

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

2009 ACCESSORIES & EQUIPMENT**Cruise Control - Highlander****CRUISE CONTROL SYSTEM****PRECAUTION**

NOTE: When disconnecting the cable from the negative (-) battery terminal, initialize the following system(s) after the cable is reconnected.

SYSTEM NAME REFERENCE CHART

System Name	See procedure
Power Back Door System	<u>INITIALIZATION</u>

1. HANDLING PRECAUTION FOR CRUISE CONTROL SYSTEM

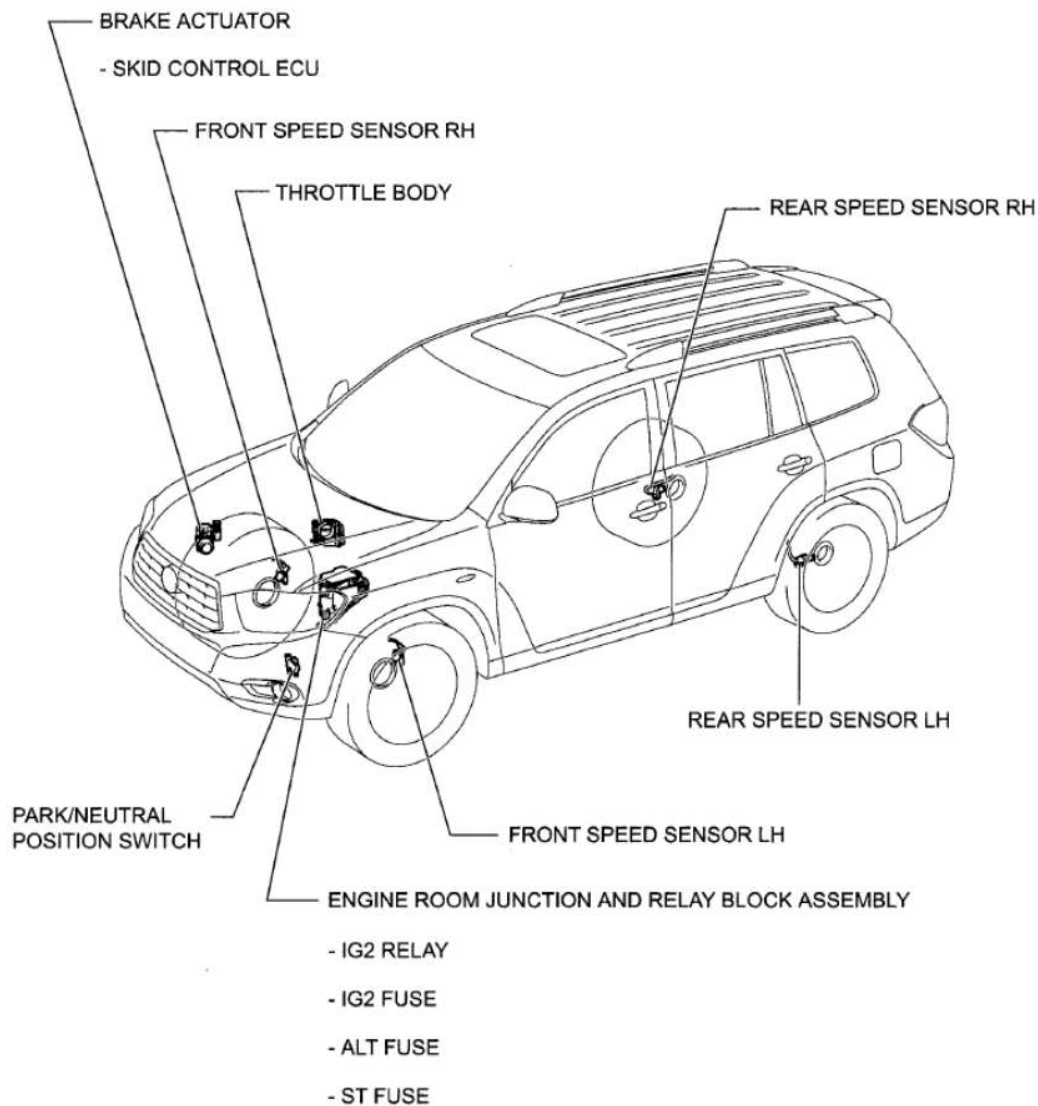
- a. Turn the cruise control main switch off when not using the cruise control system.
- b. Be careful as the vehicle speed increases when driving downhill with the cruise control system on.
- c. The + (ACCEL)/RES (RESUME) operation changes according to the cruise control system status. When the cruise control system is operating, the + (ACCEL) function operates. When the cruise control system is not operating, the RES (RESUME) function operates.
- d. If the CRUISE main indicator light blinks while the cruise control system is operating, turn the cruise control main switch off to reset the cruise control system. After the reset, if the cruise control main switch cannot be turned on, or the cruise control system is canceled immediately after turning the cruise control main switch on, the system may have a malfunction.
- e. Do not use the cruise control system where the road conditions are as follows:
 - Heavy traffic
 - Steep decline
 - Roads with sharp turns
 - Icy or snowy roads
 - Slippery roads
- f. Do not use the cruise control system while towing.

PARTS LOCATION

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

For 2GR-FE:



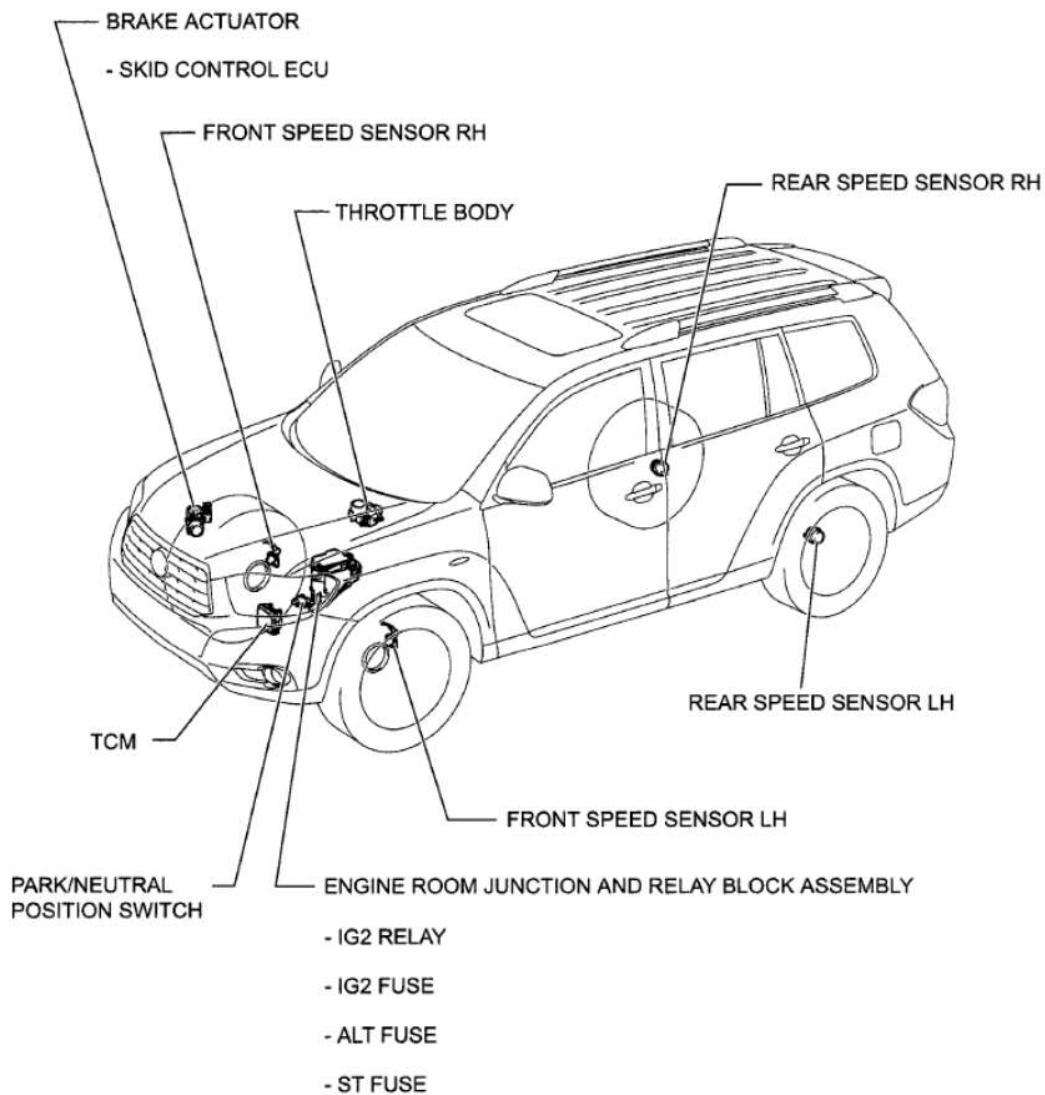
E186793E01

Fig. 1: Identifying Cruise Control System Parts Location (1 Of 3)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

For 1AR-FE:

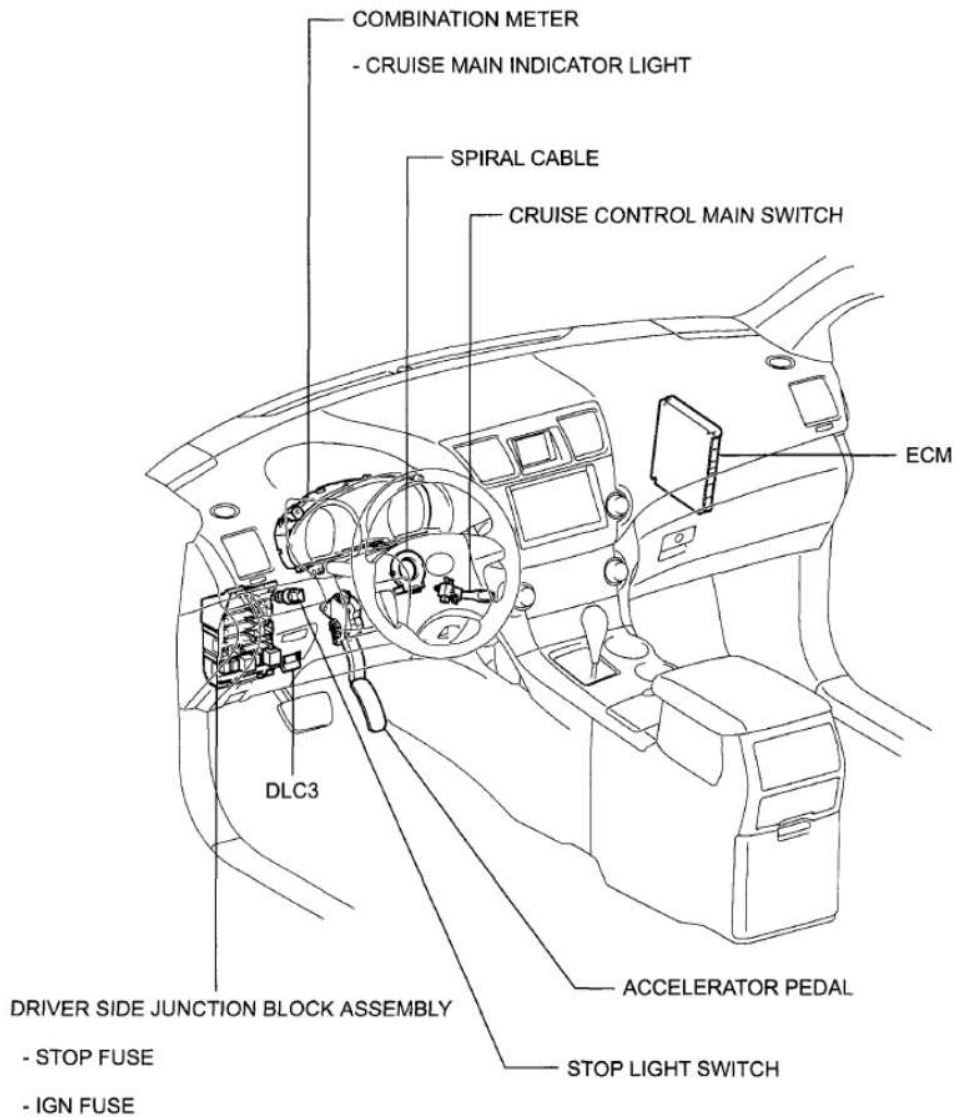


E185764E01

Fig. 2: Identifying Cruise Control System Parts Location (2 Of 3)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander



H

E101263E04

Fig. 3: Identifying Cruise Control System Parts Location (3 Of 3)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

SYSTEM DIAGRAM

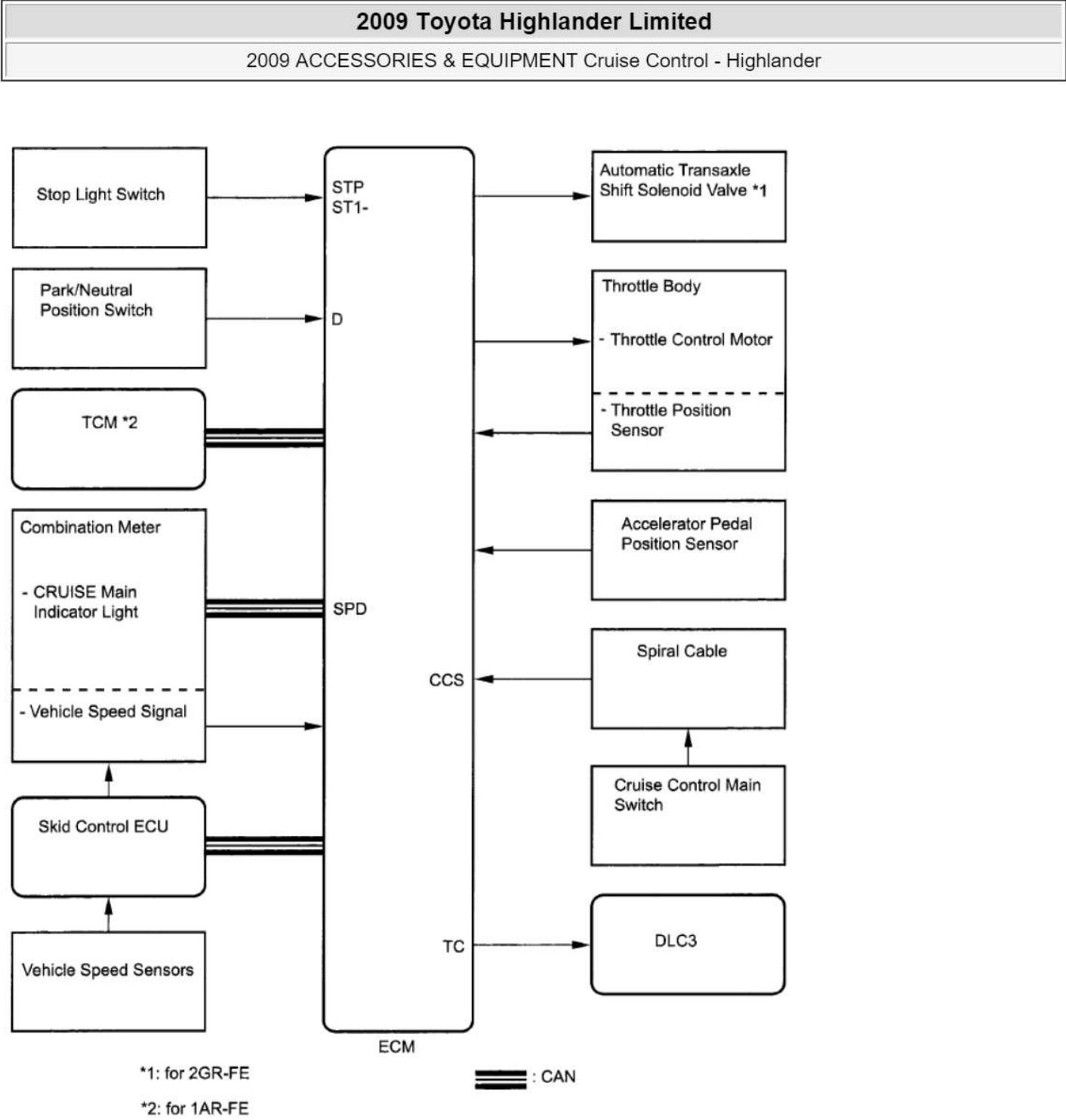


Fig. 4: Cruise Control System Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Communication Table

COMMUNICATION REFERENCE CHART

Sender	Receiver	Signal	Line
ECM	Combination meter	CRUISE main indicator operation signal	CAN

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

ECM	TCM (for 1AR-FE)	Shift up/down request signal	CAN
TCM (for 1AR-FE)	ECM	Shift up/down response	CAN

SYSTEM DESCRIPTION

1. CRUISE CONTROL SYSTEM

This system is controlled by the ECM, and is activated by the throttle position sensor and motor. The ECM controls the following functions: ON-OFF, - (COAST)/SET, + (ACCEL)/RES (RESUME), CANCEL, vehicle speed control, motor output control, and shift down control.

- The ECM compares the vehicle speed from the speed sensor with the stored vehicle speed set through the cruise control main switch. The ECM instructs the throttle valve motor of the throttle body assembly to close the valve when the vehicle speed is greater than the stored speed, and instructs it to open the valve when the vehicle speed is less than the stored speed.
- The ECM receives signals such as ON-OFF, - (COAST)/SET, + (ACCEL)/RES (RESUME), and CANCEL from the cruise control main switch and executes the command.
- The ECM illuminates the combination meter CRUISE main indicator light when it receives a cruise control main switch ON signal.
- The ECM cancels cruise control operation when the brake pedal is depressed and the ECM receives a stop light switch signal.
- The ECM cancels cruise control operation when the shift lever is moved from the D to the N position or the transmission is shifted to the 3rd, 2nd, or 1st gear with the shift lever in the S position, and the ECM receives a park/neutral position switch signal.

2. LIMIT CONTROL

a. Low speed limit

The lowest possible limit of the speed setting range is set at approximately 40 km/h (25 mph). The cruise control system cannot be set when the vehicle speed is below the low speed limit. Cruise control operation will be automatically canceled but the stored vehicle speed will be retained when the vehicle speed drops below the low speed limit of 40 km/h (25 mph) while the cruise control is in operation.

b. High speed limit

The highest possible limit of the speed setting range is set at approximately 200 km/h (125 mph). The cruise control system cannot be set when the vehicle speed is over the high speed limit. Also, + (ACCEL)/RES (RESUME) cannot be used to increase speed beyond the high speed limit.

3. OPERATION OF CRUISE CONTROL

The cruise control main switch operates 7 functions: SET, - (COAST), TAP-DOWN, RES (RESUME), + (ACCEL), TAP-UP, and CANCEL. The SET, TAP-DOWN, and - (COAST) functions, and the RES (RESUME), TAP-UP and + (ACCEL) functions are operated with the same switch. The cruise control main switch is an automatic return type switch which turns on only while it is operated in the direction of each arrow and turns off after being released.

2009 Toyota Highlander Limited**2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander****a. SET CONTROL**

Vehicle speed is stored and constant speed control is maintained when pushing the cruise control main switch to - (COAST)/SET while driving with the main switch on (the CRUISE main indicator light is on), and the vehicle speed is within the set speed range (between the low and high speed limits).

b. - (COAST) CONTROL

When the cruise control main switch is set to - (COAST)/SET and held in that position while the cruise control system is operating, the ECM sends a "throttle valve opening angle 0°" demand signal to the cruise control system. Then the vehicle speed, when the cruise control main switch is released, is stored and maintained.

HINT:

An actual throttle valve opening angle of 0° is not possible due to the idle speed control, etc.

c. TAP-DOWN CONTROL

When tapping down the cruise control main switch to - (COAST)/SET (for approximately 0.6 seconds) while the cruise control system is in operation, the stored vehicle speed decreases each time by approximately 1.6 km/h (1.0 mph). When the cruise control main switch is released from - (COAST)/SET and the difference between the driving and stored vehicle speeds is more than 5 km/h (3 mph), the vehicle speed is stored and constant speed control is maintained.

d. ACCELERATION CONTROL

The throttle valve motor of the throttle body assembly is instructed by the ECM to open the throttle valve when pushing and holding the cruise control main switch to + (ACCEL)/RES (RESUME) while the cruise control system is in operation. When the cruise control main switch is released from + (ACCEL)/RES (RESUME), the vehicle speed is stored and the vehicle is controlled at a constant speed.

e. TAP-UP CONTROL

When tapping up the cruise control main switch to + (ACCEL)/RES (RESUME) (for approximately 0.6 seconds) while the cruise control system is in operation, the stored vehicle speed increases each time by approximately 1.6 km/h (1.0 mph). However, when the difference between the driving and the stored vehicle speeds is more than 5 km/h (approximately 3 mph), the stored vehicle speed will not be changed.

f. RESUME CONTROL

If cruise control operation was canceled with the stop light switch or the CANCEL switch, and even if driving speed is less than the lower speed control limit, pushing the cruise control main switch to + (ACCEL)/RES (RESUME) restores vehicle speed memorized at the time of

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

cancellation, and maintains constant speed control. This resume operation will occur after the vehicle speed has risen higher than the lower speed control limit.

g. MANUAL CANCEL CONTROL

Performing any of the following cancels the cruise control system while in operation (the stored vehicle speed in the ECM is maintained).

- Depressing the brake pedal
- The shift lever is moved from the D to the N position or the transmission is shifted to the 3rd, 2nd, or 1st gear with the shift lever in the S position.
- Pulling the cruise control main switch to CANCEL
- Turning the cruise control main switch off (the stored vehicle speed in the ECM is not maintained.)

4. AUTO CANCEL (FAIL-SAFE)

This system has an automatic cancellation function (failsafe) (See **FAIL-SAFE CHART**).

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedures to troubleshoot the cruise control system.
- *: Use the Techstream.

1. **VEHICLE BROUGHT TO WORKSHOP**
2. **PROBLEM SYMPTOM CONFIRMATION**
3. **CHECK CAN COMMUNICATION SYSTEM***

Refer to PRECAUTION (See **CAN COMMUNICATION SYSTEM**).

- a. Check for output DTCs.

Result

RESULT CHART

Result	Proceed to
CAN DTC is not output	A
CAN DTC is output	B

HINT:

The ECM of this system is connected to the CAN communication system. Therefore, before starting troubleshooting, make sure to check that there is no trouble in the CAN communication system.

2009 Toyota Highlander Limited**2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander****B: PROCEED TO "CAN COMMUNICATION SYSTEM"****A: Go to next step****4. DTC CHECK AND CLEAR***Refer to DTC CHECK/CLEAR (See DTC CHECK/CLEAR).**5. DTC CHECK (OTHER THAN CAN SYSTEM DTC)*****Result****RESULT CHART**

Result	Proceed to
DTC is not output	A
DTC is output	B

A GO TO STEP 7**B: Go to next step****6. DTC CHART**Refer to DIAGNOSTIC TROUBLE CODE CHART (See DIAGNOSTIC TROUBLE CODE CHART).**GO TO STEP 10****7. PROBLEM SYMPTOM CONFIRMATION****Result****RESULT CHART**

Result	Proceed to
Symptom occurs	A
Symptom does not occur	B

A GO TO STEP 9**B: Go to next step****8. SYMPTOM SIMULATION**Refer to ELECTRONIC CIRCUIT INSPECTION PROCEDURE (See ELECTRONIC CIRCUIT INSPECTION PROCEDURE).

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

GO TO STEP 7

9. PROBLEM SYMPTOMS TABLE

Refer to PROBLEM SYMPTOMS TABLE (See PROBLEM SYMPTOMS TABLE).

10. CIRCUIT INSPECTION

11. TERMINALS OF ECM

Refer to TERMINALS OF ECM (See TERMINALS OF ECM).

12. IDENTIFICATION OF PROBLEM

13. REPAIR OR REPLACE

14. CONFIRMATION TEST

END

ROAD TEST

1. PROBLEM SYMPTOM CONFIRMATION

- a. Inspect the SET function.
 1. Turn the cruise control main switch on.
 2. Drive at the required speed of between 40 km/h (25 mph) and 200 km/h (125 mph).
 3. Push the cruise control main switch to - (COAST)/SET.
 4. After releasing the switch, check that the vehicle cruises at the set speed.

