

CRUISE CONTROL SYSTEM - TURBO

1998 Toyota Supra

1998 ACCESSORIES & EQUIPMENT
Toyota - Cruise Control Systems

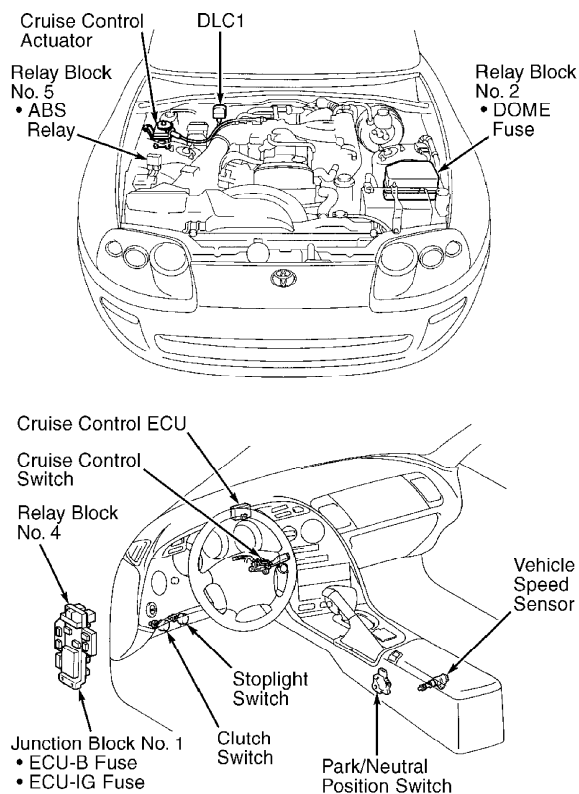
Supra Turbo

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, cruise control actuator cable, speed sensor, cruise control switch, stoplight switch, park/neutral switch (A/T), clutch switch (M/T) and related wiring. See Fig. 1.

System allows vehicle to cruise at a desired speed greater than 25 MPH. Speed control will cancel when brake pedal is depressed, CANCEL switch is activated, clutch pedal is depressed (M/T) or transmission shift lever is moved to "N" position (A/T). If vehicle speed slows to less than 25 MPH or drops 10 MPH less than preset speed, speed control will also cancel.



97A11213
Fig. 1: Locating Cruise Control Components
Courtesy of Toyota Motor Sales, U.S.A., Inc.

OPERATION

Pressing cruise control ON-OFF (main) switch to ON position activates cruise control system. Cruise indicator light in instrument cluster comes on to indicate activation of system. To set speed, increase vehicle speed to desired speed (must be more than 25 MPH). Set cruise control switch to SET/COAST position and release switch. Vehicle speed will now be maintained. To increase speed, depress accelerator pedal enough to exceed set speed. When accelerator pedal is released, speed will return to speed previously set.

To cancel set speed, set cruise control switch to CANCEL position, depress brake pedal, depress clutch pedal (M/T) or place shift lever in "N" position (A/T). If vehicle speed slows to less than 25 MPH, set speed will automatically cancel. If vehicle speed drops 10 MPH less than preset speed, set speed will also automatically cancel.

Setting cruise control switch to RES/ACC position allows vehicle to return to speed set before cancellation. Setting cruise control switch to RES/ACC position and keeping it there gradually increases vehicle speed. Setting cruise control switch to SET/COAST position and keeping it there gradually decreases vehicle speed.

ACTUATOR

Actuator consists of a motor, safety magnetic clutch, control arm and position sensor. When actuator receives a signal from cruise control ECU, it engages safety magnetic clutch and activates motor. Motor causes control arm to move, opening or closing engine throttle valve.

When motor rotates forward, control arm also rotates via safety magnetic clutch, gears and drive shaft. Control arm pulls a cable connected to engine throttle valve and opens the valve accordingly. When motor rotates in a reverse direction, control arm also rotates 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. Switch remains off even when ignition is turned on again.

SET/COAST Position

With cruise ON-OFF switch on, and vehicle speed greater than 25 MPH, set cruise control switch to SET/COAST position and release switch. Cruise control ECU will store and constantly control vehicle speed.

While in cruise control mode, if cruise control switch is set and held in SET/COAST position, actuator will be energized. Engine throttle valve will close, and vehicle will decelerate until switch is released. From then on, cruise control ECU will store and constantly control new vehicle speed.

