

## 1999 Toyota RAV4

### 1999 ACCESSORIES & EQUIPMENT Cruise Control Systems - RAV4

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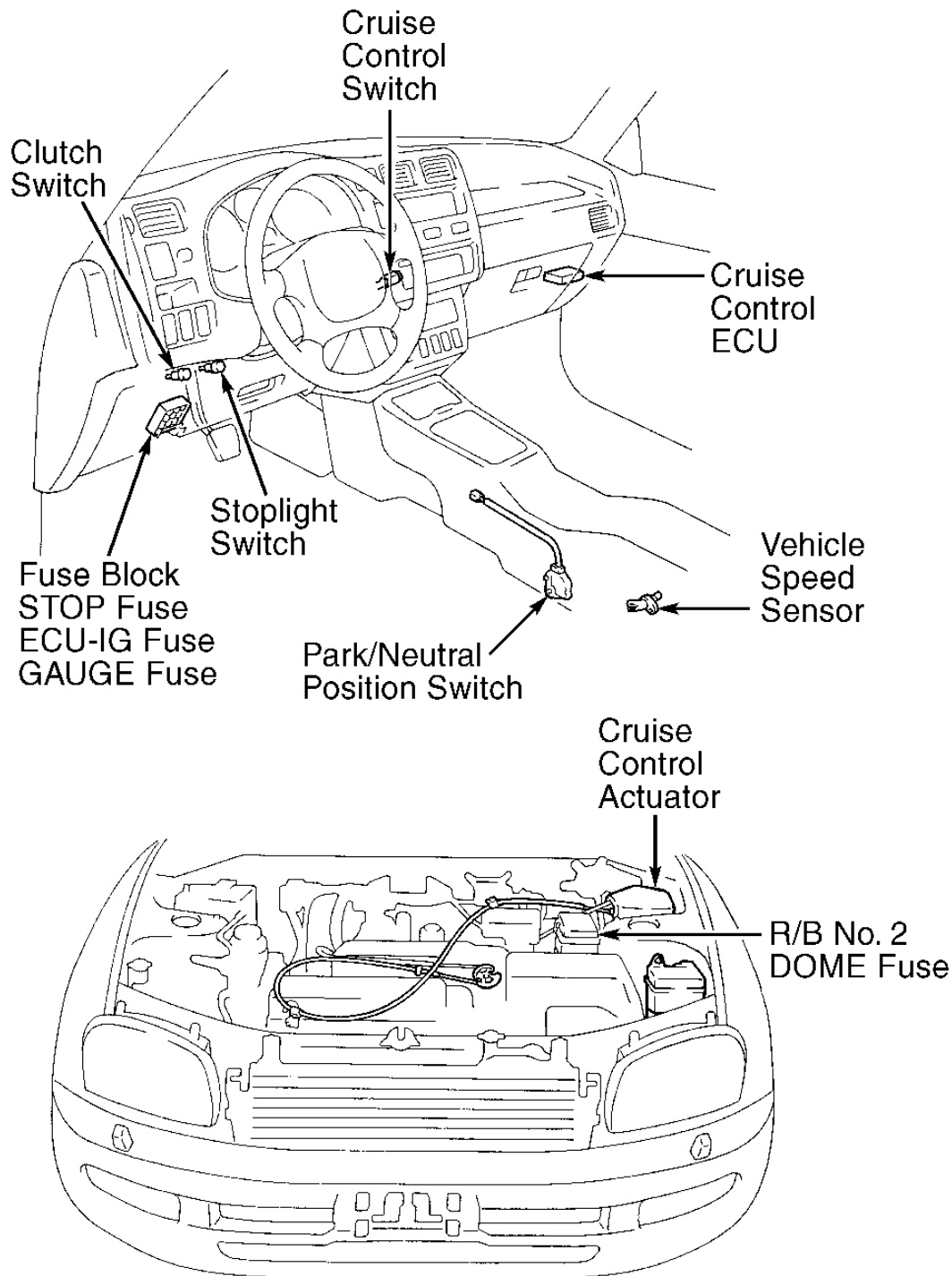
## DESCRIPTION

**WARNING:** Deactivate air bag system before performing any service operation. See **AIR BAG RESTRAINT SYSTEMS** article. DO NOT apply electrical power to any component on steering column without first deactivating air bag system. Air bag may deploy.

Cruise control system consists of cruise control Electronic Control Unit (ECU), actuator and cables, speed sensor, cruise control switch, stoplight switch, clutch switch (M/T), park/neutral position switch (A/T) and related wiring. See **Fig. 1** . The system allows vehicle to cruise at a desired speed greater than 25 MPH.

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**Fig. 1: Locating Cruise Control Components**  
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## **OPERATION**

Cruise control system functions can be performed from cruise control switch, located on lever on right side of steering column. Pressing cruise ON-OFF (main) switch at end of lever turns system on. CRUISE indicator light in instrument cluster comes on when desired cruising speed is set. To set desired speed, move control lever downward in SET/COAST direction and release it. Desired speed should be maintained. Press cruise ON-OFF (main) switch again to turn cruise control system off.

Cancel set speed by moving cruise control lever in CANCEL direction, pressing brake pedal, or pressing clutch pedal (M/T) or placing shift lever in Neutral (A/T). If vehicle speed drops to less than 25 MPH, set speed will automatically cancel. If vehicle speed decreases 10 MPH less than set speed, set speed will also cancel. If cruise control ECU detects a system malfunction, set speed will automatically cancel and CRUISE indicator light will flash several times.

Moving cruise control lever in RES/ACC (resume/accelerate) direction allows vehicle to return to speed set before cancellation. Holding cruise control lever in RES/ACC (resume/accelerate) direction gradually increases vehicle speed. Holding cruise control lever in SET/COAST direction gradually decreases vehicle speed.

## **ACTUATOR**

Actuator consists of a motor, safety magnetic clutch, position sensor, pulley and a cable connected to engine throttle valve. When actuator receives a signal from cruise control ECU, it engages safety magnetic clutch and activates motor. Motor causes pulley and cable to move, which will open or close engine throttle valve.

When motor rotates forward, pulley also rotates (via safety magnetic clutch, gears and drive shaft). A cable connected to engine throttle valve and opens valve accordingly. When motor rotates in a reverse direction, pulley and cable also rotate in a reverse direction and engine throttle valve closes.

## **CRUISE CONTROL SWITCH**

### **ON-OFF (Main Switch)**

Cruise ON-OFF switch is power switch for cruise control system. When ignition is turned off, cruise ON-OFF switch is also turned off. The switch remains off even when ignition is turned on again.

### **SET/COAST Position**

When cruise control switch is moved to SET/COAST position with cruise ON-OFF switch turned to ON position and vehicle speed greater than 25 MPH, cruise control ECU stores vehicle speed and maintains that speed via actuator.

When cruise control switch is moved to SET/COAST position while in cruise control mode, actuator motor is energized to close engine throttle valve. Vehicle decelerates until switch is released. From then on, cruise control ECU stores new vehicle speed and maintains that speed.

### **RES/ACC Position**

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If cruise control operation is canceled by any canceling switch, vehicle set speed can be resumed and controlled at the previously set speed by moving cruise control switch to RES/ACC (resume/accelerate) position. Set speed, however, cannot be resumed if vehicle speed drops to less than 25 MPH, which clears cruise control ECU set speed stored.

When cruise control switch is moved to RES/ACC (resume/accelerate) position while in cruise control mode, actuator motor is energized to open engine throttle valve. Vehicle accelerates until switch is released. From then on, cruise control ECU stores new vehicle speed and maintains that speed.

#### Cancel Position

When cruise control switch is moved to CANCEL position, a cancellation signal is sent to cruise control ECU disabling cruise control operation. Previous vehicle set speed is stored in cruise control ECU memory.

