacuum sensor supply voltage should be 4.5-5.5 volts. If vacuum sensor supply voltage is not within specification, check wiring circuit. See **WIRING DIAGRAMS** article. If vacuum sensor supply voltage is within specification, turn ignition off. Reinstall electrical connector on vacuum sensor.

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4. To test vacuum sensor output voltage, disconnect vacuum hose from vacuum sensor. Remove glove box for access to Engine Control Module (ECM). For illustration of ECM location, see **THEORY & OPERATION** article.
5. Note ECM electrical connector terminals. See **Fig. 26** . Connect voltmeter between terminals No. 14 (Violet/White wire) at ECM electrical connector E9 and No. 18 (Brown wire) at ECM electrical connector E8. See **Fig. 26** . This is the HCLS and E1 terminals at ECM.
6. Turn ignition on. Measure and record vacuum sensor output voltage under ambient atmospheric pressure. Attach vacuum pump to bottom of vacuum sensor. Apply vacuum in specified increments and measure vacuum sensor output voltage drop at each increment. See **VACUUM SENSOR OUTPUT VOLTAGE DROP SPECIFICATIONS** table. Turn ignition off. Replace vacuum sensor if vacuum sensor output voltage drop is not within specification.

VACUUM SENSOR OUTPUT VOLTAGE DROP SPECIFICATIONS

Applied Vacuum - In. Hg	Voltage Drop
3.94	.3-.5
7.87	.7-.9
11.81	1.1-1.3
15.75	1.5-1.7
19.69	1.9-2.1

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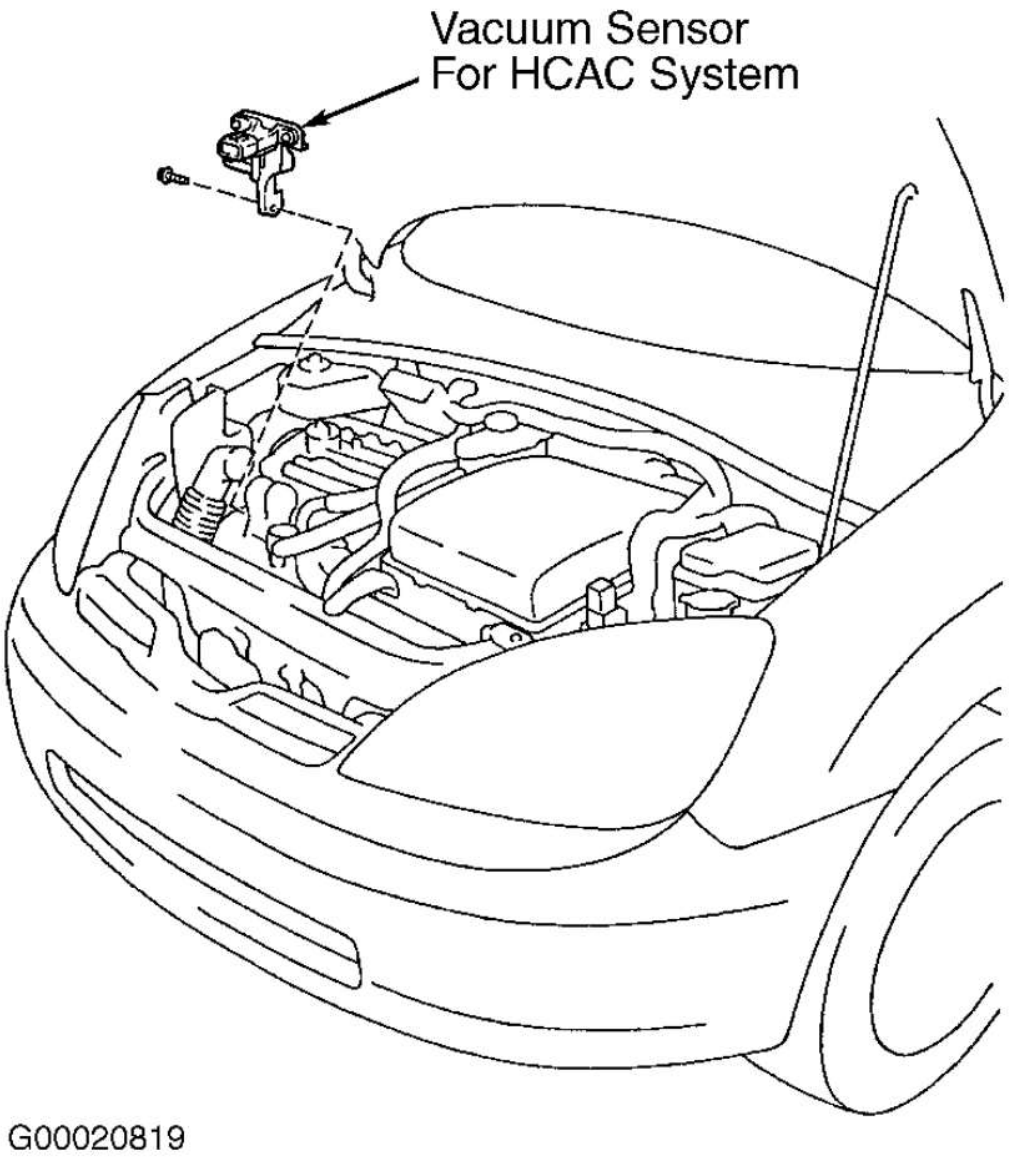


Fig. 88: Locating Vacuum Sensor For Hydrocarbon Adsorber Catalyst System (Prius)
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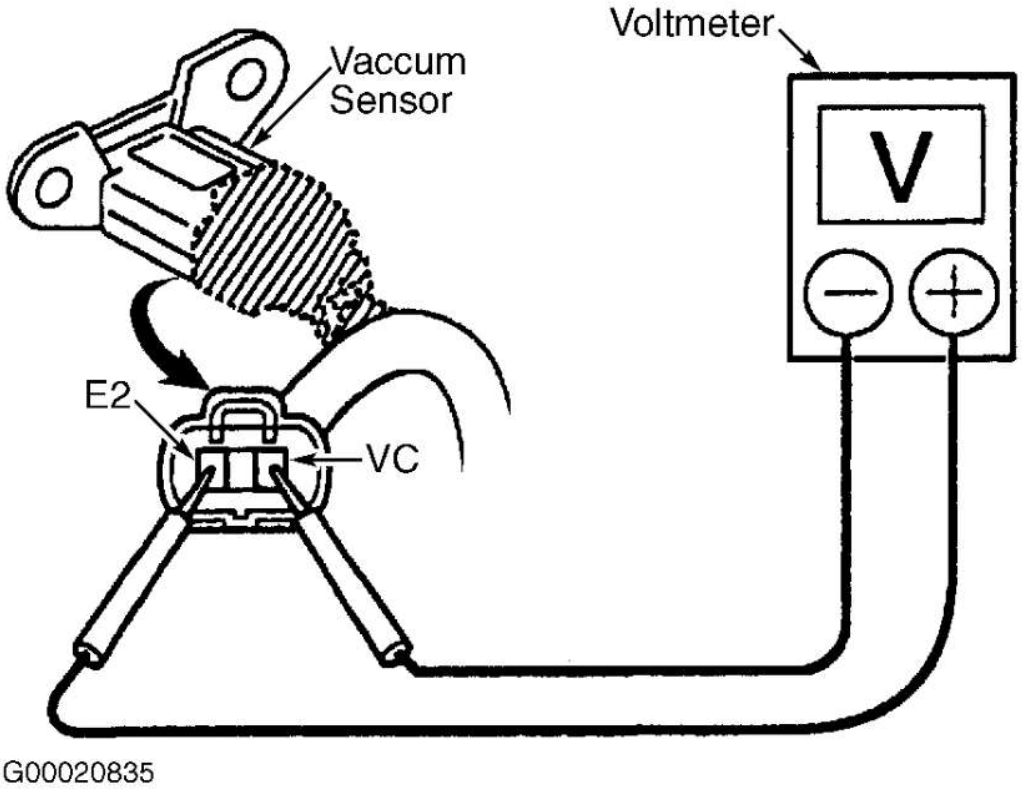


Fig. 89: Checking Vacuum Sensor Supply Voltage (Prius)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

VAPOR PRESSURE SENSOR

See VAPOR PRESSURE SENSOR under **FUEL EVAPORATIVE SYSTEM** under EMISSION SYSTEMS & SUB-SYSTEMS.

VARIABLE VALVE TIMING SENSOR

NOTE: Variable Valve Timing (VVT) sensor may also be referred to as camshaft position sensor.

Camry, Camry Solara, Celica, Corolla, ECHO, Highlander, MR2, Prius & RAV4

For Variable Valve Timing (VVT) sensor testing, see **CAMSHAFT POSITION SENSOR** under IGNITION SYSTEMS in BASIC DIAGNOSTIC PROCEDURES - 4-CYLINDER article.

VEHICLE SPEED SENSOR

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Camry

1. Vehicle speed sensor is mounted on transaxle and contains a 3-pin electrical connector. See **Fig. 90** . Raise and support vehicle so one front wheel is off the ground. Place transaxle in Neutral.
2. Turn ignition on. Using voltmeter, check voltage between terminals No. 2 and 3 on vehicle speed sensor while rotating the front wheel with electrical connector installed on vehicle speed sensor. See **Fig. 91** . Voltage should change from zero volts to 10-14 volts several times while rotating the front wheel. If voltage is not as specified, it may be necessary to verify that battery voltage exists at terminal No. 1 on vehicle speed sensor. If battery voltage exists, replace vehicle speed sensor. See **VEHICLE SPEED SENSOR** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article. If battery voltage does not exist, check wiring circuit to electrical terminal No. 1 on vehicle speed sensor. See **WIRING DIAGRAMS** article. If necessary to check GAUGE No. 1 fuse, this fuse is located is located in fuse/relay box behind driver's side of instrument panel.

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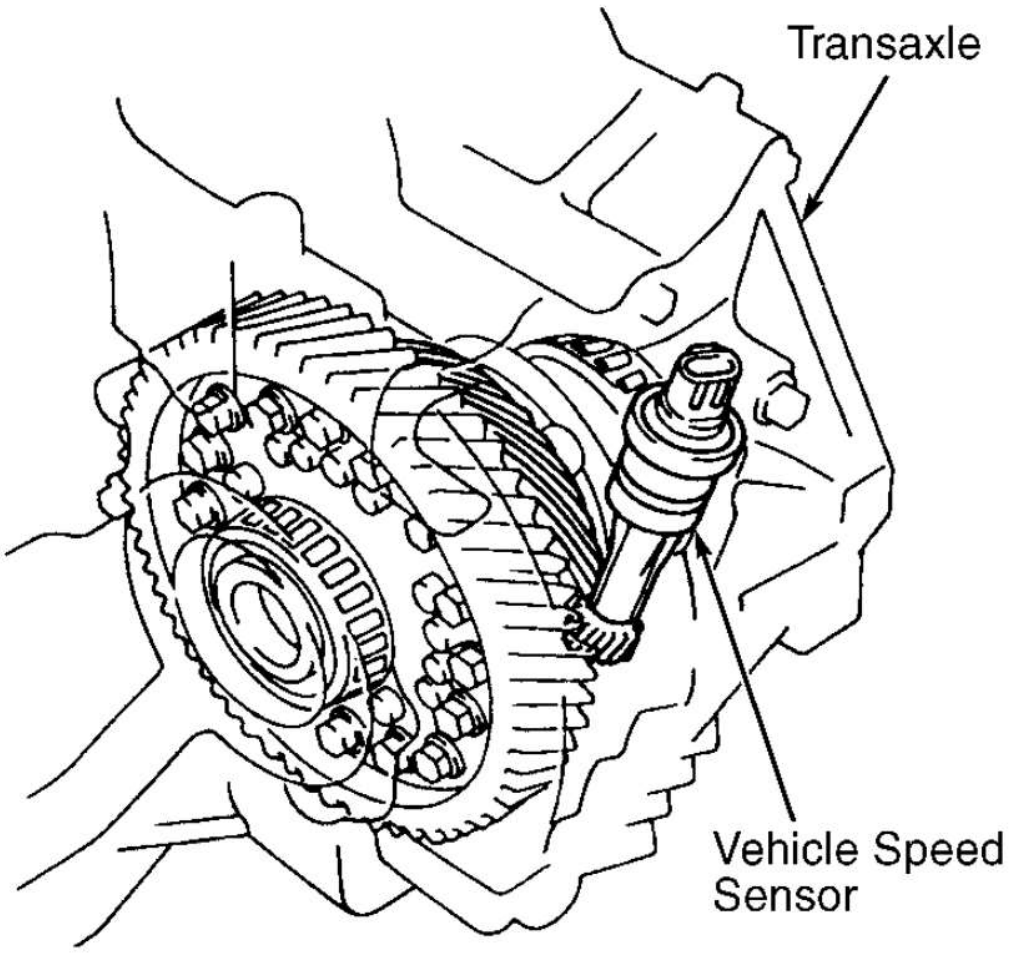


Fig. 90: Locating Typical Vehicle Speed Sensor (Camry, Camry Solara, Celica, Corolla & ECHO)
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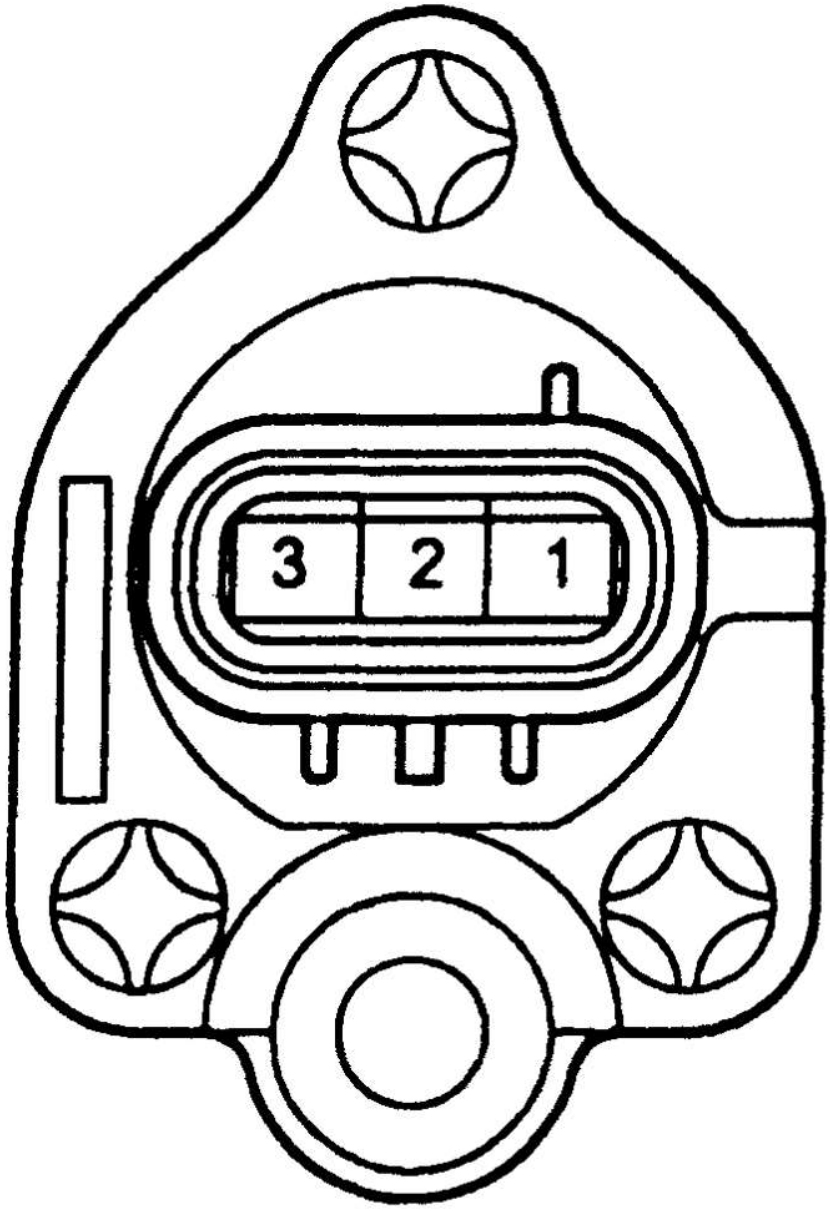


Fig. 91: Identifying Terminals On Vehicle Speed Sensor (Camry)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Camry Solara, Celica, Corolla & ECHO

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1. Vehicle speed sensor is mounted on transaxle and contains a 3-pin electrical connector. See **Fig. 90** . Remove vehicle speed sensor. Connect voltmeter positive lead to terminal No. 3 (outer terminal) and negative lead to terminal No. 2 (center terminal) on vehicle speed sensor. See **Fig. 92** and **Fig. 93** .
2. Using jumper wires, connect positive battery terminal to terminal No. 1 (outer terminal) and negative battery terminal to terminal No. 2 (center terminal) on vehicle speed sensor. See **Fig. 92** and **Fig. 93** .
3. While rotating vehicle speed sensor shaft, ensure voltage changes from zero volts to at least 11 volts. Voltage should change 4 times per revolution of shaft. Replace vehicle speed sensor if voltage does not change as specified. See **VEHICLE SPEED SENSOR** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.

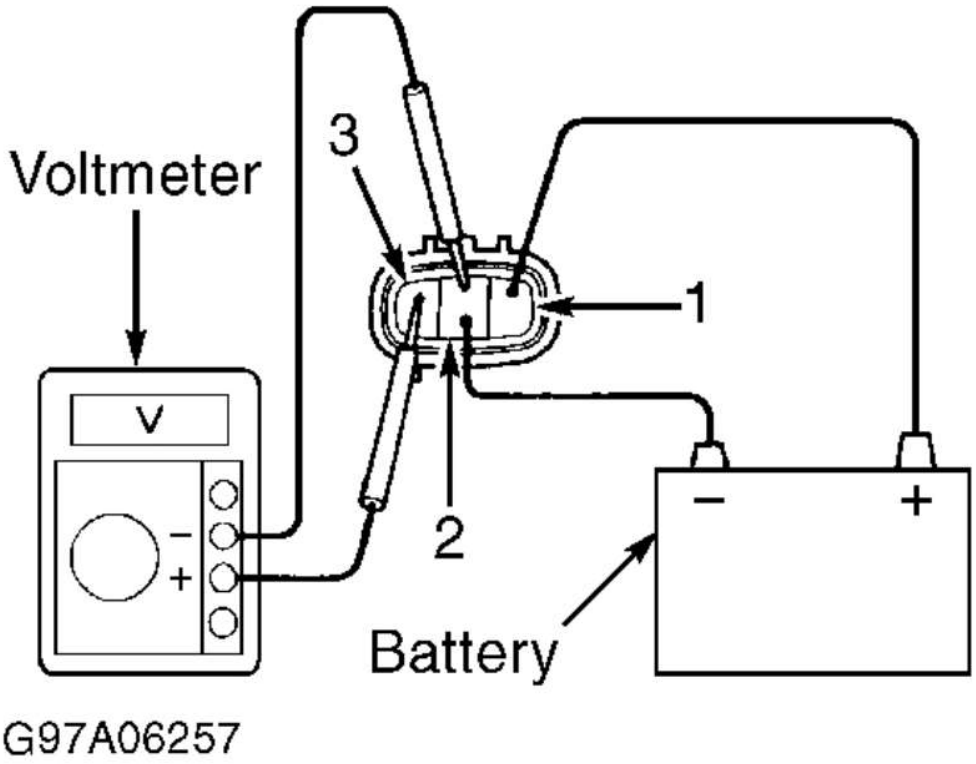


Fig. 92: Testing Vehicle Speed Sensor (Camry Solara & ECHO)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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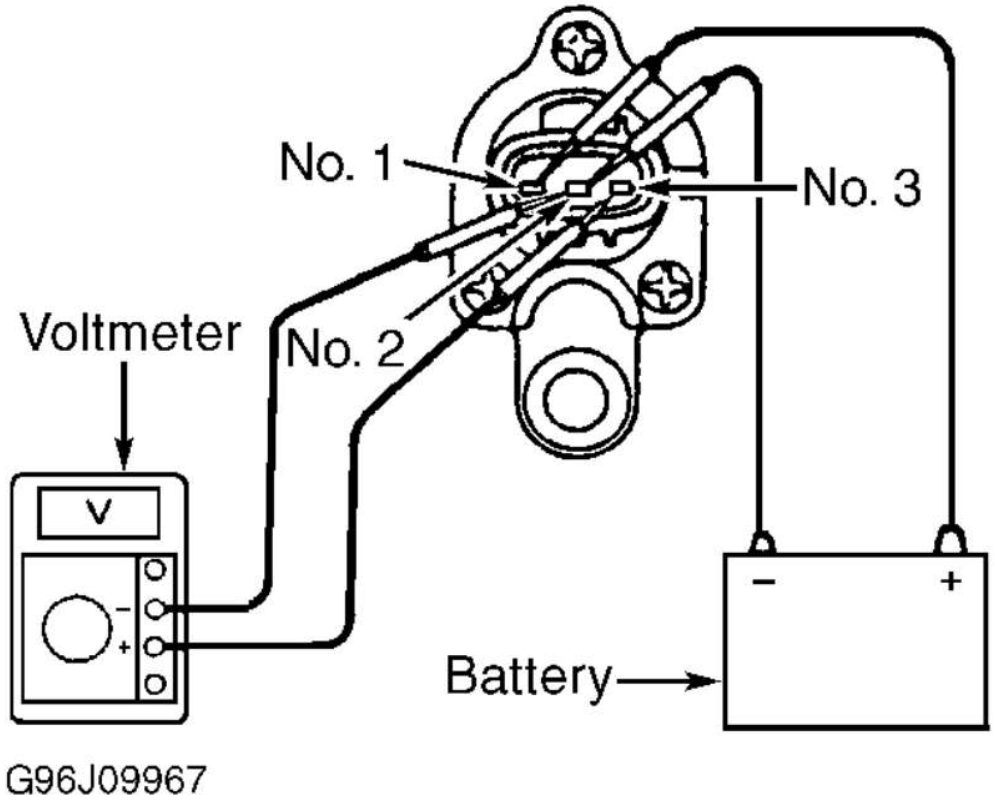


Fig. 93: Testing Vehicle Speed Sensor (Celica, Corolla & Tacoma 4WD)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Highlander

Wheel speed sensors on each wheel deliver an input signal to skid control Electronic Control Unit (ECU). Skid control ECU converts input signals from wheel speed sensors to a 4-pulse input signal to the instrument cluster. Instrument cluster then converts 4-pulse input signal to a rectangular waveform and then sends vehicle speed signal to Engine Control Module (ECM). If problem exists with vehicle speed signal, a Diagnostic Trouble Code (DTC) may be stored in Engine Control Module (ECM). See TESTING PROCEDURE under SELF-DIAGNOSTIC SYSTEM in appropriate SELF-DIAGNOSTICS article for retrieving of DTCs.

MR2

Wheel speed sensors on each wheel deliver an input signal to Anti-Lock Brake System (ABS) Electronic Control Unit (ECU). ABS ECU converts input signals from wheel speed sensors to a 4-pulse input signal to the instrument cluster. Instrument cluster then converts 4-pulse input signal to a rectangular waveform and then sends vehicle speed signal to Engine Control Module (ECM). If problem exists with vehicle speed signal, a

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Diagnostic Trouble Code (DTC) may be stored in Engine Control Module (ECM). See TESTING PROCEDURE under SELF-DIAGNOSTIC SYSTEM in appropriate SELF-DIAGNOSTICS article for retrieving of DTCs.

Prius

Wheel speed sensors on each wheel deliver an input signal to brake Electronic Control Unit (ECU) for the Anti-Lock Brake System (ABS). Brake ECU converts input signals from wheel speed sensors to a 4-pulse input signal to the instrument cluster. Instrument cluster then converts 4-pulse input signal to a rectangular waveform and then sends vehicle speed signal to Engine Control Module (ECM). If problem exists with vehicle speed signal, a Diagnostic Trouble Code (DTC) may be stored in Engine Control Module (ECM). See TESTING PROCEDURE under SELF-DIAGNOSTIC SYSTEM in appropriate SELF-DIAGNOSTICS article for retrieving of DTCs.

RAV4

Vehicle speed sensor is mounted on transaxle. Testing information is not available from manufacturer. If problem exists with vehicle speed sensor, a Diagnostic Trouble Code (DTC) may be stored in Engine Control Module (ECM). See TESTING PROCEDURE under SELF-DIAGNOSTIC SYSTEM in appropriate SELF-DIAGNOSTICS article for retrieving of DTCs.

Tacoma

1. Vehicle speed sensor is mounted near rear of transmission or transfer case and contains a 3-pin electrical connector. See **Fig. 94** . Electrical connector contains Blue, Green/Red and Pink wires.
2. Remove vehicle speed sensor. Connect voltmeter positive lead to terminal No. 3 (outer terminal) and negative lead to terminal No. 2 (center terminal) on vehicle speed sensor. See **Fig. 93** , **Fig. 95** and **Fig. 96** .
3. Using jumper wires, connect positive battery terminal to terminal No. 1 (outer terminal) and negative battery terminal to terminal No. 2 (center terminal) on vehicle speed sensor. See **Fig. 93** , **Fig. 95** and **Fig. 96** .
4. While rotating vehicle speed sensor shaft, ensure voltage changes from zero volts to at least 11 volts. Voltage should change 4 times per revolution of shaft. Replace vehicle speed sensor if voltage does not change as specified. See **VEHICLE SPEED SENSOR** under ENGINE SENSORS & SWITCHES in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.

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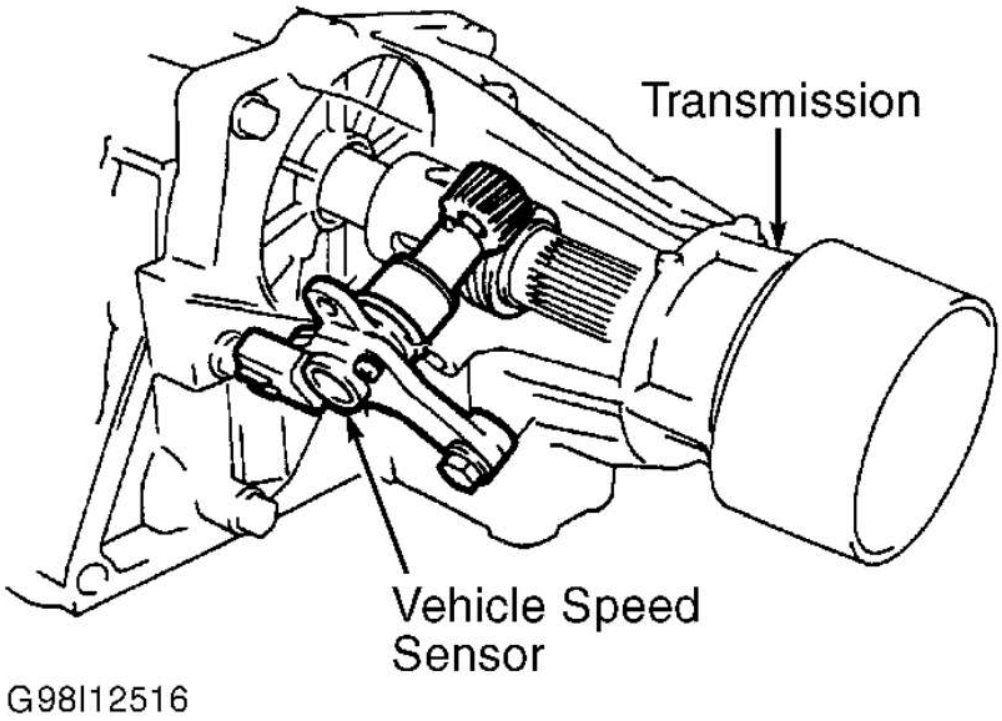


Fig. 94: Locating Typical Vehicle Speed Sensor (Tacoma)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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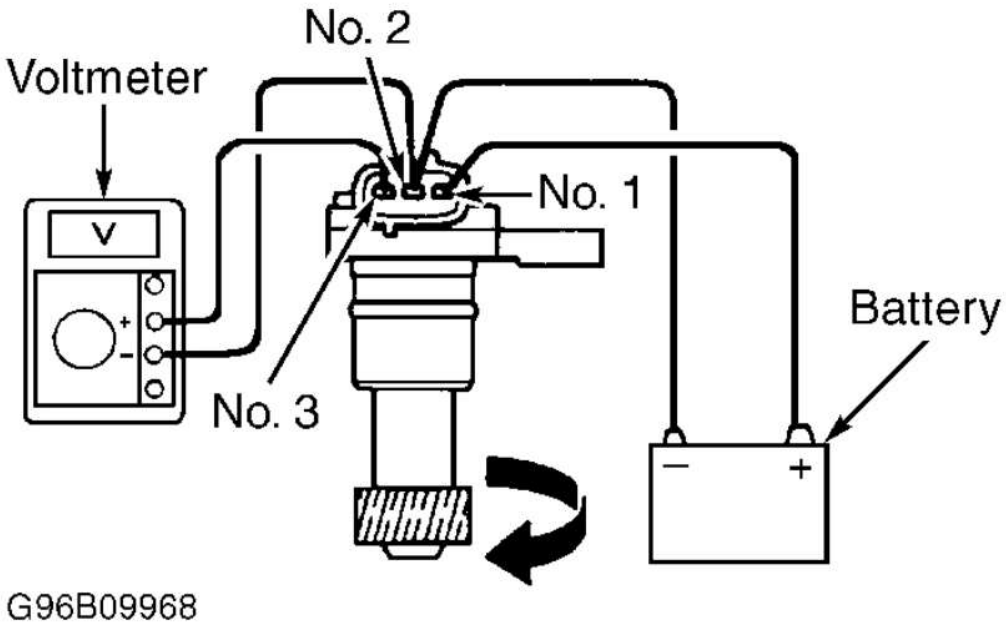


Fig. 95: Testing Vehicle Speed Sensor (Tacoma 2WD With A/T)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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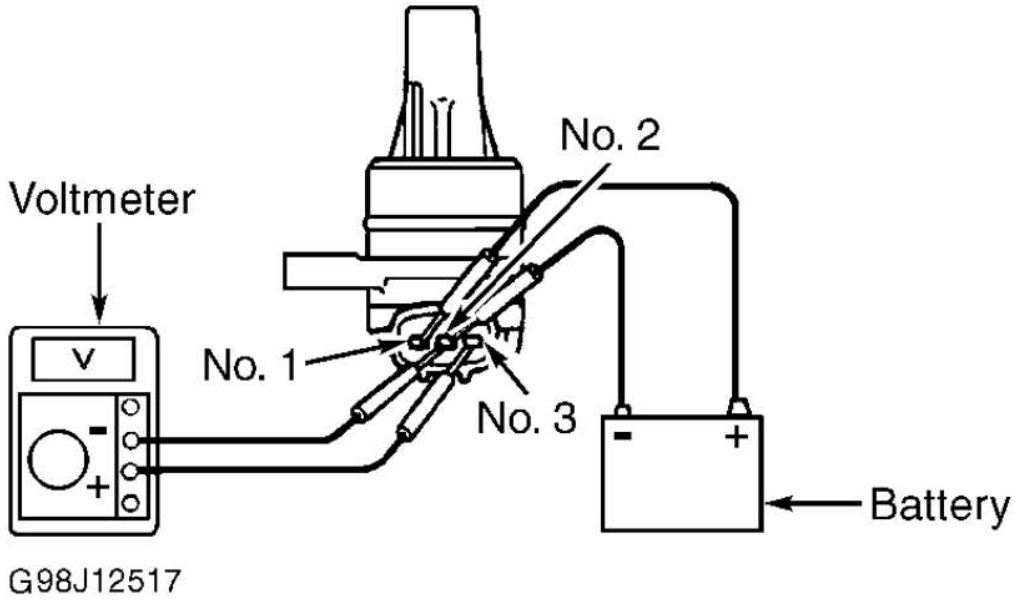


Fig. 96: Testing Vehicle Speed Sensor (Tacoma 2WD With M/T)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

MODULES, MOTORS, RELAYS & SOLENOIDS

THROTTLE CONTROL MOTOR

NOTE: **On MR2, there are 2 types of manual transaxles used. Sequential manual transaxle may be identified by shift lever pattern which consists of "R", "N", "S" and "+" in place of the conventional type shift lever pattern and there is no clutch pedal.**

Camry, Camry Solara, MR2 With Sequential Manual Transaxle & Prius

For testing of throttle control motor, see **THROTTLE BODY** under IDLE CONTROL SYSTEMS.

A/C COMPRESSOR CLUTCH RELAY

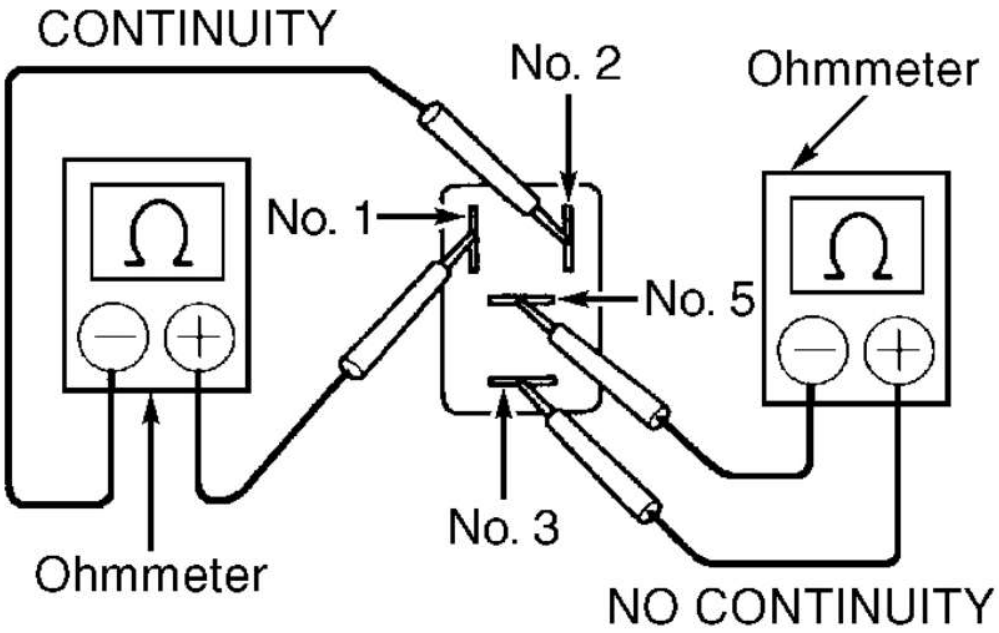
NOTE: **A/C compressor clutch relay may also be referred to as A/C compressor relay or magnetic clutch relay.**

MR2

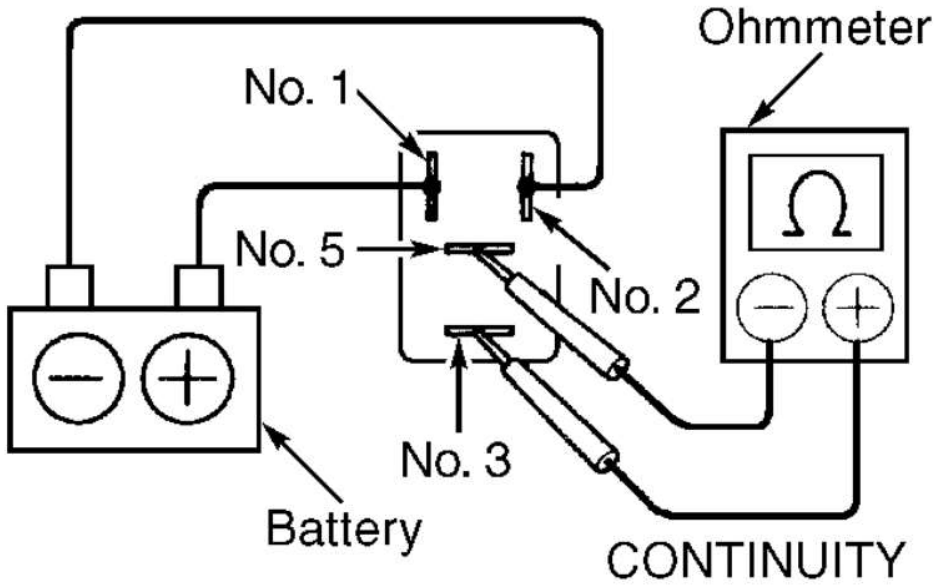
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1. Remove A/C compressor clutch relay from relay box on firewall at driver's side front corner of engine compartment. See **Fig. 105** .
2. To test A/C compressor clutch relay continuity, using ohmmeter, check for continuity and no continuity between specified terminals on A/C compressor clutch relay. See **Fig. 97** .
3. To test A/C compressor clutch relay operation, apply battery voltage and ground to A/C compressor clutch relay. Using ohmmeter, check for continuity between specified terminals on A/C compressor clutch relay. See **Fig. 97** . Replace A/C compressor clutch relay if defective.

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CHECKING CONTINUITY



CHECKING OPERATION

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Fig. 97: Testing A/C Compressor Clutch Relay (MR2) Or A/F Heater Relay (RAV4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

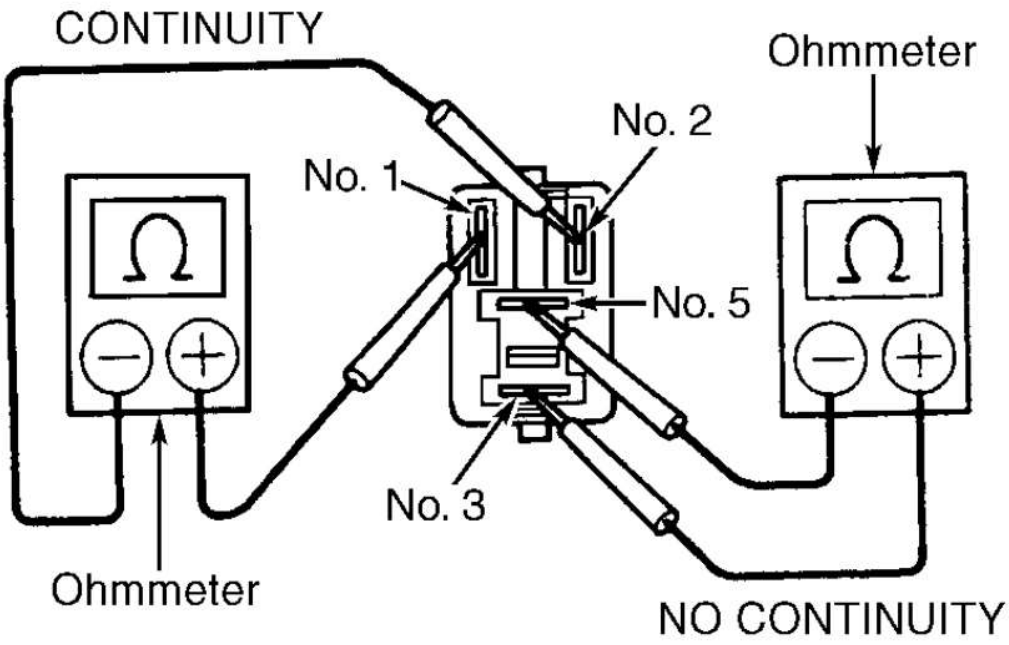
A/F HEATER RELAY

NOTE: A/F heater relay may also be referred to as A/F HTR relay, A/F sensor relay or A/F relay.

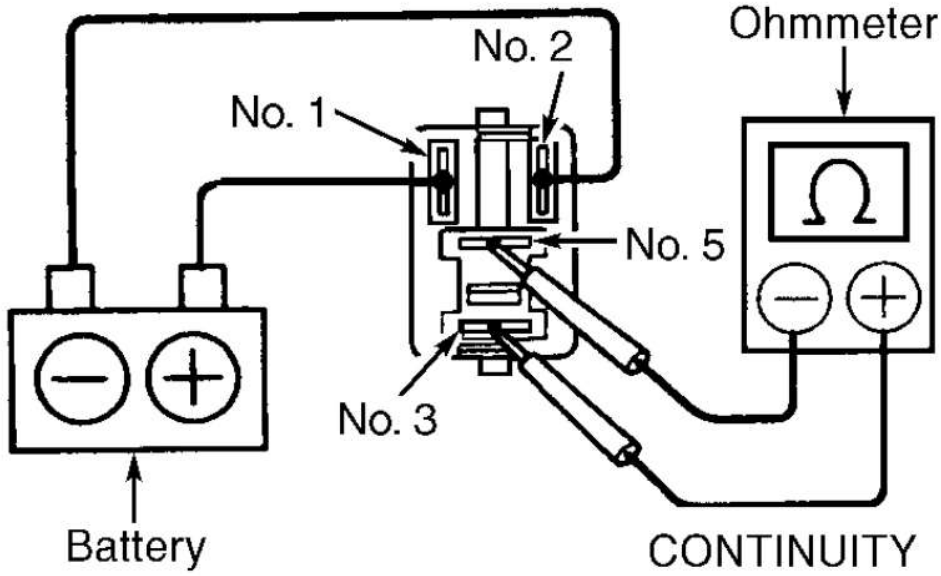
Highlander

1. Remove A/F heater relay from fuse/relay box at driver's side front corner of engine compartment, just in front of strut tower. To test A/F heater relay continuity, using ohmmeter, check for continuity and no continuity between specified terminals on A/F heater relay. See **Fig. 98** .
2. To test A/F heater relay operation, apply battery voltage and ground to A/F heater relay. Using ohmmeter, check for continuity between specified terminals on A/F heater relay. See **Fig. 98** . Replace A/F heater relay if defective.

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CHECKING CONTINUITY



CHECKING OPERATION

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Fig. 98: Testing A/F Heater Relay (Highlander)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

RAV4

1. Remove A/F heater relay from fuse/relay box at driver's side front corner of engine compartment. To test A/F heater relay continuity, using ohmmeter, check for continuity and no continuity between specified terminals on A/F heater relay. See **Fig. 97** .
2. To test A/F heater relay operation, apply battery voltage and ground to A/F heater relay. Using ohmmeter, check for continuity between specified terminals on A/F heater relay. See **Fig. 97** . Replace A/F heater relay if defective.

CIRCUIT OPENING RELAY

WARNING: On Prius, read service precautions before proceeding with service procedure. See SERVICE PRECAUTIONS .

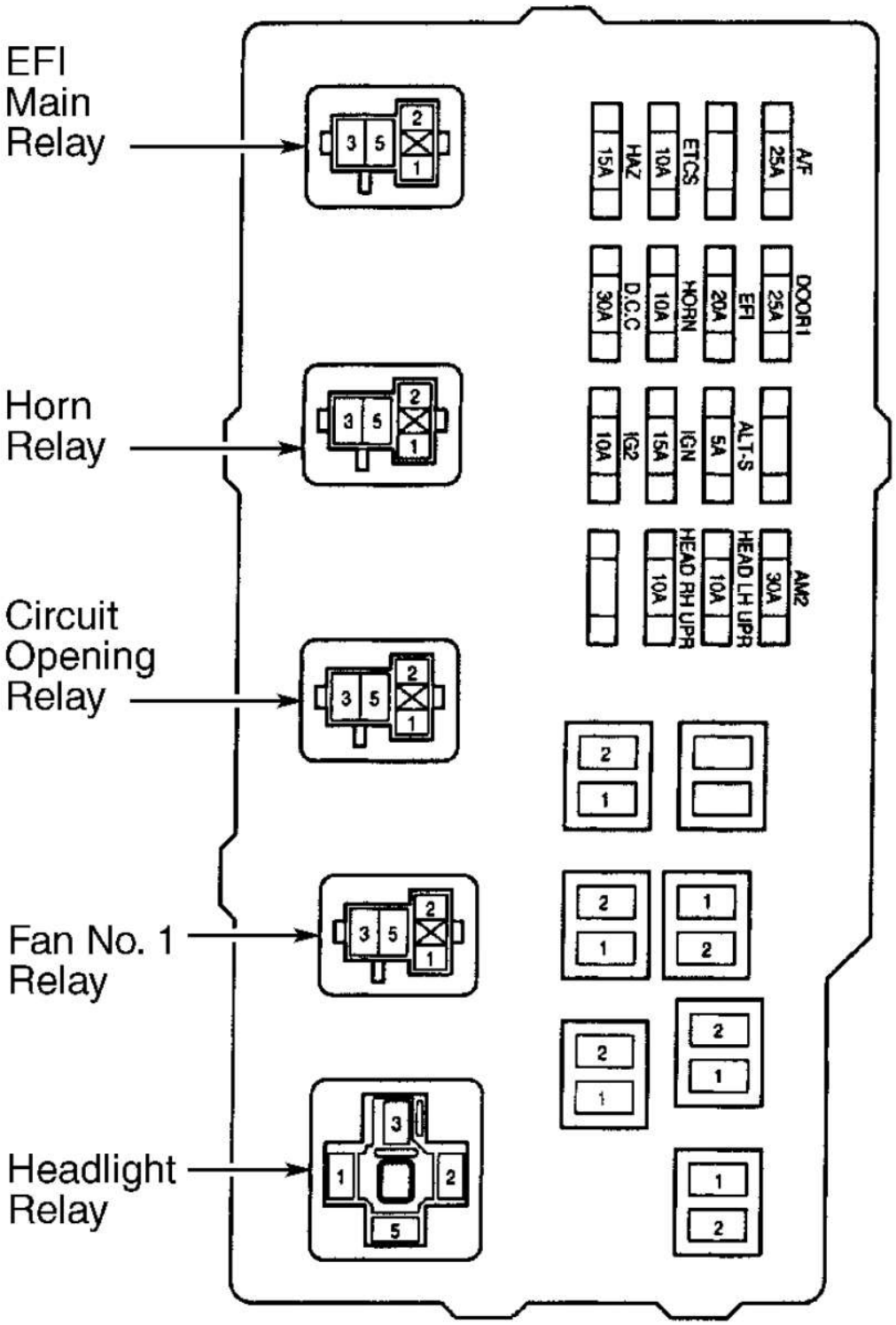
1. Ensure ignition is off. Remove circuit opening relay. See **CIRCUIT OPENING RELAY LOCATION** table. See **Fig. 99** -**Fig. 108** .

CIRCUIT OPENING RELAY LOCATION (1)

Application	Location
Camry & Camry Solara	In Fuse/Relay Box At Driver's Side Front Corner Of Engine Compartment
Celica	In Fuse/Relay Box At driver's side Front Corner Of Engine Compartment, Just In Front Of Strut Tower
Corolla	Center Relay In Relay Box Behind Driver's Side Kick Panel
ECHO	In Fuse/Relay Box Behind Driver's Side Of Instrument Panel
Highlander	In Relay Box Just Above Driver's Side Kick Panel
MR2	In Relay Box On Firewall At Driver's Side Front Corner Of Engine Compartment
Prius & RAV4	In Fuse/Relay Box At Driver's Side Front Corner Of Engine Compartment
Tacoma	Behind Lower Instrument Panel Cover, Next To Driver's Side Of Steering Column
(1) Circuit opening relay may be marked as CIR OPN relay.	

2. To test circuit opening relay continuity, using ohmmeter, check for continuity and no continuity between specified terminals on circuit opening relay. See **Fig. 109** and **Fig. 110** .
3. To test circuit opening relay operation, apply battery voltage and ground to circuit opening relay. Using ohmmeter, check for continuity between specified terminals on circuit opening relay. See **Fig. 109** and **Fig. 110** . Replace circuit opening relay if defective.

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Fig. 99: Locating Various Relays (Camry)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

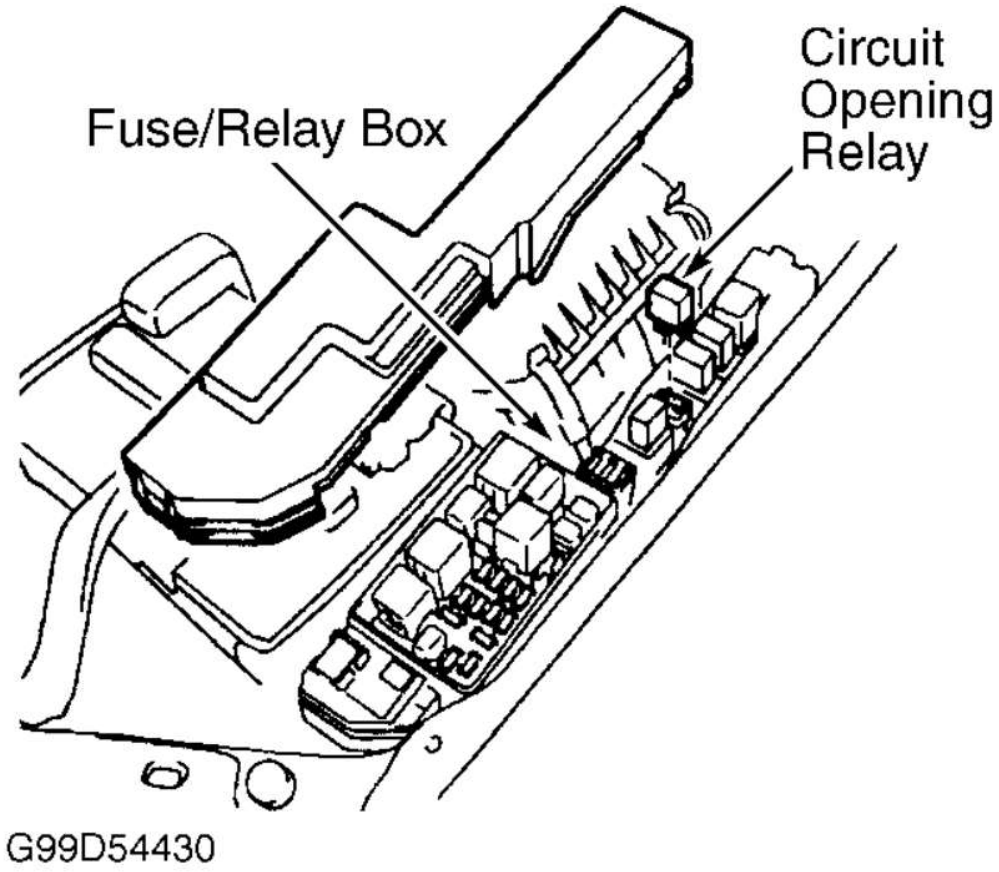


Fig. 100: Locating Circuit Opening Relay (Camry Solara)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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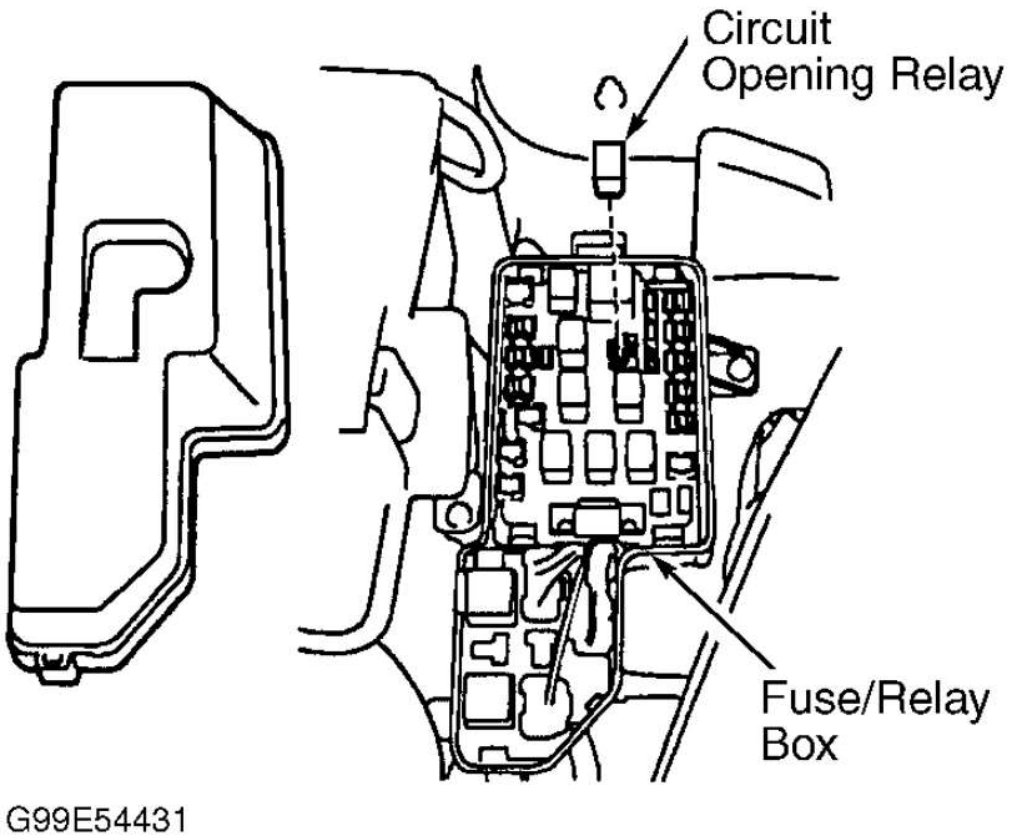


Fig. 101: Locating Circuit Opening Relay (Celica)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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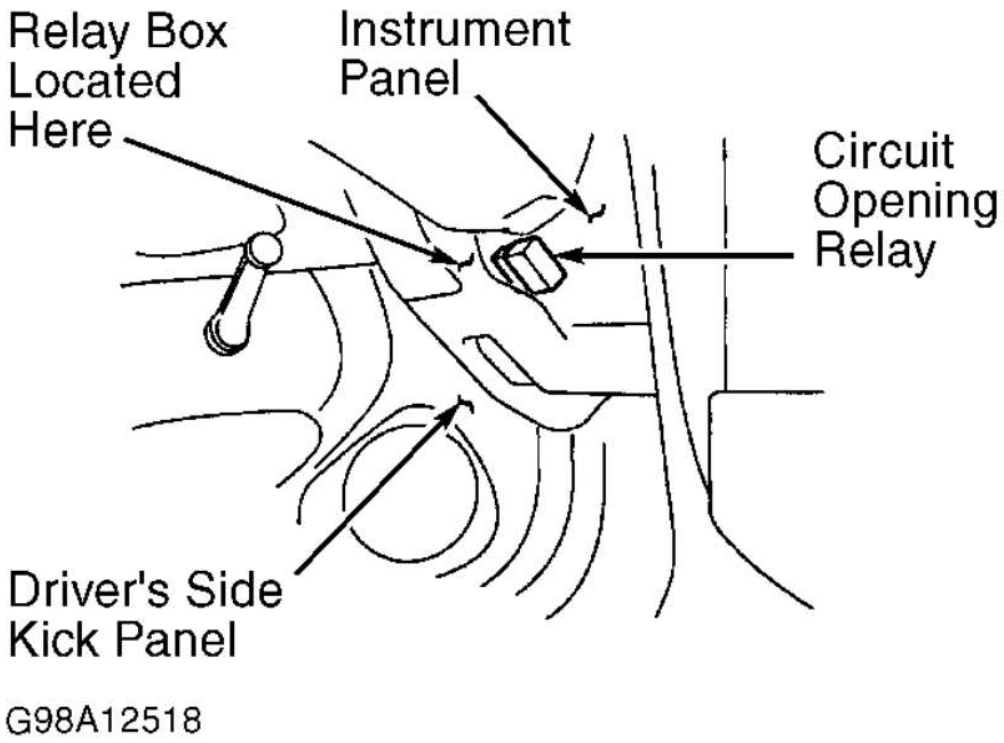


Fig. 102: Locating Circuit Opening Relay (Corolla)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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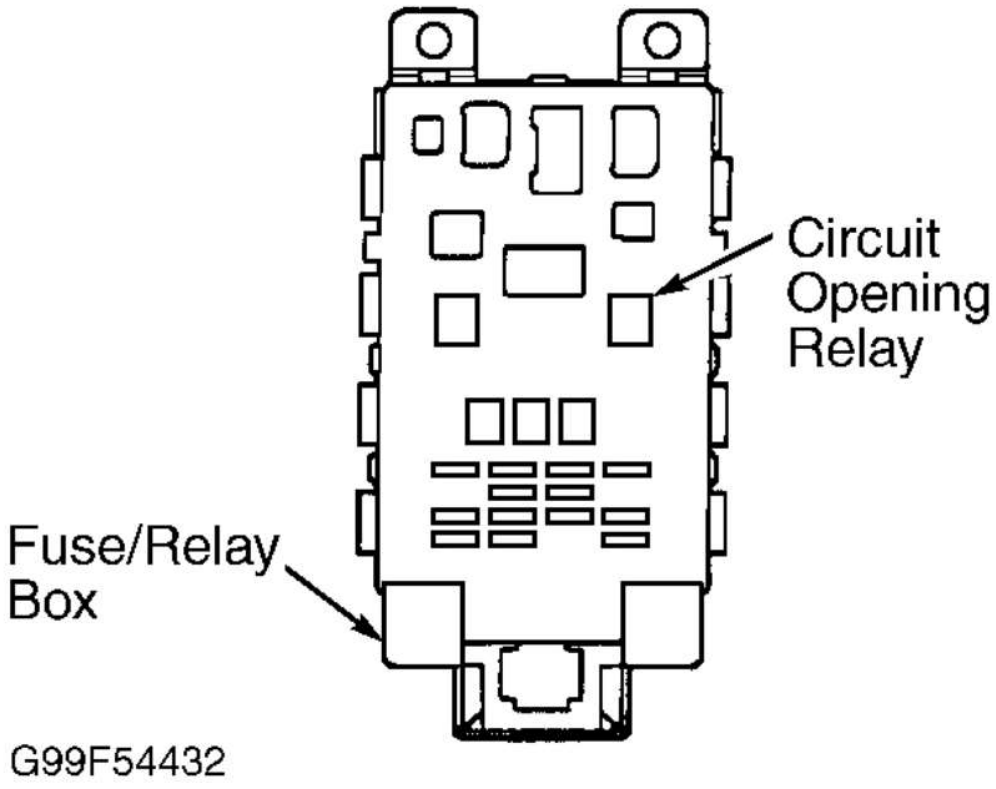


Fig. 103: Locating Circuit Opening Relay (ECHO)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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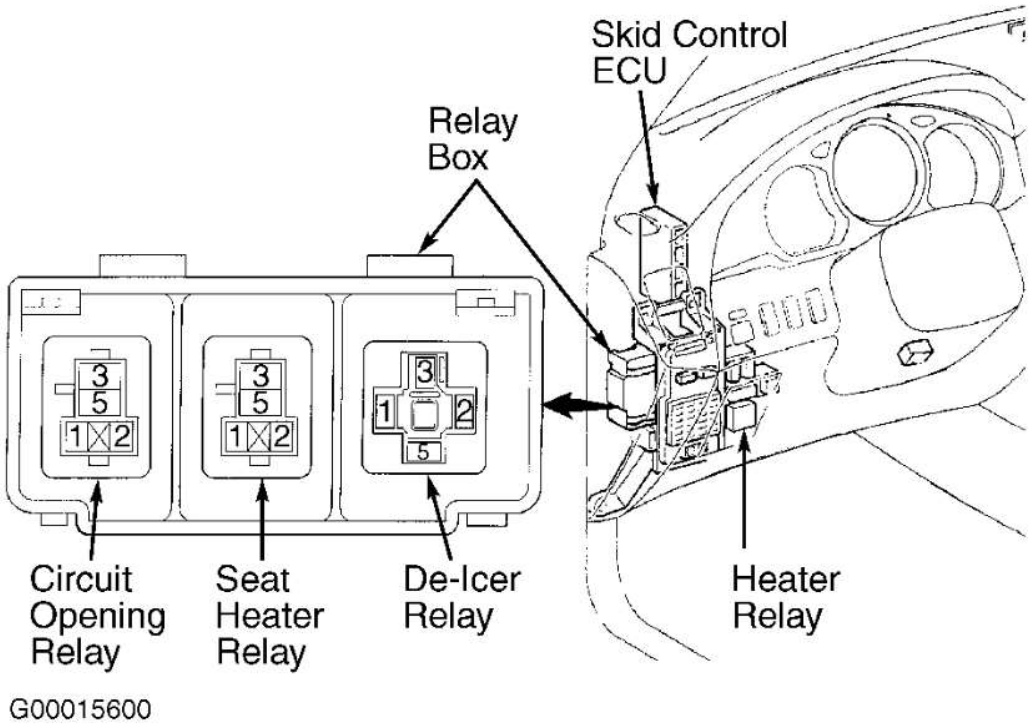


Fig. 104: Locating Various Relays (Highlander)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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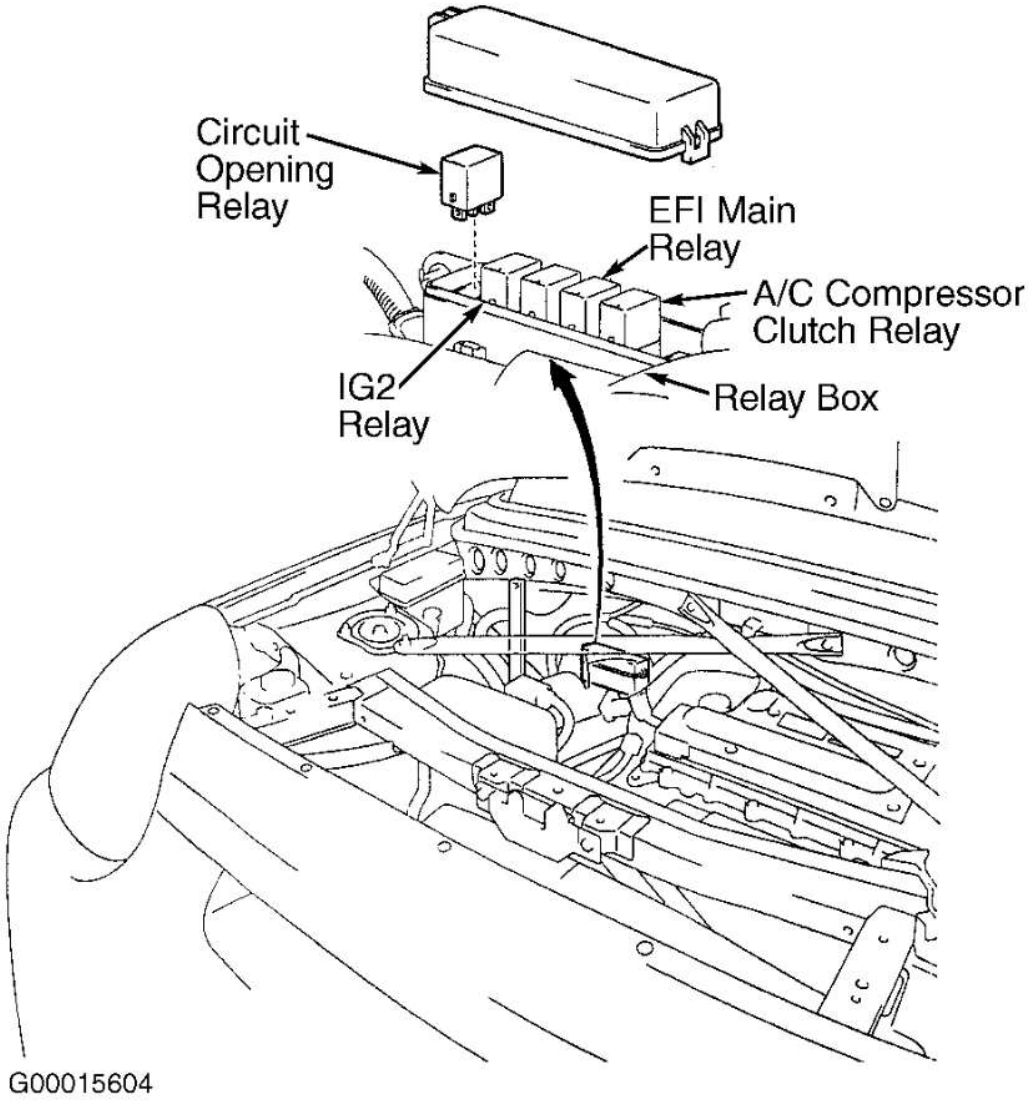


Fig. 105: Locating Various Relays (MR2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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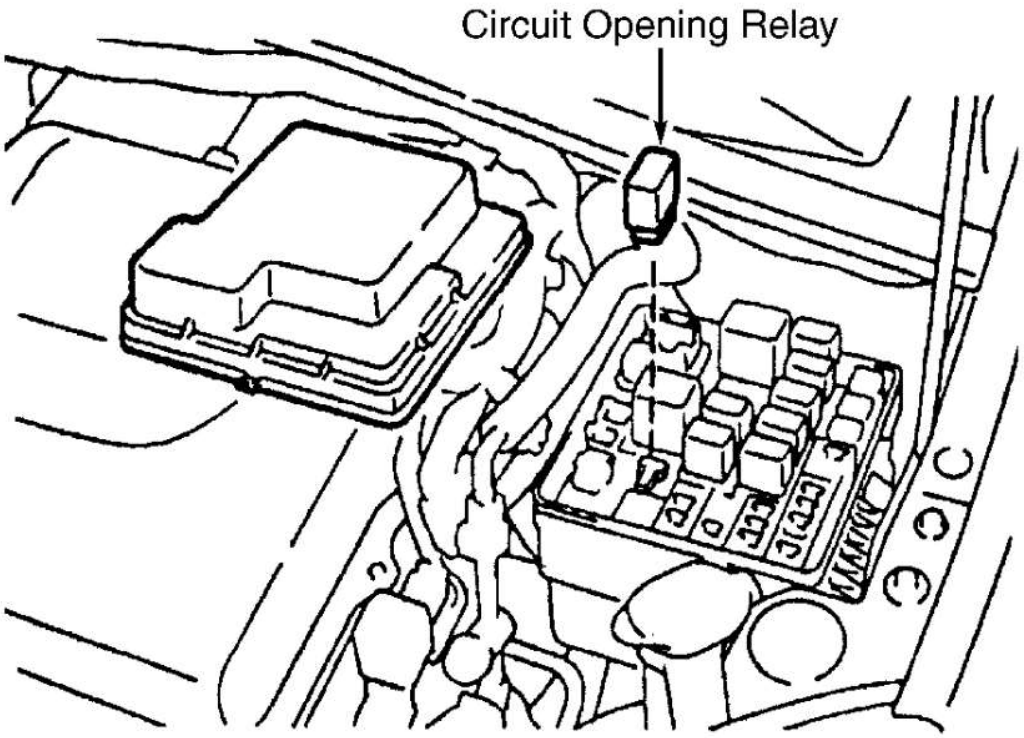


Fig. 106: Locating Circuit Opening Relay (Prius)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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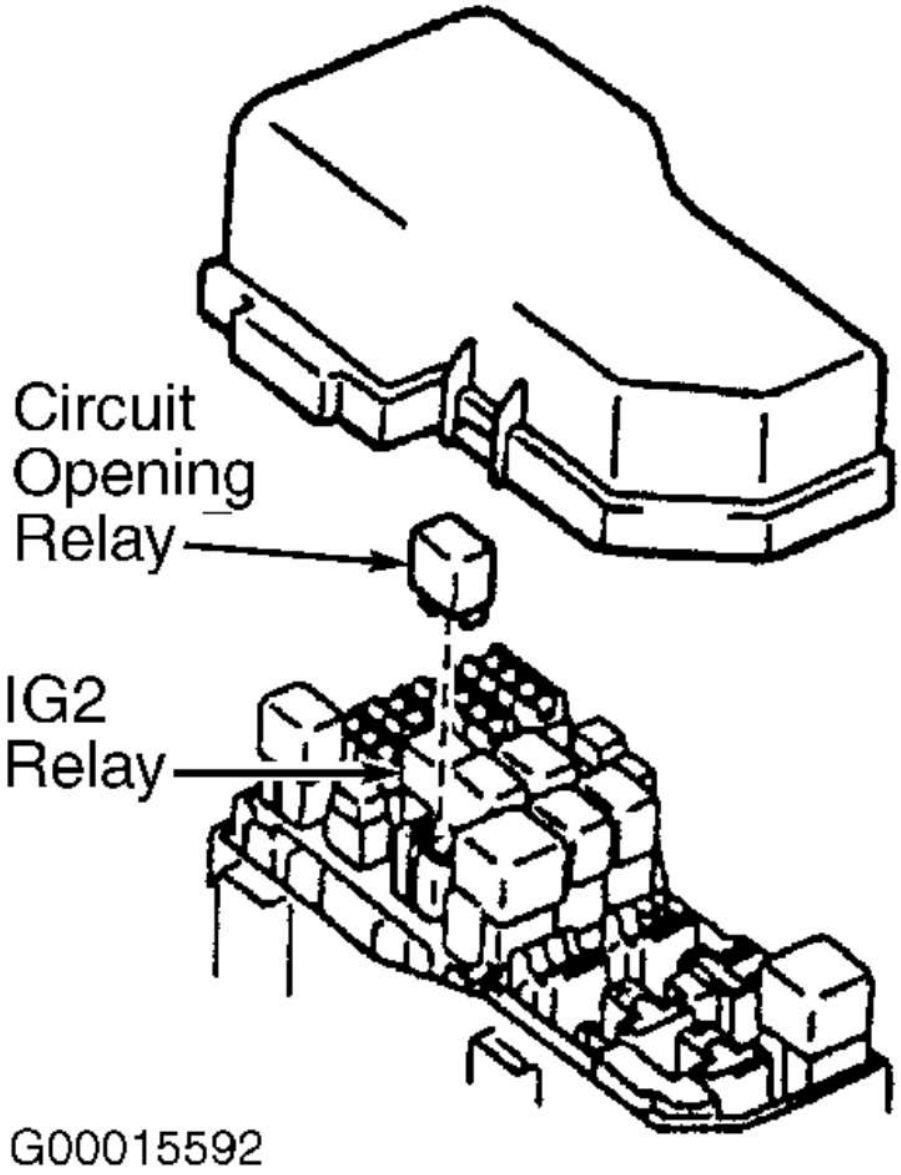


Fig. 107: Locating Circuit Opening Relay & IG2 Relay (RAV4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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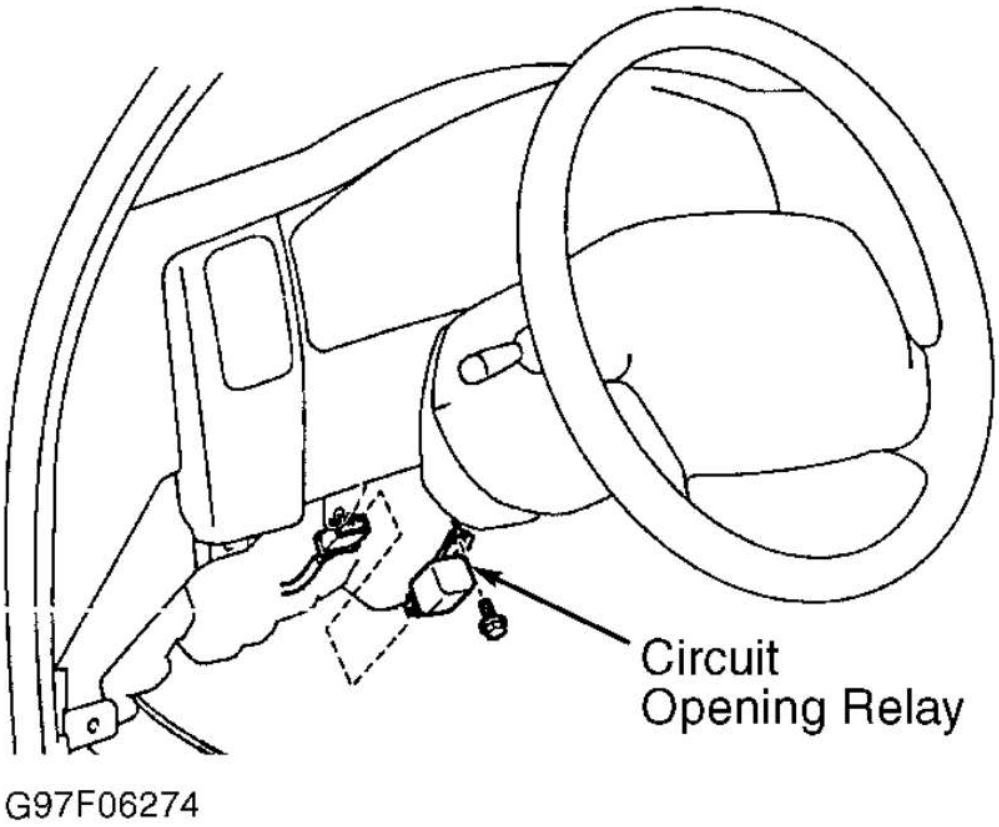


Fig. 108: Locating Circuit Opening Relay (Tacoma)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

EFI MAIN RELAY

NOTE: **On Corolla, EFI main relay may also be referred to as EFI relay or F-HTR relay. On all other models, EFI main relay may also be referred to as EFI relay.**

WARNING: On Prius, read service precautions before proceeding with service procedure. See SERVICE PRECAUTIONS .