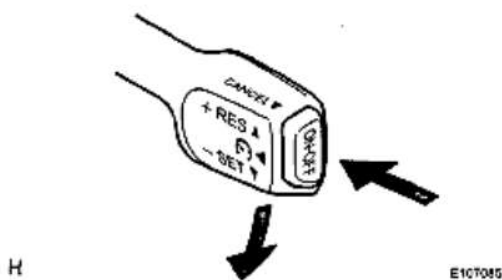


Fig. 5: Checking SET Function

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

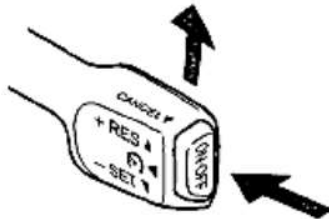
- b. Inspect the + (ACCEL) function.
 1. Turn the cruise control main switch on.
 2. Drive at the required speed of between 40 km/h (25 mph) and 200 km/h (125 mph).
 3. Push the cruise control main switch to - (COAST)/SET.
 4. Check that vehicle speed increases while the cruise control main switch is pushed to + (ACCEL)/RES (RESUME), and that the vehicle cruises at the newly set speed when the

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

switch is released.

5. Push the cruise control main switch to + (ACCEL)/RES (RESUME) and then release it immediately. Check that vehicle speed increases by approximately 1.6 km/h (1.0 mph) (tap-up control).

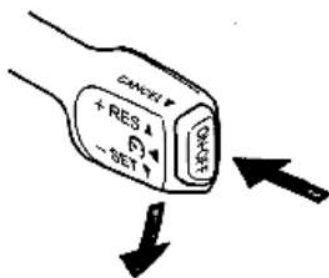


H

E107085

Fig. 6: Checking ACCELERATION Function
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Inspect the - (COAST) function.
 1. Turn the cruise control main switch on.
 2. Drive at the required speed of between 40 km/h (25 mph) and 200 km/h (125 mph).
 3. Push the cruise control main switch to - (COAST)/SET.
 4. Check that vehicle speed decreases while the cruise control main switch is pushed to - (COAST)/SET, and that the vehicle cruises at the newly set speed when the switch is released.
 5. Push the cruise control main switch to - (COAST)/SET, and then release it immediately. Check that vehicle speed decreases by approximately 1.6 km/h (1.0 mph) (tap-down control).



H

E107085

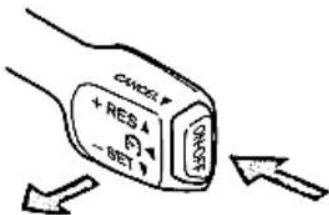
Fig. 7: Checking SET Function
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Inspect the CANCEL function.
 1. Turn the cruise control main switch on.
 2. Drive at the required speed of between 40 km/h (25 mph) and 200 km/h (125 mph).
 3. Push the cruise control main switch to - (COAST)/SET.
 4. When performing any one of the following, check that the cruise control system is canceled and that the normal driving mode returns.

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

- Depressing the brake pedal
- The shift lever is moved from the D to the N position or the transmission is shifted to the 3rd, 2nd or 1st gear with the shift lever in the S position.
- Turning the cruise control main switch off
- Pulling the cruise control main switch to CANCEL

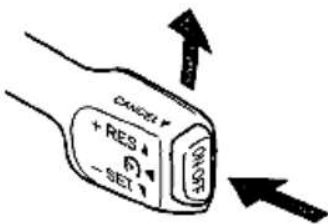


H

E107067

Fig. 8: Checking CANCEL Function
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- e. Inspect the RES (RESUME) function.
1. Turn the cruise control main switch on.
 2. Drive at the required speed of between 40 km/h (25 mph) and 200 km/h (125 mph).
 3. Push the cruise control main switch to - (COAST)/SET.
 4. Cancel cruise control operation by performing any of the above operations (other than turning the main switch off).
 5. After pushing the cruise control main switch to + (ACCEL)/RES (RESUME) at a speed of more than 40 km/h (25 mph), check that the vehicle resumes the speed set prior to the cancellation.



H

E107068

Fig. 9: Checking ACCELERATION Function
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of the problem symptom. The likely causes of the

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

problem are indicated in descending order. Check each suspected area in order. Repair or replace faulty parts or perform adjustments as necessary.

- Inspect the fuse and relay related to this system before inspecting the suspected areas below.

CRUISE CONTROL SYSTEM:

CRUISE CONTROL SYSTEM - PROBLEM SYMPTOMS CHART

Symptom	Suspected Area	Refer to
Vehicle speed cannot be set. (The CRUISE main indicator light comes on.)	Cruise control switch circuit	<u>CRUISE CONTROL SWITCH CIRCUIT</u>
	Combination meter	<u>HOW TO PROCEED WITH TROUBLESHOOTING</u>
	Vehicle speed sensor circuit	<u>DTC P0500 VEHICLE SPEED SENSOR MALFUNCTION; DTC P0503 VEHICLE SPEED SENSOR CIRCUIT MALFUNCTION</u>
	Stop light switch circuit	<u>DTC P0571 BRAKE SWITCH "A" CIRCUIT</u>
	Transmission range sensor circuit (for U151E)	<u>DTC P0705 TRANSMISSION RANGE SENSOR CIRCUIT MALFUNCTION (PRNDL INPUT)</u>
	Transmission range sensor circuit (for U151F)	<u>DTC P0705 TRANSMISSION RANGE SENSOR CIRCUIT MALFUNCTION (PRNDL INPUT)</u>
	Transmission range sensor circuit (for U760E)	<u>INSPECTION PROCEDURE</u>
	If the symptom still occurs after the above areas have been inspected and have proven to be normal, replace the ECM (for 2GR-FE).	<u>FUEL INJECTOR CIRCUIT</u>
	If the symptom still occurs after the above areas have been inspected and have proven to be normal, replace the ECM (for 1AR-FE).	<u>REMOVAL</u>
	Stop light switch circuit	<u>DTC P0571 BRAKE SWITCH "A" CIRCUIT</u>
	Vehicle speed sensor circuit	<u>DTC P0500 VEHICLE SPEED SENSOR MALFUNCTION; DTC P0503 VEHICLE SPEED SENSOR CIRCUIT MALFUNCTION</u>
	Cruise control switch circuit	<u>CRUISE CONTROL SWITCH CIRCUIT</u>
	Transmission range sensor	<u>DTC P0705 TRANSMISSION RANGE</u>

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

Pushing the ON-OFF button does not turn the cruise control system on. (Vehicle speed cannot be set.)	circuit (for U151E)	<u>SENSOR CIRCUIT MALFUNCTION (PRNDL INPUT)</u>
	Transmission range sensor circuit (for U151F)	<u>DTC P0705 TRANSMISSION RANGE SENSOR CIRCUIT MALFUNCTION (PRNDL INPUT)</u>
	Transmission range sensor circuit (for U760E)	<u>INSPECTION PROCEDURE</u>
	Combination meter	<u>HOW TO PROCEED WITH TROUBLESHOOTING</u>
	If the symptom still occurs after the above areas have been inspected and have proven to be normal, replace the ECM (for 2GR-FE).	<u>FUEL INJECTOR CIRCUIT</u>
	If the symptom still occurs after the above areas have been inspected and have proven to be normal, replace the ECM (for 1AR-FE).	<u>REMOVAL</u>
Pushing the ON-OFF button does not turn the cruise control system on. (Vehicle speed can be set.)	Cruise main indicator light circuit	<u>CRUISE MAIN INDICATOR LIGHT CIRCUIT</u>
	If the symptom still occurs after the above area has been inspected and has proven to be normal, replace the ECM (for 2GR-FE).	<u>FUEL INJECTOR CIRCUIT</u>
	If the symptom still occurs after the above areas have been inspected and have proven to be normal, replace the ECM (for 1AR-FE).	<u>REMOVAL</u>
The cruise control is canceled while it is operating.	Stop light switch circuit	<u>DTC P0571 BRAKE SWITCH "A" CIRCUIT</u>
	Transmission range sensor circuit (for U151E)	<u>DTC P0705 TRANSMISSION RANGE SENSOR CIRCUIT MALFUNCTION (PRNDL INPUT)</u>
	Transmission range sensor circuit (for U151F)	<u>DTC P0705 TRANSMISSION RANGE SENSOR CIRCUIT MALFUNCTION (PRNDL INPUT)</u>
	Transmission range sensor circuit (for U760E)	<u>INSPECTION PROCEDURE</u>
	Cruise control switch circuit	<u>CRUISE CONTROL SWITCH CIRCUIT</u>
	Vehicle speed sensor circuit	<u>DTC P0500 VEHICLE SPEED SENSOR MALFUNCTION; DTC P0503 VEHICLE SPEED SENSOR</u>

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

		<u>CIRCUIT MALFUNCTION</u>
	If the symptom still occurs after the above areas have been inspected and have proven to be normal, replace the ECM (for 2GR-FE).	<u>FUEL INJECTOR CIRCUIT</u>
	If the symptom still occurs after the above areas have been inspected and have proven to be normal, replace the ECM (for 1AR-FE).	<u>REMOVAL</u>
Pulling back on the cruise control main switch does not cancel the cruise control. (The CRUISE main indicator light remains on.)	Cruise control switch circuit	<u>CRUISE CONTROL SWITCH CIRCUIT</u>
	If the symptom still occurs after the above area has been inspected and has proven to be normal, replace the ECM (for 2GR-FE).	<u>FUEL INJECTOR CIRCUIT</u>
	If the symptom still occurs after the above areas have been inspected and have proven to be normal, replace the ECM (for 1AR-FE).	<u>REMOVAL</u>
Pulling back on the cruise control main switch does not cancel the cruise control. (The CRUISE main indicator light goes off.)	ECM (for 2GR-FE)	<u>FUEL INJECTOR CIRCUIT</u>
	ECM (for 1AR-FE)	<u>REMOVAL</u>
The cruise control is not canceled when vehicle speed drops below the low speed limit. (The CRUISE main indicator light remains on.)	Vehicle speed sensor circuit	<u>DTC P0500 VEHICLE SPEED SENSOR MALFUNCTION; DTC P0503 VEHICLE SPEED SENSOR CIRCUIT MALFUNCTION</u>
	If the symptom still occurs after the above area has been inspected and has proven to be normal, replace the ECM (for 2GR-FE).	<u>FUEL INJECTOR CIRCUIT</u>
	If the symptom still occurs after the above areas have been inspected and have proven to be normal, replace the ECM (for 1AR-FE).	<u>REMOVAL</u>
The cruise control is not canceled when vehicle speed drops below the low speed limit. (The CRUISE main	ECM (for 2GR-FE)	<u>FUEL INJECTOR CIRCUIT</u>
	ECM (for 1AR-FE)	<u>REMOVAL</u>

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

indicator light goes off.)		
Depressing the brake pedal does not cancel the cruise control. (The CRUISE main indicator light remains on.)	Stop light switch circuit	<u>DTC P0571 BRAKE SWITCH "A" CIRCUIT</u>
	If the symptom still occurs after the above area has been inspected and has proven to be normal, replace the ECM (for 2GR-FE).	<u>FUEL INJECTOR CIRCUIT</u>
	If the symptom still occurs after the above areas have been inspected and have proven to be normal, replace the ECM (for 1AR-FE).	<u>REMOVAL</u>
Depressing the brake pedal does not cancel the cruise control. (The CRUISE main indicator light goes off.)	ECM (for 2GR-FE)	<u>FUEL INJECTOR CIRCUIT</u>
	ECM (for 1AR-FE)	<u>REMOVAL</u>
Moving the shift lever does not cancel the cruise control.	Transmission range sensor circuit (for U151E)	<u>DTC P0705 TRANSMISSION RANGE SENSOR CIRCUIT MALFUNCTION (PRNDL INPUT)</u>
	Transmission range sensor circuit (for U151F)	<u>DTC P0705 TRANSMISSION RANGE SENSOR CIRCUIT MALFUNCTION (PRNDL INPUT)</u>
	Transmission range sensor circuit (for U760E)	<u>INSPECTION PROCEDURE</u>
	If the symptom still occurs after the above area has been inspected and has proven to be normal, replace the ECM (for 2GR-FE).	<u>FUEL INJECTOR CIRCUIT</u>
	If the symptom still occurs after the above areas have been inspected and have proven to be normal, replace the ECM (for 1AR-FE).	<u>REMOVAL</u>
Hunting (Speed is not constant.)	Vehicle speed sensor circuit	<u>DTC P0500 VEHICLE SPEED SENSOR MALFUNCTION; DTC P0503 VEHICLE SPEED SENSOR CIRCUIT MALFUNCTION</u>
	If the symptom still occurs after the above area has been inspected and has proven to be normal, replace the ECM (for 2GR-FE).	<u>FUEL INJECTOR CIRCUIT</u>
	If the symptom still occurs after the above areas have been	