#### CRUISE CONTROL ELECTRONIC CONTROL UNIT (ECU)

Cruise control Electronic Control Unit (ECU) constantly monitors and compares set speed with actual vehicle speed from input sensors. When vehicle speed is greater than set speed, cruise control ECU activates actuator motor to close engine throttle valve, reducing vehicle speed. When vehicle speed drops to less than set speed, cruise control ECU activates actuator motor to open engine throttle valve, increasing vehicle speed.

Cruise control ECU includes a self-diagnostic function. If cruise control system is canceled by any condition other than driver operation, cruise control ECU assumes a malfunction has occurred and may set a corresponding trouble code.

#### VEHICLE SPEED SENSOR

Vehicle speed sensor is mounted on transaxle. Vehicle speed sensor rotor shaft is driven by a gear on transaxle output shaft. For each shaft rotation, vehicle speed sensor sends a 4-pulse signal to instrument cluster and cruise control ECU. Cruise control ECU calculates vehicle speed from this pulse signal.

#### SELF-DIAGNOSTIC SYSTEM

When vehicle is in cruise control mode, system will cancel due to a malfunction in actuator, vehicle speed sensor or other cruise circuit. When cruise control functions are canceled due to a malfunction, CRUISE indicator light will blink, indicating a trouble code is stored in cruise control ECU memory. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS** table under SELF-DIAGNOSTIC SYSTEM.

If a fault or symptom is present, but no trouble codes were set, a system function test can be performed. See **CRUISE CONTROL FUNCTION TEST** under TROUBLE SHOOTING.

Before proceeding with cruise control system self-diagnostic system, ensure basic inspection of system connectors and wiring harnesses has been performed. If no faults were found during basic inspection, proceed with self-diagnostic system.

**NOTE:** Intermittent failures may cause CRUISE indicator light to flicker or come on. Light will go out after fault goes away. Fault may or may not be present at time

of testing. However, a corresponding trouble code may be stored in cruise control ECU memory. See **DIAGNOSTIC PROCEDURE** under **SELF-DIAGNOSTIC SYSTEM**.

## **ADJUSTMENTS**

### **ACTUATOR CONTROL CABLE**

Ensure actuator, control cable and throttle linkage are installed properly. Ensure actuator and bell crank operate smoothly. Ensure cable is not too loose or tight. Cable free play should be less than .39" (10 mm). If control cable is too loose, vehicle will lose speed while driving uphill. If control cable is too tight, idle RPM will increase.

## **TROUBLE SHOOTING**

### **CRUISE CONTROL FUNCTION TEST**

**NOTE:** Before performing **CRUISE CONTROL FUNCTION TEST**, perform **DIAGNOSTIC PROCEDURE** under **SELF-DIAGNOSTIC SYSTEM**. Cruise control function test should only be performed if no self-diagnostic trouble codes are present.

Cruise control function test is used to help determine if cruise control circuits are functioning properly when no trouble codes are present. To activate function test, turn ignition on. Push cruise control switch to SET/COAST position and hold. Set cruise ON-OFF (main) switch to ON position. Ensure CRUISE indicator light comes on and flashes after 3 seconds. Release cruise control switch from SET/COAST position. Activate each switch circuit in order given. Normal function code will be displayed by CRUISE indicator light, as each circuit is activated as follows:

#### **SET/COAST Switch**

Set cruise control switch to SET/COAST position and hold. If CRUISE control indicator light flashes 2 times (repeating), indicating a normal Function Code 2, set/coast circuit is okay. Go to next step. If CRUISE control indicator light does not flash 2 times (repeating), see **SYMPTOM DIAGNOSIS** and perform appropriate test (s).

#### **RES/ACC Switch**

Set cruise control switch to RES/ACC position and hold. If CRUISE control indicator light flashes 3 times (repeating), indicating a normal Function Code 3, RES/ACCEL circuit is okay. Go to next step. If CRUISE control indicator light does not flash 3 times (repeating), see **SYMPTOM DIAGNOSIS** and perform appropriate test(s).

#### **CANCEL Switches**

Observe CRUISE control indicator light and activate each cancel switch. Press CANCEL switch to ON and OFF positions. Depress and release brake pedal. On A/T models, move shift lever from "D" to "N" position. On

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M/T models, depress and release clutch pedal. On all models, if CRUISE control indicator light comes on when switch is in OFF position and goes off when switch is in ON position, circuit for that switch being activated is okay. Go to next step. If CRUISE control indicator does not function as indicated, see **SYMPTOM DIAGNOSIS** and perform appropriate test(s).

#### Vehicle Speed Sensor

1. Raise vehicle and support vehicle with drive wheels off ground. Start engine and slowly depress accelerator pedal until vehicle speed is 25 MPH or more. Turn cruise ON-OFF switch to ON position. If CRUISE control indicator light flashes on and off every .25 second, go to next step. If CRUISE control indicator light does not flash on and off every .25 second, see **SYMPTOM DIAGNOSIS** and perform appropriate test(s).
2. Slow vehicle speed to 25 MPH or less. If CRUISE control indicator light comes on and stays on, vehicle speed sensor circuit is okay. Go to next step. If CRUISE control indicator light does not come on, see **SYMPTOM DIAGNOSIS** and perform appropriate test(s).
3. Cruise control function test is now complete. No problems are indicated at this time. If cruise control system still does not function properly and no trouble codes are present, see **SYMPTOM DIAGNOSIS** and perform appropriate test(s). Problem may also be intermittent.

#### SYMPTOM DIAGNOSIS

Symptom diagnosis should only be performed if no Diagnostic Trouble Codes (DTCs) are present. If symptom is unknown, perform **CRUISE CONTROL FUNCTION TEST** to identify problem area. Identify symptom and perform appropriate test. Perform tests in order listed.

#### SET Not Occurring Or CANCEL Occurring (No DTCs Present)

Check the following components and/or circuits:

- Perform **CRUISE CONTROL SWITCH CIRCUIT** test under SYSTEM TESTS.
- Perform **DTC 21: VEHICLE SPEED SENSOR CIRCUIT** test under DIAGNOSTIC TESTS.
- Perform **STOPLIGHT SWITCH CIRCUIT** test under SYSTEM TESTS.
- Perform **PARK/NEUTRAL POSITION SWITCH CIRCUIT** test under SYSTEM TESTS.
- Perform **CLUTCH SWITCH CIRCUIT** test under SYSTEM TESTS.
- Perform **DTC 11 OR DTC 15: ACTUATOR MOTOR CIRCUIT** test under DIAGNOSTIC TESTS.
- Check actuator control cable adjustment. See **ADJUSTMENTS**.
- Replace cruise control ECU with a known-good ECU and retest. If symptom is no longer present, replace ECU.

#### SET Not Occurring Or CANCEL Occurring (DTC Is Not Output)

Check the following components and/or circuits:

- Perform **CRUISE CONTROL ECU POWER SOURCE CIRCUIT** test under SYSTEM TESTS.
- Replace cruise control ECU with a known-good ECU and retest. If symptom is no longer present, replace

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ECU.

#### Actual Vehicle Speed Deviates From Set Speed

Check the following components and/or circuits:

- Check actuator control cable adjustment. See **ADJUSTMENTS** .
- Perform **DTC 23: VEHICLE SPEED SENSOR SIGNAL FAULT** test under DIAGNOSTIC TESTS.
- Perform **ELECTRONICALLY CONTROLLED TRANSMISSION (ECT) CIRCUIT** test under SYSTEM TESTS.
- Perform **DTC 11 OR DTC 15: ACTUATOR MOTOR CIRCUIT** test under DIAGNOSTIC TESTS.
- Perform **IDLE SIGNAL CIRCUIT** test under SYSTEM TESTS.
- Replace cruise control ECU with a known-good ECU and retest. If symptom is no longer present, replace ECU.

