

2010 ACCESSORIES & EQUIPMENT

Cruise Control - Equinox & Terrain

SCHEMATIC AND ROUTING DIAGRAMS

CRUISE CONTROL SCHEMATICS

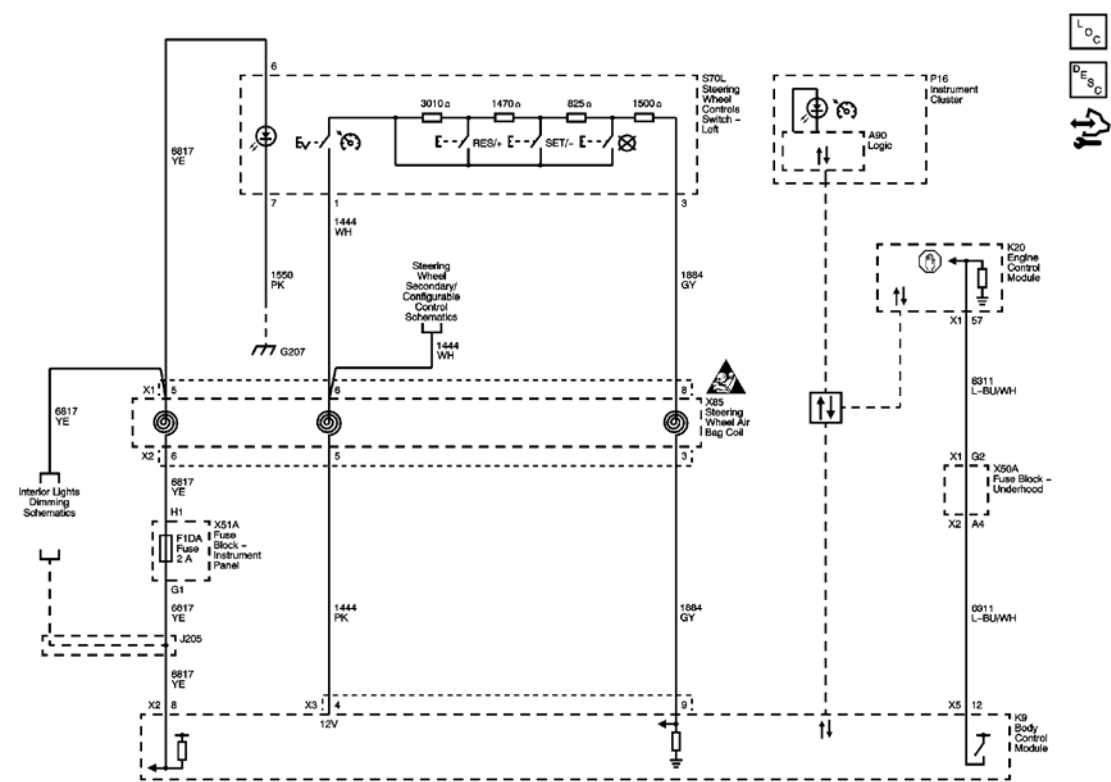


Fig. 1: View Of Cruise Control Schematic
Courtesy of GENERAL MOTORS CORP.

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC CODE INDEX

DIAGNOSTIC CODE INDEX

DTC	Description
DTC B3794	B3794 08: Cruise Control Function Request Circuit Signal Invalid B3794 61: Cruise Control Function Request Circuit Actuator Stuck
DTC P0564, P0567, or P0568	P0564: Cruise Control Multifunction Switch Circuit P0567: Cruise Control Resume Switch Circuit P0568: Cruise Control Set Switch Circuit

DTC B3794**Diagnostic Instructions**

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptors**DTC B3794 08**

Cruise Control Function Request Circuit Signal Invalid

DTC B3794 61

Cruise Control Function Request Circuit Actuator Stuck

Diagnostic Fault Information

Circuit	Short to Ground	Open or High Resistance	Short to Voltage	Signal Performance
B+	1	1	1	-
Signal	1	P0564	B3794 08, P0567, P0568	B3794 61, P0564
1. Cruise Control Malfunction				

Circuit/System Description

The cruise control switch is an input to the body control module (BCM). The BCM monitors the cruise control on/off, set/coast, resume/accelerate and cancel switches via the cruise control switch signal circuit in order to detect when the driver has requested to perform a cruise control function. The BCM detects a specific voltage signal on the cruise control switch signal circuit when a switch is applied. The BCM sends a serial data message to the engine control module (ECM) indicating the status of the cruise control switches.