1. Ensure ignition is off. Remove EFI main relay. See **EFI MAIN RELAY LOCATION** table.

EFI MAIN RELAY LOCATION

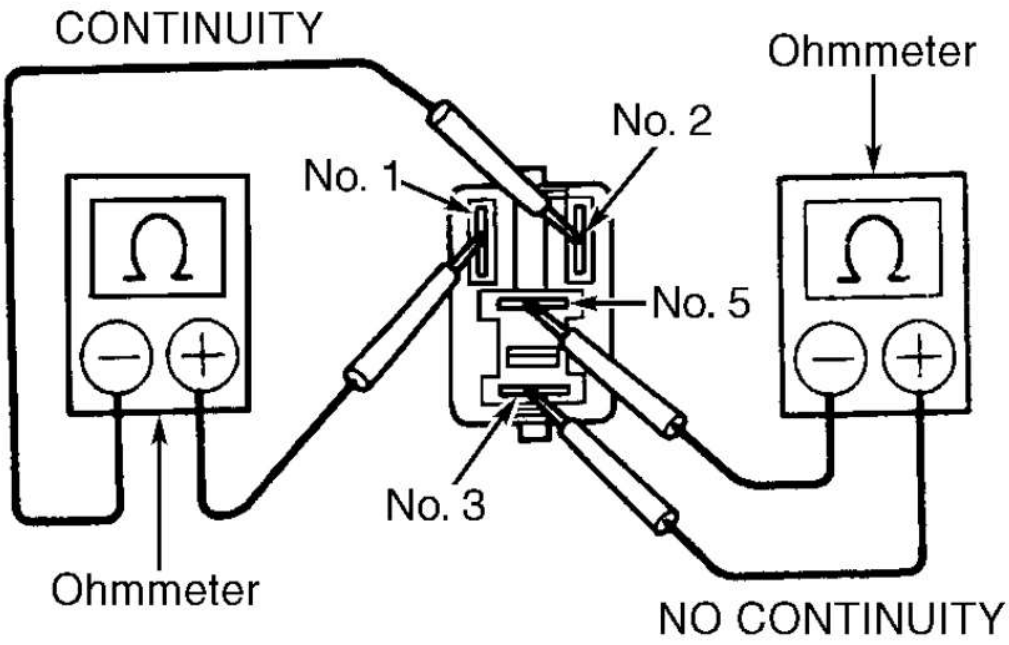
Application	Location

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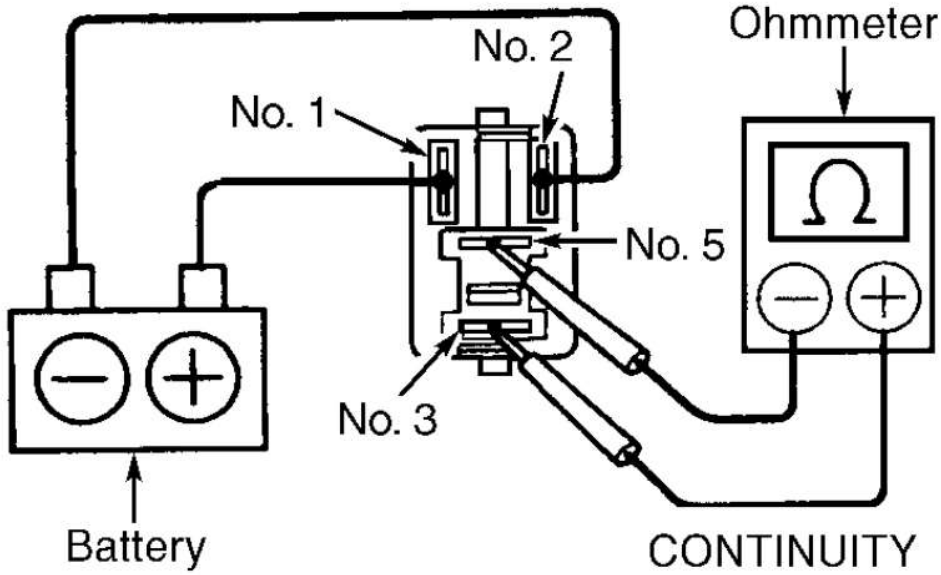
Camry & Camry Solara	In Fuse/Relay Box At Driver's Side Front Corner Of Engine Compartment
Celica, Corolla, ECHO & Highlander	In Fuse/Relay Box At Driver's Side Front Corner Of Engine Compartment, Just In Front Of Strut Tower
MR2	In Relay Box On Firewall At Driver's Side Front Corner Of Engine Compartment
Prius, RAV4 & Tacoma	In Fuse/Relay Box At Driver's Side Front Corner Of Engine Compartment

2. To test EFI main relay continuity, using ohmmeter, check for continuity and no continuity between specified terminals on EFI main relay. See **Fig. 109** and **Fig. 110** .
3. To test EFI main relay operation, apply battery voltage and ground to EFI main relay. Using ohmmeter, check for continuity between specified terminals on EFI main relay. See **Fig. 109** and **Fig. 110** . Replace EFI main relay if defective.

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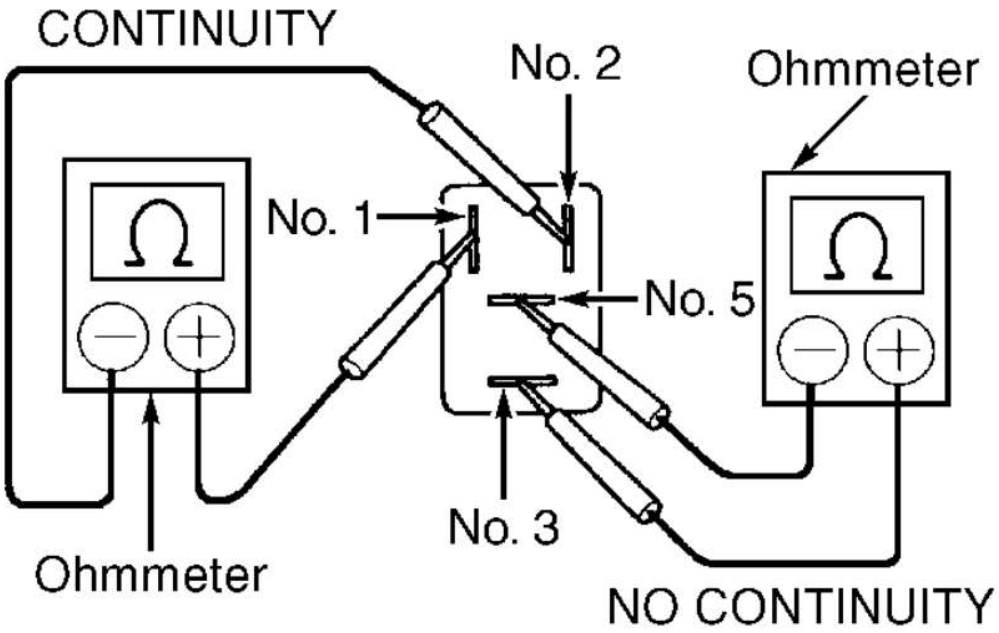
CHECKING OPERATION

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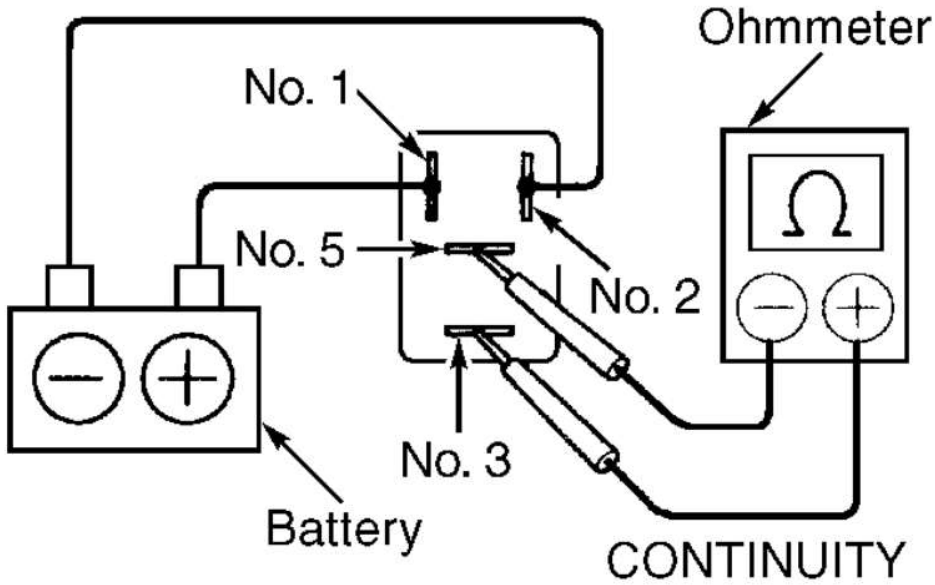
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Fig. 109: Testing Circuit Opening Relay Or EFI Main Relay (Camry, Celica, Corolla, ECHO, Highlander & Prius)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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CHECKING CONTINUITY



CHECKING OPERATION

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Fig. 110: Testing Circuit Opening Relay Or EFI Main Relay (Camry Solara, MR2, RAV4 & Tacoma)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

HTR SUB1 RELAY

NOTE: HTR SUB1 relay may also be referred to as heater sub relay.

ECHO

1. Remove HTR SUB1 relay from fuse/relay box located at driver's side front corner of engine compartment, just in front of strut tower. See **Fig. 111** .
2. Note terminals on HTR SUB1 relay. See **Fig. 111** . To test HTR SUB1 relay continuity, using ohmmeter, check that continuity exists between terminals No. 1 and 2 on HTR SUB1 relay and that no continuity exists between terminals No. 3 and 5 on HTR SUB1 relay. If continuity and no continuity are as specified, go to next step. If continuity and no continuity are not as specified, replace HTR SUB1 relay.
3. To test HTR SUB1 relay operation, apply battery voltage and ground to terminals No. 1 and 2 on HTR SUB1 relay. Using ohmmeter, check that continuity exists between terminals No. 3 and 5 on HTR SUB1 relay. Replace HTR SUB1 relay if continuity does not exist between terminals No. 3 and 5.

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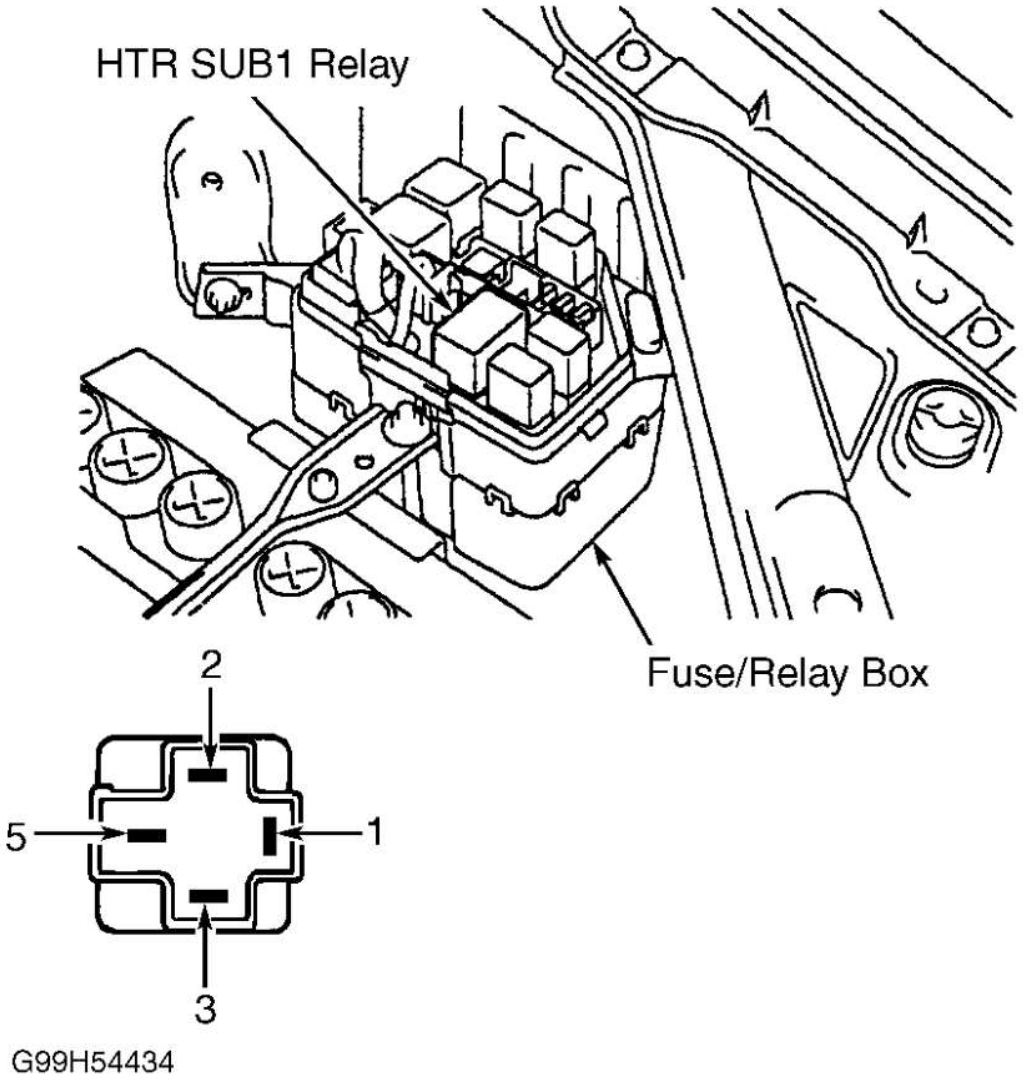


Fig. 111: Locating HTR SUB1 Relay & Identifying HTR SUB1 Relay Terminals (ECHO)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

IG2 RELAY

NOTE: IG2 relay may also be referred to as ignition relay.

Celica

IG2 relay is located in fuse/relay box at driver's side front corner of engine compartment, just in front of strut tower. Testing information is not available from manufacturer. Consult wiring diagram for IG2 relay testing.

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See **WIRING DIAGRAMS** article.

MR2

1. Remove IG2 relay from relay box on firewall at driver's side front corner of engine compartment. See **Fig. 105** .
2. To test IG2 relay continuity, using ohmmeter, check for continuity and no continuity between specified terminals on IG2 relay. See **Fig. 112** .
3. To test IG2 relay operation, apply battery voltage and ground to IG2 relay. Using ohmmeter, check for continuity between specified terminals on IG2 relay. See **Fig. 112** . Replace IG2 relay if defective.

Prius

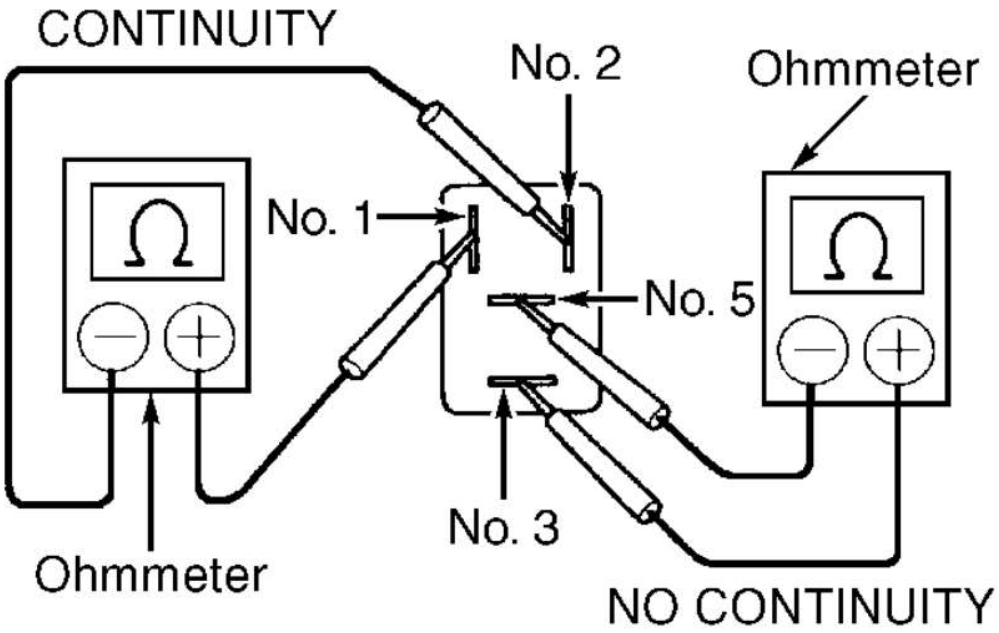
WARNING: Read service precautions before proceeding with service procedure. See SERVICE PRECAUTIONS .

IG2 relay is located in fuse/relay box at driver's side front corner of engine compartment. Testing information is not available from manufacturer. Consult wiring diagram for IG2 relay testing. See **WIRING DIAGRAMS** article.

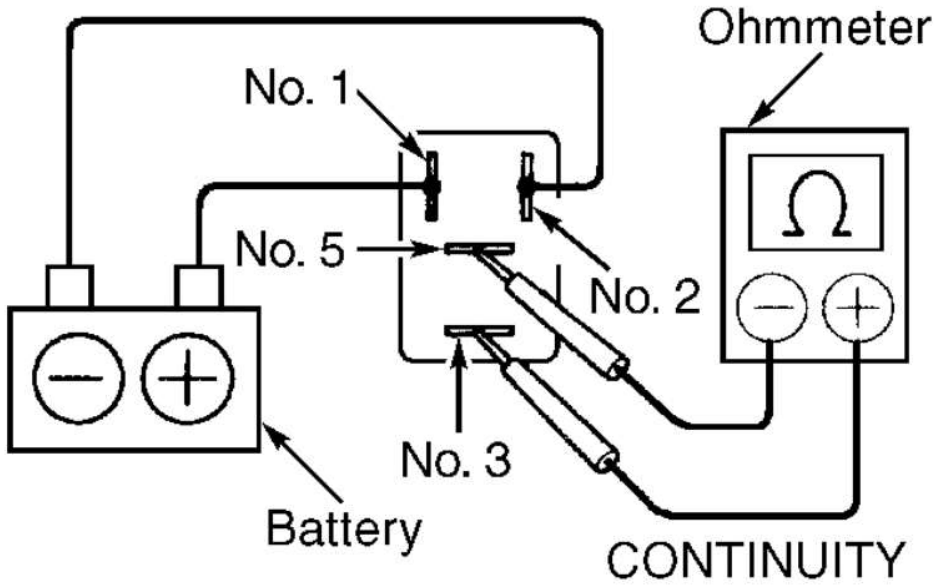
RAV4

1. Remove IG2 relay from relay box located at driver's side front corner of engine compartment. See **Fig. 107** .
2. To test IG2 relay continuity, using ohmmeter, check for continuity and no continuity between specified terminals on IG2 relay. See **Fig. 112** .
3. To test IG2 relay operation, apply battery voltage and ground to IG2 relay. Using ohmmeter, check for continuity between specified terminals on IG2 relay. See **Fig. 112** . Replace IG2 relay if defective.

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CHECKING OPERATION

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Fig. 112: Testing IG2 Relay (MR2 & RAV4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

FUEL SYSTEMS

FUEL SYSTEM PRESSURE RELEASE

WARNING: ALWAYS release fuel pressure before disconnecting any fuel injection-related component. DO NOT allow fuel to contact engine or electrical components.

For fuel system pressure release procedures, see FUEL SYSTEM PRESSURE RELEASE under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.

FUEL DELIVERY

NOTE: For fuel system pressure testing, see FUEL PRESSURE under FUEL SYSTEMS in BASIC DIAGNOSTIC PROCEDURES - 4-CYLINDER article.

Circuit Opening Relay

See **CIRCUIT OPENING RELAY** under MODULES, MOTORS, RELAYS & SOLENOIDS.

EFI Main Relay

See **EFI MAIN RELAY** under MODULES, MOTORS, RELAYS & SOLENOIDS.

Fuel Pump Resistance & Operation (Camry)

1. Manufacturer lists checking fuel pump resistance and operation with fuel pump removed from fuel tank and fuel pump mounting bracket. For removal of fuel pump from fuel tank and fuel pump mounting bracket, see FUEL PUMP under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
2. To test fuel pump resistance, using ohmmeter, check resistance between electrical terminals on fuel pump. See **Fig. 113** . Replace fuel pump if resistance is not .20-3.00 ohms at 68°F (20°C). See FUEL PUMP under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.

CAUTION: When testing fuel pump operation, DO NOT apply battery voltage to fuel pump for more than 10 seconds or fuel pump may be damaged. When testing fuel pump operation, keep fuel pump away from battery as far as possible. Always connect jumper wires to fuel pump and then to the battery when applying battery voltage to fuel pump.

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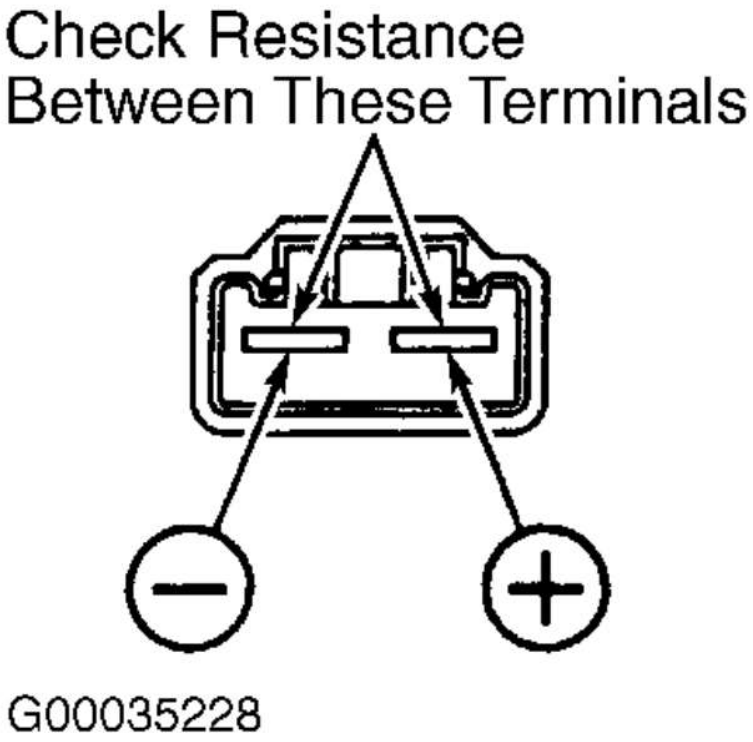


Fig. 113: Testing Fuel Pump Resistance & Operation (Camry)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. To test fuel pump operation, apply battery voltage and ground to (+) and (-) terminals on fuel pump. See **Fig. 113** . DO NOT apply battery voltage to fuel pump for more than 10 seconds. Replace fuel pump if fuel pump does not operate. See FUEL PUMP under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.

Fuel Pump Resistance & Operation (Camry Solara, Celica, Corolla, ECHO, Highlander, MR2, Prius, RAV4 & Tacoma

WARNING: On Prius, read service precautions before proceeding with service procedure. See SERVICE PRECAUTIONS .

1. On Camry Solara, Celica, Corolla, ECHO and Prius, remove rear seat cushion, cover plate on floor panel and remaining necessary covers for access to electrical connector for fuel pump.
2. On Highlander, remove driver's side and passenger's side rear seats and cover plate on floor panel for access to electrical connector for fuel pump.

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3. On MR2, remove luggage compartment lids, quarter trim covers, lower trim covers and luggage compartment boxes behind driver's and passenger's seats, and cover plate on floor panel for access to electrical connector for fuel pump. See **Fig. 123** . For additional information on removal of luggage compartment components, see **FUEL PUMP** under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
4. On RAV4, remove driver's side rear seat and cover plate on floor panel for access to electrical connector for fuel pump.
5. On Tacoma, it may be necessary to lower fuel tank for access to electrical connector for fuel pump.
6. On all models, disconnect electrical connector for fuel pump. This is electrical connector for fuel pump and fuel gauge sending unit and is located on top of fuel tank, near fuel pump.
7. To test fuel pump resistance, using ohmmeter, check resistance between specified terminals on fuel pump electrical connector or fuel pump. See **Fig. 114** -**Fig. 122** . Replace fuel pump if resistance is not .20-3.00 ohms at 68°F (20°C). On Prius, it may be necessary to replace fuel pump and fuel tank as an assembly. Consult parts department for parts availability. See **FUEL PUMP** under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.

CAUTION: When applying battery voltage to fuel pump, DO NOT apply battery voltage for more than 10 seconds or fuel pump may be damaged. Keep battery as far away from fuel pump as possible. Always connect jumper wires to fuel pump first, and then to battery, when applying battery voltage to fuel pump.

8. To test fuel pump operation, apply battery voltage and ground to (+) and (-) terminals on electrical connector or fuel pump. See **Fig. 114** -**Fig. 122** . DO NOT apply battery voltage to fuel pump for more than 10 seconds. Replace fuel pump and/or lead wire (if equipped) if fuel pump fails to operate. On Prius, it may be necessary to replace fuel pump and fuel tank as an assembly. Consult parts department for parts availability. See FUEL PUMP under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.

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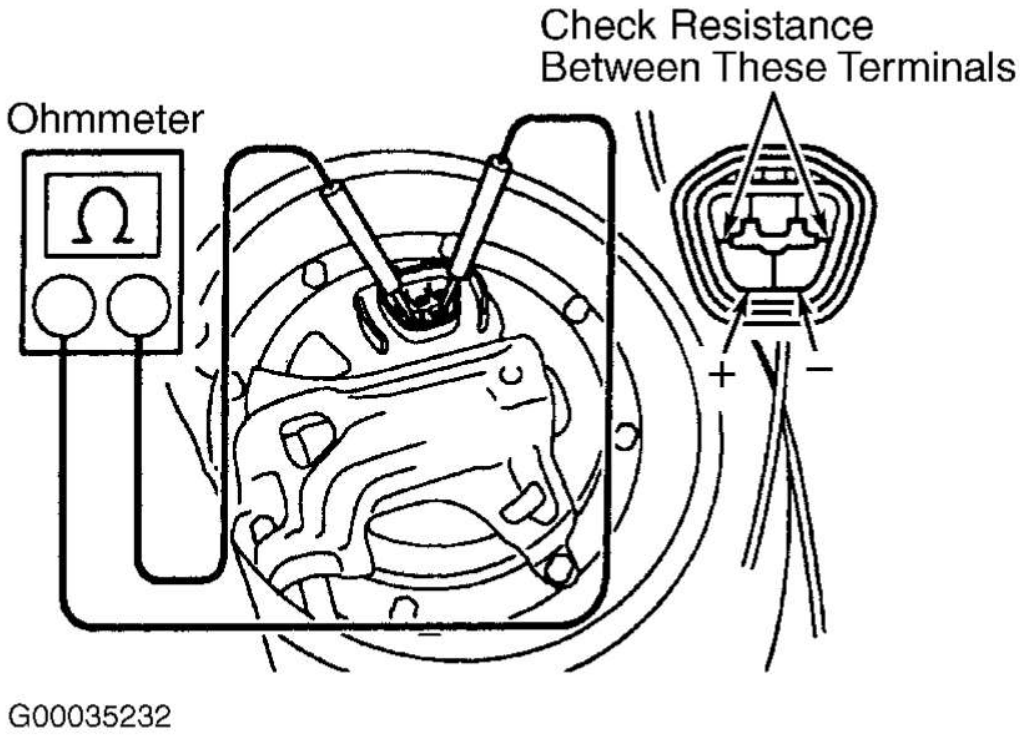


Fig. 114: Testing Fuel Pump Resistance & Operation (Camry Solara)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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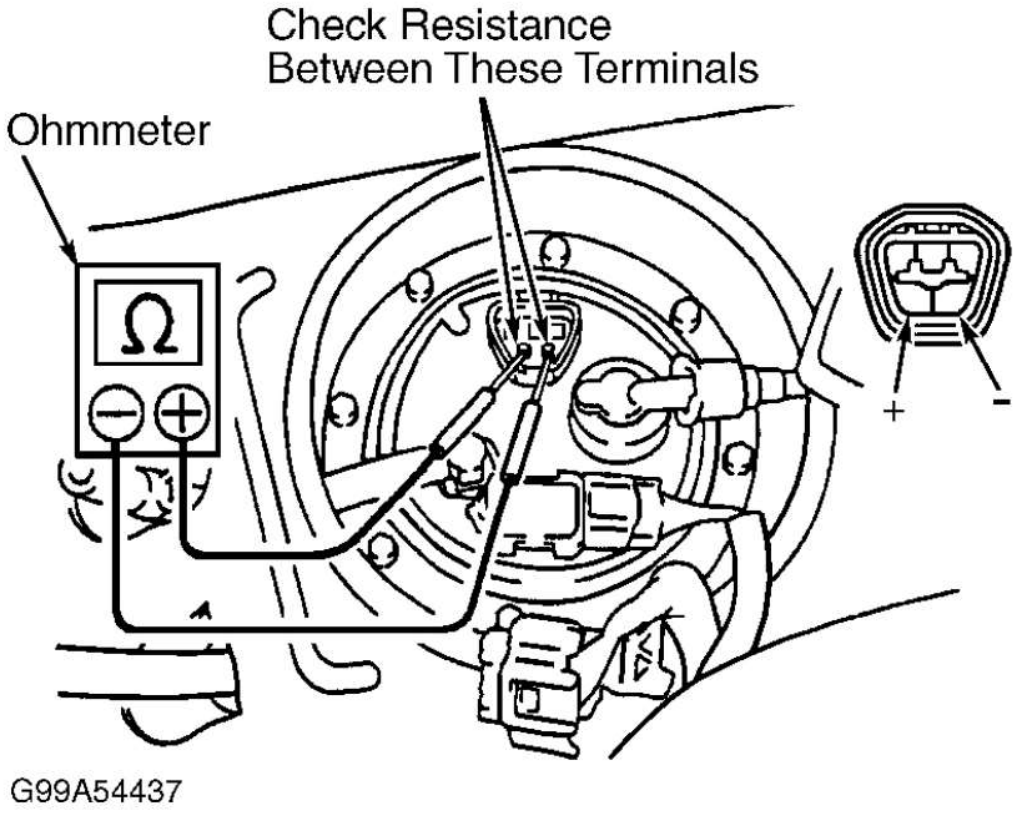


Fig. 115: Testing Fuel Pump Resistance & Operation (Celica)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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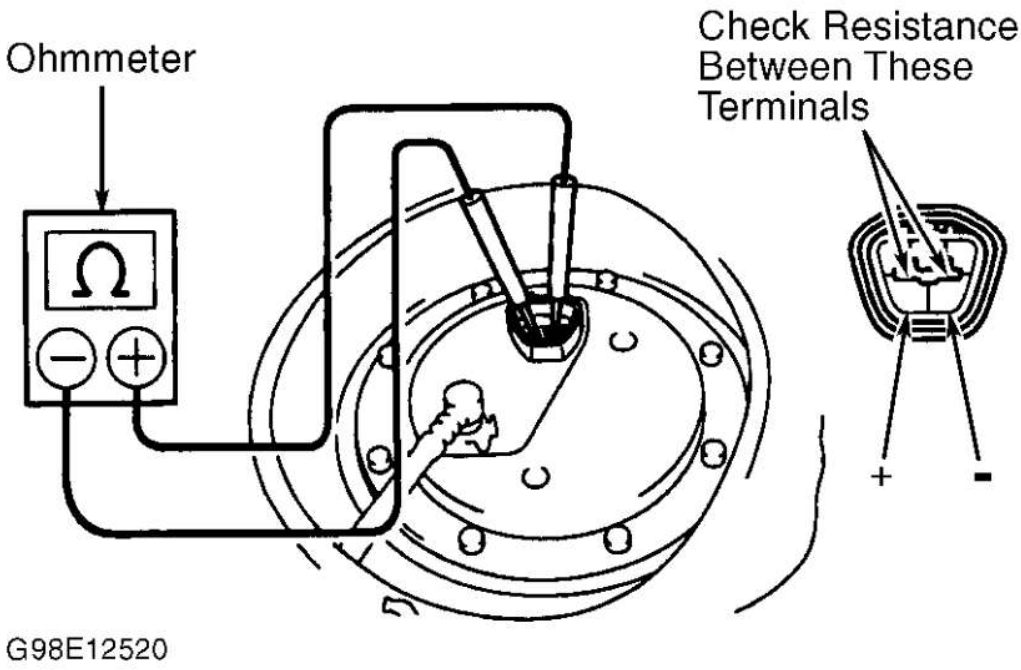


Fig. 116: Testing Fuel Pump Resistance & Operation (Corolla)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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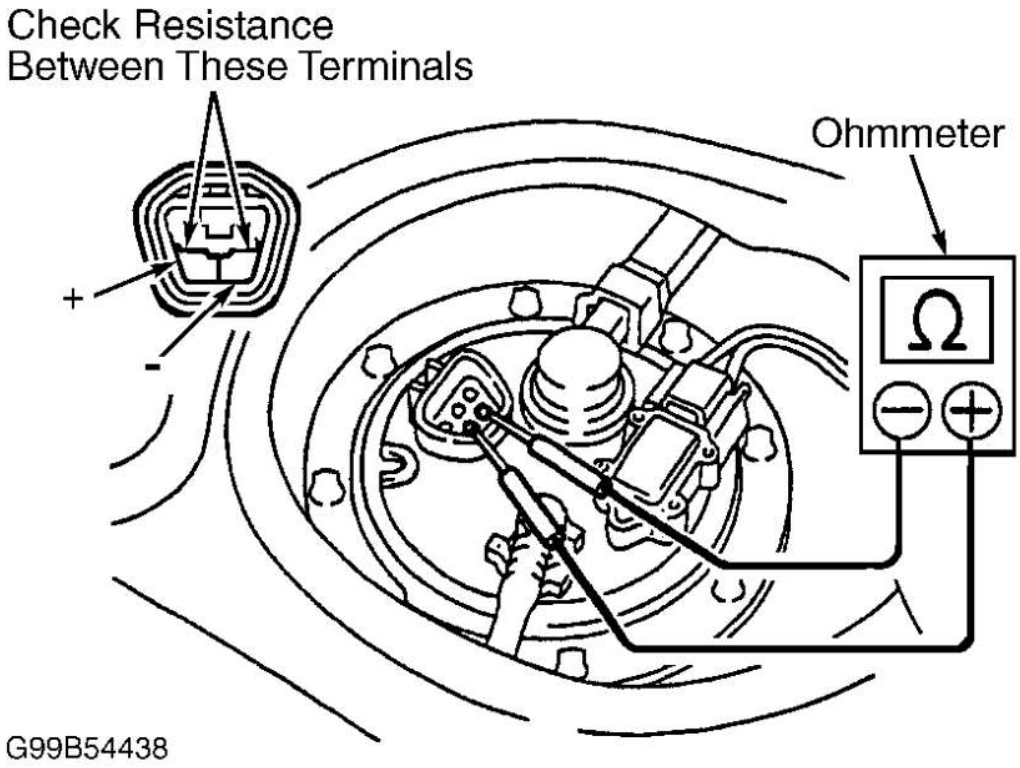


Fig. 117: Testing Fuel Pump Resistance & Operation (ECHO)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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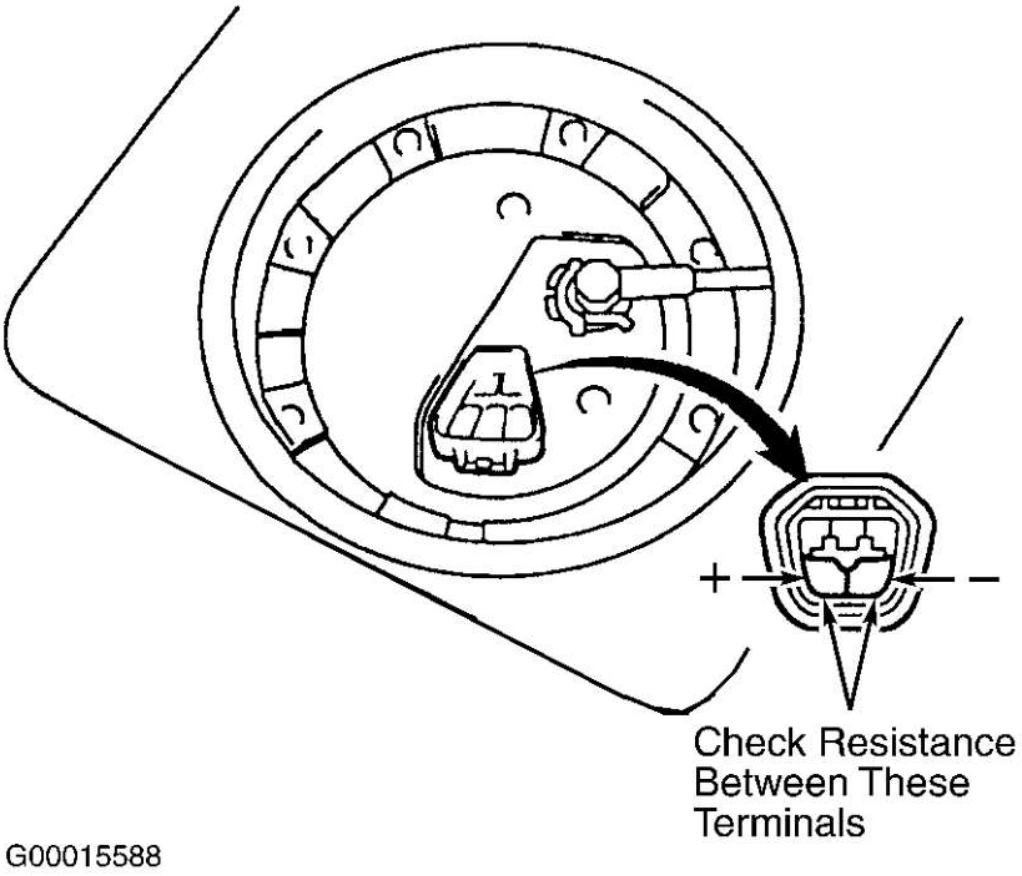


Fig. 118: Testing Fuel Pump Resistance & Operation (Highlander)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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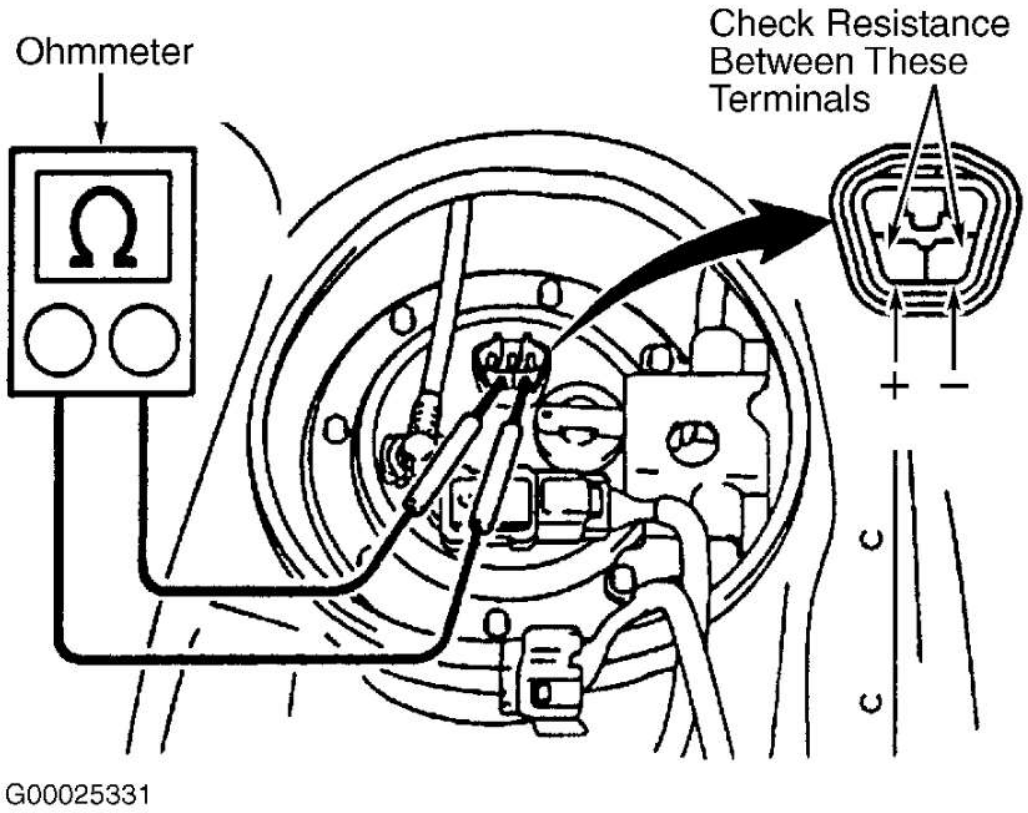


Fig. 119: Testing Fuel Pump Resistance & Operation (MR2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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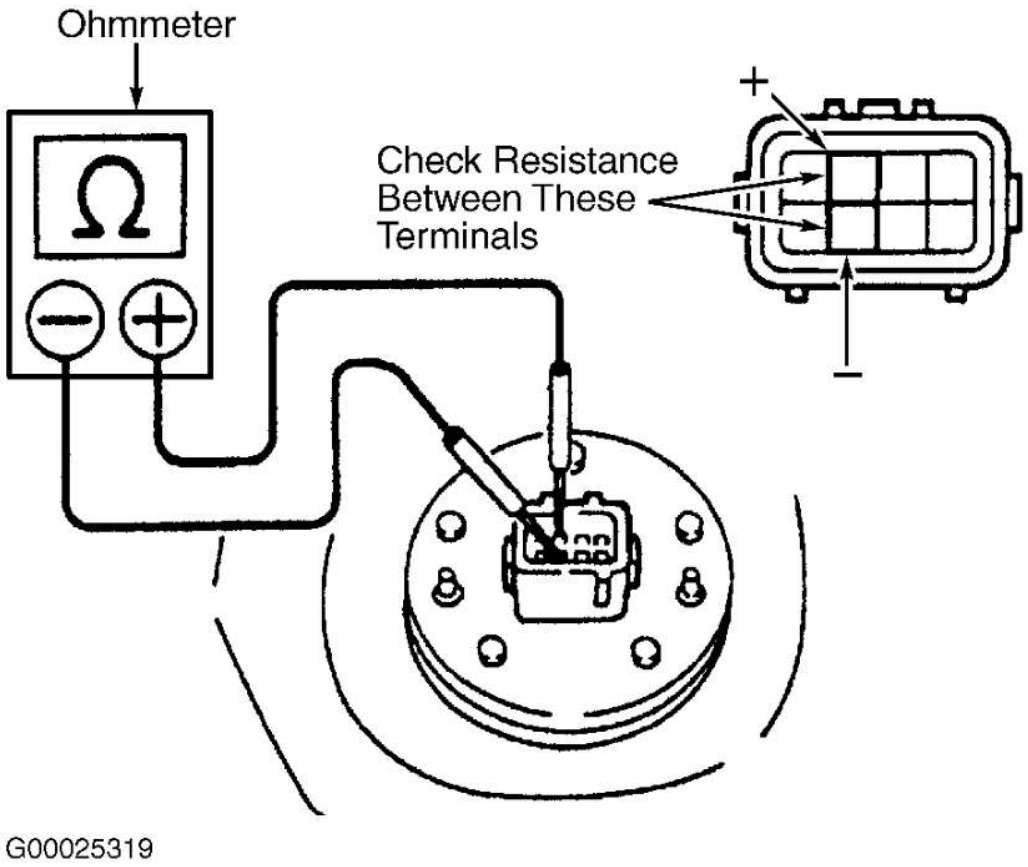


Fig. 120: Testing Fuel Pump Resistance & Operation (Prius)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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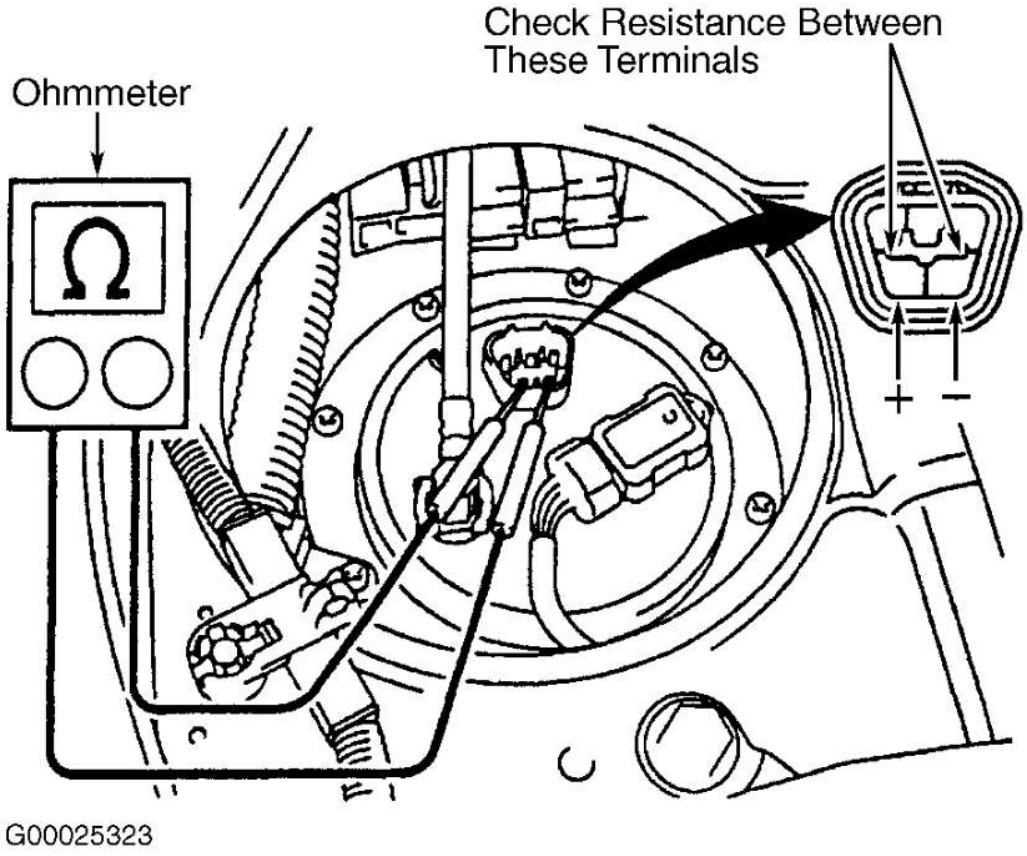


Fig. 121: Testing Fuel Pump Resistance & Operation (RAV4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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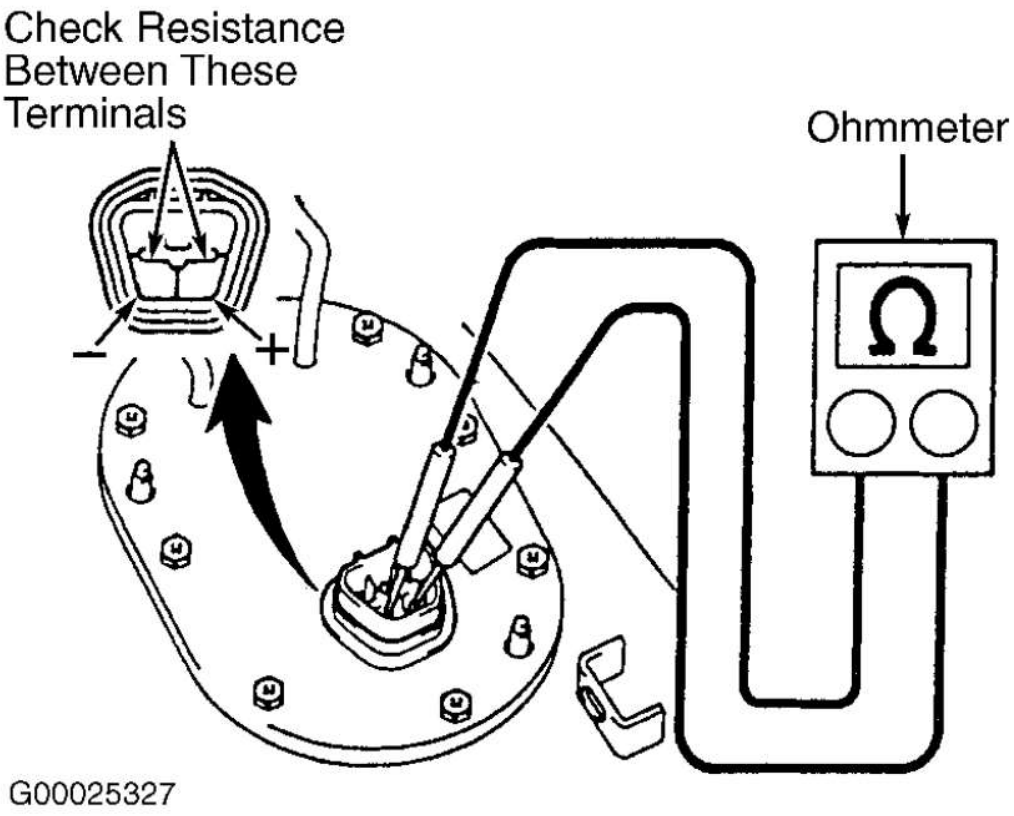


Fig. 122: Testing Fuel Pump Resistance & Operation (Tacoma)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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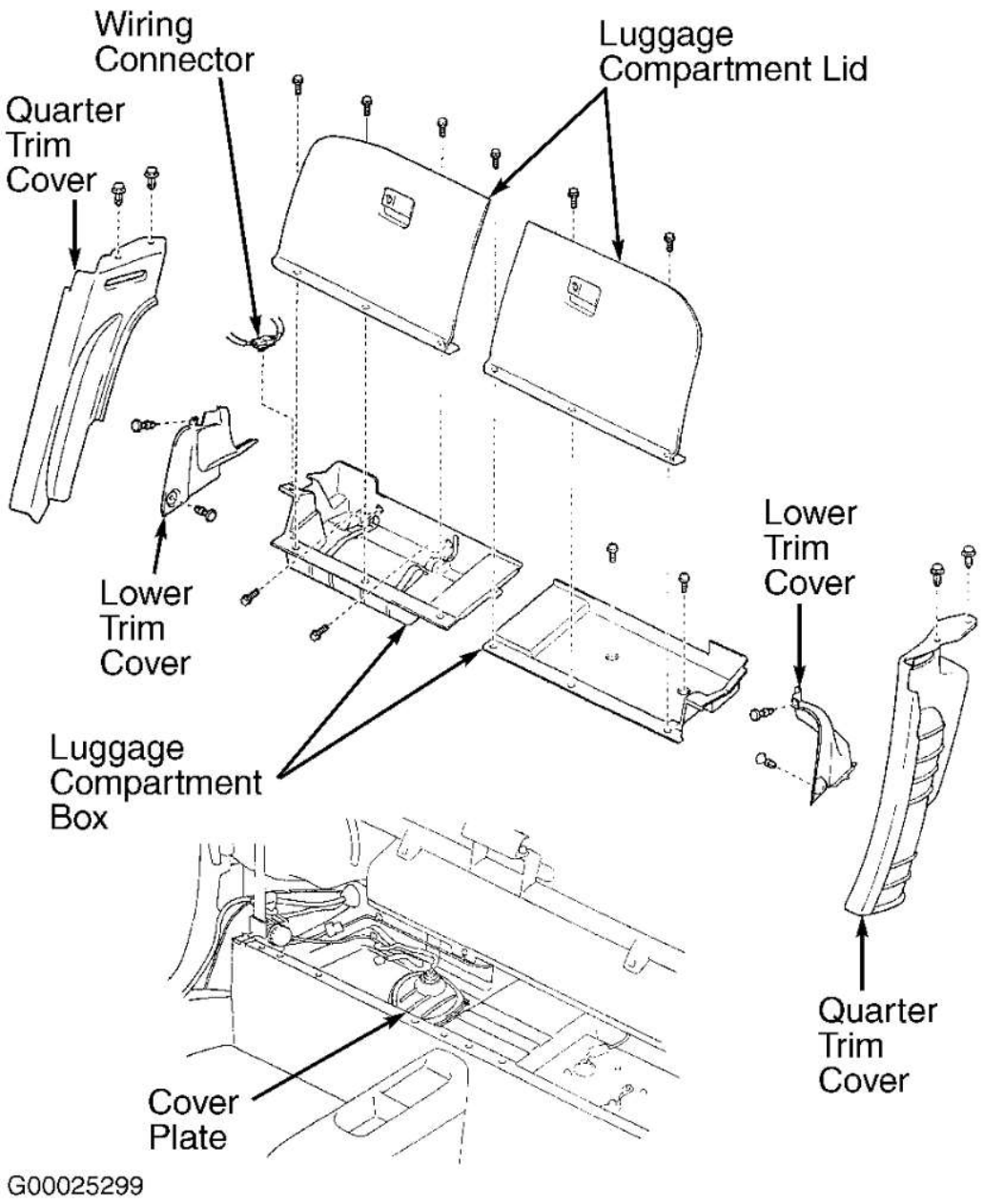


Fig. 123: Locating Luggage Compartment Components (MR2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

FUEL CONTROL

Fuel Injectors (Camry)

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1. To check for fuel injector operation, using stethoscope, listen for clicking sound at each fuel injector, or feel for fuel injector operation at fuel injector with engine cranking or with engine running. If fuel injector operation does not exist, check for loose connection at electrical connector for fuel injector. If electrical connector for fuel injector is okay, go to next step.
2. Ensure ignition is off. Disconnect electrical connector at fuel injector. Using ohmmeter, check resistance between electrical terminals on fuel injector. Replace fuel injector if resistance is not within specification. See **FUEL INJECTOR RESISTANCE** table. See **FUEL RAILS & FUEL INJECTORS** under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
3. If fuel injector operates and fuel injector resistance is within specification, go to next step. If fuel injector resistance is within specification but fuel injector does not operate, check wiring circuit to fuel injector. See **WIRING DIAGRAMS** article. If problem exists in fuel injector or wiring circuit and misfire exists, a Diagnostic Trouble Code (DTC) may be stored in Engine Control Module (ECM). See TESTING PROCEDURE under SELF-DIAGNOSTIC SYSTEM in appropriate SELF-DIAGNOSTICS article for retrieving of DTCs.
4. To check fuel injector volume, remove fuel injector. See **FUEL RAILS & FUEL INJECTORS** under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
5. Remove fuel pipe clamp from end of fuel pipe at fuel pipe fitting if not previously done. See **Fig. 124** . Ensure area around fuel pipe and disconnect fitting is clean.
6. Depress both tabs and pull fuel pipe with disconnect fitting from fuel pipe fitting. See **Fig. 124** . Use care when disconnecting fuel pipe, as some residual fuel pressure may still exist in fuel system.
7. Purchase fuel pipe (part No. 23901-28130) from parts department. Remove fuel pipe connector from end of NEW fuel pipe. See **Fig. 125** .
8. Install fuel pipe connector on fuel pipe fitting. See **Fig. 126** . Ensure fuel pipe connector is securely attached on fuel pipe fitting is fully seated.
9. Connect delivery hose from Fuel Injector Measuring Set (SST 09268-41047) to fuel pipe connector. Check that "O" ring is installed on top of fuel injector. Using clamp and union from fuel injector measuring set, connect fuel injector to delivery hose. See **Fig. 126** .
10. Place vinyl tube on end of fuel injector to prevent fuel spillage. Place fuel injector into a clean graduated container.
11. Connect Toyota hand-held tester to data link connector No. 3 at driver's side of instrument panel. See **Fig. 8** . Turn ignition on and then turn hand-held tester on. Select ACTIVE TEST MODE on hand-held tester. Using hand-held tester manufacturer's instructions, activate fuel pump.

NOTE: **If hand-held tester is not available, fuel pump may also be operated to pressurize fuel system by removing circuit opening relay from fuse/relay box and installing jumper wire between FP and +B terminals in fuse/relay box for circuit opening relay and then turning ignition on. See Fig. 127 . Fuse/relay box is located at driver's side front corner of engine compartment.**

12. Connect Fuel Injector Tester (09842-30080) to fuel injector for 15 seconds. See **Fig. 128** . Measure fuel injector volume. Test each fuel injector 2-3 times. Replace fuel injector if fuel injector volume is not within specification. See **FUEL INJECTOR VOLUME SPECIFICATIONS** table. Ensure difference between fuel injector volume on all fuel injectors is within specification. See **FUEL INJECTOR**

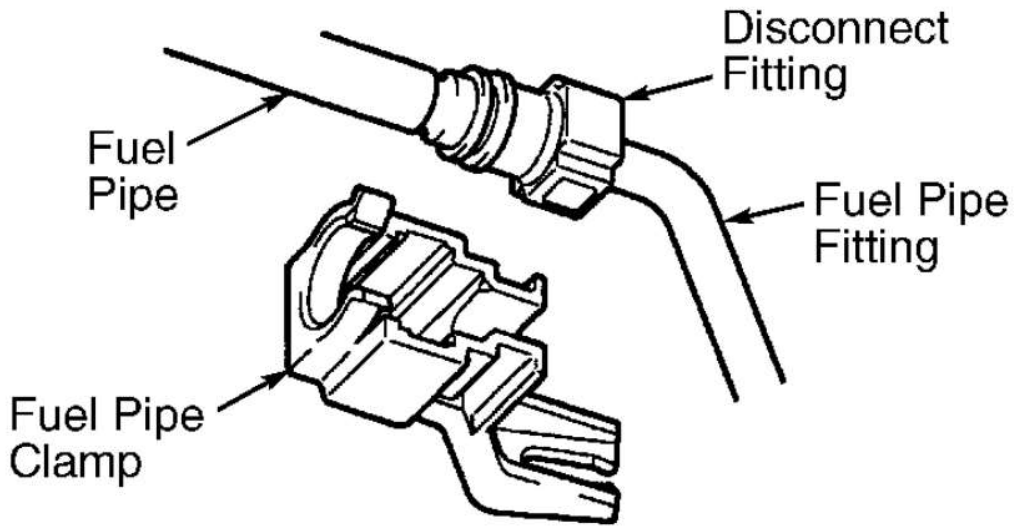
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VOLUME SPECIFICATIONS table.

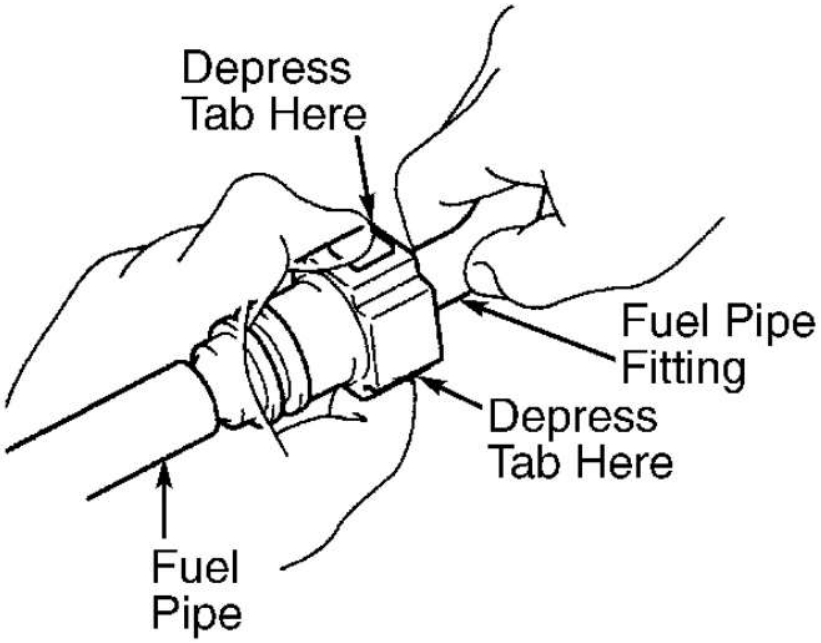
13. Disconnect fuel injector tester. Ensure fuel leakage from end of fuel injector does not exceed one drop in 12 minutes. Replace fuel injector if leakage exceeds one drop in 12 minutes. Disconnect negative battery cable. Remove test equipment.
14. Install fuel pipe on fuel pipe fitting. Pull on fuel pipe to ensure fuel pipe is properly locked on fuel pipe fitting. Reinstall fuel pipe clamp. Install negative battery cable. Check for fuel leaks by operating the fuel pump by using hand-held tester or connecting battery voltage to fuel pump.

NOTE: It may be possible that power sun roof may not operate properly after battery was disconnected. If power sun roof does not operate properly, perform power sun roof reinitialization procedure. See appropriate POWER SUN ROOF REINITIALIZATION PROCEDURE under PROGRAMMING.

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STEP 1



STEP 2

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Fig. 124: Locating Fuel Pipe Clamp & Disconnecting Fuel Pipe From Fuel Pipe Fitting (Camry)
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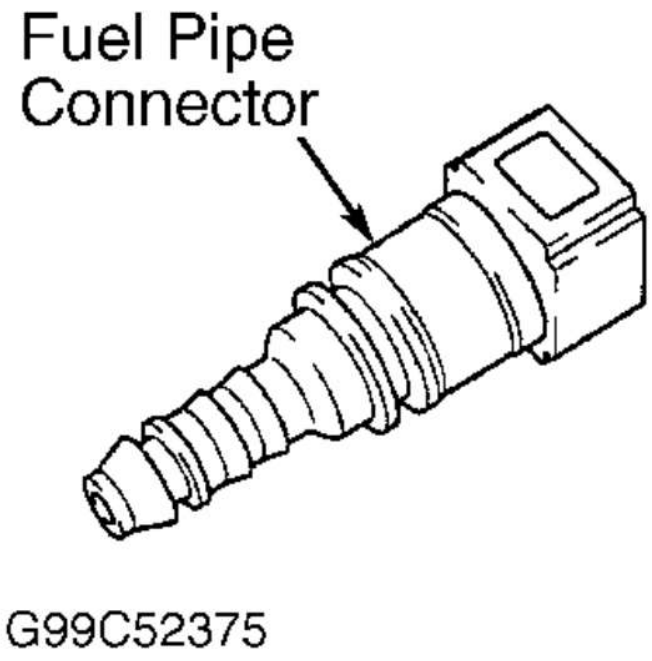


Fig. 125: Identifying Fuel Pipe Connector (Camry, ECHO, Highlander, Prius & RAV4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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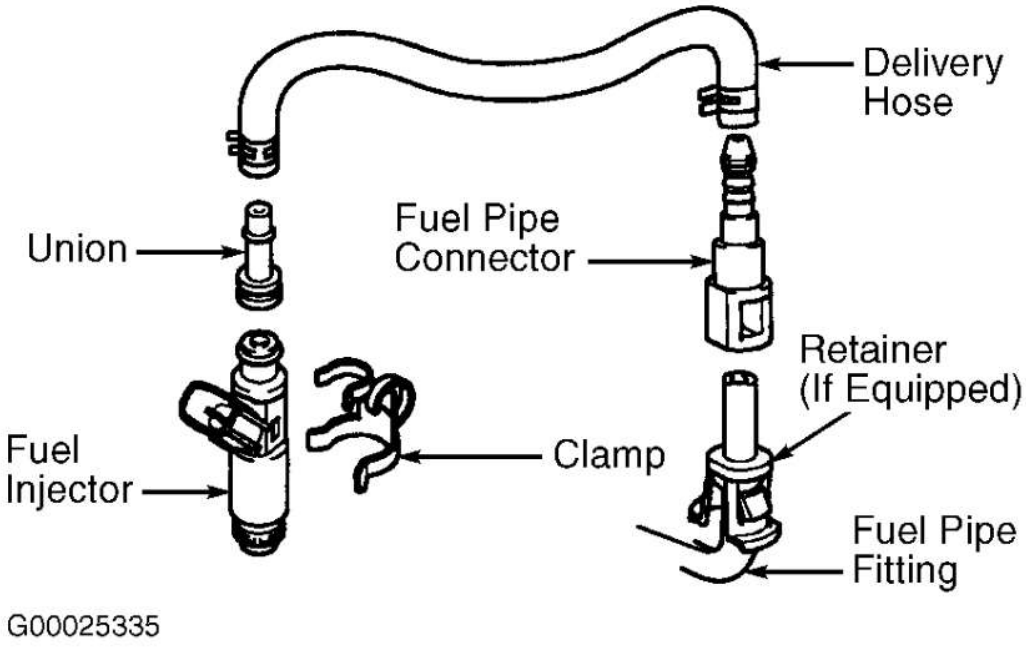


Fig. 126: Connections For Testing Typical Fuel Injector (Camry, Celica, Corolla, ECHO, Highlander, MR2, Prius & RAV4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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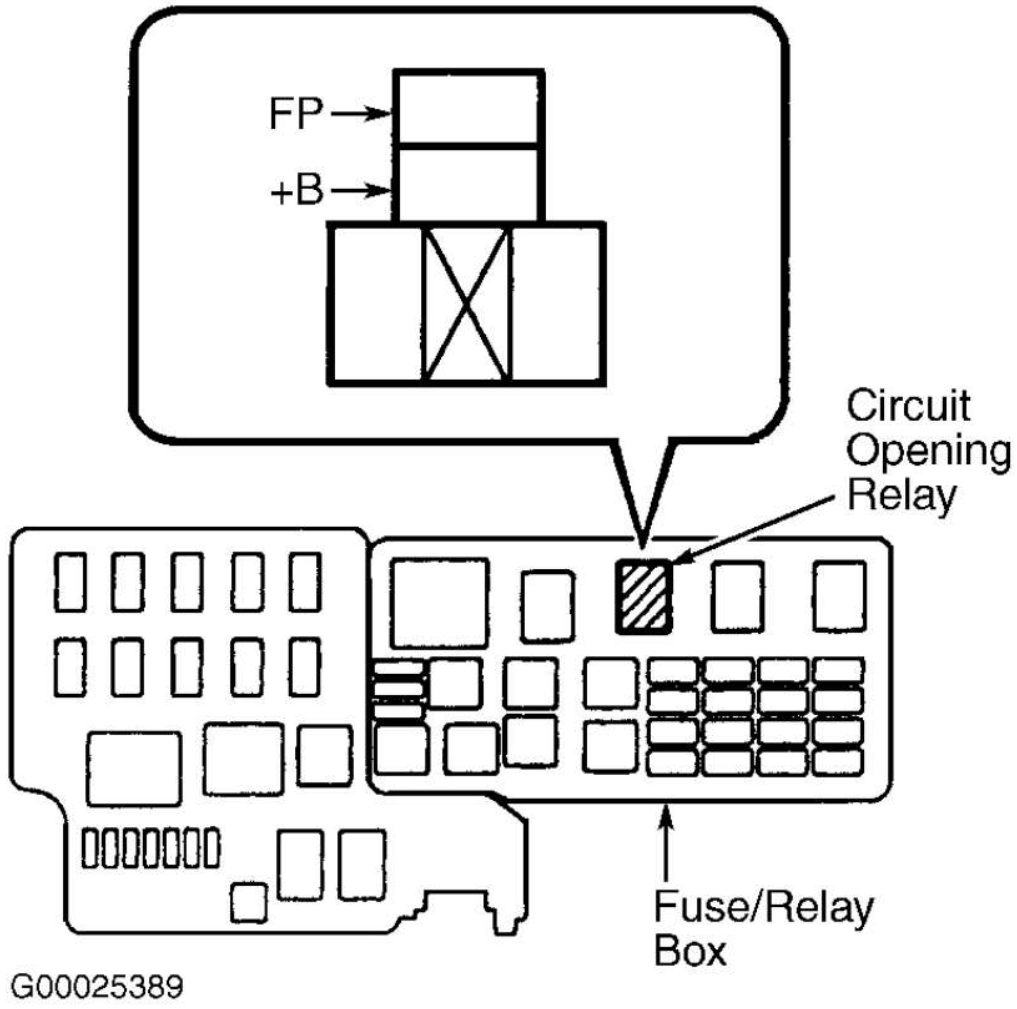


Fig. 127: Locating Circuit Opening Relay & Identifying FP & +B Cavities For Circuit Opening Relay (Camry)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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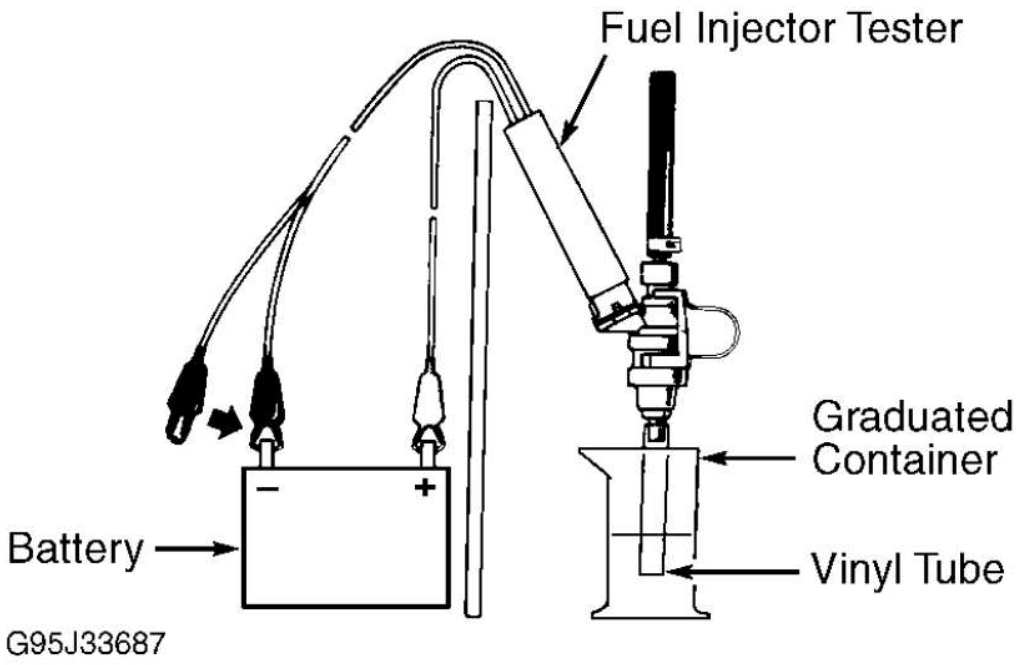


Fig. 128: Connecting Fuel Injector Tester
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Fuel Injectors (Camry Solara)

1. To check for fuel injector operation, using stethoscope, listen for clicking sound at each fuel injector, or feel for fuel injector operation at fuel injector with engine cranking or with engine running. If fuel injector operation does not exist, check for loose connection at electrical connector for fuel injector. If electrical connector for fuel injector is okay, go to next step.
2. Ensure ignition is off. Disconnect electrical connector at fuel injector. Using ohmmeter, check resistance between electrical terminals on fuel injector. Replace fuel injector if resistance is not within specification. See **FUEL INJECTOR RESISTANCE** table. See **FUEL RAILS & FUEL INJECTORS** under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
3. If fuel injector operates and fuel injector resistance is within specification, go to next step. If fuel injector resistance is within specification but fuel injector does not operate, check wiring circuit to fuel injector. See **WIRING DIAGRAMS** article. If problem exists in fuel injector or wiring circuit and misfire exists, a Diagnostic Trouble Code (DTC) may be stored in Engine Control Module (ECM). See TESTING PROCEDURE under SELF-DIAGNOSTIC SYSTEM in appropriate SELF-DIAGNOSTICS article for retrieving of DTCs.
4. To check fuel injector volume, remove fuel injector. See **FUEL RAILS & FUEL INJECTORS** under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
5. Remove fuel pipe clamp from fuel pipe at fuel filter if not previously done. Perform STEP 1 in

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illustration. See **Fig. 129** . Ensure area around fuel pipe and fuel filter is clean.