#### Gear Shifting Frequent Between 3rd & Overdrive When Driving Uphill (Hunting)

Check the following components and/or circuits:

- Perform **ELECTRONICALLY CONTROLLED TRANSMISSION (ECT) CIRCUIT** test under SYSTEM TESTS.
- Replace cruise control ECU with a known-good ECU and retest. If symptom is no longer present, replace ECU.

#### Cruise Control Does Not Cancel Even W/Brake Pedal Depressed

Check the following components and/or circuits:

- Check actuator control cable adjustment. See **ADJUSTMENTS** .
- Perform **STOPLIGHT SWITCH CIRCUIT** test under SYSTEM TESTS.
- Perform **DTC 11 OR DTC 15: ACTUATOR MOTOR CIRCUIT** test under DIAGNOSTIC TESTS.
- Replace cruise control ECU with a known-good ECU and retest. If symptom is no longer present, replace ECU.

#### Cruise Control Does Not Cancel Even With Transaxle Shifted To Neutral (A/T Only)

Check the following components and/or circuits:

- Check actuator control cable adjustment. See **ADJUSTMENTS** .
- Perform **PARK/NEUTRAL POSITION SWITCH CIRCUIT** test under SYSTEM TESTS.
- Perform **DTC 11 OR DTC 15: ACTUATOR MOTOR CIRCUIT** test under DIAGNOSTIC TESTS.
- Replace cruise control ECU with a known-good ECU and retest. If symptom is no longer present, replace ECU.

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#### Cruise Control Does Not Cancel Even With Clutch Pedal Depressed (M/T Only)

Check the following components and/or circuits:

- Check actuator control cable adjustment. See **ADJUSTMENTS** .
- Perform **CLUTCH SWITCH CIRCUIT** test under SYSTEM TESTS.
- Perform **DTC 11 OR DTC 15: ACTUATOR MOTOR CIRCUIT** test under DIAGNOSTIC TESTS.
- Replace cruise control ECU with a known-good ECU and retest. If symptom is no longer present, replace ECU.

#### Cruise Control Switch Does Not Operate (SET/COAST, RES/ACC Or CANCEL Not Possible)

Check the following components and/or circuits:

- Check actuator control cable adjustment. See **ADJUSTMENTS** .
- Perform **CRUISE CONTROL SWITCH CIRCUIT** test under SYSTEM TESTS.
- Perform **DTC 11 OR DTC 15: ACTUATOR MOTOR CIRCUIT** test under DIAGNOSTIC TESTS.
- Replace cruise control ECU with a known-good ECU and retest. If symptom is no longer present, replace ECU.

#### SET Possible at 25 MPH Or Less, Or CANCEL Does Not Operate At 25 MPH Or Less

Check the following components and/or circuits:

- Check actuator control cable adjustment. See **ADJUSTMENTS** .
- Perform **DTC 23: VEHICLE SPEED SENSOR SIGNAL FAULT** test under DIAGNOSTIC TESTS.
- Perform **DTC 11 OR DTC 15: ACTUATOR MOTOR CIRCUIT** test under DIAGNOSTIC TESTS.
- Replace cruise control ECU with a known-good ECU and retest. If symptom is no longer present, replace ECU.

#### Poor Response In ACCEL & RESUME Modes

Check the following components and/or circuits:

- Check actuator control cable adjustment. See **ADJUSTMENTS** .
- Perform **ELECTRONICALLY CONTROLLED TRANSMISSION (ECT) CIRCUIT** test under SYSTEM TESTS.
- Perform **DTC 11 OR DTC 15: ACTUATOR MOTOR CIRCUIT** test under DIAGNOSTIC TESTS.
- Replace cruise control ECU with a known-good ECU and retest. If symptom is no longer present, replace ECU.

#### Overdrive Does Not Resume, Even Though Road Is Not Uphill

Check the following components and/or circuits:



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- Perform **ELECTRONICALLY CONTROLLED TRANSMISSION (ECT) CIRCUIT** test under SYSTEM TESTS.
- Replace cruise control ECU with a known-good ECU and retest. If symptom is no longer present, replace ECU.

#### DTC Memory Is Erased

Replace cruise control ECU with a known-good ECU and retest. If symptom is no longer present, replace ECU.

#### DTC Not Output, Or DTC Output When It Should Not Be

Check the following components and/or circuits:

- Perform **DIAGNOSTIC CIRCUIT** test under SYSTEM TESTS.
- Replace cruise control ECU with a known-good ECU and retest. If symptom is no longer present, replace ECU.

#### CRUISE Control Indicator Light Stays On Or Fails To Turn On

Check the following components and/or circuits:

- Perform **CRUISE CONTROL INDICATOR LIGHT CIRCUIT** test under SYSTEM TESTS.
- Replace cruise control ECU with a known-good ECU and retest. If symptom is no longer present, replace ECU.

## COMPONENT TESTS

### VEHICLE SPEED SENSOR

1. Remove vehicle speed sensor from transaxle. See **Fig. 1** . Using jumper wires, connect positive battery terminal to vehicle speed sensor terminal No. 1 (Red/Blue wire) and negative battery terminal to terminal No. 2 (Blue/Black wire).
2. Connect voltmeter positive lead to terminal No. 3 (Red/Yellow wire) and negative lead to terminal No. 2 (Blue/Black wire). See **Fig. 5** . Rotate vehicle speed sensor shaft and ensure voltage changes from 0-11 volts or more 4 times per shaft revolution. Replace vehicle speed sensor as necessary.

## SYSTEM TESTS

**NOTE:** To identify cruise control ECU connector terminals, see **Fig. 6** . To help identify all other cruise control related connector terminals and wire colors, see **WIRING DIAGRAMS** .

### CRUISE CONTROL SWITCH CIRCUIT

1. Perform SET/COAST, RES/ACC, and CANCEL SWITCHES tests under **CRUISE CONTROL**

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**FUNCTION TEST** under TROUBLE SHOOTING. If SET/COAST, RES/ACC or CANCEL input signals are not as specified, go to next step. If input signals are as specified, no problem is indicated at this time. Fault may be intermittent. If sent here from SYMPTOM DIAGNOSIS, perform next test listed, go to next step. If input signals are as specified, no problem is indicated at this time. Fault may be intermittent. If sent here from SYMPTOM DIAGNOSIS, perform next test listed.

2. Remove cruise control ECU with connector attached. See **Fig. 1** . Turn ignition switch to ON position. Backprobing connector, measure voltage between cruise control ECU connector terminal No. 10 (Green/Yellow wire) and ground with switch in specified positions. See **CRUISE CONTROL ECU VOLTAGE SPECIFICATIONS** table. If voltage is not as specified, go to next step. If voltage is as specified, no problem is indicated at this time. Fault may be intermittent. If sent here from SYMPTOM DIAGNOSIS, perform next test listed.

#### CRUISE CONTROL ECU VOLTAGE SPECIFICATIONS

Switch Position	Volts
Off	10-16
RES/ACC On	0.6-2.3
SET/COAST On	1.9-4.7
CANCEL On	3.4-7.2

3. Turn ignition switch to OFF position. Disable air bag system. See AIR BAG RESTRAINT SYSTEMS article. Remove steering wheel center pad (air bag module) and disconnect CRUISE control switch 6-pin connector. Measure resistance between cruise control switch connector terminals No. 4 (White/Black wire) and No. 5 (Green/Yellow wire) with switch in specified positions. See **CRUISE CONTROL SWITCH RESISTANCES** table. If resistance is as specified, go to next step. If resistance is not as specified, replace cruise control switch and retest system.