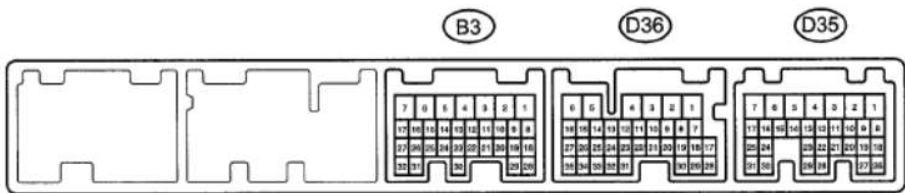
2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

	inspected and have proven to be normal, replace the ECM (for 1AR-FE).	<u>REMOVAL</u>
The CRUISE main indicator light remains blinking.	TC and CG terminal circuit	<u>TC AND CG TERMINAL CIRCUIT</u>
	If the symptom still occurs after the above area has been inspected and has proven to be normal, replace the ECM (for 2GR-FE).	<u>FUEL INJECTOR CIRCUIT</u>
	If the symptom still occurs after the above areas have been inspected and have proven to be normal, replace the ECM (for 1AR-FE).	<u>REMOVAL</u>

TERMINALS OF ECM

1. CHECK ECM (for 2GR-FE)



N

E127018ED8

Fig. 10: Identifying ECM (2GR-FE) Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TERMINAL DESCRIPTION

Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specified Condition
D35-15 (STP) - B3-1	R-W-B	Stop light signal	Ignition switch on (IG), Brake pedal depressed	11 to 14 V
D35-15 (STP) - B3-1 (E1)	R-W-B	Stop light signal	Ignition switch on (IG), Brake pedal released	Below 1 V
D35-16 (ST1-) - B3-1 (E1)	LG - W-B	Stop light signal	Ignition switch on (IG), Brake pedal depressed	Below 1 V
D35-16 (ST1-) - B3-1 (E1)	LG - W-B	Stop light signal	Ignition switch on (IG), Brake pedal released	11 to 14 V
D35-23 (TC) - B3-1 (E1)	L-W-B	Terminal TC of DLC3	Ignition switch on (IG)	11 to 14 V
D35-23 (TC) -	L-W-B	Terminal TC of	Terminals TC and CG of DLC3	Below 1 V

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

B3-1 (E1)		DLC3	connected	
D36-2 (CCS) - B3-1 (E1)	R-W-B	Cruise control main switch circuit	Ignition switch on (IG)	11 to 14 V
D36-2 (CCS) - B3-1 (E1)	R-W-B	Cruise control main switch circuit	CANCEL switch ON	6.6 to 10.1 V
D36-2 (CCS) - B3-1 (E1)	R-W-B	Cruise control main switch circuit	- SET switch ON	4.5 to 7.1 V
D36-2 (CCS) - B3-1 (E1)	R-W-B	Cruise control main switch circuit	+ RES switch ON	2.3 to 4.0 V
D36-2 (CCS) - B3-1 (E1)	R-W-B	Cruise control main switch circuit	MAIN switch ON	Below 1 V
D36-21 (D)-B3-1 (E1)	BR - W-B	D shift position signal	Ignition switch on (IG), shift lever in any position except D position	Below 1 V
D36-21 (D)-B3-1 (E1)	BR - W-B	D shift position signal	Ignition switch on (IG), shift lever in D position	11 to 14 V

2. CHECK ECM (for 1AR-FE)

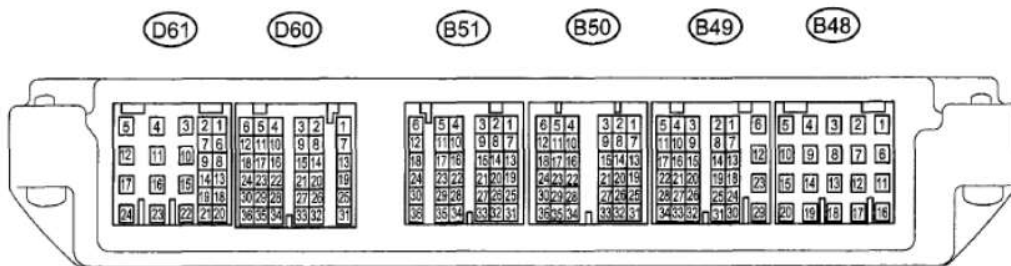


Fig. 11: Identifying ECM (1AR-FE) Connector Terminals

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

TERMINAL DESCRIPTION

Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specified Condition
D60-20 (STP) - B49-1 (E1)	R-W-B	Stop light signal	Ignition switch on (IG), Brake pedal depressed	11 to 14 V
D60-20 (STP) - B49-1 (E1)	R-W-B	Stop light signal	Ignition switch on (IG), Brake pedal released	Below 1 V
D60-15 (ST1-) - B49-1 (E1)	LG - W-B	Stop light signal	Ignition switch on (IG), Brake pedal depressed	Below 1 V
D60-15 (ST1-) - B49-1 (E1)	LG - W-B	Stop light signal	Ignition switch on (IG), Brake pedal released	11 to 14 V
D60-35 (TC) - B49-1 (E1)	Y-W-B	Terminal TC of DLC3	Ignition switch on (IG)	11 to 14 V

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

D60-35 (TC) - B49-1 (E1)	Y-W-B	Terminal TC of DLC3	Terminals TC and CG of DLC3 connected	Below 1 V
D60-14 (CCS) - B49-1 (E1)	B-W-B	Cruise control main switch circuit	Ignition switch on (IG)	11 to 14 V
D60-14 (CCS) - B49-1 (E1)	B-W-B	Cruise control main switch circuit	CANCEL switch ON	6.6 to 10.1 V
D60-14 (CCS) - B49-1 (E1)	B-W-B	Cruise control main switch circuit	-SET switch ON	4.5 to 7.1 V
D60-14 (CCS) - B49-1 (E1)	B-W-B	Cruise control main switch circuit	+ RES switch ON	2.3 to 4.0 V
D60-14 (CCS) - B49-1 (E1)	B-W-B	Cruise control main switch circuit	MAIN switch ON	Below 1 V
B50-30 (D) - B49-1 (E1)	G-W-B	D shift position signal	Ignition switch on (IG), shift lever in any position except D position	Below 1 V
B50-30 (D) - B49-1 (E1)	G-W-B	D shift position signal	Ignition switch on (IG), shift lever in D position	11 to 14 V

DIAGNOSIS SYSTEM

1. CHECK DLC3

- a. Check the DLC3 (See **HOW TO TROUBLESHOOT ECU CONTROLLED SYSTEMS**).

2. CHECK INDICATOR

- a. Turn the ignition switch on (IG).

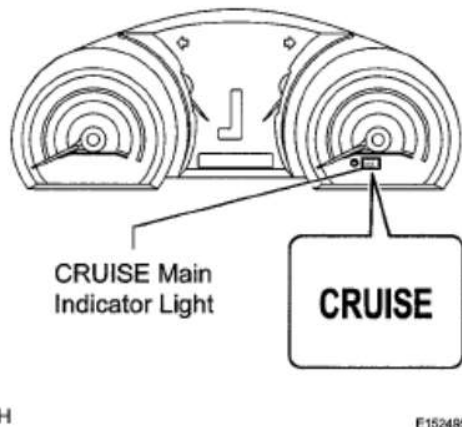


Fig. 12: Identifying CRUISE Main Indicator Light
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Check that the CRUISE main indicator light illuminates when the cruise control main switch is turned on, and that the indicator light turns off when the main switch is turned off. If the results are not as specified, inspect the CRUISE main indicator light circuit (See **CRUISE MAIN INDICATOR LIGHT CIRCUIT**).

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

HINT:

While driving with cruise control, the ECM activates AUTO CANCEL of the cruise control system when a malfunction occurs in one of the following: vehicle speed sensors, stop light switch, or other related parts. When AUTO CANCEL is activated, the CRUISE main indicator light outputs the blinking pattern as shown in the illustration. At the same time, data of the malfunction is stored as a DTC.

CRUISE Main Indicator Light

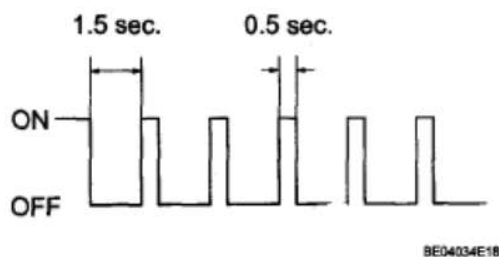


Fig. 13: Cruise Main Indicator Light Blinking Pattern
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DTC CHECK/CLEAR

1. DTC CHECK

- Connect the Techstream to the DLC3.
- Turn the ignition switch on (IG).
- Turn the Techstream main switch on.
- Select the following menu items: Powertrain/Cruise Control/Trouble Codes.
- Check the details of the DTC(s) (See **DIAGNOSTIC TROUBLE CODE CHART**).

2. DTC CLEAR

- Connect the Techstream to the DLC3.
- Turn the ignition switch on (IG).
- Turn the Techstream main switch on.
- Select the following menu items: Powertrain/Cruise Control/Trouble Codes.
- Erase the DTCs.

FAIL-SAFE CHART

HINT:

If the following conditions are detected while the cruise control is in operation, the system clears the stored vehicle speed in the ECM and cancels the cruise control operation.

FAIL-SAFE CHART

--	--	--

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

Vehicle Condition	Auto Cancel Condition	Re-operation Condition
CRUISE main indicator light blinks	- There is an open or short in the stop light switch circuit - There is a problem with the vehicle speed signal	Turn cruise control main switch on again
CRUISE main indicator light blinks	- There is a problem with the input circuit of the stop light switch circuit - There is a problem with the cancel circuit	Turn ignition switch off then on again
Cruise control is cancelled (The indicator light remains on)	At the following conditions, the stored vehicle speed is maintained. - Vehicle speed is lower than the low speed limit (approx. 40 km/h (25 mph)) while running with the cruise control on - VSC operates	Push cruise control main switch to + (ACCEL)/RES (RESUME)
	Vehicle speed is lower than the stored speed by approx. 16 km/h (10 mph) or more	Push cruise control main switch to - (COAST)/SET
Cruise control is cancelled (The indicator light is off)	There is a problem with throttle position sensor and motor	Turn cruise control main switch on again

DATA LIST/ACTIVE TEST

1. READ DATA LIST

HINT:

Using the Techstream to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

- Connect the Techstream to the DLC3.
- Turn the ignition switch on (IG).
- Turn the Techstream main switch on.
- Select the following menu items: Powertrain/Cruise Control/Data List.
- Read the Data List according to the display on the Techstream.

ECM (Cruise Control):

ECM (CRUISE CONTROL) - DATA LIST

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
CCS Vehicle	Vehicle speed/min.: 0 km/h (0		

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

Spd	mph), max.: 255 km/h (158 mph)	Actual vehicle speed	-
CCS Mem Vehicle Spd	Stored vehicle speed/min.: 0 km/h (0 mph), max.: 200 km/h (125 mph)	Stored vehicle speed	-
Throttle Opening Angle	Required throttle opening angle/min.: 0°, max.: 125°	Required throttle opening angle	-
Cruise Control	Cruise control system active condition/ON or OFF	ON: Cruise control activated OFF: Cruise control deactivated	-
Main SW M-CPU	Main SW signal (Main CPU)/ON or OFF	ON: Main switch ON OFF: Main switch OFF	3
CCS Ready M-CPU	Cruise control system standby condition (Main CPU)/ON or OFF	ON - OFF: Change ON/OFF each time main switch is pushed in.	1
CCS Indicator M-CPU	CRUISE Main indicator signal (Main CPU)/ON or OFF	ON: "CRUISE" ON OFF: "CRUISE" OFF	2
Cancel Switch	CANCEL SW signal/ON or OFF	ON: CANCEL Switch ON OFF: CANCEL Switch OFF	-
SET/COAST Switch	SET/COAST SW signal/ON or OFF	ON:-SET Switch ON OFF: - SET Switch OFF	-
RES/ACC Switch	RES/ACC SW signal/ON or OFF	ON: + RES Switch ON OFF: + RES Switch OFF	-
Stp Light SW M-CPU	Stop light SW signal (Main CPU)/ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-
Cruise Operation Status	Transmission range sensor signal/ON or OFF	For 2GR-FE • ON: Shift lever in D or S (5th or 4th gear) position • OFF: Shift lever in any position except D or S (5th or 4th gear) For 1AR-FE • ON: Shift lever in D or S (6th, 5th or 4th gear) position • OFF: Shift lever in any position except D or S (6th, 5th or 4th gear)	-
#Codes	Number of DTC recorded/0 to 255	Number of DTCs will be displayed	-

HINT:

- 3 is OK but 1 is NG --> ECM failure
- 1 is OK but 2 is NG --> DTC output or ECM failure
- 3 is OK but cruise indicator does not turn on --> CRUISE main indicator, wire harness, or ECM failure

2. PERFORM ACTIVE TEST

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

HINT:

Using the Techstream to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

- a. Connect the Techstream to the DLC3.
- b. Turn the ignition switch on (IG).
- c. Turn the Techstream main switch on.
- d. Select the following menu items: Body Electrical/Main Body/Active Test.
- e. Perform "Active Test" according to the display on the Techstream.