6. Depress both sides of retainer and pull fuel pipe with disconnect fitting from fuel filter. Perform STEP 2 in illustration. See **Fig. 129** . Use care when disconnecting fuel pipe from fuel filter, as some residual fuel pressure may still exist in the fuel system.
7. Purchase fuel pipe (part No. 23901-22070) from parts department. Remove fuel pipe connector from end of NEW fuel pipe. See **Fig. 130** .
8. Install fuel pipe connector on fuel pipe fitting at fuel filter. See **Fig. 131** . Ensure fuel pipe connector is securely attached on fuel pipe fitting.
9. Connect delivery hose from Fuel Injector Measuring Set (SST 09268-41047) to fuel pipe connector. Check that grommet and "O" ring are installed on top of fuel injector. Using clamp and union from fuel injector measuring set, connect fuel injector to delivery hose. See **Fig. 131** .
10. Place vinyl tube on end of fuel injector to prevent fuel spillage. Place fuel injector into a clean graduated container.
11. Connect Toyota hand-held tester to data link connector No. 3 at driver's side of instrument panel. See **Fig. 9** . Turn ignition on and then turn hand-held tester on. Select ACTIVE TEST MODE on hand-held tester. Using hand-held tester manufacturer's instructions, activate fuel pump.

NOTE: If hand-held tester is not available, fuel pump may also be operated to pressurize fuel system by applying battery voltage to electrical terminals on fuel pump. For operating of fuel pump, see appropriate FUEL PUMP RESISTANCE & OPERATION procedure under FUEL DELIVERY under FUEL SYSTEMS.

12. Connect Fuel Injector Tester (09842-30070) to fuel injector for 15 seconds. See **Fig. 128** . Measure fuel injector volume. Test each fuel injector 2-3 times. Replace fuel injector if fuel injector volume is not within specification. See **FUEL INJECTOR VOLUME SPECIFICATIONS** table. Ensure difference between fuel injector volume on all fuel injectors is within specification. See **FUEL INJECTOR VOLUME SPECIFICATIONS** table.
13. Disconnect fuel injector tester. Ensure fuel leakage from end of fuel injector does not exceed one drop in 12 minutes. Replace fuel injector if leakage exceeds one drop in 12 minutes. Disconnect negative battery cable. Remove test equipment.

CAUTION: DO NOT reuse old retainer when installing fuel pipe on fuel filter. Always use a NEW retainer.

14. Apply light coat of engine oil on tip of fuel pipe fitting on fuel filter to allow for ease of disconnect fitting and fuel pipe installation. Using NEW retainer, install fuel pipe on fuel filter until "click" sound is heard. DO NOT reuse old retainer. Pull on fuel pipe to ensure fuel pipe is properly locked on fuel filter.
15. Reinstall fuel pipe clamp. Install negative battery cable. Check for fuel leaks by activating the fuel pump by using hand-held tester or connecting battery voltage to fuel pump.

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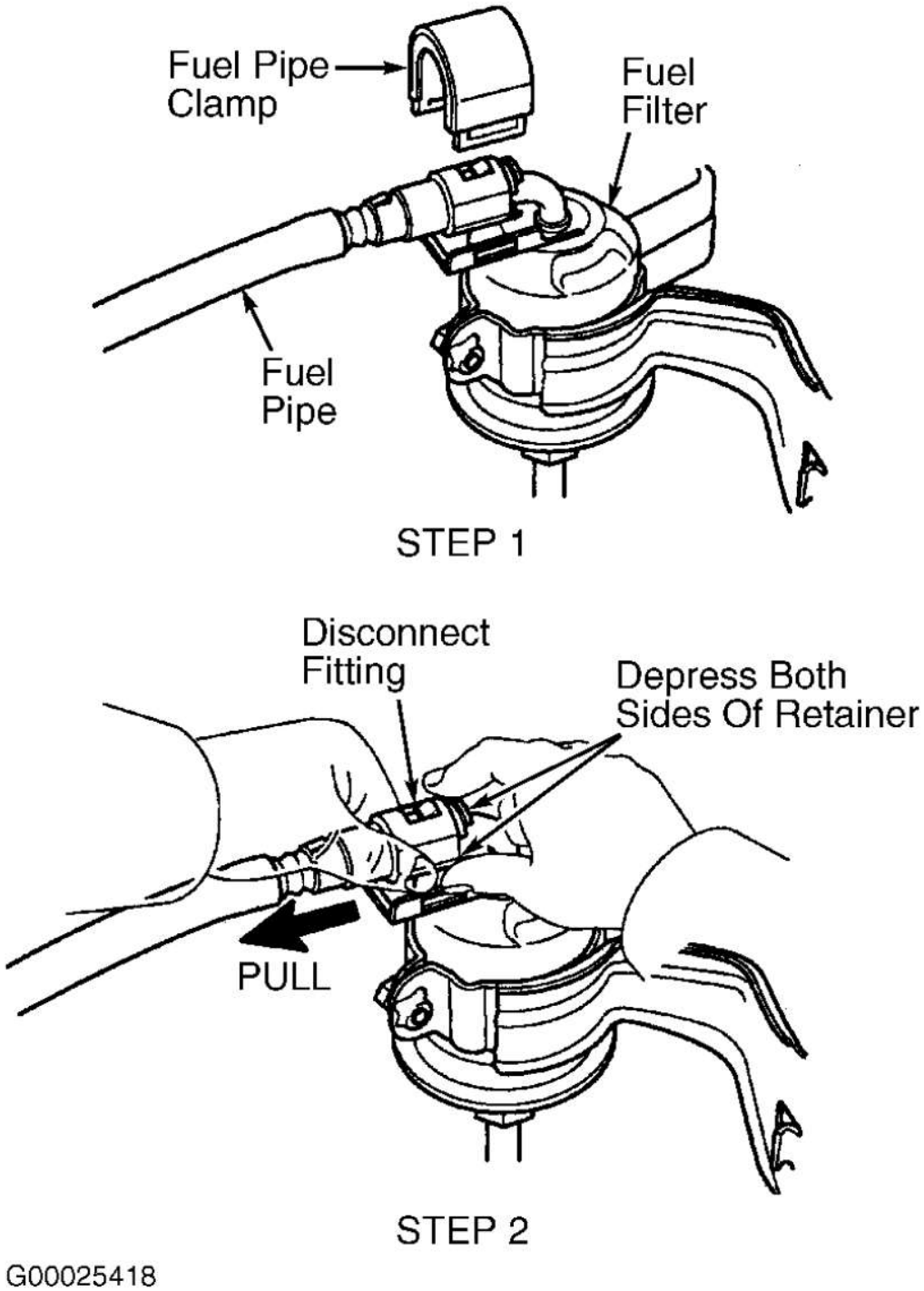


Fig. 129: Disconnecting Fuel Pipe From Fuel Filter (Camry Solara)

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Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

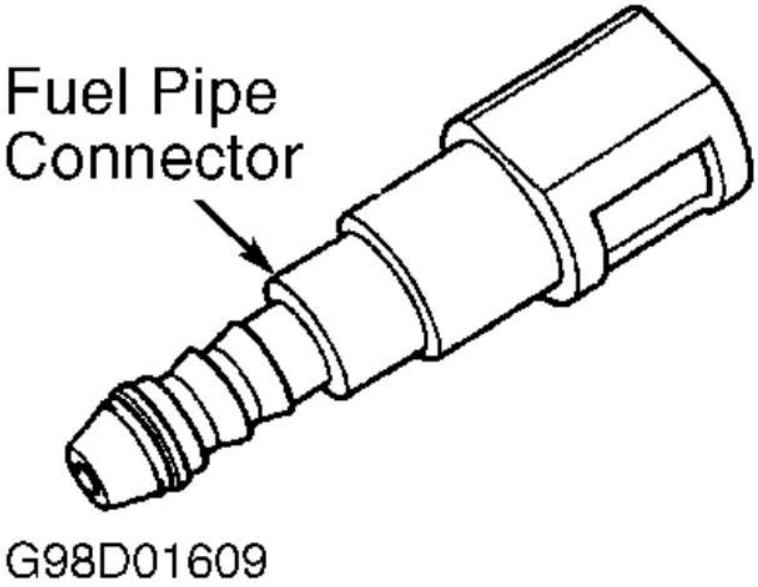


Fig. 130: Identifying Fuel Pipe Connector (Camry Solara, Celica, Corolla & MR2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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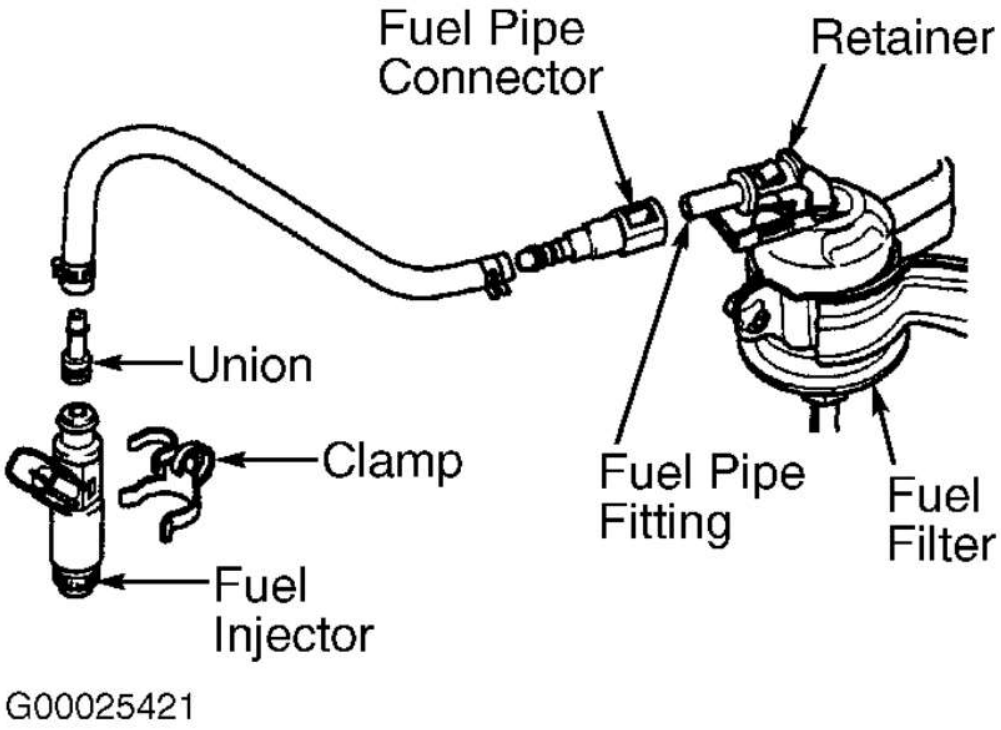


Fig. 131: Connections For Testing Fuel Injector (Camry Solara)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Fuel Injectors (Celica, Corolla, ECHO, Highlander, MR2, Prius & RAV4)

WARNING: On Prius, read service precautions before proceeding with service procedure. See SERVICE PRECAUTIONS .

1. To check for fuel injector operation, remove No. 2 cylinder head cover on top of engine (if equipped) any other components for access to fuel injectors. Using stethoscope, listen for clicking sound at each fuel injector, or feel for fuel injector operation at fuel injector with engine cranking or with engine running. If fuel injector operation does not exist, check for loose connection at electrical connector for fuel injector. If electrical connector for fuel injector is okay, go to next step.
2. Ensure ignition is off. Disconnect electrical connector at fuel injector. Using ohmmeter, check resistance between electrical terminals on fuel injector. Replace fuel injector if resistance is not within specification. See **FUEL INJECTOR RESISTANCE** table. See **FUEL RAILS & FUEL INJECTORS** under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
3. If fuel injector operates and fuel injector resistance is within specification, go to next step. If fuel injector resistance is within specification but fuel injector does not operate, check wiring circuit to fuel injector.

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See **WIRING DIAGRAMS** article. If problem exists in fuel injector or wiring circuit and misfire exists, a Diagnostic Trouble Code (DTC) may be stored in Engine Control Module (ECM). See TESTING PROCEDURE under SELF-DIAGNOSTIC SYSTEM in appropriate SELF-DIAGNOSTICS article for retrieving of DTCs.

4. To check fuel injector volume, remove fuel injector. See **FUEL RAILS & FUEL INJECTORS** under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
5. On Celica, Corolla, ECHO and MR2, remove fuel pipe clamp from end of fuel pipe at end of fuel rail if not previously done. Perform STEP 1 in illustration. See **Fig. 132** -**Fig. 134** and **Fig. 136** . Ensure area around fuel pipe and disconnect fitting is clean. Depress both sides of retainer and pull fuel pipe with disconnect fitting from fuel pipe fitting. Perform STEP 2 in illustration. See **Fig. 132** -**Fig. 134** and **Fig. 136** . Use care when disconnecting fuel pipe, as some residual fuel pressure may still exist in fuel system. Go to step 8 .
6. On Highlander and RAV4, remove fuel pipe clamp from end of fuel pipe at end of fuel rail if not previously done. See **Fig. 135** and **Fig. 138** . Depress both tabs and pull fuel pipe with disconnect fitting from fuel pipe fitting. See **Fig. 135** and **Fig. 138** . Use care when disconnecting fuel pipe, as some residual fuel pressure may still exist in fuel system. Go to step 8 .
7. On Prius, depress both sides of retainer and pull fuel pipe with disconnect fitting from fuel pipe fitting. See **Fig. 137** . Use care when disconnecting fuel pipe, as some residual fuel pressure may still exist in fuel system. Go to next step.
8. On all models, purchase appropriate fuel pipe from parts department. See **FUEL PIPE IDENTIFICATION** table. Remove fuel pipe connector from end of NEW fuel pipe. See **Fig. 125** and **Fig. 130** .

FUEL PIPE IDENTIFICATION

Application	Fuel Pipe Part No.
Celica	
1.8L 1ZZ-FE	23901-22100
1.8L 2ZZ-GE	23271-88600
Corolla	23901-22010
ECHO	23901-21020 Or 23901-22010
Highlander	23901-28070
MR2	23901-22070
Prius	23901-21020
RAV4	23901-22110

9. Install fuel pipe connector on fuel pipe fitting and retainer (if equipped). See **Fig. 126** . Ensure fuel pipe connector is securely attached on fuel pipe fitting and retainer (if equipped) is fully seated.
10. Connect delivery hose from Fuel Injector Measuring Set (SST 09268-41047) to fuel pipe connector. Check that grommet (if equipped) and "O" ring are installed on top of fuel injector. Using clamp and union from fuel injector measuring set, connect fuel injector to delivery hose. See **Fig. 126** .
11. Place vinyl tube on end of fuel injector to prevent fuel spillage. Place fuel injector into a clean graduated container.
12. Connect Toyota hand-held tester to data link connector No. 3 at driver's side of instrument panel. See **Fig.**

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10 -**Fig. 16** . Turn ignition on and then turn hand-held tester on. Select ACTIVE TEST MODE on hand-held tester. Using hand-held tester manufacturer's instructions, activate fuel pump.

NOTE: If hand-held tester is not available, fuel pump may also be operated to pressurize fuel system by applying battery voltage to electrical terminals on fuel pump. For operating of fuel pump, see appropriate FUEL PUMP RESISTANCE & OPERATION procedure under FUEL DELIVERY under FUEL SYSTEMS.

13. Connect Fuel Injector Tester (09842-30080) to fuel injector for 15 seconds. See **Fig. 128** . Measure fuel injector volume. Test each fuel injector 2-3 times. Replace fuel injector if fuel injector volume is not within specification. See **FUEL INJECTOR VOLUME SPECIFICATIONS** table. Ensure difference between fuel injector volume on all fuel injectors is within specification. See **FUEL INJECTOR VOLUME SPECIFICATIONS** table.
14. Disconnect fuel injector tester. Ensure fuel leakage from end of fuel injector does not exceed one drop in 12 minutes. Replace fuel injector if leakage exceeds one drop in 12 minutes. Disconnect negative battery cable. Remove test equipment.
15. On Celica, Corolla, ECHO, MR2 and Prius, DO NOT reuse old retainer when installing fuel pipe on fuel pipe fitting. Always use a NEW retainer. Apply light coat of engine oil on tip of fuel pipe fitting to allow for ease of disconnect fitting and fuel pipe installation. Using NEW retainer, install fuel pipe on fuel pipe fitting until "click" sound is heard. DO NOT reuse old retainer. Pull on fuel pipe to ensure fuel pipe is properly locked on fuel pipe fitting. Reinstall fuel pipe clamp (if equipped). Go to step 17 .
16. On Highlander and RAV4, install fuel pipe on fuel pipe fitting. Pull on fuel pipe to ensure fuel pipe is properly locked on fuel pipe fitting. Reinstall fuel pipe clamp. Go to next step.
17. On all models, install negative battery cable. Check for fuel leaks by operating the fuel pump by using hand-held tester or connecting battery voltage to fuel pump.

NOTE: On Celica, it may be possible that power sun roof may not operate properly after battery was disconnected. If power sun roof does not operate properly, perform power sun roof reinitialization procedure. See appropriate POWER SUN ROOF REINITIALIZATION PROCEDURE under PROGRAMMING.

Fuel Injectors (Tacoma)

1. To check for fuel injector operation, using stethoscope, listen for clicking sound at each fuel injector, or feel for fuel injector operation at fuel injector with engine cranking or with engine running. If fuel injector operation does not exist, check for loose connection at electrical connector for fuel injector. If electrical connector for fuel injector is okay, go to next step.
2. Ensure ignition is off. Disconnect electrical connector at fuel injector. Using ohmmeter, check resistance between electrical terminals on fuel injector. Replace fuel injector if resistance is not within specification. See **FUEL INJECTOR RESISTANCE** table. See FUEL RAILS & FUEL INJECTORS under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
3. If fuel injector operates and fuel injector resistance is within specification, go to next step. If fuel injector resistance is within specification but fuel injector does not operate, check wiring circuit to fuel injector.

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See **WIRING DIAGRAMS** article. If problem exists in fuel injector or wiring circuit and misfire exists, a Diagnostic Trouble Code (DTC) may be stored in Engine Control Module (ECM). See TESTING PROCEDURE under SELF-DIAGNOSTIC SYSTEM in appropriate SELF-DIAGNOSTICS article for retrieving of DTCs.

4. To check fuel injector volume, remove fuel injector. See **FUEL RAILS & FUEL INJECTORS** under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article. Ensure area around fuel hoses on fuel filter is clean. Remove union bolts with gaskets, and disconnect fuel hose from fuel filter. See **Fig. 139** .
5. Install union, delivery hose, gaskets and union bolt from Fuel Injector Measuring Set (SST 09268-41047) on fuel filter. See **Fig. 139** . Tighten union bolt to 21 ft. lbs. (29 N.m).
6. Check that "O" ring is installed on top of fuel injector. Using clamp and union from fuel injector measuring set, connect fuel injector to delivery hose. See **Fig. 139** .
7. Remove fuel pressure regulator from fuel rail. See **FUEL PRESSURE REGULATOR** under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article. Using NEW "O" ring, install union on fuel pressure regulator. See **Fig. 139** . Connect delivery hose to union and fuel return hose on fuel pressure regulator.
8. Place vinyl tube on end of fuel injector to prevent fuel spillage. Place fuel injector into a clean graduated container.
9. Connect Toyota hand-held tester to data link connector No. 3 at driver's side of instrument panel. See **Fig. 17** . Turn ignition on and then turn hand-held tester on. Select ACTIVE TEST MODE on hand-held tester. Using hand-held tester manufacturer's instructions, activate fuel pump.

NOTE: If hand-held tester is not available, fuel pump may also be operated to pressurize fuel system by applying battery voltage to electrical terminals on fuel pump. For operating of fuel pump, see appropriate FUEL PUMP RESISTANCE & OPERATION procedure under FUEL DELIVERY under FUEL SYSTEMS.

10. Connect Fuel Injector Tester (09842-30070) to fuel injector for 15 seconds. See **Fig. 128** . Measure fuel injector volume. Test each fuel injector 2-3 times. Replace fuel injector if fuel injector volume is not within specification. See **FUEL INJECTOR VOLUME SPECIFICATIONS** table. Ensure difference between fuel injector volume on all fuel injectors is within specification. See **FUEL INJECTOR VOLUME SPECIFICATIONS** table.
11. Disconnect fuel injector tester. Ensure fuel leakage from end of fuel injector does not exceed one drop in 12 minutes. Replace fuel injector if leakage exceeds one drop in 12 minutes. Disconnect negative battery cable. Remove test equipment.
12. Using NEW gaskets, install fuel hose on top of fuel filter. Tighten union bolt to 21 ft. lbs. (29 N.m). Reinstall fuel pressure regulator. Install negative battery cable. Check for fuel leaks by operating the fuel pump by using hand-held tester or connecting battery voltage to fuel pump.

FUEL INJECTOR RESISTANCE

Application	Ohms @ 68°F (20°C)
Camry, Camry Solara, Celica, Corolla, ECHO, Highlander, MR2, Prius & RAV4	13.40-14.20
Tacoma	12.00-16.00

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FUEL INJECTOR VOLUME SPECIFICATIONS

Application	cc (Cu. In.)
Volume	
Camry	68-82 (4.1-5.0)
Camry Solara	69-82 (4.2-5.0)
Celica	47-58 (2.8-3.5)
Corolla	60-73 (3.7-4.5)
ECHO	47-58 (2.8-3.5)
Highlander	69-82 (4.2-5.0)
MR2	60-73 (3.7-4.5)
Prius	36-46 (2.1-2.8)
RAV4	53-65 (3.2-3.9)
Tacoma	71-86 (4.3-5.2)
Maximum Difference Between Each Fuel Injector	
Camry & Camry Solara	14 (.85)
Celica	10 (.61)
Corolla	13 (.80)
ECHO	10 (.61)
Highlander & MR2	13 (.80)
Prius	10 (.61)
RAV4	6 (.37)
Tacoma	15 (.91)

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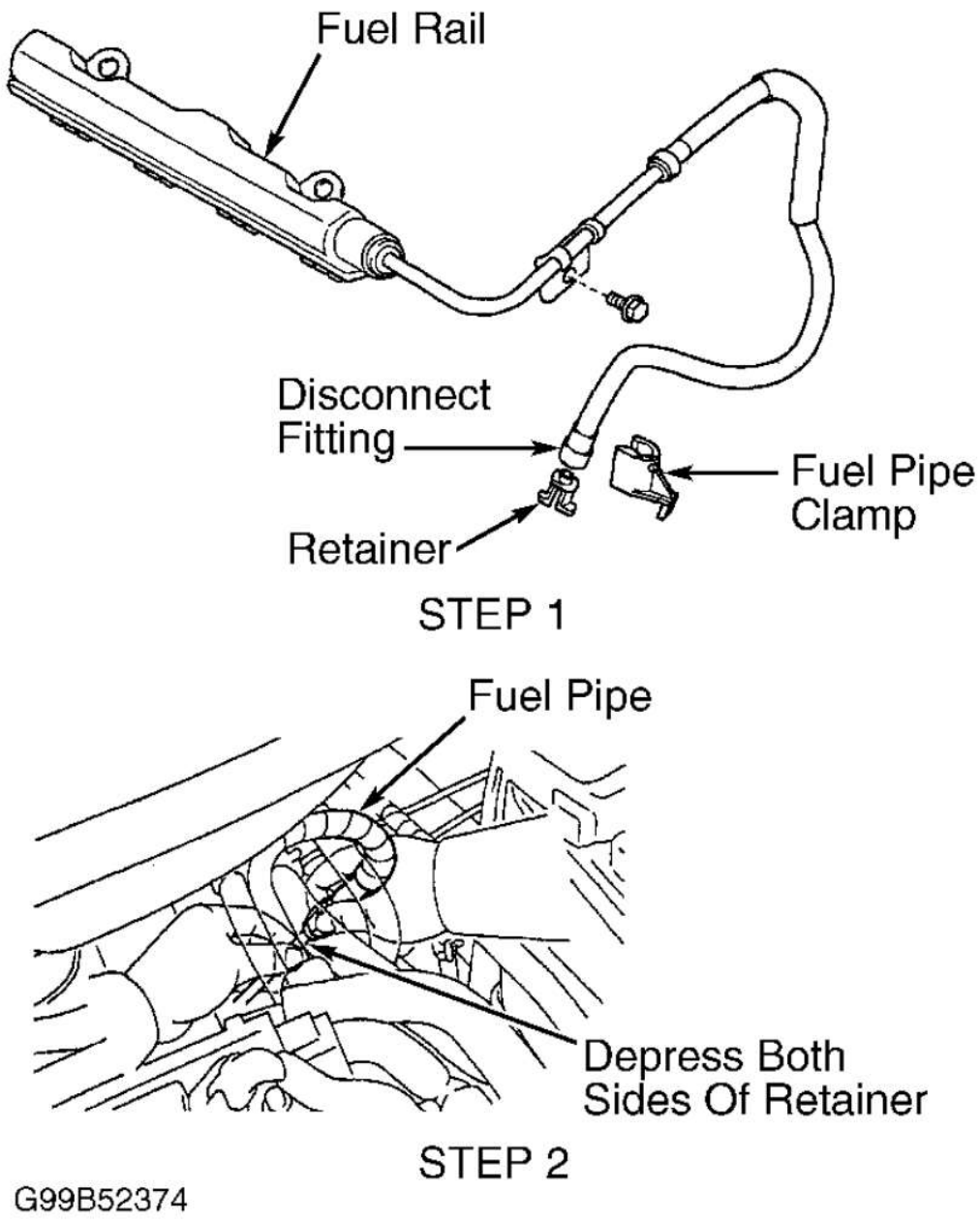


Fig. 132: Locating Fuel Pipe Clamp & Disconnecting Fuel Pipe From Fuel Pipe Fitting (Celica)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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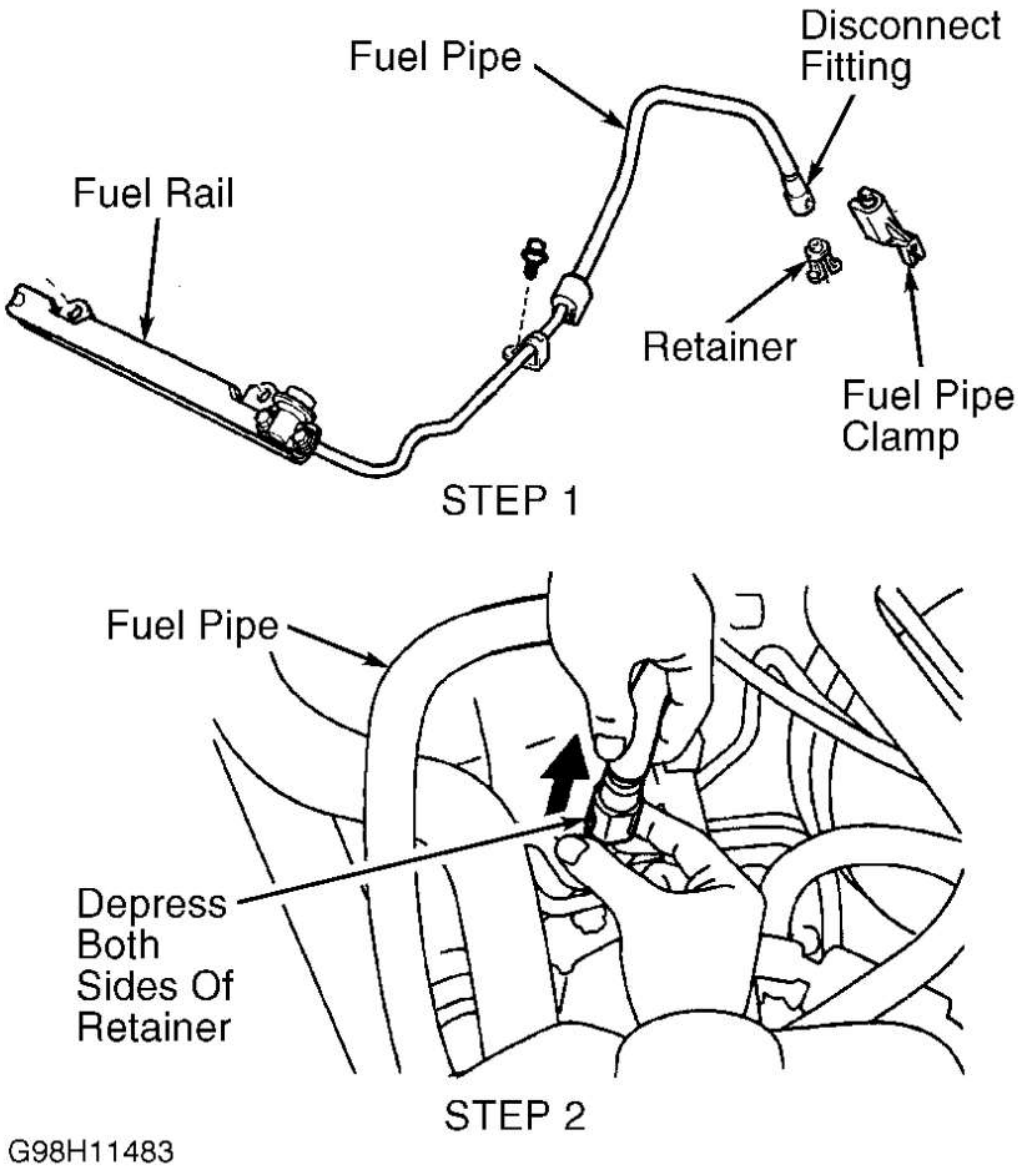


Fig. 133: Locating Fuel Pipe Clamp & Disconnecting Fuel Pipe From Fuel Pipe Fitting (Corolla)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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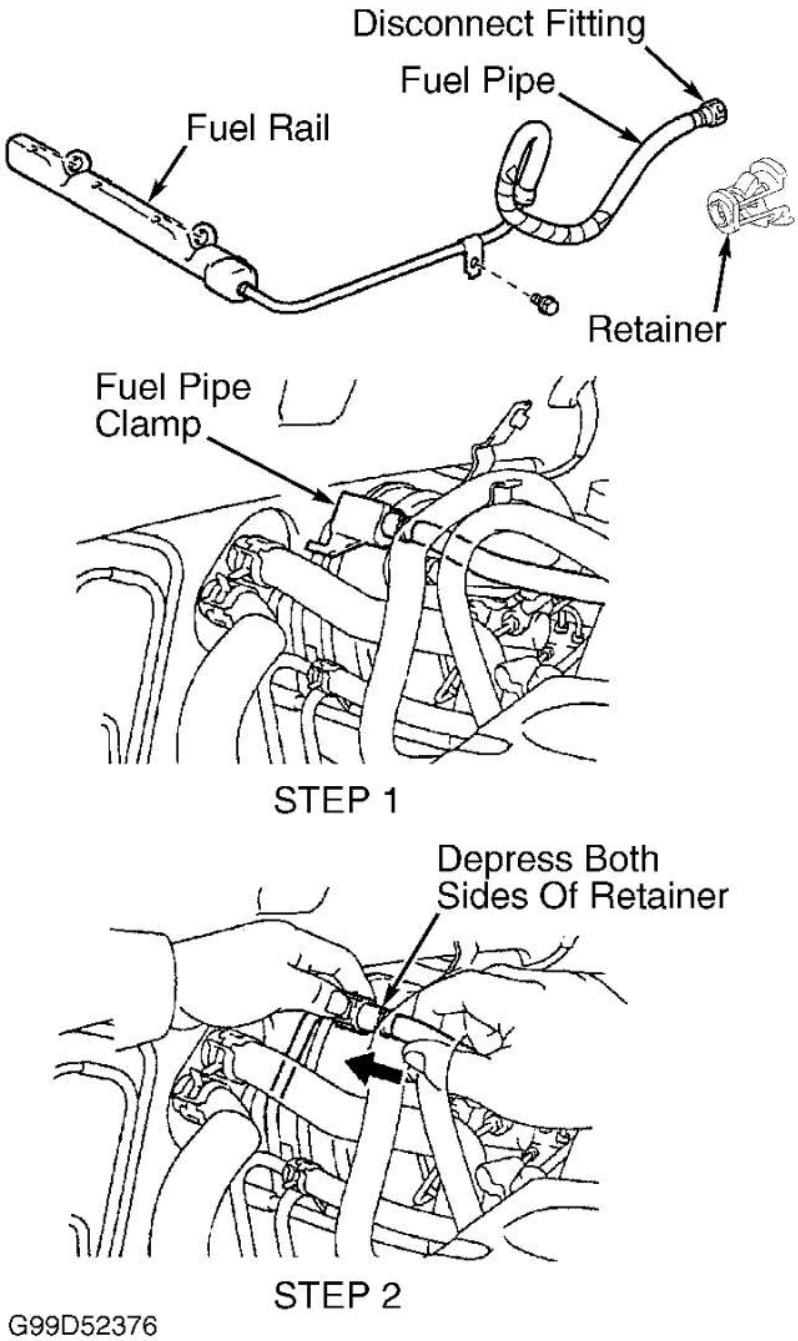


Fig. 134: Locating Fuel Pipe Clamp & Disconnecting Fuel Pipe From Fuel Pipe Fitting (ECHO)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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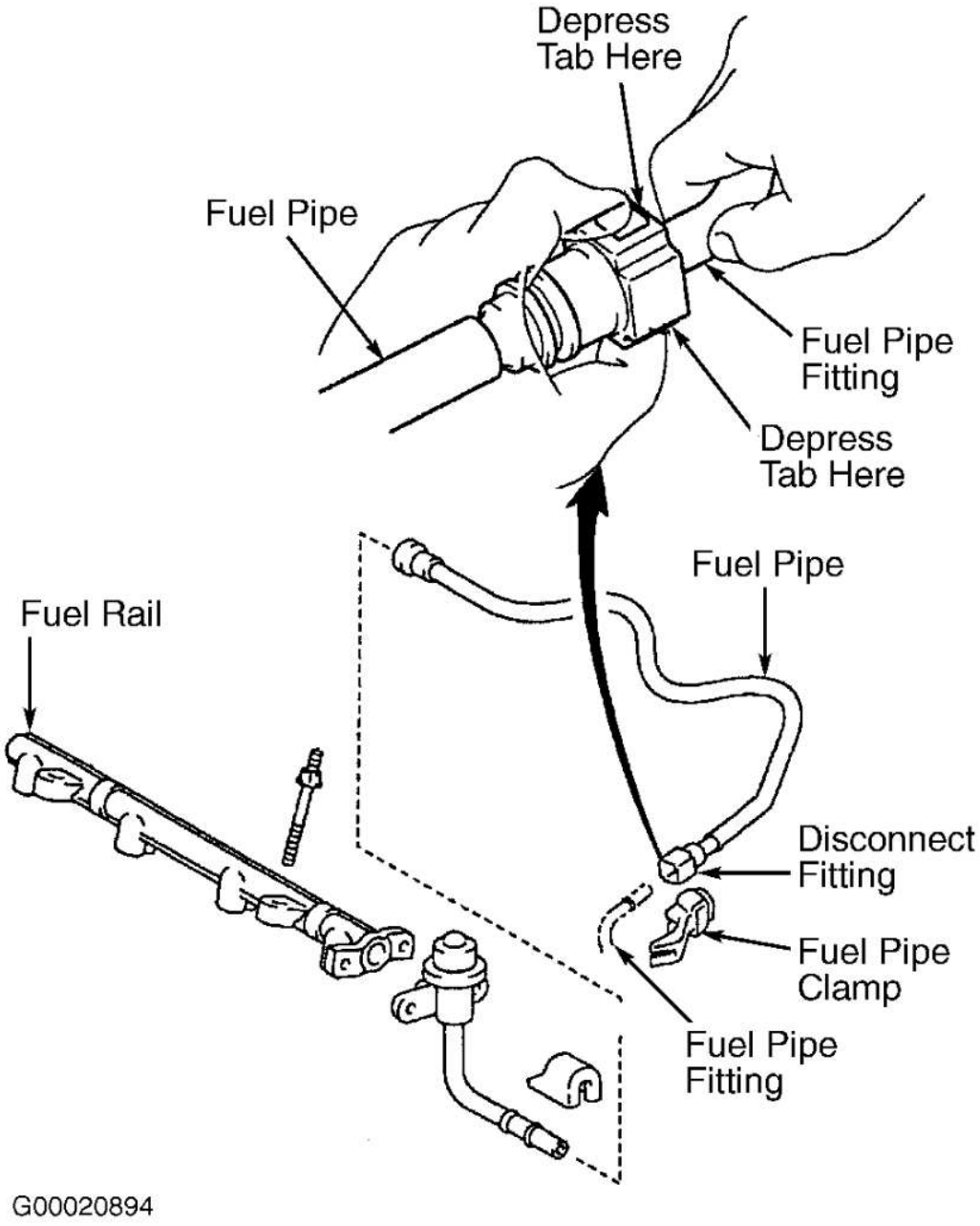
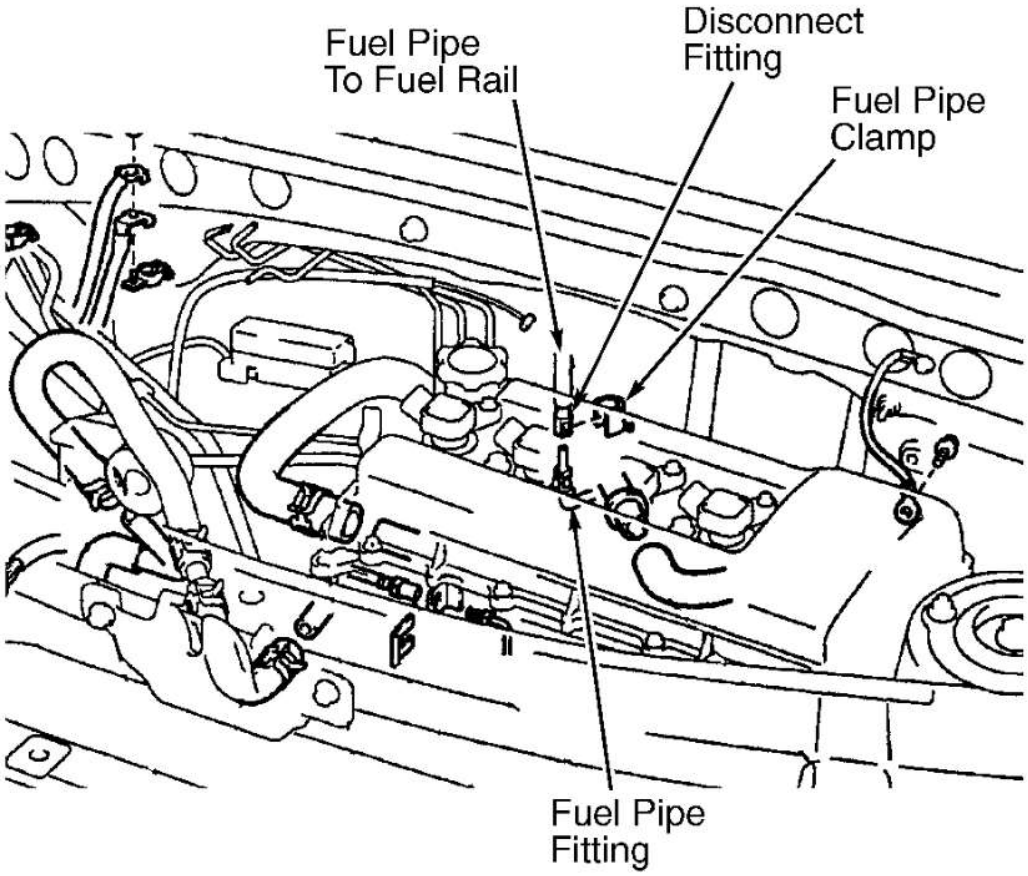
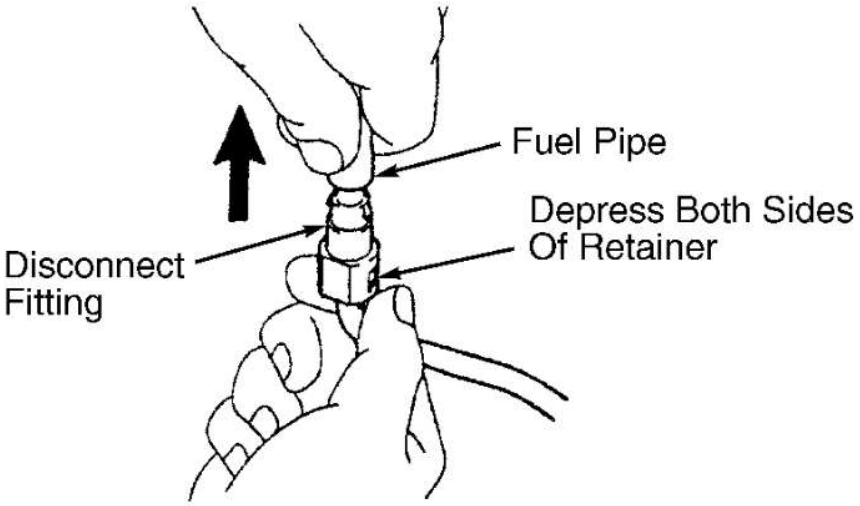


Fig. 135: Locating Fuel Pipe Clamp & Disconnecting Fuel Pipe From Fuel Pipe Fitting (Highlander)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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STEP 1



STEP 2

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Fig. 136: Locating Fuel Pipe Clamp & Disconnecting Fuel Pipe From Fuel Pipe Fitting (MR2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

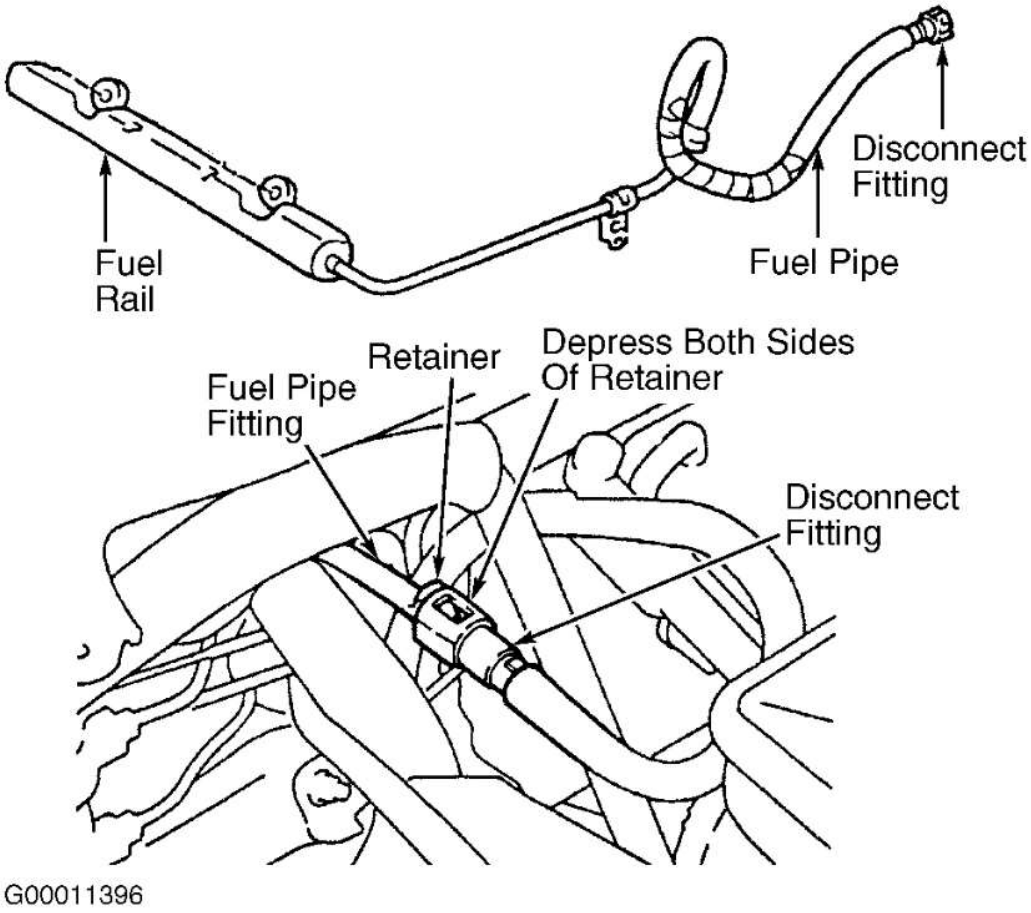


Fig. 137: Locating Fuel Pipe & Disconnecting Fuel Pipe From Fuel Pipe Fitting (Prius)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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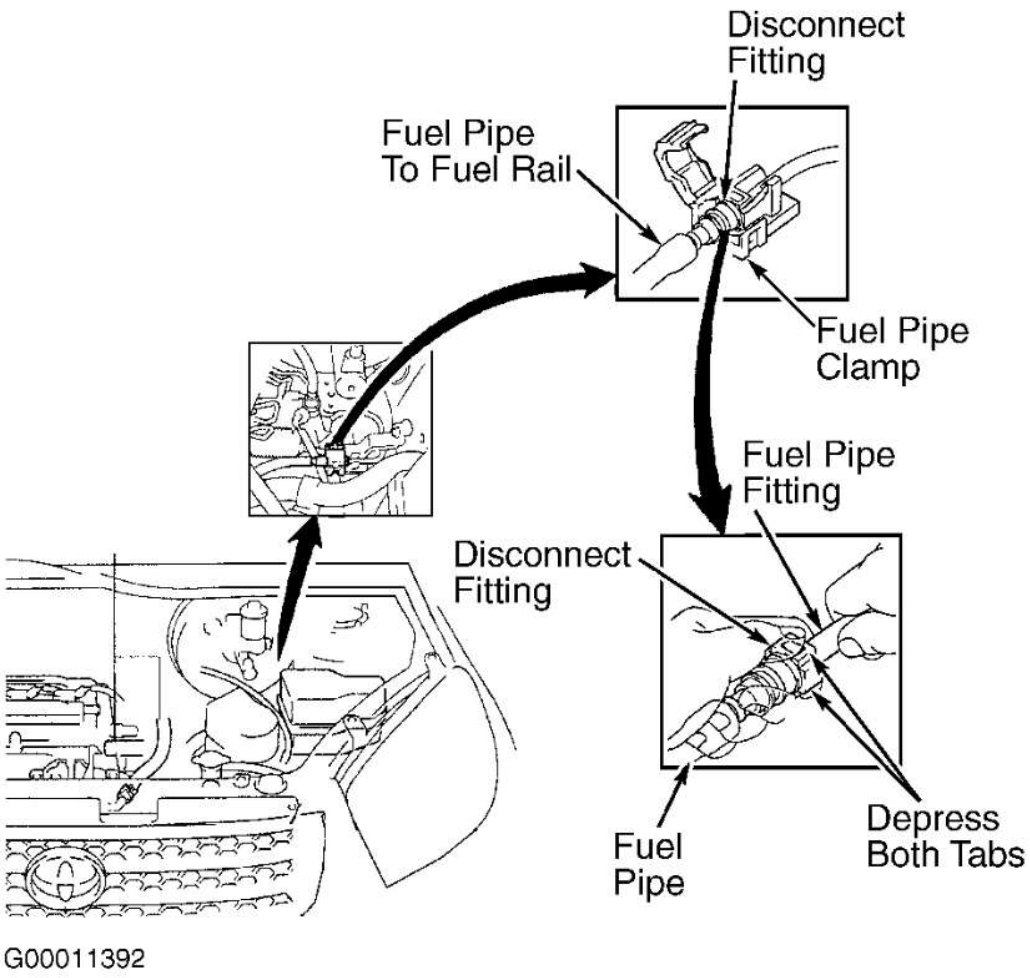


Fig. 138: Locating Fuel Pipe Clamp & Disconnecting Fuel Pipe From Fuel Pipe Fitting (RAV4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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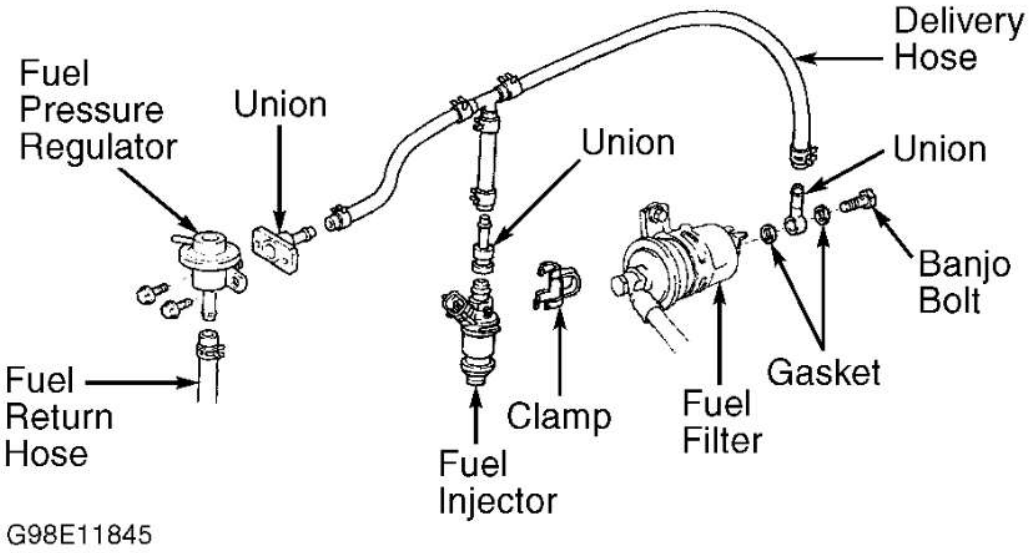


Fig. 139: Connections For Testing Fuel Injector (Tacoma)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Fuel Cut System (Camry & Highlander)

1. Connect Toyota hand-held tester or scan tool to data link connector No. 3 at driver's side of instrument panel. See **Fig. 8** and **Fig. 13** . Hand-held tester or scan tool is used to read engine RPM. Start engine and warm engine to normal operating temperature.
2. Gradually increase engine speed to 3500 RPM. Using stethoscope, check for fuel injector operating sound. Ensure when throttle lever is released, fuel injector stops operating momentarily and then resumes operating. Shut engine off. Remove hand-held tester or scan tool.

Fuel Cut System (Camry Solara, Celica, Corolla, ECHO, MR2, RAV4 & Tacoma)

1. Connect Toyota hand-held tester or scan tool to data link connector No. 3 at driver's side of instrument panel. See **Fig. 9** -**Fig. 17** . Hand-held tester or scan tool is used to read engine RPM. Start engine and warm engine to normal operating temperature.
2. Ensure A/C is off. Gradually increase engine speed to 3500 RPM. Using stethoscope, check for fuel injector operating sound. Ensure when throttle lever is released, fuel injector stops operating momentarily and then resumes operating (fuel return RPM).
3. Ensure fuel return RPM is within specification. See **FUEL CUT SYSTEM SPECIFICATIONS** table. Shut engine off. Remove hand-held tester or scan tool.

FUEL CUT SYSTEM SPECIFICATIONS (1)

Application	Fuel Return RPM

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Camry Solara	
A/T	1500
M/T	1200
Celica, Corolla, ECHO, MR2 & RAV4	1400
Tacoma	
A/T	1500
M/T	1400
(1) Check with engine at normal operating temperature and A/C off.	

Fuel Cut System (Prius)

WARNING: Read service precautions before proceeding with service procedure. See SERVICE PRECAUTIONS .

1. It is necessary to put transit in inspection mode so engine will run continuously when checking fuel cut system. To put transit in inspection mode, perform the following steps within 60 seconds:
   - Ensure ignition is off and then turn ignition on.
   - Ensure transaxle is in Park and then fully depress accelerator pedal 2 times.
   - Place transaxle in Neutral and then fully depress accelerator pedal 2 times.
   - Place transaxle back in Park and then fully depress accelerator pedal 2 times.
2. Check that master warning light on instrument cluster at center of instrument panel is flashing to indicate inspection mode operation. See **Fig. 140** . Master warning light may also be referred to as hybrid system error warning light. Turn ignition switch to START position to start engine. Engine will now start and run continuously.
3. Connect Toyota hand-held tester or scan tool to data link connector No. 3 at driver's side of instrument panel. See **Fig. 15** . Hand-held tester or scan tool is used to read engine RPM. Warm engine to normal operating temperature.
4. Ensure A/C is off. Gradually increase engine speed to 2250 RPM. Using stethoscope, check for fuel injector operating sound. Ensure when throttle lever is released, fuel injector stops operating momentarily and then resumes operating. Ensure when throttle lever is released, fuel injector stops operating momentarily and then resumes operating at 1400 RPM which is the fuel return RPM. Shut engine off. Remove hand-held tester or scan tool.

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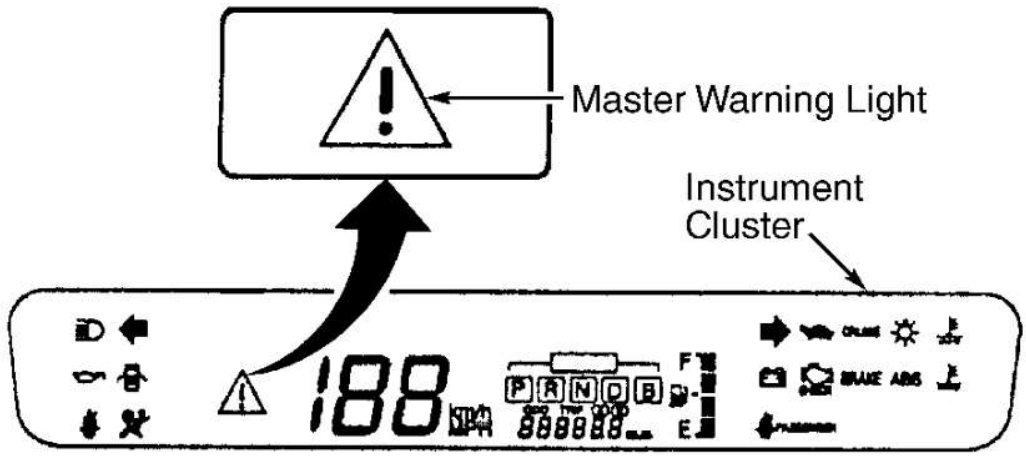


Fig. 140: Locating Master Warning Light (Prius)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

IDLE CONTROL SYSTEMS

IDLE AIR CONTROL VALVE

Celica & ECHO

1. Start engine and warm engine to normal operating temperature. Ensure idle speed is within specification. See **IDLE SPEED & MIXTURE** in ON-VEHICLE ADJUSTMENTS - 4-CYLINDER article.
2. Turn ignition off. Apply parking brake and place transaxle in Neutral. Ensure A/C is off. Install Jumper Wire (SST 09843-18020 or SST 09843-18040) between terminals No. 4 (CG) and No. 13 (TC) on data link connector No. 3. See **Fig. 141** . Data link connector No. 3 is located behind driver's side of instrument panel. See **Fig. 10** and **Fig. 12** .
3. Start engine and note engine speed. Engine speed should increase to 900-1300 RPM for 5 seconds and then return to idle speed. If engine speed is as specified, turn ignition off and remove jumper wire. If engine speed is not as specified, turn ignition off and remove jumper wire. Go to next step.
4. To test Idle Air Control (IAC) valve operation, remove IAC valve from throttle body. See **THROTTLE BODY** under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article. Check that valve on inside of IAC valve is half open. See **Fig. 142** and **Fig. 143** . Reinstall electrical connector on IAC valve.
5. Disconnect electrical connector from Engine Coolant Temperature (ECT) sensor. On Celica, ECT sensor is located on flywheel end of cylinder head and contains Gray electrical connector with Green and Brown wires. On ECHO, ECT sensor is located on flywheel end of cylinder head and contains Gray electrical connector with Red/Blue and Brown wires.
6. On all models, turn ignition on. Check that valve on inside of IAC valve moves. Repeatedly disconnect

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and reconnect electrical connector for IAC valve several times while checking that valve on inside of IAC valve opens and closes. See **Fig. 142** and **Fig. 143** .

7. Turn ignition off. Reinstall electrical connector on ECT sensor. If IAC valve operates as specified, wiring circuit, Engine Control Module (ECM) and IAC valve are okay. If IAC valve does not operate, check wiring circuit between ECM and IAC valve. On Celica, ECM is located in engine compartment, below cover, just in front of battery, next to driver's side strut tower. On ECHO, ECM is located behind glove box. On all models, for illustration of ECM location, see THEORY & OPERATION article. See **WIRING DIAGRAMS** article. On all models, if wiring circuit and ECM are okay, replace IAC valve.

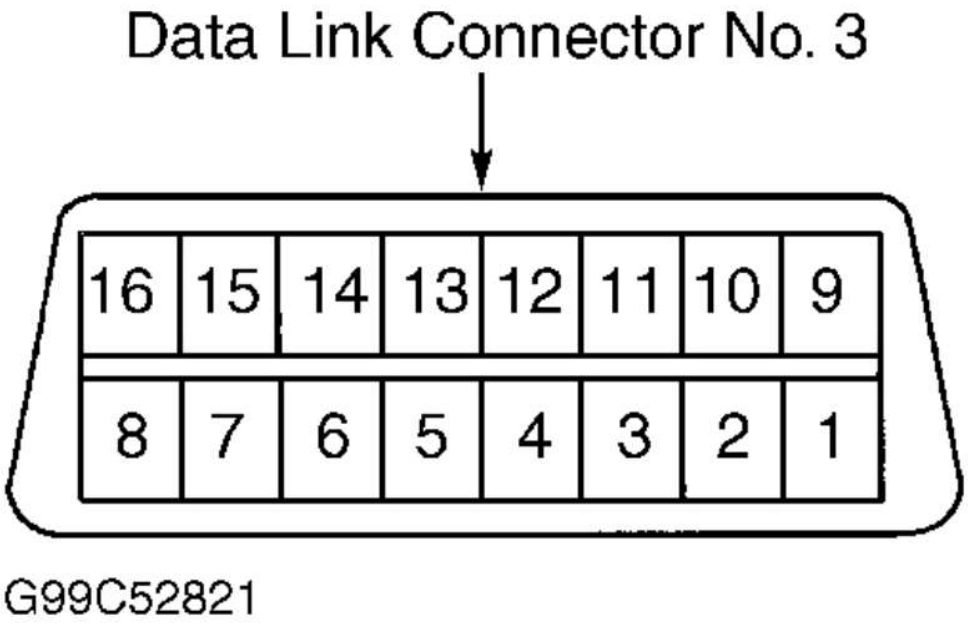


Fig. 141: Identifying Terminals On Data Link Connector No. 3 (Celica, ECHO, MR2, RAV4 & Tacoma)
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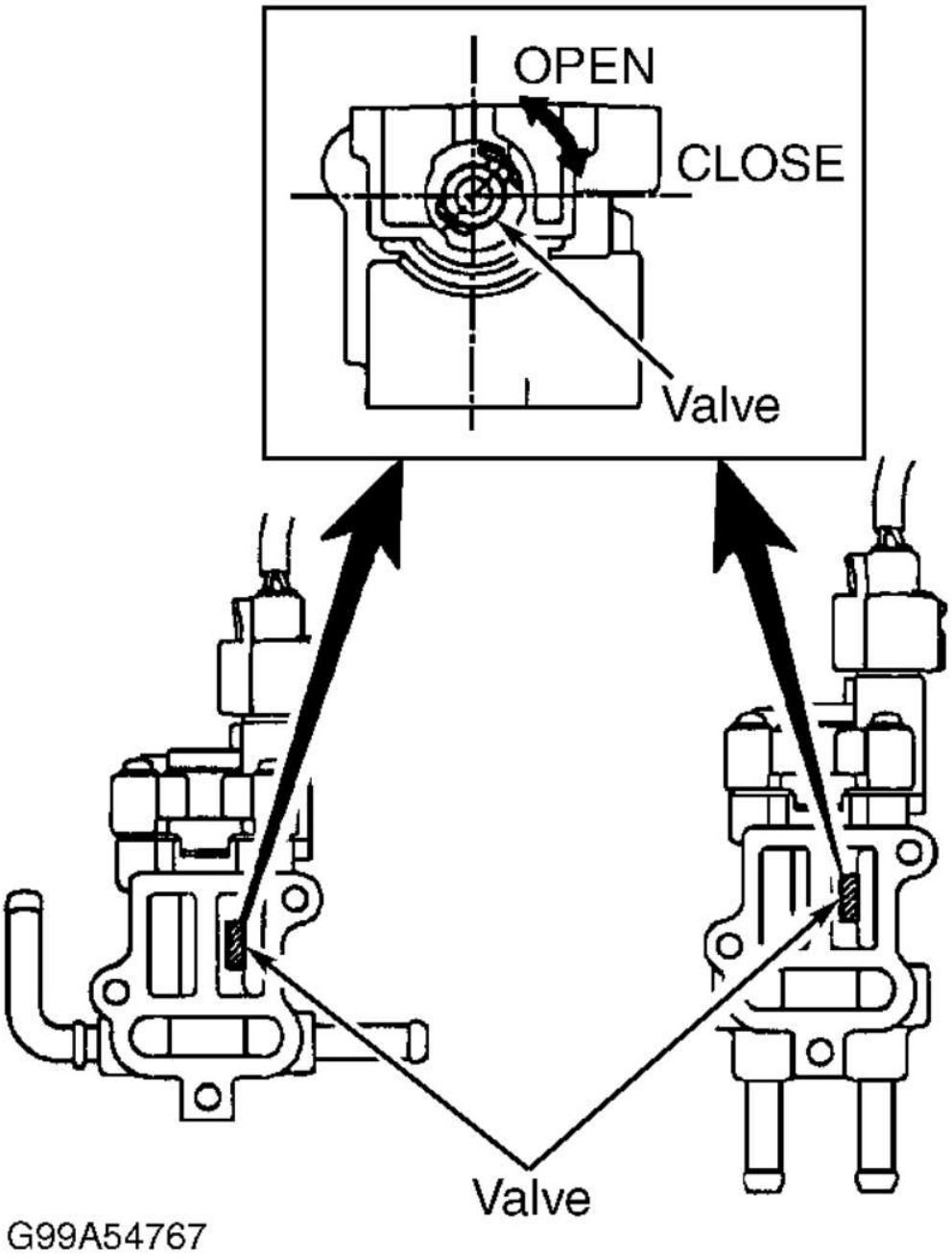


Fig. 142: Testing Idle Air Control Valve Operation (Celica)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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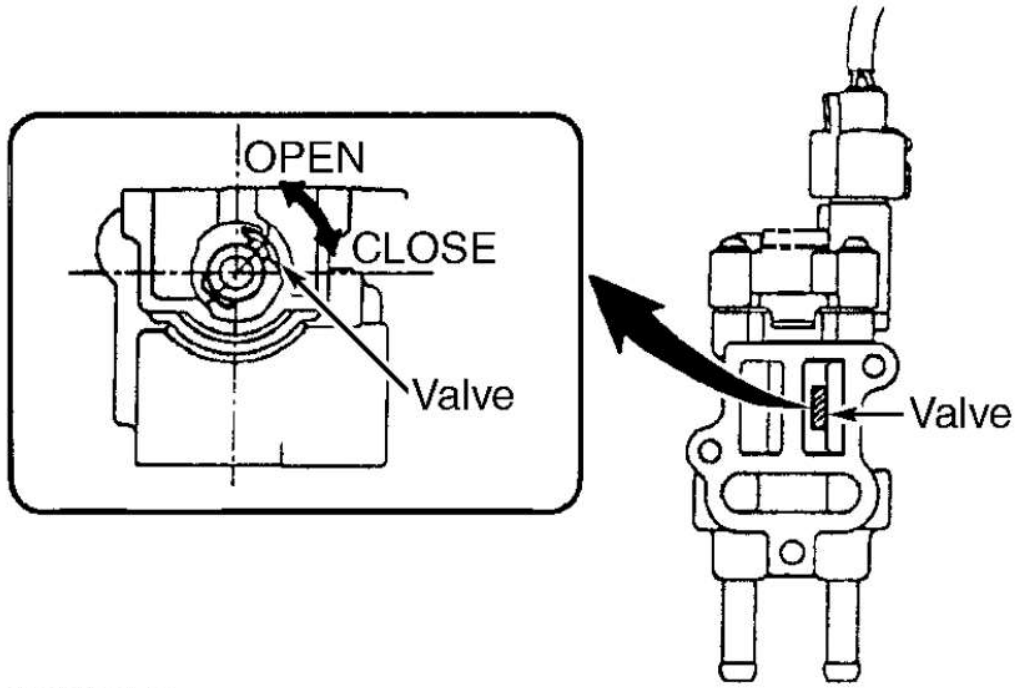


Fig. 143: Testing Idle Air Control Valve Operation (ECHO & MR2 With Standard Type Manual Transaxle)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Corolla

1. Start engine and warm engine to normal operating temperature. Ensure idle speed is within specification. See **IDLE SPEED & MIXTURE** in ON-VEHICLE ADJUSTMENTS - 4-CYLINDER article.
2. Turn ignition off. Apply parking brake and place transaxle in Neutral. Ensure A/C is off. Install Jumper Wire (SST 09843-18020 or SST 09843-18040) between terminals TE1 and E1 on data link connector No. 1. See **Fig. 144** . Data link connector No. 1 is located at driver's side of engine compartment, near strut tower.
3. Start engine and note engine speed. Engine speed should increase to 900-1300 RPM for 5 seconds and then return to idle speed. If engine speed is as specified, turn ignition off and remove jumper wire. If engine speed is not as specified, turn ignition off and remove jumper wire. Go to next step.
4. To test Idle Air Control (IAC) valve operation, remove IAC valve from throttle body. See **THROTTLE BODY** under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article. Check that valve on inside of IAC valve is half open. See **Fig. 145** . Reinstall electrical connector on IAC valve.
5. Disconnect electrical connector from Engine Coolant Temperature (ECT) sensor. ECT sensor is located

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on flywheel end of cylinder head and contains Dark Gray electrical connector with White and Brown wires.

6. Turn ignition on. Check that valve on inside of IAC valve moves. Repeatedly disconnect and reconnect electrical connector for IAC valve several times while checking that valve on inside of IAC valve opens and closes. See **Fig. 145** .
7. Turn ignition off. Reinstall electrical connector on ECT sensor. If IAC valve operates as specified, wiring circuit, Engine Control Module (ECM) and IAC valve are okay. If IAC valve does not operate, check wiring circuit between ECM and IAC valve. ECM is located behind stereo on instrument panel, just in front of center console. For illustration of ECM location, see **THEORY & OPERATION** article. It may be necessary to remove bolts from ECM so electrical connectors can be accessed on ECM. See **ENGINE CONTROL MODULE** under COMPUTERIZED ENGINE CONTROLS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article. See **WIRING DIAGRAMS** article. If wiring circuit and ECM are okay, replace IAC valve.

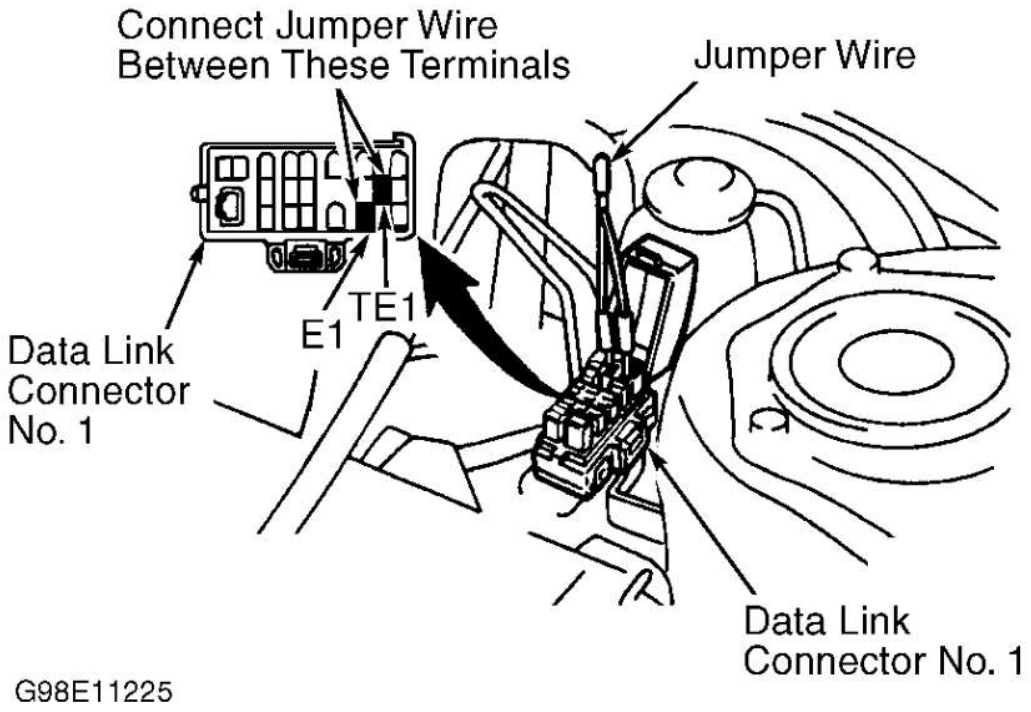


Fig. 144: Installing Jumper Wire Between Data Link Connector No. 1 Terminals (Corolla)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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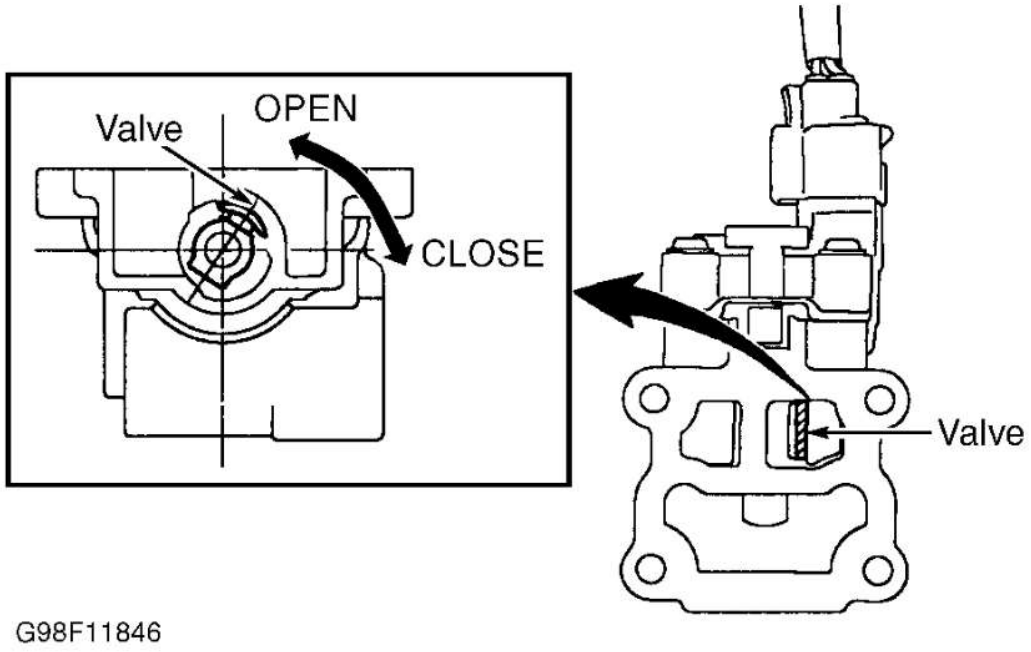


Fig. 145: Testing Idle Air Control Valve Operation (Corolla)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Highlander

1. If problem exists in Idle Air Control (IAC) valve or wiring circuit, a Diagnostic Trouble Code (DTC) P0505 may be stored in Engine Control Module (ECM). See TESTING PROCEDURE under SELF-DIAGNOSTIC SYSTEM in appropriate SELF-DIAGNOSTICS article for retrieving of DTCs.
2. To test IAC valve operation, remove IAC valve from throttle body. See **THROTTLE BODY** under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article. Reinstall electrical connector on IAC valve.
3. Turn ignition on. Check that valve on inside of IAC valve moves from half open to fully closed, fully open and then returns to half open within .5 seconds. See **Fig. 146** . Turn ignition off. If IAC valve operates as specified, wiring circuit, Engine Control Module (ECM) and IAC valve are okay.
4. If IAC valve operates as specified, wiring circuit, Engine Control Module (ECM) and IAC valve are okay. Clear any stored DTCs from ECM after checking IAC valve operation. See CLEARING DIAGNOSTIC TROUBLE CODES under SELF-DIAGNOSTIC SYSTEM in appropriate SELF-DIAGNOSTICS article. If IAC valve does not operate, check wiring circuit between ECM and IAC valve. ECM is located behind glove box. For illustration of ECM location, see **THEORY & OPERATION** article. See **WIRING DIAGRAMS** article. If wiring circuit and ECM are okay, replace IAC valve.

