

CRUISE CONTROL SYSTEM

1994 Toyota Celica

1994 ACCESSORIES & EQUIPMENT

Toyota Motor Sales, U.S.A., Inc. - Cruise Control Systems

Celica

DESCRIPTION

Cruise control system consists of Cruise Control Electronic Control Unit (CC ECU), actuator, control cable, speed sensor, parking brake switch, main and cruise control switches, stoplight switch, park/neutral switch (A/T), clutch switch (M/T) and related wiring. See Fig. 1.

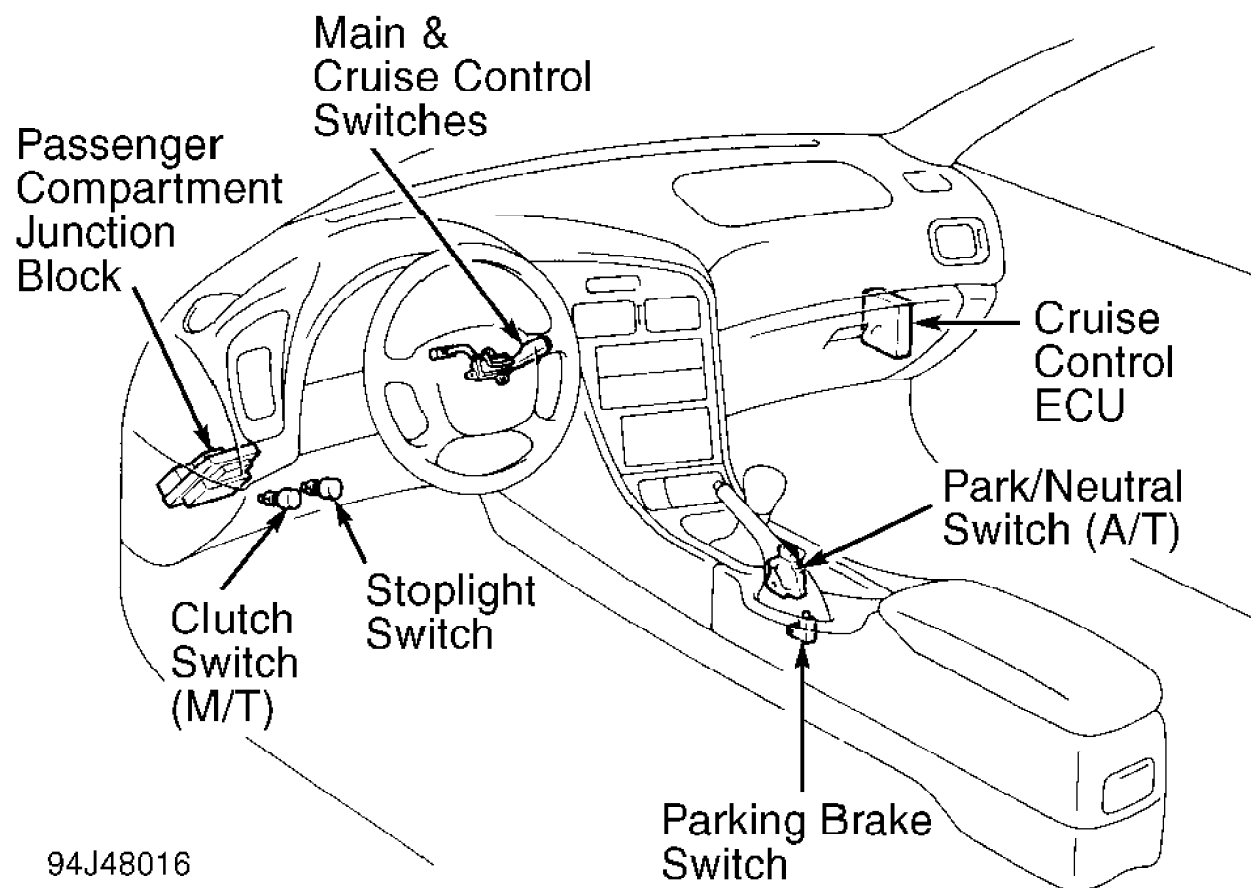
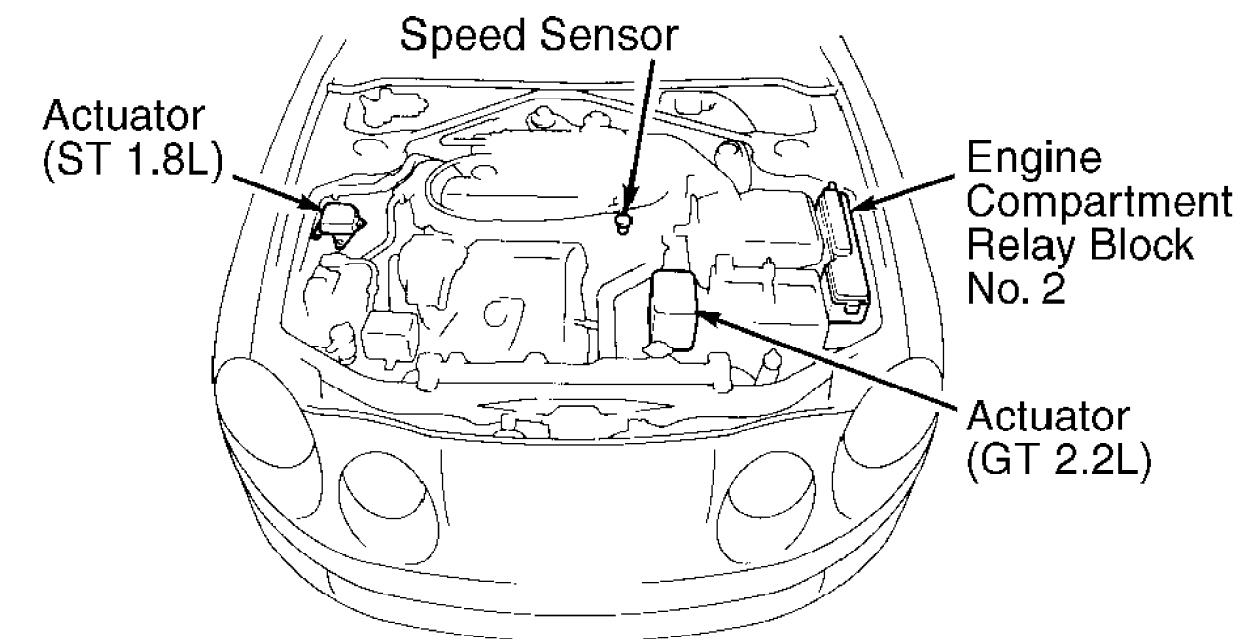
System allows vehicle to cruise at a desired speed greater than 25 MPH. Speed control will cancel when brake pedal or clutch pedal (M/T) is depressed, CANCEL switch is activated or automatic transmission shift lever is moved to "N" position (A/T). If vehicle speed slows to less than 25 MPH or drops 10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

OPERATION

Pressing cruise ON-OFF (main) switch to ON position, activates cruise control system. CRUISE indicator light in instrument cluster illuminates to indicate activation of system. To set speed, increase vehicle speed to desired speed (must be over 25 MPH). Pull cruise control switch downward 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, pull 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.

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



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

ACTUATOR

Actuator consists of a motor, safety magnetic clutch, control arm and position sensor. When actuator receives a signal from CC 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, pull cruise control switch downward to SET/COAST position and release switch. CC ECU will store and constantly control vehicle speed.

While in cruise control mode, if cruise control switch is pulled downward 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, CC 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 pushing cruise control switch upward to RES/ACC position and then releasing switch. Set speed, however, cannot be resumed if vehicle speed drops to less than 25 MPH, as CC ECU memory will be cleared.

While in cruise control mode, if cruise control switch is pushed upward and held 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, CC ECU stores new vehicle speed and controls that speed constantly.

CANCEL Switch

When CANCEL switch is pulled on, a cancellation signal is sent to CC ECU, causing cruise control system to cancel.

CRUISE CONTROL ELECTRONIC CONTROL UNIT (CC ECU)

CC ECU constantly monitors and compares set speed with actual vehicle speed from input sensors. When vehicle speed is different from set speed, CC ECU activates actuator motor to change engine throttle valve, changing vehicle speed.

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

SPEED SENSOR

Speed sensor is mounted on transmission. Speed sensor rotor shaft is driven by a gear on speedometer output shaft. For each shaft rotation, speed sensor sends a 4-pulse signal which is sent to CC ECU. CC ECU 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 cruise control switch circuits. When cruise control functions are canceled, CRUISE indicator light will flash for .5 seconds with a 1.5 second pause separating each flash, indicating 2-digit trouble code(s) are stored in CC ECU memory. See CC ECU TROUBLE CODE DEFINITION table under SELF-DIAGNOSTICS. Two digit trouble code(s) will be stored in CC ECU memory until ignition is turned off. See SELF-DIAGNOSTICS.

Not all malfunctions set a trouble code. When a malfunction is present that does not set a trouble code, CRUISE indicator light will flash on and off every .25 seconds indicating normal system operation. See TROUBLE SHOOTING BY SYMPTOM under TROUBLE SHOOTING.

NOTE: Intermittent failures may cause CRUISE indicator light to flicker or illuminate. 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 CC ECU memory. See SELF-DIAGNOSTICS.

SELF-DIAGNOSTICS

CAUTION: Vehicles that are equipped with Supplemental Restraint System (SRS). SRS wiring harness is routed close to instrument cluster, steering wheel and related components. All SRS wiring harnesses and connectors are Yellow. DO NOT use electrical test equipment on these circuits. Before working on cruise control components, disable air bag system. See the AIR BAG RESTRAINT SYSTEM article in the ACCESSORIES & EQUIPMENT section.

WARNING: Wait at least 90 seconds after disabling SRS. Back-up power circuit, capacitor, maintains system voltage for about 90 seconds after battery is disconnected. Servicing cruise control system before 90 seconds may cause accidental air bag deployment and possible personal injury.