RES/ACC Position

If cruise control system is canceled by any of various cancellation methods, the previously set speed can be resumed by setting cruise control switch to RES/ACC position and then releasing switch. Set speed, however, cannot be resumed if vehicle speed drops to less than 25 MPH, as cruise control ECU memory will be cleared.

While in cruise control mode, if cruise control switch is set in RES/ACC position, actuator motor will be energized. Engine throttle valve will open, and vehicle will accelerate until switch is released. From then on, cruise control ECU stores new vehicle speed and controls that speed constantly.

CANCEL Switch

When cruise control switch is set to CANCEL position, a cancellation signal is sent to cruise control ECU, causing cruise control system to cancel.

CRUISE CONTROL ELECTRONIC CONTROL UNIT (ECU)

Cruise control ECU constantly monitors and compares set speed with actual vehicle speed from input sensors. When vehicle speed is different from set speed, cruise control ECU activates actuator motor to change engine throttle valve, changing 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 transmission. Vehicle speed sensor rotor shaft is driven by a gear on transmission output shaft. For each shaft rotation, speed sensor sends a 4-pulse signal to cruise control ECU. The ECU then calculates vehicle speed from this pulse frequency.

SELF-DIAGNOSTIC SYSTEM

When vehicle is in cruise control mode, system will cancel due to a malfunction in actuator, speed sensor or speed control switch circuit. 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. 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. System function test will cause CRUISE indicator light to display a one-digit function code if circuit tested is okay. See CRUISE CONTROL FUNCTION TEST under TROUBLE SHOOTING. Function codes are not to be confused with DTCs. One-digit function codes are only used in the function test. Two-digit trouble codes indicate that a fault has occurred in the 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 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:

1) SET/COAST

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).

2) RES/ACC

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).

3) 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 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).

4) Vehicle Speed Sensor

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).

5) 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).

6) 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

Diagnosis by symptom 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):

- * Perform CRUISE CONTROL ON-OFF (MAIN) SWITCH CIRCUIT under SYSTEM TESTS.
- * Perform DTC 21: VEHICLE SPEED SENSOR CIRCUIT under DIAGNOSTIC TESTS.
- * Perform DTC 32: CRUISE CONTROL SWITCH CIRCUIT under DIAGNOSTIC TESTS.
- * Perform STOPLIGHT SWITCH CIRCUIT under SYSTEM TESTS.
- * Perform PARK/NEUTRAL POSITION SWITCH CIRCUIT under SYSTEM TESTS.
- * Perform CLUTCH SWITCH CIRCUIT under SYSTEM TESTS.
- * Perform DTC 11 OR 15: ACTUATOR MOTOR CIRCUIT 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 (CRUISE Indicator Light Inoperative):

- * Perform CRUISE CONTROL ECU POWER SOURCE CIRCUIT under SYSTEM TESTS.

Actual Vehicle Speed Deviates From Set Speed:

- * Check actuator control cable adjustment. See ADJUSTMENTS.
- * Perform DTC 23: VEHICLE SPEED SENSOR SIGNAL FAULT under DIAGNOSTIC TESTS.
- * Perform ELECTRONICALLY CONTROLLED TRANSMISSION (ECT) CIRCUIT under SYSTEM TESTS.
- * Perform DTC 11 OR 15: ACTUATOR MOTOR CIRCUIT under DIAGNOSTIC TESTS.
- * Perform DTC 51: IDLE SIGNAL CIRCUIT under DIAGNOSTIC 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):

- * Perform ELECTRONICALLY CONTROLLED TRANSMISSION (ECT) CIRCUIT 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 With Brake Pedal Depressed:

- * Check actuator control cable adjustment. See ADJUSTMENTS.
- * Perform STOPLIGHT SWITCH CIRCUIT under SYSTEM TESTS.
- * Perform DTC 11 OR 15: ACTUATOR MOTOR CIRCUIT 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 actuator control cable adjustment. See ADJUSTMENTS.
- * Perform PARK/NEUTRAL POSITION SWITCH CIRCUIT under SYSTEM TESTS.
- * Perform DTC 11 OR 15: ACTUATOR MOTOR CIRCUIT 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 Clutch Pedal
Depressed (M/T Only):