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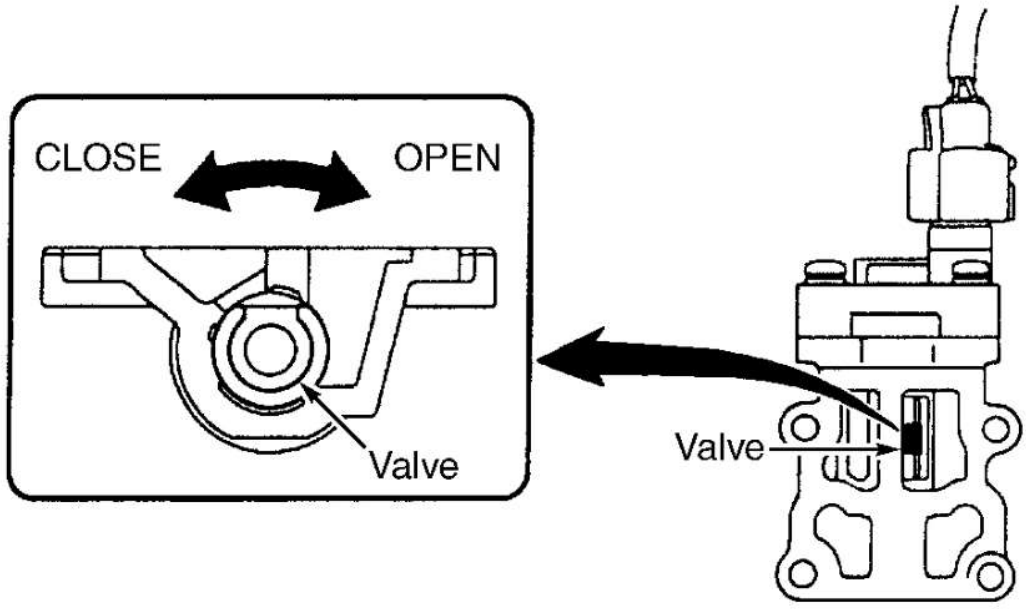


Fig. 146: Testing Idle Air Control Valve Operation (Highlander & RAV4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

MR2 With Standard Type Manual Transaxle

NOTE: Idle Air Control (IAC) valve is used only on models with standard type manual transaxle.

1. Start engine and warm engine to normal operating temperature. Ensure idle speed is within specification. See **IDLE SPEED & MIXTURE** in ON-VEHICLE ADJUSTMENTS - 4-CYLINDER article.
2. Turn ignition off. Apply parking brake and place transaxle in Neutral. Ensure A/C is off. Install Jumper Wire (SST 09843-18020 or SST 09843-18040) between terminals No. 4 (CG) and No. 13 (TC) on data link connector No. 3. See **Fig. 141** . Data link connector No. 3 is located behind driver's side of instrument panel. See **Fig. 14** .
3. Start engine and note engine speed. Engine speed should increase to 1000-1500 RPM for 5 seconds and then return to idle speed. If engine speed is as specified, turn ignition off and remove jumper wire. If engine speed is not as specified, turn ignition off and remove jumper wire. Go to next step.
4. To test IAC operation, remove IAC valve from throttle body. See **THROTTLE BODY** under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article. Check that valve on inside of IAC valve is half open. See **Fig. 143** . Reinstall electrical connector on IAC valve.
5. Turn ignition on. Check that valve on inside of IAC valve moves from half open to fully closed, fully open and then returns to half open within .5 seconds. See **Fig. 143** . Turn ignition off.

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6. If IAC valve operates as specified, wiring circuit, Engine Control Module (ECM) and IAC valve are okay. If IAC valve does not operate, check wiring circuit between ECM and IAC valve. ECM is located on inside of firewall, directly behind driver's seat and luggage compartment. For illustration of ECM location, see **THEORY & OPERATION** article. See **ENGINE CONTROL MODULE** under COMPUTERIZED ENGINE CONTROLS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article for removal of components for access to ECM. See **WIRING DIAGRAMS** article. If wiring circuit and ECM are okay, replace IAC valve.

RAV4

1. Start engine and warm engine to normal operating temperature. Ensure idle speed is within specification. See **IDLE SPEED & MIXTURE** in ON-VEHICLE ADJUSTMENTS - 4-CYLINDER article.
2. Turn ignition off. Apply parking brake and place transaxle in Neutral. Ensure A/C is off. Install Jumper Wire (SST 09843-18020 or SST 09843-18040) between terminals No. 4 (CG) and No. 13 (TC) on data link connector No. 3. See **Fig. 141** . Data link connector No. 3 is located behind driver's side of instrument panel. See **Fig. 16** .
3. Start engine and note engine speed. Engine speed should increase to 900-1500 RPM for 5 seconds and then return to idle speed. If engine speed is as specified, turn ignition off and remove jumper wire. If engine speed is not as specified, turn ignition off and remove jumper wire. Go to next step.
4. To test Idle Air Control (IAC) valve operation, remove IAC valve from throttle body. See **THROTTLE BODY** under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article. Check that valve on inside of IAC valve is half open. See **Fig. 146** . Reinstall electrical connector on IAC valve.
5. Turn ignition on. Check that valve on inside of IAC valve moves from half open to fully closed, fully open and then returns to half open within .5 seconds. See **Fig. 146** . Turn ignition off.
6. If IAC valve operates as specified, wiring circuit, Engine Control Module (ECM) and IAC valve are okay. If IAC valve does not operate, check wiring circuit between ECM and IAC valve. ECM is located behind passenger's side kick panel, just below instrument panel. For illustration of ECM location, see **THEORY & OPERATION** article. See **WIRING DIAGRAMS** article. If wiring circuit and ECM are okay, replace IAC valve.

Tacoma

1. Start engine and warm engine to normal operating temperature. Ensure idle speed is within specification. See **IDLE SPEED & MIXTURE** in ON-VEHICLE ADJUSTMENTS - 4-CYLINDER article.
2. Turn ignition off. Apply parking brake and place transmission in Neutral. Install Jumper Wire (SST 09843-18020 or SST 09843-18040) between terminals No. 4 (CG) and No. 13 (TC) on data link connector No. 3. See **Fig. 141** . Data link connector No. 3 is located behind driver's side of instrument panel. See **Fig. 17** .
3. Start engine and note engine speed. Engine speed should increase to 1000-1500 RPM for 5 seconds and then return to idle speed. If engine speed is as specified, turn ignition off and remove jumper wire. If engine speed is not as specified, turn ignition off and remove jumper wire. Go to next step.
4. To test Idle Air Control (IAC) valve operation, remove IAC valve from throttle body. See **THROTTLE BODY** under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article. Check that valve on inside of IAC valve is half open. See **Fig. 147** . Reinstall electrical connector

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on IAC valve.

5. Disconnect electrical connector from Engine Coolant Temperature (ECT) sensor. ECT sensor is located on coolant housing at rear of cylinder head and contains Dark Gray 2-pin electrical connector with Green/Red and Blue/Black wires.
6. Turn ignition on. Check that valve on inside of IAC valve moves. Repeatedly disconnect and reconnect electrical connector for IAC valve several times while checking that valve on inside of IAC valve opens and closes. See **Fig. 147** .
7. Turn ignition off. Reinstall electrical connector on ECT sensor. If IAC valve operates as specified, wiring circuit, Engine Control Module (ECM) and IAC valve are okay. If IAC valve does not operate, check wiring circuit between ECM and IAC valve. ECM is located behind glove box. For illustration of ECM location, see **THEORY & OPERATION** article. See **WIRING DIAGRAMS** article. If wiring circuit and ECM are okay, replace IAC valve.

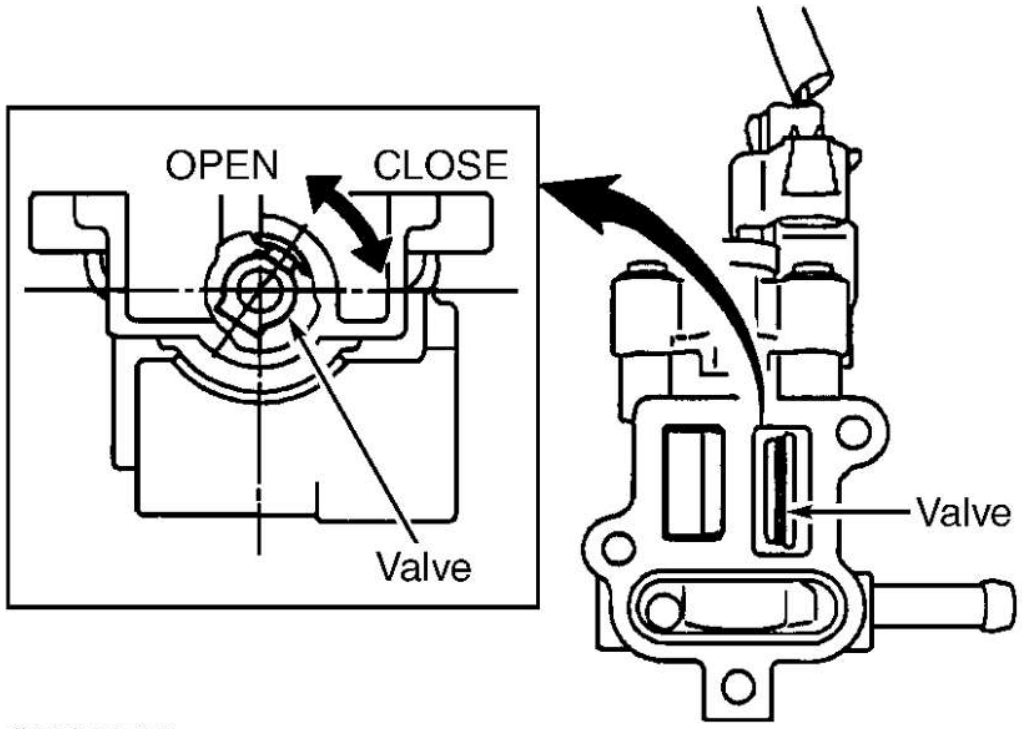


Fig. 147: Testing Idle Air Control Valve Operation (Tacoma)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

THROTTLE BODY

Camry & Camry Solara

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1. Electronic Throttle Control System (ETCS) is used for controlling idle speed. ETCS consists of throttle body, accelerator pedal position sensor, Throttle Position (TP) sensor, throttle control motor and Engine Control Module (ECM).
2. To test throttle control motor operation, turn ignition on. Depress accelerator pedal to operate accelerator pedal position sensor while listing for operating sound at throttle control motor and note that no grinding noise is heard at throttle control motor and throttle body. Accelerator pedal position sensor is located near top of accelerator pedal and throttle control motor is located on the throttle body. See **Fig. 148** .
3. If throttle control motor operating sound is heard, go to next step. If throttle control motor operating sound is not heard, throttle control motor, wiring harness or ECM may be defective. ECM is located on behind glove box. For illustration of ECM location, see THEORY & OPERATION article. For wiring of throttle control motor, see **WIRING DIAGRAMS** article. For testing of throttle control motor, go to step 6 .
4. To test accelerator pedal position sensor, turn ignition off. Connect Toyota hand-held tester or scan tool to data link connector No. 3 at driver's side of instrument panel. See **Fig. 8** and **Fig. 9** . Turn ignition on. Hand-held tester or scan tool is used to read throttle valve opening which is displayed as a percentage. Ensure Malfunction Indicator Light (MIL) on instrument panel is not illuminated. MIL is displayed as an engine icon. If MIL is not illuminated, go to next step. If MIL is illuminated, a Diagnostic Trouble Code (DTC) may be stored in ECM. See TESTING PROCEDURE under SELF-DIAGNOSTIC SYSTEM in appropriate SELF-DIAGNOSTICS article for retrieving of DTCs.
5. Read throttle valve opening on hand-held tester or scan tool by accessing THROTTLE POS under CURRENT DATA. Read throttle valve opening while fully depressing accelerator pedal to operate accelerator pedal position sensor. Throttle valve opening should be 60 percent or more. Turn ignition off. If throttle valve opening is 60 percent or more, go to next step. If throttle valve opening is not at least 60 percent, problem may exist in accelerator position sensor, wiring circuit or ECM. If necessary to check wiring between ECM and accelerator pedal position sensor, see **WIRING DIAGRAMS** article. ECM is located behind glove box. For illustration of ECM location, see **THEORY & OPERATION** article. For testing of accelerator pedal position sensor, see **ACCELERATOR PEDAL POSITION SENSOR** under ENGINE SENSORS & SWITCHES.
6. To test throttle control motor, disconnect electrical connector from side of throttle body. See **Fig. 148** . Note electrical terminal identification on throttle body. See **Fig. 149** . Using ohmmeter, check resistance between specified terminals on throttle control motor. See **THROTTLE CONTROL MOTOR RESISTANCE** table. If resistance is within specification, reinstall electrical connector. If resistance is not within specification, replace throttle body with throttle control motor as an assembly.

THROTTLE CONTROL MOTOR RESISTANCE

Terminal	Ohms @ 68°F (20°C)
M+ & M-	.3-100.0
VC & E2	1.2-3.2

7. To test Throttle Position (TP) sensor, disconnect electrical connector from side of throttle body. See **Fig. 148** . Note electrical terminal identification on throttle body. See **Fig. 149** . Using ohmmeter, check resistance between VC and E2 terminals on throttle body. Replace throttle body with TP sensor if resistance is not 1200-3200 ohms at 68°F (20°C).

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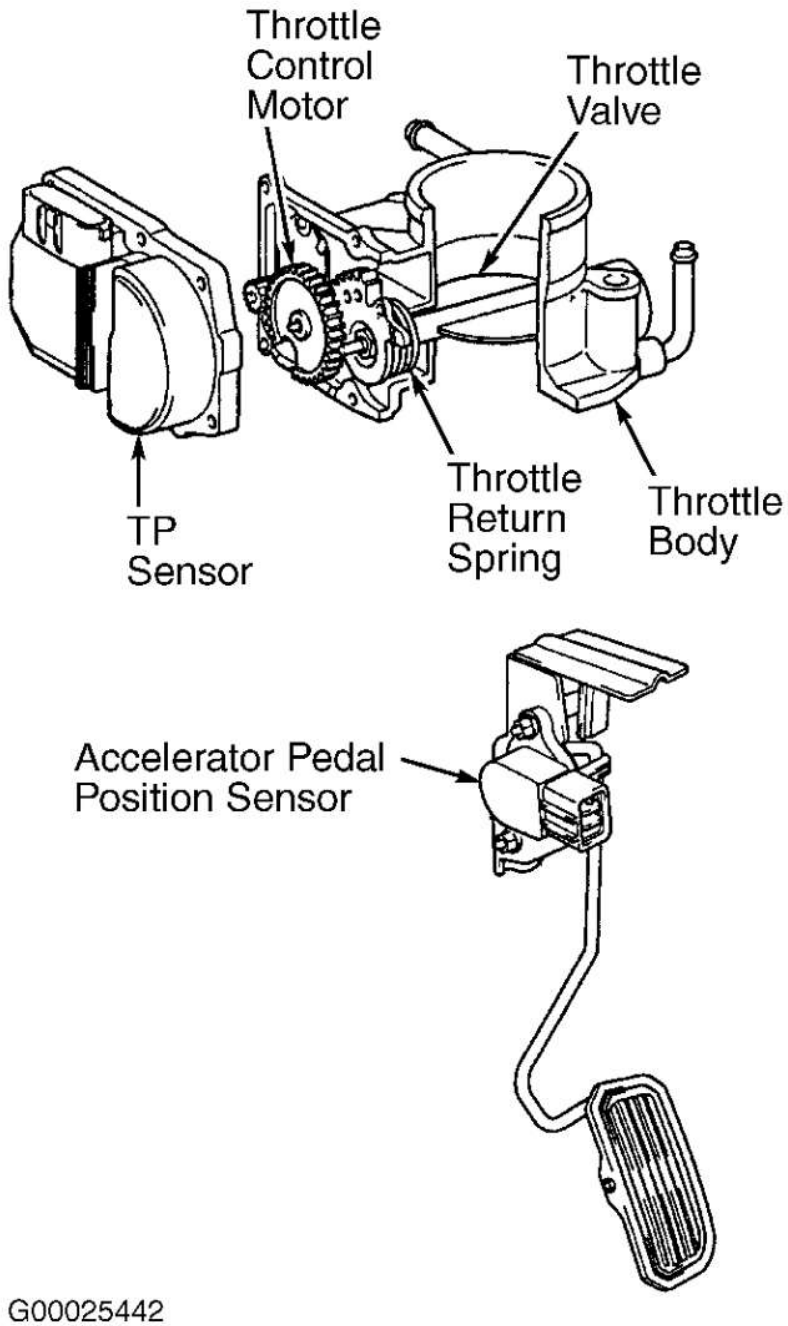


Fig. 148: Locating Electronic Throttle Control System Components On Throttle Body & Accelerator Pedal Position Sensor (Camry & Camry Solara)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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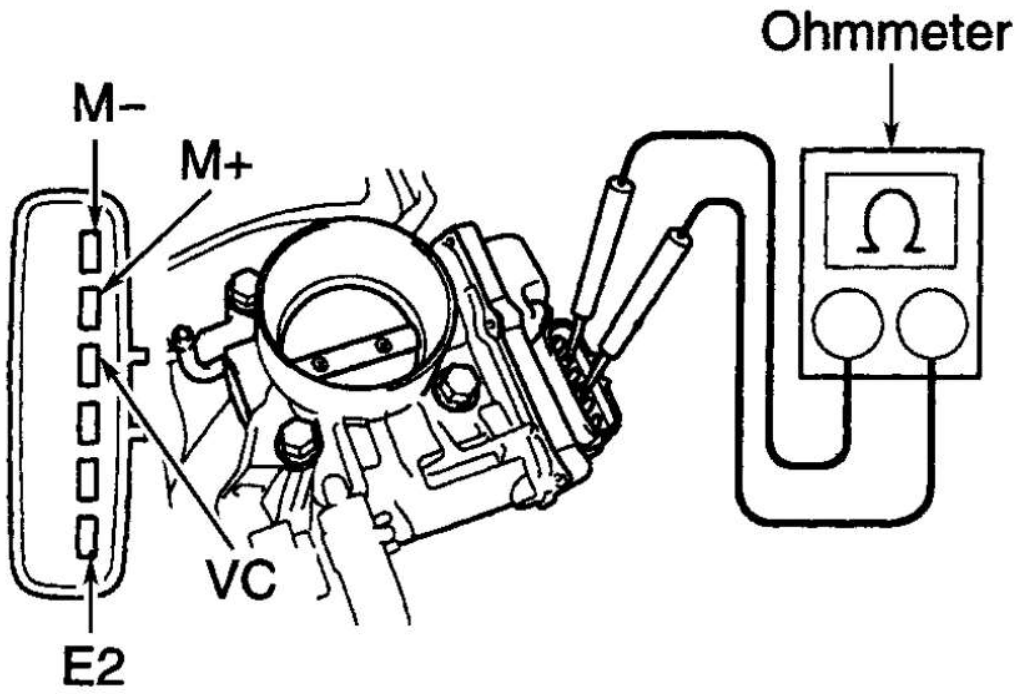


Fig. 149: Identifying Electrical Terminals On Throttle Body (Camry & Camry Solara)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Celica, Corolla, ECHO, MR2 With Standard Type Manual Transaxle & RAV4

Check that throttle linkage moves freely at throttle body. Procedure for checking vacuum supply at throttle body is not available from manufacturer.

Highlander

1. Check that throttle linkage moves freely at throttle body. Ensure no vacuum ports on throttle body are restricted. Procedure for checking vacuum supply at throttle body is not available from manufacturer.
2. Check that no clearance exists between throttle stop screw and throttle lever when throttle is fully closed. See **Fig. 150** . If clearance exists between throttle stop screw and throttle lever with throttle fully closed, go to next step.
3. Loosen lock nut on throttle stop screw. See **Fig. 150** . With clearance between throttle stop screw and throttle lever, hold throttle fully closed and tighten throttle stop screw until it just contacts throttle lever. Once throttle stop screw contacts the throttle lever, tighten throttle stop screw an additional 1/4 turn and then tighten lock nut. Ensure Throttle Position (TP) sensor operates properly after performing this procedure. See **THROTTLE POSITION SENSOR** under ENGINE SENSORS & SWITCHES.

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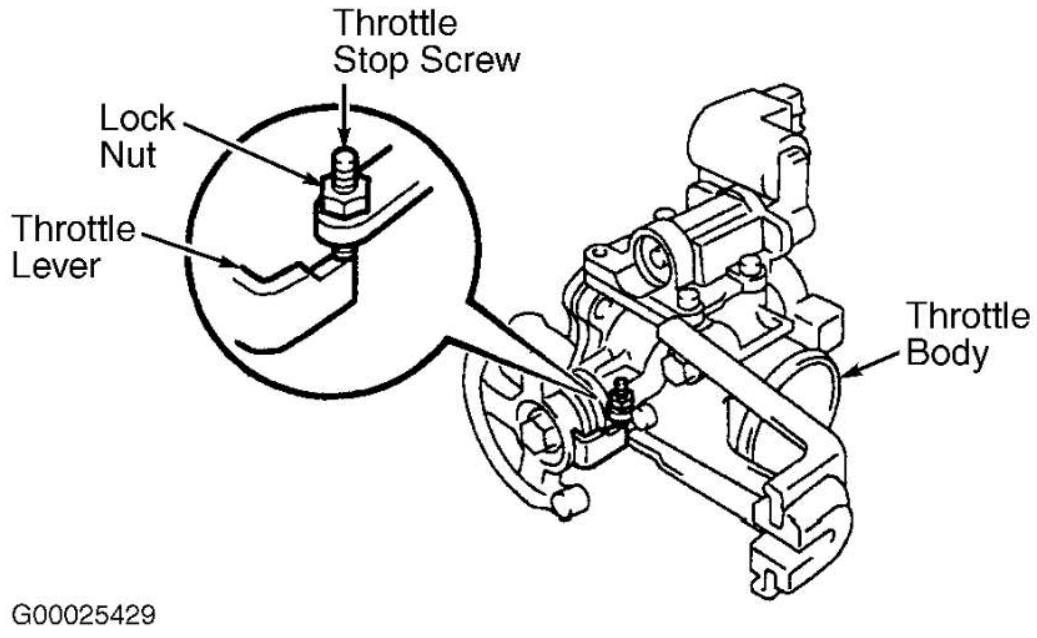


Fig. 150: Locating Throttle Stop Screw & Throttle Lever (Highlander)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

MR2 With Sequential Manual Transaxle

NOTE: A standard type manual transaxle and a sequential manual transaxle may be used. On models with a standard type manual transaxle, the driver operates the clutch and shifts the transaxle. On models with sequential manual transaxle, the transaxle is electronically controlled and the clutch is operated and transaxle is shifted hydraulically by moving shift lever forward or backward. Sequential manual transaxle may be identified by shift lever pattern which consists of "R", "N", "S" and "+" in place of the conventional type shift lever pattern and there is no clutch pedal. On this model, Electronic Throttle Control System (ETCS) is used for controlling idle speed. ETCS consists of throttle body, accelerator pedal position sensor, Throttle Position (TP) sensor, throttle control motor, magnetic clutch and Engine Control Module (ECM).

1. Ensure throttle cable and throttle lever on throttle body move smoothly. Note location of throttle control motor on throttle body. See **Fig. 151** .

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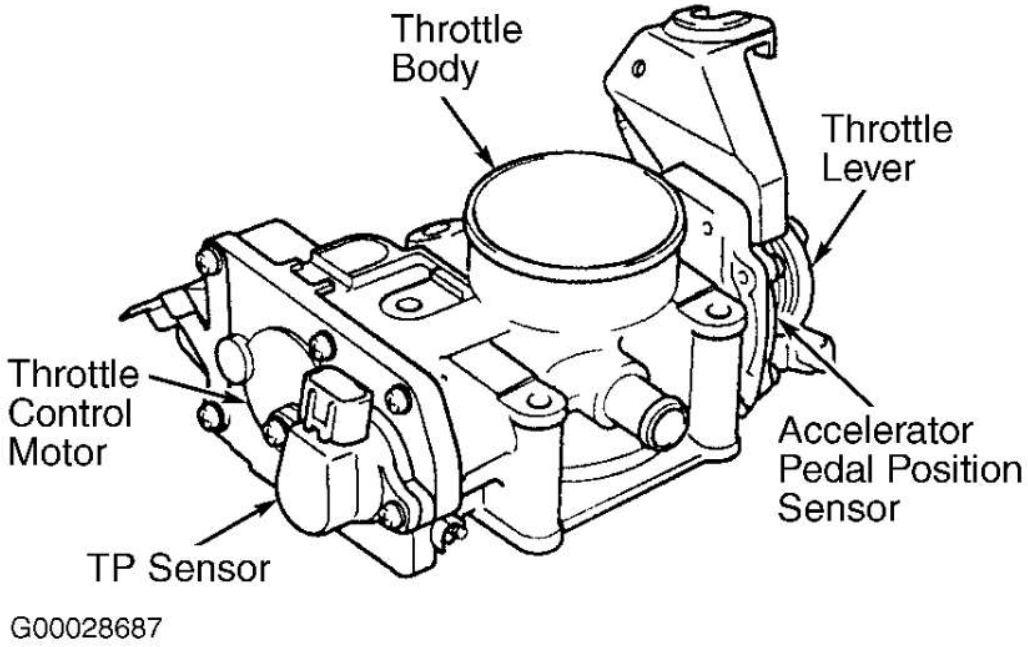


Fig. 151: Locating Electronic Throttle Control System Components On Throttle Body (MR2 With Sequential Manual Transaxle)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. To check throttle control motor operation, turn ignition on. Rotate throttle lever on throttle body to full throttle while listing for operating sound at throttle control motor and note that no grinding noise is heard at throttle control motor and throttle body. Throttle lever will also rotate accelerator pedal position sensor.
3. If throttle control motor operating sound is heard, go to next step. If throttle control motor operating sound is not heard, throttle control motor, wiring harness or ECM may be defective. ECM is located on inside of firewall, directly behind driver's seat and luggage compartment. For illustration of ECM location, see **THEORY & OPERATION** article. To remove components for access to ECM, see **ENGINE CONTROL MODULE** under COMPUTERIZED ENGINE CONTROLS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article. Go to step 12 for testing of throttle control motor. For wiring of throttle control motor, see **WIRING DIAGRAMS** article.
4. To test operation of accelerator pedal position sensor, Toyota hand-held tester may be used or voltmeter may be used. If using hand-held tester, go to next step. If using voltmeter, go to step 8 .
5. Connect hand-held tester to data link connector No. 3 at driver's side of instrument panel. See **Fig. 14** . Hand-held tester is used to read throttle valve opening which is displayed as a percentage. Ensure Malfunction Indicator Light (MIL) on instrument panel is not illuminated. MIL is displayed as an engine icon. If MIL is not illuminated, go to next step. If MIL is illuminated, a Diagnostic Trouble Code (DTC) may be stored in ECM. See TESTING PROCEDURE under SELF-DIAGNOSTIC SYSTEM in appropriate SELF-DIAGNOSTICS article for retrieving of DTCs.
6. Rotate throttle lever on throttle body to full throttle while reading throttle valve opening on hand-held

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tester which is accessed by THROTTLE POS under CURRENT DATA. Throttle lever will also rotate accelerator pedal position sensor. Throttle valve opening should be 60 percent or more.

7. If throttle valve opening is at least 60 percent, go to step 10 . If throttle valve opening is not at least 60 percent, problem may exist in accelerator pedal position sensor, wiring circuit or ECM. Go to step 16 for testing of accelerator pedal position sensor. For wiring of accelerator pedal position sensor, see **WIRING DIAGRAMS** article.
8. Access ECM. ECM is located on inside of firewall, directly behind driver's seat and luggage compartment. For illustration of ECM location, see **THEORY & OPERATION** article. To remove components for access to ECM, see **ENGINE CONTROL MODULE** under COMPUTERIZED ENGINE CONTROLS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
9. Ensure ignition is on. Using voltmeter, check voltage between ECM terminals VPA (Blue wire) and E2 (Brown wire) with accelerator pedal released and with accelerator pedal fully depressed. See **Fig. 152** . Voltage should .3-.9 volt with accelerator pedal released and 3.2-4.7 volts with accelerator pedal fully depressed. If voltage is within specification, go to next step. If voltage is not within specification, problem may exist in accelerator pedal position sensor, wiring circuit or ECM. Go to step 16 for testing of accelerator pedal position sensor. For wiring of accelerator pedal position sensor, see **WIRING DIAGRAMS** article.

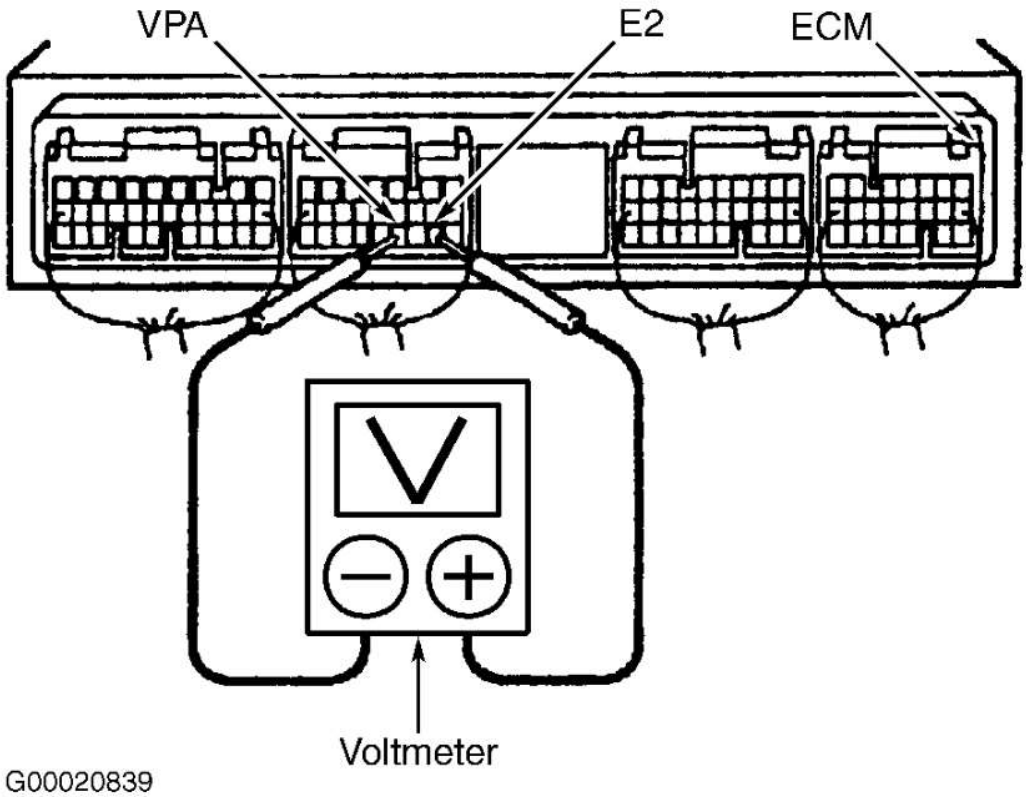


Fig. 152: Testing Voltage At Engine Control Module Terminals VPA & E2 (MR2 With Sequential

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Manual Transaxle)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

10. Start engine and allow engine to idle. Check operation of Malfunction Indicator Light (MIL) on instrument panel. MIL is displayed as an engine icon. If MIL is not illuminated, go to next step. If MIL is illuminated, a Diagnostic Trouble Code (DTC) may be stored in Engine Control Module (ECM). See TESTING PROCEDURE under SELF-DIAGNOSTIC SYSTEM in appropriate SELF-DIAGNOSTICS article for retrieving of DTCs.
11. To test operation of air assist system, allow engine to warm to normal operating temperature. Apply parking brake. Place transaxle in Neutral. Ensure A/C is off. Note engine idle speed. Engine idle speed should be 700-800 RPM. If all previous steps have been performed, drive vehicle to verify proper operation of throttle body.
12. To test throttle control motor, disconnect electrical connector at throttle control motor. See **Fig. 151** . It may be necessary to remove throttle body for access to electrical connector at throttle control motor. If necessary to remove throttle body, see **THROTTLE BODY** under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
13. Note terminal identification on throttle control motor. See **Fig. 153** . Using ohmmeter, check resistance between specified terminals on throttle control motor. See **THROTTLE CONTROL MOTOR RESISTANCE** table. If resistance is within specification, reinstall electrical connector. Go to next step. If resistance is not within specification, replace throttle body with throttle control motor as an assembly.

THROTTLE CONTROL MOTOR RESISTANCE

Terminal No.	Ohms @ 68°F (20°C)
1 & 2	.3-100.0
3 & 4	4.2-5.2

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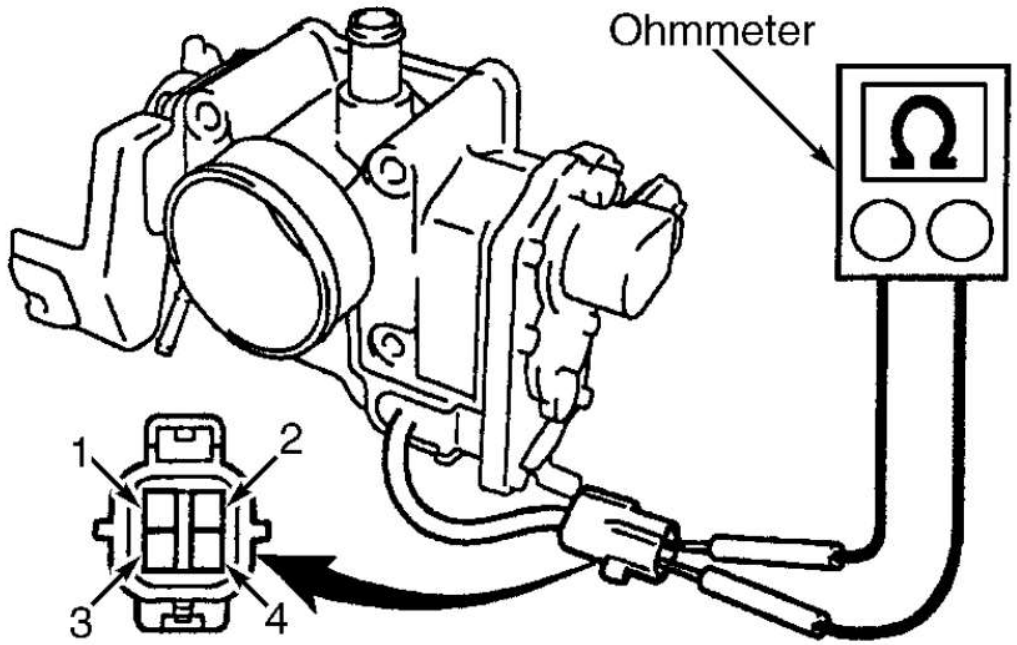


Fig. 153: Identifying Terminals & Testing Throttle Control Motor (MR2 With Sequential Manual Transaxle)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

14. To test TP sensor, it may be necessary to remove throttle body for access to electrical connector at TP sensor. If necessary to remove throttle body, see **THROTTLE BODY** under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
15. Disconnect electrical connector at TP sensor. See **Fig. 151** . Using ohmmeter, check resistance between terminals E2 and VC on TP sensor. See **Fig. 154** . Replace TP sensor if resistance is not 1200-3200 ohms at 68°F (20°C). See **THROTTLE BODY** under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
16. To test accelerator pedal position sensor, it may be necessary to remove throttle body for access to electrical connector at TP sensor. If necessary to remove throttle body, see **THROTTLE BODY** under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
17. Disconnect electrical connector at accelerator pedal position sensor. See **Fig. 151** . Using ohmmeter, check resistance between terminals E2 and VC on accelerator pedal position sensor. See **Fig. 155** . Replace accelerator pedal position sensor if resistance is not 1200-3200 ohms at 68°F (20°C). See **THROTTLE BODY** under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.

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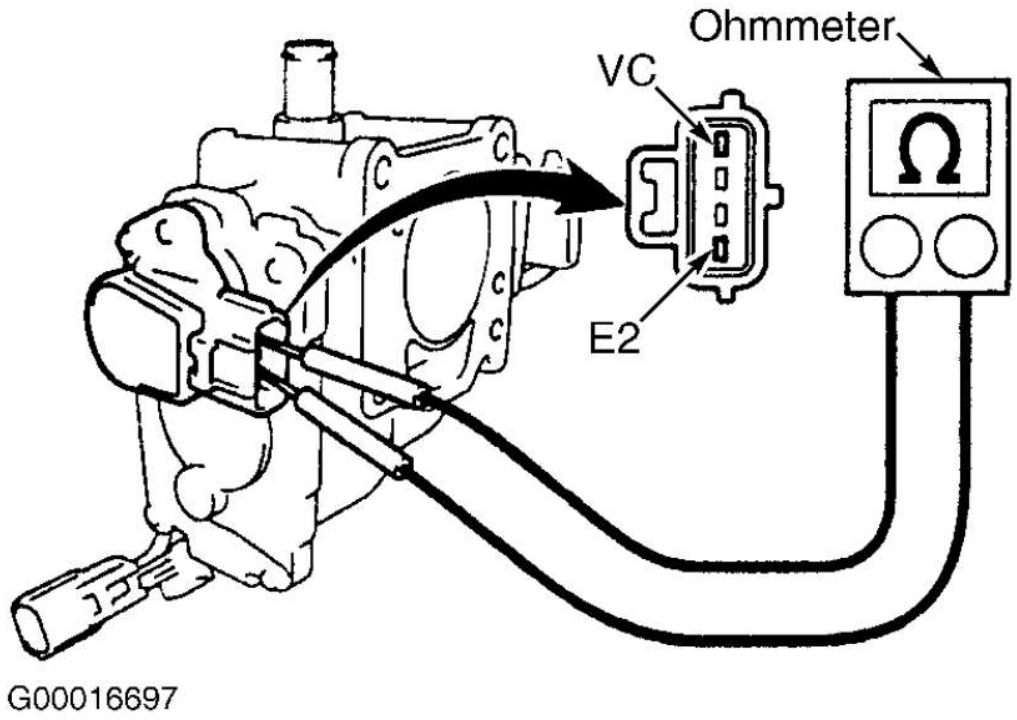


Fig. 154: Identifying Terminals & Testing Throttle Position Sensor (MR2 With Sequential Manual Transaxle)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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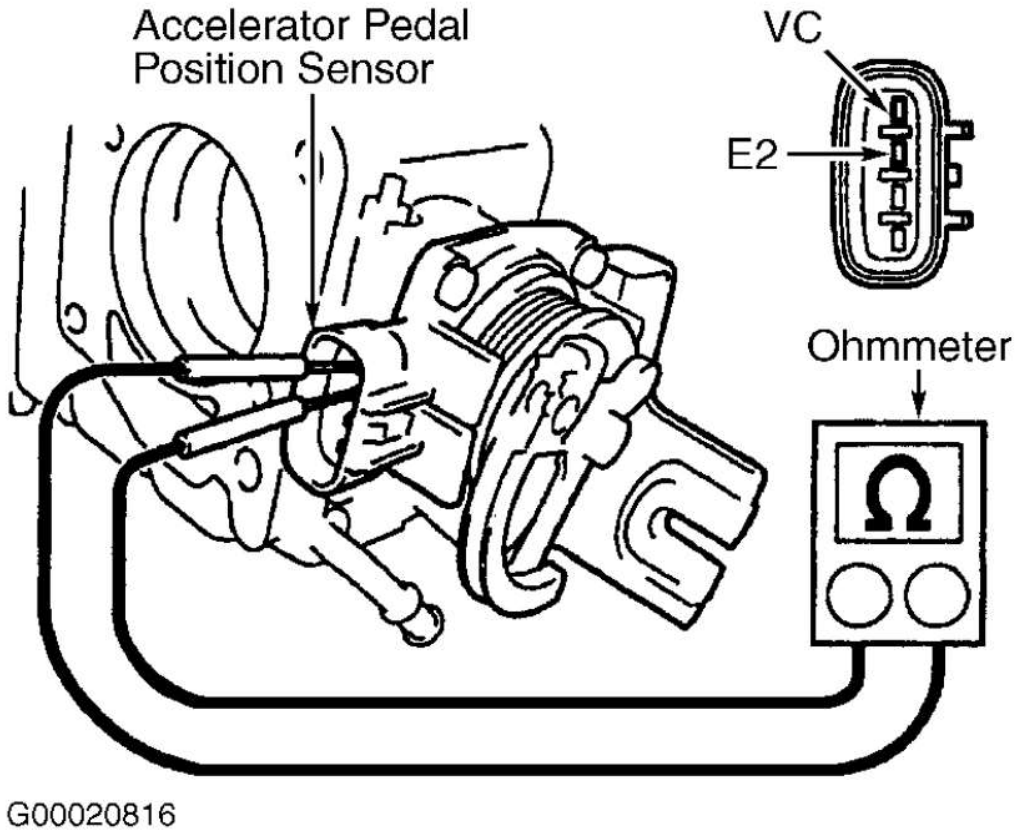


Fig. 155: Identifying Terminals & Testing Accelerator Pedal Position Sensor (MR2 With Sequential Manual Transaxle)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Prius

WARNING: Read service precautions before proceeding with service procedure. See SERVICE PRECAUTIONS .

1. Electronic Throttle Control System (ETCS) is used for controlling idle speed. ETCS consists of throttle body, accelerator pedal position sensor, Throttle Position (TP) sensor, throttle control motor, Hybrid Vehicle Control Electronic Control Unit (HV ECU) and Engine Control Module (ECM).
2. To inspect ETCS operation, ensure ignition is off. Disconnect electrical connector at throttle control motor on throttle body. See **Fig. 156** .

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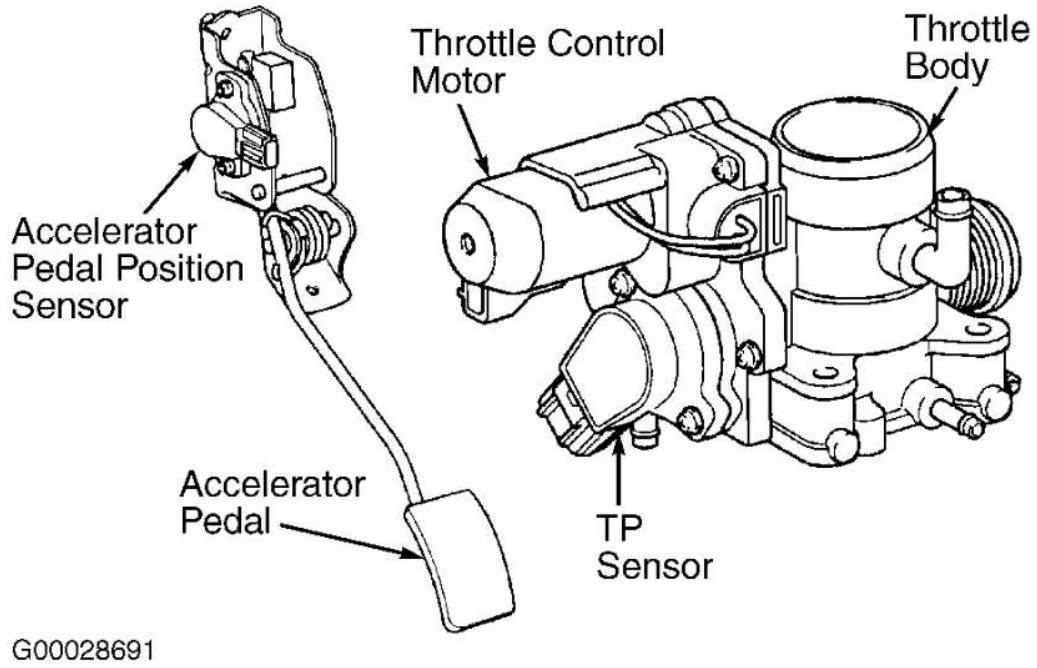


Fig. 156: Locating Electronic Throttle Control System Components On Throttle Body & Accelerator Pedal Position Sensor (Prius)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. To test TP sensor operation, connect Toyota hand-held tester to data link connector No. 3 at driver's side of instrument panel. See **Fig. 15** . Turn ignition on. Hand-held tester is used to read throttle valve opening which is displayed as a percentage.
4. Rotate throttle linkage to full throttle while reading throttle valve opening on hand-held tester which is accessed by THROTTLE POS under CURRENT DATA. Throttle valve opening should be at 60 percent or more. If throttle valve opening is at least 60 percent, go to next step. If throttle valve opening is not at least 60 percent, problem may exist in TP sensor, wiring circuit or ECM. Go to step 10 for testing of TP sensor. If necessary to check wiring between ECM and TP sensor, see **WIRING DIAGRAMS** article. ECM is located behind glove box. For illustration of ECM location, see **THEORY & OPERATION** article.
5. Turn ignition off. Reinstall electrical connector at throttle control motor. It is necessary to put transit in inspection mode so engine will run continuously. To put transit in inspection mode, perform the following steps within 60 seconds:
   - Ensure ignition is off and then turn ignition on.
   - Ensure transaxle is in Park and then fully depress accelerator pedal 2 times.
   - Place transaxle in Neutral and then fully depress accelerator pedal 2 times.
   - Place transaxle back in Park and then fully depress accelerator pedal 2 times.
6. Check that master warning light on instrument cluster at center of instrument panel is flashing to indicate

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inspection mode operation. See **Fig. 140** . Master warning light may also be referred to as hybrid system error warning light. Turn ignition switch to START position to start engine. Engine will now start and run continuously.

7. Warm engine to normal operating temperature. To check charging rate of High Voltage (HV) battery, apply brake and place shift lever in Drive and check that engine shuts off. If engine shuts off, go to next step. If engine does not shut off, charging rate of HV battery may be low. Place shift lever in Park and allow engine to run for a while to charge the HV battery. After engine has ran for a while, place shift lever in Drive and check that engine shuts off. If engine now shuts off, go to next step. If engine does not shut off, it may be necessary to place shift lever in Park and allow engine to run for a while to charge the HV battery.
8. With engine idling, turn A/C switch to ON and OFF positions while noting engine idle speed. Idle speed should be 950-1050 RPM with A/C switch in OFF position and 1150-1250 RPM with A/C switch in ON position. If idle speed is not as specified, go to next step. If idle speed is as specified, shut engine off. Remove hand-held tester.
9. To test throttle control motor, disconnect electrical connector for throttle control motor. See **Fig. 156** . Using ohmmeter, check resistance between terminals No. 1 and 2 on electrical connector for throttle control motor. See **Fig. 157** . Resistance should be .3-100.0 ohms at 68°F (20°C). If resistance is within specification, reinstall electrical connector. Go to next step. If resistance is not within specification, replace throttle body with throttle control motor as an assembly. See **THROTTLE BODY** under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
10. To test TP sensor, disconnect electrical connector at TP sensor. See **Fig. 156** . Using ohmmeter, check resistance between terminals E2 and VC on TP sensor. See **Fig. 158** . Resistance should be 1200-3200 ohms at 68°F (20°C). If resistance is within specification, reinstall electrical connector. Go to next step. If resistance is not within specification, replace TP sensor. See **THROTTLE BODY** under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
11. It may be necessary to check accelerator pedal position sensor. See **ACCELERATOR PEDAL POSITION SENSOR** under ENGINE SENSORS & SWITCHES. If TP sensor, throttle control motor and accelerator pedal position sensor are okay, but ETCS does not operate properly, it may be necessary to check wiring between ECM and TP sensor, ECM and throttle control motor, ECM and HV ECU. See **WIRING DIAGRAMS** article. ECM is located behind glove box. HV ECU is located below carpet on floor panel, just below passenger's side of instrument panel. For illustration of ECM location, see **THEORY & OPERATION** article.

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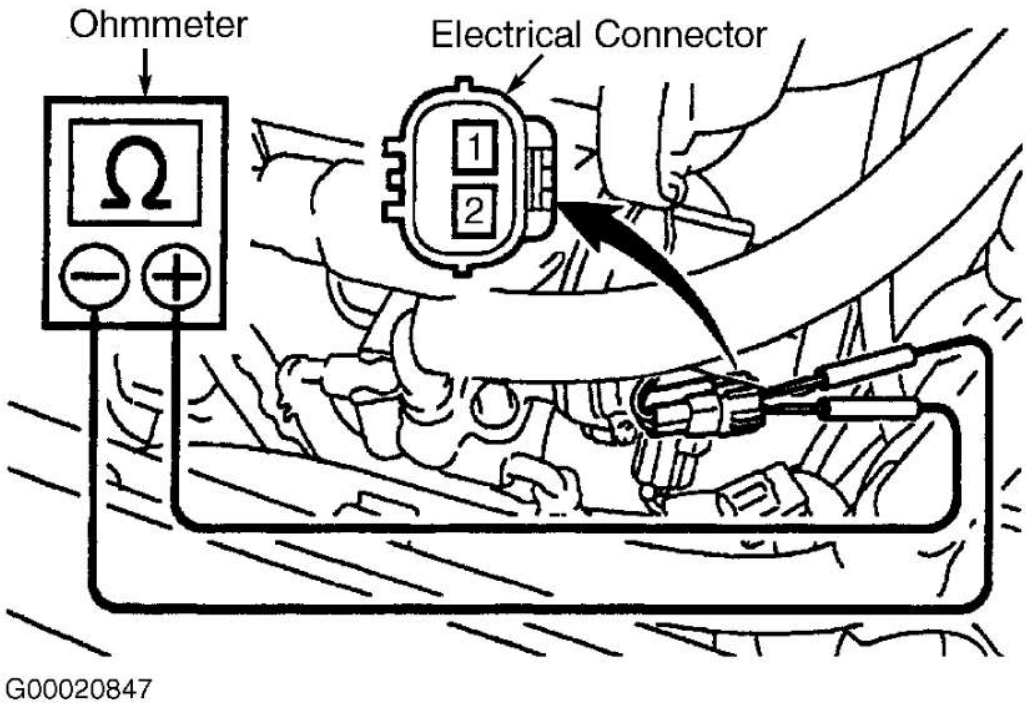


Fig. 157: Identifying Terminals & Testing Throttle Control Motor (Prius)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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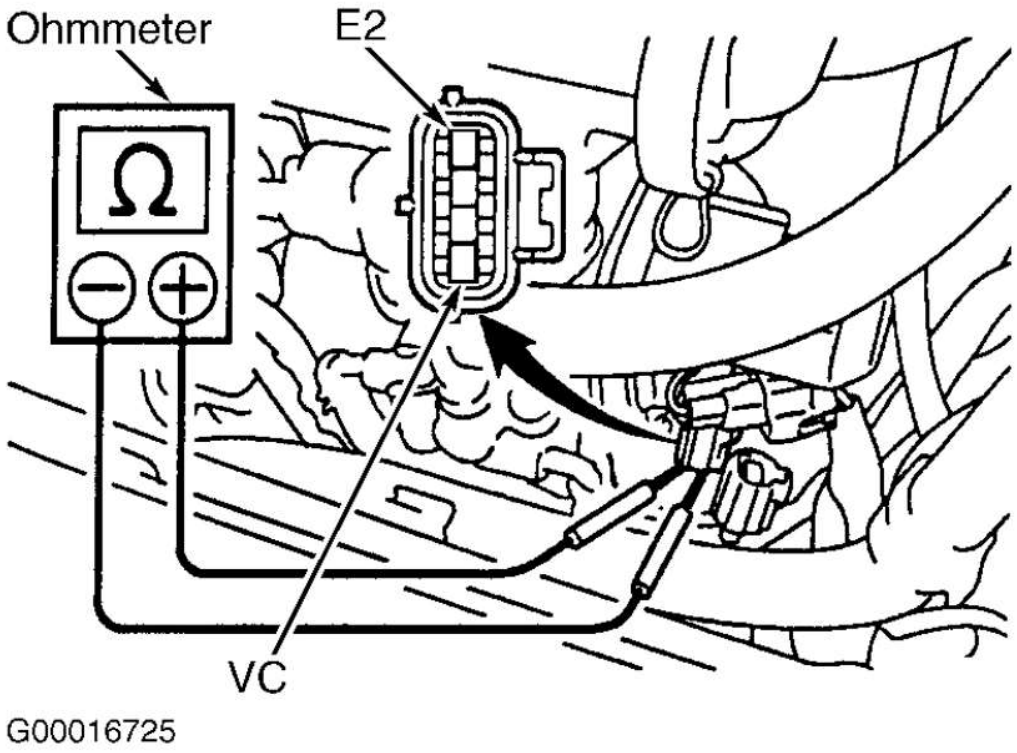


Fig. 158: Identifying Terminals & Testing Throttle Position Sensor (Prius)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Tacoma

1. Check that throttle linkage moves freely at throttle body. To check vacuum supply at throttle body, start engine and allow engine to idle. Note vacuum port location on throttle body. See **Fig. 159** .
2. Check that vacuum and no vacuum exist at specified vacuum ports on throttle body with engine idling and with engine at more than idle. See **THROTTLE BODY VACUUM SUPPLY** table. Repair or replace components if vacuum supply is not as designated.

THROTTLE BODY VACUUM SUPPLY

Vacuum Port	Engine Idling	Engine At More Than Idle
E	No Vacuum	(1) Vacuum
P	Vacuum	(1) Vacuum
R	No Vacuum	(1) Vacuum
(1) With engine at 3500 RPM.		

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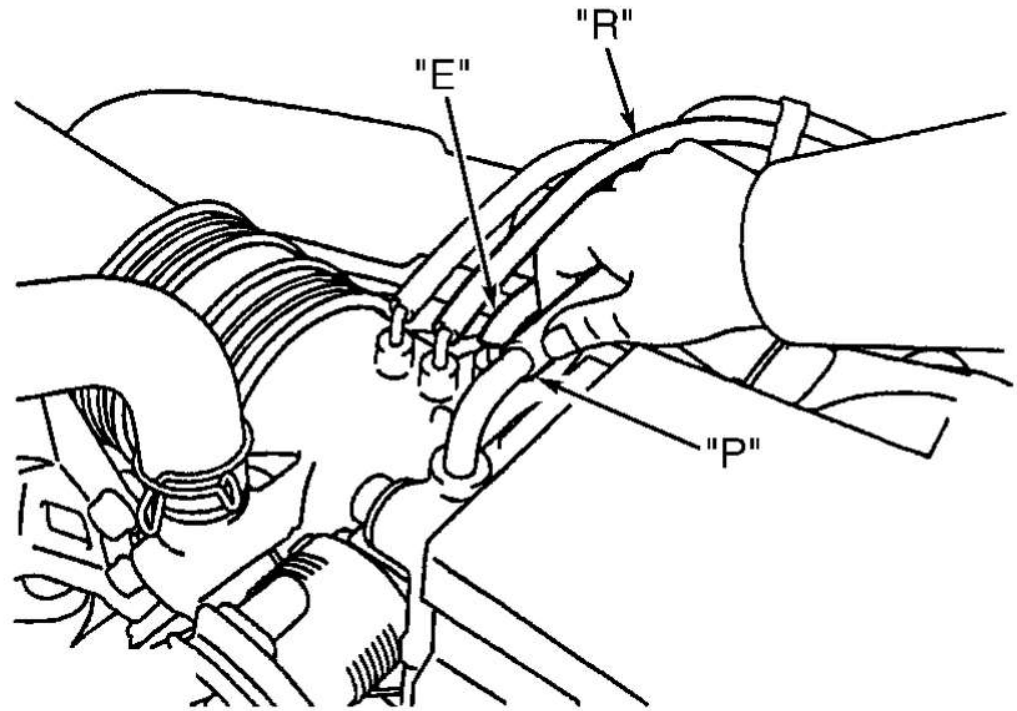


Fig. 159: Identifying Vacuum Ports On Throttle Body (Tacoma)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

IGNITION SYSTEMS

NOTE: **For basic ignition checks, see IGNITION SYSTEMS in BASIC DIAGNOSTIC PROCEDURES - 4-CYLINDER article.**

TIMING CONTROL SYSTEMS

Knock Sensor

See **KNOCK SENSOR** under ENGINE SENSORS & SWITCHES.

EMISSION SYSTEMS & SUB-SYSTEMS

NOTE: **For emission system component location, refer to illustrations. See Fig. 160 - Fig. 167 . On Camry and Highlander, illustration was not available from manufacturer.**

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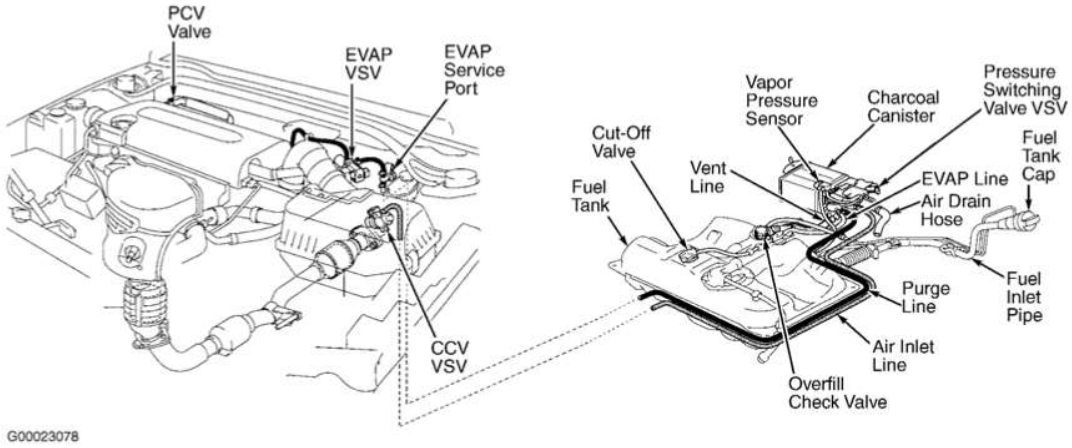


Fig. 160: Locating Emission System Components (Camry Solara)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

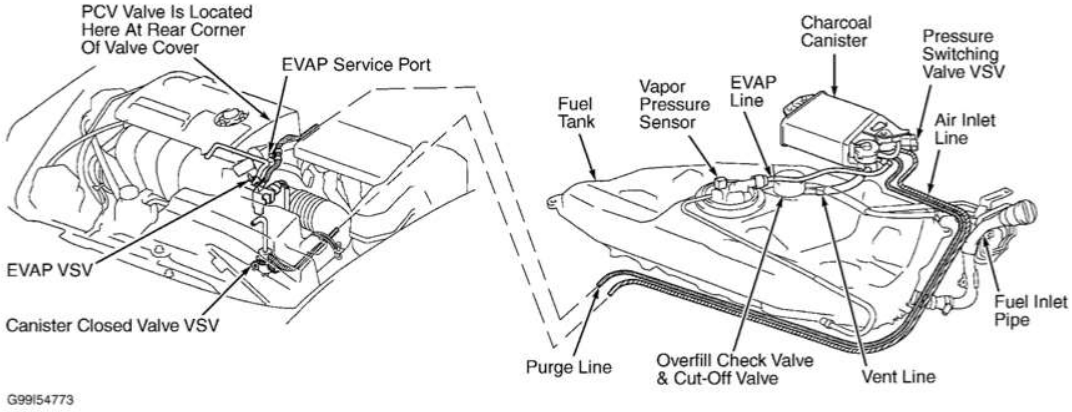


Fig. 161: Locating Emission System Components (Celica)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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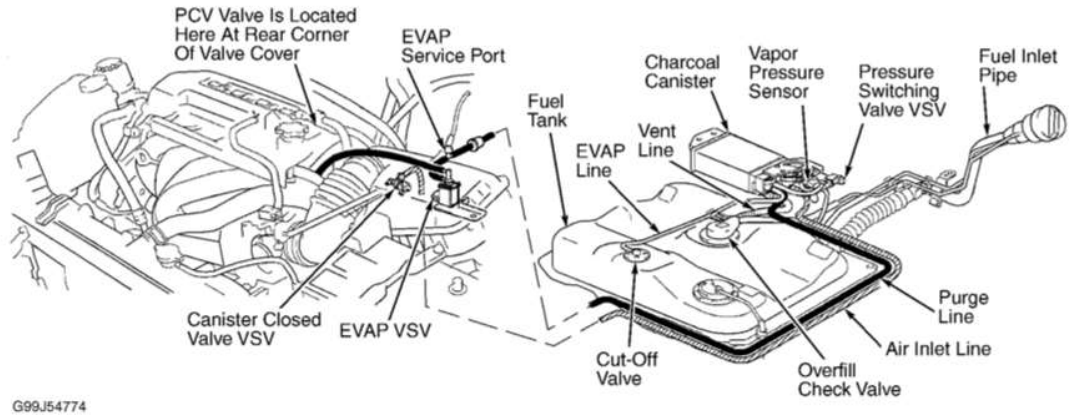


Fig. 162: Locating Emission System Components (Corolla)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

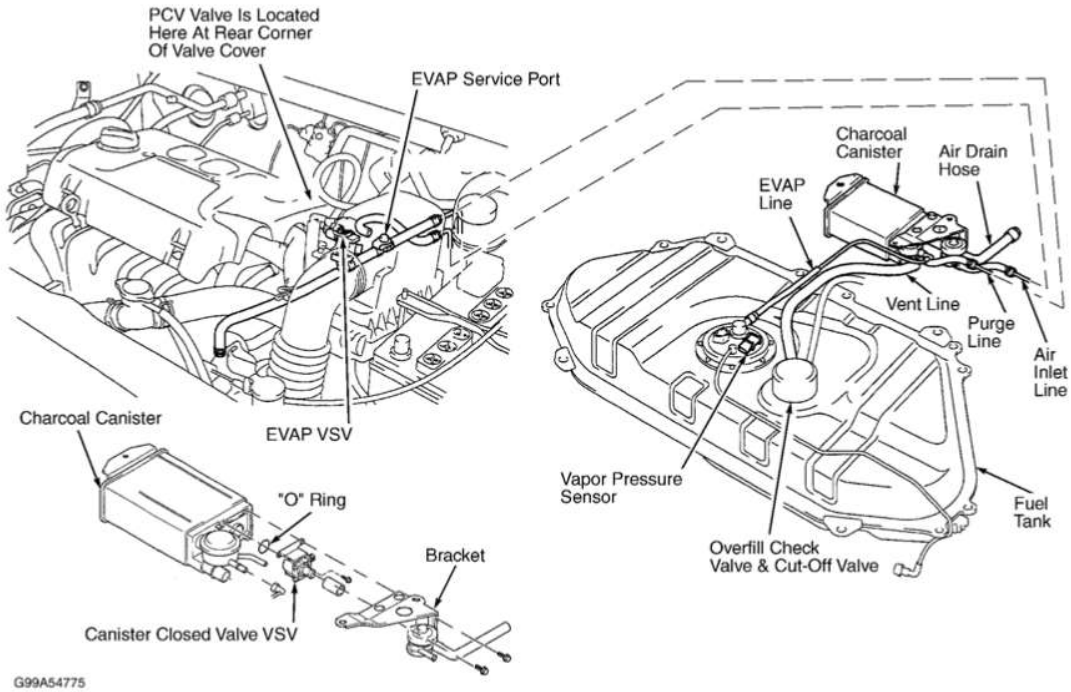
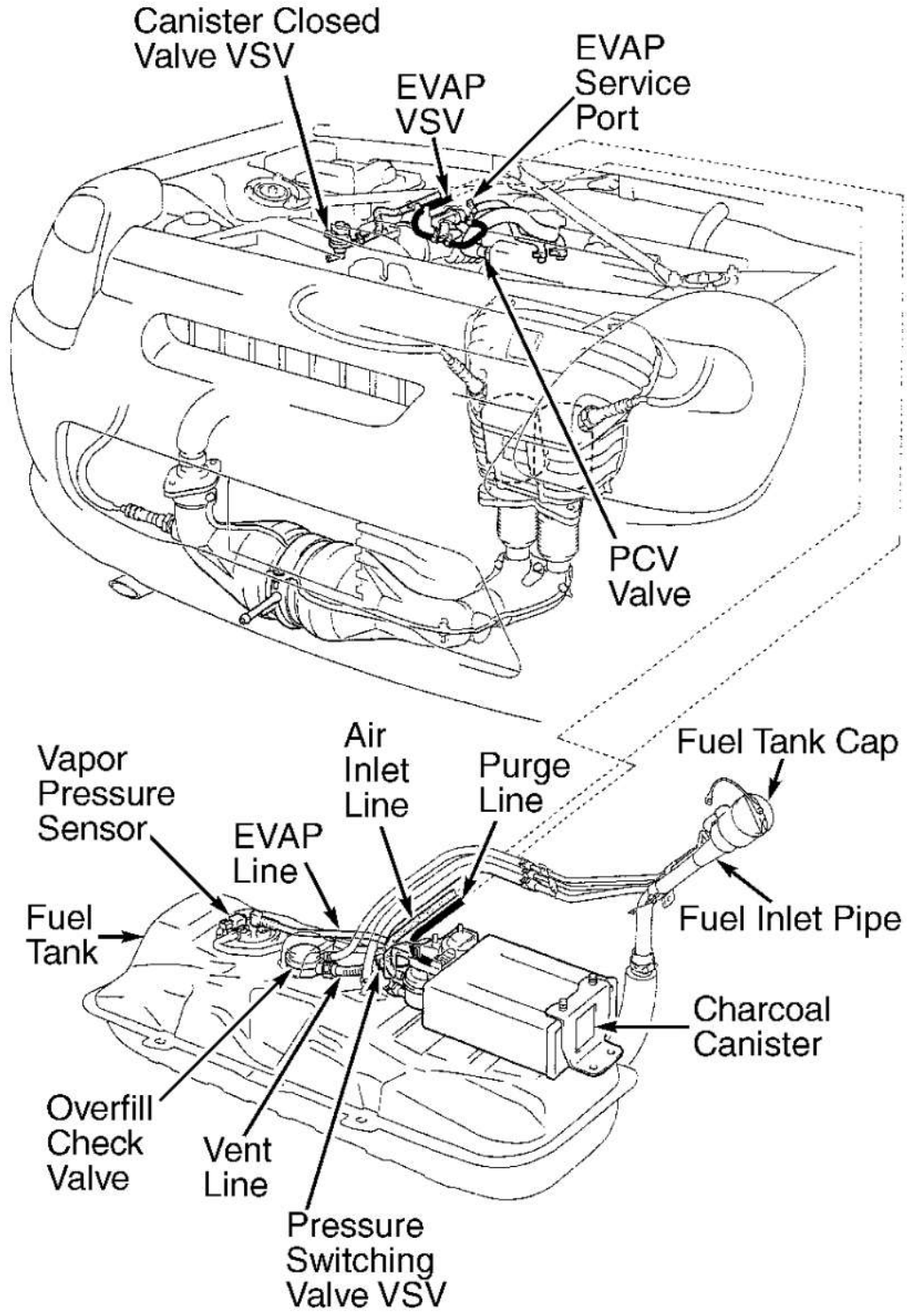


Fig. 163: Locating Emission System Components (ECHO)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

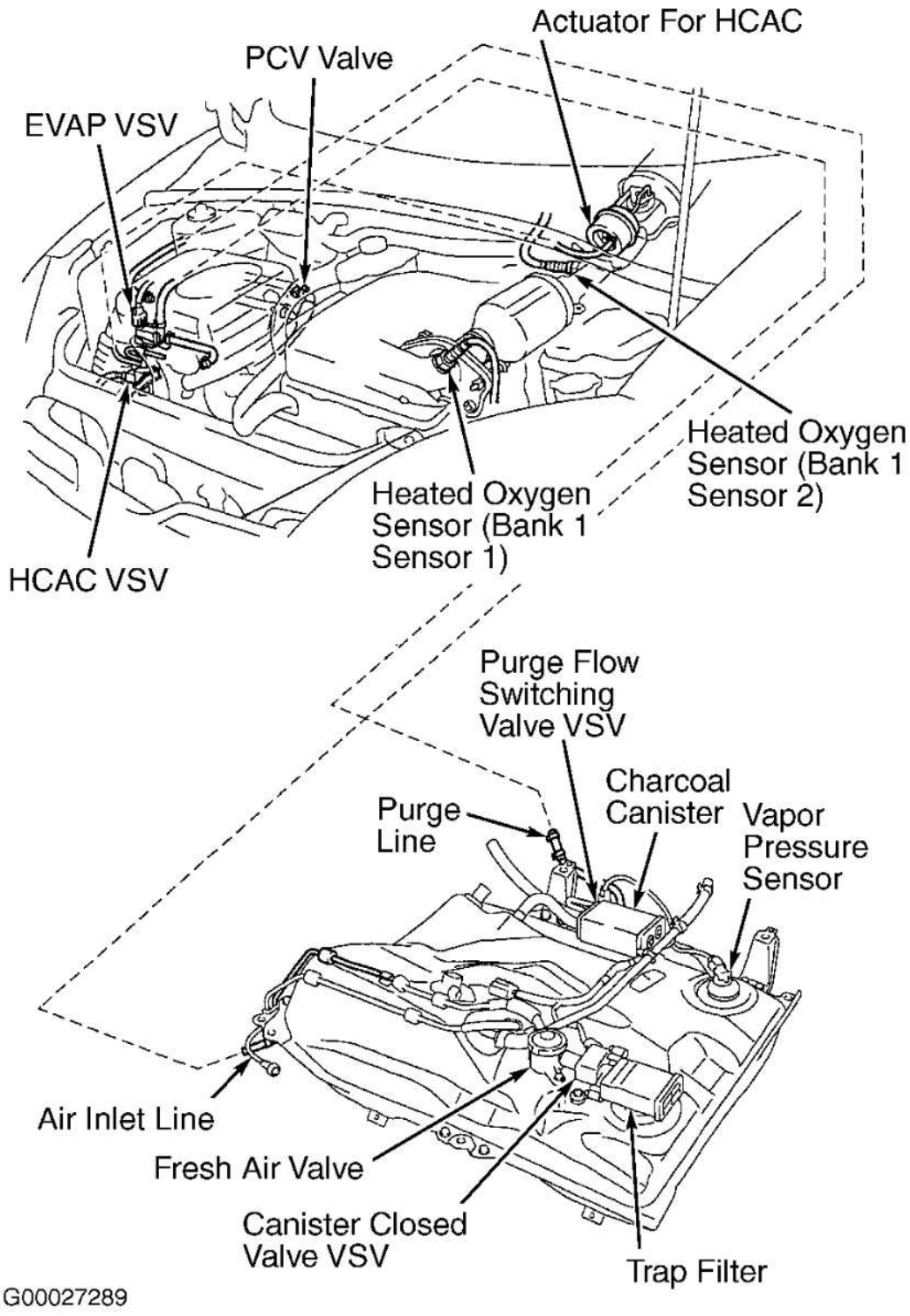
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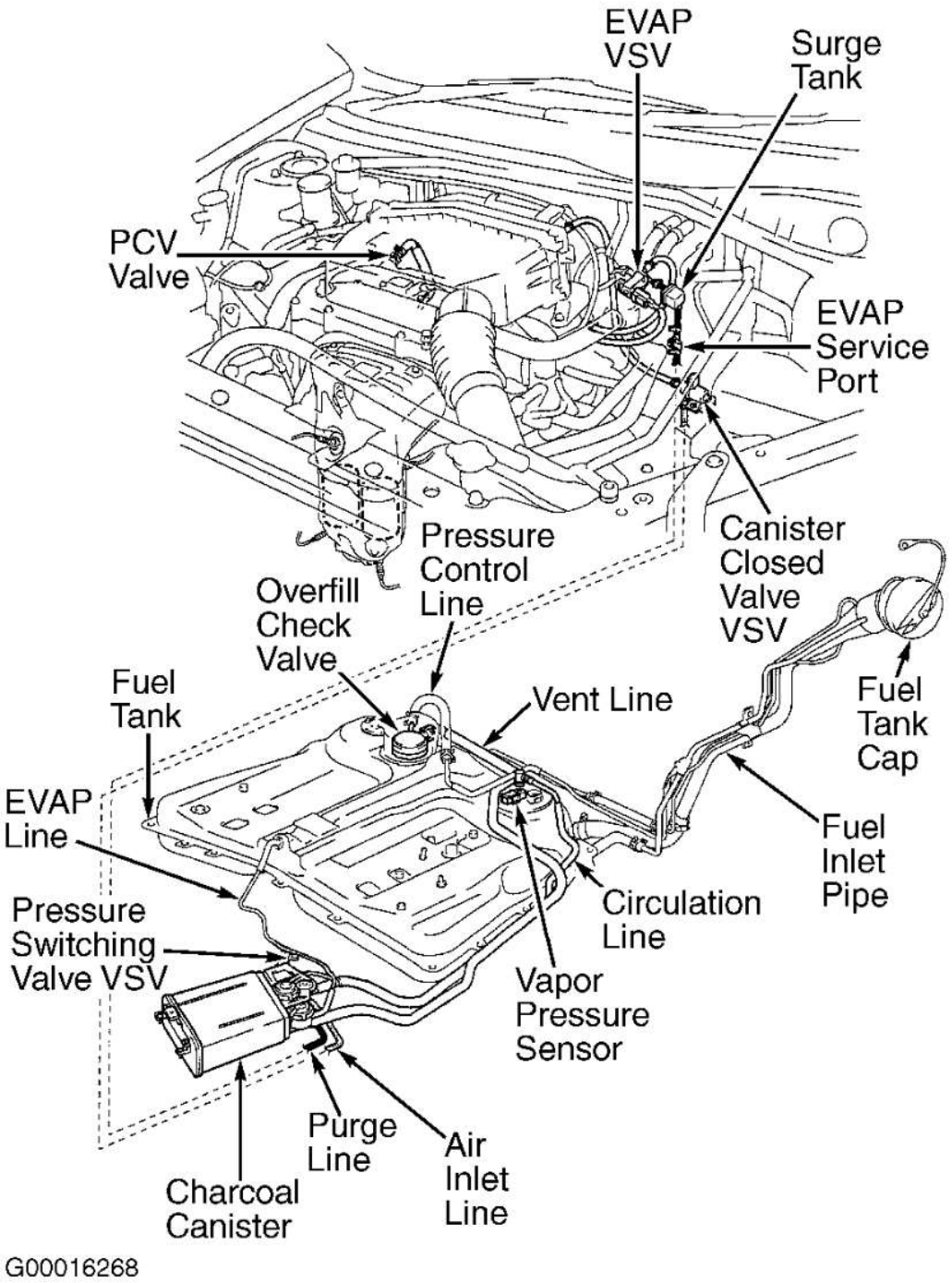
Fig. 164: Locating Emission System Components (MR2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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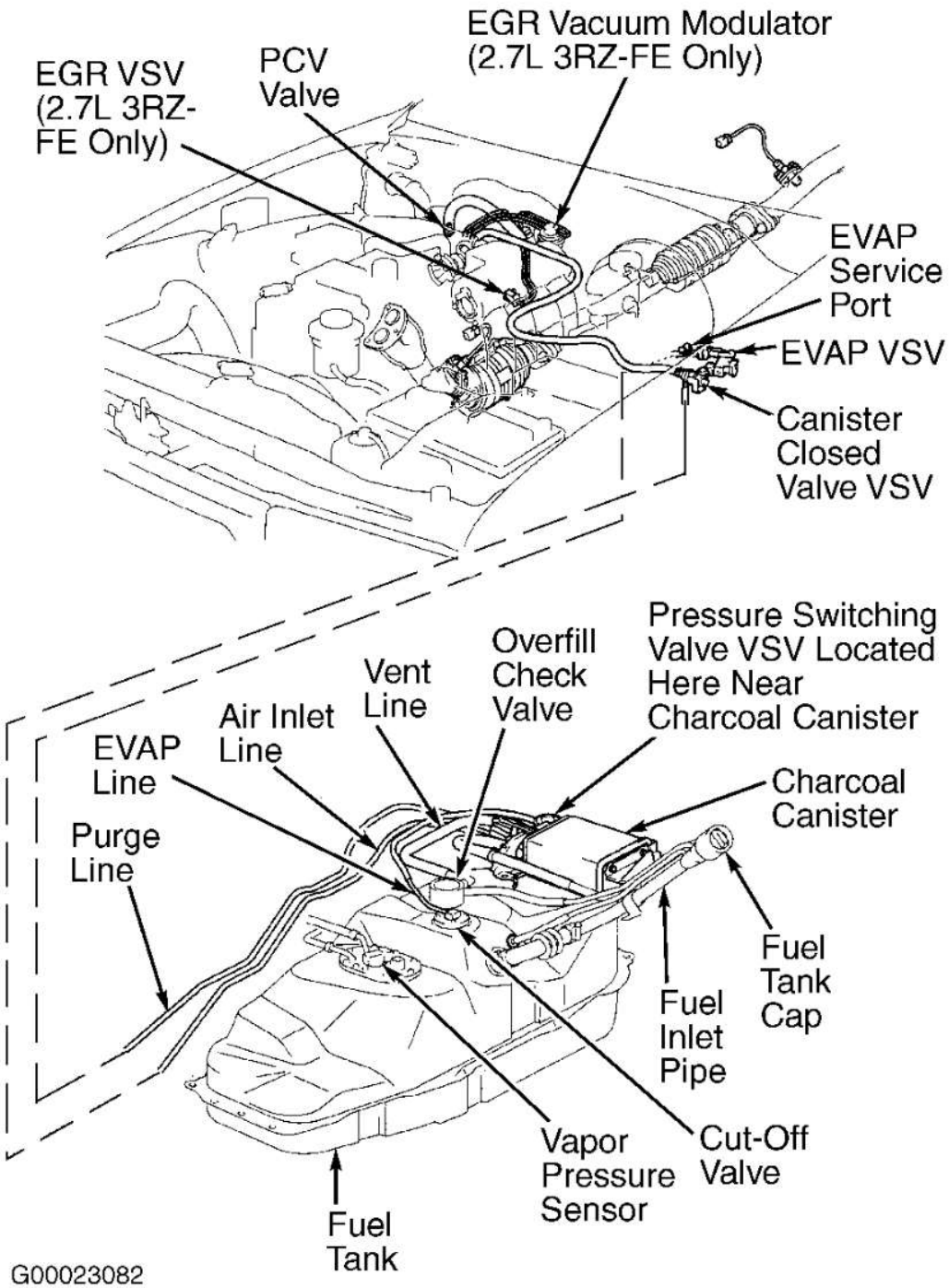
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Fig. 165: Locating Emission System Components (Prius)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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Fig. 166: Locating Emission System Components (RAV4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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Fig. 167: Locating Emission System Components (Tacoma)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

EXHAUST GAS RECIRCULATION SYSTEM

System Check (Tacoma 2.7L 3RZ-FE)

1. Remove cap and filter from top of EGR vacuum modulator. See **Fig. 167** . Ensure filter is clean and in good condition. Clean filter with compressed air (if necessary).
2. Reinstall filter and cap. Ensure filter is installed in EGR vacuum modulator with coarse side facing upward, away from EGR vacuum modulator. Using 3-way connector, install vacuum gauge in vacuum hose between top of EGR valve and EGR vacuum modulator. Perform STEP 1 in illustration. See **Fig. 168** . Start engine. Ensure engine idles smoothly to ensure proper seating of EGR valve. Shut engine off.
3. Connect Toyota hand-held tester or scan tool to data link connector No. 3 at driver's side of instrument panel. See **Fig. 17** . Hand-held tester or scan tool is used to read engine RPM. To test operation of EGR Vacuum Switching Valve (VSV) with engine cold, ensure engine coolant temperature is less than 122°F (50°C). Start engine. Increase and maintain engine speed at 3500 RPM. Ensure no vacuum reading is obtained on vacuum gauge with engine speed at 3500 RPM and EGR pipe is not hot.
4. To test operation of EGR VSV and EGR vacuum modulator. Shut engine off. This test procedure may be performed by using Toyota hand-held tester to operate EGR VSV, or by connecting vacuum hose from port "Q" on EGR vacuum modulator to EGR valve. If using hand-held tester, go to next step. If hand-held tester is not available, go to step 6 .
5. Select ACTIVE TEST MODE on hand-held tester so EGR VSV is closed. Start engine. Operate engine at 3500 RPM. Ensure a low vacuum reading is obtained on vacuum gauge with engine speed at 3500 RPM. Shut engine off. Remove hand-held tester, vacuum gauge and reconnect vacuum hoses. Go to step 8 .
6. Remove 3-way connector and small vacuum hose between port "Q" (single port) on EGR vacuum modulator and EGR valve. Perform STEP 2 in illustration. See **Fig. 168** . This 3-way connector and small vacuum hose goes from EGR valve and EGR vacuum modulator to EGR VSV. Install plug in vacuum hose to EGR VSV.
7. Connect vacuum hose from port "Q" on EGR vacuum modulator directly to EGR valve. See **Fig. 169** . This will by-pass EGR VSV. Start engine. Operate engine at 3500 RPM. Ensure a low vacuum reading is obtained on vacuum gauge with engine speed at 3500 RPM. Shut engine off. Remove vacuum gauge and reconnect vacuum hoses. Go to next step.
8. To check EGR valve operation, remove and plug vacuum hose at EGR valve. Start engine. 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.