READING TROUBLE CODES

Trouble codes are displayed as flashes of CRUISE indicator light. All trouble codes are 2-digit numbers. After a 4 second pause, code(s) will begin to flash. A .5 second flash indicates one digit with a 1.5 second pause separating each digit of a code. A 2.5 second pause separates each trouble code. See Fig. 2. Trouble codes with a 2, 3 or 4 as the first digit, a .5 second flash separates each tenth indicated.

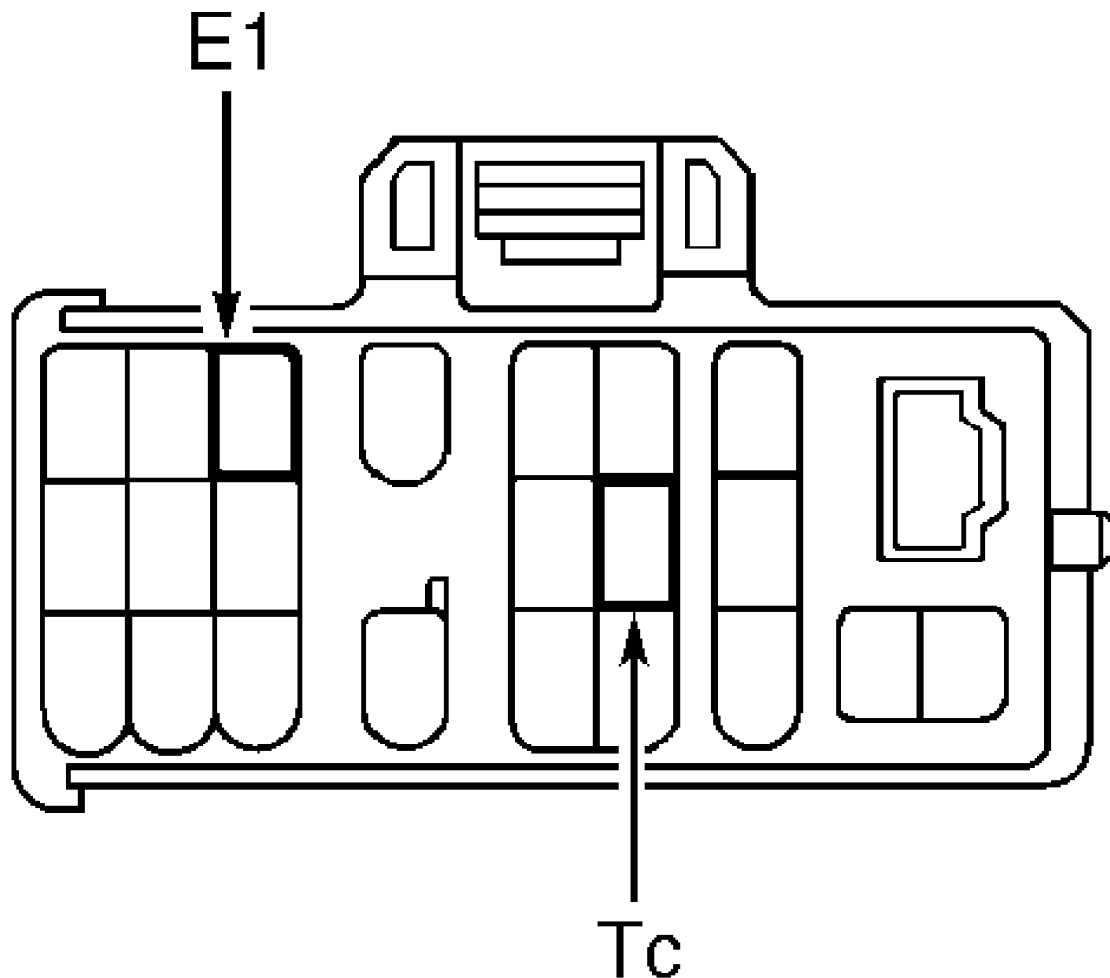
CC ECU outputs trouble codes from lowest to highest. These codes indicate current faults in system and should be serviced in order of appearance. Pay careful attention to length of pauses in order to read codes correctly. See Fig. 2.

through self-test diagnostic Data Link Connector (DLC). Test drive vehicle to allow trouble codes to set in CC ECU memory. If CRUISE indicator light begins to flash for .5 seconds with a 1.5 second pause separating each flash while driving, or cruise control will not set or operate, check for trouble codes. Go to next step.

2) Stop vehicle and leave ignition switch in ON position. If ignition switch is turned to OFF position, any stored trouble codes will be erased from CC ECU memory. Connect jumper wire between DLC self-diagnostic terminals. See Fig. 3.

3) If any code is present, perform test(s) in order given. See CC ECU TROUBLE CODE DEFINITION table. See TROUBLE CODE/CIRCUIT TEST CHARTS. If CRUISE indicator light begins flashing on and off every .25 seconds (normal) and no trouble codes are present, but a malfunction still exists, go to TROUBLE SHOOTING BY SYMPTOM under TROUBLE SHOOTING.

4) If CRUISE indicator light does not flash and no trouble codes are present, but cruise control system malfunction still exists, go to TROUBLE SHOOTING BY SYMPTOM under TROUBLE SHOOTING.



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Fig. 3: Identifying DLC Terminals
Courtesy of Toyota Motor Sales, U.S.A., Inc.

Trouble Code (1) Problem Diagnosis

Normal Indicator Light Flashes On And Off Every .25 Seconds, CC
System Can Not Be Set Or Does Not Operate
11 Overcurrent/Short In Motor Circuit
12 Overcurrent/Short In Magnet Clutch Circuit
& Open In Magnet Clutch Circuit
13 Position Sensor Detects Abnormal Voltage
14 Open In Actuator Motor Circuit & Position
Sensor Signal Value Does Not Change When Motor Operates
21 Speed Sensor Signal Not Input To CC ECU
23 (2) Actual Vehicle Speed Decreased 10 MPH Or More Below
Speed Set During Cruise Control Operation
& Vehicle Speed Sensor Pulse Is Abnormal
32 Short In Control Switch Circuit
34 Voltage Abnormality In Control Switch Circuit
41 Duty Ratio Of 100 Percent Output to Motor Acceleration Side
42 Source Voltage Drop

(1) - Perform test numbers in order given.

(2) - When vehicle speed is reduced on uphill roads, speed can be set again and driving continued. No malfunction is present.

CLEARING CODES

CAUTION: Do not disconnect vehicle battery to clear codes.

1) Turn ignition off. To clear codes from CC ECU memory, remove ECU-B fuse for 10 seconds. ECU-B fuse is located in engine compartment relay block No. 2, on left inner fender panel.

2) This procedure erases fault codes from CC ECU memory. If problem has not been corrected or fault is still present, code will be reset in CC ECU memory. Check that CRUISE indicator light flashes on and off every .25 seconds (normal) after reinstalling fuse.

TROUBLE SHOOTING

NOTE: Before TROUBLE SHOOTING BY SYMPTOM, perform SELF-DIAGNOSTICS. TROUBLE SHOOTING BY SYMPTOM should only be performed if CRUISE indicator light flashes a normal pattern or does not flash at all, and a cruise control system malfunction exists.

TROUBLE SHOOTING BY SYMPTOM

NOTE: Perform circuit tests when CRUISE indicator light flashes a normal pattern or does not flash at all, and a cruise control system malfunction exists. See TROUBLE CODE/CIRCUIT TEST CHARTS. Perform circuit tests in order listed.

SET Not Occurring Or CANCEL Occurring (Flash Pattern Normal)
Perform the following tests. Check Cruise Control ECU. See

CRUISE CONTROL ECU CIRCUIT TESTING CHARTS.

- * ACTUATOR MOTOR CIRCUIT
- * ACTUATOR MAGNET CLUTCH CIRCUIT
- * ACTUATOR POSITION SENSOR CIRCUIT
- * SPEED SENSOR CIRCUIT
- * CONTROL SWITCH CIRCUIT (CRUISE CONTROL SWITCH)
- * STOPLIGHT SWITCH CIRCUIT
- * PARKING BRAKE SWITCH CIRCUIT

- * PARK/NEUTRAL SWITCH CIRCUIT (A/T)
- * MAIN SWITCH CIRCUIT (CRUISE CONTROL SWITCH)

SET Not Occurring Or CANCEL Occurring
(Trouble Code Does Not Output)

Perform the following test. Check Cruise Control ECU. See
CRUISE CONTROL ECU CIRCUIT TESTING CHARTS.

- * ECU POWER SOURCE CIRCUIT

Actual Vehicle Speed Deviates Above Or Below The Set Speed
Perform the following tests. Check actuator control cable.

See ACTUATOR CONTROL CABLE INSPECTION. Check Cruise Control ECU. See
CRUISE CONTROL ECU CIRCUIT TESTING CHARTS.

- * ACTUATOR MOTOR CIRCUIT
- * ACTUATOR MAGNET CLUTCH CIRCUIT
- * ACTUATOR POSITION SENSOR CIRCUIT
- * SPEED SENSOR CIRCUIT
- * IDLE SWITCH CIRCUIT (MAIN THROTTLE POSITION SENSOR)
- * ELECTRONIC CONTROLLED TRANSMISSION COMMUNICATION CIRCUIT

Gear Shifting Is Frequent Between 3rd And OD When Driving On
Uphill Road (Hunting)

Perform the following test. Check Cruise Control ECU. See
CRUISE CONTROL ECU CIRCUIT TESTING CHARTS.

- * ELECTRONIC CONTROLLED TRANSMISSION COMMUNICATION CIRCUIT

Cruise Control Not Canceled, Even When Brake Pedal Depressed
Perform the following tests. Check actuator control cable.

See ACTUATOR CONTROL CABLE INSPECTION. Check Cruise Control ECU. See
CRUISE CONTROL ECU CIRCUIT TESTING CHARTS.

- * ACTUATOR MOTOR CIRCUIT
- * ACTUATOR MAGNET CLUTCH CIRCUIT
- * ACTUATOR POSITION SENSOR CIRCUIT
- * STOPLIGHT SWITCH CIRCUIT

Cruise Control Not Canceled, Even When Parking Brake
Lever Pulled

Perform the following tests. Check actuator control cable.
See ACTUATOR CONTROL CABLE INSPECTION. Check Cruise Control ECU. See
CRUISE CONTROL ECU CIRCUIT TESTING CHARTS.