HINT:

The ignition switch must be turned on to proceed with the Active Test using the Techstream.

Combination Meter:

COMBINATION METER - ACTIVE TEST

Tester Display	Test Part	Control Range	Diagnostic Note
Indicat. Lamp Cruise	CRUISE main indicator light	Indicator light BLINK/OFF	-

DIAGNOSTIC TROUBLE CODE CHART

If a trouble code is indicated during the DTC check, check the circuit listed for that code in the table below, and proceed to the applicable page.

Cruise Control System

CRUISE CONTROL SYSTEM - DIAGNOSTIC TROUBLE CODE CHART

DTC Code	Detection Item	Trouble Area
<u>P0500</u>	Vehicle Speed Sensor Malfunction	1. Combination meter assembly 2. Vehicle speed sensor 3. Vehicle speed sensor circuit 4. ECM
<u>P0503</u>	Vehicle Speed Sensor Circuit Malfunction	1. Combination meter assembly 2. Vehicle speed sensor 3. Vehicle speed sensor circuit 4. ECM

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

<u>P0571</u>	Brake Switch "A" Circuit	1. Stop light switch 2. Stop light switch circuit 3. ECM
<u>P0575</u>*1	Cruise Control Input Circuit	ECM
<u>P0607</u>*2	Input Signal Circuit Malfunction	ECM
HINT: • *1: for 1AR-FE • *2: for 2GR-FE		

DTC P0500 VEHICLE SPEED SENSOR MALFUNCTION; DTC P0503 VEHICLE SPEED SENSOR CIRCUIT MALFUNCTION

DESCRIPTION

The cruise control system uses the same vehicle speed signal that is sent to the ECM for the SFI system. If DTC P0500 is detected, perform the diagnosis using the inspection procedure for DTC P0500 in the SFI system (for 2GR-FE: See **DTC P0500 VEHICLE SPEED SENSOR "A"** , for 1AR-FE: See **DTC P0500 VEHICLE SPEED SENSOR "A"**). The speed signal is converted for use by the cruise control inside the ECM.

Both the SFI system and the cruise control system can set DTC P0500, however, the detection conditions of the two systems are different.

DTC DETECTION CONDITION REFERENCE

DTC No.	DTC Detection Condition	Trouble Area
P0500	The vehicle speed signal from the vehicle speed sensor is cut for 0.14 sec. or more while the cruise control is in operation.	• Combination meter assembly • Vehicle speed sensor • Vehicle speed sensor circuit • ECM
P0503	Momentary interruption and noise malfunction codes are detected when a rapid change of vehicle speed occurs while the cruise control is in operation.	

WIRING DIAGRAM

Refer to the SFI system (for 2GR-FE) (See **WIRING DIAGRAM**).

Refer to the SFI system (for 1AR-FE) (See **WIRING DIAGRAM**).

INSPECTION PROCEDURE

Refer to the SFI system (for 2GR-FE) (See **INSPECTION PROCEDURE**).

2009 Toyota Highlander Limited
2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

Refer to the SFI system (for 1AR-FE) (See **INSPECTION PROCEDURE**).

DTC P0571 BRAKE SWITCH "A" CIRCUIT

DESCRIPTION

When the brake pedal is depressed, the stop light switch sends a signal to the ECM. When the ECM receives this signal, it cancels the cruise control. The fail-safe function operates to enable normal driving even if there is a malfunction in the stop light signal circuit. The cancellation condition occurs when voltage is applied to terminal STP. When the brake is applied, voltage is normally applied to terminal STP of the ECM through the STOP fuse and the stop light switch, and the ECM turns the cruise control off.

DTC DETECTION CONDITION REFERENCE

DTC No.	DTC Detection Condition	Trouble Area
P0571	Voltage of STP terminal and that of ST1- terminal of ECM are less than 1 V for 0.5 sec. or more.	• Stop light switch • Stop light switch circuit • ECM

WIRING DIAGRAM

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

w/o Smart Key System:

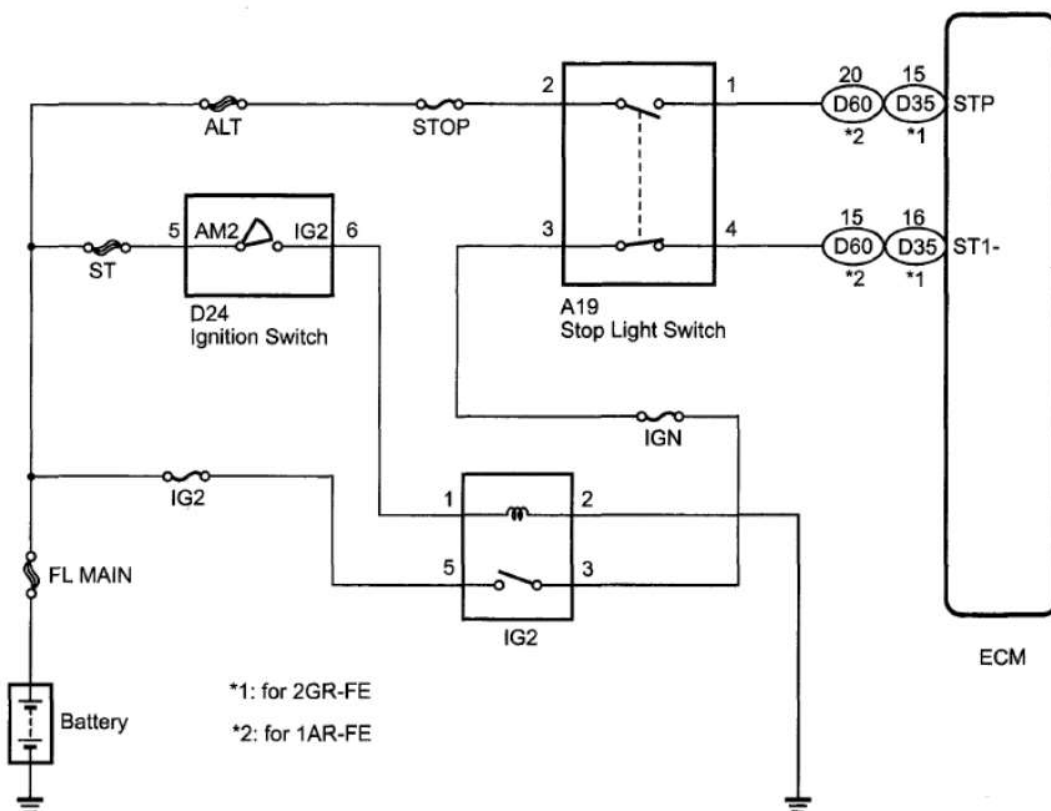


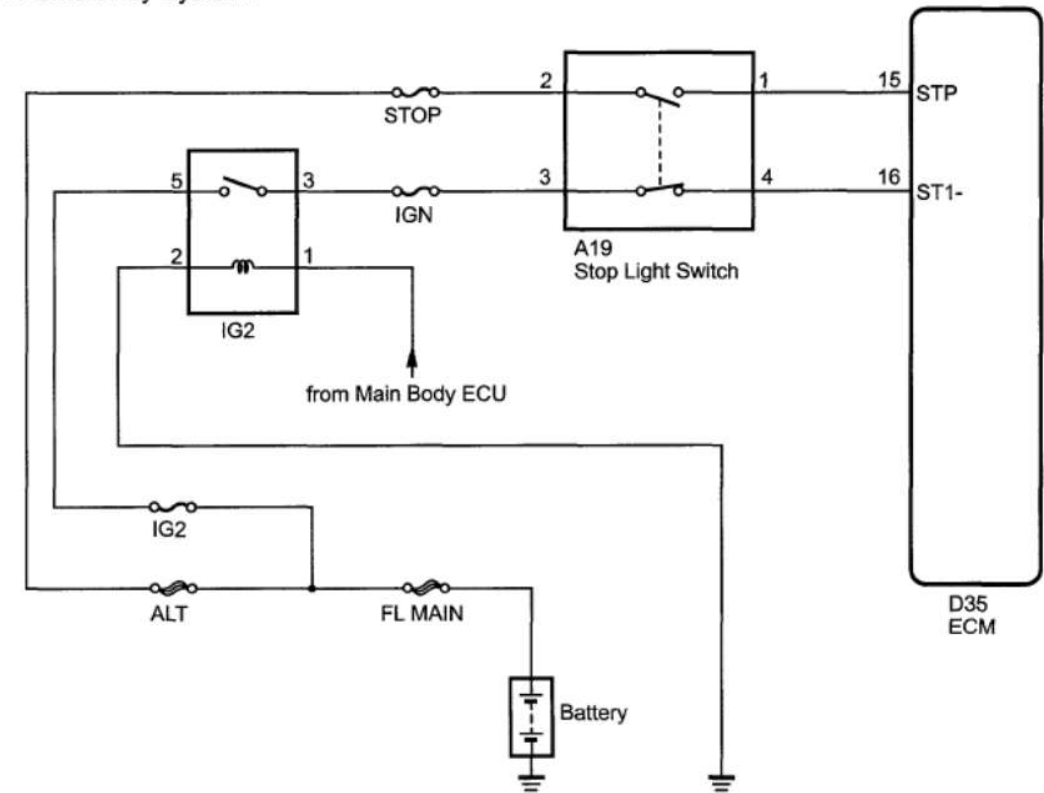
Fig. 14: Brake Switch "A" - Wiring Diagram (W/O Smart Key System)

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

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

w/ Smart Key System:



E152502E01

Fig. 15: Brake Switch "A" - Wiring Diagram (W/ Smart Key System)

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

INSPECTION PROCEDURE

1. CHECK HARNESS AND CONNECTOR (STOP LIGHT SWITCH - BATTERY)

- a. Disconnect the stop light switch connector.
- b. Measure the voltage according to the value(s) in the table below.

Standard voltage

VOLTAGE SPECIFICATION

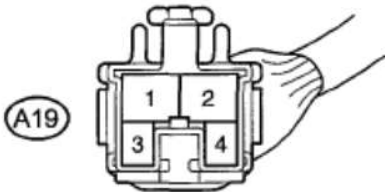
Tester Connection	Condition	Specified Condition
A19-2 - Body ground	Always	11 to 14 V
A19-3 - Body ground	Ignition switch on (IG)	11 to 14 V

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

Front view of wire harness connector:
(to Stop Light Switch)



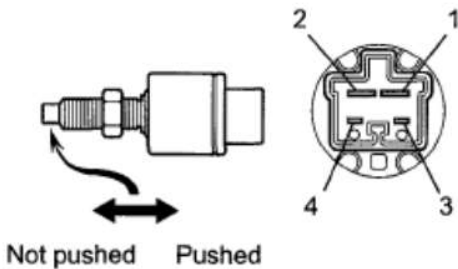
E144327E02

Fig. 16: Identifying Stop Light Switch A19 Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

2. INSPECT STOP LIGHT SWITCH

Stop Light Switch



N

E144510E01

Fig. 17: Inspecting Stop Light Switch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- a. Remove the stop light switch (See **STOP LIGHT SWITCH**).
- b. Measure the resistance according to the value(s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

1 - 2	Switch pin not pushed	Below 1 ohms
3 - 4	Switch pin not pushed	10 kohms or higher
1 - 2	Switch pin pushed	10 kohms or higher
3 - 4	Switch pin pushed	Below 1 ohms

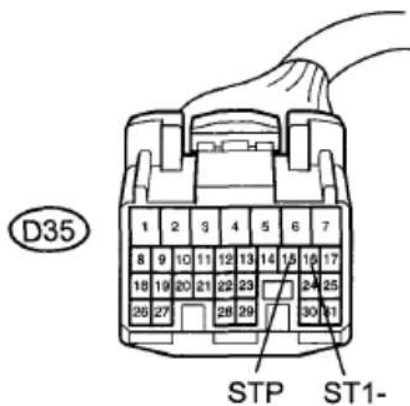
- c. Install the stop light switch (See **INSTALLATION**).