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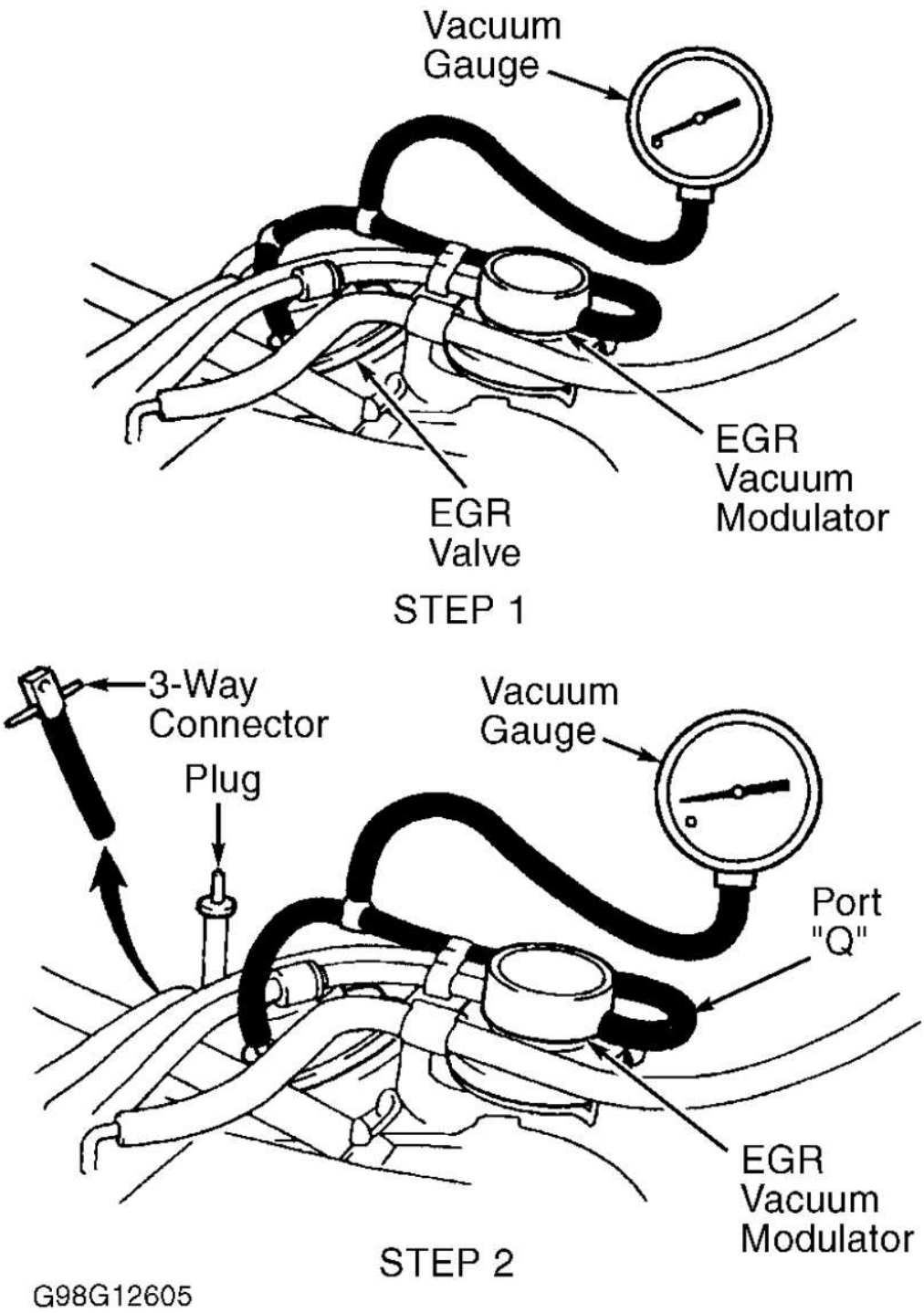


Fig. 168: Installing Vacuum Gauge (Tacoma 2.7L 3RZ-FE)

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Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

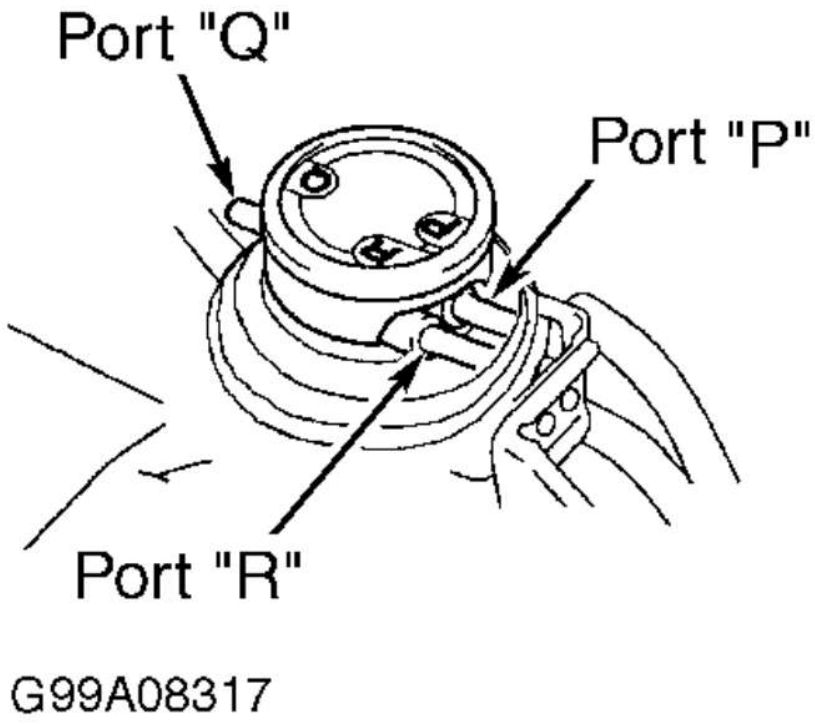


Fig. 169: Identifying Ports On EGR Vacuum Modulator (Tacoma 2.7L 3RZ-FE)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

EGR Gas Temperature Sensor (Tacoma 2.7L 3RZ-FE)

See **EGR GAS TEMPERATURE SENSOR** under ENGINE SENSORS & SWITCHES.

EGR Vacuum Modulator (Tacoma 2.7L 3RZ-FE)

1. When testing EGR vacuum modulator, it may be necessary to monitor engine RPM by using Toyota hand-held tester or scan tool. Toyota hand-held tester or scan tool may be connected to data link connector No. 3 at driver's side of instrument panel for monitoring engine RPM. See **Fig. 17** .
2. Mark vacuum hose locations and disconnect vacuum hoses from EGR vacuum modulator. See **Fig. 167** .
3. Block ports "P" and "R" on EGR vacuum modulator. See **Fig. 169** . Ports "P" and "R" are the double ports on side of EGR vacuum modulator. Port "Q" is single port on side of EGR vacuum modulator.
4. Apply air pressure to port "Q". See **Fig. 169** . Air should flow freely through air filter side of EGR

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vacuum modulator.

5. Start engine and operate engine at 3500 RPM. Repeat test procedures in steps 3 and 4 . Strong resistance of airflow should be felt with engine at specified RPM. Replace EGR vacuum modulator if strong resistance is not felt. Reconnect vacuum hoses to proper locations.

EGR Vacuum Switching Valve (Tacoma 2.7L 3RZ-FE)

1. Disconnect electrical connector from EGR Vacuum Switching Valve (VSV). See **Fig. 167** . EGR VSV is located on bracket, near throttle body and contains Green 2-pin electrical connector with White/Red and Red/Black wires.
2. Using ohmmeter, check that continuity exists between electrical terminals on EGR VSV and that resistance is 33-39 ohms at 68°F (20°C). Replace EGR VSV if no continuity exists or resistance is not within specification.
3. Ensure no continuity exists between each electrical terminal and body of EGR VSV body. Replace EGR VSV if continuity exists between electrical terminal and body of EGR VSV.
4. To test EGR VSV operation, apply air pressure to port "E". Ensure air does not flow from port "F". Perform STEP 1 in illustration. See **Fig. 170** .
5. Apply battery voltage and ground to electrical terminals on EGR VSV. Apply air pressure to port "E". Ensure air flows from port "F". Perform STEP 2 in illustration. See **Fig. 170** . Replace EGR VSV if defective.

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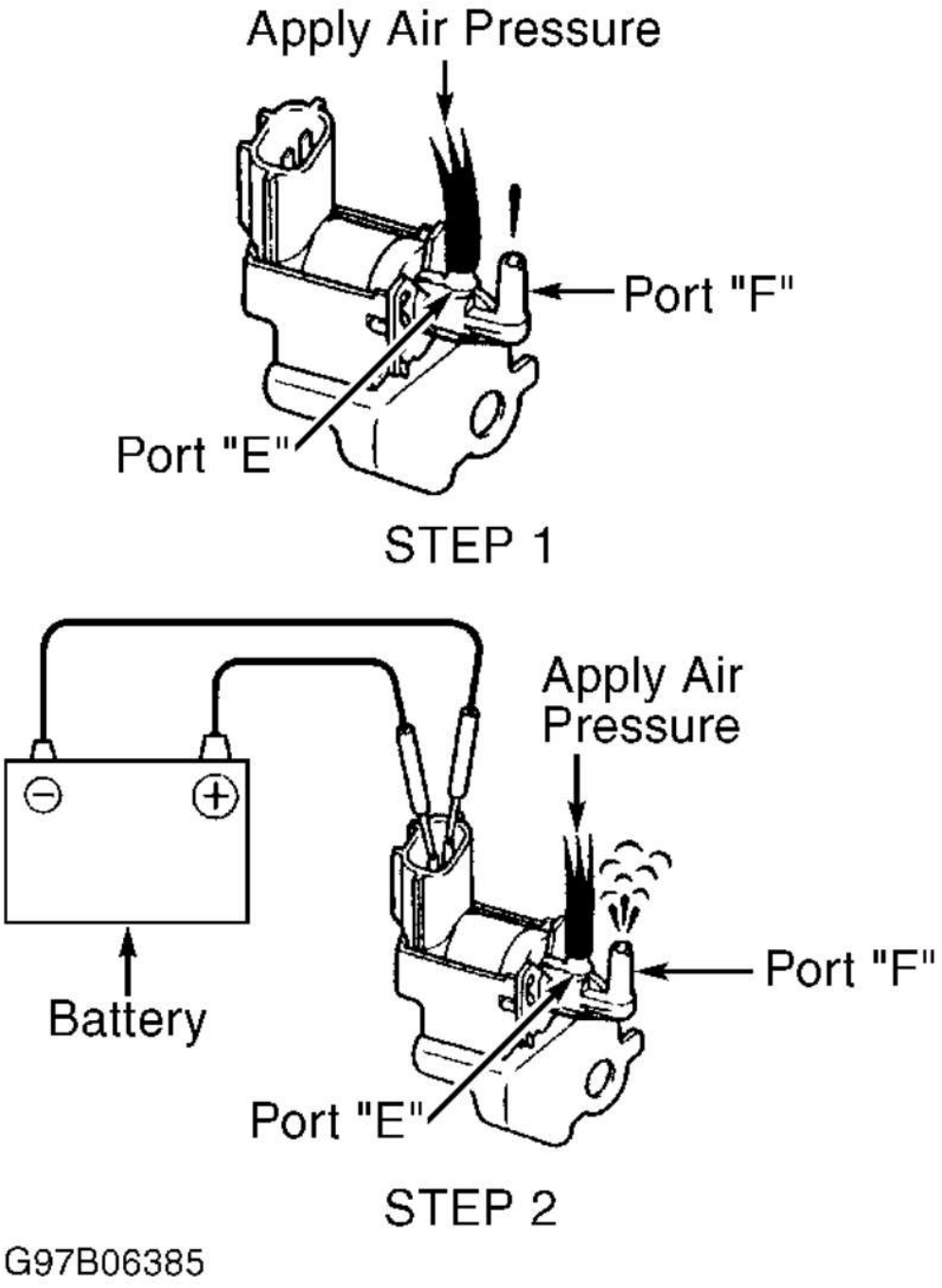


Fig. 170: Testing EGR Vacuum Switching Valve (Tacoma 2.7L 3RZ-FE)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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EGR Valve (Tacoma 2.7L 3RZ-FE)

1. Remove EGR valve. See **EGR VALVE** under EMISSION SYSTEMS & SUB-SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
2. Inspect EGR valve for restricted passages caused by carbon deposits. Using vacuum pump, apply vacuum directly to EGR valve and ensure valve opens. Release vacuum and ensure valve closes. Replace EGR valve if defective.

HYDROCARBON ADSORBER CATALYST SYSTEM (PRIUS)

NOTE: Hydrocarbon adsorber catalyst system may also be referred to as HCAC system.

WARNING: Read service precautions before proceeding with service procedure. See SERVICE PRECAUTIONS .

Hydrocarbon Adsorber Catalyst System Check

1. Hydrocarbon adsorber may also be referred to as HC adsorber. Start engine and warm engine to normal operating temperature. Shut engine off. If Toyota hand-held tester is available, go to next step. If Toyota hand-held tester is not available, go to step 3 .
2. Connect hand-held tester to data link connector No. 3 at driver's side of instrument panel. See **Fig. 15** . Start engine. Turn hand-held tester on. Select proper mode on hand-held tester to operate HCAC Vacuum Switching Valve (VSV). Go to step 4 .
3. Disconnect electrical connector at HCAC Vacuum Switching Valve (VSV). See **Fig. 171** . HCAC VSV is located on bracket bolted to timing chain end of engine and uses a Brown 2-pin electrical connector with Black and Black/White wires. Apply battery voltage and ground to electrical terminals on HCAC VSV to operate HCAC VSV. See **Fig. 172** . Start engine. Go to next step.
4. With engine idling and HCAC VSV operating, check that rod on actuator is pulled inward and that by-pass valve moves. Actuator and by-pass valve are located at front of three-way catalytic converter on exhaust pipe. See **Fig. 173** . If rod on actuator is not pulled inward and by-pass valve does not move, shut engine off. Go to next step. If rod on actuator is pulled inward and by-pass valve moves, HCAC system is operating properly. Shut engine off. Reinstall electrical connector at HCAC VSV (if removed) and disconnect hand-held tester (if used).
5. Check vacuum hose and line to HCAC VSV. If vacuum hose and line are okay, check operation of actuator for HCAC system and HCAC VSV. See **ACTUATOR FOR HCAC SYSTEM & BY-PASS VALVE** and **HCAC VACUUM SWITCHING VALVE** . If vacuum hose or line are defective, replace components as necessary and recheck system operation.

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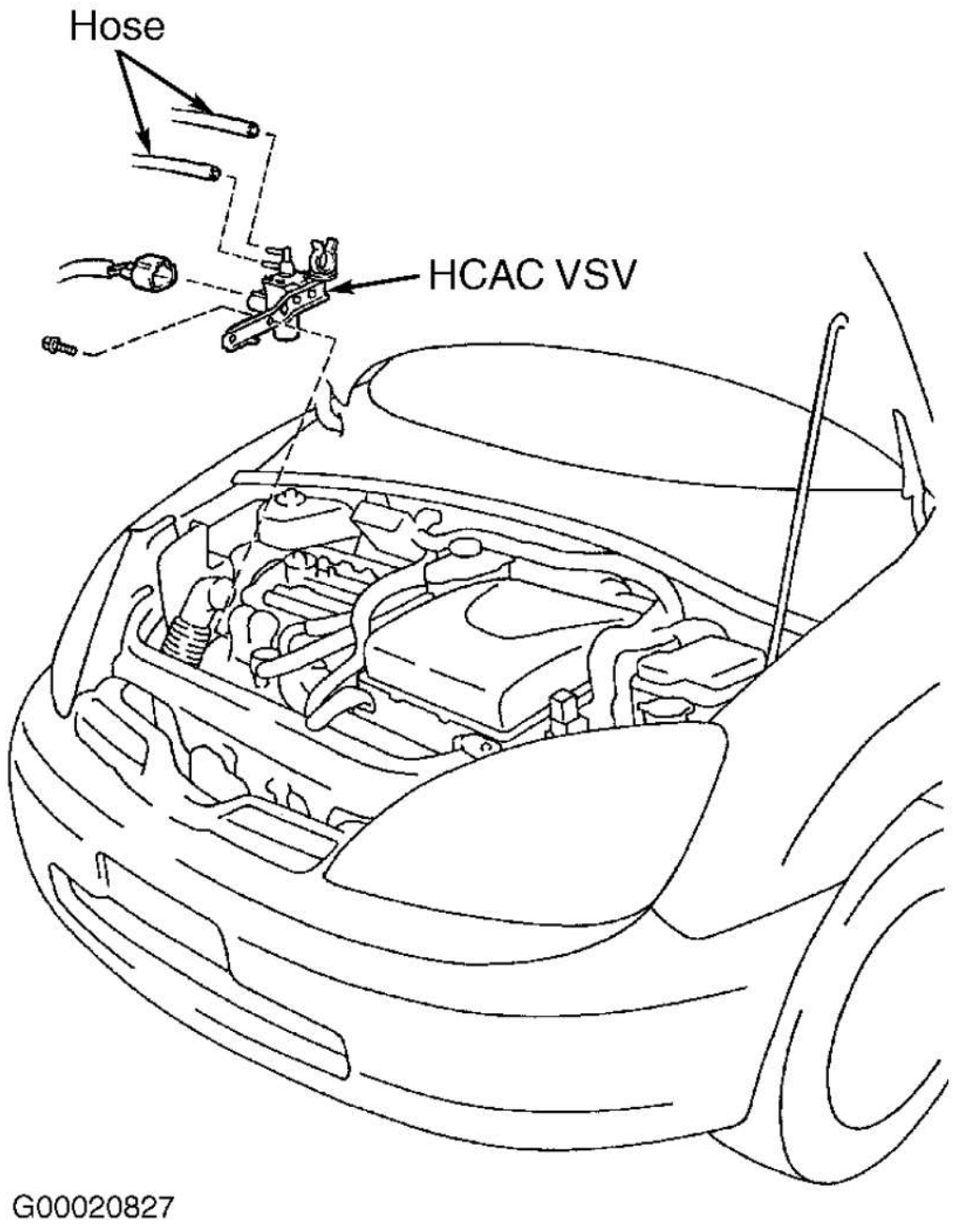


Fig. 171: Locating Hydrocarbon Adsorber Catalyst Vacuum Switching Valve (Prius)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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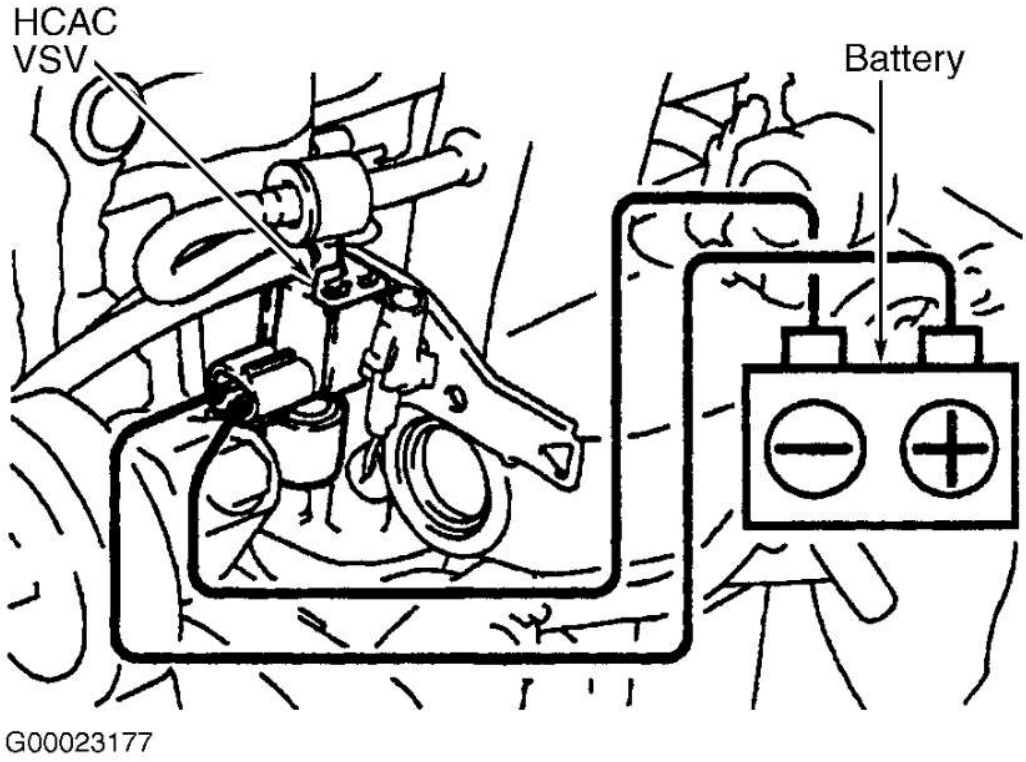


Fig. 172: Applying Battery Voltage & Ground To Hydrocarbon Adsorber Catalyst Vacuum Switching Valve (Prius)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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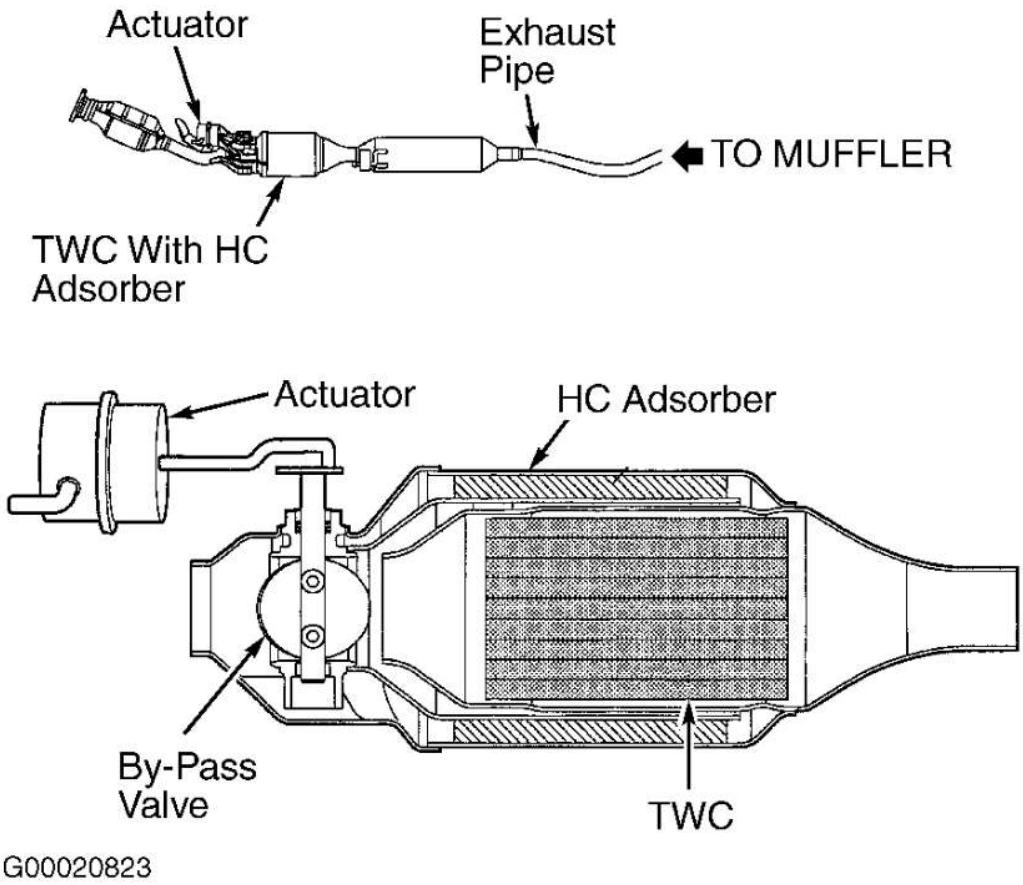


Fig. 173: Locating Actuator & By-Pass Valve (Prius)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Actuator For HCAC System & By-Pass Valve

WARNING: Read service precautions before proceeding with service procedure. See SERVICE PRECAUTIONS .

1. Remove front exhaust pipe. Remove actuator from front exhaust pipe. See **Fig. 173** . To check the actuator, using vacuum pump, apply 9.83 in. Hg of vacuum to actuator while checking to see if rod on actuator is pulled inward. If rod is pulled inward, actuator is operating properly. If rod is not pulled inward, replace actuator.
2. To check by-pass valve, ensure by-pass valve can be rotated in front exhaust pipe. If by-pass valve will not rotate, replace front exhaust pipe. Reinstall actuator and front exhaust pipe.

HCAC Vacuum Switching Valve

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WARNING: Read service precautions before proceeding with service procedure. See SERVICE PRECAUTIONS .

1. Remove HCAC Vacuum Switching Valve (VSV). See **Fig. 171** . HCAC VSV is located on bracket bolted to timing chain end of engine and uses a Brown 2-pin electrical connector with Black and Black/White wires.
2. Using ohmmeter, check that continuity exists between electrical terminals on HCAC VSV and that resistance is 33-39 ohms at 68°F (20°C). Replace HCAC VSV if no continuity exists or resistance is not within specification.
3. Ensure no continuity exists between each electrical terminal and body of HCAC VSV body. Replace HCAC VSV if continuity exists between electrical terminal and body of HCAC VSV.
4. To test HCAC VSV operation, apply air pressure to port "E". Ensure air flows from air filter and not from port "F". Perform STEP 1 in illustration. See **Fig. 174** .
5. Apply battery voltage and ground to electrical terminals on HCAC VSV. Apply air pressure to port "E". Ensure air flows from port "F" and not from air filter. Perform STEP 2 in illustration. See **Fig. 174** . Replace HCAC VSV if defective.

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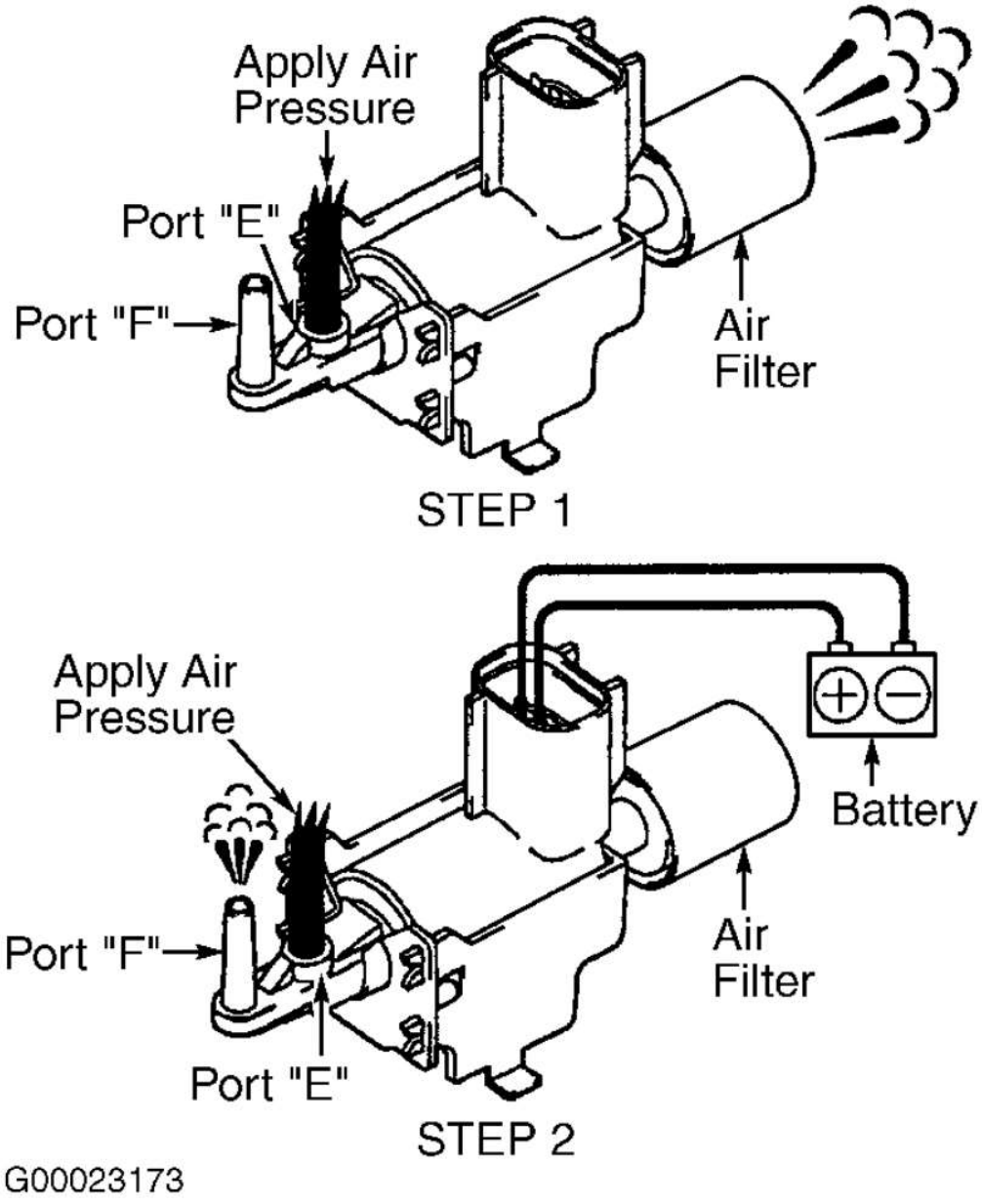


Fig. 174: Testing Hydrocarbon Adsorber Catalyst Vacuum Switching Valve (Prius)
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FUEL EVAPORATIVE SYSTEM

NOTE: **Fuel evaporative system is referred to as fuel EVAP system and may contain**

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different components depending on application. See Fig. 160 -Fig. 167 . When testing fuel EVAP system components, use proper illustration to determine component location.

NOTE: On all models, an On-Board Refilling Vapor Recovery (ORVR) system is used to recover fuel vapors into charcoal canister that are generated during refueling. ORVR system consists of fuel inlet pipe, overfill check valve, cut-off valve and charcoal canister. See Fig. 160 -Fig. 167 . Overfill check valve may also be referred to as On-Board Refueling Vapor Recovery Overfill Check Valve (ORVR-OCKV) or fill check valve. Cut-off valve may also be referred to On-Board Refueling Vapor Recovery Cut-Off Valve (ORVR-COV). For testing of fuel EVAP system and ORVR system, see appropriate FUEL EVAP SYSTEM TEST.

NOTE: Charcoal canister may also be referred to as EVAP canister. Manufacturer provides testing information for testing airtightness of fuel tank and components along with testing of charcoal canister and fuel EVAP system.

Fuel EVAP System Test (Camry & Highlander)

NOTE: Manufacturer provides testing information for testing airtightness of fuel tank and components along with testing of charcoal canister and fuel EVAP system.

1. Inspect all fuel EVAP system lines and connections for sharp bends or damage. Fuel inlet pipe may also be referred to as fuel filler pipe. Inspect fuel inlet pipe for cracks, damage or fuel leakage. Inspect fuel tank cap for cracks or deformed gasket. Replace components if defective or damaged.
2. Start engine and warm engine to normal operating temperature. Shut engine off. Connect vacuum gauge from EVAP System Test Kit (00002-6872A) to EVAP service port. EVAP service port is located in engine compartment, in purge vacuum hose for EVAP system, near air cleaner assembly. EVAP service port contains a Green label for identification.
3. Operate EVAP Vacuum Switching Valve (VSV). If Toyota hand-held tester is available to operate EVAP VSV, go to next step. If Toyota hand-held tester is not available to operate EVAP VSV, go to step 5 .
4. Connect hand-held tester to data link connector No. 3 at driver's side of instrument panel. See **Fig. 8** and **Fig. 13** . . Start engine. Turn hand-held tester on. Select ACTIVE TEST MODE on hand-held tester. Using hand-held tester manufacturer's instructions, activate EVAP VSV. Go to step 6 .
5. Disconnect electrical connector at EVAP VSV. On Camry, EVAP VSV is located near rear of air cleaner housing and contains Blue or Black 2-pin electrical connector with Black/White and Black/Red wires. On Highlander, EVAP VSV is located on rear of air cleaner housing and contains Blue 2-pin electrical connector with Black/White and Black/Red wires. On all models, using jumper wires, connect battery voltage and ground to electrical terminals on EVAP VSV to operate EVAP VSV. Start engine. Go to next step.
6. Check vacuum reading on vacuum gauge with engine idling. Vacuum reading should be .368-19.713 in. Hg (5.00-268.00 in. H2O) for over 5 seconds. If vacuum reading is within specification, go to next step. If vacuum reading is not within specification, check for loose or restricted vacuum hose to EVAP service port, or for malfunctioning EVAP VSV. To check EVAP VSV operation, see **EVAP VACUUM SWITCHING VALVE** .

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7. Shut engine off. If using hand-held tester to operate EVAP VSV, stop operation of EVAP VSV. Remove hand-held tester. Go to next step. If connecting battery voltage to EVAP VSV to operate EVAP VSV, disconnect jumper wires and reconnect electrical connector on EVAP VSV. Go to next step.
8. Disconnect vacuum gauge from EVAP service port. Connect pressure gauge to EVAP service port. Install hose crimper on air drain hose near charcoal canister. Perform STEP 1 in illustration. See **Fig. 175** and **Fig. 176** . Charcoal canister is located near the fuel tank.
9. Apply 13.5-15.5 in. H2O of pressure to EVAP service port. After 2 minutes of applying pressure, pressure should be 7.7-8.8 in. H2O. If pressure is within specification, go to next step. If pressure cannot be maintained, remove hose crimper. Check for disconnected vacuum hose between EVAP VSV, charcoal canister and fuel tank. If vacuum hose is properly installed on EVAP VSV, charcoal canister and fuel tank, check for stuck open EVAP VSV. To check EVAP VSV operation, see **EVAP VACUUM SWITCHING VALVE** .
10. With pressure still applied at EVAP service port, remove fuel tank cap and note pressure reading. Pressure should decrease when fuel tank cap is removed. If pressure decreases when fuel tank cap is removed, remove pressure gauge and hose crimper. Go to next step. If pressure does not decrease when fuel tank cap is removed, remove pressure gauge and hose crimper. Check for restricted vacuum hose between EVAP service port, charcoal canister and fuel tank. Repair or replace vacuum hose as necessary.
11. To check airtightness of fuel tank and fuel inlet pipe, disconnect EVAP line hose from charcoal canister. Perform STEP 2 in illustration. See **Fig. 175** and **Fig. 176** . Apply .58 psi (.040 kg/cm^2) air pressure to EVAP line hose so pressure inside fuel tank is .58 psi (.040 kg/cm^2). Check that pressure inside fuel tank holds steady for one minute.
12. If pressure inside fuel tank holds steady for one minute, reinstall EVAP line hose on charcoal canister. Go to next step. If pressure inside fuel will not hold steady for one minute, check for leaking hoses or pipes at fuel tank and fuel inlet pipe, or for leaks at fuel tank or installed components on fuel tank. If no leaks exist, replace fuel tank and fuel inlet pipe. Reinstall EVAP line hose on charcoal canister. Go to next step.

NOTE: Overfill check valve may also be referred to as fill check valve. Cut-off valve may also be referred to as fuel cut-off valve.

13. To check overfill check valve and cut-off valve, disconnect purge line hose and EVAP line hose from charcoal canister and install cap on air drain hose. Perform STEP 3 in illustration. See **Fig. 175** and **Fig. 176** .
14. Apply .58 psi (.040 kg/cm^2) air pressure to purge line hose fitting on charcoal canister. Perform STEP 3 in illustration. See **Fig. 175** and **Fig. 176** . Ensure air flows from EVAP line hose when air pressure is applied to purge line hose fitting on charcoal canister. If fuel tank is full of fuel, air may not flow from EVAP line hose, as overfill check valve may be closed. Ensure fuel tank is not full of fuel when checking for airflow at EVAP line hose.
15. If air flows from EVAP line hose, go to next step. If air does not flow from EVAP line hose, check for restrictions in EVAP line hose and vent line hose. If any hose is restricted, replace hose and recheck operation. If hoses are not restricted, replace overfill check valve and cut-off valve located on top of fuel tank.
16. Reinstall purge line hose and EVAP line hose on charcoal canister. To check air inlet line, disconnect air inlet line hose from charcoal canister. Perform STEP 4 in illustration. See **Fig. 175** and **Fig. 176** . Apply air pressure to air inlet line hose. Air should flow through air inlet line hose. If air flows through air inlet

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line hose, go to next step. If air does not flow through air inlet line hose, check for restricted air inlet line hose or air inlet line.

17. To check charcoal canister, disconnect necessary electrical connectors and components for removal of charcoal canister. Remove retaining bolts/nuts and charcoal canister. Inspect charcoal canister for cracks or damage. If charcoal canister is okay, go to next step. If charcoal canister is defective, replace charcoal canister.
18. Install cap on vent port on charcoal canister. See **Fig. 177** . Apply .26 psi (.018 kg/cm^2) air pressure to EVAP port while holding purge port closed. See **Fig. 177** . Ensure air flows freely from air drain port.
19. Apply .26 psi (.018 kg/cm^2) air pressure to EVAP port while holding air drain port and purge port closed. See **Fig. 177** . Ensure air does not flow for air inlet port.
20. Using vacuum pump, apply 1.01 in. Hg of vacuum to purge port. See **Fig. 177** . Ensure vacuum does not decrease when air inlet port is closed and that vacuum decreases when air inlet port is opened.
21. While holding air inlet port closed, use vacuum pump to apply 1.01 in. Hg of vacuum to EVAP port. See **Fig. 177** . Ensure air flows into purge port. Remove cap from vent port. Replace charcoal canister if defective.
22. Reinstall charcoal canister. If fuel EVAP system operates properly, it may be necessary to check operation of EVAP VSV, canister closed valve Vacuum Switching Valve (VSV) and pressure switching valve Vacuum Switching Valve (VSV). See **EVAP VACUUM SWITCHING VALVE** , **CANISTER CLOSED VALVE VACUUM SWITCHING VALVE** and **PRESSURE SWITCHING VALVE VACUUM SWITCHING VALVE** . Manufacturer does provide individual component testing for vapor pressure sensor. If problem exists with vapor pressure sensor, a Diagnostic Trouble Code (DTC) may be stored in Engine Control Module (ECM). See TESTING PROCEDURE under SELF-DIAGNOSTIC SYSTEM in appropriate SELF-DIAGNOSTICS article for retrieving of DTCs.

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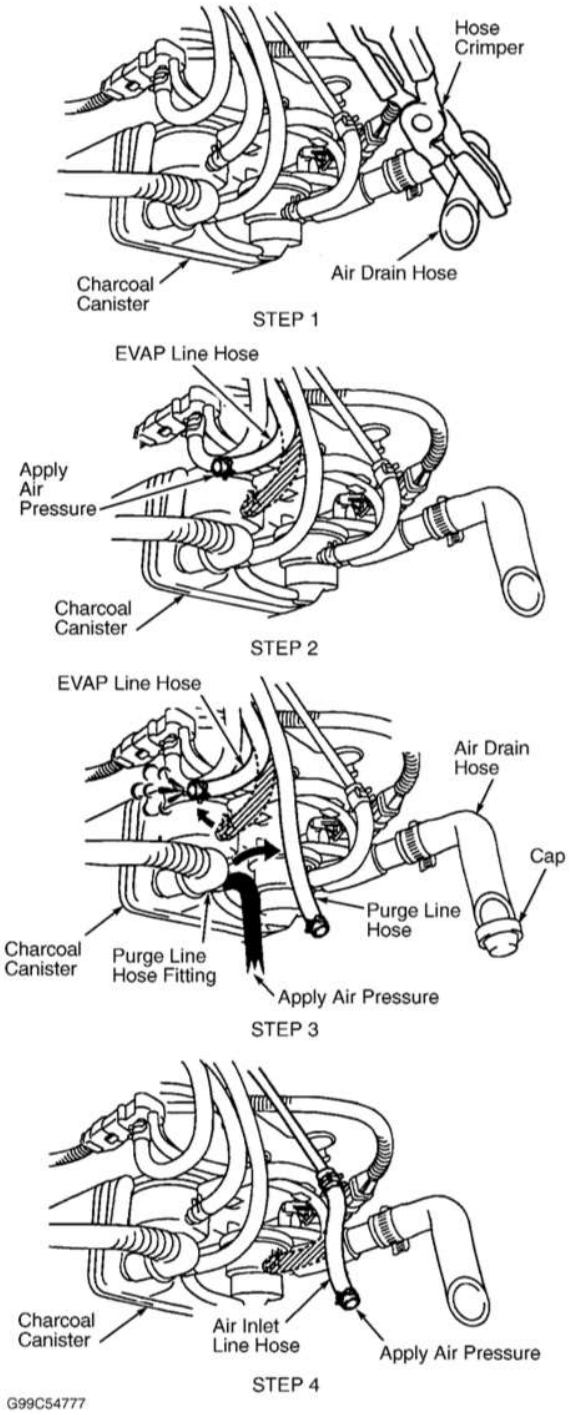


Fig. 175: Testing Fuel EVAP System & Lines (Camry, Camry Solara & Corolla)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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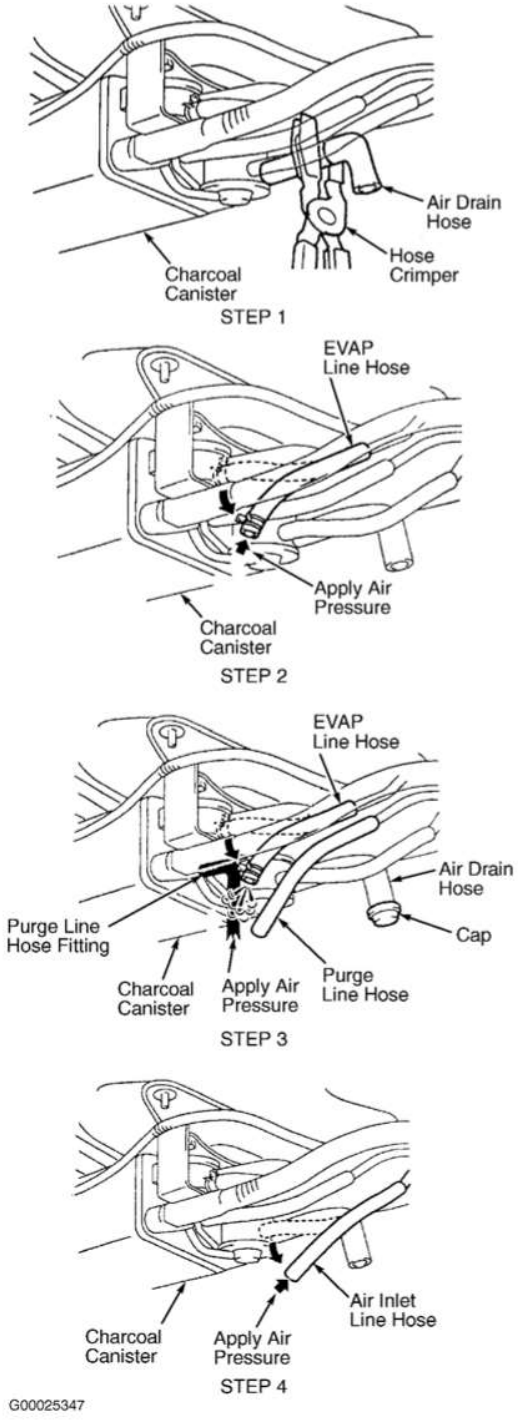


Fig. 176: Testing Fuel EVAP System & Lines (Highlander)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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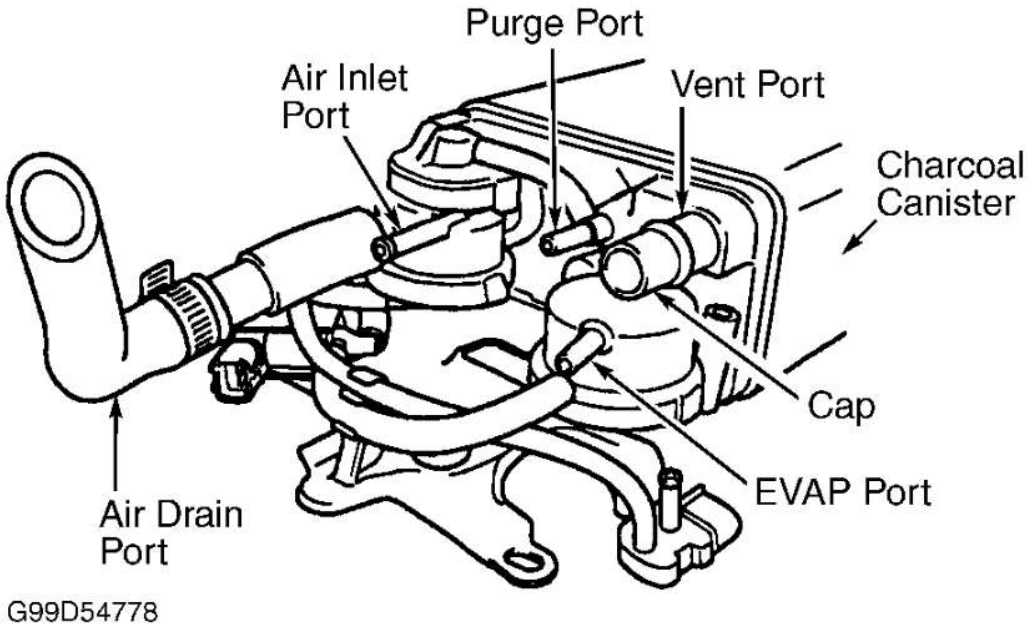


Fig. 177: Identifying Typical Charcoal Canister Ports (Camry, Camry Solara, Celica, Corolla, Highlander, MR2, RAV4 & Tacoma)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Fuel EVAP System Test (Camry Solara, Celica, Corolla, MR2, RAV4 & Tacoma)

NOTE: Manufacturer provides testing information for testing airtightness of fuel tank and components along with testing of charcoal canister and fuel EVAP system.

1. Inspect all fuel EVAP system lines and connections for sharp bends or damage. Fuel inlet pipe may also be referred to as fuel filler pipe. Inspect fuel inlet pipe for cracks, damage or fuel leakage. Inspect fuel tank cap for cracks or deformed gasket. Replace components if defective or damaged.
2. Start engine and warm engine to normal operating temperature. Shut engine off. Connect vacuum gauge from EVAP System Test Kit (00002-6872A) to EVAP service port. EVAP service port is located in engine compartment, in purge vacuum hose for EVAP system. See **Fig. 160** -**Fig. 162** , **Fig. 164** , **Fig. 166** and **Fig. 167** .
3. Operate EVAP Vacuum Switching Valve (VSV). If Toyota hand-held tester is available to operate EVAP VSV, go to next step. If Toyota hand-held tester is not available to operate EVAP VSV, go to step 5 .
4. Connect hand-held tester to data link connector No. 3 at driver's side of instrument panel. See **Fig. 9** -**Fig. 11** , **Fig. 14Fig. 16** and **Fig. 17** . Start engine. Turn hand-held tester on. Select ACTIVE TEST MODE on hand-held tester. Using hand-held tester manufacturer's instructions, activate EVAP VSV. Go to step 6 .
5. Disconnect electrical connector at EVAP VSV. See **EVAP VSV LOCATION** table. See **Fig. 160** -**Fig. 162** , **Fig. 164** , **Fig. 166** and **Fig. 167** . Using jumper wires, connect battery voltage and ground to

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electrical terminals on EVAP VSV to operate EVAP VSV. Start engine. Go to next step.

EVAP VSV LOCATION

Application	Location
Camry Solara	On Air Intake Hose, Near Air Cleaner Assembly & Contains Black 2-Pin Electrical Connector With Black/White & Black/Red Wires
Celica	On Bracket At Rear Of Air Cleaner Housing & Contains Black 2-Pin Electrical Connector With Green/Orange & Black/White Wires
Corolla	On Bracket At Rear Of Air Cleaner Housing & Contains Black 2-Pin Electrical Connector With Blue/Black & Black Wires
MR2	On Air Intake Hose, Near Air Cleaner Assembly & Contains Blue 2-Pin Electrical Connector With Black/Red & White Wires
RAV4	On Air Intake Hose, Near Air Cleaner Assembly & Contains Black 2-Pin Electrical Connector With Black/Red & Pink Wires
Tacoma	On Bracket Bolted To Inside Of Driver's Side Front Fender Panel & Contains Black 2-Pin Electrical Connector With White/Green & White/Red Wires

6. Check vacuum reading on vacuum gauge with engine idling. Vacuum reading should be within specification for over 5 seconds. See **VACUUM SPECIFICATIONS** table. If vacuum reading is within specification, go to next step. If vacuum reading is not within specification, check for loose or restricted vacuum hose to EVAP service port, or for malfunctioning EVAP VSV. To check EVAP VSV operation, see **EVAP VACUUM SWITCHING VALVE** .

VACUUM SPECIFICATIONS

Application	In. Hg (In. H20)
Camry Solara, Celica, Corolla & Tacoma	.368-19.713 (5.00-268.00)
MR2 & RAV4	.368-3.678 (5.00-50.00)

7. Shut engine off. If using hand-held tester to operate EVAP VSV, stop operation of EVAP VSV. Remove hand-held tester. Go to next step. If connecting battery voltage to EVAP VSV to operate EVAP VSV, disconnect jumper wires and reconnect electrical connector on EVAP VSV. Go to next step.
8. Disconnect vacuum gauge from EVAP service port. Connect pressure gauge to EVAP service port. Install hose crimper on air drain hose near charcoal canister. Perform STEP 1 in illustration. See **Fig. 175** and **Fig. 178** -**Fig. 181** . On MR2, hose crimper should be installed at White-colored area on air drain hose. On RAV4, hose crimper should be installed at Yellow-colored area on air drain hose. On all models, charcoal canister is located near fuel tank. See **Fig. 160** -**Fig. 162** , **Fig. 164** , **Fig. 166** and **Fig. 167** .
9. Apply 13.5-15.5 in. H2O of pressure to EVAP service port. After 2 minutes of applying pressure, pressure should be 7.7-8.8 in. H2O. If pressure is within specification, go to next step. If pressure cannot be maintained, remove hose crimper. Check for disconnected vacuum hose between EVAP VSV, charcoal canister and fuel tank. If vacuum hose is properly installed on EVAP VSV, charcoal canister and fuel tank, check for stuck open EVAP VSV. To check EVAP VSV operation, see **EVAP VACUUM SWITCHING VALVE** .
10. With pressure still applied at EVAP service port, remove fuel tank cap and note pressure reading. Pressure should decrease when fuel tank cap is removed. If pressure decreases when fuel tank cap is removed, remove pressure gauge and hose crimper. Go to next step. If pressure does not decrease when

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fuel tank cap is removed, remove pressure gauge and hose crimper. Check for restricted vacuum hose between EVAP service port, charcoal canister and fuel tank. Repair or replace vacuum hose as necessary.

11. To check airtightness of fuel tank and fuel inlet pipe, disconnect EVAP line hose from charcoal canister. Perform STEP 2 in illustration. See **Fig. 175** and **Fig. 178** -**Fig. 181** . Apply .58 psi (.040 kg/cm^2) air pressure to EVAP line hose so pressure inside fuel tank is .58 psi (.040 kg/cm^2). Check that pressure inside fuel tank holds steady for one minute.
12. If pressure inside fuel tank holds steady for one minute, reinstall EVAP line hose on charcoal canister. Go to next step. If pressure inside fuel will not hold steady for one minute, check for leaking hoses or pipes at fuel tank and fuel inlet pipe, or for leaks at fuel tank or installed components on fuel tank. If no leaks exist, replace fuel tank and fuel inlet pipe. Reinstall EVAP line hose on charcoal canister. Go to next step.

NOTE: Overfill check valve may also be referred to as fill check valve. Cut-off valve may also be referred to as fuel cut-off valve.

13. To check overfill check valve and cut-off valve, disconnect purge line hose and EVAP line hose from charcoal canister. Install cap on air drain hose or cap on air drain hose fitting on charcoal canister. Perform STEP 3 in illustration. See **Fig. 175** and **Fig. 178** -**Fig. 181** .
14. Apply .58 psi (.040 kg/cm^2) air pressure to purge line hose fitting on charcoal canister. Perform STEP 3 in illustration. See **Fig. 175** and **Fig. 178** -**Fig. 181** . Ensure air flows from EVAP line hose when air pressure is applied to purge line hose fitting on charcoal canister. If fuel tank is full of fuel, air may not flow from EVAP line hose, as overfill check valve may be closed. Ensure fuel tank is not full of fuel when checking for airflow at EVAP line hose.
15. If air flows from EVAP line hose, go to next step. If air does not flow from EVAP line hose, check for restrictions in EVAP line hose and vent line hose. If any hose is restricted, replace hose and recheck operation. If hoses are not restricted, replace overfill check valve and cut-off valve (if equipped). Overfill check valve and cut-off valve (if equipped) are located on top of fuel tank. See **Fig. 160** -**Fig. 162** , **Fig. 164** , **Fig. 166** and **Fig. 167** .
16. Reinstall purge line hose and EVAP line hose on charcoal canister. To check air inlet line, disconnect air inlet line hose from charcoal canister. Perform STEP 4 in illustration. See **Fig. 175** and **Fig. 178** -**Fig. 181** . Apply air pressure to air inlet line hose. Air should flow through air inlet line hose. If air flows through air inlet line hose, go to next step. If air does not flow through air inlet line hose, check for restricted air inlet line hose or air inlet line.
17. To check charcoal canister, remove necessary components for access to charcoal canister. Disconnect necessary electrical connectors for removal of charcoal canister. Disconnect purge line hose, EVAP line hose and air inlet line hose from charcoal canister if not previously done.
18. Push connector on vent line hose toward charcoal canister and pinch both sides of retainer on connector, and then disconnect vent line hose with connector from charcoal canister. See **Fig. 182** and **Fig. 183** .
19. Remove vapor pressure sensor bolts/nut (if equipped). Remove retaining bolts/nuts and charcoal canister. Inspect charcoal canister for cracks or damage. If charcoal canister is okay, go to next step. If charcoal canister is defective, replace charcoal canister.
20. On Camry Solara, Celica, MR2 and RAV4 install cap on vent port on charcoal canister. See **Fig. 177** . On Corolla and Tacoma, install hose and cap on vent port. See **Fig. 177** . On all models, apply .26 psi (.018 kg/cm^2) air pressure to EVAP port while holding purge port closed. See **Fig. 177** . Ensure air flows freely from air drain port.

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21. Apply .26 psi (.018 kg/cm^2) air pressure to EVAP port while holding air drain port and purge port closed. See **Fig. 177** . Ensure air does not flow from air inlet port.
22. Using vacuum pump, apply 1.01 in. Hg of vacuum to purge port. See **Fig. 177** . Ensure vacuum does not decrease when air inlet port is closed and that vacuum decreases when air inlet port is opened.
23. While holding air inlet port closed, use vacuum pump to apply 1.01 in. Hg of vacuum to EVAP port. See **Fig. 177** . Ensure air flows into purge port. Remove hose (if used) and cap from vent port. Replace charcoal canister if defective.
24. Reinstall charcoal canister. If fuel EVAP system operates properly, it may be necessary to check operation of EVAP VSV, canister closed valve Vacuum Switching Valve (VSV), pressure switching valve Vacuum Switching Valve (VSV) and vapor pressure sensor. See **EVAP VACUUM SWITCHING VALVE** , **CANISTER CLOSED VALVE VACUUM SWITCHING VALVE** , **PRESSURE SWITCHING VALVE VACUUM SWITCHING VALVE** and appropriate **VAPOR PRESSURE SENSOR** procedure.