- * Check actuator control cable adjustment. See ADJUSTMENTS.
- * Perform CLUTCH SWITCH CIRCUIT under SYSTEM TESTS.
- * Perform DTC 11 OR 15: ACTUATOR MOTOR CIRCUIT 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 actuator control cable adjustment. See ADJUSTMENTS.
- * Perform DTC 32: CRUISE CONTROL SWITCH CIRCUIT under
DIAGNOSTIC TESTS.
- * Perform DTC 11 OR 15: ACTUATOR MOTOR CIRCUIT 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 actuator control cable adjustment. See ADJUSTMENTS.
- * Perform DTC 23: VEHICLE SPEED SENSOR SIGNAL FAULT under
DIAGNOSTIC TESTS.
- * Perform DTC 11 OR 15: ACTUATOR MOTOR CIRCUIT 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 actuator control cable adjustment. See ADJUSTMENTS.
- * Perform ELECTRONICALLY CONTROLLED TRANSMISSION (ECT) CIRCUIT
under SYSTEM TESTS.
- * Perform DTC 11 OR 15: ACTUATOR MOTOR CIRCUIT 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:

- * Perform ELECTRONICALLY CONTROLLED TRANSMISSION (ECT) CIRCUIT
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:

- * Perform CRUISE CONTROL ECU BACK-UP POWER SOURCE CIRCUIT under
SYSTEM TESTS.
- * 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:

- * Perform DIAGNOSTIC CIRCUIT 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:

- * Perform CRUISE CONTROL INDICATOR LIGHT CIRCUIT under SYSTEM TESTS.

COMPONENT TESTS

VEHICLE SPEED SENSOR

1) Remove vehicle speed sensor from transmission. See Fig. 1. Using jumper wires, connect positive battery terminal to speed sensor terminal No. 1 (Yellow wire) and negative battery terminal to terminal No. 2 (Red wire).

2) Connect voltmeter positive lead to terminal No. 3 (Blue/Red wire) and negative lead to terminal No. 2 (Red 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 speed sensor as necessary.

SYSTEM TESTS

STOPLIGHT SWITCH CIRCUIT

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.

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 connectors connected. See Fig. 1. Turn ignition switch to ON position. Backprobing connector, measure voltage between ground and cruise control ECU connector terminal No. 16 (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.

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 TRANSMISSION SERVICE & REPAIR 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 connector terminal No. 9 (Light Green/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. 22 (Red/Blue 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 connector terminal No. 22 (Red/Blue 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 harness connector terminal No. 9 (Light Green/Black wire) and Engine Control Module (ECM) Dark Gray 40-pin E10 connector. See WIRING DIAGRAMS. 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. If starting system is okay, go to next step.

2) Perform park/neutral position switch test. See CANCEL SWITCHES under 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 connected. See Fig. 1. Turn ignition switch to ON position. Using voltmeter positive lead, backprobe cruise control ECU connector terminal No. 2 (Green/Red wire) with negative lead to ground. 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 under 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 connected. See

Fig. 1. Turn ignition switch to ON position. Using voltmeter positive lead, backprobe cruise control ECU connector terminal No. 2 (Green/Red 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 GAUGE fuse in instrument panel junction block No. 1. 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 fuse in instrument panel junction block No. 1 behind left kick panel. 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. 14 (Black/Red wire) and ECU-IG fuse.

2) Remove cruise control ECU with connector connected. See Fig. 1. Turn ignition switch to ON position. Using voltmeter, backprobe between cruise control ECU connector terminals No. 14 (Black/Red wire) and No. 13 (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 cruise control ECU connector terminal No. 13 (White/Black wire). If resistance is one ohm or less, check wiring harness and connector between cruise control ECU connector and battery. Repair wiring harness as necessary. If resistance is more than one ohm, repair open White/Black wire in wiring harness.

CRUISE CONTROL ECU BACK-UP POWER SOURCE CIRCUIT

1) Locate ECU-B fuse in instrument panel junction block No. 1 behind left kick panel. See Fig. 1. Remove ECU-B 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. 15 (White/Red wire) and ECU-B fuse.

2) Remove cruise control ECU with connector connected. See Fig. 1. Backprobing connector, measure voltage between ground and cruise control ECU connector terminal No. 15 (White/Red 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) Check wiring harness and connectors between cruise control ECU and battery. Repair as necessary.