Conditions for Running the DTC

- The cruise switch is ON.
- The ignition is ON.

Conditions for Setting the DTC**B3794 08**

The BCM detects an invalid voltage signal on the cruise control switch signal circuit for 1 second.

B3794 61

Stuck switch for either Resume/Accel or Set/Coast button for 60 seconds.

Actions Taken When the DTC Sets

- The malfunction indicator lamp (MIL) will not illuminate.
- The cruise control system is disabled.

Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear after 40 malfunction-free ignition cycles have occurred.

Reference Information

Schematic Reference

Cruise Control Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Cruise Control Description and Operation

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

Engine ON, while rotating the steering wheel to both steering stops, observe the scan tool Cruise Control Switch parameter while pressing each of the cruise control switches. The parameter should toggle between On, Off, Resume, Set, and Cancel as the applicable switch is pressed.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the S70L steering wheel control switch-left.
2. Ignition ON, test for B+ between the B+ circuit terminal 1 and ground.
 - If less than the specified value, test the circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the K9 BCM.
3. Test for B+ between the B+ circuit terminal 1 and the signal circuit terminal 3.
 - If less than the specified value, test the signal circuit for a short to voltage or an open/high resistance. If the circuit tests normal, replace the K9 BCM.
4. Ignition OFF, disconnect the X1 harness connector at the K9 BCM.
5. Test for infinite resistance between the signal circuit terminal 3 and ground.
 - If less than the specified value, test the signal circuit for a short to ground.
6. If all circuits test normal, test or replace the S70L steering wheel control switch-left.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Cruise Control Switch Replacement (NK5)** or **Cruise Control Switch Replacement (NP5)**
- **Control Module References** for BCM replacement, setup, and programming

DTC P0564, P0567, OR P0568

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptors

DTC P0564

Cruise Control Multifunction Switch Circuit

DTC P0567

Cruise Control Resume Switch Circuit

DTC P0568

Cruise Control Set Switch Circuit

Diagnostic Fault Information

Circuit	Short to Ground	Open or High Resistance	Short to Voltage	Signal Performance
B+	1	1	1	-
Signal	1	P0564	B3794 08, P0567, P0568	B3794 61, P0564
1. Cruise Control Malfunction				

Circuit/System Description

The cruise control switch is an input to the body control module (BCM). The BCM monitors the cruise control on/off, set/coast, resume/accelerate and cancel switches via the cruise control switch signal circuit in order to detect when the driver has requested to perform a cruise control function. The BCM detects a specific voltage signal on the cruise control switch signal circuit when a switch is applied. The BCM sends a serial data message to the engine control module (ECM) indicating the status of the cruise control switches.

Conditions for Running the DTC

- The cruise switch is ON.
- The ignition is ON.

Conditions for Setting the DTC

- The BCM detects an invalid voltage signal on the cruise control switch signal circuit for greater than 2 seconds and sends a serial data message to the ECM. The ECM sets these DTCs when the message is received.
- The ECM runs this diagnostic every 0.05 second.

Actions Taken When the DTC Sets

DTCs P0564, P0567, or P0568 are type C DTCs.

Conditions for Clearing the DTC

DTCs P0564, P0567, or P0568 are type C DTCs.