#### CRUISE CONTROL SWITCH RESISTANCES

Switch Position	Ohms
Off	One Megohm Or Greater
RES/ACC On	50-80
SET/COAST On	180-220
CANCEL On	400-440

4. Check for continuity between cruise control switch terminals No. 4 (White/Black wire) and No. 5 (Green/Yellow wire). No continuity should exist with cruise control switch in OFF position. Continuity should exist with cruise control switch held in ON position. If continuity is as specified, go to next step. If continuity is not as specified, replace cruise control switch and retest system.
5. Check wiring harness and connectors between cruise control ECU, cruise control switch and ground. Repair as necessary and retest system. If wiring harness and connectors are okay, go to next step.
6. Repeat step 1 . If SET/COAST, RES/ACC or CANCEL input signals are still not as specified, replace cruise control ECU and retest system. If input signals are as specified, no problem is indicated at this time. Fault may be intermittent. If sent here from SYMPTOM DIAGNOSIS, perform next test listed.

## STOPLIGHT SWITCH CIRCUIT

1. Check stoplight operation. If stoplight operation is okay, go to next step. If stoplights DO NOT operate correctly, check and repair stoplight system as necessary. See **WIRING DIAGRAMS**.
2. Perform CANCEL SWITCHES test under **CRUISE CONTROL FUNCTION TEST** under TROUBLE SHOOTING. If stoplight input signal is not as specified, go to next step. If stoplight input signal is as specified, no problem is indicated at this time. Fault may be intermittent. If sent here from SYMPTOM DIAGNOSIS, perform next test listed.
3. Remove cruise control ECU with connector attached. See **Fig. 1**. Turn ignition switch to ON position. Backprobing cruise control ECU connector, measure voltage between ground and cruise control ECU connector terminal No. 2 (Green/White wire). With brake pedal depressed, battery voltage should exist. With brake pedal released, voltage should be less than one volt. If voltage is not as specified, go to next step. If voltage is as specified, no problem is indicated at this time. Fault may be intermittent. If sent here from SYMPTOM DIAGNOSIS, perform next test listed.
4. Check for open circuit in wiring harness and connectors between cruise control ECU and stoplight switch. Repair as necessary and retest system. If wiring harness and connectors are okay, replace cruise control ECU and retest system.

## **IDLE SIGNAL CIRCUIT**

**NOTE:**      **Ensure Throttle Position (TP) sensor circuit is operating as designed, and no fault codes are present for TP sensor circuit. See appropriate ON-VEHICLE ADJUSTMENTS article in ENGINE PERFORMANCE.**

1. Remove cruise control ECU with connector attached. Disconnect Engine Control Module (ECM) 16-pin connector. ECM is located behind bottom center of instrument panel, in front of console. Turn ignition switch to ON position. Backprobing connector, measure voltage between ground and cruise control ECU connector terminal No. 13 (Blue wire).
2. With throttle valve fully open, battery voltage should exist. With throttle valve fully closed, voltage should be less than 2 volts. If voltage is not as specified, go to next step. If voltage is as specified, no problem is indicated at this time. Fault may be intermittent. If sent here from SYMPTOM DIAGNOSIS, perform next test listed.
3. Check wiring harness and connectors between ECM and TP sensor. Repair as necessary and retest system. If wiring harness and connectors are okay, go to next step.
4. Disconnect TP sensor 3-pin Black connector. Measure resistance between TP sensor connector terminals No. 2 (Brown wire) and No. 3 (Blue/Red wire). Resistance should be 2000-10,200 ohms with throttle valve fully opened, and 200-6300 ohms with throttle valve fully closed. If resistance is as specified, go to next step. If resistance is not as specified, replace TP sensor and retest system.
5. Check wiring harness and connectors between cruise control ECU and TP sensor, and between TP sensor and ground. Repair as necessary and retest system. If wiring harness and connectors are okay, replace cruise control ECU and retest system.

## **ELECTRONICALLY CONTROLLED TRANSMISSION (ECT) CIRCUIT**

1. Start engine and bring to operating temperature. Drive vehicle and ensure overdrive operation is turned on and off when overdrive ON-OFF switch is operated. If overdrive switch is okay, go to next step. If overdrive switch is not okay, see appropriate ELECTRONIC CONTROLS article in AUTOMATIC

TRANSMISSIONS article.

2. Turn ignition switch to OFF position. Remove cruise control ECU and disconnect connector. See **Fig. 1** . Turn ignition switch to ON position. Using voltmeter positive lead, backprobe cruise control ECU harness connector terminal No. 14 (Yellow/Black wire) with negative lead to ground. If battery voltage is present, go to next step. If battery voltage is not present, go to step 5 .
3. Turn ignition switch to OFF position. Reconnect cruise control ECU connector. Using voltmeter positive lead, backprobe cruise control ECU connector terminal No. 6 (Pink wire) with negative lead to ground. Bring engine to operating temperature and test drive vehicle with overdrive switch moved from ON to OFF position. With overdrive in OFF position, voltage should be less than .5 volt. With overdrive in ON position, battery voltage should be present. If voltage is not as specified, go to next step. If voltage is as specified, no problem is indicated at this time. Fault may be intermittent. If sent here from SYMPTOM DIAGNOSIS, perform next test listed.
4. Check wiring harness and connectors between cruise control ECU terminal No. 6 (Pink wire) and electronically controlled transmission solenoid. Repair as necessary. If wiring harness and connectors are okay, replace cruise control ECU and retest system.
5. Check wiring harness and connectors between cruise control ECU connector terminal No. 14 (Yellow/Black wire) and Engine Control Module (ECM) 22-pin connector terminal No. 20 (Yellow/Black wire). Repair as necessary. If wiring harness and connectors are okay, replace cruise control ECU and retest system.

### **PARK/NEUTRAL POSITION SWITCH CIRCUIT**

1. Ensure starting system is operating normally. Check for starting system problems and repair as necessary. See STARTERS article in STARTING & CHARGING SYSTEMS. If starting system is okay, go to next step.
2. Perform park/neutral position switch test. See CANCEL SWITCHES test in **CRUISE CONTROL FUNCTION TEST** under TROUBLE SHOOTING. If park/neutral position switch input signal is not as specified, go to next step. If park/neutral position switch input signal is as specified, no problem is indicated at this time. Fault may be intermittent. If sent here from SYMPTOM DIAGNOSIS, perform next test listed.
3. Remove cruise control ECU with connector attached. See **Fig. 1** . Turn ignition switch to ON position. Backprobing connector, measure voltage between ground and terminal No. 3 (Blue/Black wire) at cruise control ECU connector. With shift lever in Drive, battery voltage should be present. With shift lever in any other position, voltage should be less than one volt. If voltage is not as specified, go to next step. If voltage is as specified, no problem is indicated at this time. Fault may be intermittent. If sent here from SYMPTOM DIAGNOSIS, perform next test listed.
4. Check wiring harness and connectors between cruise control ECU and park/neutral position switch. Repair as necessary. If wiring harness and connectors are okay, replace cruise control ECU and retest system.

### **CLUTCH SWITCH CIRCUIT**

1. Ensure starting system is operating normally. Check for starting system problems and repair as necessary. If starting system is okay, go to next step.
2. Perform clutch switch position test. See CANCEL SWITCHES test in **CRUISE CONTROL**

**FUNCTION TEST** under TROUBLE SHOOTING. If clutch switch input signal is not as specified, go to next step. If clutch switch input signal is as specified, no problem is indicated at this time. Fault may be intermittent. If sent here from SYMPTOM DIAGNOSIS, perform next test listed.

3. Remove cruise control ECU with connector attached. See **Fig. 1** . Turn ignition switch to ON position. Using voltmeter positive lead, backprobe cruise control ECU connector terminal No. 3 (Blue/Black wire) with negative lead to ground. With clutch pedal depressed, battery voltage should exist. With clutch pedal released, voltage should be less than one volt. If voltage is not as specified, go to next step. If voltage is as specified, no problem is indicated at this time. Fault may be intermittent. If sent here from SYMPTOM DIAGNOSIS, perform next test listed.
4. Check wiring harness and connectors between cruise control ECU and TURN & GAUGE fuses in instrument panel junction block. Repair as necessary. If wiring harness and connectors are okay, replace cruise control ECU and retest system.