CRUISE CONTROL ON-OFF (MAIN) SWITCH CIRCUIT

1) Remove cruise control ECU with connector connected. See Fig. 1. Turn ignition switch to ON position. Backprobing connector, measure voltage between ground and cruise control ECU connector terminal No. 19 (Red/Yellow wire). With cruise control main switch off, battery voltage should exist. With cruise control main switch on, voltage should be less than .5 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.

2) Turn ignition switch to OFF position. Disable air bag system. See AIR BAG RESTRAINT SYSTEMS article. Remove steering wheel center pad (air bag module). Disconnect cruise control switch 6-pin connector. Check for continuity between cruise control switch terminals No. 3 (White/Black wire) and No. 5 (Red/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.

3) 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, replace cruise control ECU and retest system.

CRUISE CONTROL INDICATOR LIGHT CIRCUIT

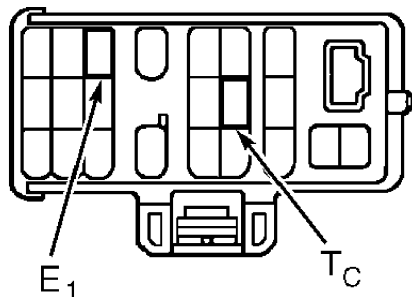
1) Remove cruise control ECU with connector connected. See Fig. 1. Turn ignition switch to ON position. Using voltmeter positive lead, backprobe cruise control ECU connector terminal No. 7 (Orange wire) with negative lead to ground. With cruise control switch in OFF position, battery voltage should be present. With cruise control switch in ON position, voltage should be less than 1.2 volts. 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.

2) Check instrument cluster. See 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 rear of engine compartment. See Fig. 1. 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 for open or short circuit in wiring harness between cruise control ECU and DLC No. 1, or between DLC No. 1 and ground. If wiring harness and connectors are okay, replace cruise control ECU and retest system.



98F10228

Fig. 2: Identifying DLC No. 1 Terminals
Courtesy of Toyota Motor Sales, U.S.A., Inc.

SELF-DIAGNOSTIC SYSTEM

*** PLEASE READ THIS FIRST ***

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.

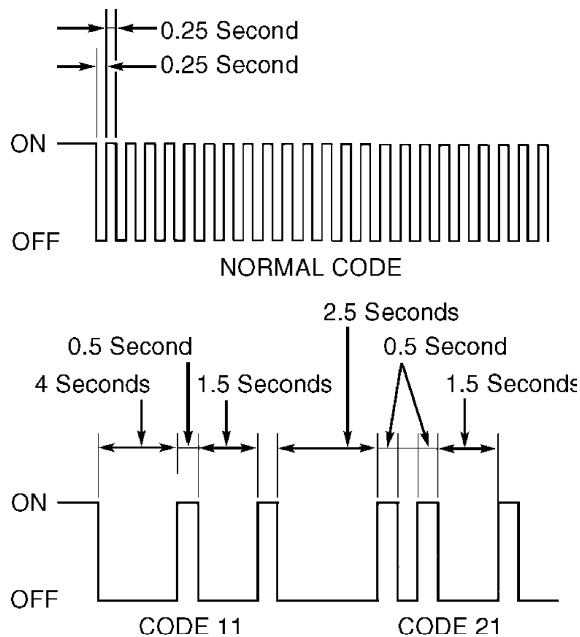
DIAGNOSTIC PROCEDURE

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. See RETRIEVING TROUBLE CODES and retrieve trouble code(s). See DIAGNOSTIC TROUBLE CODE DEFINITIONS table. Perform appropriate DTC test under DIAGNOSTIC TESTS.

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 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.



G93C02769

Fig. 3: Reading 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. See Fig. 1. 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.

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.

CLEARING CODES

CAUTION: DO NOT disconnect vehicle battery to clear codes.

To clear codes from cruise control ECU memory, locate junction block No. 1. See Fig. 1. Remove ECU-B fuse for 10 seconds or more with ignition switch in OFF position. Fault codes are now erased from cruise control ECU memory. Check for normal code after reinstalling fuse. If problem has not been corrected or fault is still present, code will reset in cruise control ECU memory.