- * ACTUATOR MOTOR CIRCUIT
- * ACTUATOR MAGNET CLUTCH CIRCUIT
- * ACTUATOR POSITION SENSOR CIRCUIT
- * PARKING BRAKE SWITCH CIRCUIT

Cruise Control Not Canceled, Even When Transmission Is
Shifted To Except "D" Range (A/T)

Perform the following tests. Check actuator control cable.
See ACTUATOR CONTROL CABLE INSPECTION. Check Cruise Control ECU. See
CRUISE CONTROL ECU CIRCUIT TESTING CHARTS.

- * ACTUATOR MOTOR CIRCUIT
- * ACTUATOR MAGNET CLUTCH CIRCUIT
- * ACTUATOR POSITION SENSOR CIRCUIT
- * PARK/NEUTRAL SWITCH CIRCUIT (A/T)

Cruise Control Not Canceled, Even When Clutch Pedal Is
Depressed (M/T)

Perform the following tests. Check actuator control cable.
See ACTUATOR CONTROL CABLE INSPECTION. Check Cruise Control ECU. See
CRUISE CONTROL ECU CIRCUIT TESTING CHARTS.

- * ACTUATOR MOTOR CIRCUIT
- * ACTUATOR MAGNET CLUTCH CIRCUIT
- * ACTUATOR POSITION SENSOR CIRCUIT
- * CLUTCH SWITCH CIRCUIT (M/T)

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

Perform the following tests. Check actuator control cable.
See ACTUATOR CONTROL CABLE INSPECTION. Check Cruise Control ECU. See
CRUISE CONTROL ECU CIRCUIT TESTING CHARTS.

- * ACTUATOR MOTOR CIRCUIT
- * ACTUATOR MAGNET CLUTCH CIRCUIT
- * ACTUATOR POSITION SENSOR CIRCUIT
- * CONTROL SWITCH CIRCUIT (CRUISE CONTROL SWITCH)

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

Perform the following tests. Check actuator control cable.
See ACTUATOR CONTROL CABLE INSPECTION. Check Cruise Control ECU. See
CRUISE CONTROL ECU CIRCUIT TESTING CHARTS.

- * ACTUATOR MOTOR CIRCUIT
- * ACTUATOR MAGNET CLUTCH CIRCUIT
- * ACTUATOR POSITION SENSOR CIRCUIT
- * SPEED SENSOR CIRCUIT

Poor Response In ACC and RES Modes

Perform the following tests. Check actuator control cable.
See ACTUATOR CONTROL CABLE INSPECTION. Check Cruise Control ECU. See
CRUISE CONTROL ECU CIRCUIT TESTING CHARTS.

- * ACTUATOR MOTOR CIRCUIT
- * ACTUATOR MAGNET CLUTCH CIRCUIT
- * ACTUATOR POSITION SENSOR CIRCUIT
- * ELECTRONIC CONTROLLED TRANSMISSION COMMUNICATION CIRCUIT

O/D Does Not Resume, Even Through Road Is Not Uphill

Perform the following test. Check Cruise Control ECU. See
CRUISE CONTROL ECU CIRCUIT TESTING CHARTS.

- * ELECTRONIC CONTROLLED TRANSMISSION COMMUNICATION CIRCUIT

Diagnostic Trouble Code Memory Is Erased

Perform the following test. Check Cruise Control ECU. See
CRUISE CONTROL ECU CIRCUIT TESTING CHARTS.

- * BACK-UP POWER SOURCE CIRCUIT

Diagnostic Trouble Code Is Not Output, Or Is Output When It
Should Not Be

Check Cruise Control ECU. See CRUISE CONTROL ECU CIRCUIT
TESTING CHARTS.

CRUISE Indicator Light Remains On, Or Fails To Illuminate

Check indicator bulb, cruise control ECU, meter circuit plate
and wiring harness. Repair or replace as necessary.

ACTUATOR CONTROL CABLE INSPECTION

Check for properly installed actuator, control cable, and throttle link. Check for properly connected control cable and throttle link. Check for smooth operation of actuator and throttle link. Check if control cable is too tight or too loose. If control cable is too tight, idle RPM will increase. If control cable is too loose, loss of uphill speed will increase.

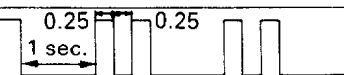
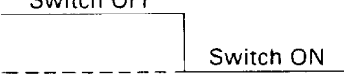
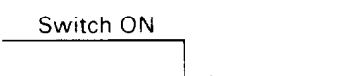
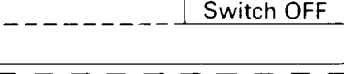
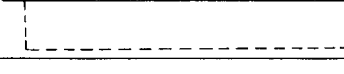
INPUT SIGNAL CHECK

Output Of Code

1) Pull cruise control switch downward to SET/COAST position, or push cruise control switch upward to RES/ACC position and hold in position. Press cruise ON-OFF (main) switch to ON position. Check that CRUISE indicator light flashes 2-3 times repeatedly after 3 seconds. Turn SET/COAST or RES/ACC switch off.

2) Operate each of the following switches as described. See Fig. 4. Note flashing pattern of CRUISE indicator light while operating switches as specified. After completing checks, turn main switch off.

NOTE: When 2 or more signals are input to CC ECU, only the lowest numbered code is displayed.

No.	Operation Method	CRUISE MAIN Indicator Light Blinking Pattern	Diagnosis
1	Turn SET/COAST switch ON.	Light ON  OFF	SET/COAST switch circuit is normal.
2	Turn RES/ACC switch ON.	Light ON  OFF	RES/ACC switch circuit is normal.
3	Turn CANCEL switch ON.	Light ON  OFF	CANCEL switch circuit is normal.
	Turn stop light switch ON. (Depress brake pedal)	ON  OFF	Stop light switch circuit is normal.
	Turn parking brake switch ON. (Pull up the parking brake lever)	ON  OFF	Parking brake switch circuit is normal.
	Turn neutral start switch OFF. (Shift to except D range)	ON  OFF	Park/neutral position switch circuit is normal.
	Turn clutch switch OFF. (Depress clutch pedal)	ON  OFF	Clutch switch circuit is normal.
4	Drive at 40 km/h (25 mph) or higher.	Light ON  OFF	Speed sensor is normal.
	Drive at 40 km/h (25 mph) or below.	Light ON  OFF	

NOTE: For check Nos. 1 and 2 - Turn ignition switch to ON position.
For check No. 3 - Turn ignition switch to ON position and place shift lever in "D" position (A/T).
For check No. 4 - Raise and support vehicle. Start engine and place shift lever in "D" position (A/T).

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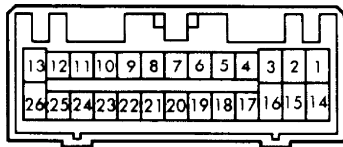
Fig. 4: Checking Cruise Control ECU Input Signal
Courtesy of Toyota Motor Sales, U.S.A., Inc.

CRUISE CONTROL ECU CIRCUIT TESTING CHARTS

NOTE: CC ECU circuit testing charts are provided to pinpoint a malfunctioning circuit. Checking pin voltages at CC ECU

connector will help determine if CC ECU is receiving and sending proper voltage signals. Using test charts may also help in determining if there is a short or open in harness or connectors. Test circuit continuity, resistance and voltages by backprobing CC ECU harness connector.

NOTE: Unless stated otherwise in testing procedures, perform all voltage tests using a Digital Volt-Ohmmeter (DVOM) with a minimum 10-megohm input impedance. Voltage readings may vary slightly due to battery condition or charging rate.



CRUISE CONTROL ECU CONNECTOR

No.	Symbol	Terminal Name	No.	Symbol	Terminal Name
1	STP+	Stop Light Switch	14	B	Power Source
2	D	Park/Neutral Position Switch (A/T) Clutch Switch (M/T)	15	BATT	Backup Power Source
3	PKB	Parking Brake Switch	16	STP-	Stop Light Switch
4	-	-	17	-	-
5	-	-	18	CCS	Control Switch
6	-	-	19	CMS	Main Switch
7	Pi	CRUISE MAIN Indicator Light	20	SPD	Vehicle Speed Sensor
8	Tc	DLC2	21	IDL	Throttle Position Sensor
9	OD	ECM	22	ECT	No.2 Solenoid Valve
10	L	Magnetic Clutch	23	VR1	Position Sensor
11	MC	Motor	24	VR2	Position Sensor
12	MO	Motor	25	VR3	Position Sensor
13	GND	Ground	26	L-	Actuator Ground

Terminals	Symbols	Condition	Standard Value
1 - 13	STP+ ↔ GND	Depress brake pedal.	10 - 14 V
		Release brake pedal.	10 - 14 V
2 - 13	D ↔ GND	(M/T) Depress clutch pedal. (A/T) Shift to except D range.	Below 1 V
		(M/T) Release clutch pedal (A/T) shift to D range.	10 - 14 V
3 - 13	PKB ↔ GND	IG ON. Pull up parking brake lever.	Below 2 V
		IG ON. Release parking brake lever.	10 - 14 V
7 - 13	Pi ↔ GND	IG ON. Main Switch ON. Main indicator light ON.	Below 1.2 V
		IG ON. Main switch OFF. Main indicator light OFF.	10 - 14 V
8 - 13	Tc ↔ GND	Ignition switch ON.	10 - 14 V
		Except during cruise control driving.	10 - 14 V
9 - 13	O/D ↔ GND	O/D Switch ON. During cruise control driving. (Driving on flat road).	10 - 14 V
		O/D Switch OFF. During cruise control driving. (3rd driving).	Below 1 V
10 - 13	L ↔ GND	During cruise control driving.	9 - 14 V
		Except during cruise control driving.	Below 1 V
11 - 13	MC ↔ GND	During cruise control driving. COAST switch hold ON.	9 - 14 V
		Except during cruise control driving.	Below 1 V

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Fig. 5: Cruise Control ECU Terminal Voltages (1 Of 2)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