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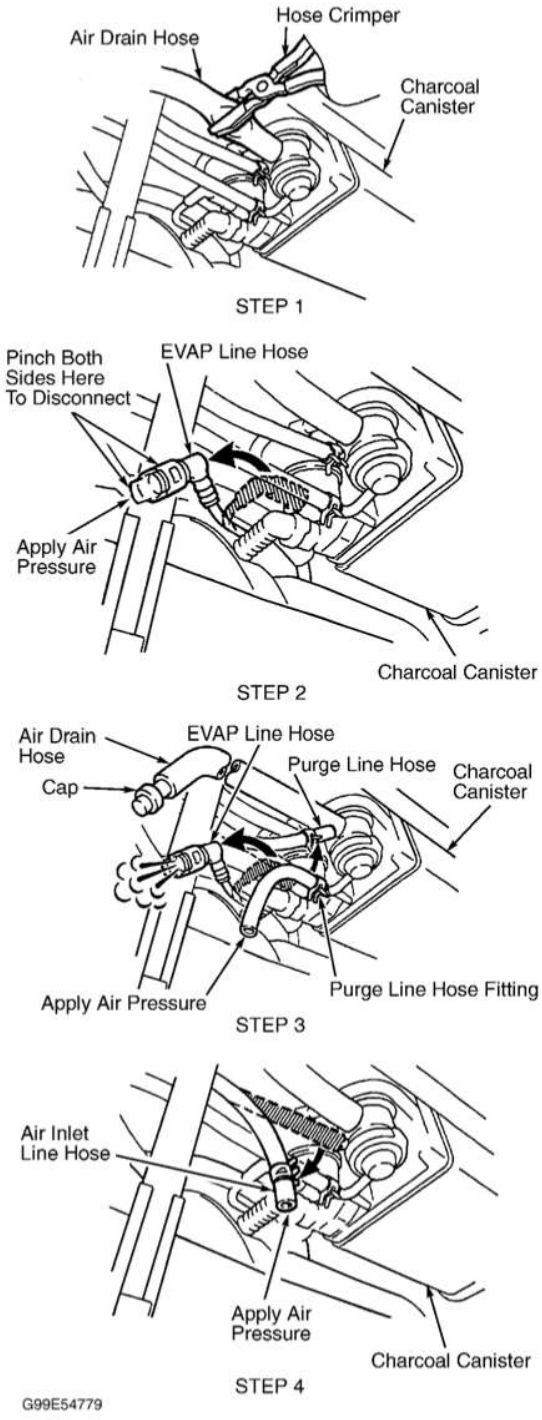


Fig. 178: Testing Fuel EVAP System & Lines (Celica)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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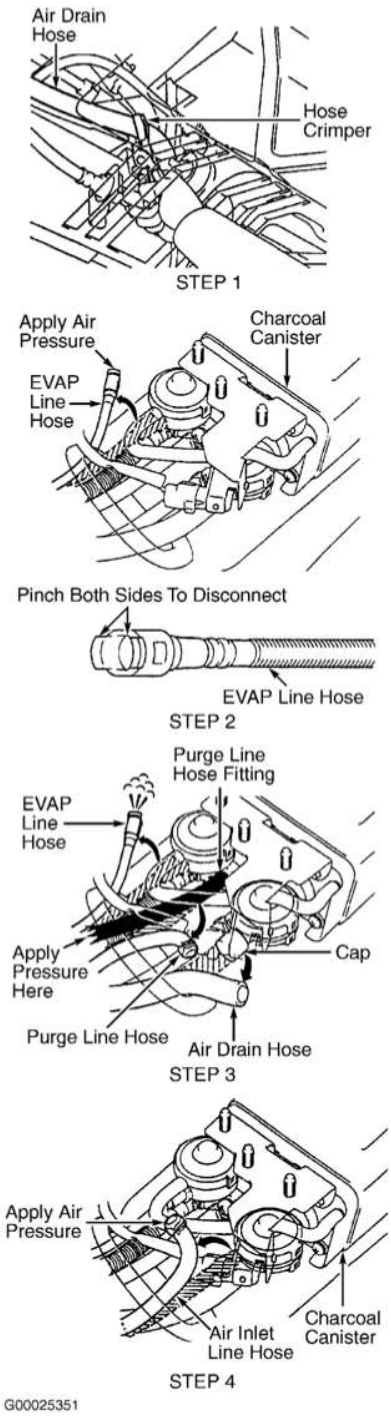


Fig. 179: Testing Fuel EVAP System & Lines (MR2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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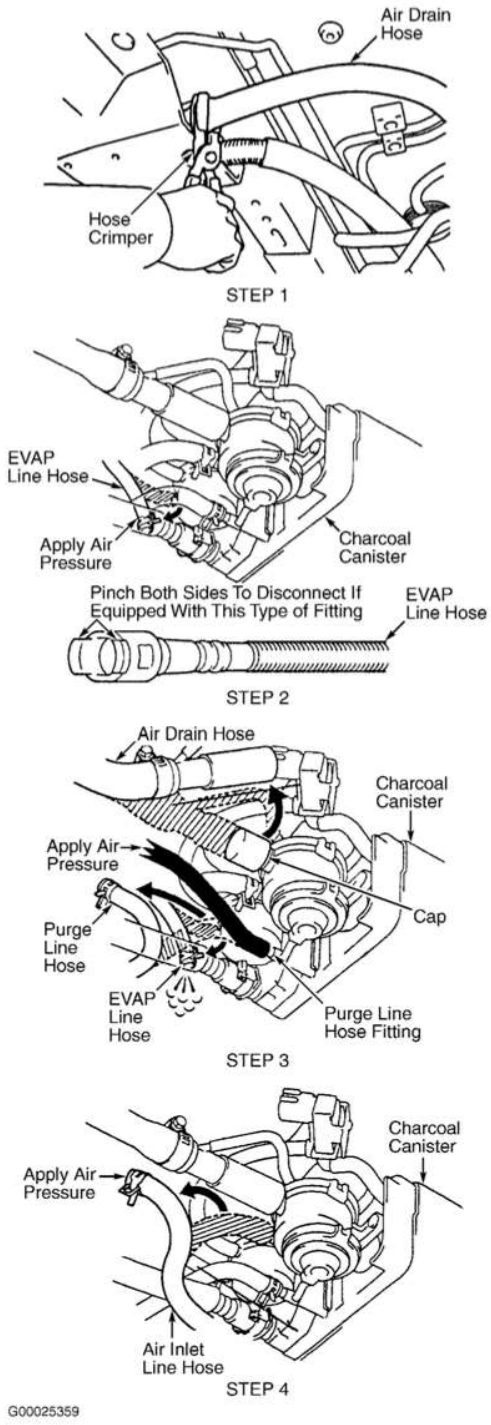


Fig. 180: Testing Fuel EVAP System & Lines (RAV4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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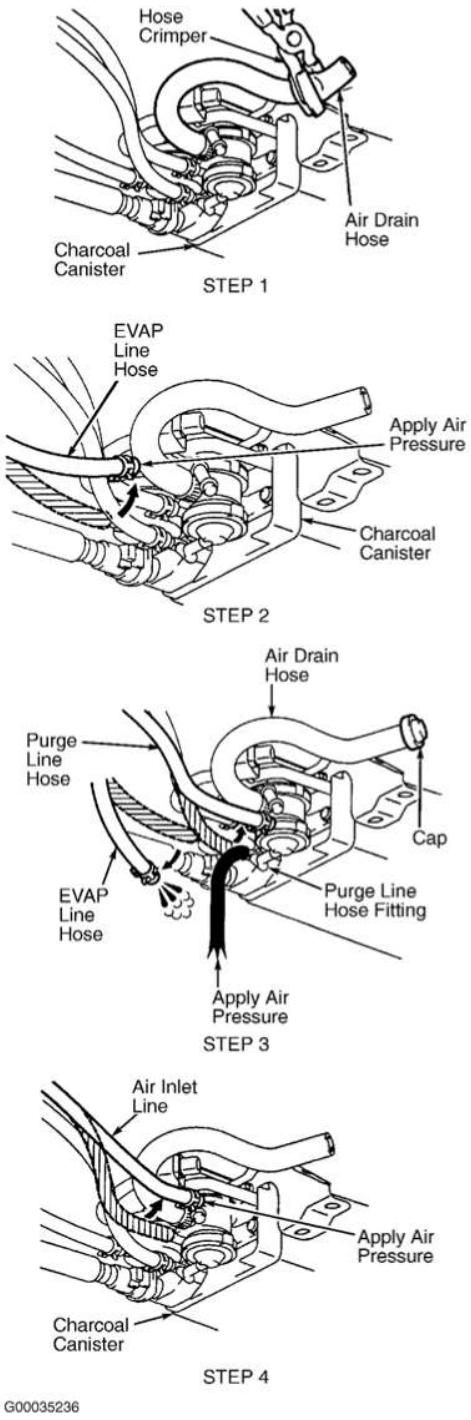


Fig. 181: Testing Fuel EVAP System & Lines (Tacoma)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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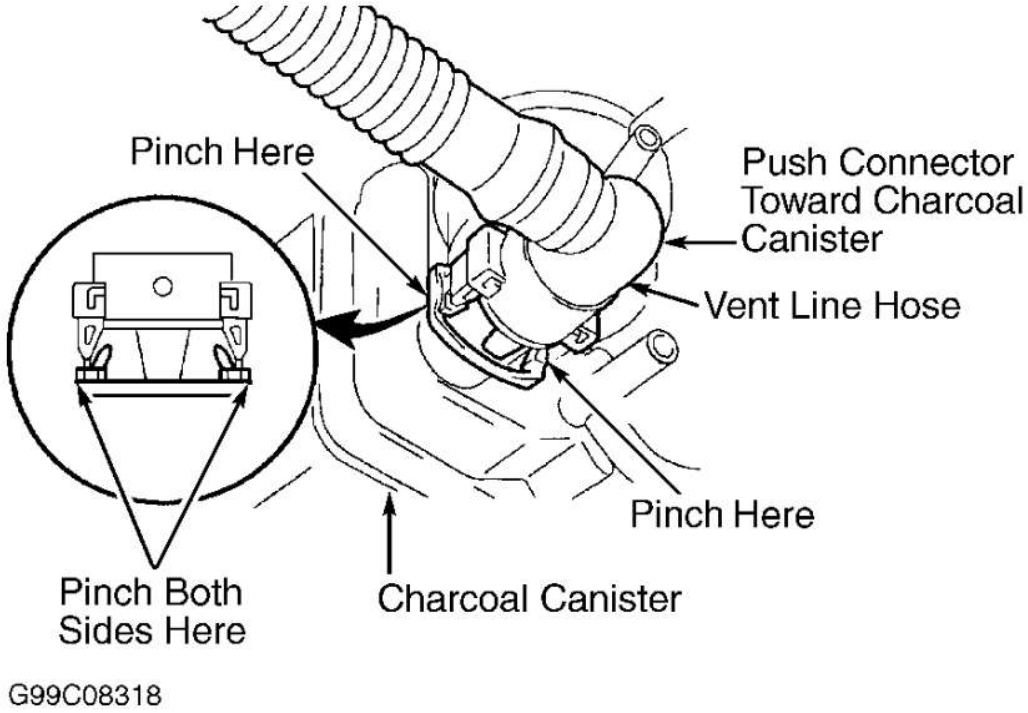


Fig. 182: Disconnecting Vent Line Hose & Connector At Charcoal Canister (Camry Solara)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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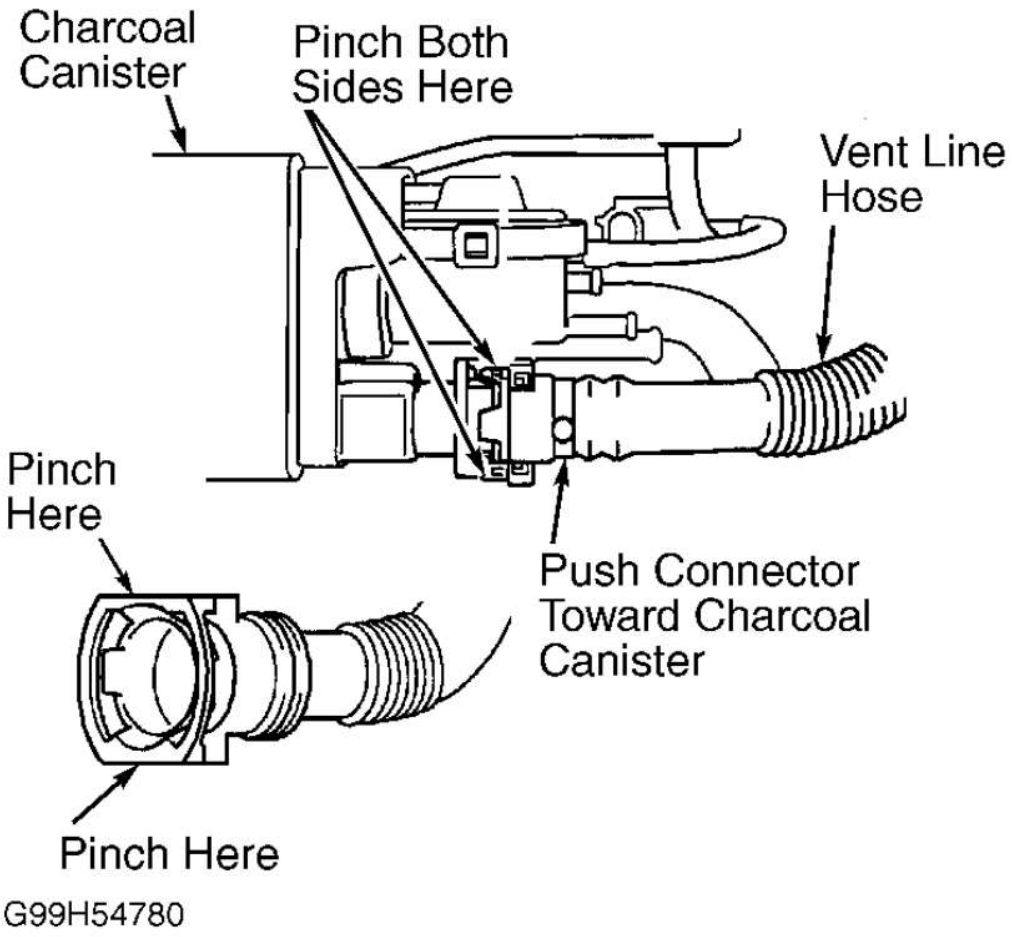


Fig. 183: Disconnecting Typical Vent Line Hose & Connector At Charcoal Canister (Celica, Corolla, MR2, RAV4 & Tacoma)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Fuel EVAP System Test (ECHO)

NOTE: Manufacturer provides testing information for testing airtightness of fuel tank and components along with testing of charcoal canister and fuel EVAP system.

1. Inspect all fuel EVAP system lines and connections for sharp bends or damage. Fuel inlet pipe may also be referred to as fuel filler pipe. Inspect fuel inlet pipe for cracks, damage or fuel leakage. Inspect fuel tank cap for cracks or deformed gasket. Replace components if defective or damaged.
2. Start engine and warm engine to normal operating temperature. Shut engine off. Connect vacuum gauge from EVAP System Test Kit (00002-6872A) to EVAP service port. EVAP service port is located in

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engine compartment, in purge vacuum hose for EVAP system. See **Fig. 163** .

3. Operate EVAP Vacuum Switching Valve (VSV). If Toyota hand-held tester is available to operate EVAP VSV, go to next step. If Toyota hand-held tester is not available to operate EVAP VSV, go to step 5 .
4. Connect hand-held tester to data link connector No. 3 at driver's side of instrument panel. See **Fig. 12** . Start engine. Turn hand-held tester on. Select ACTIVE TEST MODE on hand-held tester. Using hand-held tester manufacturer's instructions, activate EVAP VSV. Go to step 6 .
5. Disconnect electrical connector at EVAP VSV. EVAP VSV is located on bracket at side of air cleaner housing and contains Blue 2-pin electrical connector with Black/Yellow and White/Green wires. See **Fig. 163** . Using jumper wires, connect battery voltage and ground to electrical terminals on EVAP VSV to operate EVAP VSV. Start engine. Go to next step.
6. Check vacuum reading on vacuum gauge with engine idling. Vacuum reading should be .368-19.713 in. Hg (5.00-268.00 in. H2O) for over 5 seconds. If vacuum reading is within specification, go to next step. If vacuum reading is not within specification, check for loose or restricted vacuum hose to EVAP service port, or for malfunctioning EVAP VSV. To check EVAP VSV operation, see **EVAP VACUUM SWITCHING VALVE** .
7. Shut engine off. If using hand-held tester to operate EVAP VSV, stop operation of EVAP VSV. Leave hand-held tester connected to data link connector No. 3 and go to next step. If connecting battery voltage to EVAP VSV to operate EVAP VSV, disconnect jumper wires and reconnect electrical connector on EVAP VSV. Go to next step.
8. Disconnect vacuum gauge from EVAP service port. Connect pressure gauge to EVAP service port. Operate Canister Closed Valve Vacuum Switching Valve (CCV VSV). If Toyota hand-held tester is available to operate CCV VSV, go to next step. If Toyota hand-held tester is not available to operate CCV VSV, go to step 10 .
9. With hand-held tester still connected to DLC No. 3, turn ignition on and then turn hand-held tester on. DO NOT start engine. Select ACTIVE TEST MODE on hand-held tester. Using hand-held tester manufacturer's instructions, activate CCV VSV. Go to step 11 .
10. Install hose crimper on air drain hose near charcoal canister. Charcoal canister is located near fuel tank. See **Fig. 163** . Perform STEP 1 in illustration. See **Fig. 184** . Go to next step.

NOTE: If using hand-held tester to activate CCV VSV, this step must be completed within 10 minutes after CCV VSV was activated or CCV VSV will be reset.

11. Apply 13.5-15.5 in. H2O of pressure to EVAP service port. After 2 minutes of applying pressure, pressure should be 7.7-8.8 in. H2O. If pressure is within specification, go to next step. If pressure cannot be maintained, check for disconnected vacuum hose between EVAP VSV, charcoal canister and fuel tank. If vacuum hose is properly installed on EVAP VSV, charcoal canister and fuel tank, check for stuck open EVAP VSV. To check EVAP VSV operation, see **EVAP VACUUM SWITCHING VALVE** .
12. With pressure still applied at EVAP service port, remove fuel tank cap and note pressure reading. Pressure should decrease when fuel tank cap is removed. If pressure decreases when fuel tank cap is removed and hand-held tester was used to activate CCV VSV, turn ignition off. Remove pressure gauge and hand-held tester. Go to next step. If pressure decreases when fuel tank cap is removed and hand-held tester was not used to operate CCV VSV, remove hose crimper and pressure gauge. Go to next step. On all applications, if pressure does not decrease when fuel tank cap is removed, remove pressure gauge and hose crimper. Check for restricted vacuum hose between EVAP service port, charcoal canister and fuel tank. Repair or replace vacuum hose as necessary.

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13. To check airtightness of fuel tank and fuel inlet pipe, disconnect EVAP line hose from charcoal canister by pinching both sides of connector together. Perform STEP 2 in illustration. See **Fig. 184** . Apply .58 psi (.040 kg/cm^2) air pressure to EVAP line hose so pressure inside fuel tank is .58 psi (.040 kg/cm^2). Check that pressure inside fuel tank holds steady for one minute.
14. If pressure inside fuel tank holds steady for one minute, reinstall EVAP line hose on charcoal canister. Go to next step. If pressure inside fuel will not hold steady for one minute, check for leaking hoses or pipes at fuel tank and fuel inlet pipe, or for leaks at fuel tank or installed components on fuel tank. If no leaks exist, replace fuel tank and fuel inlet pipe. Reinstall EVAP line hose on charcoal canister. Go to next step.

NOTE: Overfill check valve may also be referred to as fill check valve. Cut-off valve may also be referred to as fuel cut-off valve.

15. To check overfill check valve and cut-off valve, disconnect purge line hose and EVAP line hose from charcoal canister and install cap on air drain hose. Perform STEP 3 in illustration. See **Fig. 184** .
16. Apply .58 psi (.040 kg/cm^2) air pressure to purge line hose fitting on charcoal canister. Perform STEP 3 in illustration. See **Fig. 184** . Ensure air flows from EVAP line hose when air pressure is applied to purge line hose fitting on charcoal canister. If fuel tank is full of fuel, air may not flow from EVAP line hose, as overfill check valve may be closed. Ensure fuel tank is not full of fuel when checking for airflow at EVAP line hose.
17. If air flows from EVAP line hose, go to next step. If air does not flow from EVAP line hose, check for restrictions in EVAP line hose and vent line hose. If any hose is restricted, replace hose and recheck operation. If hoses are not restricted, replace overfill check valve and cut-off valve located on top of fuel tank. See **Fig. 163** .
18. Reinstall purge line hose and EVAP line hose on charcoal canister. To check air inlet line, disconnect air inlet line hose from charcoal canister. Perform STEP 4 in illustration. See **Fig. 184** . Apply air pressure to air inlet line hose. Air should flow through air inlet line hose. If air flows through air inlet line hose, go to next step. If air does not flow through air inlet line hose, check for restricted air inlet line hose or air inlet line.
19. To check charcoal canister, disconnect necessary electrical connectors and components for removal of charcoal canister. Disconnect purge line hose, EVAP line hose and air inlet line hose from charcoal canister if not previously done.
20. Push connector on vent line hose toward charcoal canister, pinch both sides of retainer on connector, and disconnect vent line hose with connector from charcoal canister. See **Fig. 185** .
21. Remove retaining nuts and charcoal canister. Inspect charcoal canister for cracks or damage. If charcoal canister is okay, go to next step. If charcoal canister is defective, replace charcoal canister.
22. Install cap on vent port on charcoal canister. See **Fig. 186** . Apply .26 psi (.018 kg/cm^2) air pressure to EVAP port while holding purge port closed. See **Fig. 186** . Ensure air flows freely from air drain port.
23. Apply .26 psi (.018 kg/cm^2) air pressure to EVAP port while holding air drain port and purge port closed. See **Fig. 186** . Ensure air does not flow from air inlet port.
24. Using vacuum pump, apply 1.01 in. Hg of vacuum to purge port. See **Fig. 186** . Ensure vacuum does not decrease when air inlet port is closed and that vacuum decreases when air inlet port is opened.
25. While holding air inlet port closed, use vacuum pump to apply 1.01 in. Hg of vacuum to EVAP port. See **Fig. 186** . Ensure air flows into purge port. Remove cap from vent port. Replace charcoal canister if

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defective.

26. Reinstall charcoal canister. If fuel EVAP system operates properly, it may be necessary to check operation of EVAP Vacuum Switching Valve (VSV), canister closed valve Vacuum Switching Valve (VSV) and vapor pressure sensor. See **EVAP VACUUM SWITCHING VALVE** , **CANISTER CLOSED VALVE VACUUM SWITCHING VALVE** and **VAPOR PRESSURE SENSOR** .

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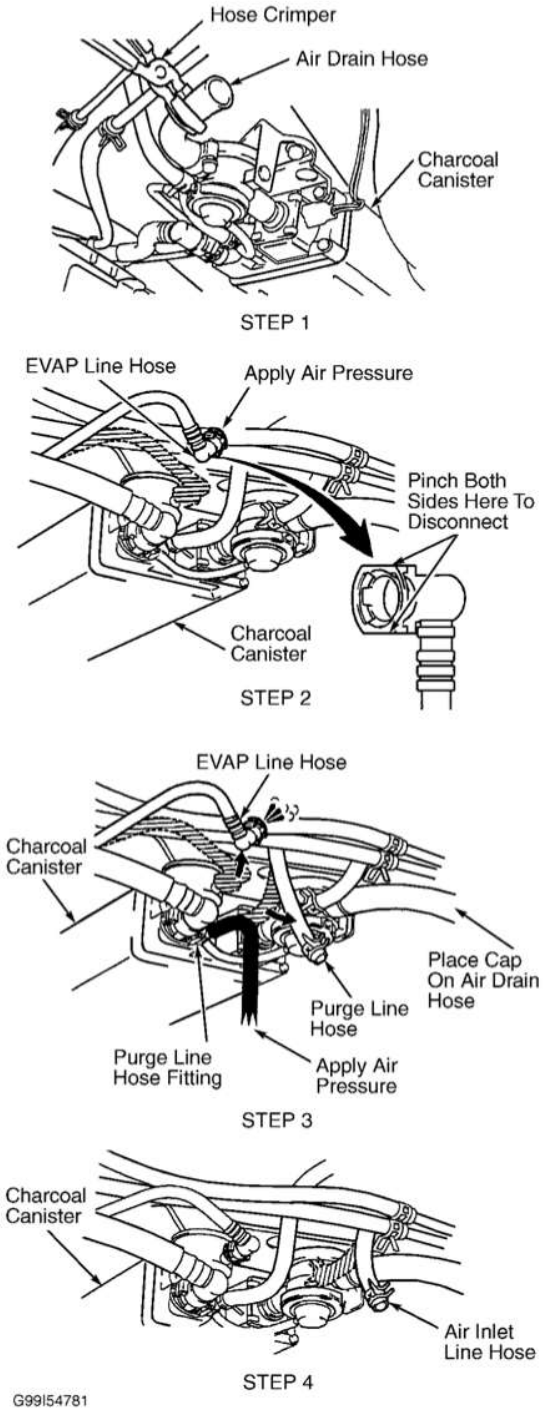


Fig. 184: Testing Fuel EVAP System & Lines (ECHO)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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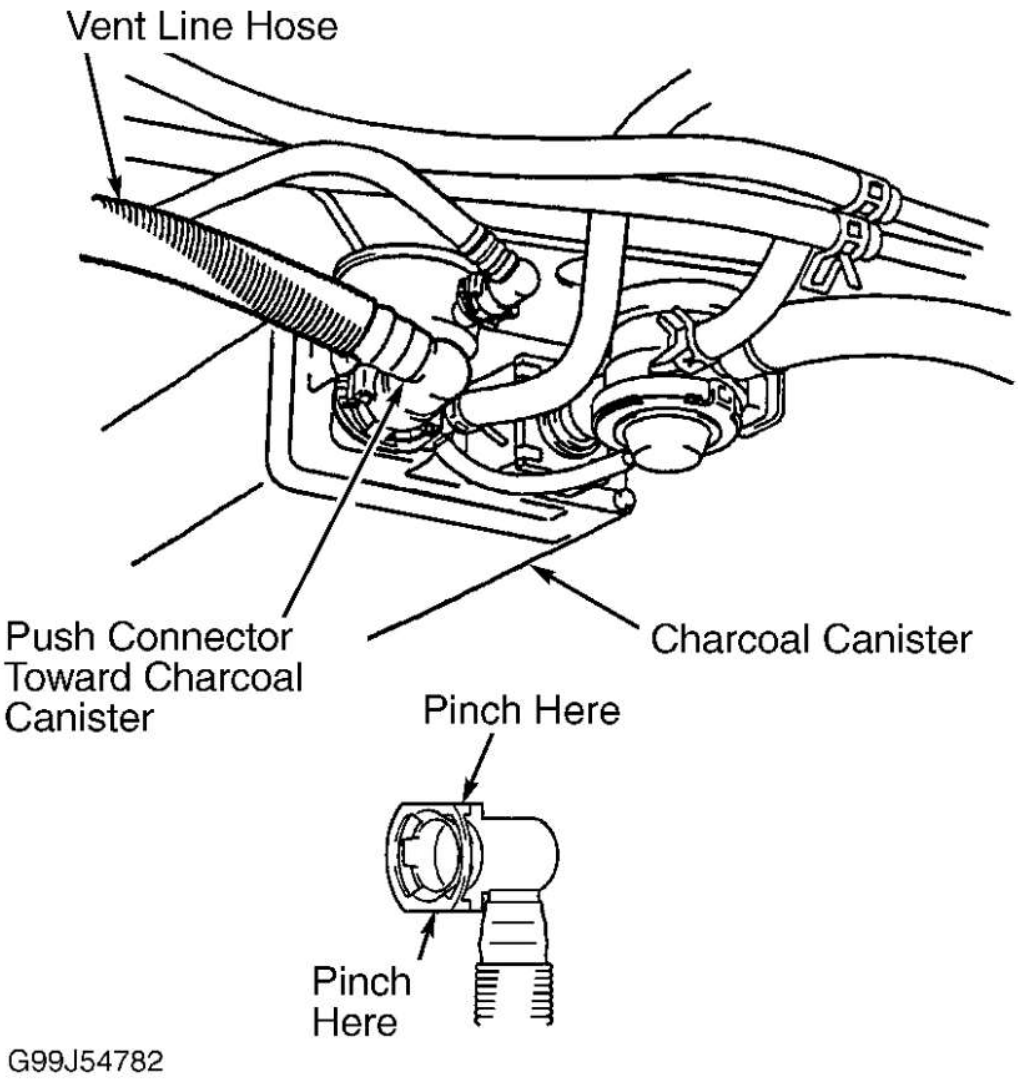


Fig. 185: Disconnecting Vent Line Hose & Connector At Charcoal Canister (ECHO)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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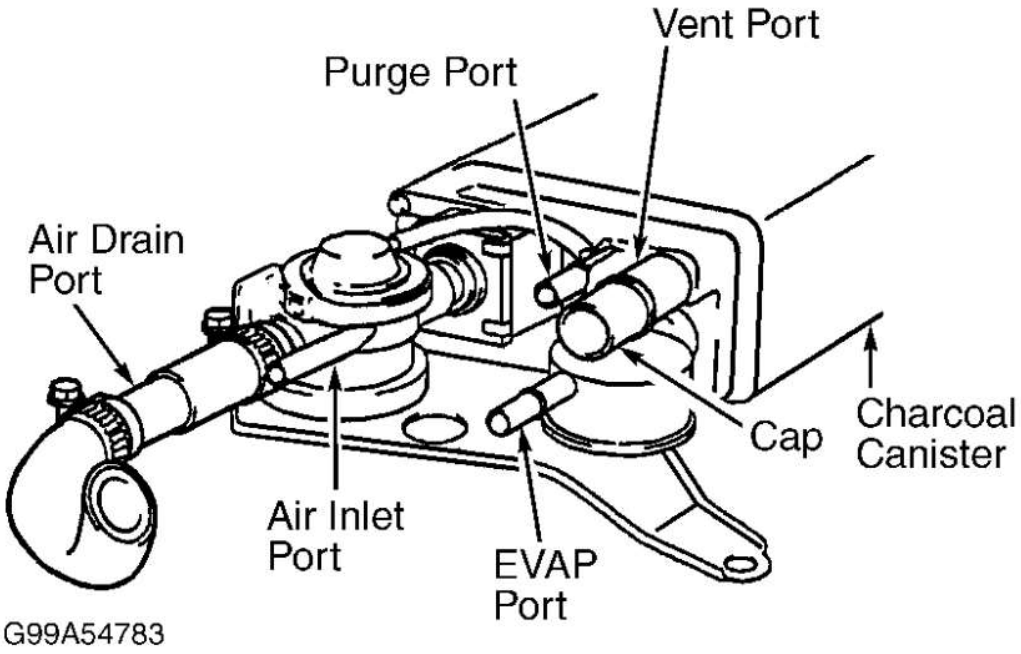


Fig. 186: Identifying Charcoal Canister Ports (ECHO)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Fuel EVAP System Test (Prius)

NOTE: Manufacturer provides testing information for testing airtightness of fuel tank and components along with testing of charcoal canister and fuel EVAP system.

WARNING: Read service precautions before proceeding with service procedure. See SERVICE PRECAUTIONS .

1. Inspect all fuel EVAP system lines and connections for sharp bends or damage. It may be necessary to remove tailpipe and heat insulator for access to lines and connections. Fuel inlet pipe may also be referred to as fuel filler pipe. Inspect fuel inlet pipe for cracks, damage or fuel leakage. Inspect fuel tank cap for cracks or deformed gasket. Replace components if defective or damaged.
2. Start engine and warm engine to normal operating temperature. Shut engine off. Connect vacuum gauge from EVAP System Test Kit (00002-6872A) to EVAP service port. EVAP service port is located in engine compartment, in purge vacuum hose for EVAP system, near air cleaner assembly. EVAP service port contains a Green label for identification.
3. Operate EVAP Vacuum Switching Valve (VSV). If Toyota hand-held tester is available to operate EVAP VSV, go to next step. If Toyota hand-held tester is not available to operate EVAP VSV, go to step 5 .
4. Connect hand-held tester to data link connector No. 3 at driver's side of instrument panel. See **Fig. 15** .

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Start engine. Turn hand-held tester on. Select ACTIVE TEST MODE on hand-held tester. Using hand-held tester manufacturer's instructions, activate EVAP VSV. Go to step 6 .

5. Disconnect electrical connector at EVAP VSV. EVAP VSV is located at passenger's side front corner of engine compartment, near air intake hose and contains Blue 2-pin electrical connector with Red/Blue and Black wires. See **Fig. 165** . Using jumper wires, connect battery voltage and ground to electrical terminals on EVAP VSV to operate EVAP VSV. Start engine. Go to next step.
6. Check vacuum reading on vacuum gauge with engine idling. Vacuum reading should be .368-19.713 in. Hg (5.00-268.00 in. H2O) for over 5 seconds. If vacuum reading is within specification, go to next step. If vacuum reading is not within specification, check for loose or restricted vacuum hose to EVAP service port, or for malfunctioning EVAP VSV. To check EVAP VSV operation, see **EVAP VACUUM SWITCHING VALVE** .
7. Shut engine off. If using hand-held tester to operate EVAP VSV, stop operation of EVAP VSV. Leave hand-held tester connected to DLC No. 3. Go to next step. If connecting battery voltage to EVAP VSV to operate EVAP VSV, disconnect jumper wires and reconnect electrical connector on EVAP VSV. Go to next step.
8. Disconnect vacuum gauge from EVAP service port. Connect pressure gauge to EVAP service port. Install hose crimper on air drain hose near charcoal canister. See **Fig. 187** . Charcoal canister is located near fuel tank. See **Fig. 165** .

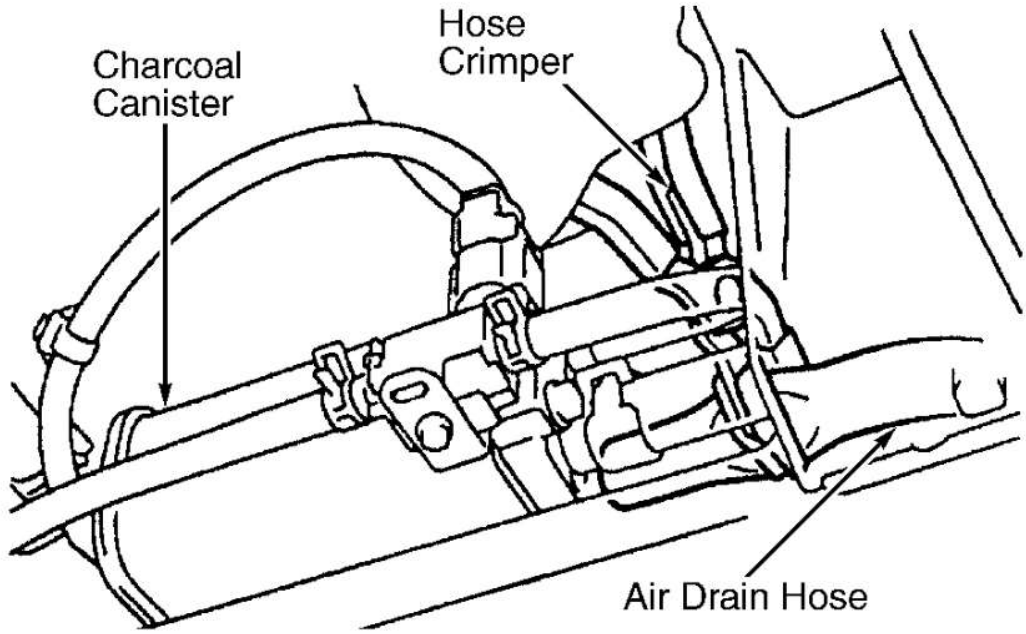


Fig. 187: Installing Hose Crimper On Air Drain Hose (Prius)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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9. Apply 13.5-15.5 in. H2O of pressure to EVAP service port. After 2 minutes of applying pressure, pressure should be 7.7-8.8 in. H2O. If pressure is within specification, remove hose crimper and go to next step. If pressure cannot be maintained, remove hose crimper. Check for disconnected vacuum hose between EVAP VSV, charcoal canister and fuel tank. If vacuum hose is properly installed on EVAP VSV, charcoal canister and fuel tank, check for stuck open EVAP VSV. To check EVAP VSV operation, see **EVAP VACUUM SWITCHING VALVE** .
10. To check airtightness of fuel tank and fuel inlet pipe, operate Canister Closed Valve Vacuum Switching Valve (CCV VSV). If Toyota hand-held tester is available to operate CCV VSV, go to next step. If Toyota hand-held tester is not available to operate CCV VSV, go to step 12 .
11. With hand-held tester still connected to data link connector No. 3, turn ignition on and then turn hand-held tester on. DO NOT start engine. Select ACTIVE TEST MODE on hand-held tester. Using hand-held tester manufacturer's instructions, activate CCV VSV. Go to step 13 .
12. Remove glove box for access to Engine Control Module (ECM). For illustration of ECM location, see THEORY & OPERATION article. Turn ignition on. Connect jumper wire between body ground and terminal No. 13 (Blue wire) at ECM electrical connector E9. See **Fig. 188** . This is the CCV terminal at ECM which is the ground circuit for the CCV VSV. Go to next step.

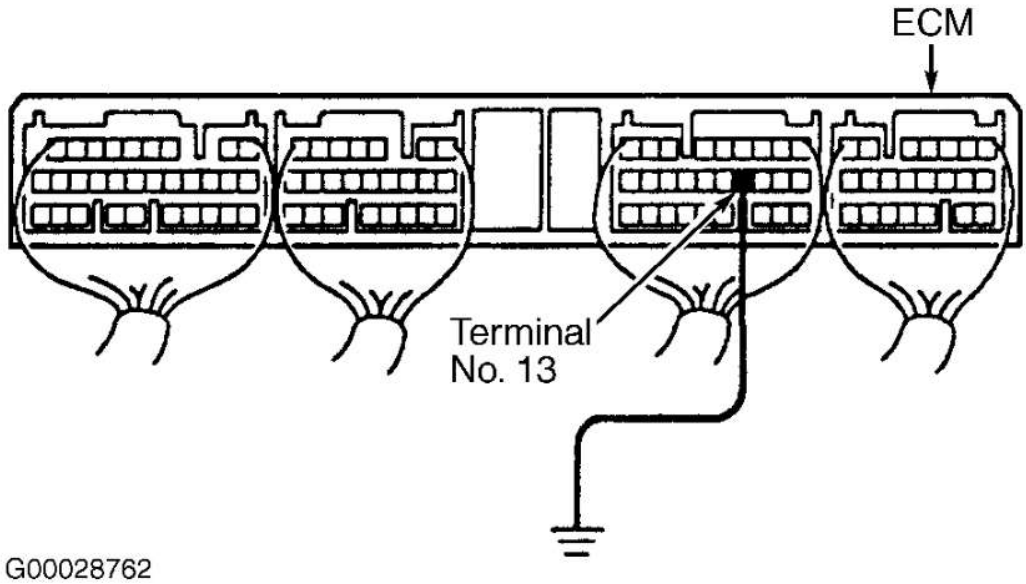


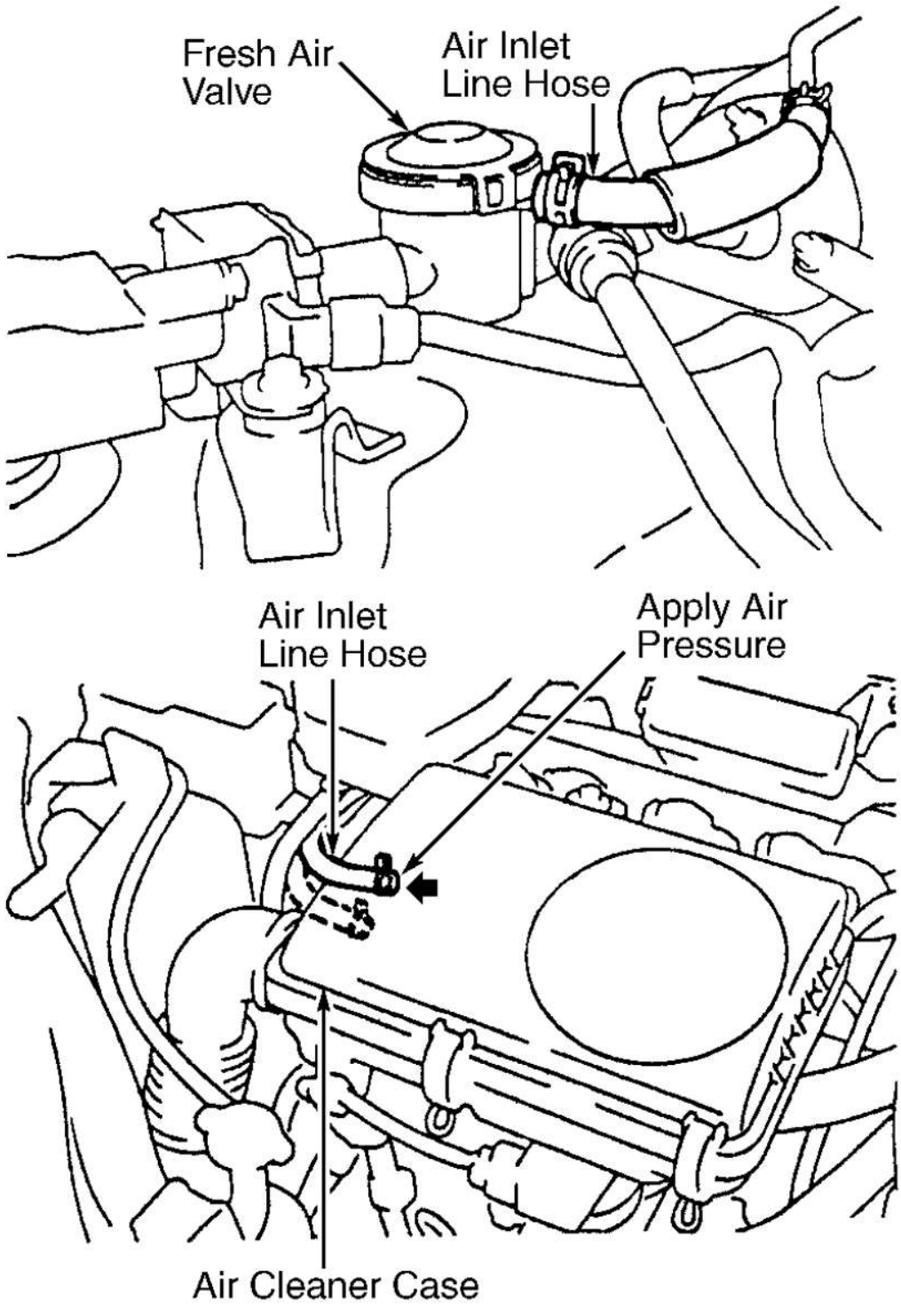
Fig. 188: Connecting Jumper Wire At Engine Control Module (Prius)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

13. Apply .232 psi (.016 kg/cm^2) of pressure to EVAP service port. Check that pressure can be held for 30 seconds. If pressure can be held for 30 seconds, turn ignition off. Remove pressure gauge and hand-held tester or jumper wire. Go to next step. If pressure cannot be held for 30 seconds, check for leaking hoses or pipes at fuel tank and fuel inlet pipe, or for leaks at fuel tank or installed components on fuel tank. If no leaks exist, replace fuel tank and fuel inlet pipe. Go to next step.

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14. To check air inlet line, disconnect air inlet line hose from fresh air valve and air cleaner case. See **Fig. 189** . Fresh air valve is located on top of fuel tank. See **Fig. 165** . Apply air pressure to air inlet line hose at air cleaner case. Ensure air flows from air inlet line hose at fresh air valve. If air flows from air inlet line hose, go to next step. If air does not flow from air inlet line hose, check for restrictions or damage to air inlet line and air inlet line hoses. If air inlet line or air inlet line hose is restricted, replace components as necessary.
15. Inspect air inlet line hoses and air inlet line for damage. If air inlet line and air inlet line hose are okay, reinstall air inlet line hoses. Go to next step. If air inlet line or air inlet line hose is defective, replace components as necessary.

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Fig. 189: Disconnecting Air Inlet Line Hoses (Prius)
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16. To check charcoal canister, manufacturer states to remove fuel tank for access to charcoal canister. See **FUEL PUMP** under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article for removal of fuel tank. Disconnect necessary hoses for removal of charcoal canister if not previously done. Remove purge flow switching valve Vacuum Switching Valve (VSV) and retaining bolts for charcoal canister. Remove charcoal canister from fuel tank. Inspect charcoal canister for cracks or damage. If charcoal canister is okay, go to next step. If charcoal canister is defective, replace charcoal canister.
17. Note ports on charcoal canister. See **Fig. 190** . While holding port "C" closed, apply .71 psi (.05 kg/cm^2) air pressure to port "A". Ensure air flows freely from port "B".
18. Apply .71 psi (.05 kg/cm^2) air pressure to port "A". Ensure air flows freely from all other ports on charcoal canister. Replace charcoal canister if defective. Reinstall charcoal canister on fuel tank.
19. To check trap filter and fresh air valve, manufacturer states to remove fuel tank (if not already done) for access to trap filter and fresh air valve, as they are mounted on top of fuel tank. See **Fig. 165** . Disconnect necessary hoses and electrical connectors for removal of Canister Closed Valve Vacuum Switching Valve (CCV VSV) and fresh air valve. Remove bolt and separate fresh air valve from CCV VSV. Remove bolts for CCV VSV and remove CCV VSV along with trap filter. Remove bolts and separate trap filter from CCV VSV.
20. Inspect trap filter and fresh air valve for cracks or damage. If trap filter and fresh air valve are okay, go to next step. If trap filter or fresh air valve is defective, replace components as necessary.
21. To check trap filter operation, apply light air pressure to port "A". Ensure air flows freely from port "B". See **Fig. 190** . Replace trap filter if defective. To check fresh air valve operation, apply light air pressure to port "A". Ensure air flows freely from ports "B" and "C". See **Fig. 190** . Replace fresh air valve if defective. Reinstall components on fuel tank.
22. If fuel EVAP system operates properly, it may be necessary to check operation of EVAP Vacuum Switching Valve (VSV), canister closed valve Vacuum Switching Valve (VSV), purge flow switching valve Vacuum Switching Valve (VSV) and vapor pressure sensor. See **EVAP VACUUM SWITCHING VALVE** , **CANISTER CLOSED VALVE VACUUM SWITCHING VALVE** , **PURGE FLOW SWITCHING VALVE VACUUM SWITCHING VALVE** and **VAPOR PRESSURE SENSOR** .

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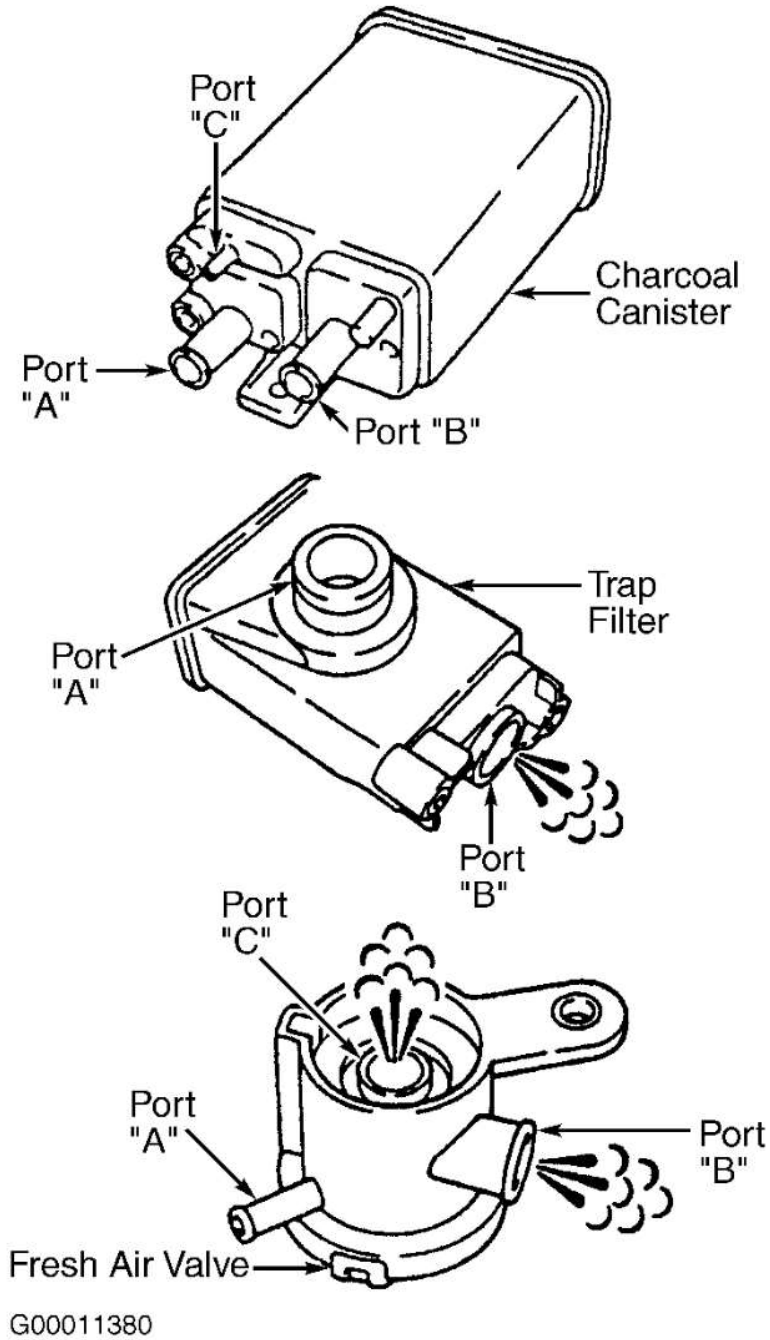


Fig. 190: Identifying Ports On Charcoal Canister, Trap Filter & Fresh Air Valve (Prius)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Canister Closed Valve Vacuum Switching Valve (Camry, Camry Solara, Celica, Corolla, ECHO, Highlander, MR2,

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RAV4 & Tacoma)

1. Disconnect electrical connector at Canister Closed Valve Vacuum Switching Valve (CCV VSV). See **Fig. 191** -**Fig. 199** . Remove CCV VSV.

NOTE: **On ECHO, charcoal canister must be removed for removal of CCV VSV. Charcoal canister is located near fuel tank. See Fig. 163 . For removal of CCV VSV, see CANISTER CLOSED VALVE VACUUM SWITCHING VALVE under EMISSION SYSTEMS & SUB-SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.**

2. Using ohmmeter, check that continuity exists between electrical terminals on CCV VSV and that resistance is within specification. See **CANISTER CLOSED VALVE VACUUM SWITCHING VALVE RESISTANCE** table. Replace CCV VSV if no continuity exists or resistance is not within specification.

CANISTER CLOSED VALVE VACUUM SWITCHING VALVE RESISTANCE

Application	Ohms @ 68°F (20°C)
Camry	24-30
Camry Solara & ECHO	(1)
Celica & Highlander	24-30
Corolla, MR2 & RAV4	25-30
Tacoma	(1)
(1) Resistance should be 25-30 ohms at 68°F (20°C) and 33-42 ohms at 248 °F (120°C).	

3. Using ohmmeter, ensure no continuity exists between each electrical terminal and body of CCV VSV. Replace CCV VSV if continuity exists between electrical terminal and body of CCV VSV.
4. To test CCV VSV operation, apply air pressure to port "A". Ensure air flows from port "B". Perform STEP 1 in illustration. See **Fig. 200** -**Fig. 205** .
5. Apply battery voltage and ground to electrical terminals on CCV VSV. Apply air pressure to port "A". Ensure air does not flow from port "B". Perform STEP 2 in illustration. See **Fig. 200** -**Fig. 205** . Replace CCV VSV if defective.

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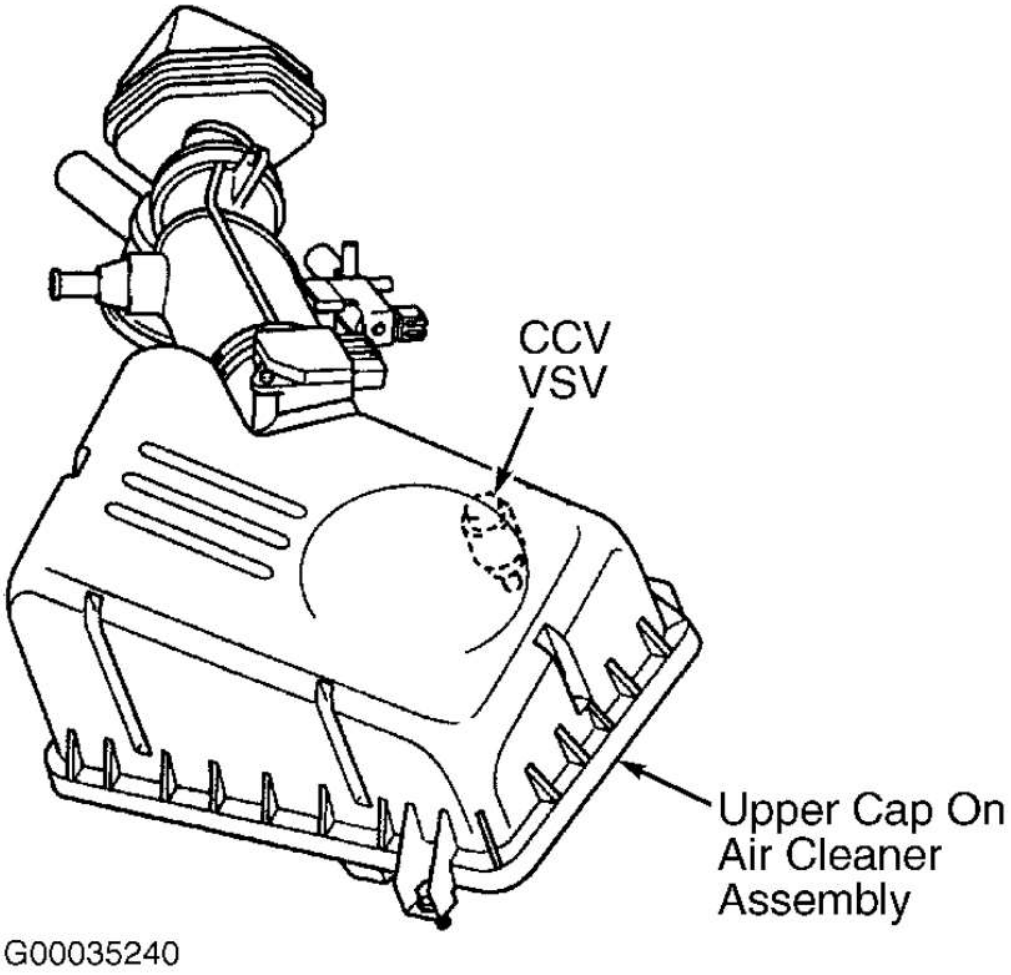


Fig. 191: Locating Canister Closed Valve Vacuum Switching Valve (Camry)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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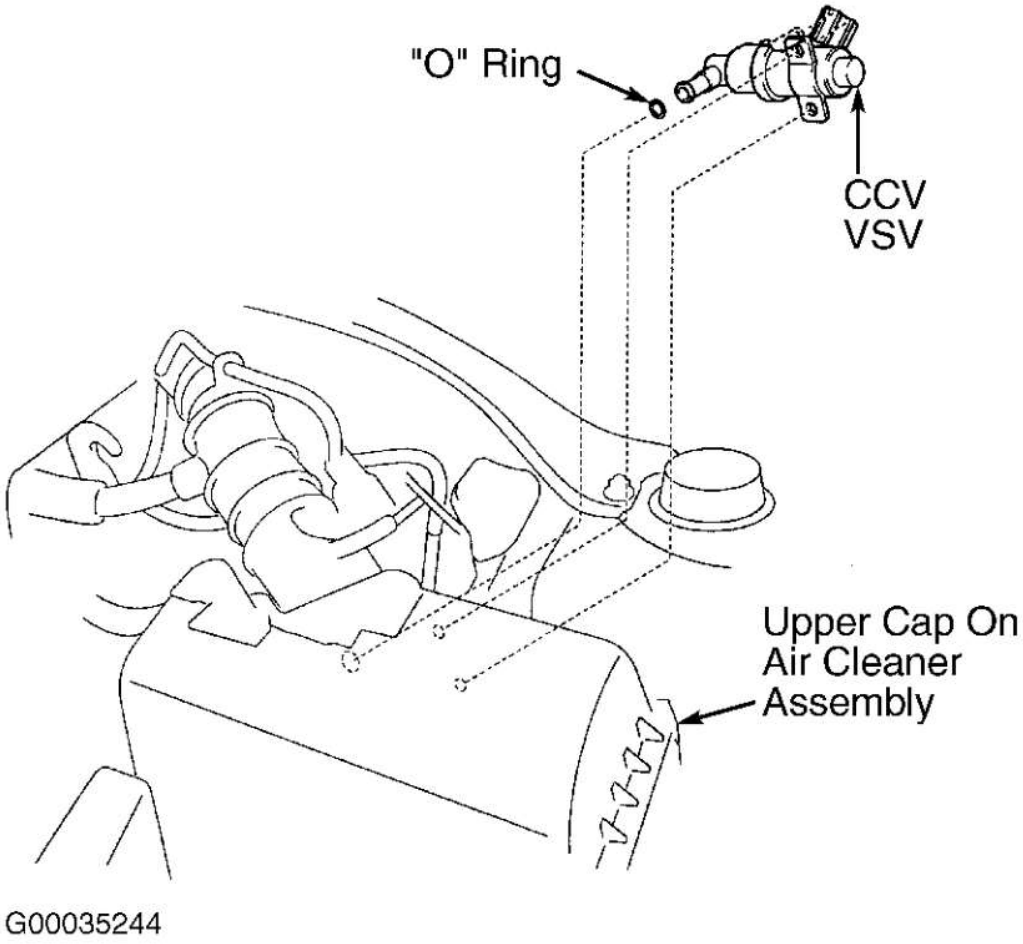


Fig. 192: Locating Canister Closed Valve Vacuum Switching Valve (Camry Solara)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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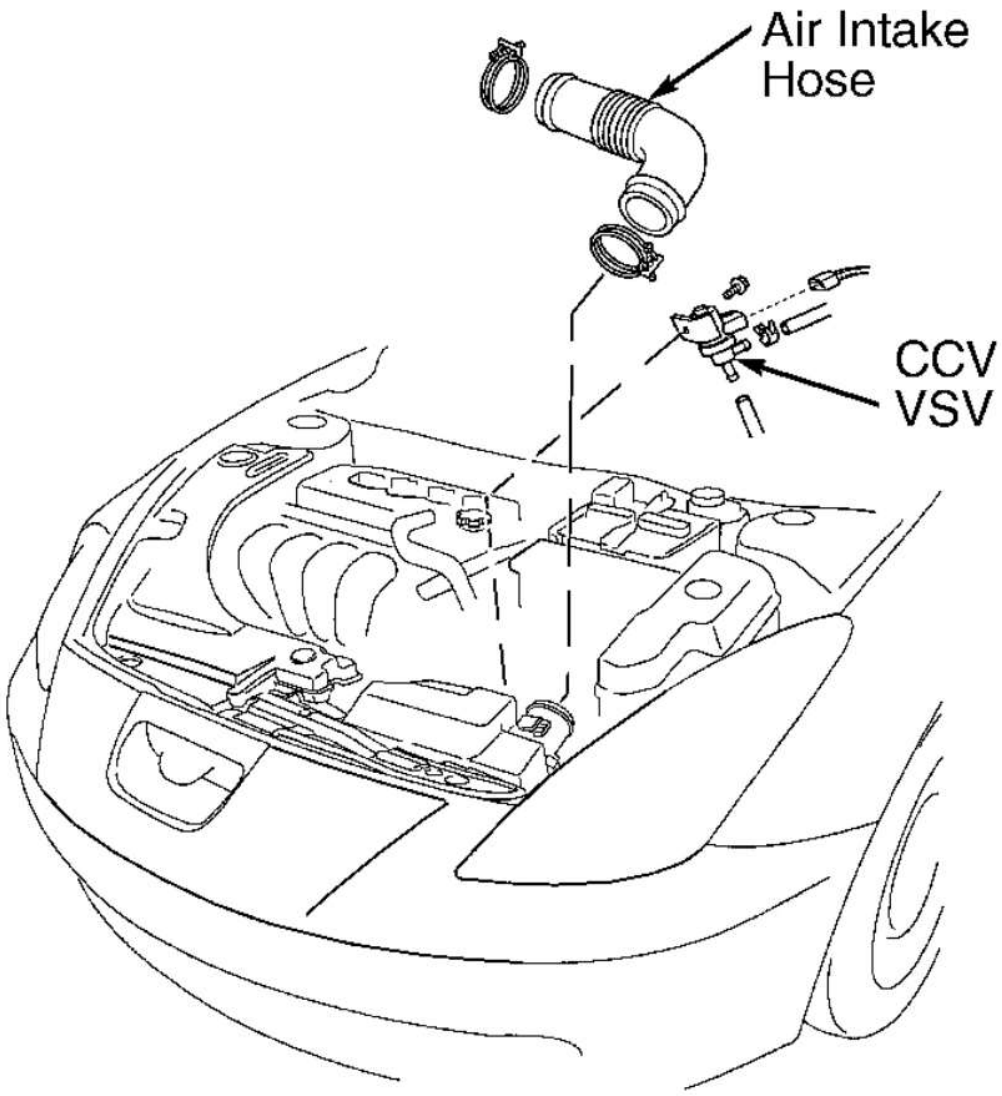


Fig. 193: Locating Canister Closed Valve Vacuum Switching Valve (Celica)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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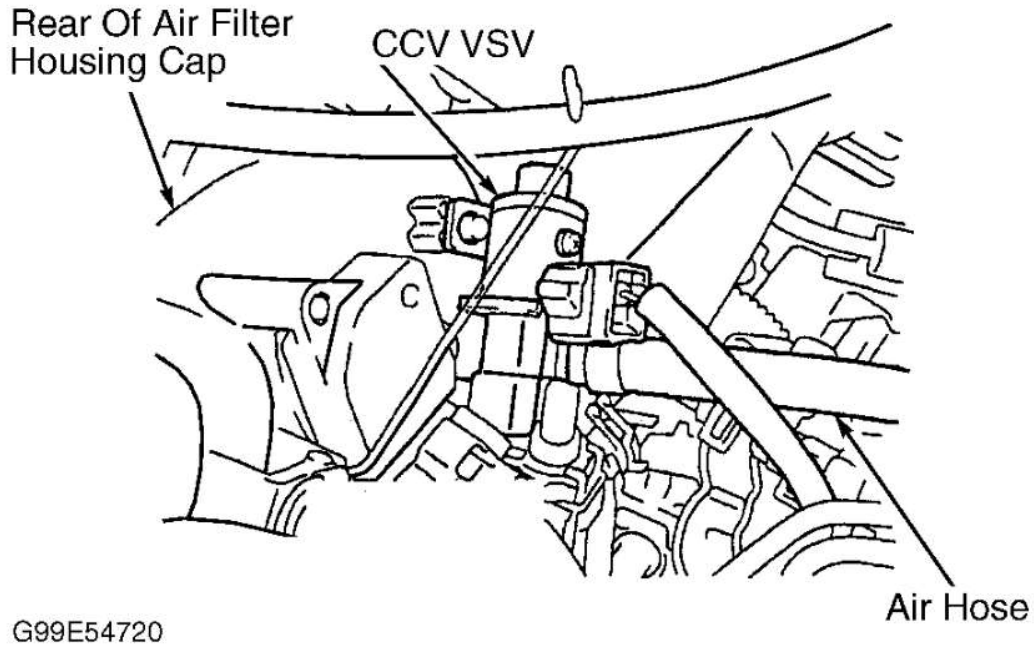


Fig. 194: Locating Canister Closed Valve Vacuum Switching Valve (Corolla)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

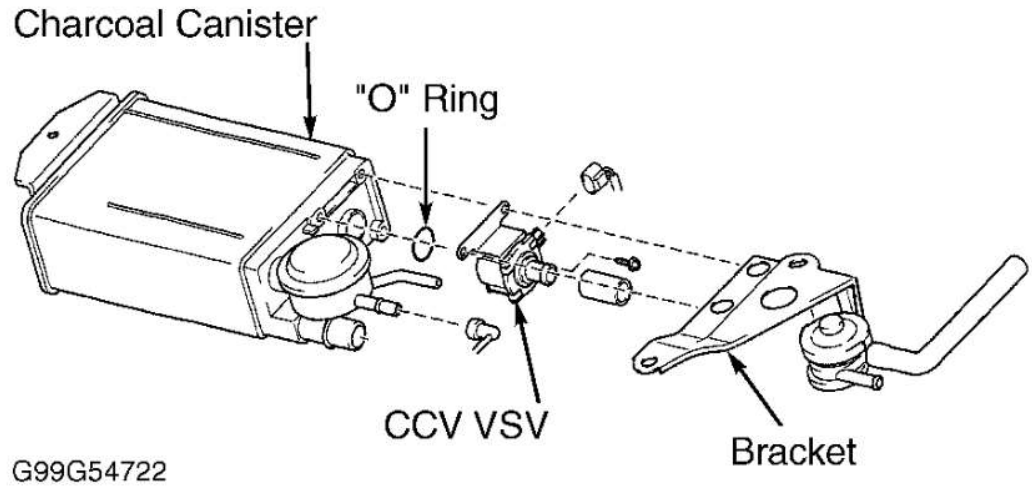


Fig. 195: Locating Canister Closed Valve Vacuum Switching Valve (ECHO)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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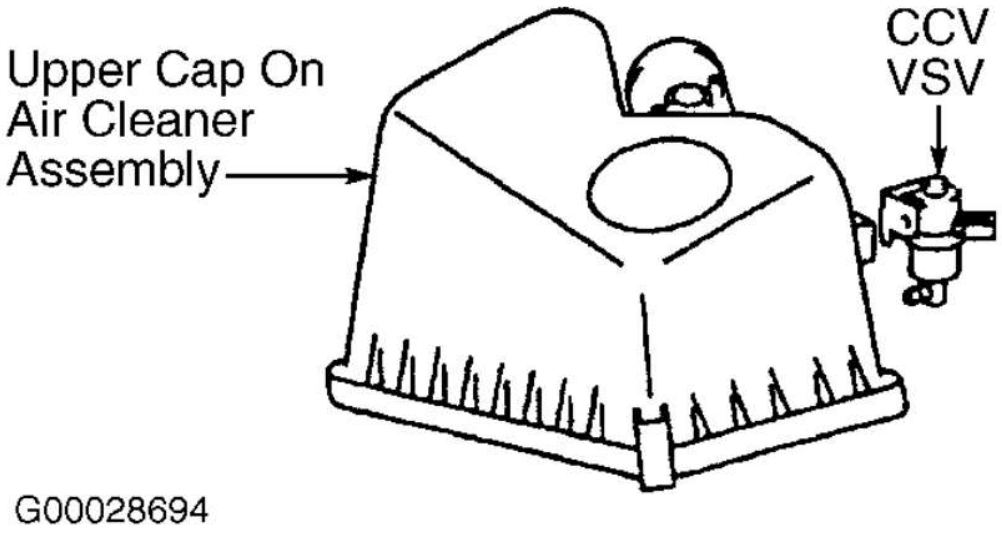


Fig. 196: Locating Canister Closed Valve Vacuum Switching Valve (Highlander)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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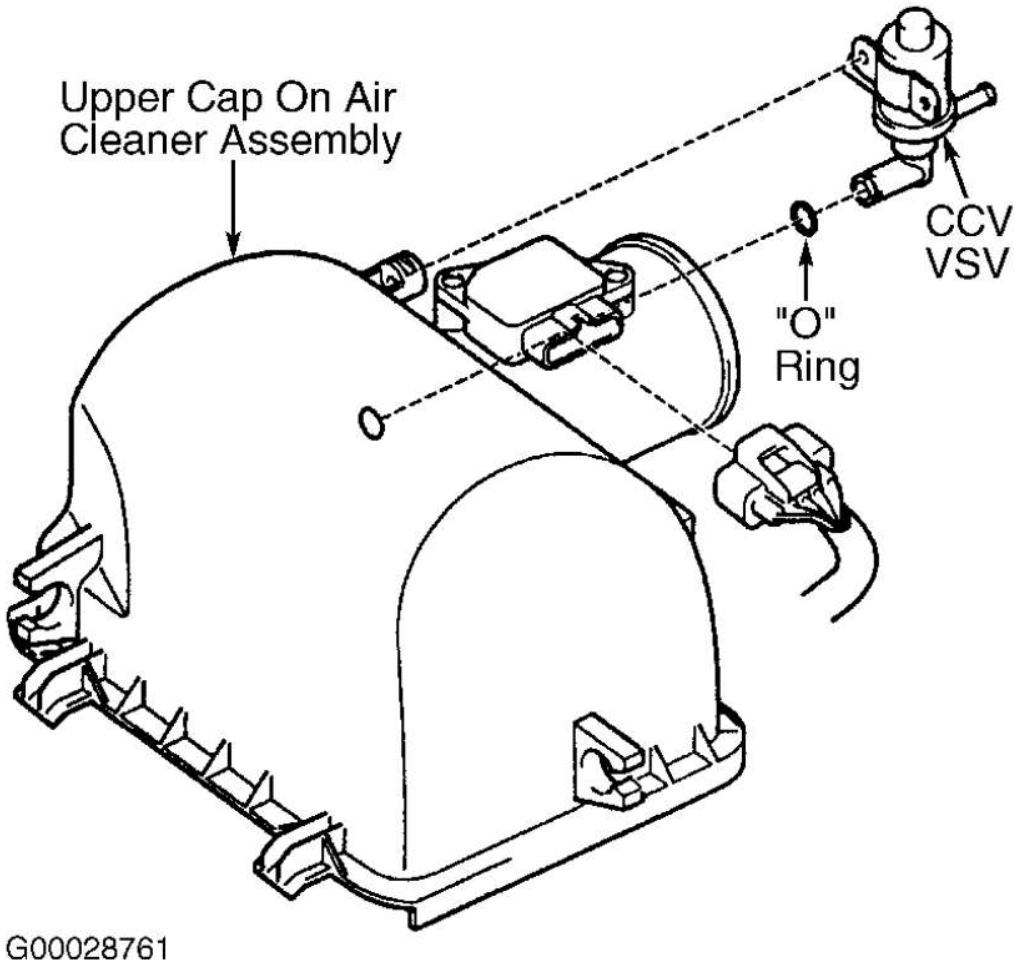


Fig. 197: Locating Canister Closed Valve Vacuum Switching Valve (MR2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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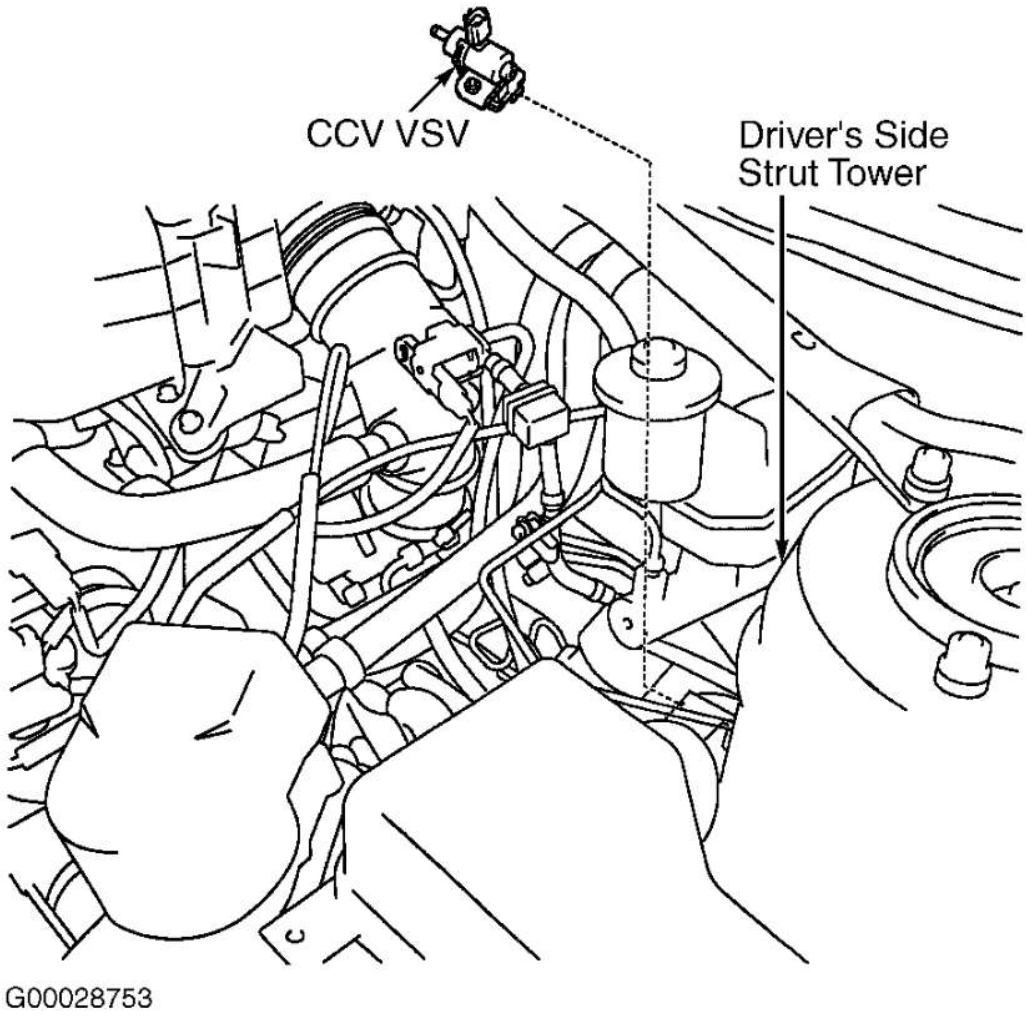


Fig. 198: Locating Canister Closed Valve Vacuum Switching Valve (RAV4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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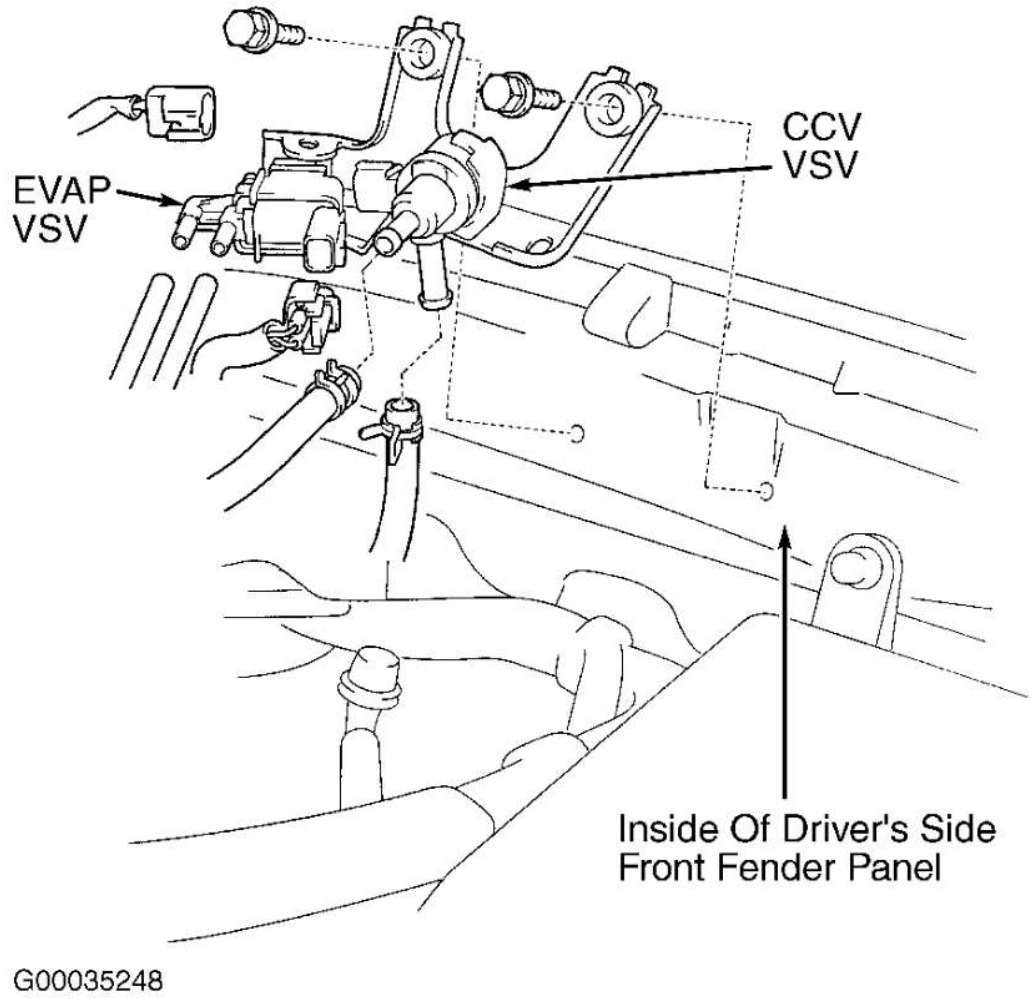