DIAGNOSTIC TROUBLE CODE DEFINITIONS TABLE

DTC	System Affected	Probable Cause
11 ..	Actuator Motor Circuit	Actuator Motor Open Circuit, Actuator Motor Or Cruise Control ECU
12	Actuator Magnetic Clutch Circuit ..	STOP Fuse, Stoplight Switch, Actuator Magnetic Clutch, Wiring Harness Or Cruise Control ECU
14 ..	Actuator Mechanical Fault	Actuator Motor Or Cruise Control ECU
15 ...	Actuator Motor Circuit	Actuator Motor Short Circuit, Actuator Motor Or Cruise Control ECU
21	Vehicle Speed Sensor Circuit	Instrument Cluster, Wiring Harness, Vehicle Speed Sensor Or Cruise Control ECU
23	Vehicle Speed Sensor Signal Fault	Vehicle Speed Sensor Or Cruise Control ECU
32	Cruise Control Switch Circuit	Cruise Control Switch, Wiring Harness Or Cruise Control ECU
41 (1) ..	Cruise Control ECU	Cruise Control ECU
42 (1)	Power Source Voltage Drop	Power Source
51	Idle Signal Circuit	Throttle Position Sensor, Wiring Harness Or Cruise Control ECU

- (1) - Perform CRUISE CONTROL ECU POWER SOURCE CIRCUIT test and CRUISE CONTROL ECU BACK-UP POWER SOURCE CIRCUIT test under SYSTEM TESTS.
-

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 15: ACTUATOR MOTOR CIRCUIT

1) Ensure actuator control plate is NOT in fully opened (clockwise) position or fully closed (counterclockwise) 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 (Light/Green wire) and No. 2 (Green/Red 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.

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.

DTC 12: ACTUATOR MAGNETIC CLUTCH CIRCUIT

1) Turn ignition switch to OFF position. Remove and inspect STOP fuse from instrument panel junction block No. 1. 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 (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 (Black/White wire) and No. 4 (Red/Blue 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/Blue wire) and terminal No. 4 (Brown/Yellow 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.