Terminals	Symbols	Condition	Standard Value
12 – 13	MO ↔ GND	During cruise control driving. SET switch ON. (moment)	8 – 14 V
		Except during cruise control driving.	Below 1 V
13 – Body Ground	GND ↔ Body Ground	Always.	Below 1 V
14 – 13	B ↔ GND	Ignition switch ON.	10 – 14 V
15 – 13	BATT ↔ GND	Always.	10 – 14 V
16 – 13	STP- ↔ GND	Depress brake pedal.	10 – 14 V
		Release brake pedal.	Below 1.5 V
18 – 13	CCS ↔ GND	IG ON. Main switch ON. Switch neutral position	10 – 14 V
		IG ON. Main switch ON. CANCEL switch hold ON.	4.1 – 7.2 V
		IG ON. Main switch ON. SET/COAST switch hold ON.	2.3 – 4.6 V
		IG ON. Main switch ON. RESUME/ACCEL switch hold ON.	0.7 – 2.5 V
19 – 13	CMS ↔ GND	IG ON. Main Switch hold ON. (Indicator light ON)	Below 2 V
		IG ON. Main switch OFF. (Indicator Light OFF)	10 – 14 V
20 – 13	SPD ↔ GND	Engine start. Car stationary.	Below 1.5 V or 10 – 14 V
		During driving. (Pulse generated)	5 – 7 V
21 – 13	IDL ↔ GND	IG ON. throttle valve fully opened.	10 – 14 V
		IG ON. Throttle valve fully closed.	Below 2 V
22 – 13	ECT ↔ GND	During cruise control driving. O/D switch ON.	Below 1.0 V
		During cruise control driving. O/D switch OFF (3rd driving).	10 – 14 V
23 – 13	VR1 ↔ GND	Ignition switch ON.	4.5 – 5 V
24 – 25	VR2 ↔ VR3	During cruise control driving.	1 – 4.5 V
		IG ON. Control Plate fully opened.	3.4 – 5.1 V
		IG ON. Control plate fully closed.	0.6 – 1.6 V
25 – 13	VR3 ↔ GND	Always.	Below 1 V
26 – 13	L- ↔ GND	Always.	Below 1 V

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Fig. 6: Cruise Control ECU Terminal Voltages (2 Of 2)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

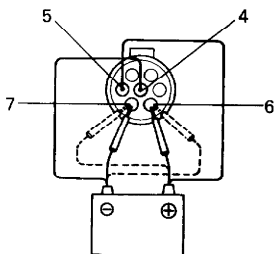
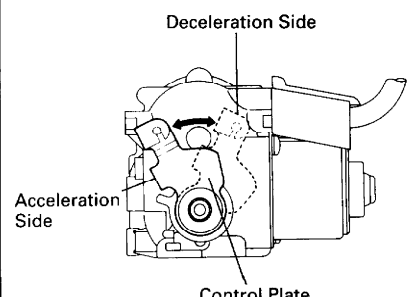
TROUBLE CODE/CIRCUIT TEST CHARTS

NOTE: Following charts courtesy of Toyota Motor Sales, U.S.A., Inc.

CODES 11, 14 & 41 - ACTUATOR MOTOR CIRCUIT

1

Check actuator motor.

P

- Remove cruise control actuator.
- Disconnect actuator connector.

C

- Connect positive $\oplus$ lead to terminal 5 and negative $\ominus$ lead to terminal 4 of actuator connector.
(Magnetic clutch ON)
- When battery positive voltage is applied to each of the actuator connector terminals check that the control plate moves smoothly without hesitating.

○—○

Connect

Terminal	Positive $\oplus$	Negative $\ominus$	6	7
Moving direction				
Acceleration side	○—○	○—○		
Deceleration side	○—○	○—○		

- With the motor rotating as in 2., check that the motor is stopped by limit switches when the control plate moves to fully opened or fully closed position.

OK

NG

Replace actuator assembly.

2

Check harness and connector between cruise control ECU and actuator motor

OK

NG

Repair or replace harness or connector.

Proceed to CODE 12 ACTUATOR MAGNET CLUTCH CIRCUIT chart. If Code 11, 14 and/or 41 is present, check and replace cruise control ECU.

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Fig. 7: Codes 11, 14 & 41 - Actuator Motor Circuit

CODE 12 - ACTUATOR MAGNET CLUTCH CIRCUIT

1

Check actuator magnet clutch.

P

(1) Remove cruise control actuator.
(2) Disconnect actuator connector.

C

Move the control plate by hand.

OK

Control plate moves. (Magnetic clutch off)

C

(1) Connect positive $\oplus$ lead to terminal 5 and negative $\ominus$ lead to terminal 4 of actuator connector.
(2) Move the control plate by hand.

OK

Control plate doesn't move. (Magnet clutch on)

OK

NG

Replace actuator assembly.

2

Check stop light switch.

P

Disconnect stop light switch connector.

C

Check continuity between terminals.

OK

Terminals	1	2	3	4
Switch position				
Switch pin free (Brake pedal depressed)	○—○			
Switch pin pushed in (Brake pedal released)			○—○	

OK

NG

Replace stop light switch.

3

Check for open and short in harness and connectors between ECU and stop light switch, stop light switch and magnetic clutch, magnetic clutch and body ground

OK

NG

Repair or replace harness or connector.

Proceed to CODES 13 & 14 ACTUATOR POSITION SENSOR CIRCUIT chart. If Code 12 is present, check harness and connector for loose connection. If connection is okay, check and replace cruise control ECU.

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Fig. 8: Code 12 - Actuator Magnet Clutch Circuit

CODES 13 & 14 - ACTUATOR POSITION SENSOR CIRCUIT

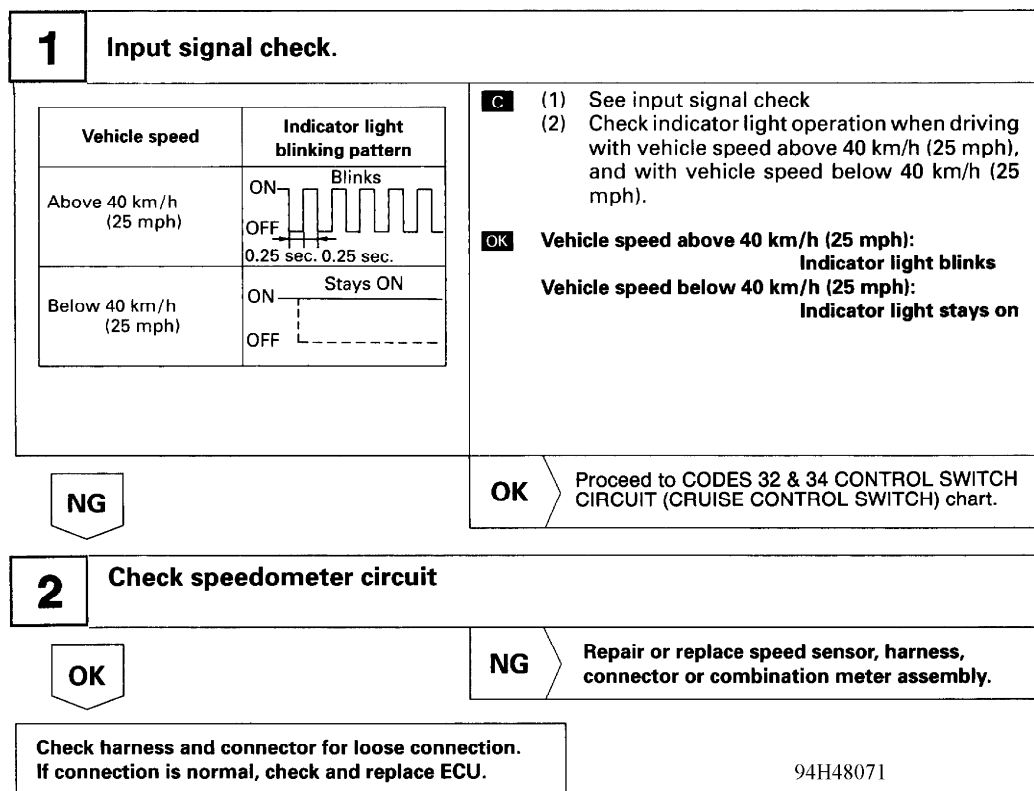
1	Check voltage between terminals VR2 and VR3 of ECU connector.
	P Remove ECU with connectors still connected. C (1) Turn ignition switch ON. (2) Measure voltage between terminals VR2 and VR3 of ECU connector while turning control plate slowly by hand from the deceleration side to the acceleration side. OK Voltage: Fully closed: approx. 1.3 V Fully opened: approx. 4.1 V In addition, as the control plate is turned, the voltage should increase gradually without interruption.
NG	OK Proceed to CODES 21 & 23 SPEED SENSOR CIRCUIT chart.
2	Check actuator position sensor.
	P (1) Remove cruise control actuator. (2) Disconnect the actuator connector. C Measure resistance between actuator terminals 1 and 3 of actuator connector. OK Resistance: Approx. 2.0 kΩ C Measure resistance between terminals 2 and 3 of actuator connector, while turning the control plate slowly by hand from the deceleration side to the acceleration side. OK Resistance: Fully closed: Approx. 530 Ω Fully opened: Approx. 2.0 kΩ In addition, as the control plate turns, the resistance should increase gradually without interruption.
OK	NG Replace actuator assembly.
3	Check for open and short in harness and connector between ECU and actuator position sensor
OK	NG Repair or replace harness or connector.

Check harness and connector for loose connection.
If connection is normal check and replace ECU.

94G48070

Fig. 9: Codes 13 & 14 - Actuator Position Sensor Circuit

CODES 21 & 23 - SPEED SENSOR CIRCUIT



94H48071

Fig. 10: Code 21 & 23 - Speed Sensor Circuit

CODES 32 & 34 - (CRUISE) CONTROL SWITCH CIRCUIT

1

Input signal check.

Input Signal	Indicator light blinking pattern
SET/COAST SWITCH	ON OFF 2 Pulse
RESUME/ACCEL SWITCH	ON OFF 3 Pulse
CANCEL SWITCH	ON OFF Switch OFF Switch ON

- P** (1) See input signal check
(2) Check the indicator light operation when each of the SET/COAST, RESUME/ACCEL and CANCEL is turned ON.