NG: REPLACE STOP LIGHT SWITCH (See **STOP LIGHT SWITCH**)

OK: Go to next step

3. CHECK ECM

Front view of wire harness connector:
(to ECM of 2GR-FE)



N

E161264E04

Fig. 18: Identifying ECM And D35 Connector Terminals

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

- Disconnect the ECM connector.
- Turn the ignition switch on (IG).
- Measure the voltage according to the value(s) in the table below.

Standard voltage (for 2GR-FE)

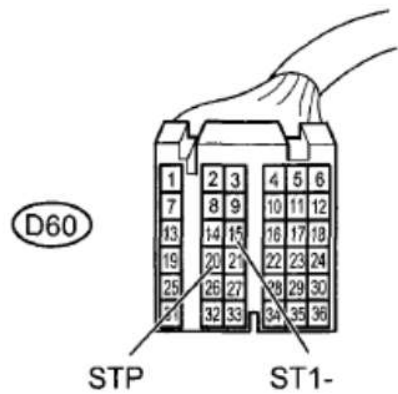
VOLTAGE SPECIFICATION

Tester Connection	Condition	Specified Condition
D35-15 (STP)-Body ground	Brake pedal is depressed	11 to 14 V
D35-15 (STP)-Body ground	Brake pedal is released	Below 1 V
D35-16 (ST1-)-Body ground	Brake pedal is depressed	Below 1 V
D35-16 (ST1-)-Body ground	Brake pedal is released	11 to 14 V

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

Front view of wire harness connector:
(to ECM of 1AR-FE)



E178897E01

Fig. 19: Identifying ECM And D60 Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard voltage (for 1AR-FE)

VOLTAGE SPECIFICATION

Tester Connection	Condition	Specified Condition
D60-20 (STP) - Body ground	Brake pedal is depressed	11 to 14 V
D60-20 (STP) - Body ground	Brake pedal is released	Below 1 V
D60-15 (ST1-) - Body ground	Brake pedal is depressed	Below 1 V
D60-15 (ST1-) - Body ground	Brake pedal is released	11 to 14 V

Result

RESULT CHART

Result	Proceed to
NG	A
OK (for 2GR-FE)	B
OK (for 1AR-FE)	C

B REPLACE ECM (See FUEL INJECTOR CIRCUIT)

C REPLACE ECM (See REMOVAL)

A: Go to next step

REPAIR OR REPLACE HARNESS OR CONNECTOR (STOP LIGHT SWITCH - ECM)

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

DTC P0575 CRUISE CONTROL INPUT CIRCUIT; DTC P0607 INPUT SIGNAL CIRCUIT MALFUNCTION

DESCRIPTION

This DTC indicates internal abnormalities of the ECM.

DTC REFERENCE CHART

DTC No.	Detection Item	Trouble Area
P0575*1	When either of the following conditions is met: • Cruise control input signal abnormal • Stop light switch input signal abnormal	ECM
P0607*2	The ECM has a supervisory CPU and control ECU inside. When each input STP signal is different for 0.15 sec. or more, this trouble code is output. This trouble code is output after 0.4 sec. has passed from the time the cruise cancel input signal (STP input) is input into the ECM. HINT: When a trouble code is detected, the fail safe must be kept on until the ignition switch is turned off.	ECM
HINT: • *1: for 1AR-FE • *2: for 2GR-FE		

INSPECTION PROCEDURE

1. REPLACE ECM

Replace the ECM (See **REMOVAL** for 2GR-FE).

Replace the ECM (See **REMOVAL** for 1AR-FE).

END

CRUISE CONTROL SWITCH CIRCUIT

DESCRIPTION

The cruise control main switch operates 7 functions: SET, - (COAST), TAP-DOWN, RES (RESUME), + (ACCEL), TAP-UP, and CANCEL. The SET, TAP-DOWN, and - (COAST) functions, and the RES (RESUME), TAP-UP, and + (ACCEL) functions are operated with the same switch. The cruise control main switch is an automatic return type switch which turns on only while it is operated in the direction of each arrow and turns off after being released. The internal contact point of the cruise control main switch is turned on with the switch operation. Then the ECM reads the voltage value that has been changed by the switch operation to control SET, - (COAST), RES (RESUME), + (ACCEL), and CANCEL.

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

WIRING DIAGRAM

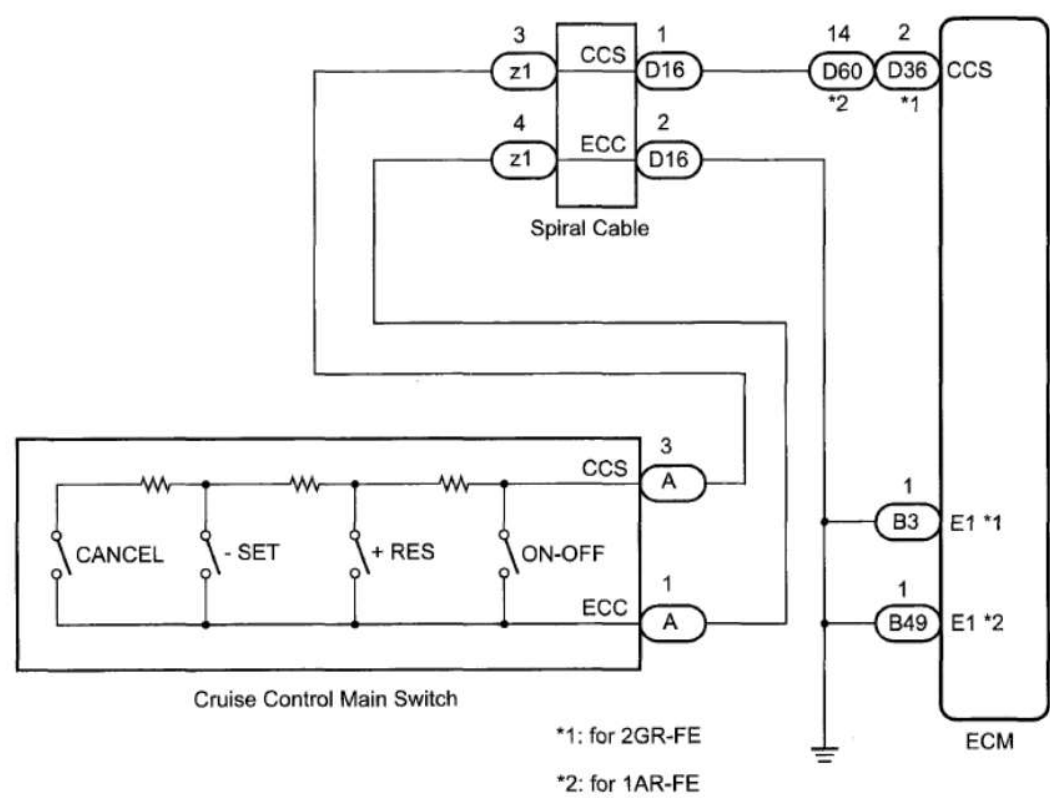


Fig. 20: Cruise Control Switch - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

1. READ VALUE USING TECHSTREAM

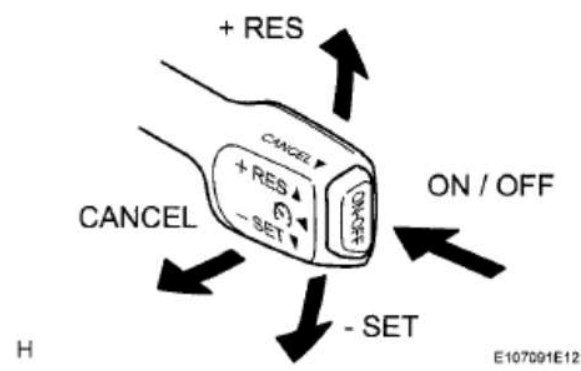


Fig. 21: [Checking Cruise Control Switch]
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

- a. Connect the Techstream to the DLC3.
- b. Turn the ignition switch on (IG).
- c. Turn the Techstream main switch on.
- d. Select the following menu items: Powertrain/Cruise Control/Data List.
- e. Check the Data List for proper functioning of the cruise control main switch.

ECM (Cruise control):

ECM (CRUISE CONTROL) - DATA LIST

Techstream Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Main SW M-CPU	Main switch signal (Main CPU)/ON or OFF	ON: Main switch on OFF: Main switch off	-
Cancel Switch	CANCEL switch signal/ON or OFF	ON: CANCEL switch on OFF: CANCEL switch off	-
SET/COAST Switch	SET/COAST switch signal/ON or OFF	ON: - SET switch on OFF: - SET switch off	-
RES/ACC Switch	RES/ACC switch signal/ON or OFF	ON: + RES switch on OFF: + RES switch off	-

OK:

The display changes as shown above according to switch operation.

Result

RESULT CHART

Result	Proceed to
OK	A
NG (All items are defective)	B
NG (1 to 3 items are defective)	C

B: Go to step 2

C: REPLACE CRUISE CONTROL MAIN SWITCH (See CRUISE CONTROL MAIN SWITCH)

A: Go to next step

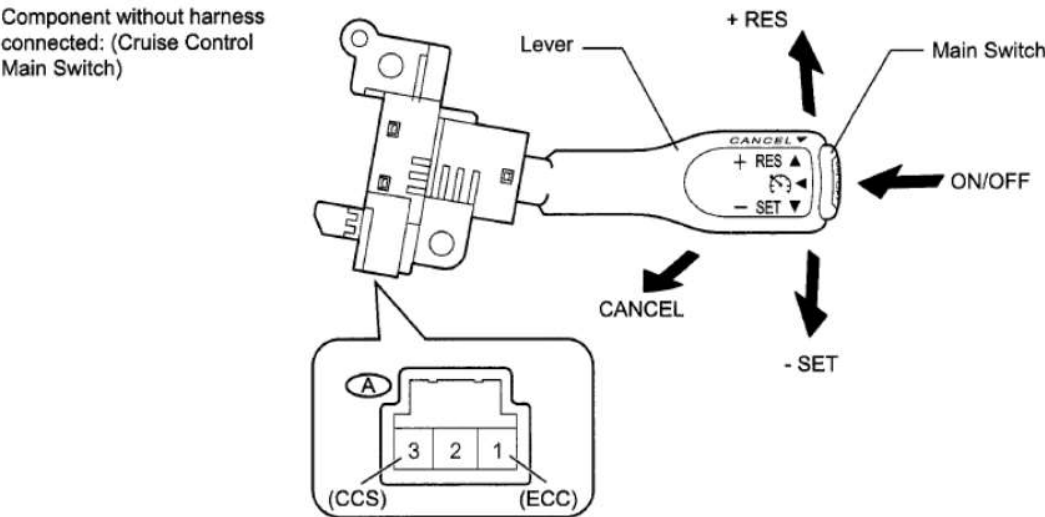
PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE (See PROBLEM SYMPTOMS TABLE)

2. INSPECT CRUISE CONTROL MAIN SWITCH

- a. Remove the cruise control main switch (See CRUISE CONTROL MAIN SWITCH).
- b. Measure the resistance according to the value(s) in the table below.