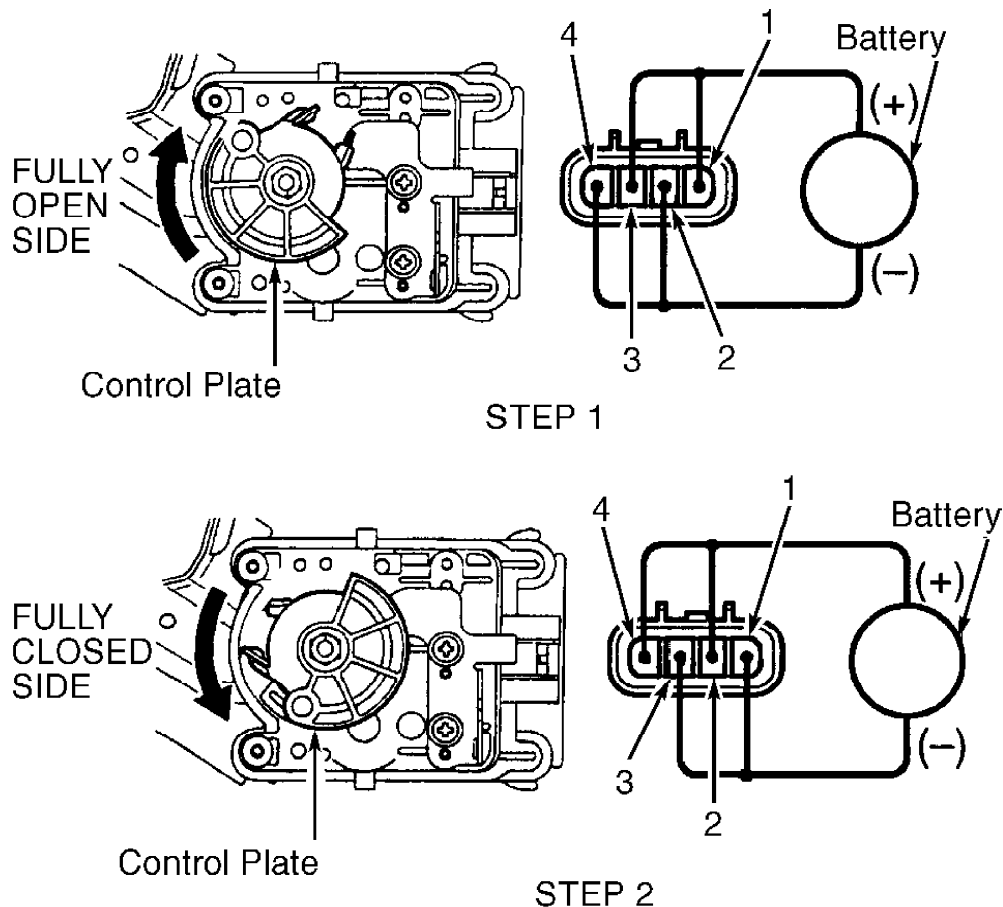
DTC 14: ACTUATOR MECHANICAL FAULT

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/Blue wire). Connect another jumper wire between negative battery terminal and actuator terminal No. 4 (Brown/Yellow 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 (Light/Green wire) and No. 3 (Red/Blue wire). Connect another jumper wire between negative battery terminal and actuator terminals No. 2 (Green/Red wire) and No. 4 (Brown/Yellow wire). Actuator control plate should rotate to full open (clockwise) position. See STEP 1. See Fig. 4. Reverse positive and negative jumper wires at actuator terminals. Actuator control plate should rotate to full closed (counterclockwise) position. See STEP 2. See 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.



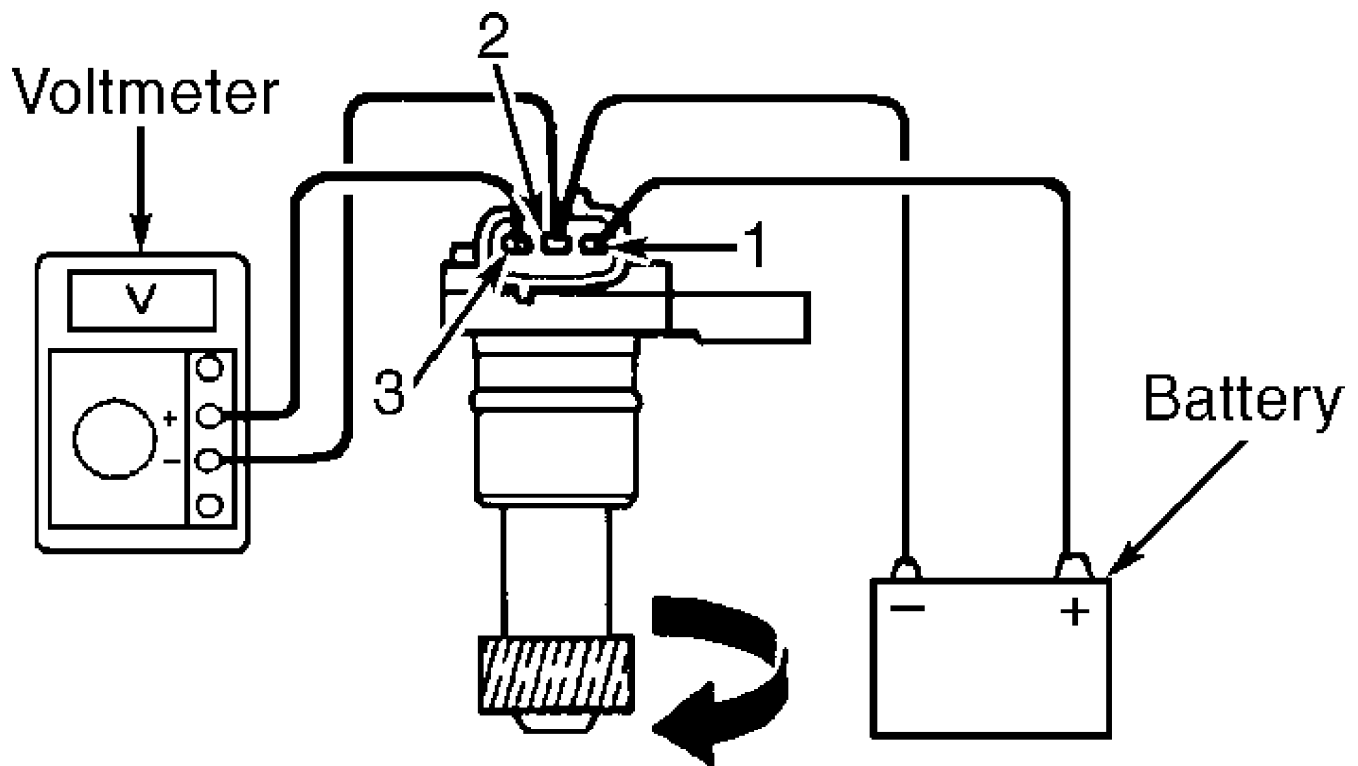
98E10235
Fig. 4: Checking Cruise Control Actuator Operation
Courtesy of Toyota Motor Sales, U.S.A., Inc.