### **CRUISE CONTROL ECU POWER SOURCE CIRCUIT**

1. Locate ECU-IG (10-amp) fuse in instrument panel junction block. See **Fig. 1** . Remove ECU-IG fuse and ensure fuse continuity. If fuse is okay, go to next step. If fuse is not okay, check for short between cruise control ECU connector terminal No. 9 (Black/Yellow wire) and ECU-IG fuse.
2. Remove cruise control ECU with connector attached. See **Fig. 1** . Turn ignition switch to ON position. Using voltmeter, backprobe between cruise control ECU connector terminals No. 9 (Black/Yellow wire) and No. 16 (White/Black wire). If battery voltage is not present, go to next step. If battery voltage is present, no problem is indicated at this time. Fault may be intermittent. If sent here from SYMPTOM DIAGNOSIS, perform next test listed.
3. Turn ignition switch to OFF position. Backprobing connector, measure resistance between ground and terminal No. 16 (White/Black wire) at cruise control ECU connector. If resistance is less than one ohm, check wiring harness or connector between cruise control ECU connector and battery. Repair as necessary and retest system. If resistance is one ohm or more, repair wiring harness or connector between cruise control ECU connector terminal No. 16 (White/Black wire) and ground. Retest system.

### **CRUISE CONTROL INDICATOR LIGHT CIRCUIT**

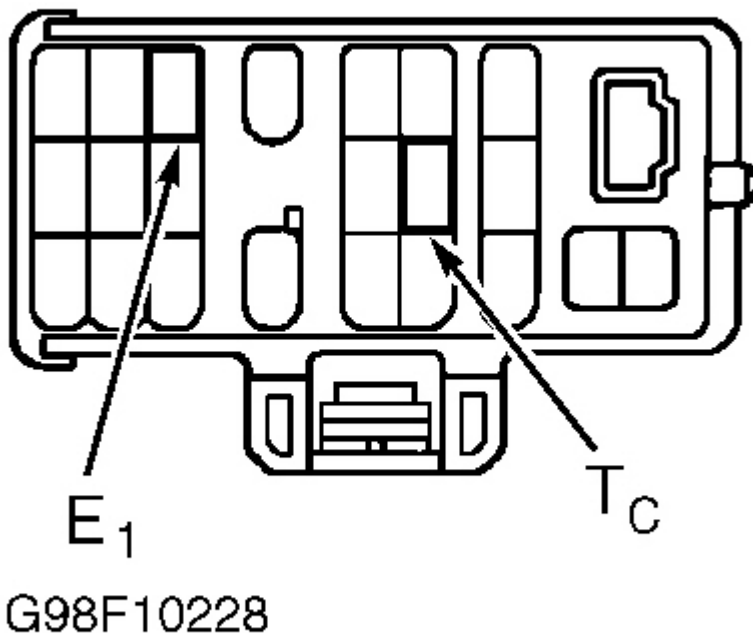
1. Turn ignition switch to ON position. Backprobing connector, measure voltage between ground and terminal No. 4 (Green/Red wire) at cruise control ECU connector. With cruise control switch in OFF position, battery voltage should be present. With cruise control switch in ON position, voltage should be less than 1.2 volts.
2. If voltage is as specified, no problem is indicated at this time. Fault may be intermittent. If sent here from SYMPTOM DIAGNOSIS, perform next test listed. If voltage is not as specified, check instrument cluster. See appropriate INSTRUMENT PANELS article. Repair as necessary. If instrument cluster is okay, replace cruise control ECU and retest system.

### **DIAGNOSTIC CIRCUIT**

1. Locate Data Link Connector (DLC) No. 1 in right side of engine compartment, near shock tower. Connect voltmeter positive lead to terminal Tc and negative lead to terminal E1. See **Fig. 2** . Turn ignition switch to ON position. If battery voltage is not present, go to next step. If battery voltage is present, no problem is indicated at this time. Fault may be intermittent. If sent here from SYMPTOM

DIAGNOSIS, perform next test listed.

2. Check wiring harness and connectors between cruise control ECU and DLC No. 1, and between DLC No. 1 and ground. Repair as necessary and retest system. If harness and connectors are okay, replace cruise control ECU and retest system.



**Fig. 2: Identifying DLC No. 1 Terminals**

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

## SELF-DIAGNOSTIC SYSTEM

**WARNING:** Deactivate air bag system before performing any service operation. See **AIR BAG RESTRAINT SYSTEMS** article. DO NOT apply electrical power to any component on steering column without first deactivating air bag system. Air bag may deploy.

## DIAGNOSTIC PROCEDURE

When cruise control functions are canceled, CRUISE indicator light will blink 5 times, indicating 2-digit trouble code(s) are stored in cruise control ECU memory. Retrieve trouble code(s). See **RETRIEVING TROUBLE CODES** . Perform appropriate DTC test under **DIAGNOSTIC TESTS** . See **DIAGNOSTIC**

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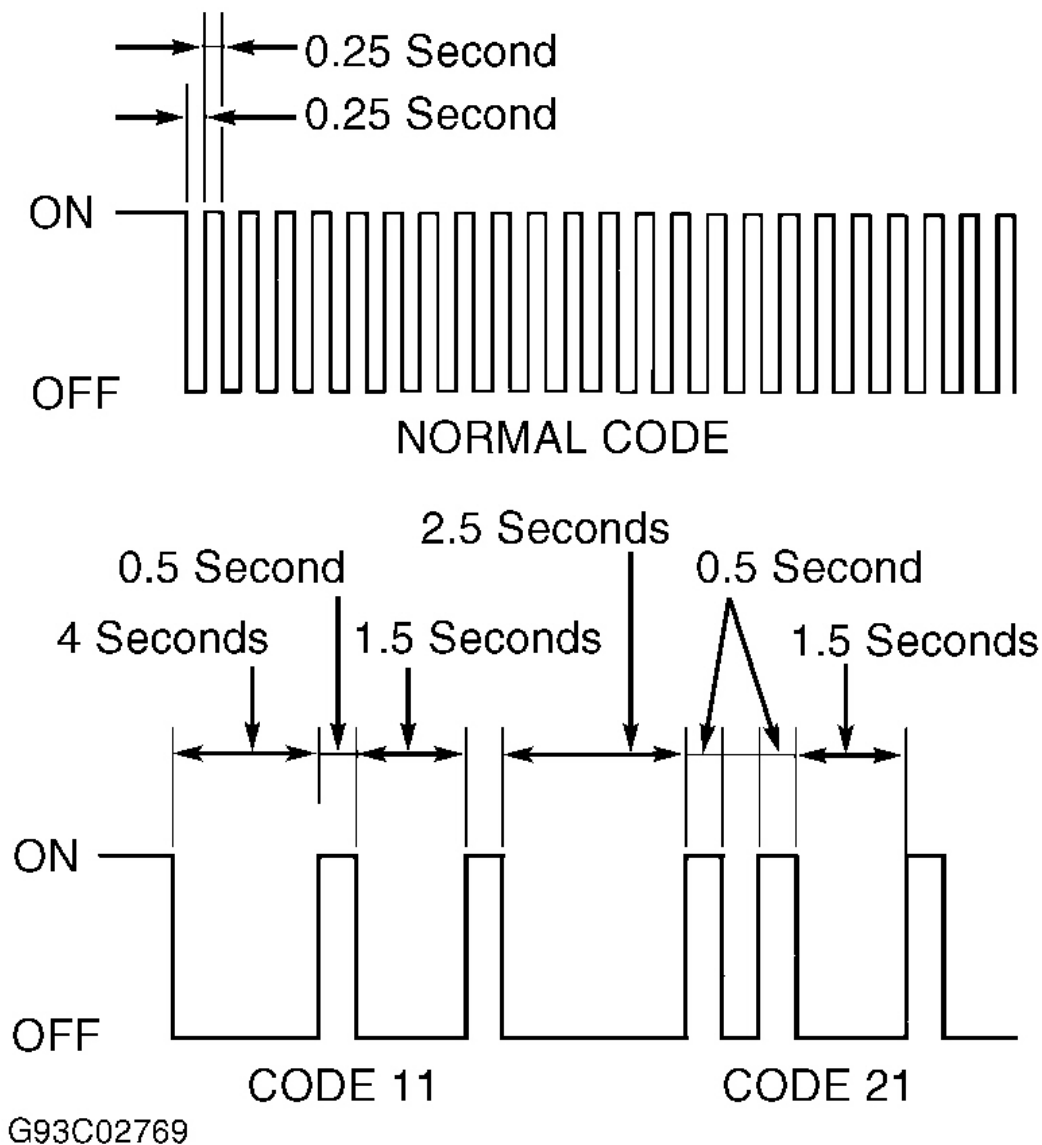
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#### **TROUBLE CODE DEFINITIONS** table.