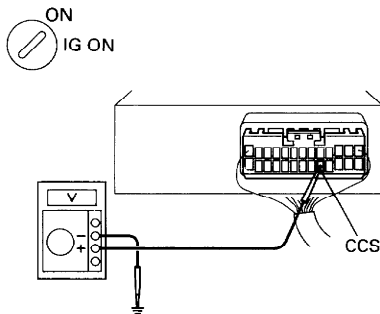
OK **SET/COAST, RESUME/ACCEL Switch**
The signals shown in the table on the left should be output when each switch is ON. The signal should disappear when the switch is turned OFF.
CANCEL Switch.
The indicator light goes off when the cancel switch is turned ON.

NG

OK Proceed to STOPLIGHT SWITCH CIRCUIT chart.

2

Check voltage between terminal CCS of ECU connector and body ground.



- P** Remove ECU with connectors still connected.

- C** (1) Turn ignition switch ON.
(2) Measure voltage between terminal CCS of ECU connector and body ground, when each of the SET/COAST, RESUME/ACCEL and CANCEL is turned ON.

OK

Switch position	Voltage
Neutral	10 – 14 V
RES/ACC	0.7 – 2.5 V
SET/COAST	2.3 – 4.6 V
CANCEL	4.1 – 7.2 V

NG

OK Proceed to STOPLIGHT SWITCH CIRCUIT chart.

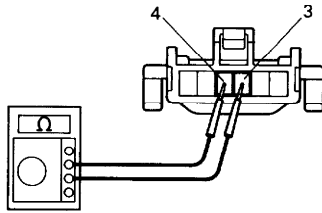
Go to stop 3 .

94148072

Fig. 11: Codes 32 & 34 – (Cruise) Control Switch Circuit (1 Of 2)

3**Check control switch.**

Disconnect

**P**

1. Remove steering wheel center pad.
2. Disconnect control switch connector

C

Measure resistance between terminals 3 and 4 of control switch connector when control switch is operated.

OK

Switch position	Resistance
Neutral	1 M Ω or higher
RES/ACC	60 – 80 Ω
SET/COAST	180 – 220 Ω
CANCEL	400 – 440 Ω

Hint

When diagnostic trouble code 34 is displayed, carefully check that resistance is always ∞ in neutral position, particularly when switching between RES/ACC and SET/COAST.

OK**NG**

Replace cruise control switch.

4**Check for open and short in harness and connector between ECU and control switch****OK****NG**

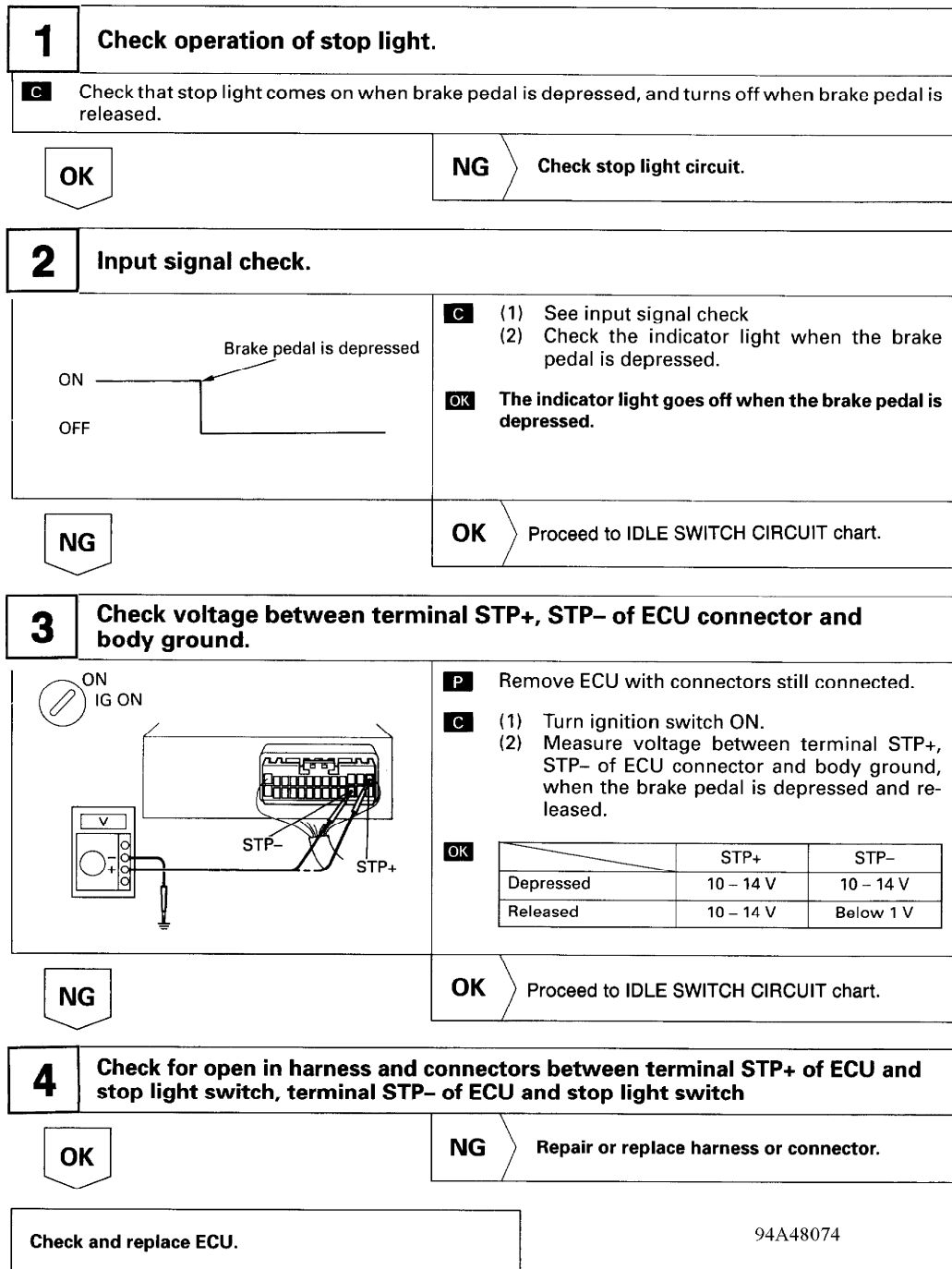
Repair or replace harness or connector.

Check and replace ECU.

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Fig. 12: Codes 32 & 34 – (Cruise) Control Switch Circuit (2 Of 2)

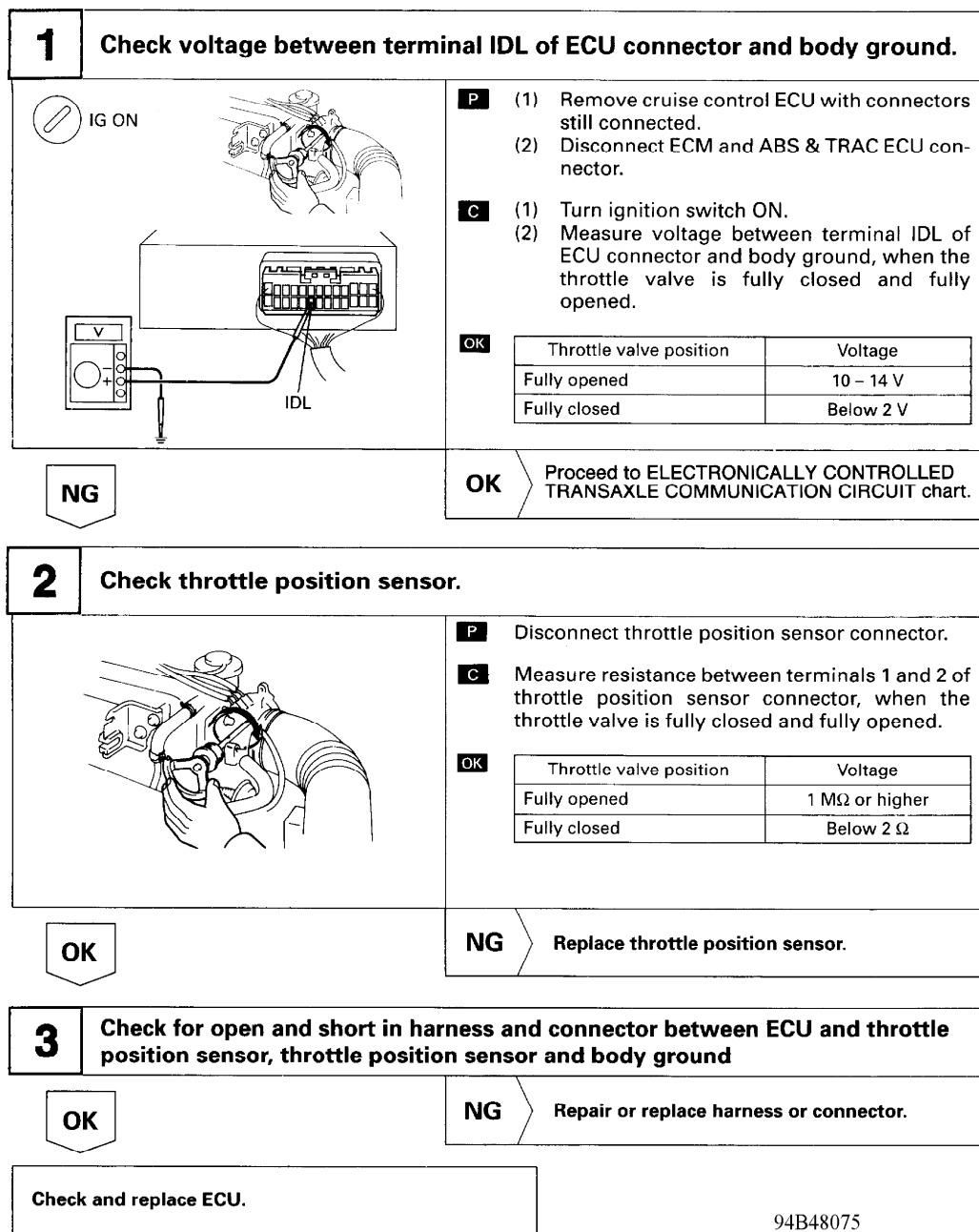
STOPLIGHT SWITCH CIRCUIT

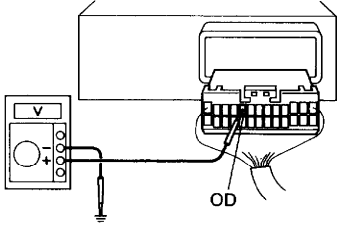


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Fig. 13: Stoplight Switch Circuit