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 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. See Fig. 1. Using jumper wires, connect positive battery terminal to speed sensor terminal No. 1 (Yellow wire) and negative battery terminal to terminal No. 2 (Red wire). Connect voltmeter positive lead to terminal No. 3 (Blue/Red wire) and negative lead to terminal No. 2 (Red 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.



96B09968

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

DTC 32: CRUISE CONTROL SWITCH CIRCUIT

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

2) 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. 3 (White/Black wire) and No. 4 (Blue wire) with switch in specified positions. See CRUISE CONTROL SWITCH RESISTANCE 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 RESISTANCE TABLE

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

3) 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.

4) 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.

DTC 51: IDLE SIGNAL CIRCUIT

NOTE: Ensure Throttle Position (TP) sensor adjustment and operation are normal. See D - ADJUSTMENTS article in the ENGINE PERFORMANCE section. Adjust or replace TP sensor as necessary.

1) Remove cruise control ECU with connectors connected. Disconnect Engine Control Module (ECM) connector. ECM is located underneath carpet below passenger's side of instrument panel. Turn ignition switch to ON position. Backprobing cruise control ECU, measure voltage between ground and cruise control ECU connector terminal No. 16 (Red/Black 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.

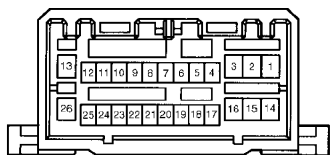
3) Check wiring harness and connectors between ECM and TP sensor. Repair as necessary and retest system. If wiring harness and connectors are okay, go to next step.

4) Disconnect TP sensor 4-pin connector. Measure resistance between TP sensor connector terminal No. 2 (Yellow wire) and terminal No. 4 (White/Black wire). Resistance should be 2400-11,200 ohms with throttle valve fully opened, and 340-6300 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.

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 connected. 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.



ECU TERMINALS

Terminals	Condition	STD Voltage (V)
2-13	M/T: Depress clutch pedal A/T: Shift to except D position	Below 1 V
	M/T: Release clutch pedal A/T: Shift to D position	10 – 16 V
7-13	Ignition switch ON Cruise control main switch ON	Below 1.2 V
	Ignition switch ON Cruise control main switch OFF	10 – 16 V
8-13	Ignition switch ON	10 – 16 V
	Ignition switch ON Connect terminals TC and E1 of DLC1	Below 1 V
9-13	During cruise control driving OD switch ON	10 – 16 V
	During cruise control driving OD switch OFF (3rd driving)	Below 1 V
10-13	During cruise control driving	9 – 15 V
	Except during cruise control driving	Below 1 V
11-13	During cruise control driving COAST switch hold ON	9 – 15 V
	During cruise control driving ACC switch hold ON	Below 1 V
12-13	During cruise control driving ACC switch hold ON	9 – 15 V
	During cruise control driving COAST switch hold ON	Below 1 V
13-GND	Constant	Below 1 V
14-13	Ignition switch ON	10 – 16 V
15-13	Constant	10 – 16 V
16-13	Depress brake pedal	10 – 16 V
	Release brake pedal	Below 1 V
18-13	Ignition switch ON	10 – 16 V
	Ignition switch ON CANCEL switch hold ON	4.2 – 8.7 V
	Ignition switch ON SET/COAST switch hold ON	2.5 – 6.2 V
	Ignition switch ON RES/ACC switch hold ON	0.8 – 3.6 V
19-13	Ignition switch ON Main switch ON	Below 1 V
	Ignition switch ON Main switch OFF	10 – 16 V
20-13	Ignition switch ON During driving	10 – 16 V Repeatedly change from below 1 V to 10 – 16 V
21-13	Ignition switch ON Throttle valve fully closed	Below 1 V
	Ignition switch ON Throttle valve fully opened	10 – 16 V
22-13	During driving Gear position O/D	Below 1 V
	During driving Gear position 3rd	10 – 16 V

97D11216

Fig. 6: Cruise Control ECU Voltage Testing
Courtesy of Toyota Motor Sales, U.S.A., Inc.