If a fault or symptom is present, but no trouble codes were set, perform **CRUISE CONTROL FUNCTION TEST** under TROUBLE SHOOTING. Cruise control function test will cause CRUISE indicator light to display a one-digit function code if circuit tested is okay. After performing cruise control function test, if system still does not operate properly and no self-diagnostic trouble codes are present, perform **SYMPTOM DIAGNOSIS** under TROUBLE SHOOTING.

#### **READING TROUBLE CODES**

Trouble codes are displayed as flashes of CRUISE indicator light. All trouble codes are 2-digit numbers. Cruise control ECU outputs trouble codes from lowest to highest. These codes indicate current faults in system and should be serviced in order of appearance. Pay careful attention to length of pauses in order to read codes correctly. See **Fig. 3** .



**Fig. 3: Reading Diagnostic Trouble Codes**

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

### RETRIEVING TROUBLE CODES

1. Codes from cruise control ECU self-diagnostic system are retrieved through Data Link Connector (DLC) No. 1. Connector is located in right side of engine compartment, near shock tower. Turn ignition switch to ON position. Turn cruise control main switch on. If CRUISE indicator light turns on, leave ignition on and go to next step. If CRUISE indicator light does not turn on, check CRUISE indicator light circuit. See **CRUISE CONTROL INDICATOR LIGHT CIRCUIT** under SYSTEM TESTS.



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2. Turn cruise control main switch off. Connect a jumper wire between terminals E1 and Tc at DLC No. 1. See **Fig. 2** . If any DTCs are present, perform appropriate DTC test under **DIAGNOSTIC TESTS** . See **DIAGNOSTIC TROUBLE CODE DEFINITIONS** table.
3. If no codes are present and CRUISE indicator light begins flashing on and off every .25 second, system is operating normally at this time. If no codes are present and cruise control system fault still exists, perform **CRUISE CONTROL FUNCTION TEST** under TROUBLE SHOOTING.

#### DIAGNOSTIC TROUBLE CODE DEFINITIONS

DTC	Circuit Affected/Probable Cause
<b><u>11</u></b>	Actuator Motor Circuit, Actuator Motor Or Cruise Control ECU
<b><u>12</u></b>	Actuator Magnetic Clutch, STOP Fuse, Stoplight Switch, Wiring Harness Or Cruise Control ECU
<b><u>14</u></b>	Actuator Motor Or Cruise Control ECU
<b><u>15</u></b>	Actuator Motor Circuit, Actuator Motor Or Cruise Control ECU
<b><u>21</u></b>	Instrument Cluster, Wiring Harness, VSS Or Cruise Control ECU
<b><u>23</u></b>	VSS Or Cruise Control ECU
41 <sup>(1)</sup>	Cruise Control ECU
42 <sup>(1)</sup>	Power Source
43 <sup>(1)</sup>	Cruise Control ECU Or Wiring Harness
(1) Perform <b>CRUISE CONTROL ECU POWER SOURCE CIRCUIT</b> test.	

#### CLEARING CODES

**CAUTION: DO NOT disconnect vehicle battery to clear codes.**

1. To clear codes from cruise control ECU memory, locate DLC No. 1 in right side of engine compartment, near shock tower. Connect a jumper wire between terminals E1 and Tc at DLC No. 1. See **Fig. 2** . Road test vehicle at 9 MPH or less. Holding cruise control switch in CANCEL position, depress cruise control ON-OFF (main) switch to ON position 5 times within 3 seconds.
2. Fault codes are now erased from cruise control ECU memory. If problem has not been corrected or fault is still present, code will reset in cruise control ECU memory.

#### DIAGNOSTIC TESTS

**NOTE:** To identify cruise control ECU connector terminals, see **Fig. 6** . To help identify all other cruise control related connector terminals and wire colors, see **WIRING DIAGRAMS** .

#### DTC 11 OR DTC 15: ACTUATOR MOTOR CIRCUIT

1. Ensure actuator control plate is NOT in fully opened (counterclockwise) position or fully closed

(clockwise) position before disconnecting actuator connector. See **Fig. 4** . Disconnect Black 4-pin actuator connector. See **Fig. 1** .

2. Measure resistance between actuator terminals No. 1 (Red/Green wire) and No. 2 (Red/Black wire). If resistance is greater than 4.2 ohms, go to next step. If resistance is 4.2 ohms or less, replace cruise control actuator and retest system.
3. Check wiring harness and connectors between actuator motor and cruise control ECU. Repair as necessary. If wiring harness and connectors are okay, replace cruise control ECU and retest system.

## DTC 12: ACTUATOR MAGNETIC CLUTCH CIRCUIT

**NOTE:**        **Magnetic clutch and motor circuits include a diode. If circuit shows no continuity or incorrect resistance, reverse positive and negative test leads and retest circuit.**