Fig. 199: Locating Canister Closed Valve Vacuum Switching Valve (Tacoma)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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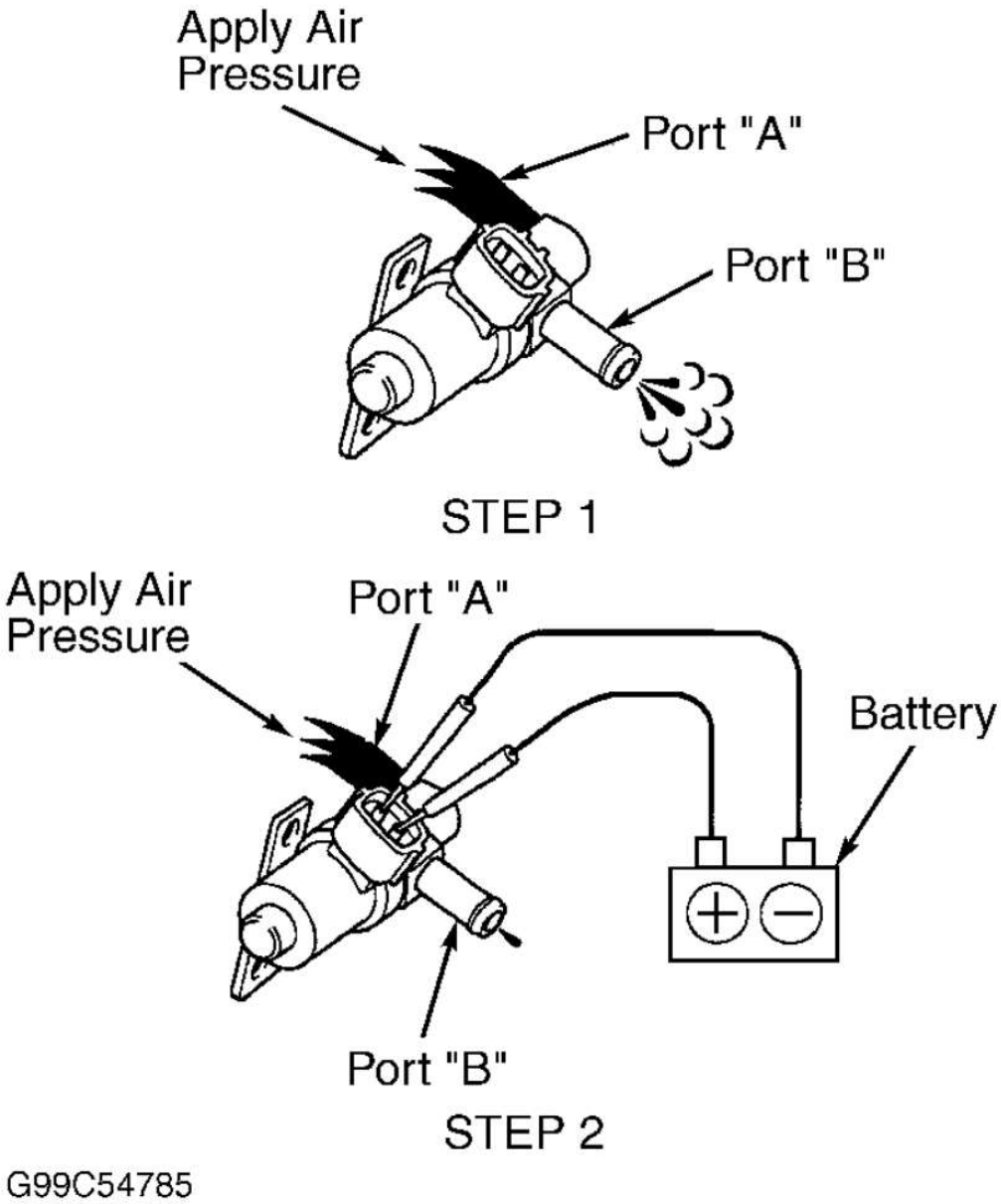


Fig. 200: Testing Typical Canister Closed Valve Vacuum Switching Valve (Camry, Camry Solara, Highlander & MR2)
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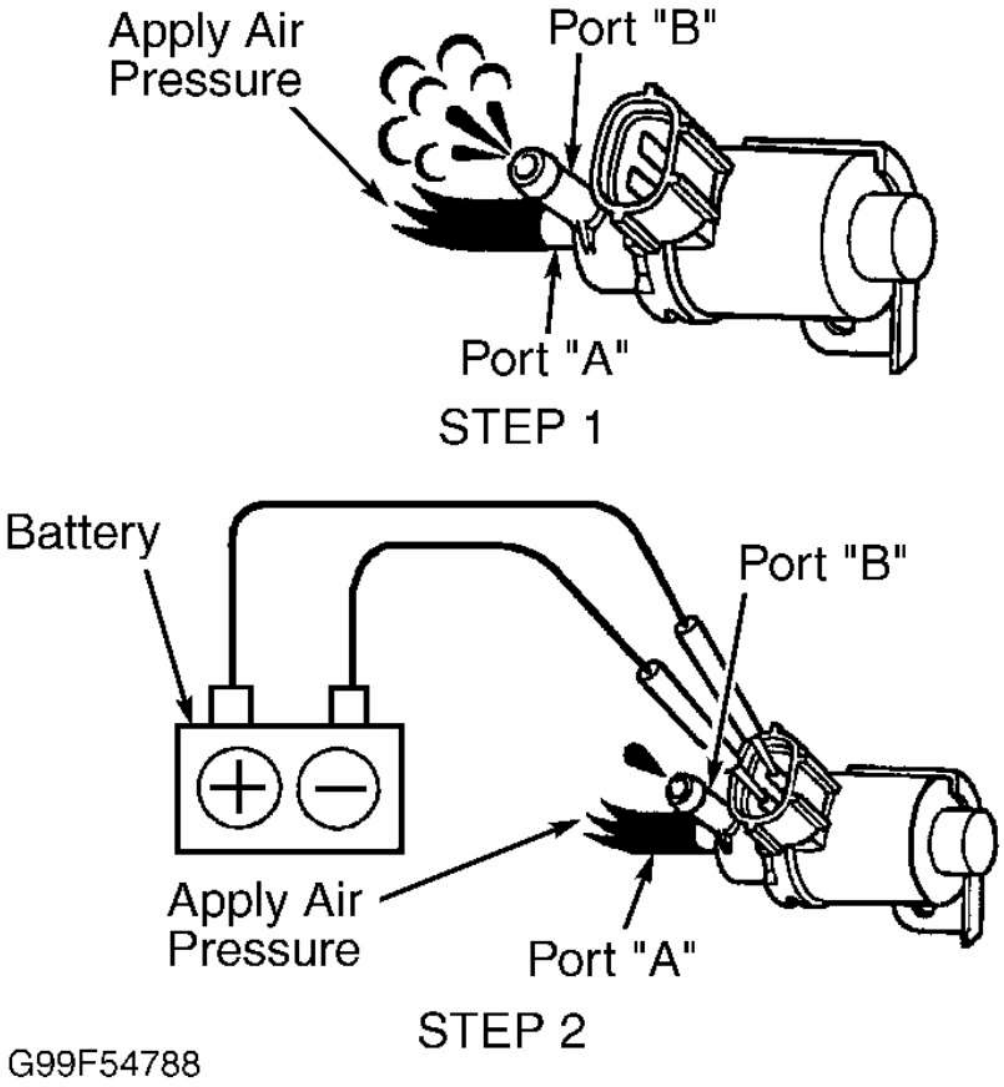
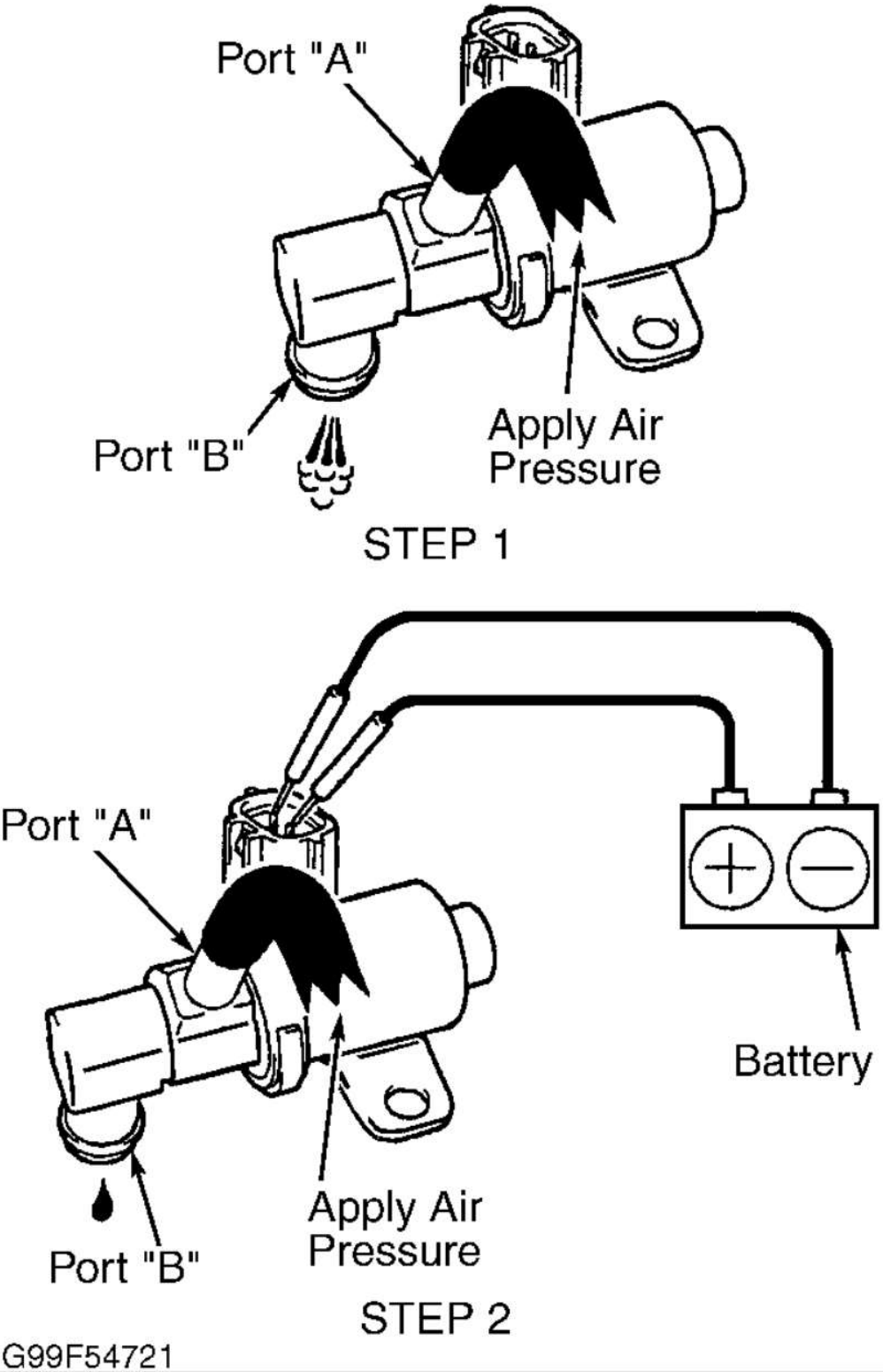


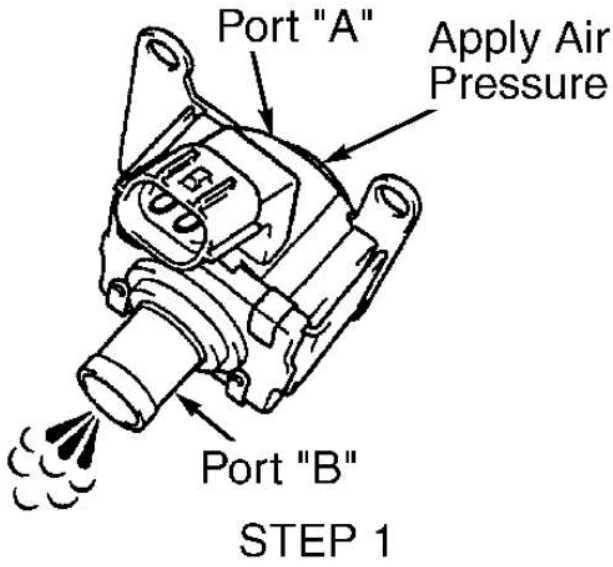
Fig. 201: Testing Canister Closed Valve Vacuum Switching Valve (Celica)
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Fig. 202: Testing Canister Closed Valve Vacuum Switching Valve (Corolla)
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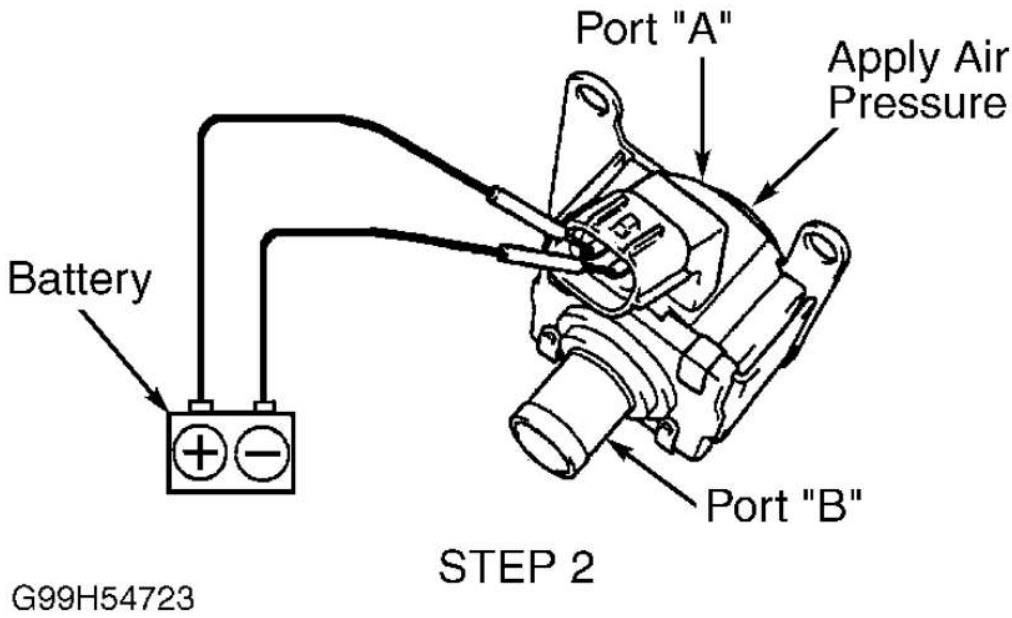


Fig. 203: Testing Canister Closed Valve Vacuum Switching Valve (ECHO)
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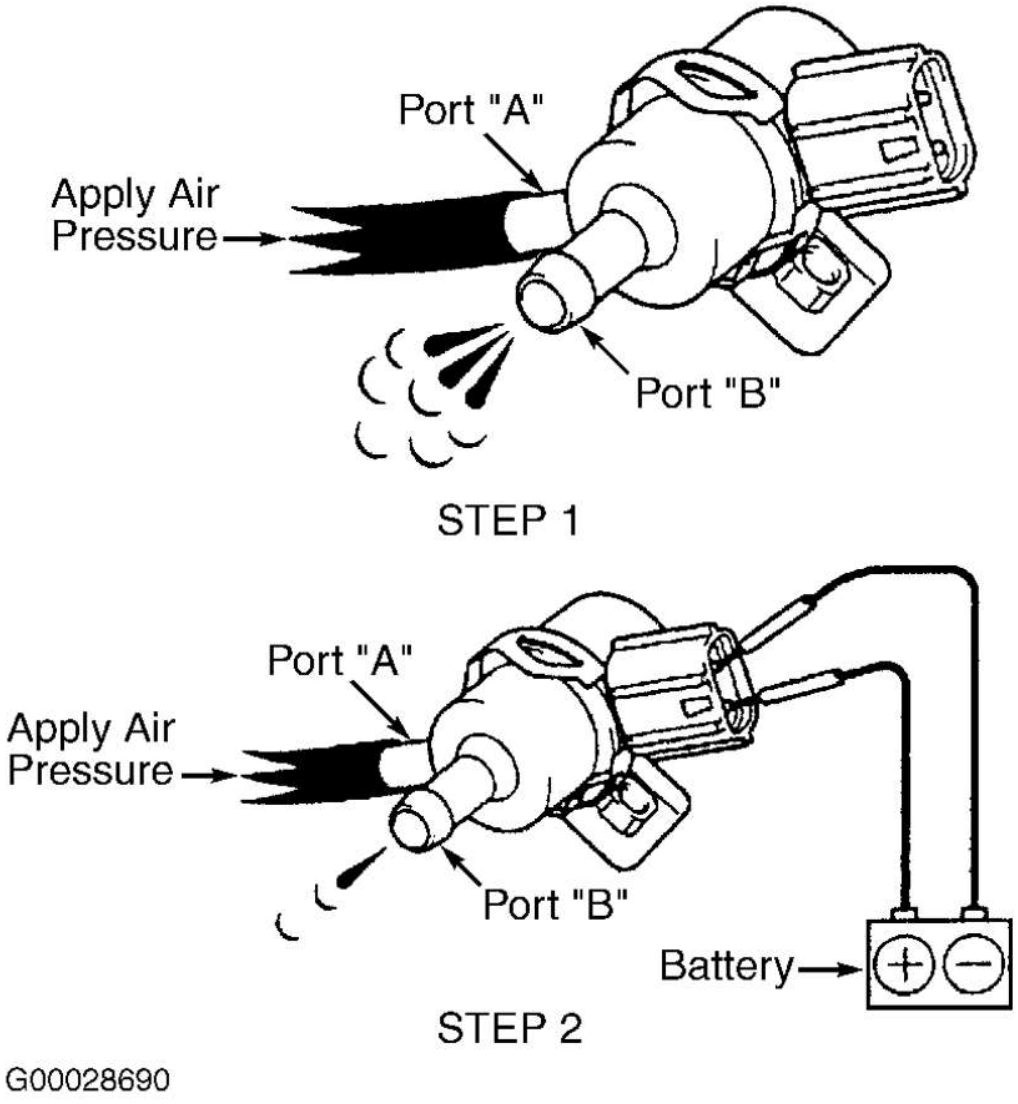
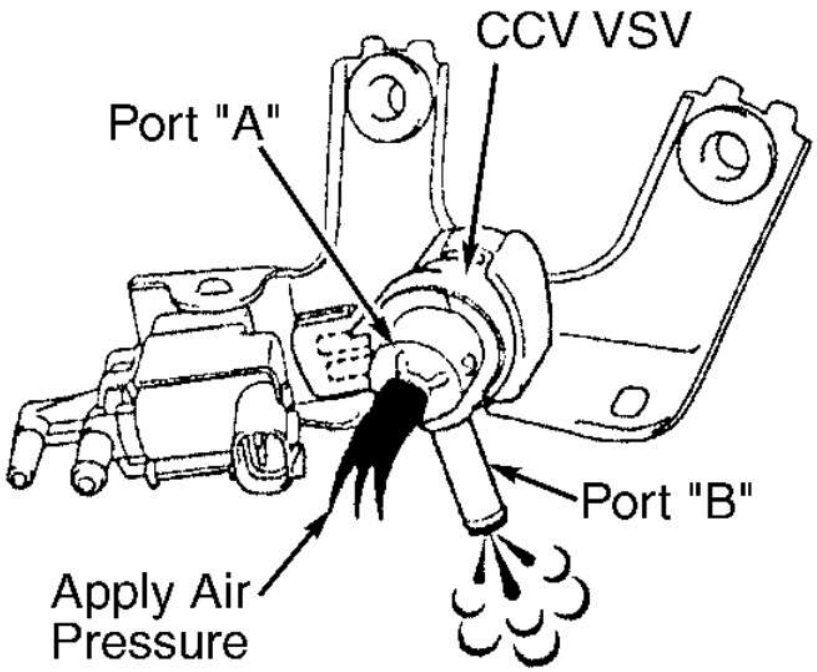
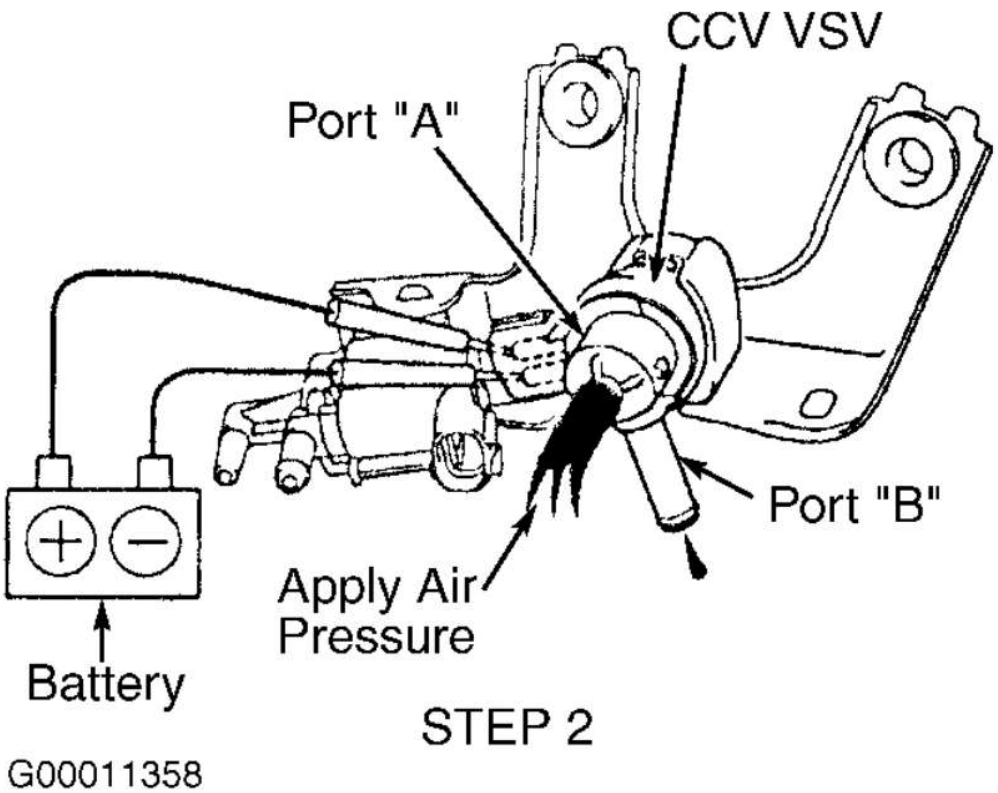


Fig. 204: Testing Canister Closed Valve Vacuum Switching Valve (RAV4)
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STEP 1



STEP 2

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Fig. 205: Testing Canister Closed Valve Vacuum Switching Valve (Tacoma)
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Canister Closed Valve Vacuum Switching Valve (Prius)

WARNING: Read service precautions before proceeding with service procedure. See SERVICE PRECAUTIONS .

1. Manufacturer states to remove fuel tank for access to Canister Closed Valve Vacuum Switching Valve (CCV VSV) as it is mounted on top of fuel tank. See **Fig. 165** .
2. Remove fuel tank. See **FUEL PUMP** under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article for removal of fuel tank. Disconnect necessary hoses and electrical connectors for removal of CCV VSV and fresh air valve. Remove bolt and separate fresh air valve from CCV VSV. See **Fig. 165** . Remove bolts for CCV VSV and remove CCV VSV along with trap filter. Remove bolts and separate trap filter from CCV VSV.
3. Using ohmmeter, check that continuity exists between electrical terminals on CCV VSV and that resistance is 25-30 ohms at 68°F (20°C). Replace CCV VSV if no continuity exists or resistance is not within specification.
4. Using ohmmeter, ensure no continuity exists between each electrical terminal and body of CCV VSV. Replace CCV VSV if continuity exists between electrical terminal and body of CCV VSV.
5. To test CCV VSV operation, apply air pressure to port "A". Ensure air flows from port "B". Perform STEP 1 in illustration. See **Fig. 206** .
6. Apply battery voltage and ground to electrical terminals on CCV VSV. Apply air pressure to port "A". Ensure air does not flow from port "B". Perform STEP 2 in illustration. See **Fig. 206** . Replace CCV VSV if defective. Reinstall CCV VSV and fuel tank.

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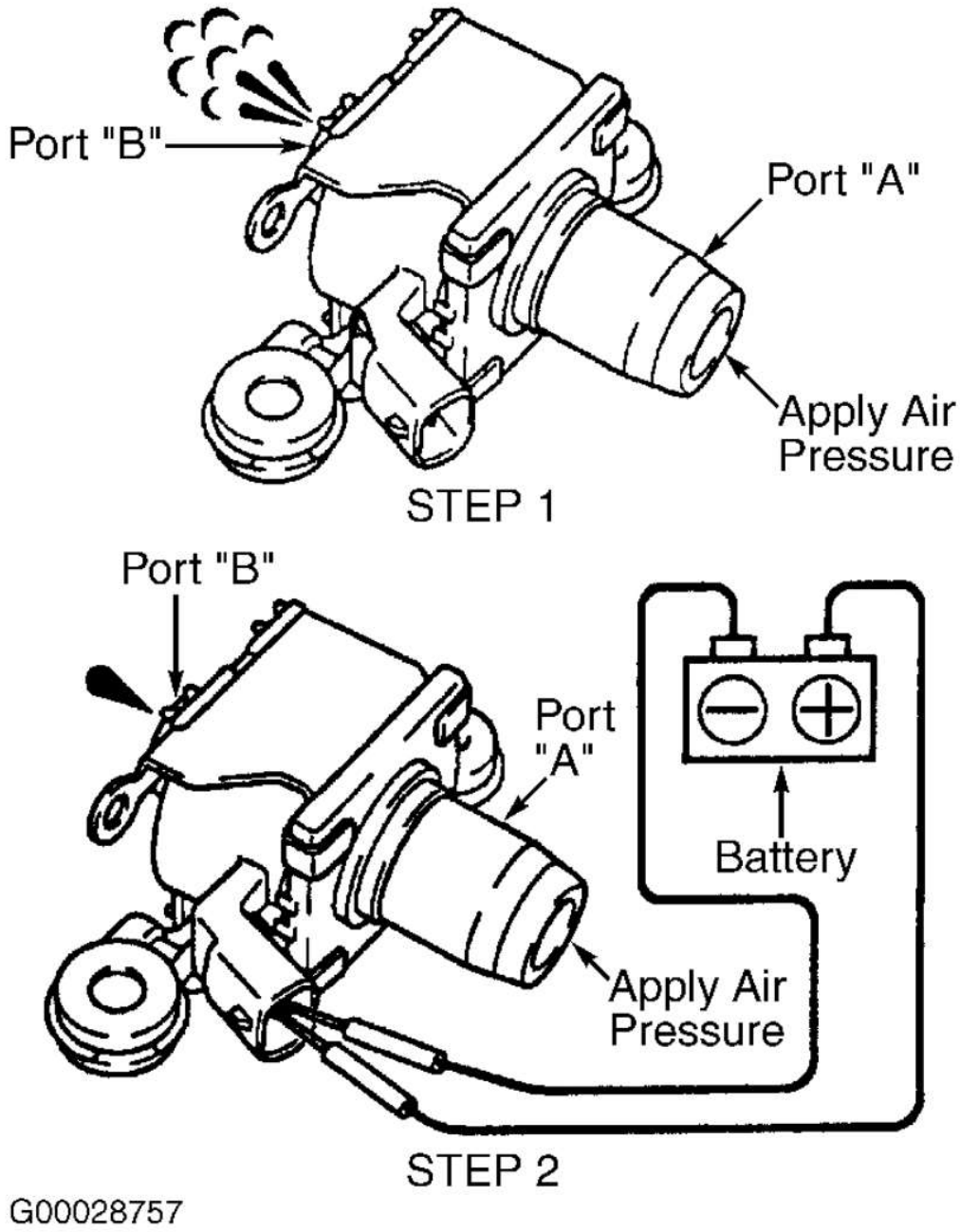


Fig. 206: Testing Canister Closed Valve Vacuum Switching Valve (Prius)
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Charcoal Canister

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For testing of charcoal canister, see appropriate FUEL EVAP SYSTEM TEST.

Cut-Off Valve

Individual component testing is not available from manufacturer. Manufacturer provides testing information for testing airtightness of fuel tank and components along with testing of charcoal canister, cut-off valve and fuel EVAP system. See appropriate FUEL EVAP SYSTEM TEST.

EVAP Vacuum Switching Valve (All Models)

WARNING: On Prius, read service precautions before proceeding with service procedure. See SERVICE PRECAUTIONS .

1. Remove EVAP Vacuum Switching Valve (VSV). See **EVAP VACUUM SWITCHING VALVE LOCATION** table. See **Fig. 160** -**Fig. 167** .

EVAP VACUUM SWITCHING VALVE LOCATION

Application	Location
Camry	On Air Cleaner Housing & Contains Blue or Black 2-Pin Electrical Connector With Black/White & Black/Red Wires
Camry Solara	On Air Intake Hose, Near Air Cleaner Assembly & Contains Black 2-Pin Electrical Connector With Black/White & Black/Red Wires
Celica	On Bracket At Rear Of Air Cleaner Housing & Contains Black 2-Pin Electrical Connector With Green/Orange & Black/White Wires
Corolla	On Bracket At Rear Of Air Cleaner Housing & Contains Black 2-Pin Electrical Connector With Blue/Black & Black Wires
ECHO	On Bracket At Side Of Air Cleaner Housing & Contains Blue 2-Pin Electrical Connector With Black/Yellow & White/Green Wires
Highlander	On Rear Of Air Cleaner Housing & Contains Blue 2-Pin Electrical Connector With Black/White & Black/Red Wires
MR2	On Air Intake Hose, Near Air Cleaner Assembly & Contains Blue 2-Pin Electrical Connector With Black/Red & White Wires
Prius	At Passenger's Side Front Corner Of Engine Compartment, Near Air Intake Hose & Contains Blue 2-Pin Electrical Connector With Red/Blue & Black Wires
RAV4	On Air Intake Hose, Near Air Cleaner Assembly & Contains Black 2-Pin Electrical Connector With Black/Red & Pink Wires
Tacoma	On Bracket Bolted To Inside Of Driver's Side Front Fender Panel & Contains Black 2-Pin Electrical Connector With White/Green & White/Red Wires

2. Using ohmmeter, ensure continuity exists between electrical terminals on EVAP VSV and that resistance is within specification. See **EVAP VACUUM SWITCHING VALVE RESISTANCE** table. Replace EVAP VSV if no continuity exists or resistance is not within specification.

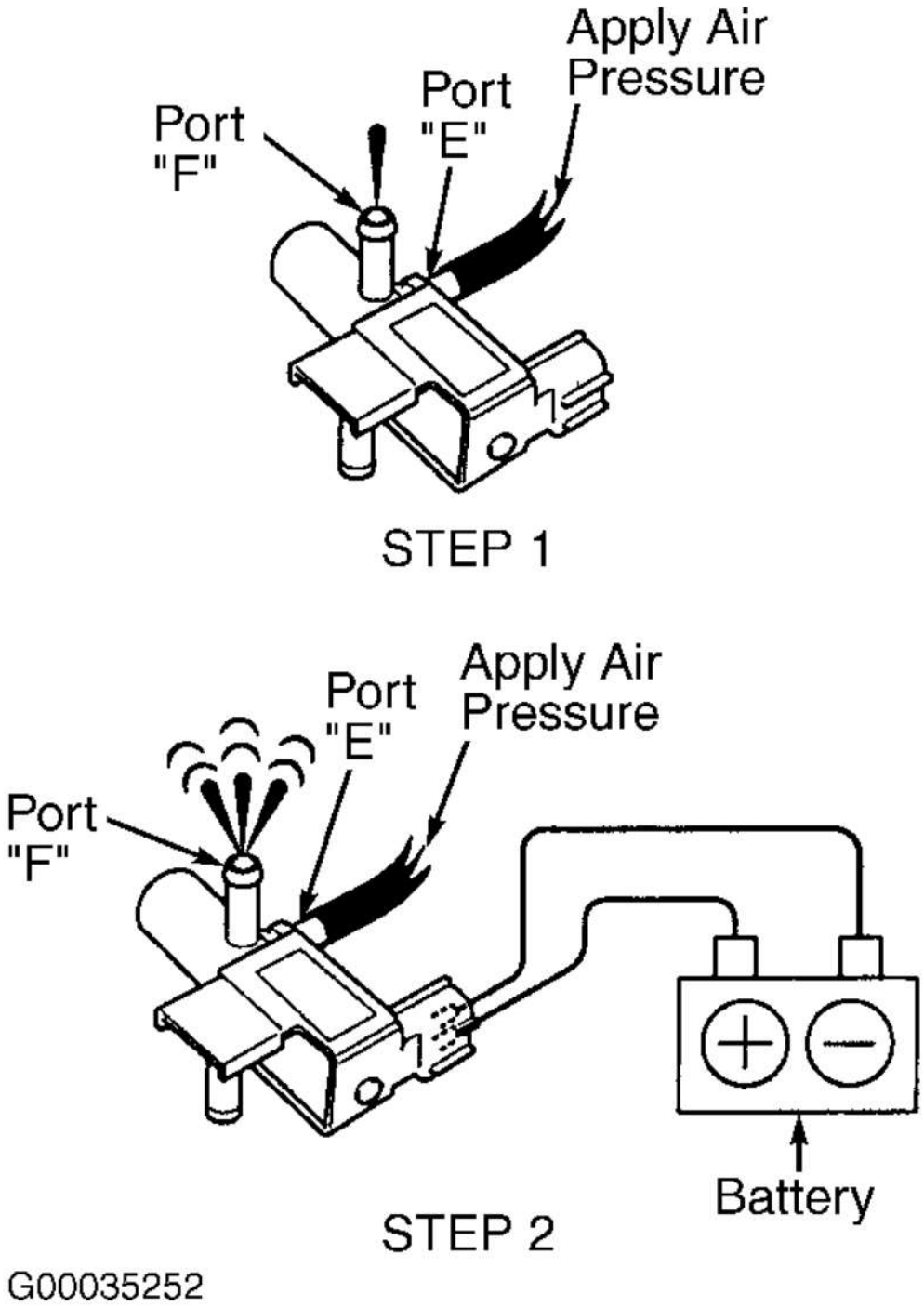
EVAP VACUUM SWITCHING VALVE RESISTANCE

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Application	Ohms @ 68°F (20°C)
Camry & Camry Solara	30-34
Celica, Corolla, ECHO, MR2 & Prius	27-33
Highlander, RAV4 & Tacoma	30-34

3. Using ohmmeter, ensure no continuity exists between each electrical terminal and body of EVAP VSV. Replace EVAP VSV if continuity exists between electrical terminal and body of EVAP VSV.
4. To test EVAP VSV operation, apply air pressure to port "E". Ensure air does not flow from port "F". Perform STEP 1 in illustration. See **Fig. 207** -**Fig. 211** .
5. Apply battery voltage and ground to electrical terminals on EVAP VSV. Apply air pressure to port "E". Ensure air flows from port "F". Perform STEP 2 in illustration. See **Fig. 207** -**Fig. 211** . Replace EVAP VSV if defective.

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Fig. 207: Testing EVAP Vacuum Switching Valve (Camry & Camry Solara)
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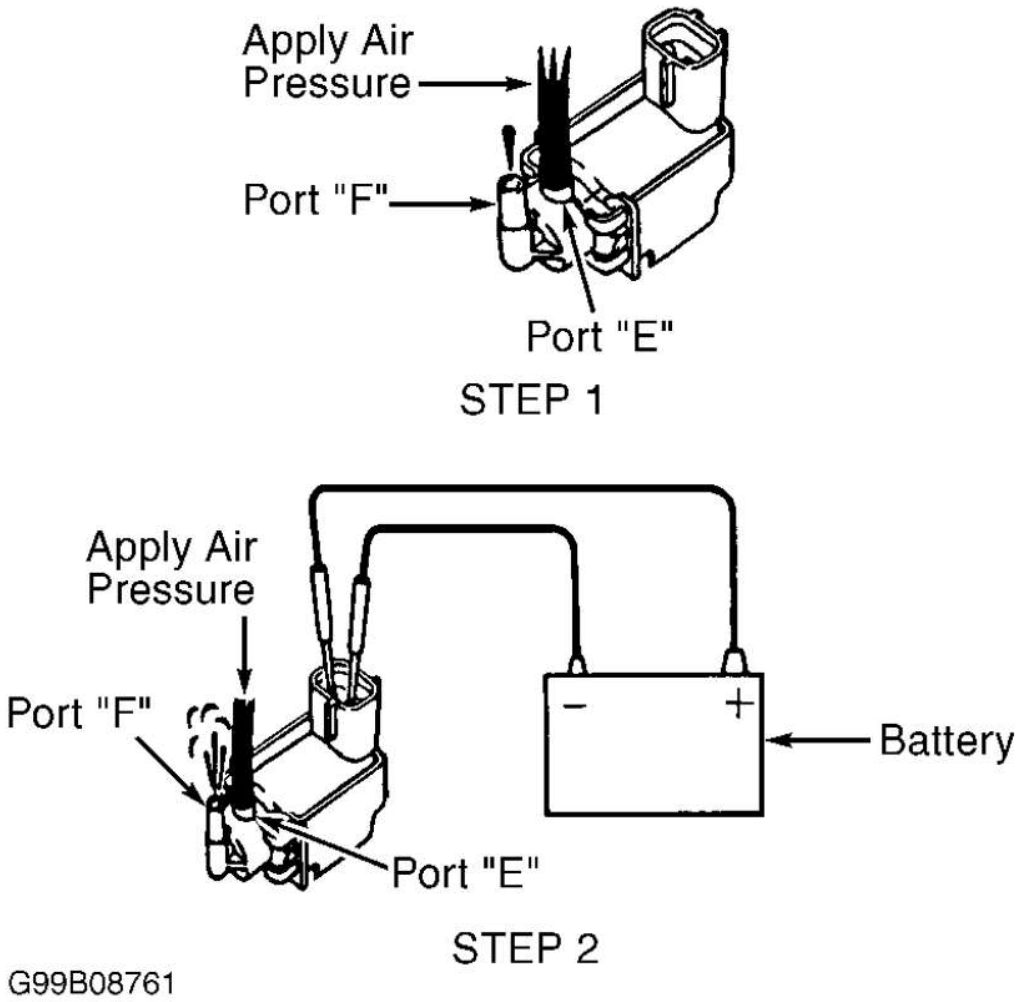


Fig. 208: Testing Typical EVAP Vacuum Switching Valve (Celica &Corolla)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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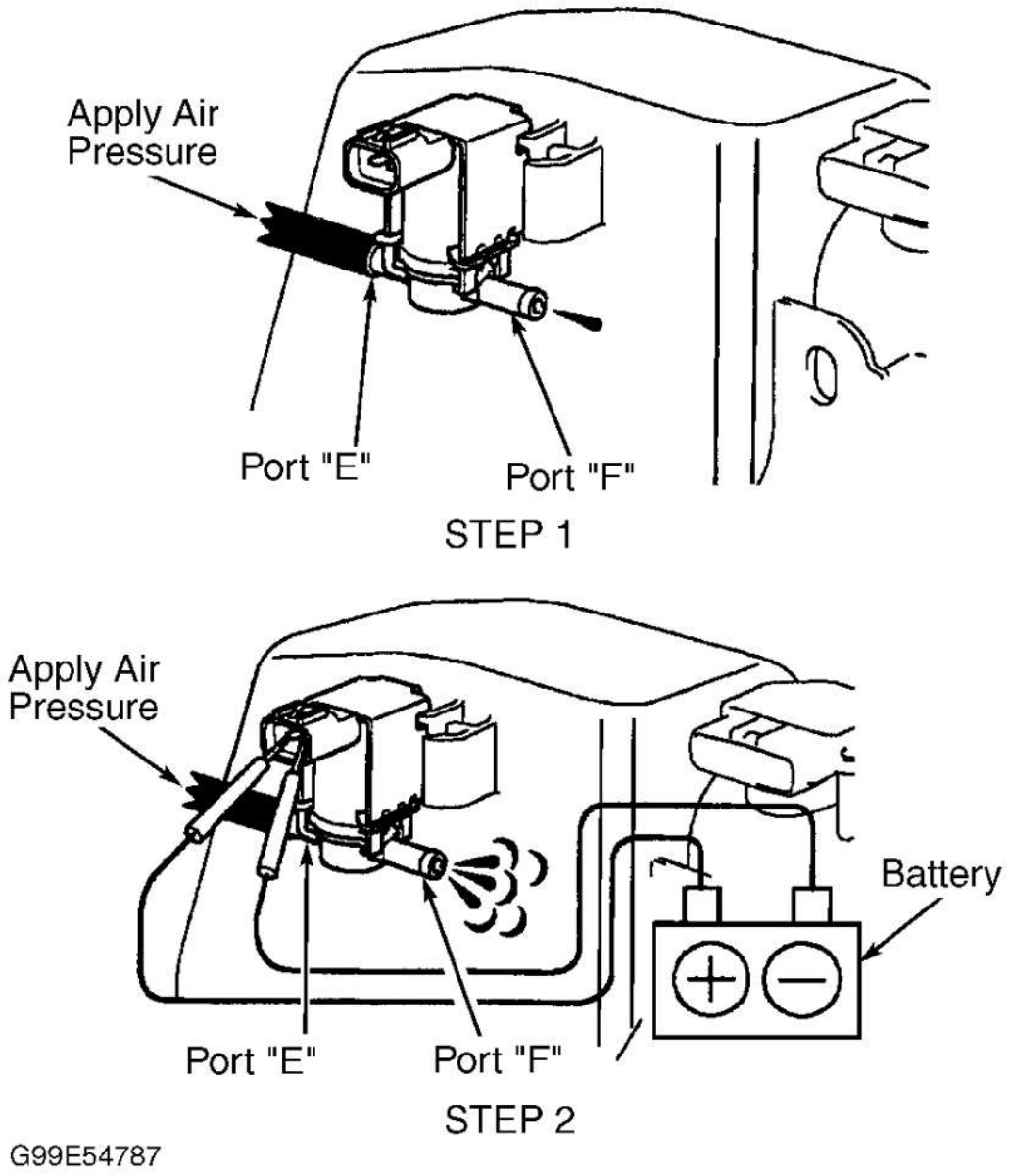


Fig. 209: Testing EVAP Vacuum Switching Valve (ECHO)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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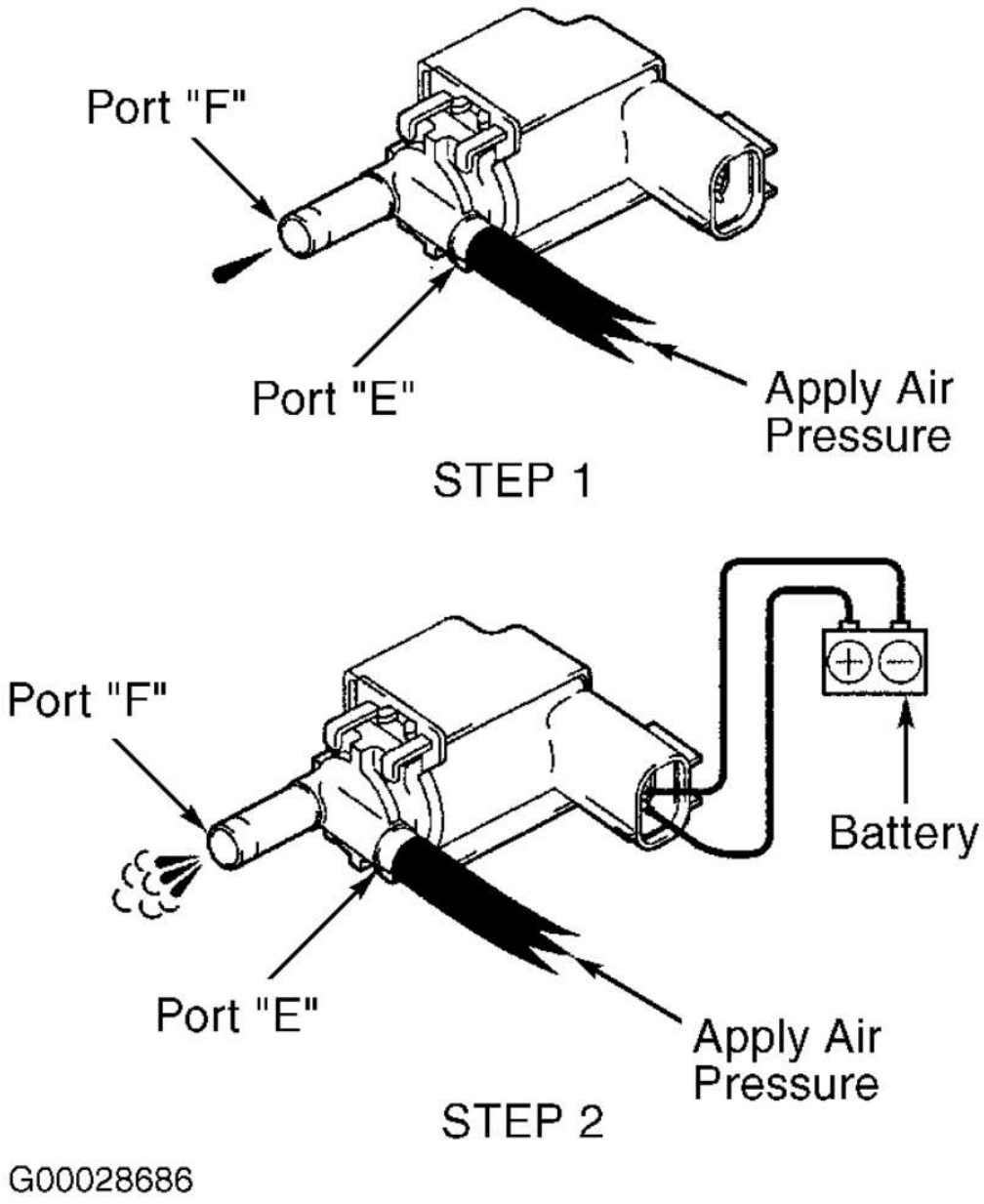


Fig. 210: Testing Typical EVAP Vacuum Switching Valve (Highlander, MR2, Prius & RAV4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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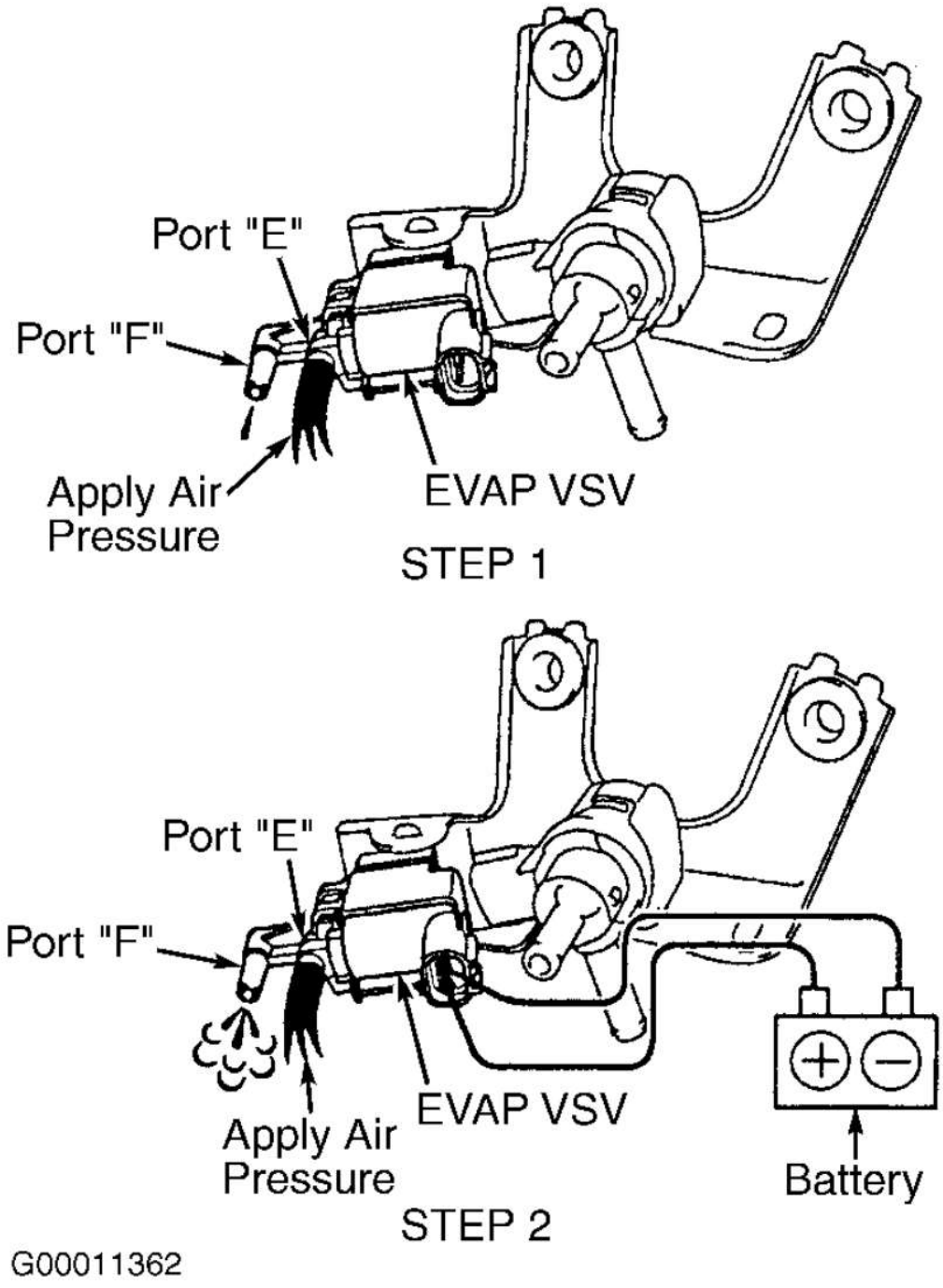


Fig. 211: Testing EVAP Vacuum Switching Valve (Tacoma)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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Overfill Check Valve

Individual component testing is not available from manufacturer. Manufacturer provides testing information for testing airtightness of fuel tank and components along with testing of charcoal canister, overfill check valve and fuel EVAP system. See appropriate FUEL EVAP SYSTEM TEST.

Pressure Switching Valve Vacuum Switching Valve (Camry, Camry Solara, Celica, Corolla, Highlander, MR2, RAV4 & Tacoma)

1. Remove pressure switching valve Vacuum Switching Valve (VSV). See **PRESSURE SWITCHING VALVE VACUUM SWITCHING VALVE LOCATION** table. See **Fig. 160** -**Fig. 166** .

PRESSURE SWITCHING VALVE VACUUM SWITCHING VALVE LOCATION

Application	Location
Camry	On Bracket At Charcoal Canister Near Fuel Tank & Contains Blue 2-Pin Electrical Connector With Violet & Black/Red Wires
Camry Solara	On Bracket At Charcoal Canister Near Fuel Tank & Contains Blue 2-Pin Electrical Connector With White/Red & Red Wires
Celica	On Bracket At Charcoal Canister Near Fuel Tank & Contains Blue 2-Pin Electrical Connector With Green/Orange & Black/White Wires
Corolla	On Bracket At Charcoal Canister Near Fuel Tank & Contains Black 2-Pin Electrical Connector With Red & Black Wires
Highlander	On Bracket At Charcoal Canister Near Fuel Tank & Contains Blue 2-Pin Electrical Connector With White & Green/Yellow Wires
MR2	Below Driver's Side Luggage Compartment, On Bracket At Charcoal Canister Near Fuel Tank & Contains Blue 2-Pin Electrical Connector With Blue/White & Black/Red Wires
RAV4	On Bracket At Charcoal Canister Near Fuel Tank & Contains Blue 2-Pin Electrical Connector With Green/Orange & Black/Red Wires
Tacoma	On Bracket At Charcoal Canister Near Fuel Tank & Contains Blue 2-Pin Electrical Connector With Green/Black & White/Red Wires

2. Using ohmmeter, ensure continuity exists between electrical terminals on pressure switching valve VSV and that resistance is within specification. See **PRESSURE SWITCHING VALVE VACUUM SWITCHING VALVE RESISTANCE** table. Replace pressure switching valve VSV if no continuity exists or resistance is not within specification.

PRESSURE SWITCHING VALVE VACUUM SWITCHING VALVE RESISTANCE

Application	Ohms @ 68°F (20°C)
Camry	30-36
Camry Solara & Celica	(1)
Corolla	37-44
Highlander, MR2, RAV4 & Tacoma	30-36

(1) Resistance should be 37-44 ohms at 68°F (20°C) and 51-62 ohms at 248 °F (120°C).

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3. Ensure no continuity exists between each electrical terminal and body of pressure switching valve VSV. Replace pressure switching valve VSV if continuity exists between electrical terminal and body of pressure switching valve VSV.
4. To test pressure switching valve VSV operation, apply air pressure to port "E". Ensure air does not flow from port "F". Perform STEP 1 in illustration. See **Fig. 212** -**Fig. 214** .
5. Apply battery voltage and ground to electrical terminals on pressure switching valve VSV. Apply air pressure to port "E". Ensure air flows from port "F". Perform STEP 2 in illustration. See **Fig. 212** -**Fig. 214** . Replace pressure switching valve VSV if defective.

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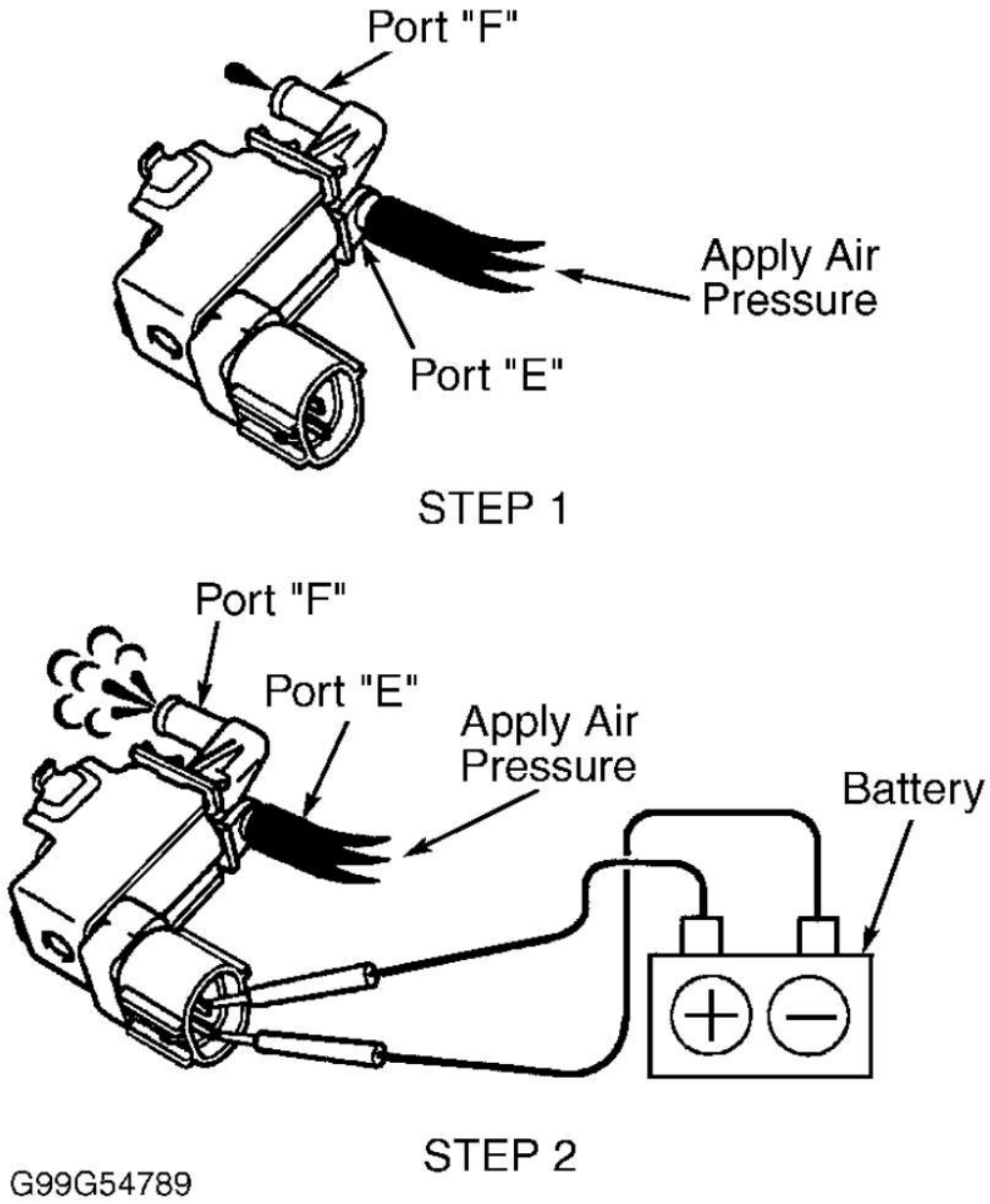
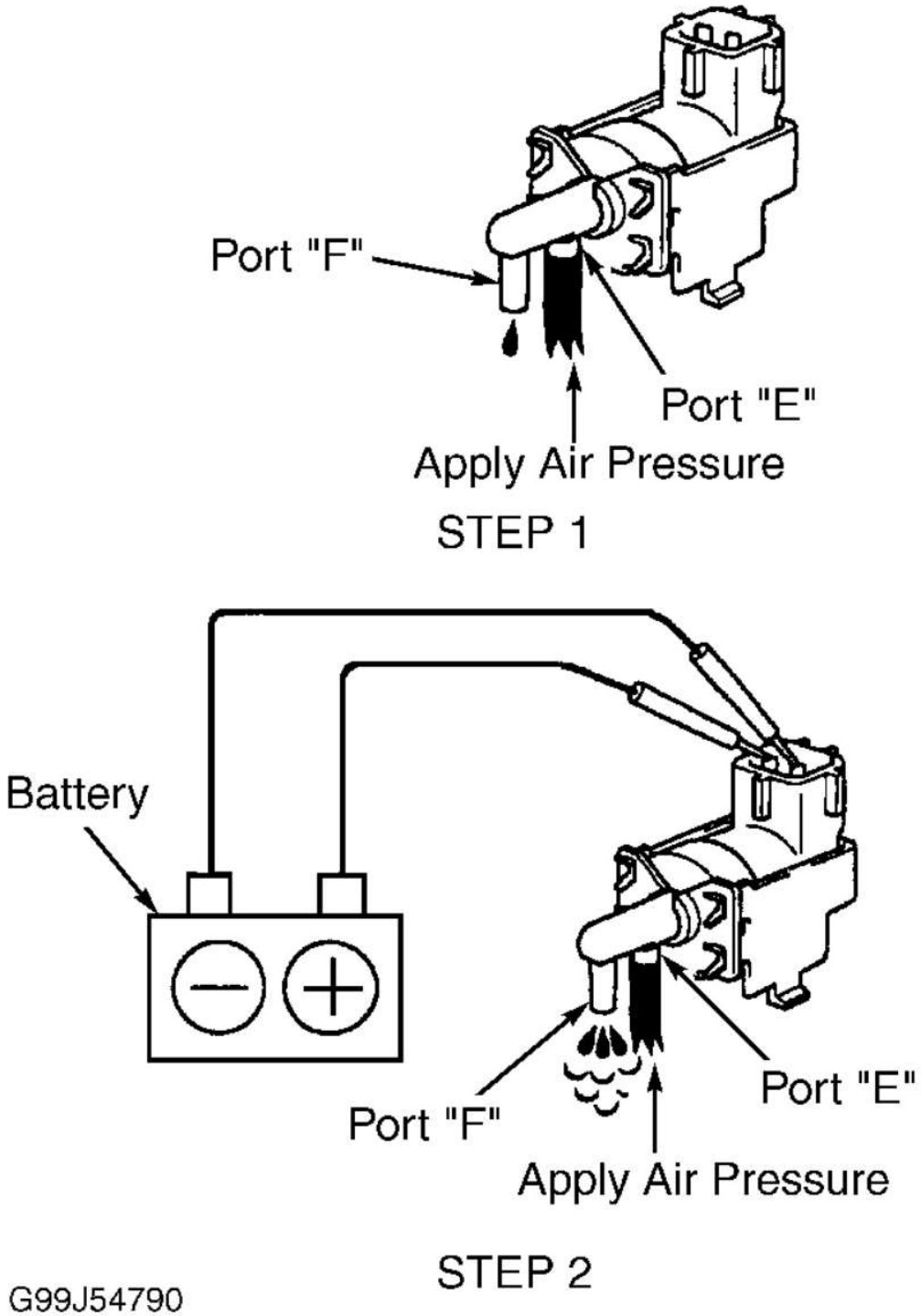


Fig. 212: Testing Pressure Switching Valve Vacuum Switching Valve (Camry, Camry Solara, Celica, Highlander, MR2 & RAV4)
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Fig. 213: Testing Pressure Switching Valve Vacuum Switching Valve (Corolla)
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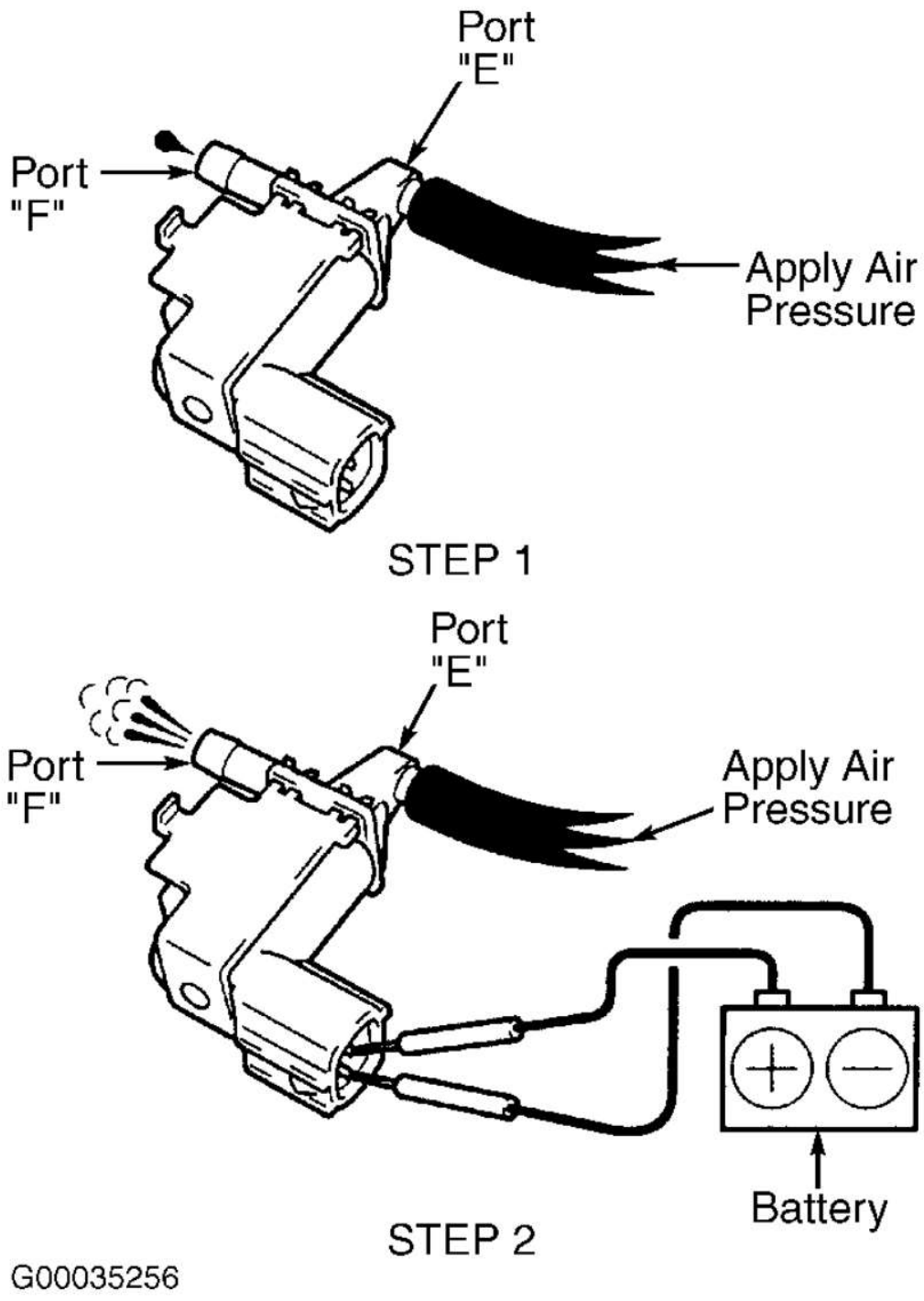


Fig. 214: Testing Pressure Switching Valve Vacuum Switching Valve (Tacoma)

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Purge Flow Switching Valve Vacuum Switching Valve (Prius)

WARNING: Read service precautions before proceeding with service procedure. See SERVICE PRECAUTIONS .

1. Remove purge flow switching valve Vacuum Switching Valve (VSV). Purge flow switching valve VSV is located on bracket at charcoal canister on top of fuel tank and contains Blue 2-pin electrical connector with Black and Black/Red wires. See **Fig. 165** . If necessary to remove fuel tank for access to purge flow switching valve VSV, see **FUEL PUMP** under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article for removal of fuel tank.
2. Using ohmmeter, ensure continuity exists between electrical terminals on purge flow switching valve VSV and that resistance is 33-39 ohms at 68°F (20°C). Replace purge flow switching valve VSV if no continuity exists or resistance is not within specification.
3. Ensure no continuity exists between each electrical terminal and body of purge flow switching valve VSV. Replace purge flow switching valve VSV if continuity exists between electrical terminal and body of purge flow switching valve VSV.
4. To test purge flow switching valve VSV operation, apply air pressure to port "E". Ensure air flows from port "F" and not from port "G". Perform STEP 1 in illustration. See **Fig. 215** .
5. Apply battery voltage and ground to electrical terminals on purge flow switching valve VSV. Apply air pressure to port "G". Ensure air flows from port "F" and not from port "E". Perform STEP 2 in illustration. See **Fig. 215** . Replace purge flow switching valve VSV if defective.

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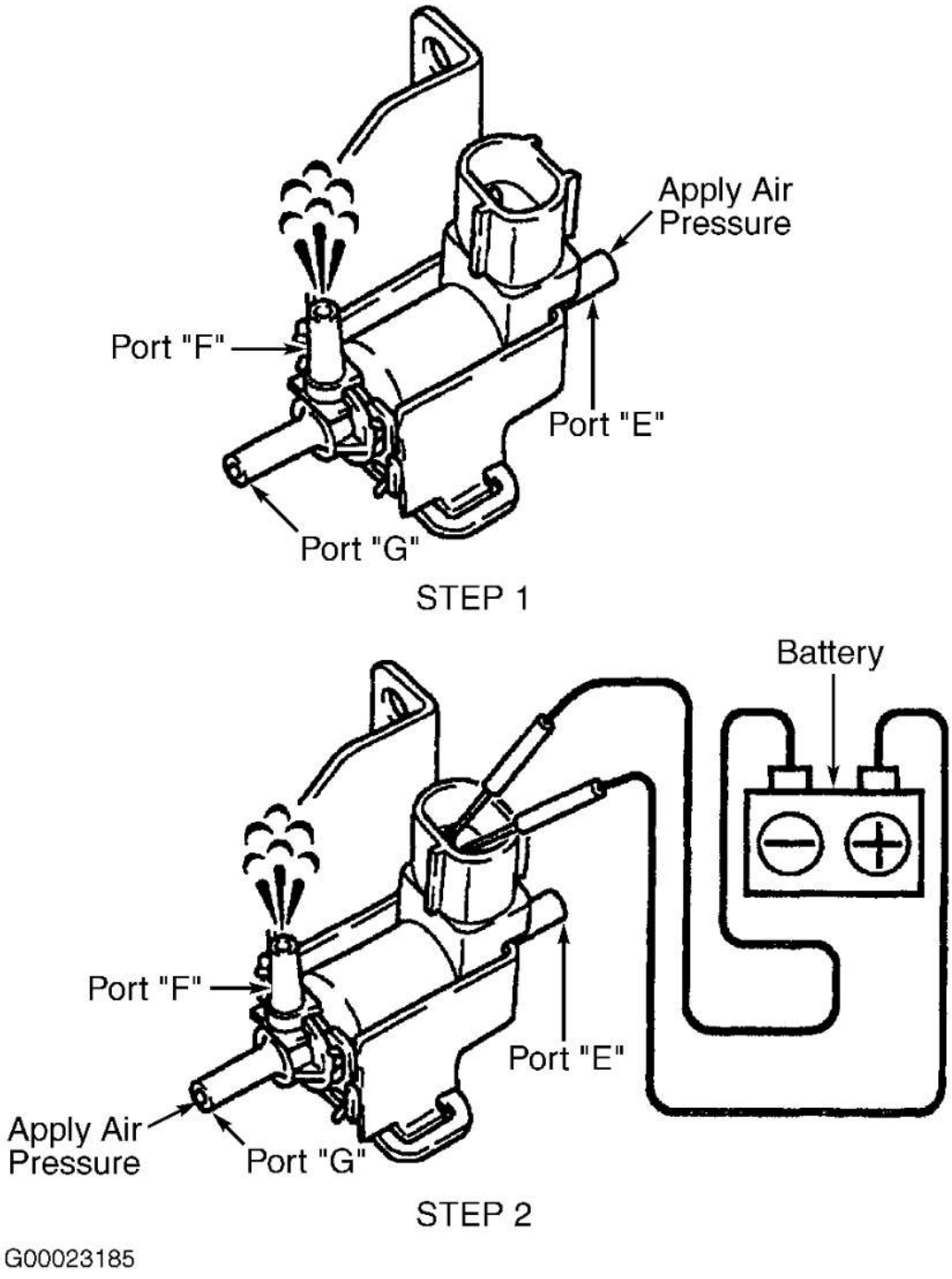


Fig. 215: Testing Purge Flow Switching Valve Vacuum Switching Valve (Prius)
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Vapor Pressure Sensor (Camry)

Testing information is not available from manufacturer.

Vapor Pressure Sensor (Camry Solara, Corolla, MR2 & RAV4)

1. Ensure ignition is off. To test vapor pressure sensor supply voltage, disconnect electrical connector from vapor pressure sensor. See **VAPOR PRESSURE SENSOR LOCATION** table. See **Fig. 160** , **Fig. 162** , **Fig. 164** and **Fig. 166** . For additional information for obtaining access to vapor pressure sensor, see **VAPOR PRESSURE SENSOR** under EMISSION SYSTEMS & SUB-SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.

VAPOR PRESSURE SENSOR LOCATION

Application	Location
Camry Solara	On Charcoal Canister Near Fuel Tank & Contains Black 3-Pin Electrical Connector With Blue/Red, Brown & Yellow Wires
Corolla	On Charcoal Canister Near Fuel Tank & Contains Black 3-Pin Electrical Connector With Brown, Blue & Yellow Wires
MR2	On Top Of Fuel Pump Assembly On Fuel Tank, Below Cover Plate & Luggage Compartment Boxes Behind Seats & Contains Black 3-Pin Electrical Connector With Brown, Blue/Red & Green/Black Wires
RAV4	On Top Of Fuel Pump Assembly On Fuel Tank, Below Cover Plate & Driver's Side Rear Seat & Contains Black 3-Pin Electrical Connector With Brown, Yellow & Blue/Black Wires

2. Turn ignition on. Using voltmeter, measure vapor pressure sensor supply voltage between terminals VC and E2 on wiring harness side of electrical connector for vapor pressure sensor. See **Fig. 216** and **Fig. 217** . VC and E2 terminals are the 2 outer terminals. DO NOT use center terminal. Vapor pressure sensor supply voltage should be 4.5-5.5 volts.