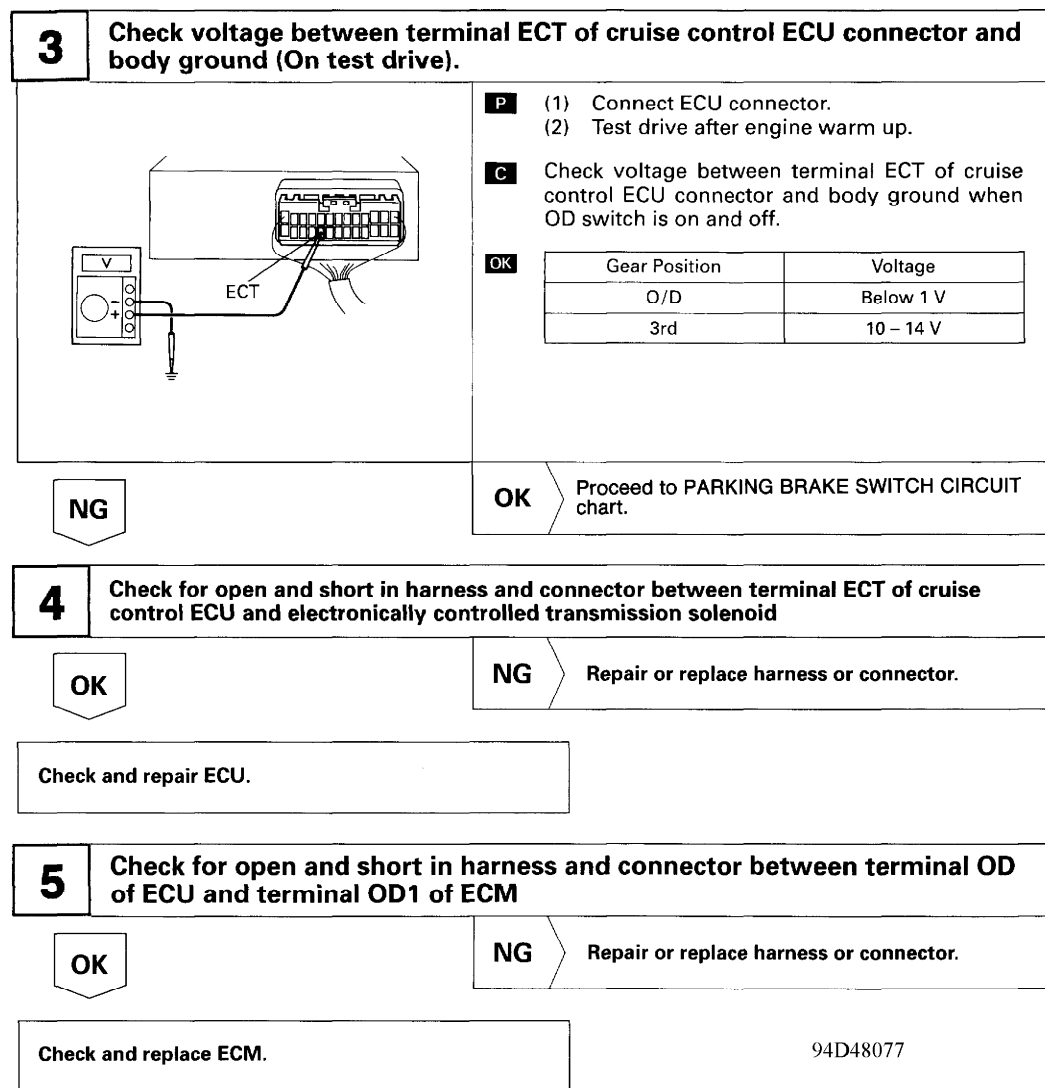
IDLE SWITCH CIRCUIT



1	Check operation of overdrive.
P	Test drive after engine warm up.
C	Check that overdrive ON ↔ OFF occurs with operation of OD switch ON-OFF.
OK	NG Check and Repair Electronic controlled transmission
2	Check voltage between terminal OD of harness side connector of ECU and body ground.
ON IG ON 	P Remove ECU with connector still connected. C (1) Disconnect ECU connector. (2) Turn ignition switch ON. (3) Measure voltage between terminal OD of harness side connector of ECU and body ground. OK Voltage: 10 – 14 V
OK	NG Go to step 5.
Go to step 3 .	

94C48076

Fig. 15: Electronically Controlled Transaxle Communication Circuit
(1 OF 2)



4

Check for open and short in harness and connector between terminal ECT of cruise control ECU and electronically controlled transmission solenoid

OK

NG

Repair or replace harness or connector.

Check and repair ECU.

5

Check for open and short in harness and connector between terminal OD of ECU and terminal OD1 of ECM

OK

NG

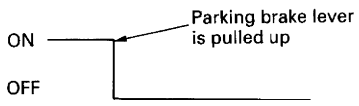
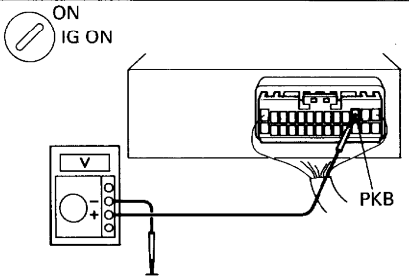
Repair or replace harness or connector.

Check and replace ECM.

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Fig. 16: Electronically Controlled Transaxle Communication Circuit
(2 Of 2)

PARKING BRAKE SWITCH CIRCUIT

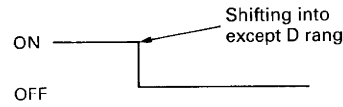
1	Check operation of brake warning light.								
C Check that the brake warning light in the instrument panel comes on when the parking brake lever is pulled up with the engine running, and the light goes off when the parking brake lever is released.									
OK		NG							
		Check brake warning light circuit.							
2	Input signal check.								
		C 1. See input signal check 2. Check the indicator light when the parking brake lever is pulled up. OK The indicator light goes off when the parking brake lever is pulled up.							
NG		OK							
		Proceed to PARK/NEUTRAL SWITCH CIRCUIT (A/T) chart.							
3	Check voltage between terminal PKB of cruise control ECU connector and body ground.								
		P Remove cruise control ECU with connectors still connected. C 1. Turn ignition switch ON. 2. Measure voltage between terminal PKB of cruise control ECU connector and body ground, when the parking brake lever is pulled up and released. OK <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th>Parking brake lever</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>Pulled up</td> <td>Below 1 V</td> </tr> <tr> <td>Released</td> <td>10 – 14 V</td> </tr> </tbody> </table>		Parking brake lever	Voltage	Pulled up	Below 1 V	Released	10 – 14 V
Parking brake lever	Voltage								
Pulled up	Below 1 V								
Released	10 – 14 V								
NG		OK							
		Proceed to PARK/NEUTRAL SWITCH CIRCUIT (A/T) chart.							
4	Check for open in harness and connector between cruise control ECU and brake warning light.								
OK		NG							
		Repair or replace harness or connector.							
Check and replace cruise control ECU.									

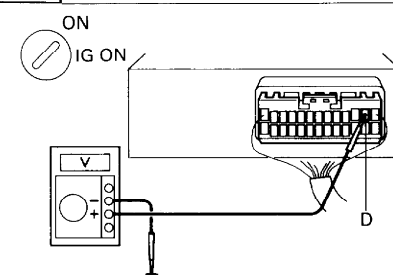
94E48078

Fig. 17: Parking Brake Switch Circuit

PARK/NEUTRAL SWITCH CIRCUIT (A/T)

1	Check operation of starter.	
C Check that the starter operates normally and that the engine starts.		
OK		NG Diagnose and repair engine as necessary.

2	Input signal check.	
		P (1) See input signal check (2) Check the indicator light when shifting into except D range. OK The indicator light goes off when shifting into except D range.
NG		OK Proceed to CLUTCH SWITCH CIRCUIT (M/T) chart.

3	Check voltage between terminal D of ECU connector and body ground.							
		P Remove ECU with connectors still connected. C (1) Turn ignition switch ON. (2) Measure voltage between terminal D of ECU connector and body ground, when shifting into D range and other ranges. OK <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <thead> <tr> <th style="text-align: center;">Shift Position</th> <th style="text-align: center;">Voltage</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">D range</td> <td style="text-align: center;">10 – 14 V</td> </tr> <tr> <td style="text-align: center;">Other ranges</td> <td style="text-align: center;">Below 1 V</td> </tr> </tbody> </table>	Shift Position	Voltage	D range	10 – 14 V	Other ranges	Below 1 V
Shift Position	Voltage							
D range	10 – 14 V							
Other ranges	Below 1 V							
NG		OK Proceed to CLUTCH SWITCH CIRCUIT (M/T) chart.						