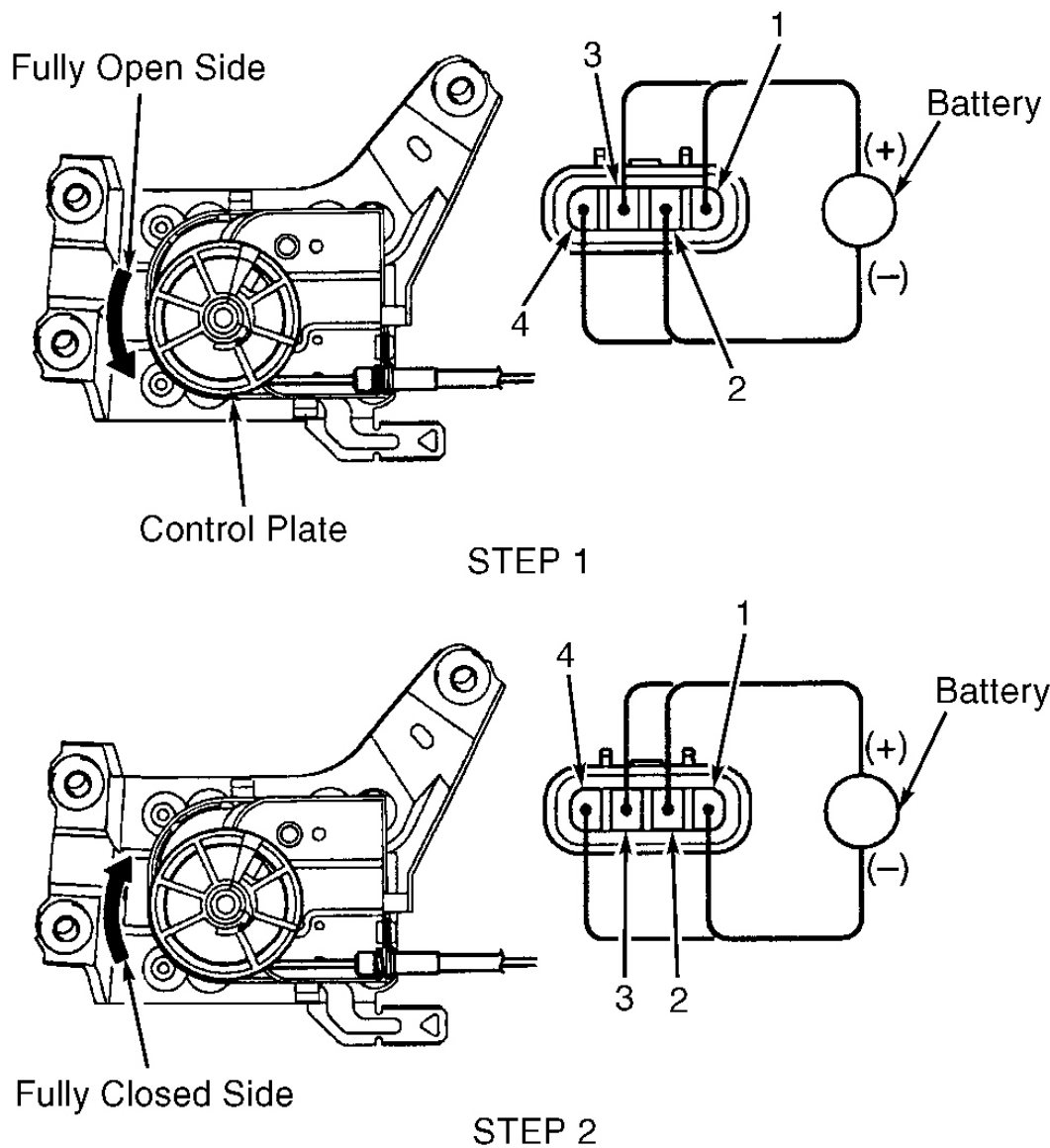
1. Turn ignition switch to OFF position. Remove and inspect STOP fuse from instrument panel junction block. See **Fig. 1** . If fuse is okay, reinstall fuse and go to next step. If fuse is blown, replace fuse and retest system.
2. Disconnect 4-pin stoplight switch connector. See **Fig. 1** . Depress brake pedal (stoplight switch pin free). Ensure continuity exists between stoplight switch connector terminals No. 1 (Green/White wire) and No. 2 (Red/White wire). If continuity does not exist, replace stoplight switch and retest system. If continuity exists, go to next step.
3. Release brake pedal (stoplight switch pin pushed in). Ensure continuity exists between stoplight switch connector terminals No. 3 (Green/Black wire) and No. 4 (Red/Yellow wire). If continuity does not exist, replace stoplight switch and retest system. If continuity exists, go to next step.
4. Ensure ignition switch is in OFF position. Disconnect Black 4-pin actuator connector. See **Fig. 1** . Measure resistance between actuator terminals No. 3 (Red/Yellow wire) and No. 4 (White/Black wire). If resistance is 34.65-42.35 ohms, go to next step. If resistance is not 34.65-42.35 ohms, replace cruise control actuator and retest system.
5. Check wiring harness and connectors between cruise control ECU and stoplight switch, stoplight switch and magnetic clutch, and magnetic clutch and ground. Repair as necessary. If wiring harness and connectors are okay, replace cruise control ECU and retest system.

## DTC 14: ACTUATOR MECHANICAL FAULT

1. Turn ignition switch to OFF position. Disconnect Black 4-pin actuator connector. See **Fig. 1** . Connect a jumper wire between positive battery terminal and actuator terminal No. 3 (Red/Yellow wire). Connect another jumper wire between negative battery terminal and actuator terminal No. 4 (White/Black wire). Attempt to move actuator control plate by hand. If control plate does not move, disconnect jumper wires and go to next step. If control plate moves, replace cruise control actuator and retest system.
2. Connect a jumper wire between positive battery terminal and actuator terminals No. 1 (Red/Green wire) and No. 3 (Red/Yellow wire). Connect another jumper wire between negative battery terminal and actuator terminals No. 2 (Red/Black wire) and No. 4 (White/Black wire). Actuator control plate should rotate to full open (counterclockwise) position. See STEP 1 in **Fig. 4** . Reverse positive and negative jumper wires at actuator terminals. Actuator control plate should rotate to full closed (clockwise) position. See STEP 2 in **Fig. 4** . If actuator control plate operates as specified, go to next step. If actuator control

plate does not operate as specified, replace cruise control actuator and retest system.

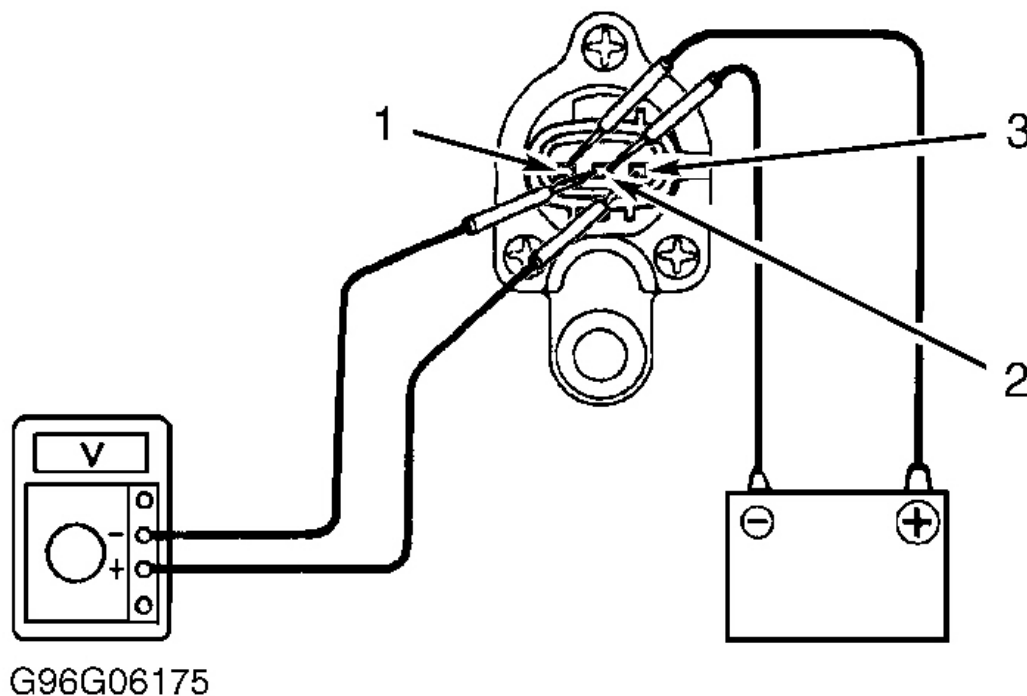
3. Check wiring harness and connector between cruise control ECU and cruise control actuator. Repair as necessary. If wiring harness and connectors are okay, replace cruise control ECU and retest system.