WIRING DIAGRAMS

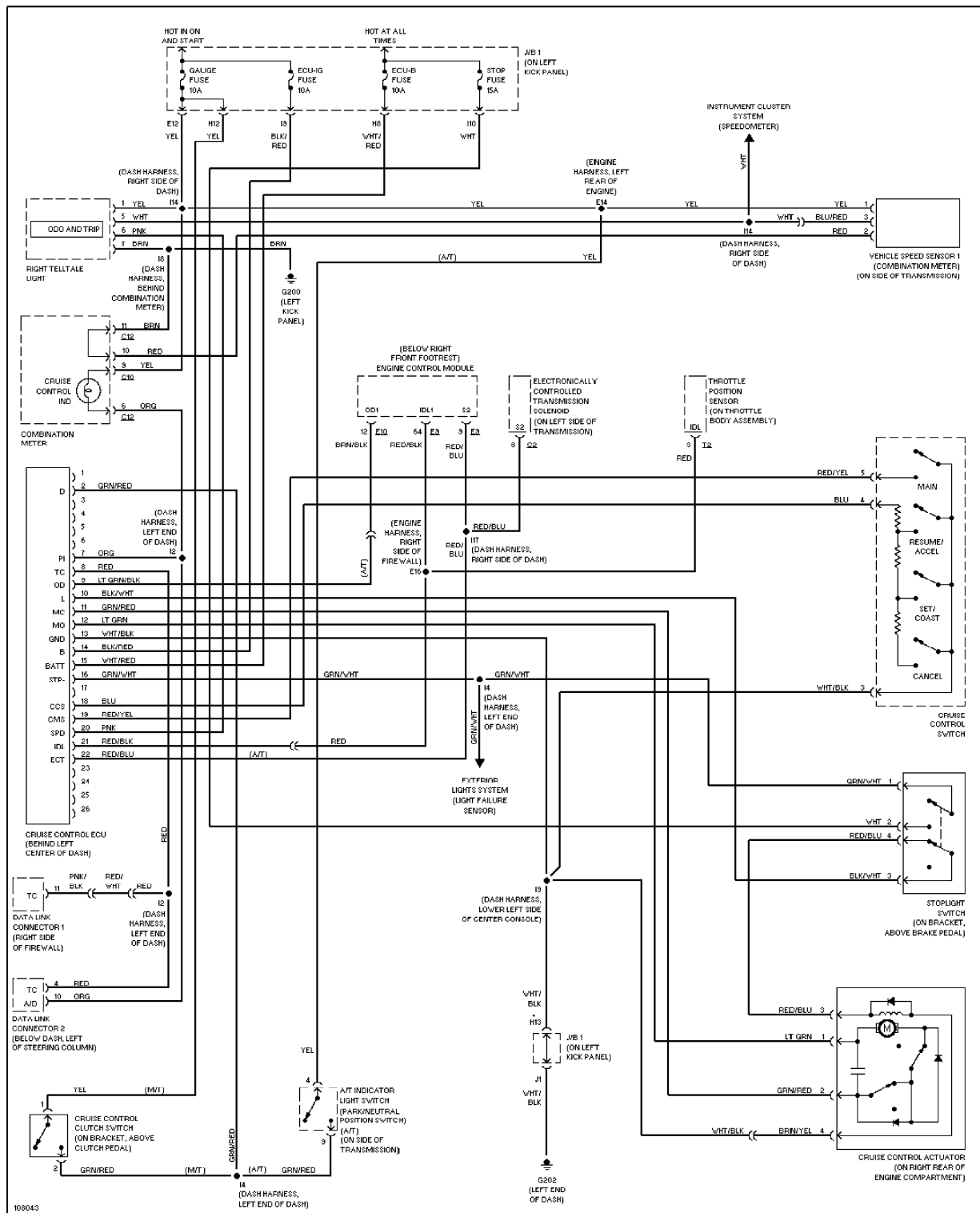


Fig. 7: Cruise Control System Wiring Diagram