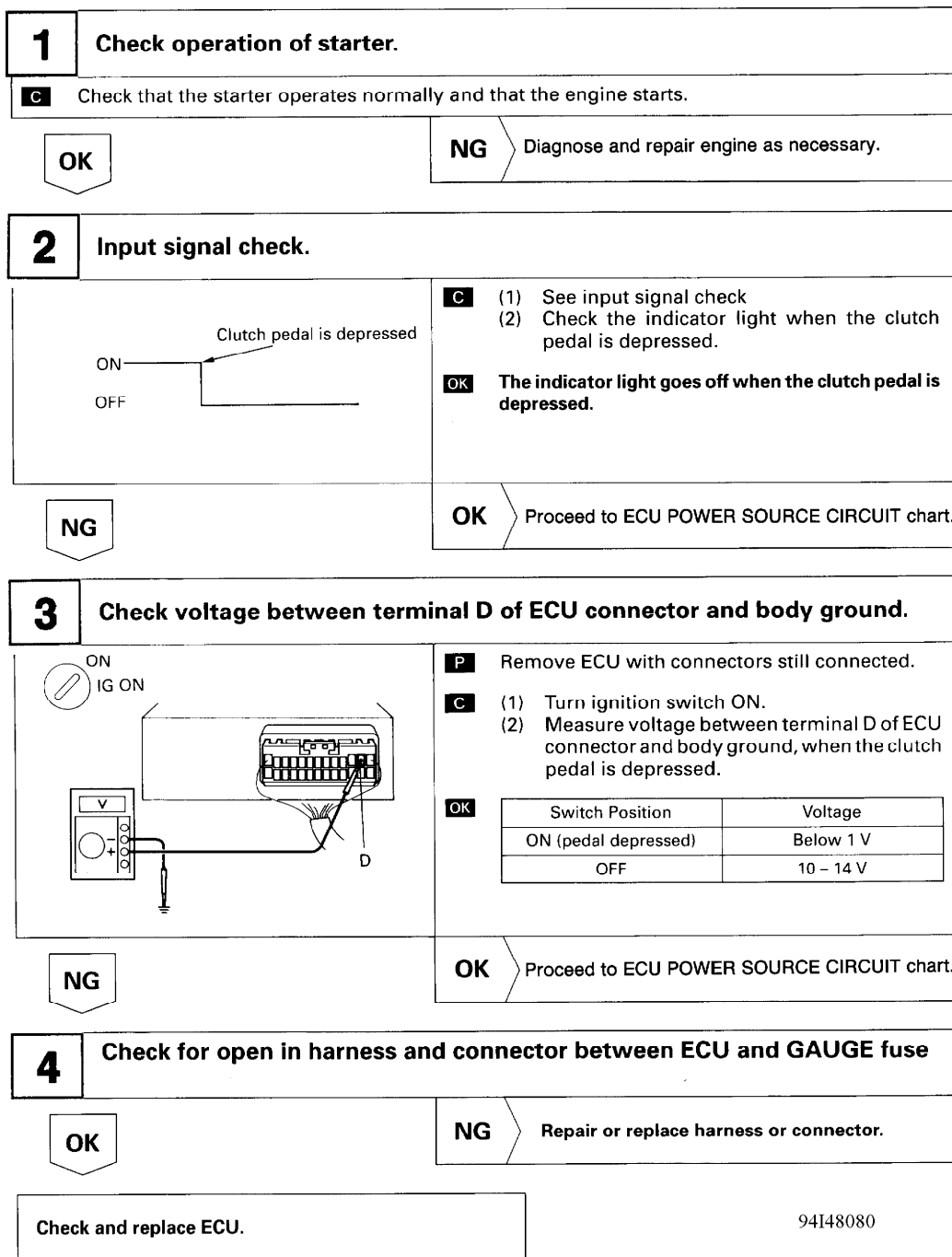
4	Check for open in harness and connector between ECU and GAUGE fuse	
OK		NG Repair or replace harness or connector.

Check and replace ECU.

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Fig. 18: Park/Neutral Switch Circuit (A/T)

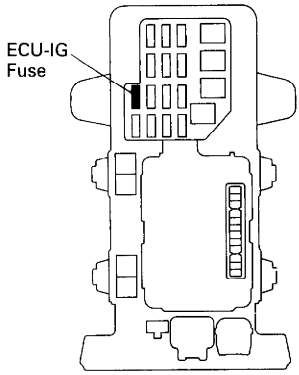
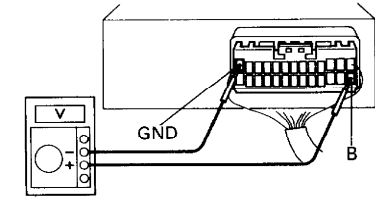
CLUTCH SWITCH CIRCUIT (M/T)



94I48080

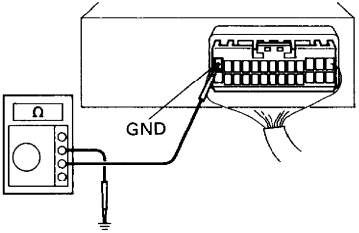
Fig. 19: Clutch Switch Circuit (M/T)

ECU POWER SOURCE CIRCUIT

1 Check ECU-IG fuse.	
Inpane J/B 	P Remove ECU-IG fuse from Inpane J/B. OK Check continuity of ECU-IG fuse. OK Continuity
OK	NG Check for short in all the harness and components connected to the ECU-IG fuse
2 Check voltage between terminals B and GND of ECU connector.	
ON IG ON 	P Remove ECU with connectors still connected. C (1) Turn ignition switch ON. (2) Measure voltage between terminals B and GND of ECU connector. OK Voltage: 10 – 14 V
NG	OK Proceed to BACK-UP POWER SOURCE CIRCUIT chart.
Go to stpe 3 .	

94J48081

Fig. 20: ECU Power Source Circuit (1 Of 2)

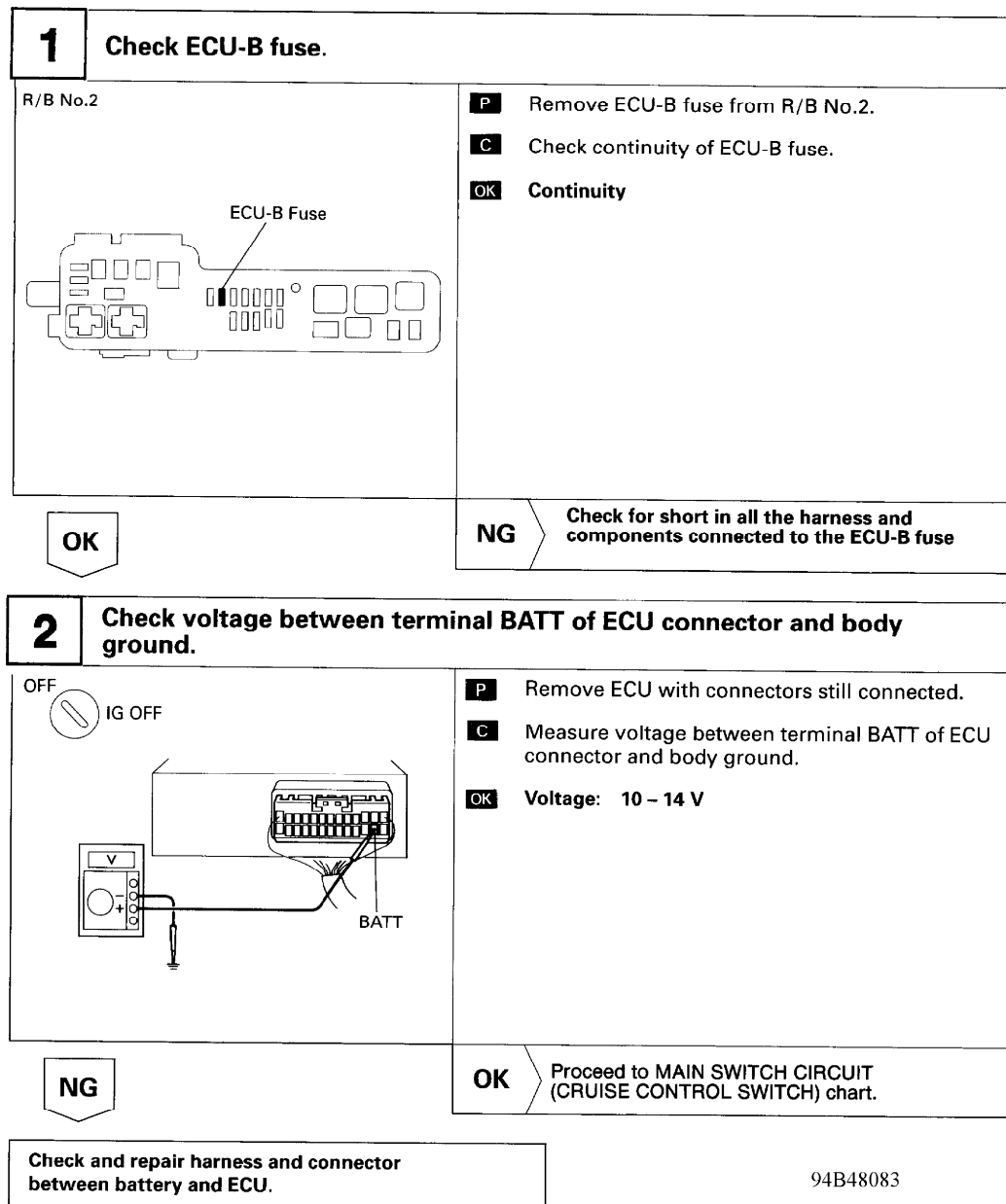
3	Check continuity between terminal GND of ECU connector and body ground.
OFF  IG OFF 	C Measure resistance between terminal GND of cruise control ECU connector and body ground. OK Resistance: 1 Ω or less
OK	NG Repair or replace harness or connector.

Check and repair harness and connector between battery and ECU.