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander



H

E108137E31

Fig. 22: Inspecting Cruise Control Main Switch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
A-1 (ECC) - A-3 (CCS)	Main Switch off ⁽¹⁾	1 Mohms or higher
	Main Switch on	Below 2.5 ohms
	+ RES	235 to 245 ohms
	-SET	617 to 643 ohms
	CANCEL	1509 to 1571 ohms
(1) Lever is in the neutral position		

NG: REPLACE CRUISE CONTROL MAIN SWITCH (See CRUISE CONTROL MAIN SWITCH)

OK: Go to next step

3. **CHECK HARNESS AND CONNECTOR (CRUISE CONTROL MAIN SWITCH - SPIRAL CABLE)**
- a. Disconnect the spiral cable connector.
 - b. Measure the resistance according to the value(s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
-------------------	-----------	---------------------

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

A-3 - z1-3	Always	Below 1 ohms
A-1 - z1-4	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

OK: Go to next step

Front view of wire harness connector:
(to Spiral Cable)

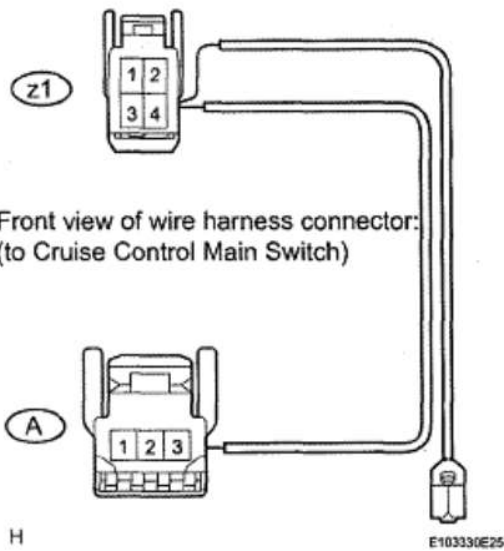


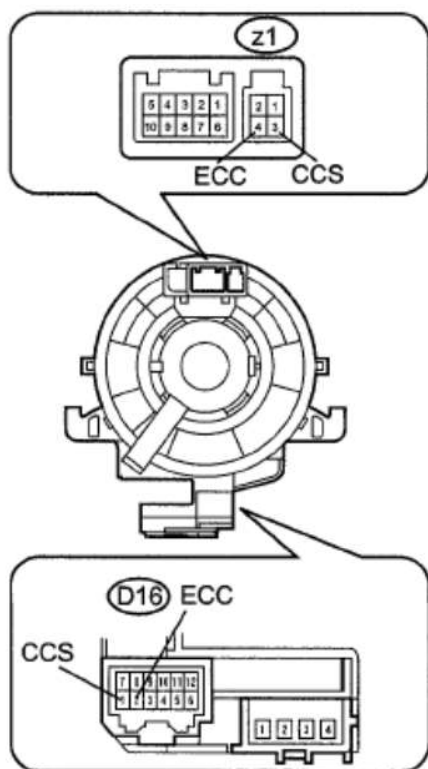
Fig. 23: Identifying Cruise Control Main Switch And Spiral Cable Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. CHECK SPIRAL CABLE

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

Component without harness connected:
(Spiral Cable)



E144333E04

Fig. 24: Checking Spiral Cable

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

NOTE: The spiral cable is an important part of the SRS airbag system. Incorrect removal or installation of the spiral cable may prevent the airbag from deploying. Be sure to read the page shown in the brackets.

HINT:

- Removal (See **REMOVAL**)
- Installation (See **INSTALLATION**)
 - a. Remove the spiral cable.
 - b. Measure the resistance according to the value(s) in the table below.

Standard resistance

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

RESISTANCE SPECIFICATION

Tester Connection	Spiral Cable Position	Specified Condition
z1-3 (CCS) - D16-1 (CCS)	Center	Below 1 ohms
	2.5 rotations to the left	
	2.5 rotations to the right	
z1-4 (ECC) - D16-2 (ECC)	Center	Below 1 ohms
	2.5 rotations to the left	
	2.5 rotations to the right	

HINT:

The spiral cable makes a maximum of approximately 5 rotations.

NG: REPLACE SPIRAL CABLE (See **REMOVAL**)

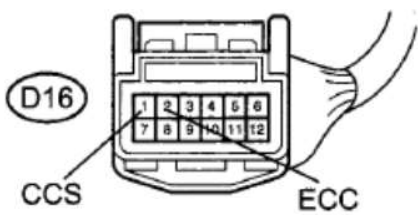
OK: Go to next step

5. **CHECK HARNESS AND CONNECTOR (SPIRAL CABLE - ECM AND BODY GROUND)**
 - a. Disconnect the ECM connector.

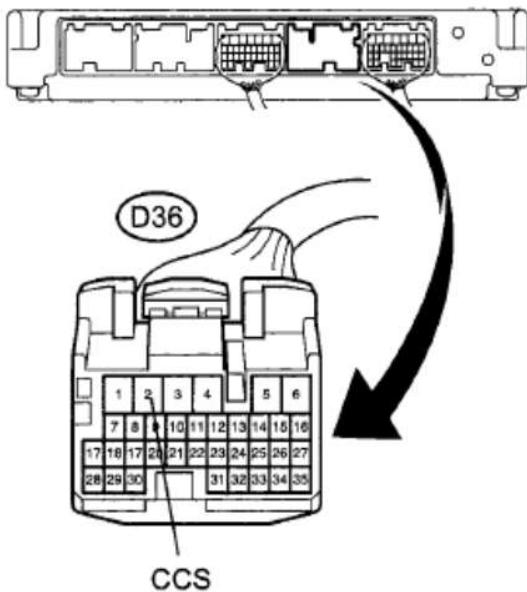
2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

Front view of wire harness connector:
(to Spiral Cable)



Front view of wire harness connector:
(to ECM of 2GR-FE)



N E151265E03

Fig. 25: Identifying Spiral Cable And ECM 2GR-FE Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Measure the resistance according to the value(s) in the table below.

Standard resistance (for 2GR-FE)

RESISTANCE SPECIFICATION

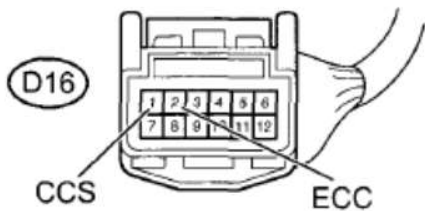
Tester Connection	Condition	Specified Condition
D16-1 (CCS)-D36-2 (CCS)	Always	Below 1 ohms
D36-2 (CCS) - Body ground	Always	10 kohms or higher

2009 Toyota Highlander Limited

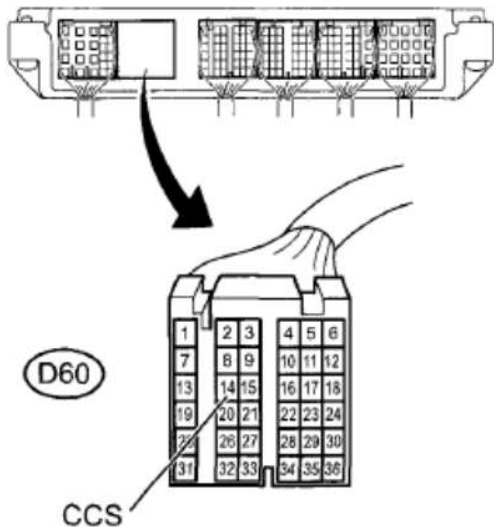
2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

D16-2 (ECC) - Body ground	Always	Below 1 ohms
---------------------------	--------	--------------

Front view of wire harness connector:
(to Spiral Cable)



Front view of wire harness connector:
(to ECM of 1AR-FE)



E178896E01

Fig. 26: Identifying Spiral Cable And ECM 1AR-FE Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard resistance (for 1AR-FE)

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
D16-1 (CCS)-D60-14 (CCS)	Always	Below 1 ohms
D60-14 (CCS) - Body ground	Always	10 kohms or higher
D16-2 (ECC) - Body ground	Always	Below 1 ohms

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

Result

RESULT CHART

Result	Proceed to
NG	A
OK (for 2GR-FE)	B
OK (for 1AR-FE)	C

B: REPLACE ECM (See FUEL INJECTOR CIRCUIT)

C: REPLACE ECM (See REMOVAL)

A: REPAIR OR REPLACE HARNESS OR CONNECTOR

CRUISE MAIN INDICATOR LIGHT CIRCUIT

DESCRIPTION

- The ECM detects a cruise control switch signal and sends it to the combination meter through CAN. Then the CRUISE main indicator light comes on.
- The CRUISE main indicator light circuit uses CAN for communication. If there is a malfunction in this circuit, check for DTCs in the CAN communication system before troubleshooting this circuit.

INSPECTION PROCEDURE

1. PERFORM ACTIVE TEST USING TECHSTREAM

- Connect the Techstream to the DLC3.
- Turn the ignition switch on (IG).
- Turn the Techstream main switch on.
- Select the following menu items: Body Electrical/Main Body/Active Test.
- Check the CRUISE main indicator light by performing the Active Test.

Combination Meter:

COMBINATION METER - ACTIVE TEST

Techstream Display	Test Part	Control Range	Diagnostic Note
Indicat. Lamp Cruise	CRUISE main indicator light	Indicator light BLINK/OFF	-

OK: The indicator light blinks or goes off according to the Techstream operation.

NG: REPLACE COMBINATION METER ASSEMBLY (See REMOVAL)

OK: Go to next step

2. READ VALUE USING TECHSTREAM

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

- a. Connect the Techstream to the DLC3.
- b. Turn the ignition switch on (IG).
- c. Turn the Techstream main switch on.
- d. Select the following menu items: Powertrain/Cruise Control/Data List.
- e. Check the Data List for proper functioning of the CRUISE main indicator light.

ECM (Cruise control):

ECM (CRUISE CONTROL) - DATA LIST

Techstream Display	Measurement Item/Range	Normal Condition	Diagnostic Note
CCS Indicator M-CPU	CRUISE Main indicator signal (Main CPU)/ON or OFF	ON: "CRUISE" ON OFF: "CRUISE" OFF	-

OK: The display changes as shown above according to switch operation.

Result

RESULT CHART

Result	Proceed to
OK	A
NG (for 2GR-FE)	B
NG (for 1AR-FE)	C

B: REPLACE ECM (See FUEL INJECTOR CIRCUIT)

C: REPLACE ECM (See REMOVAL)

A: PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE
(See PROBLEM SYMPTOMS TABLE)

TC AND CG TERMINAL CIRCUIT

DESCRIPTION

Connecting terminals TC and CG of the DLC3 causes the system to enter the self-diagnostic mode. If a malfunction is present, DTCs will be output.

HINT:

When a particular warning light remains blinking, a ground short in the wiring of terminal TC of the DLC3 or an internal ground short in the relevant ECU is suspected.

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

WIRING DIAGRAM

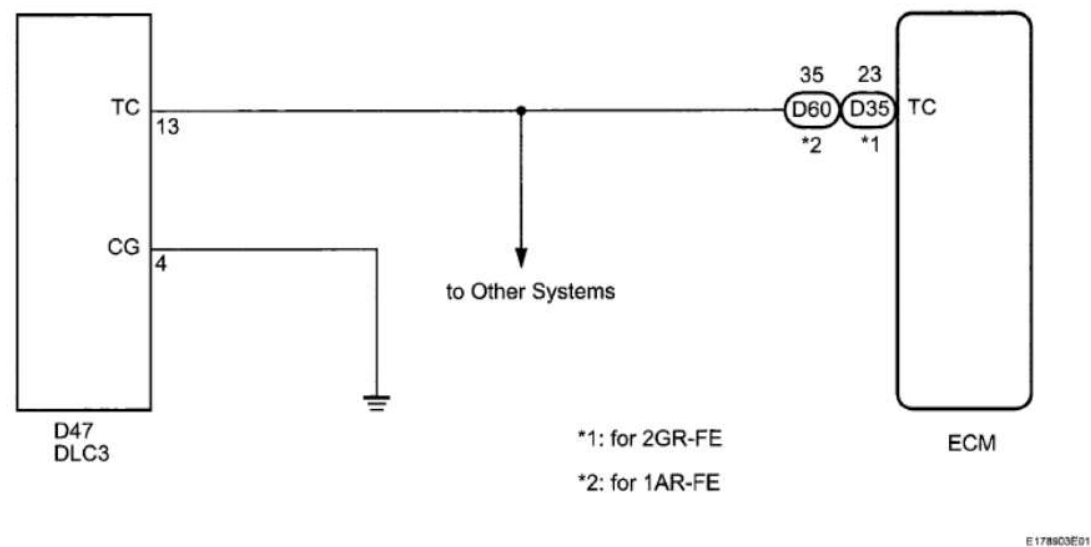


Fig. 27: TC And CG Terminal Circuit - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

- 1. **CHECK HARNESS AND CONNECTOR (TERMINAL TC of DLC3 - ECM)**
 - a. Disconnect the ECM connector.
 - b. Measure the resistance according to the value(s) in the table below.