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**Fig. 4: Checking Cruise Control Actuator Operation**  
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

1. Perform VEHICLE SPEED SENSOR test under **CRUISE CONTROL FUNCTION TEST** under TROUBLE SHOOTING. If speed sensor input signals are not as specified, go to next step. If speed sensor input signals are as specified, replace cruise control ECU and retest system.
2. Check speedometer circuit. See appropriate INSTRUMENT PANELS article. If speedometer circuit is okay, go to next step. If speedometer circuit is not okay, repair wiring harness, connector or instrument cluster as necessary. Retest system.
3. Check wiring harness and connectors between cruise control ECU, vehicle speed sensor and instrument cluster. Repair as necessary and retest system. If wiring harness and connectors are okay, go to next step.
4. Remove vehicle speed sensor from transaxle. See **Fig. 1** . Using jumper wires, connect positive battery terminal to vehicle speed sensor terminal No. 1 (Red/Blue wire) and negative battery terminal to terminal No. 2 (Blue/Black wire). Connect voltmeter positive lead to terminal No. 3 (Red/Yellow wire) and negative lead to terminal No. 2 (Blue/Black wire). See **Fig. 5** . Rotate vehicle speed sensor shaft and ensure voltage changes from 0-11 volts or more 4 times per shaft revolution. Replace vehicle speed sensor as necessary. If vehicle speed sensor is okay, replace cruise control ECU and retest system.



**Fig. 5: Testing Vehicle Speed Sensor**

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

## DTC 23: VEHICLE SPEED SENSOR SIGNAL FAULT

Check vehicle speed sensor. See **COMPONENT TESTS** . Replace vehicle speed sensor as necessary. If

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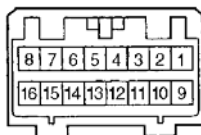
vehicle speed sensor is okay, replace cruise control ECU and retest system.

## PIN VOLTAGE TESTS

Cruise control ECU pin testing chart is used for diagnosing intermittent symptoms and faults that are unable to be resolved during self-diagnostics. Pin test ensures cruise control ECU is receiving and transmitting proper voltage signals. To perform pin voltage test, remove cruise control ECU with connector attached. See **Fig. 1** . Test cruise control ECU voltages by backprobing ECU connector using a DVOM with ignition switch in ON position, unless otherwise specified. If voltage readings are as specified, cruise control ECU may be faulty. See **Fig. 6** .

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CRUISE CONTROL ECU

Terminals	Condition	STD Voltage (V)
2 - 16	Depress brake pedal	10 - 16 V
	Release brake pedal	Below 1 V
3 - 16	Shift to except D position	Below 1 V
	Shift to D position	10 - 16 V
4 - 16	Ignition switch ON Cruise control main switch ON	Below 1.2 V
	Ignition switch ON Cruise control main switch OFF	10 - 16 V
5 - 16	Ignition switch ON	10 - 16 V
	Ignition switch ON Connect terminals TC and E <sub>1</sub> of diagnostic check connector	Below 1 V
6 - 16	During driving Gear position 3rd	10 - 16 V
	During driving Gear position O/D	Below 1 V
7 - 16	During cruise control driving COAST switch hold ON	9 - 15 V
	During cruise control driving ACC switch hold ON	Below 1 V
8 - 16	During cruise control driving	9 - 15 V
	Except during cruise control driving	Below 1 V
9 - 16	Ignition switch ON	10 - 16 V
	Ignition switch ON	10 - 16 V
10 - 16	Ignition switch ON CANCEL switch hold ON	4.3 - 8.7 V
	Ignition switch ON SET/COAST switch hold ON	2.6 - 6.2 V
	Ignition switch ON RES/ACC switch hold ON	0.4 - 3.6 V
11 - 16	Ignition switch ON Main switch OFF	10 - 16 V
	Ignition switch ON Main switch ON	Below 1 V
12 - 16	Engine start Stoppage a car.	4.7 - 5.2 V
	During driving (Pulse generated).	3 - 7 V
13 - 16	Ignition switch ON Throttle valve fully opened.	10 - 16 V
	Ignition switch ON Throttle valve fully closed.	Below 1 V
14 - 16	During cruise control driving OD switch ON.	10 - 16 V
	During cruise control driving OD switch OFF (3rd driving)	Below 1 V
15 - 16	During cruise control driving ACC switch hold ON	9 - 15 V
	During cruise control driving COAST switch hold ON	Below 1 V
16 - Body Ground	Constant	Below 1 V

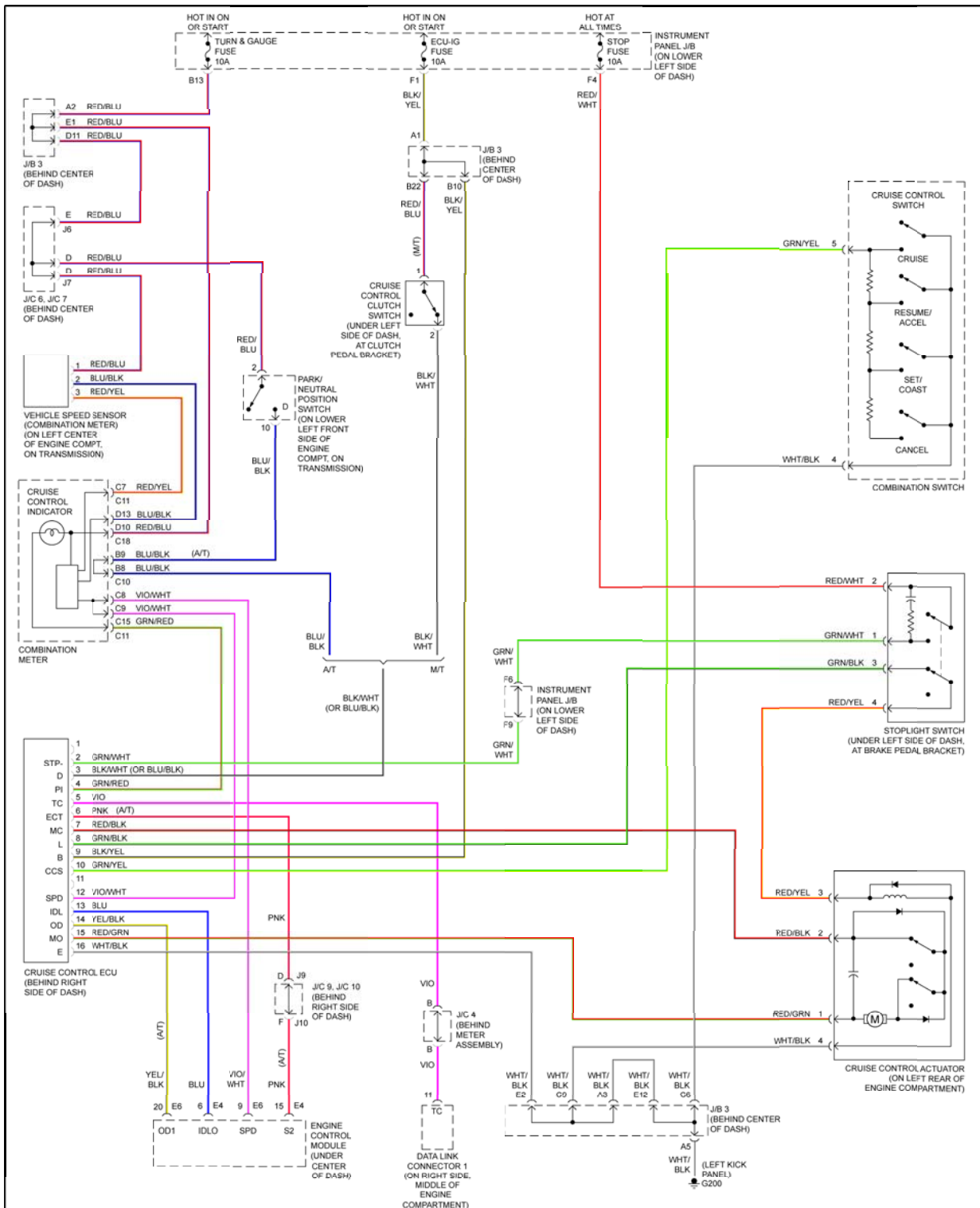
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**Fig. 6: Cruise Control ECU Voltage Testing**  
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

## WIRING DIAGRAMS

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**Fig. 7: Cruise Control System Wiring Diagram (RAV4)**