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Fig. 21: ECU Power Source Circuit (2 Of 2)

BACK-UP POWER SOURCE CIRCUIT



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Fig. 22: Back-up Power Source Circuit

MAIN SWITCH CIRCUIT (CRUISE CONTROL SWITCH)

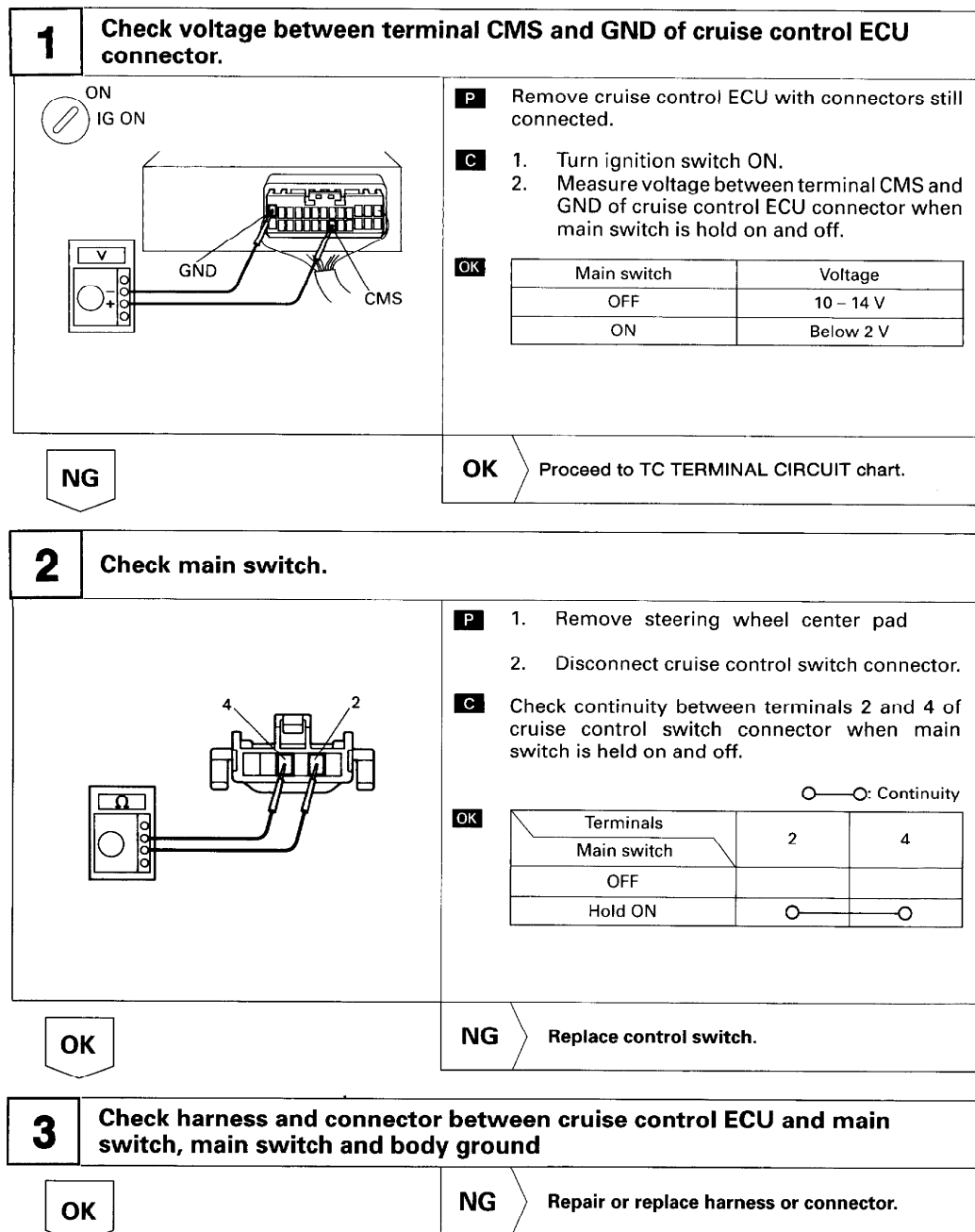
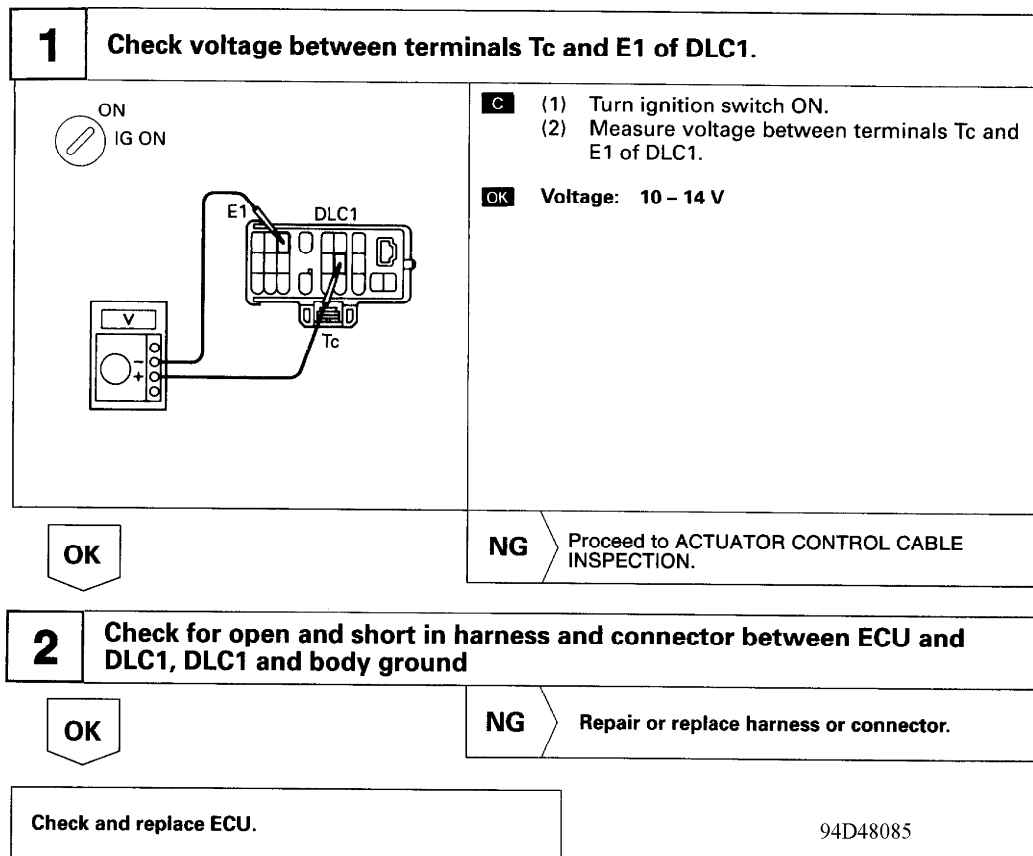


Fig. 23: Main Switch Circuit (Cruise Control Switch)

TC TERMINAL CIRCUIT



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Fig. 24: TC Terminal Circuit

WIRING DIAGRAM

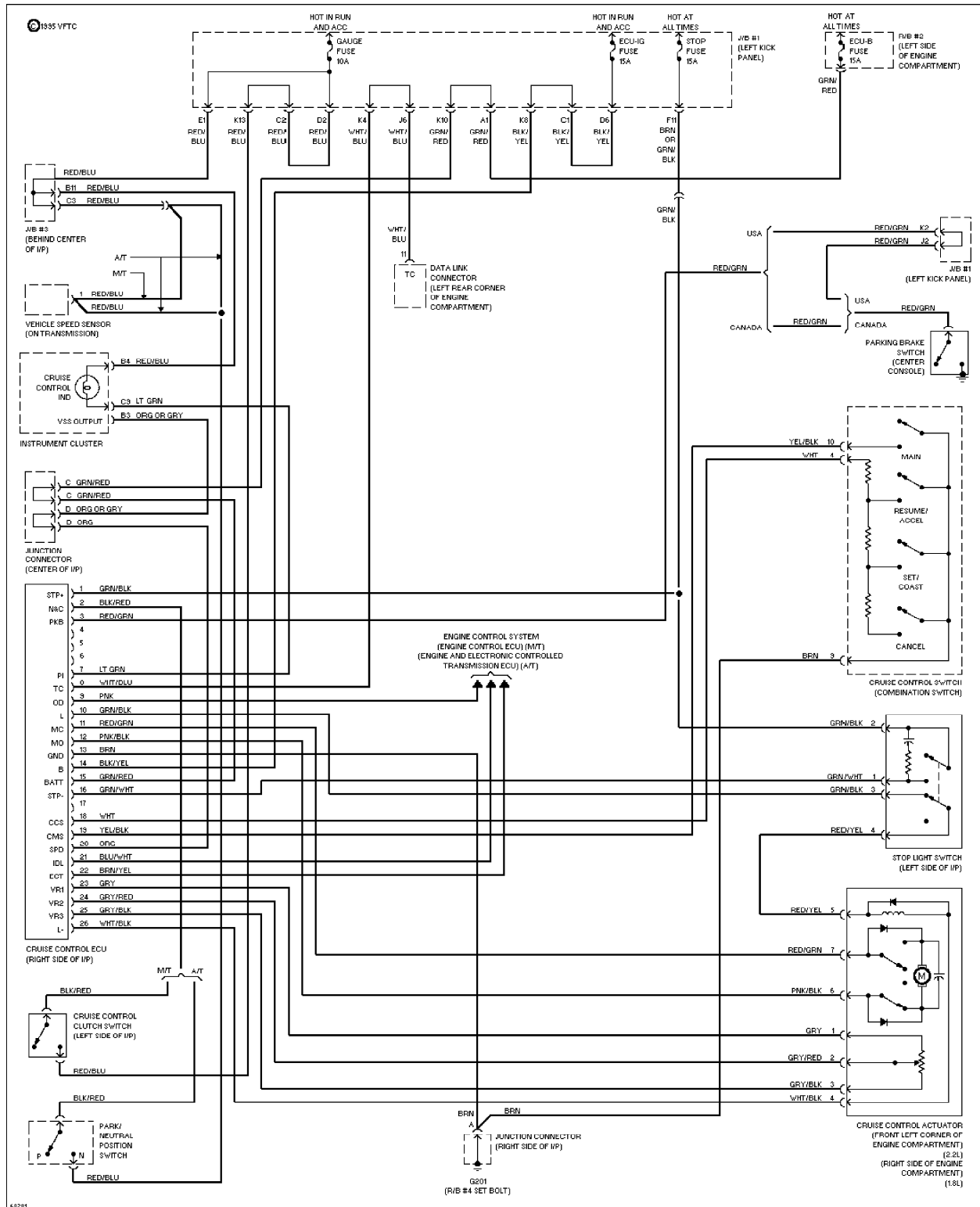


Fig. 25: Cruise Control System Wiring Diagram