Standard resistance (for 2GR-FE)

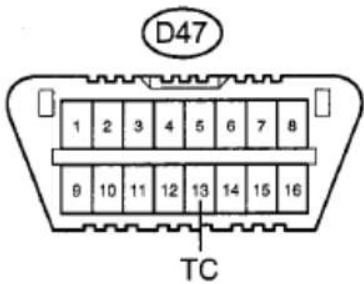
RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
D35-23 (TC)-D47-13 (TC)	Always	Below 1 ohms

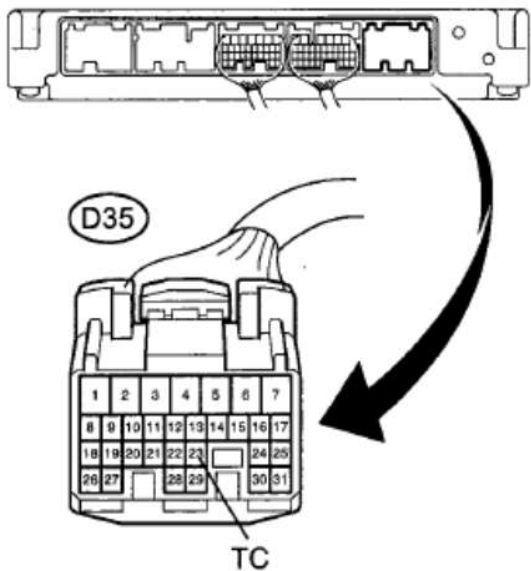
2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

DLC3:



Front view of wire harness connector:
(to ECM of 2GR-FE)



N

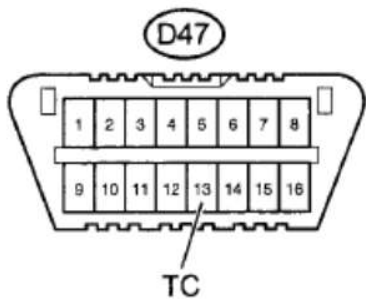
E151286E03

Fig. 28: Identifying TC Of DLC3 And ECM Of 2GR-FE Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

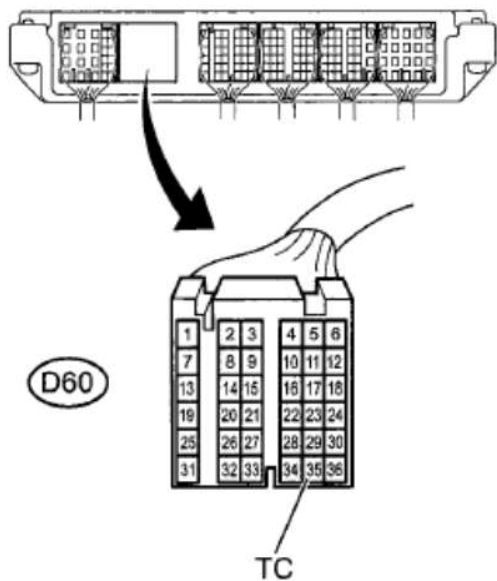
2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

DLC3:



Front view of wire harness connector:
(to ECM of 1AR-FE)



E176900E01

Fig. 29: Identifying TC Of DLC3 And ECM Of 1AR-FE Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard resistance (for 1AR-FE)

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
D60-35 (TC) - D47-13 (TC)	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (DLC3 - ECM)

OK: Go to next step

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

2. CHECK HARNESS AND CONNECTOR (TERMINAL CG of DLC3 - BODY GROUND)

DLC3:

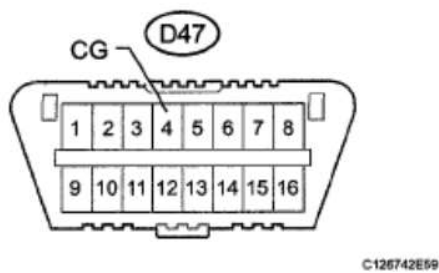


Fig. 30: Identifying CG Of DLC3 Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- a. Measure the resistance according to the value(s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
D47-4 (CG) - Body ground	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (DLC3 - BODY GROUND)

OK: Go to next step

3. CHECK HARNESS AND CONNECTOR (TERMINAL TC of DLC3 - BODY GROUND)

DLC3:

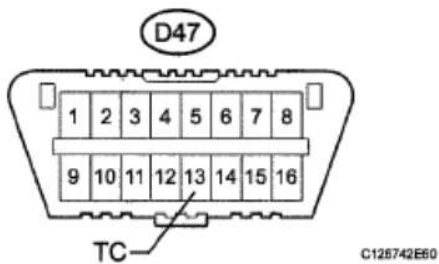


Fig. 31: Identifying TC Of DLC3 Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- a. Measure the resistance according to the value(s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

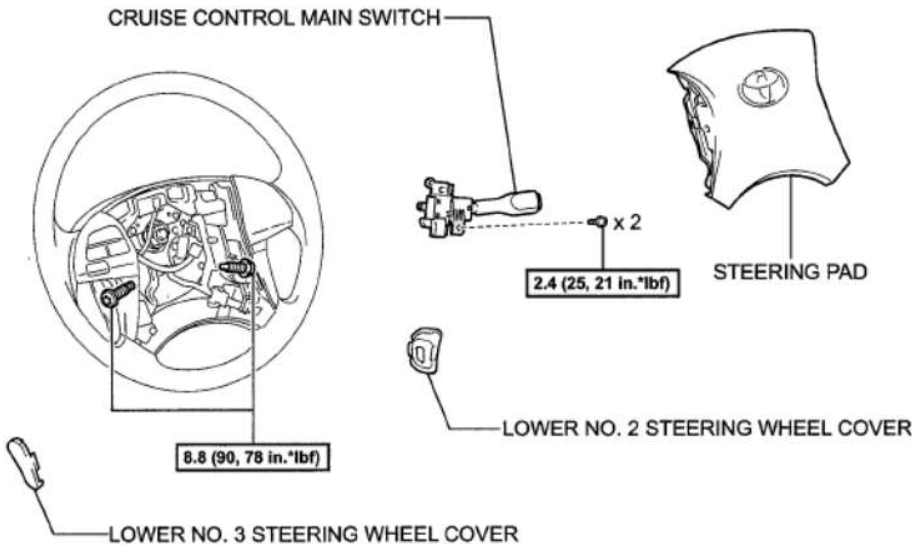
Tester Connection	Condition	Specified Condition
D47-13 (TC)-Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS, CONNECTOR, OR EACH ECU

OK: PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE
(See [PROBLEM SYMPTOMS TABLE](#))

CRUISE CONTROL MAIN SWITCH

COMPONENTS



[N*m (kgf*cm, ft.*lbf)]: Specified torque

P E150933E01

Fig. 32: Identifying Cruise Control Main Switch Components With Torque Specification
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

- 1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION: Wait for 90 seconds after disconnecting the cable to prevent airbag deployment (See [AIRBAG SYSTEM](#)).

NOTE: When disconnecting the cable, some systems need to be initialized after the cable is reconnected (See [INITIALIZATION](#)).

- 2. REMOVE LOWER NO. 3 STEERING WHEEL COVER (See [REMOVAL](#))

2009 Toyota Highlander Limited**2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander**

3. **REMOVE LOWER NO. 2 STEERING WHEEL COVER** (See **REMOVAL**)
4. **REMOVE STEERING PAD** (See **REMOVAL**)
5. **REMOVE CRUISE CONTROL MAIN SWITCH**
 - a. Remove the 2 screws.
 - b. Disconnect the connector.

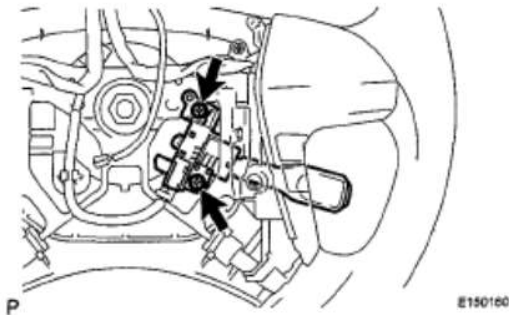


Fig. 33: Locating Screws And Cruise Control Main Switch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Remove the cruise control main switch as shown in the illustration.

INSPECTION

1. **INSPECT CRUISE CONTROL MAIN SWITCH**
 - a. Remove the cruise control main switch (See **CRUISE CONTROL MAIN SWITCH**).
 - b. Measure the resistance according to the value(s) in the table below.

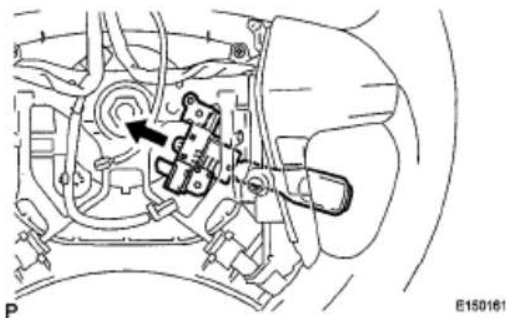
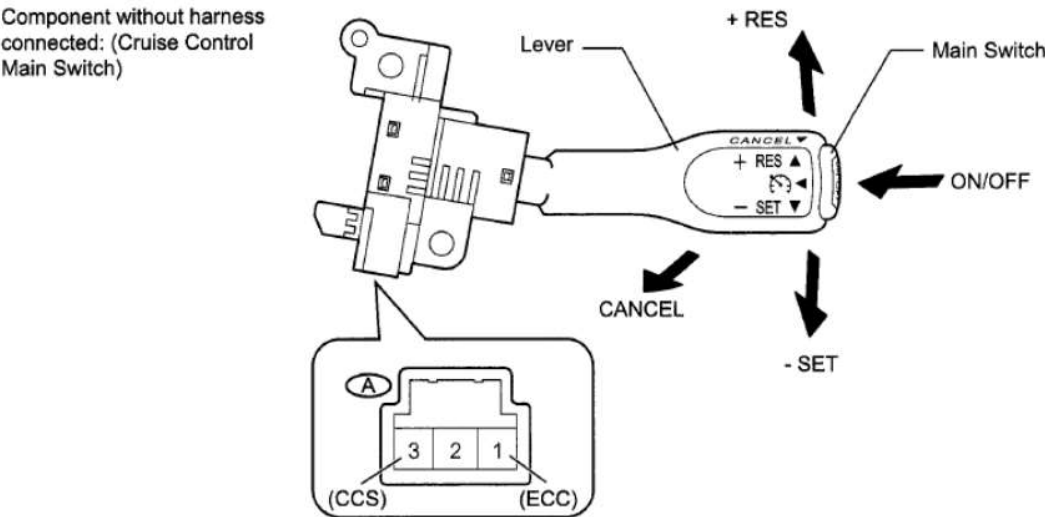


Fig. 34: Removing Cruise Control Main Switch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander



H

E106137E31

Fig. 35: Inspecting Cruise Control Main Switch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
A-1 (ECC) - A-3 (CCS)	Main Switch off ⁽¹⁾	1 Mohms or higher
	Main Switch on	Below 2.5 ohms
	+ RES	235 to 245 ohms
	-SET	617 to 643 ohms
	CANCEL	1509 to 1571 ohms
⁽¹⁾ Lever is in the neutral position		

If the result is not as specified, replace the cruise control main switch.

INSTALLATION

1. **INSTALL CRUISE CONTROL MAIN SWITCH**
 - a. Install the cruise control main switch as shown in the illustration.
 - b. Connect the connector.

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Cruise Control - Highlander

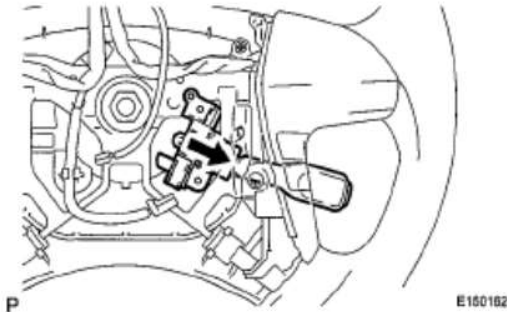


Fig. 36: Installing Cruise Control Main Switch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Install the 2 screws.

Torque: 2.4 N*m (25 kgf*cm, 21 in.*lbf)

2. **INSTALL STEERING PAD** (See INSTALLATION)
3. **INSTALL LOWER NO. 3 STEERING WHEEL COVER** (See INSTALLATION)
4. **INSTALL LOWER NO. 2 STEERING WHEEL COVER** (See INSTALLATION)
5. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

NOTE: When disconnecting the cable, some systems need to be initialized after the cable is reconnected (See INITIALIZATION).

6. **INSPECT STEERING PAD** (See INSTALLATION)
7. **INSPECT SRS WARNING LIGHT**
 - a. Inspect the SRS warning light (See DIAGNOSIS SYSTEM).

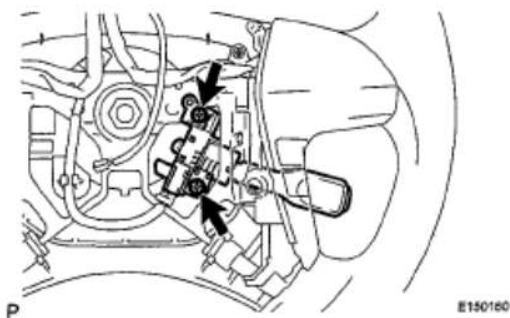


Fig. 37: Locating Screws And Cruise Control Main Switch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.