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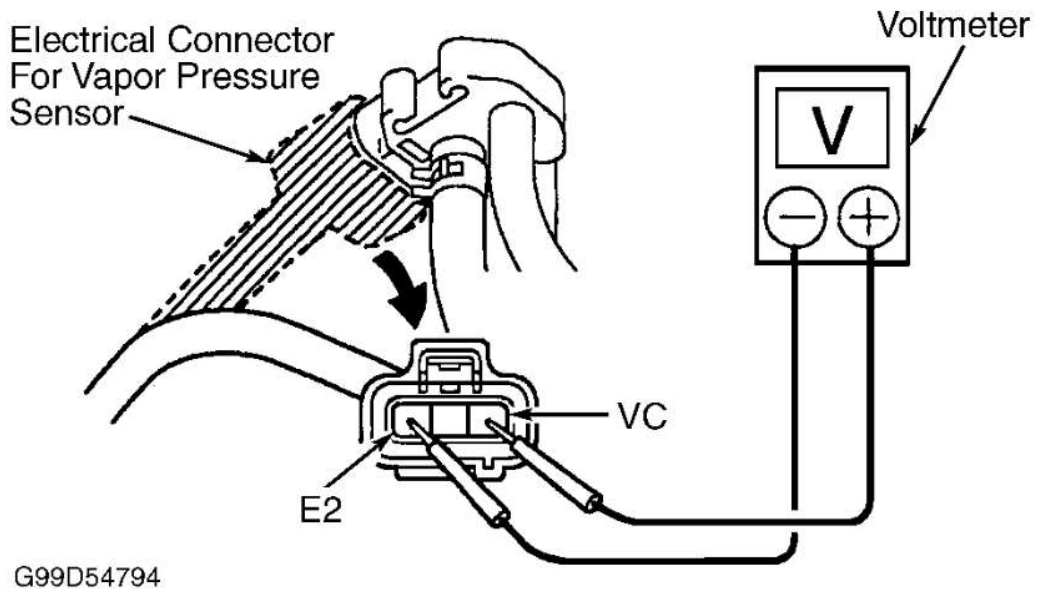


Fig. 216: Measuring Typical Vapor Pressure Sensor Supply Voltage (Camry Solara & Corolla)
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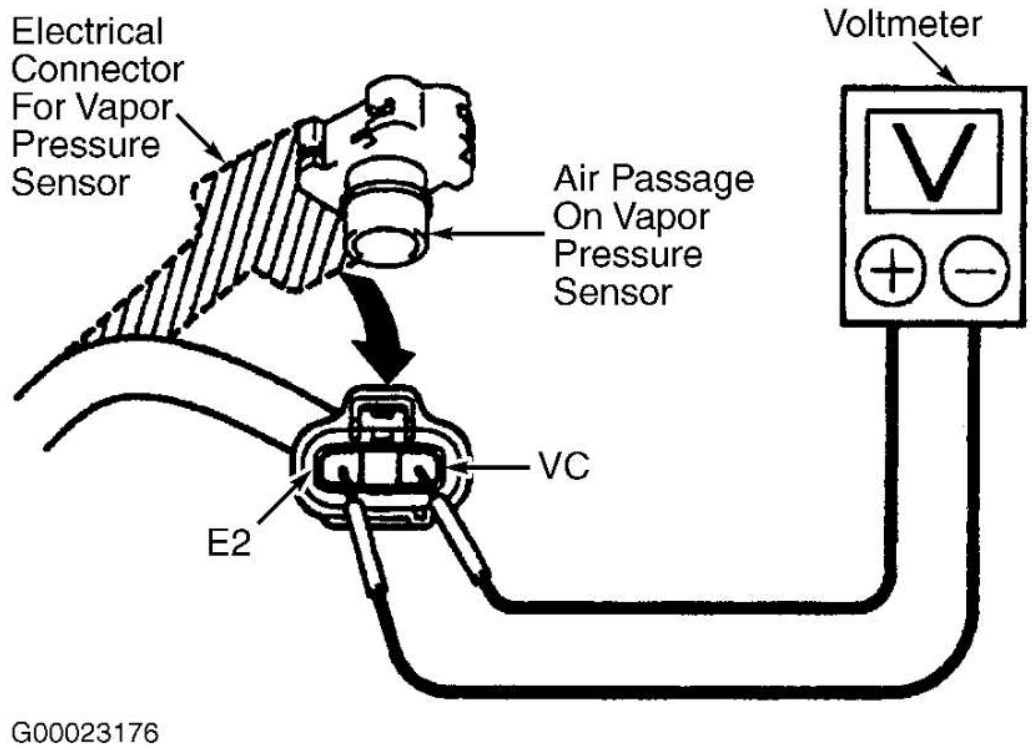


Fig. 217: Measuring Vapor Pressure Sensor Supply Voltage & Identifying Air Passage On Vapor Pressure Sensor (MR2 & RAV4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. If vapor pressure sensor supply voltage is within specification, turn ignition off. Reinstall electrical connector on vapor pressure sensor. Go to next step. If vapor pressure sensor supply voltage is not within specification, check wiring circuit between Engine Control Module (ECM) and vapor pressure sensor. See **WIRING DIAGRAMS** article. See **ENGINE CONTROL MODULE LOCATION** table.
4. On Camry Solara and Corolla, to test vapor pressure sensor output voltage, turn ignition on. Disconnect proper vacuum hose from vapor pressure sensor. See **Fig. 218** and **Fig. 219** . On MR2 and RAV4, to test vapor pressure sensor output voltage, turn ignition on. Remove retaining clip and remove vapor pressure sensor from top of fuel pump assembly. On all models, obtain access to Engine Control Module (ECM). See **ENGINE CONTROL MODULE LOCATION** table.

ENGINE CONTROL MODULE LOCATION

Model	(1) Location
Camry Solara	Behind Glove Box
Corolla	Behind Stereo On Instrument Panel, Just In Front Of Center Console
MR2	On Inside Of Firewall, Directly Behind Driver's Seat & Luggage Compartment
RAV4	Near Passenger's Side Kick Panel, Just Below Instrument Panel

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(1) For illustration of ECM location, see **THEORY & OPERATION** article. For information on accessing ECM, see **ENGINE CONTROL MODULE** under COMPUTERIZED ENGINE CONTROLS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.

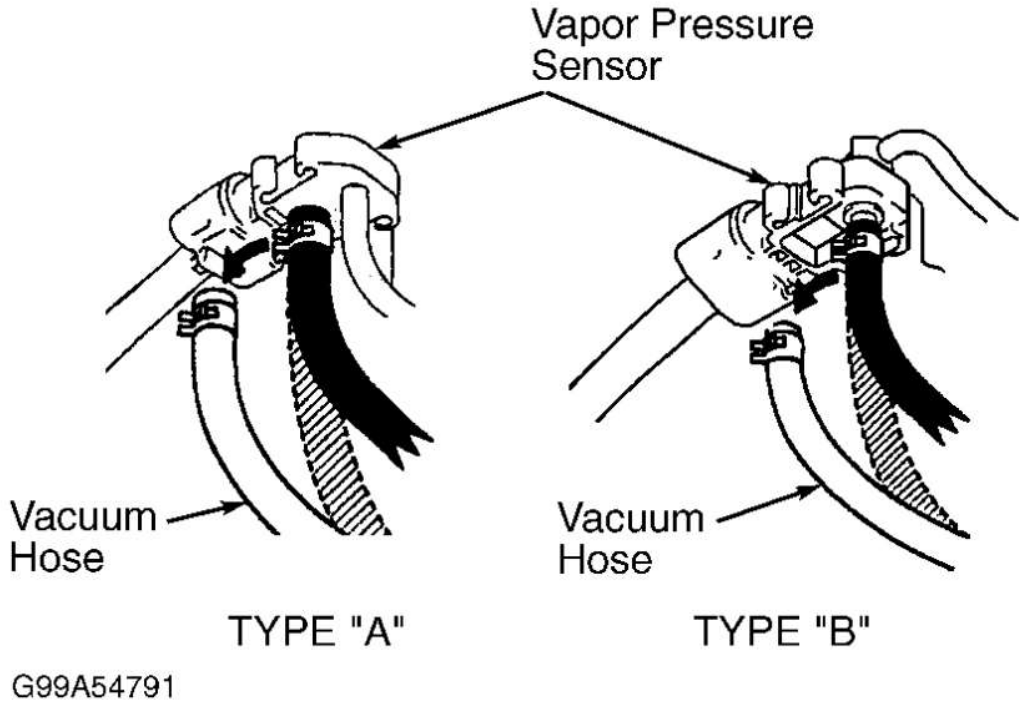


Fig. 218: Disconnecting Vacuum Hose At Vapor Pressure Sensor (Camry Solara)
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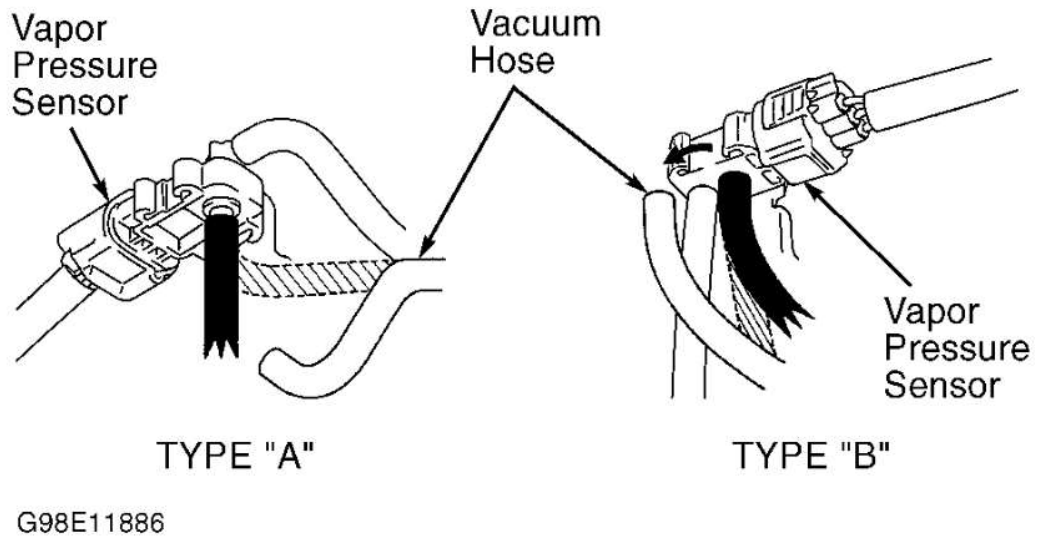


Fig. 219: Disconnecting Vacuum Hose At Vapor Pressure Sensor (Corolla)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. Connect voltmeter between specified ECM terminals. See **Fig. 220** -**Fig. 223** . See **ECM TERMINAL APPLICATION** table.

ECM TERMINAL APPLICATION

Application & Terminal	Wire Color
Camry Solara	
E2	Brown
PTNK	Blue/Red
Corolla	
E2	Brown
PTNK	Blue
MR2	
E2	Brown
PTNK	Green/Black
RAV4	
E2	Brown
PTNK	(1) Blue/Black Or White
(1) There are 2 different wiring harnesses used. Wire color at designated terminal may vary according to wiring harness used.	

6. Ensure ignition is on and electrical connector is installed on vapor pressure sensor. On Camry Solara and

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Corolla, using vacuum pump, apply .59 in. Hg of vacuum to disconnected vacuum hose port on vapor pressure sensor and note vapor pressure sensor output voltage. On MR2 and RAV4, using vacuum pump, apply .59 in. Hg of vacuum to air passage on vapor pressure sensor and note vapor pressure sensor output voltage. See**Fig. 217** . On all models, ensure vapor pressure sensor output voltage is within specification. See **VAPOR PRESSURE SENSOR OUTPUT VOLTAGE** table.

7. Release vacuum from vapor pressure sensor and note vapor pressure sensor output voltage. Ensure vapor pressure sensor output voltage is within specification. See **VAPOR PRESSURE SENSOR OUTPUT VOLTAGE** table.
8. Apply .22 psi (.015 kg/cm^2) of pressure to vapor pressure sensor and note vapor pressure sensor output voltage. Ensure vapor pressure sensor output voltage is within specification. See **VAPOR PRESSURE SENSOR OUTPUT VOLTAGE** table. Replace vapor pressure sensor if vapor pressure sensor output voltage is not within specification. Turn ignition off.

VAPOR PRESSURE SENSOR OUTPUT VOLTAGE

Condition	Volts
Vacuum Applied	1.3-2.1
Vacuum Released	3.0-3.6
Pressure Applied	4.2-4.8

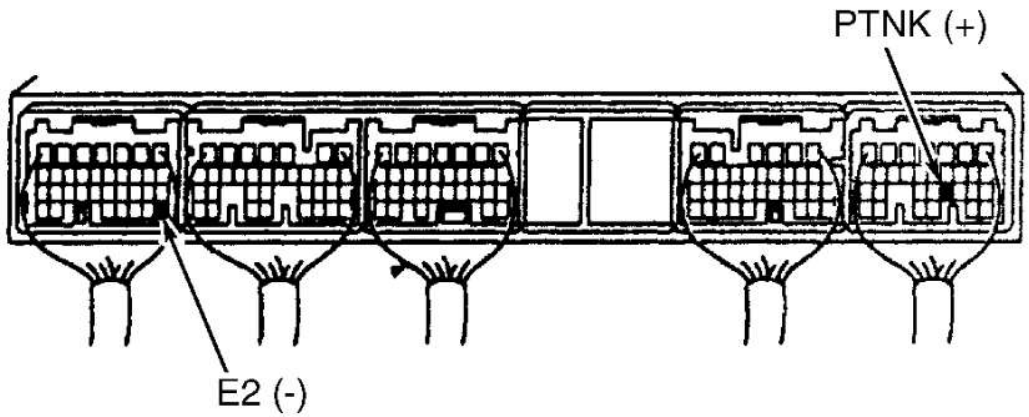
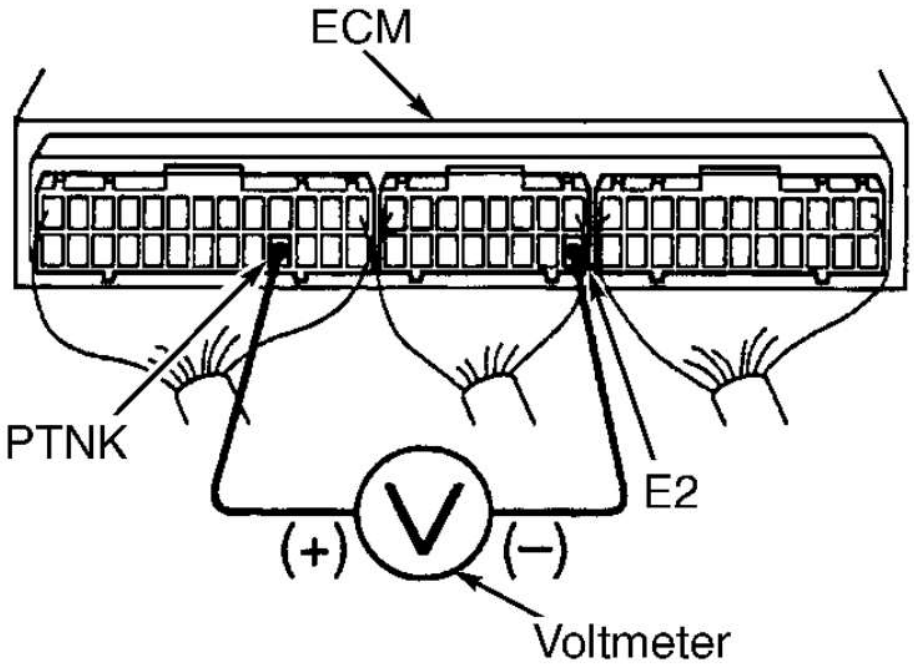
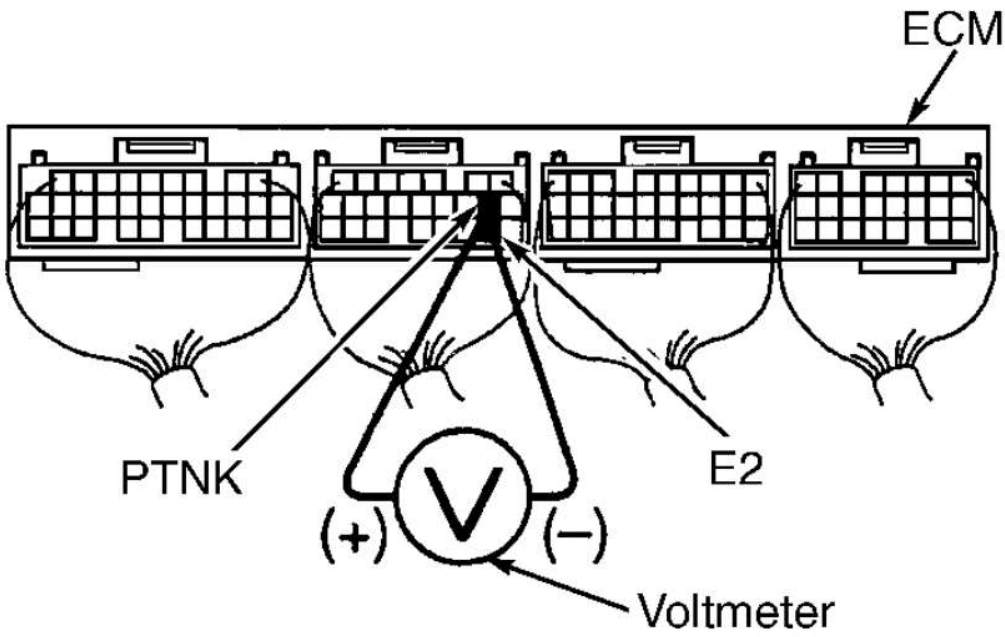


Fig. 220: Measuring Vapor Pressure Sensor Output Voltage (Camry Solara)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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3-SPEED A/T & M/T



4-SPEED A/T

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Fig. 221: Measuring Vapor Pressure Sensor Output Voltage (Corolla)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

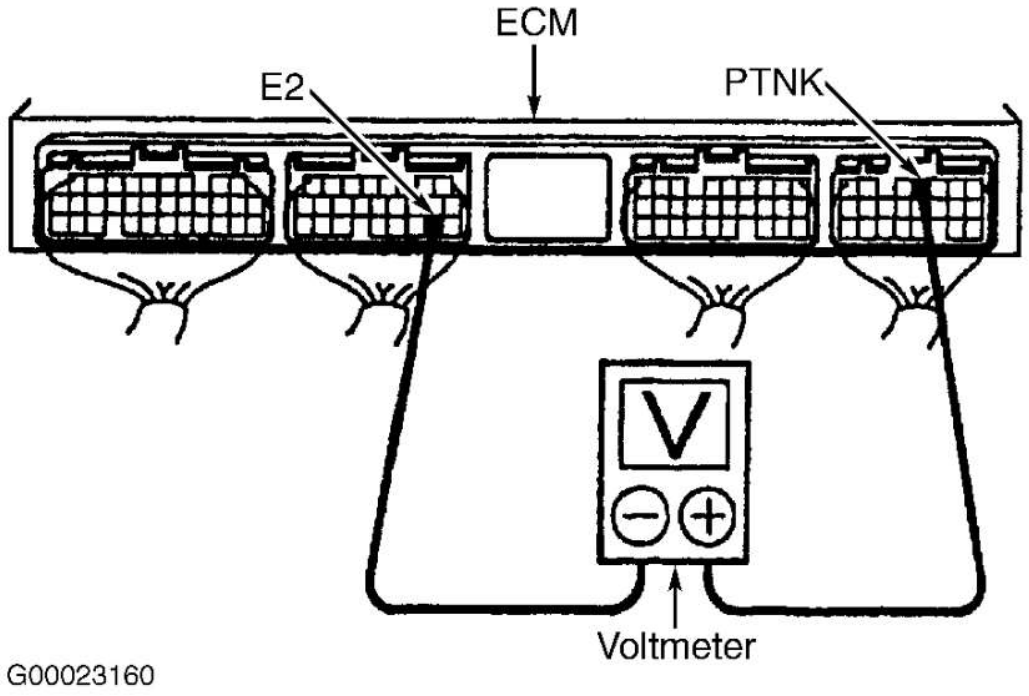


Fig. 222: Measuring Vapor Pressure Sensor Output Voltage (MR2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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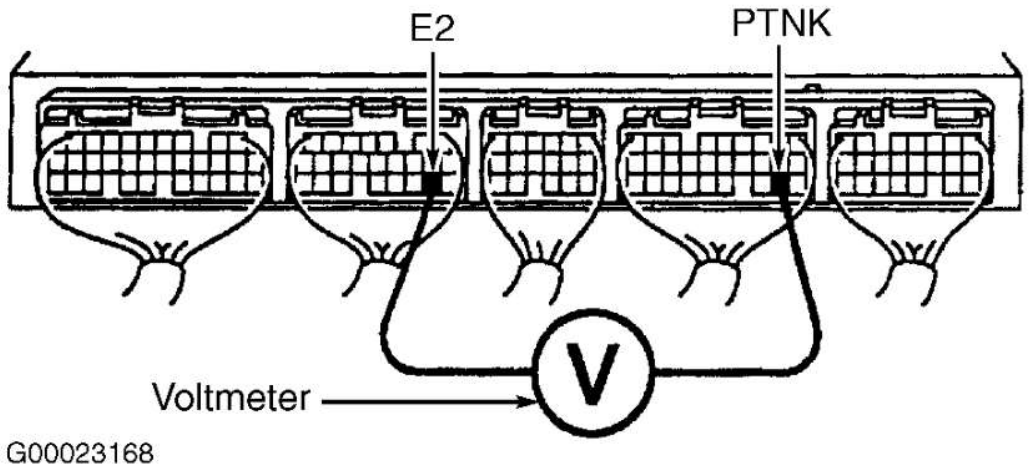


Fig. 223: Measuring Vapor Pressure Sensor Output Voltage (RAV4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Vapor Pressure Sensor (Celica & ECHO)

1. Ensure ignition is off. To test vapor pressure sensor supply voltage, remove rear seat cushion and cover plate for access to electrical connector at vapor pressure sensor. On Celica, vapor pressure sensor is located on top of fuel pump assembly on top of fuel tank and contains Black 3-pin electrical connector with Brown, Red and Blue/Black wires. See **Fig. 224** . On ECHO, vapor pressure sensor is located on top of fuel pump assembly on top of fuel tank and contains Black 3-pin electrical connector with Brown, Red/White and Black wires. See **Fig. 224** .
2. On all models, disconnect electrical connector from vapor pressure sensor. Turn ignition on. Using voltmeter, measure vapor pressure sensor supply voltage between terminals No. 1 and 3 on wiring harness side of electrical connector for vapor pressure sensor. See **Fig. 224** . DO NOT use center terminal. Vapor pressure sensor supply voltage should be 4.5-5.5 volts.
3. If vapor pressure sensor supply voltage is within specification, turn ignition off. Reinstall electrical connector on vapor pressure sensor. Go to next step. If vapor pressure sensor supply voltage is not within specification, check wiring circuit between Engine Control Module (ECM) and vapor pressure sensor. See **WIRING DIAGRAMS** article. On Celica, ECM is located in engine compartment, below cover, just in front of battery, next to driver's side strut tower. On ECHO, ECM is located behind glove box. On all models, for illustration of ECM location, see **THEORY & OPERATION** article. For information on accessing ECM, see **ENGINE CONTROL MODULE** under COMPUTERIZED ENGINE CONTROLS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
4. To test vapor pressure sensor output voltage, ensure electrical connector is installed on vapor pressure sensor. Turn ignition on. Remove fuel tank cap. Using voltmeter, measure vapor pressure sensor output voltage between terminals No. 2 and 3 on wiring harness side of electrical connector for vapor pressure sensor with electrical connector installed on vapor pressure sensor. See **Fig. 224** .
5. Vapor pressure sensor output voltage should be 3.0-3.6 volts. Replace vapor pressure sensor if vapor

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pressure sensor output voltage is not within specification. Turn ignition off. Reinstall fuel tank cap, cover plate and rear seat cushion.

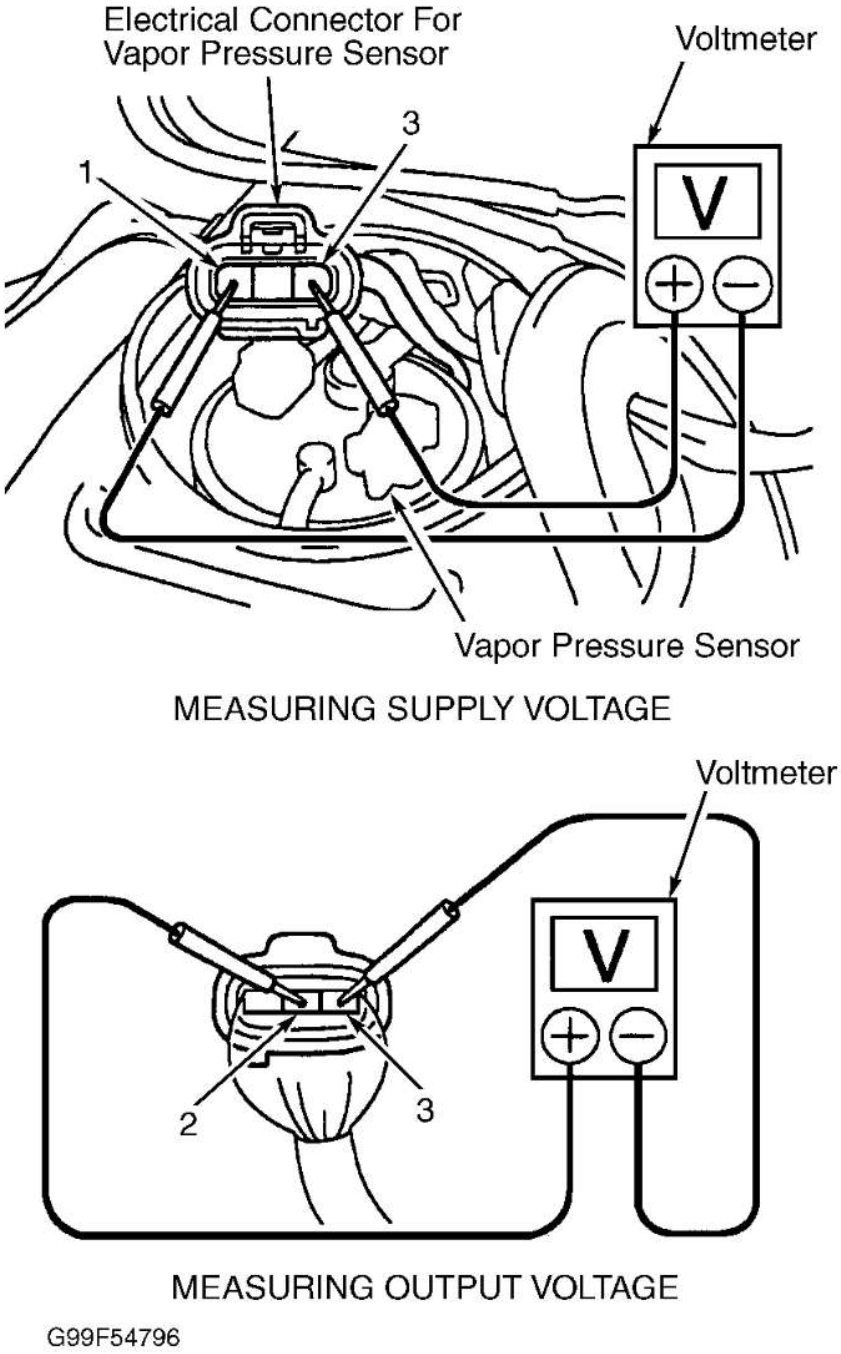


Fig. 224: Locating Vapor Pressure Sensor & Measuring Vapor Pressure Sensor Supply Voltage &

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Output Voltage (Celica & ECHO)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Vapor Pressure Sensor (Highlander)

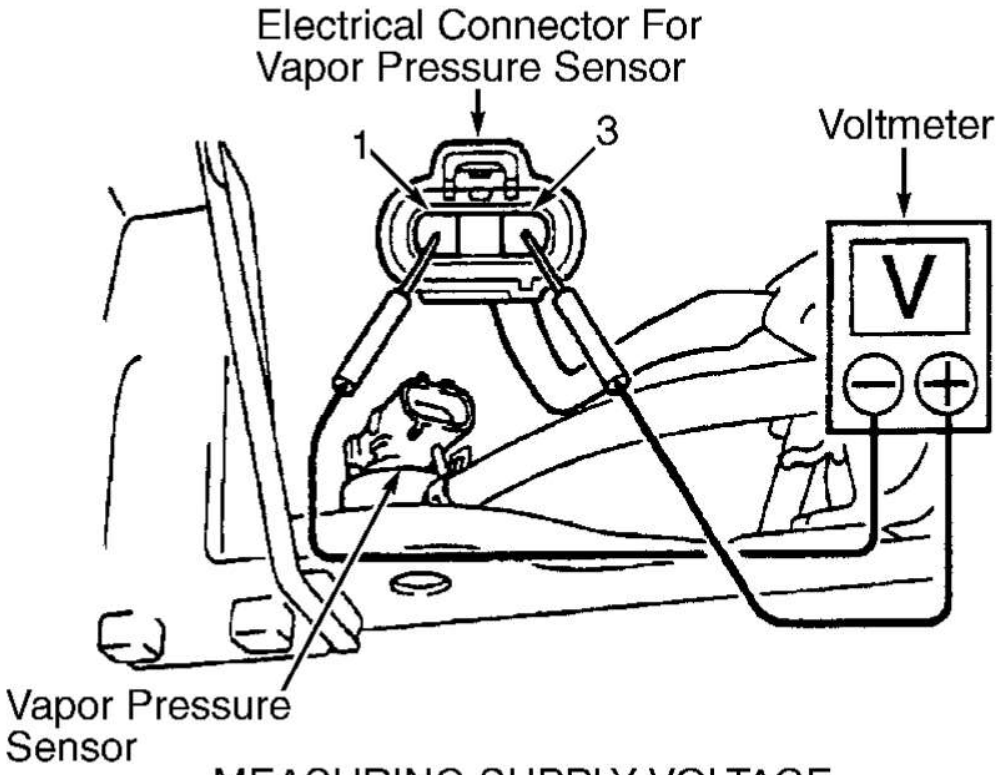
Testing information is not available from manufacturer.

Vapor Pressure Sensor (Prius)

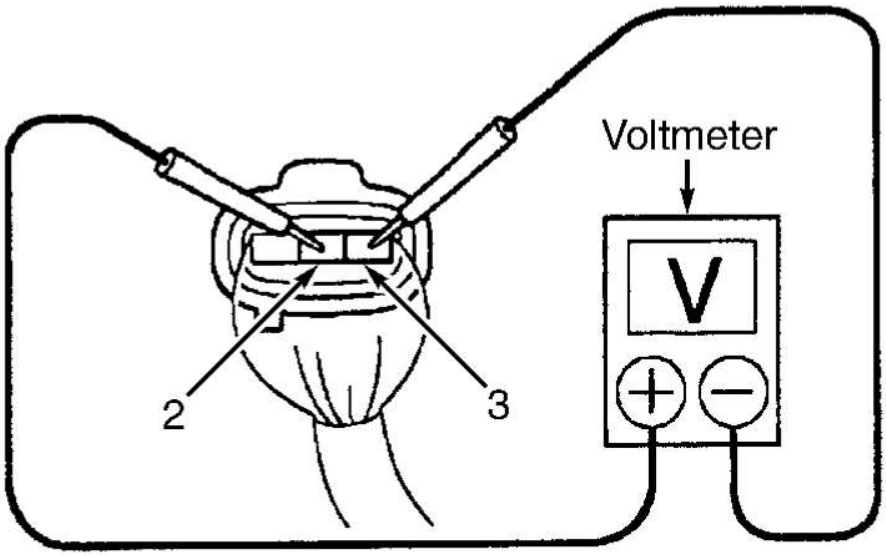
WARNING: Read service precautions before proceeding with service procedure. See SERVICE PRECAUTIONS .

1. Ensure ignition is off. To test vapor pressure sensor supply voltage, disconnect electrical connector at vapor pressure sensor. Vapor pressure sensor is located on top of fuel tank and contains Black 3-pin electrical connector with Brown, Blue/Red and Yellow/Red wires. See **Fig. 225** . It may be necessary to lower fuel tank for access to electrical connector at vapor pressure sensor.
2. Disconnect electrical connector from vapor pressure sensor. Turn ignition on. Using voltmeter, measure vapor pressure sensor supply voltage between terminals No. 1 and 3 on wiring harness side of electrical connector for vapor pressure sensor. See **Fig. 225** . DO NOT use center terminal. Vapor pressure sensor supply voltage should be 4.5-5.5 volts.
3. If vapor pressure sensor supply voltage is within specification, turn ignition off. Reinstall electrical connector on vapor pressure sensor. Go to next step. If vapor pressure sensor supply voltage is not within specification, check wiring circuit between Engine Control Module (ECM) and vapor pressure sensor. See **WIRING DIAGRAMS** article. ECM is located behind glove box. For illustration of ECM location, see **THEORY & OPERATION** article.
4. To test vapor pressure sensor output voltage, ensure electrical connector is installed on vapor pressure sensor. Turn ignition on. Remove fuel tank cap. Using voltmeter, measure vapor pressure sensor output voltage between terminals No. 2 and 3 on wiring harness side of electrical connector for vapor pressure sensor with electrical connector installed on vapor pressure sensor. See **Fig. 225** .
5. Vapor pressure sensor output voltage should be 3.0-3.6 volts. Replace vapor pressure sensor if vapor pressure sensor output voltage is not within specification. Turn ignition off. Reinstall fuel tank cap.

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MEASURING SUPPLY VOLTAGE



MEASURING OUTPUT VOLTAGE

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Fig. 225: Locating Vapor Pressure Sensor & Measuring Vapor Pressure Sensor Supply Voltage & Output Voltage (Prius)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Vapor Pressure Sensor (Tacoma)

1. Ensure ignition is off. To test vapor pressure sensor supply voltage, disconnect electrical connector from vapor pressure sensor. Vapor pressure sensor is located on top of fuel pump assembly on top of fuel tank and contains Black 3-pin electrical connector with Green/Yellow, Red/Yellow and Blue/Black wires. See **Fig. 226** .
2. Turn ignition on. Using voltmeter, measure vapor pressure sensor supply voltage between terminals VC and E2 on wiring harness side of electrical connector for vapor pressure sensor. See **Fig. 226** . DO NOT use center terminal. Vapor pressure sensor supply voltage should be 4.5-5.5 volts.
3. If vapor pressure sensor supply voltage is within specification, turn ignition off. Reinstall electrical connector on vapor pressure sensor. Go to next step. If vapor pressure sensor supply voltage is not within specification, check wiring circuit between Engine Control Module (ECM) and vapor pressure sensor. See **WIRING DIAGRAMS** article. ECM is located behind the glove box. For illustration of ECM location, see **THEORY & OPERATION** article. For information on accessing ECM, see **ENGINE CONTROL MODULE** under COMPUTERIZED ENGINE CONTROLS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
4. To test vapor pressure sensor output voltage, turn ignition on. Ensure electrical connector is installed on vapor pressure sensor. Remove fuel tank cap. Using voltmeter, check voltage between ECM terminals E2 (Brown wire) and PTNK (Red/Yellow wire). See **Fig. 227** . Vapor pressure sensor output voltage should be 3.0-3.6 volts. Replace vapor pressure sensor if vapor pressure sensor output voltage is not within specification. Turn ignition off. Reinstall fuel tank cap.

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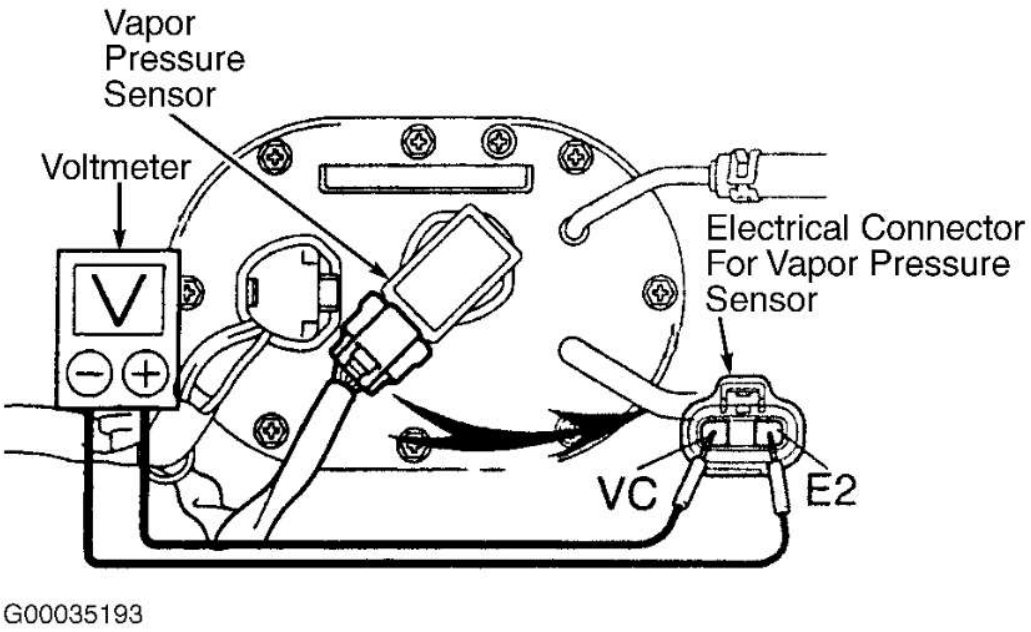


Fig. 226: Locating Vapor Pressure Sensor & Measuring Vapor Pressure Sensor Supply Voltage (Tacoma)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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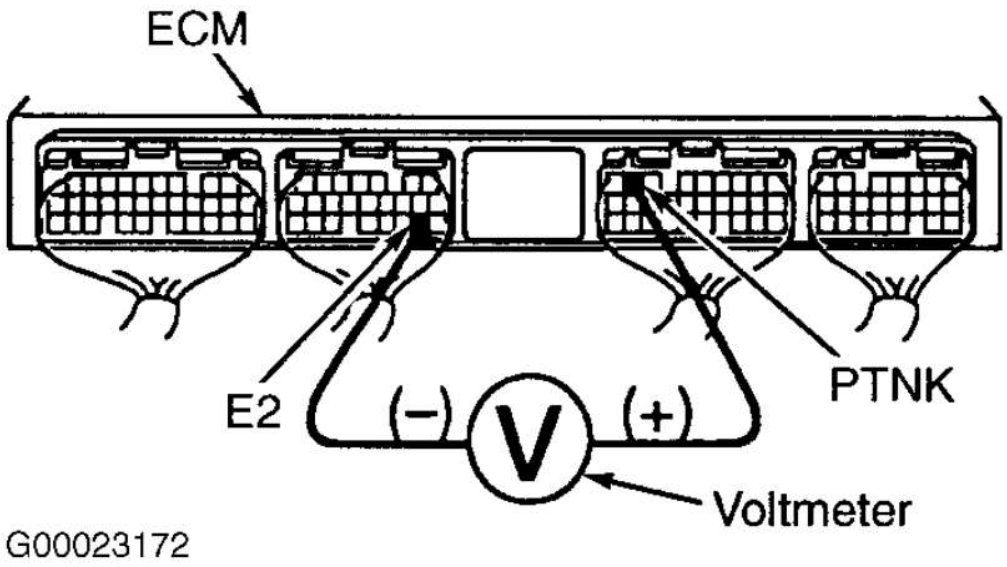


Fig. 227: Measuring Vapor Pressure Sensor Output Voltage (Tacoma)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

POSITIVE CRANKCASE VENTILATION

Camry & Highlander

1. Remove Positive Crankcase Ventilation (PCV) valve. PCV valve is located at passenger's side front corner of valve cover, just above intake manifold. Apply air pressure to PCV valve at bottom (cylinder head side) of PCV valve. Ensure air flows easily through PCV valve.
2. Apply air pressure to PCV valve at vacuum side (intake manifold side) of PCV valve. Ensure air flows through PCV valve with some resistance. Replace PCV valve if valve does not function as described.

Camry Solara, Celica, Corolla, ECHO, MR2, Prius, RAV4 & Tacoma

WARNING: On Prius, read service precautions before proceeding with service procedure. See SERVICE PRECAUTIONS .

1. Remove Positive Crankcase Ventilation (PCV) valve. See **Fig. 160** -**Fig. 167** . Apply air pressure to PCV valve at bottom (cylinder head side) of PCV valve. Ensure air flows easily through PCV valve.
2. Apply air pressure to PCV valve at vacuum side (intake manifold side) of PCV valve. Ensure air flows through PCV valve with some resistance. Replace PCV valve if valve does not function as described.

THROTTLE CONTROLS

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ELECTRONIC THROTTLE CONTROL SYSTEM

NOTE: Electronic Throttle Control System (ETCS) may also be referred to as Electronic Throttle Control System-Intelligent (ETCS-I or ETCS-i).

Camry, Camry Solara, MR2 With Sequential Manual Transaxle & Prius

For testing of throttle body and components, see **THROTTLE BODY** under IDLE CONTROL SYSTEMS.

THROTTLE OPENER

Tacoma

1. Start engine and warm engine to normal operating temperature. Ensure idle speed is within specification. See **IDLE SPEED & MIXTURE** in ON-VEHICLE ADJUSTMENTS - 4-CYLINDER article.
2. With engine idling, disconnect and plug vacuum hose at throttle opener. See **Fig. 228** . Note engine speed with vacuum hose disconnected from throttle opener. Engine speed should be 1200-1500 RPM.
3. Throttle opener is nonadjustable. If engine speed is not within specification, replace throttle body. See **THROTTLE BODY** under FUEL SYSTEMS in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article. Shut engine off. Reinstall vacuum hose on throttle opener. Start engine and ensure engine returns to proper idle speed.

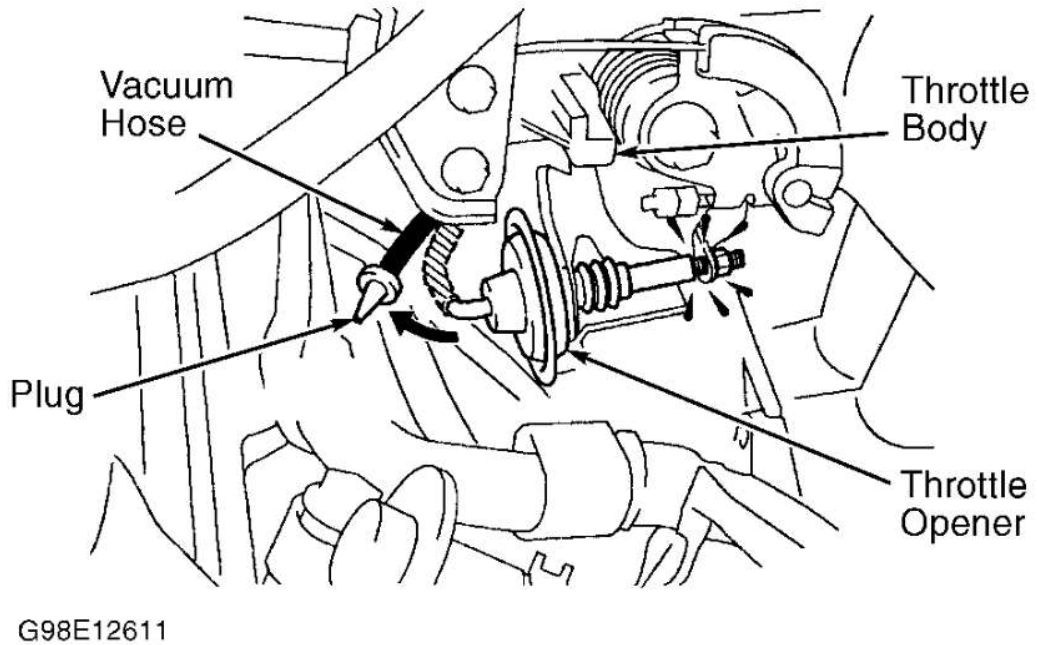


Fig. 228: Locating Throttle Opener & Disconnecting Vacuum Hose (Tacoma)

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VARIABLE VALVE LIFT SYSTEM

NOTE: Variable Valve Lift (VVL) system may also be referred to as Variable Valve Timing Lift Intelligent (VVTL-I or VVTL-i) system.

NOTE: VVL system is used only on Celica 1.8L 2ZZ-GE. If problem exists in VVL system, a Diagnostic Trouble Code (DTC) may be stored in Engine Control Module (ECM). See TESTING PROCEDURE under SELF-DIAGNOSTIC SYSTEM in appropriate SELF-DIAGNOSTICS article for retrieving of DTCs.

VARIABLE VALVE LIFT OIL CONTROL VALVE

NOTE: Variable Valve Lift (VVL) oil control valve may also be referred to as VVL Oil Control Valve (OCV) or camshaft timing oil control valve (VVL).

Celica 1.8L 2ZZ-GE

1. Remove No. 2 cylinder head cover located on top of engine, above ignition coils and valve cover. To check VVL oil control valve resistance, disconnect electrical connector at VVL oil control valve. VVL oil control valve is located at intake manifold side of cylinder head, near flywheel end of engine. See **Fig. 229** .
2. Using ohmmeter, check resistance between electrical terminals on VVL oil control valve. Resistance should be 6.9-7.9 ohms at 68°F (20°C). If resistance is within specification, go to next step. If resistance is not within specification, replace VVL oil control valve. See **VARIABLE VALVE LIFT OIL CONTROL VALVE** under VARIABLE VALVE LIFT SYSTEM in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
3. To check VVL oil control valve operation, remove VVL oil control valve. See **VARIABLE VALVE LIFT OIL CONTROL VALVE** under VARIABLE VALVE LIFT SYSTEM in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
4. Note movement of valve inside VVL oil control valve while applying and disconnecting battery voltage and ground to terminals No. 1 and 2 on VVL oil control valve. See **Fig. 235** . Valve should move outward toward end of assembly opposite electrical connector with voltage applied and should move inward toward electrical connector end of assembly with voltage not applied. See **Fig. 235** . Replace VVL oil control valve if operation is not as specified.

VARIABLE VALVE TIMING SYSTEM

NOTE: Variable Valve Timing (VVT) system is used on Camry, Camry Solara, Celica, Corolla, ECHO, Highlander, MR2, Prius & RAV4. If problem exists in VVT system, a Diagnostic Trouble Code (DTC) may be stored in Engine Control Module (ECM). See TESTING PROCEDURE under SELF-DIAGNOSTIC SYSTEM in appropriate SELF-DIAGNOSTICS article for retrieving of DTCs.

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VARIABLE VALVE TIMING SENSOR

Camry, Camry Solara, Celica, Corolla, ECHO, Highlander, MR2, Prius & RAV4

NOTE: Variable Valve Timing (VVT) sensor may also be referred to as camshaft position sensor.

For VVT sensor testing, see **CAMSHAFT POSITION SENSOR** under IGNITION SYSTEMS in BASIC DIAGNOSTIC PROCEDURES - 4-CYLINDER article.

VARIABLE VALVE TIMING CAMSHAFT TIMING OIL CONTROL VALVE

Camry, Camry Solara, Celica, Corolla, ECHO, Highlander, MR2, Prius & RAV4

NOTE: Variable Valve Timing (VVT) camshaft timing oil control valve may also be referred to as oil control valve for VVT, VVT Oil Control Valve (OCV) or camshaft timing oil control valve VVT.

WARNING: On Prius, read service precautions before proceeding with service procedure. See SERVICE PRECAUTIONS .

1. Remove No. 2 cylinder head cover located on top of engine, above ignition coils and valve cover (if necessary) for access to VVT camshaft timing oil control valve. VVT camshaft timing oil control valve is located at intake manifold side of cylinder head, near timing chain end of engine. See **Fig. 229** -**Fig. 234** . . To check VVT camshaft timing oil control valve resistance, disconnect electrical connector at VVT camshaft timing oil control valve.
2. Using ohmmeter, check resistance between electrical terminals on VVT camshaft timing oil control valve. Ensure resistance is within specification. See **VVT CAMSHAFT TIMING OIL CONTROL VALVE RESISTANCE** table. If resistance is within specification, go to next step. If resistance is not within specification, replace VVT camshaft timing oil control valve. See **VARIABLE VALVE TIMING CAMSHAFT TIMING OIL CONTROL VALVE** under VARIABLE VALVE TIMING SYSTEM in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.

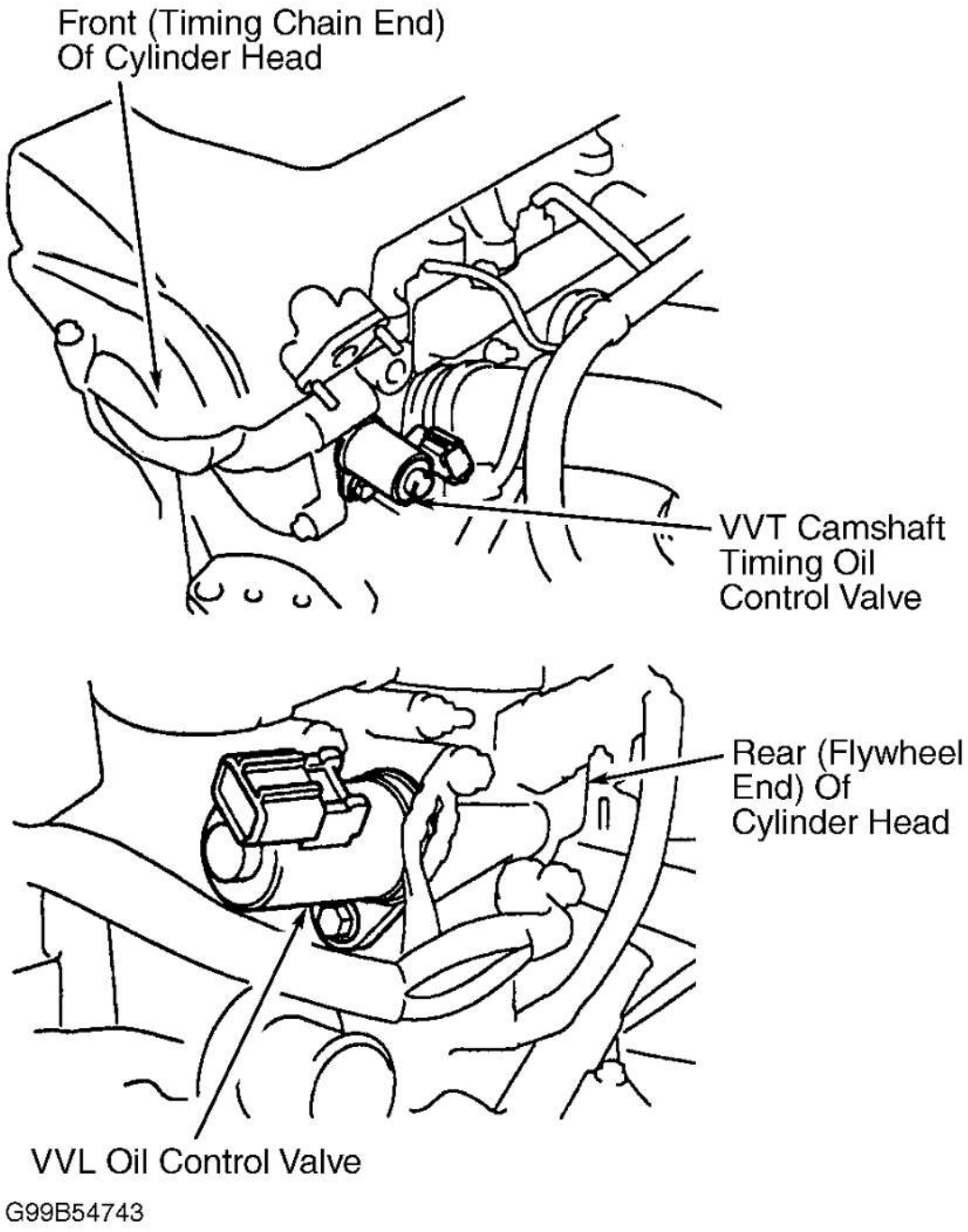
VVT CAMSHAFT TIMING OIL CONTROL VALVE RESISTANCE

Application	Ohms @ 68°F (20°C)
Camry, Camry Solara, Celica, Corolla, Highlander, MR2, Prius & RAV4	6.9-7.9
ECHO	5.5-12.0

3. To check VVT camshaft timing oil control valve operation, remove VVT camshaft timing oil control valve. See **VARIABLE VALVE TIMING CAMSHAFT TIMING OIL CONTROL VALVE** under VARIABLE VALVE TIMING SYSTEM in REMOVAL, OVERHAUL & INSTALLATION - 4-CYLINDER article.
4. Note movement of valve inside VVT camshaft timing oil control valve while applying and disconnecting battery voltage and ground to terminals No. 1 and 2 on VVT camshaft timing oil control valve. See **Fig.**

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235 and **Fig. 236** . Valve should move outward toward end of assembly opposite electrical connector with voltage applied, and should move inward toward electrical connector end of assembly with voltage not applied. See **Fig. 235** and **Fig. 236** . Replace VVT camshaft timing oil control valve if operation is not as specified.



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Fig. 229: Locating Variable Valve Lift Oil Control Valve & Variable Valve Timing Camshaft Timing Oil Control Valve (Celica 1.8L 2ZZ-GE)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

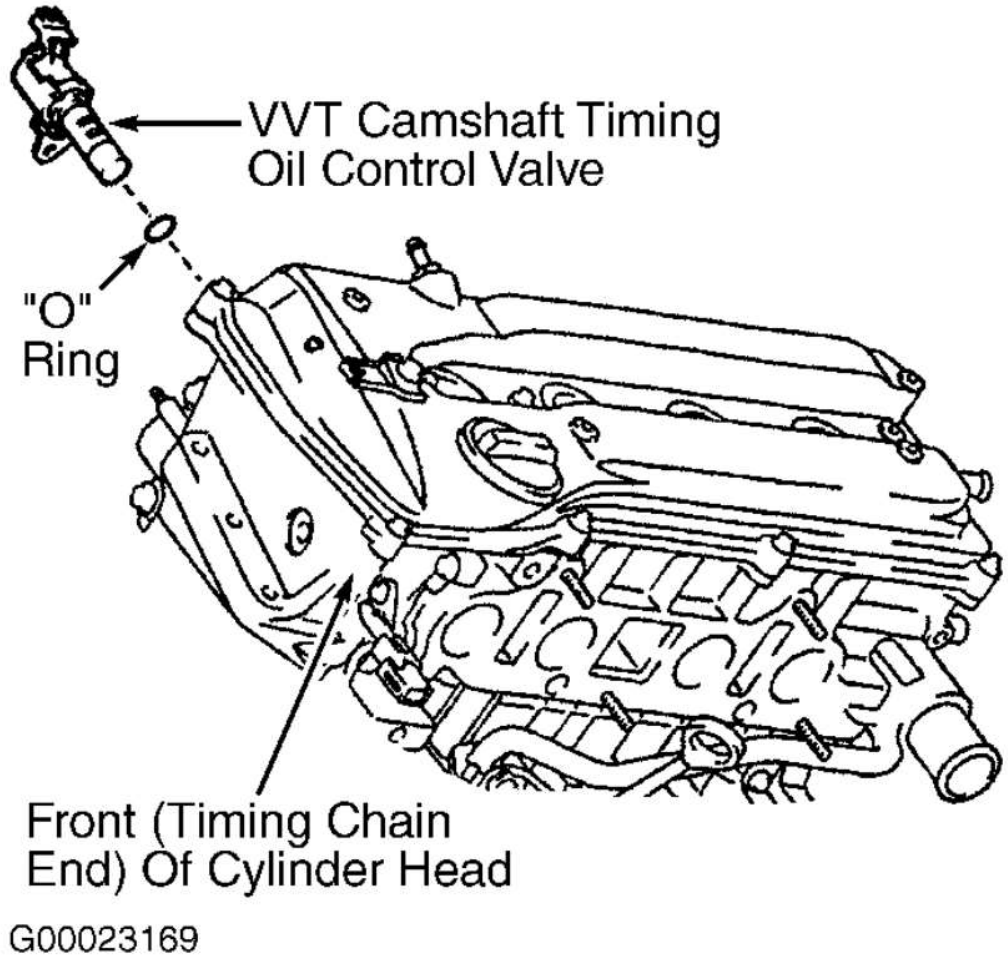


Fig. 230: Locating Variable Valve Timing Camshaft Timing Oil Control Valve (Camry, Camry Solara, Highlander & RAV4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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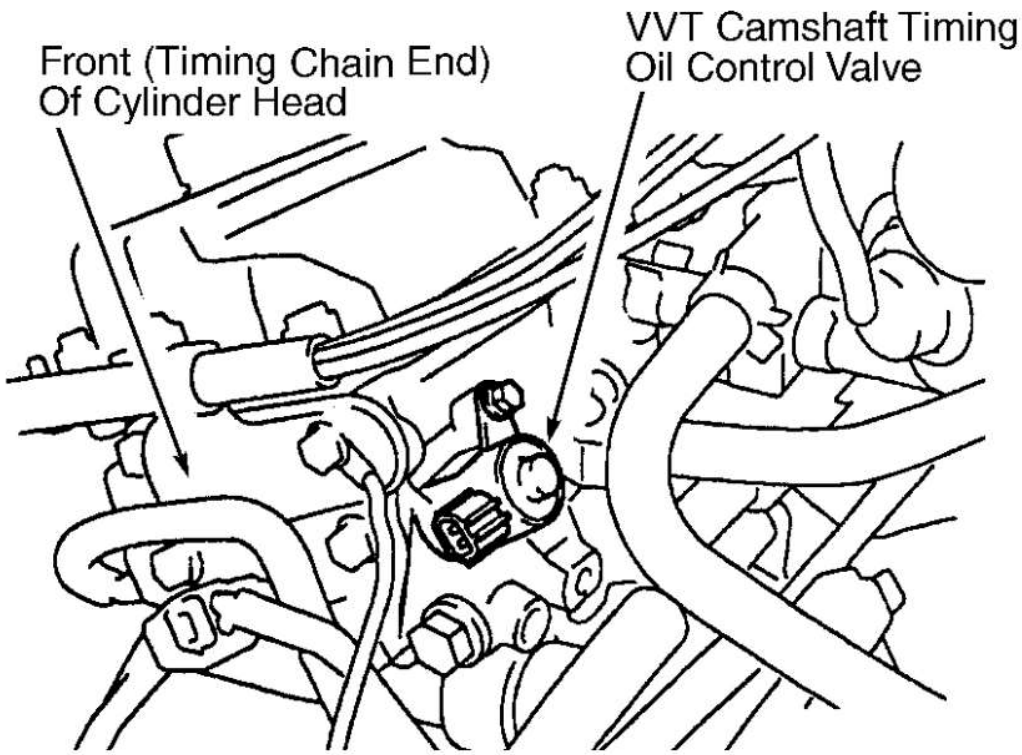


Fig. 231: Locating Variable Valve Timing Camshaft Timing Oil Control Valve (Celica 1.8L 1ZZ-FE)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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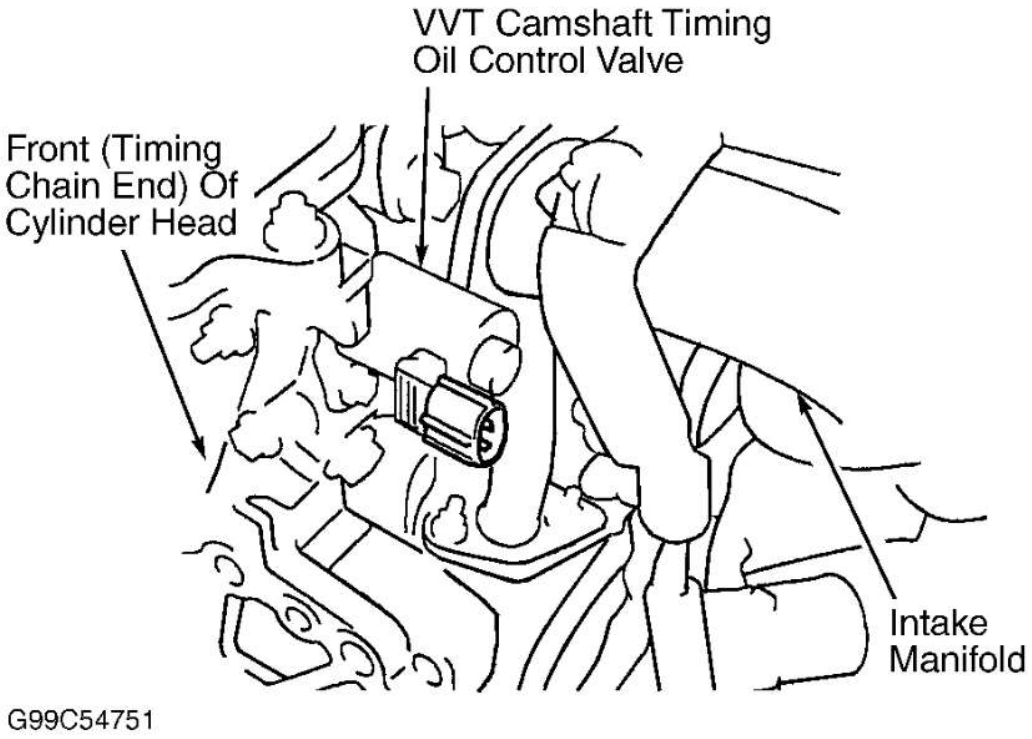


Fig. 232: Locating Variable Valve Timing Camshaft Timing Oil Control Valve (Corolla)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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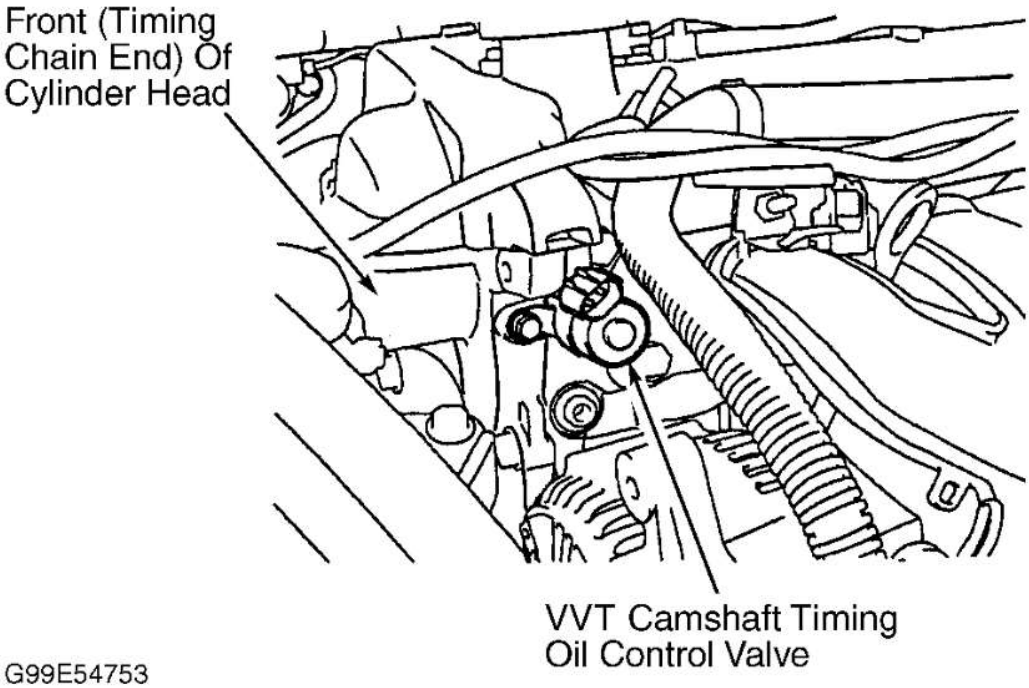


Fig. 233: Locating Variable Valve Timing Camshaft Timing Oil Control Valve (ECHO)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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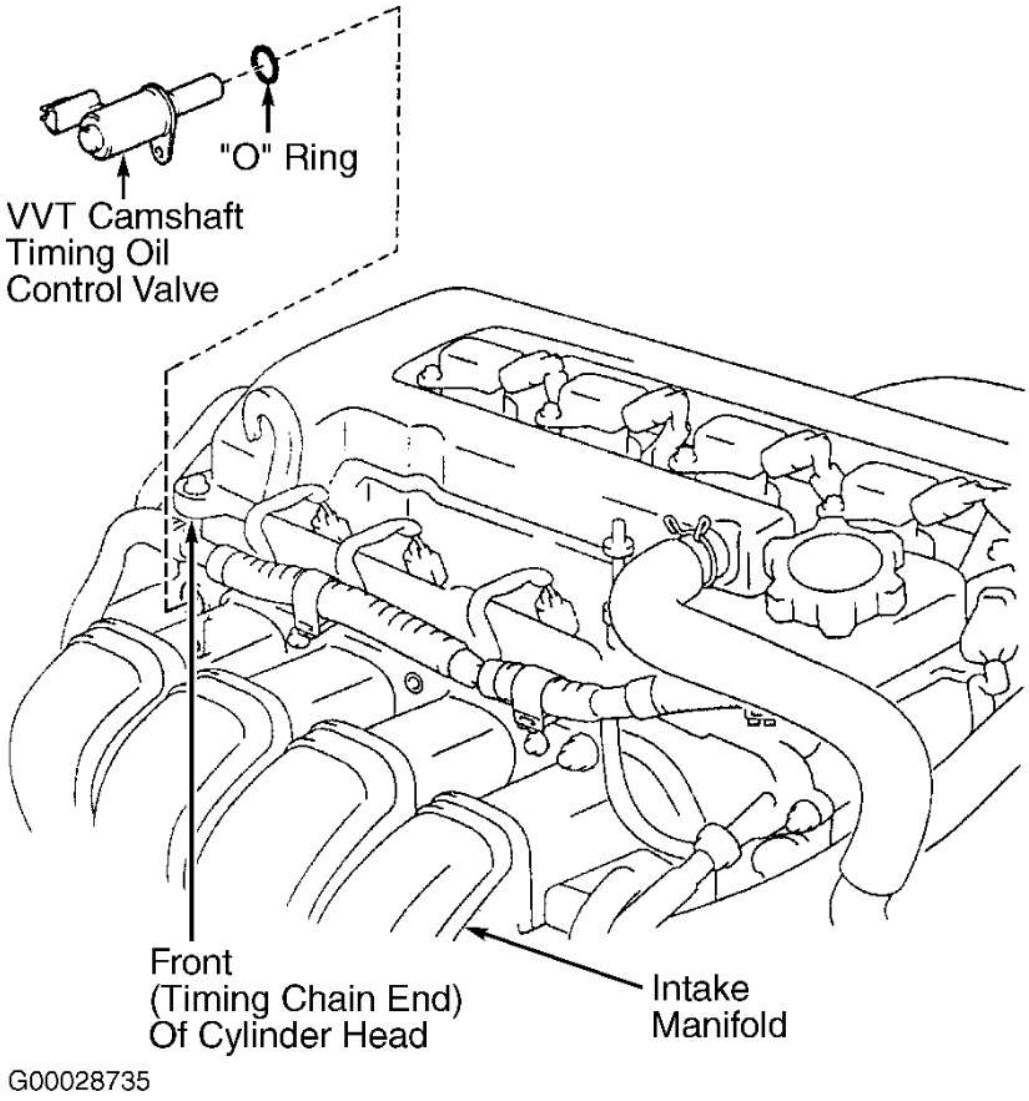


Fig. 234: Locating Typical Variable Valve Timing Camshaft Timing Oil Control Valve (MR2 & Prius)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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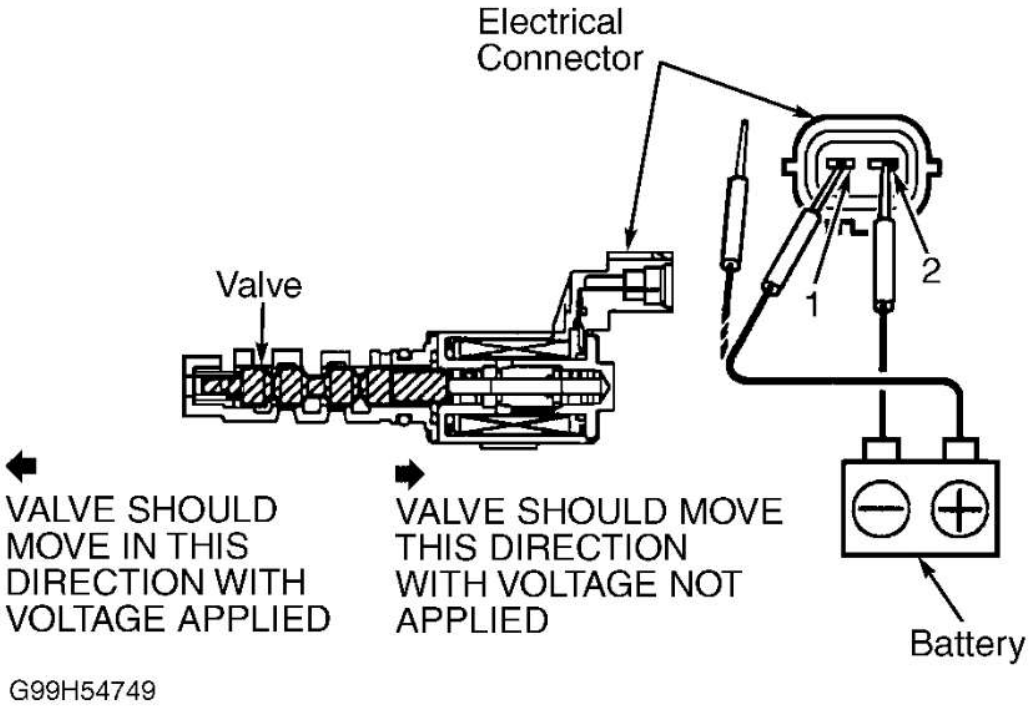


Fig. 235: Testing Typical Oil Control Valve Operation (Camry, Camry Solara, Celica, Corolla, Highlander, MR2, Prius & RAV4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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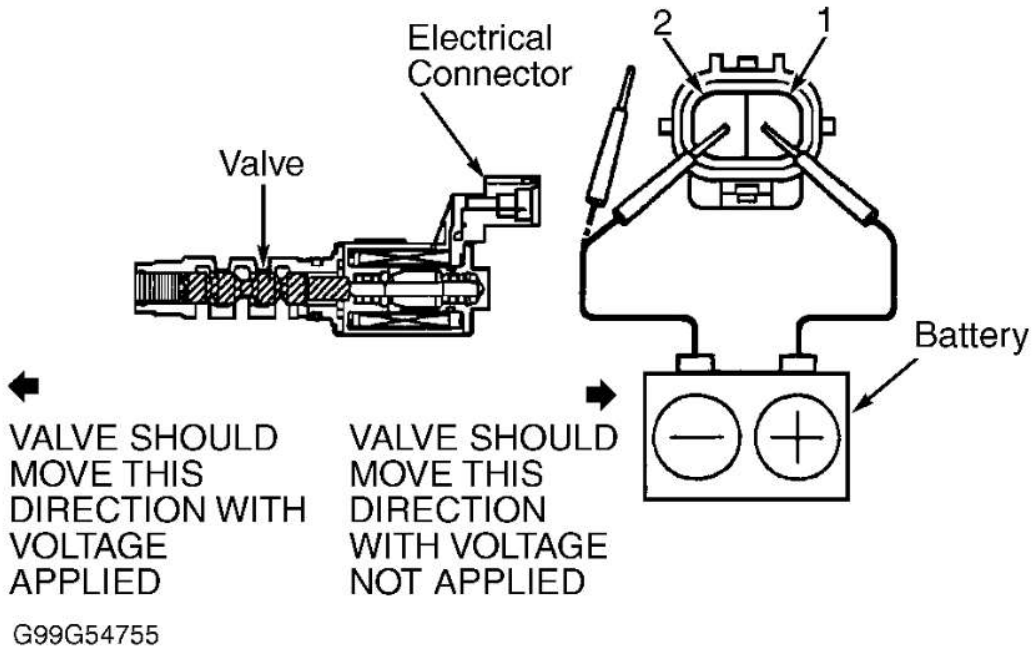


Fig. 236: Testing Oil Control Valve Operation (ECHO)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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