Reference Information

Schematic Reference

Cruise Control Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Cruise Control Description and Operation

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

Engine ON, while rotating the steering wheel to both steering stops, observe the scan tool Cruise Control Switch parameter while pressing each of the cruise control switches. The parameter should toggle between On, Off, Resume, Set, and Cancel as the applicable switch is pressed.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the S70L steering wheel control switch-left.
2. Ignition ON, test for B+ between the B+ circuit terminal 1 and ground.
 - If less than the specified value, test the circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the K9 BCM.
3. Test for B+ between the B+ circuit terminal 1 and the signal circuit terminal 3.
 - If less than the specified value, test the signal circuit for a short to voltage or an open/high resistance. If the circuit tests normal, replace the K9 BCM.
4. Ignition OFF, disconnect the X1 harness connector at the K9 BCM.
5. Test for infinite resistance between the signal circuit terminal 3 and ground.
 - If less than the specified value, test the signal circuit for a short to ground.
6. If all circuits test normal, test or replace the S70L steering wheel control switch-left.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Cruise Control Switch Replacement (NK5)** or **Cruise Control Switch Replacement (NP5)**
- **Control Module References** for BCM replacement, setup, and programming

DTC P0575

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptor

DTC P0575

Cruise Control Switch Signal Circuit

Circuit/System Description

When a cruise control function switch is activated, the body control module (BCM) detects a predetermined voltage. The BCM sends a serial data message to the engine control module (ECM) indicating the function that has been requested.

Conditions for Running the DTC

The ignition is ON.

Conditions for Setting the DTC

- The ECM receives an invalid cruise control switch status serial data message from the BCM.
- This diagnostic runs continuously.

Actions Taken When the DTC Sets

DTC P0575 is a type C DTC.

Conditions for Clearing the DTC

DTC P0575 is a type C DTC.

Reference Information

Schematic Reference

Cruise Control Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Cruise Control Description and Operation

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Verify that DTC B3794 is not set.
 - If DTC is set, refer to **DTC B3794**.
2. Road test the vehicle and attempt to engage cruise. Verify that cruise control engages properly and the DTC P0575 is not set.
 - If DTC is set, replace the K9 BCM. Clear the DTC, road test the vehicle and attempt to engage cruise. If the DTC resets, replace the K20 ECM.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

Control Module References for BCM or ECM replacement, setup, and programming

SYMPTOMS - CRUISE CONTROL

IMPORTANT: The following steps must be completed before using the symptom tables.

1. Before using the symptom diagnostic table, perform the **Diagnostic System Check - Vehicle** in order to verify the following conditions:
 - There are no DTCs set.
 - The module can communicate via the serial data link.
2. Review the system operation in order to understand the system functions. Refer to **Cruise Control Description and Operation**.

Visual/Physical Inspection

- Inspect for aftermarket devices which can affect the operation of the cruise control system. Refer to **Checking Aftermarket Accessories** .
- Inspect the accessible system components or the visible system components for obvious damage or for obvious conditions which can cause the symptom.

Intermittent

Faulty electrical connections or wiring may be the cause of intermittent conditions. Refer to **Testing for Intermittent Conditions and Poor Connections** .

Symptom List

Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:

- **Cruise Control Malfunction**
- **Cruise Control Indicator Malfunction**

CRUISE CONTROL INDICATOR MALFUNCTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

Circuit/System Description

The instrument panel cluster (IPC) illuminates the cruise control engaged indicator based on serial data messages received from the engine control module (ECM). The indicator is commanded ON when the cruise control system is controlling vehicle speed, and turned OFF with the system disengaged.

Reference Information

Schematic Reference

Cruise Control Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

- **Cruise Control Description and Operation**
- **Indicator/Warning Message Description and Operation**

Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON, with a scan tool command the IPC display test ON and OFF. The cruise control light should turn ON and OFF.
 - o If the cruise control light does not turn ON and OFF, replace the IPC.
2. Replace the ECM.

Repair Procedures

Perform the Diagnostic Repair Verification after completing the diagnostic procedure.

Control Module References for ECM or IPC replacement, setup, and programming

CRUISE CONTROL MALFUNCTION

Diagnostic Instructions

- Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.
- Review Strategy Based Diagnosis for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	Open or High Resistance	Short to Voltage	Signal Performance
B+	1	1	1	-
Cruise Control Switch Signal	1	P0564	B3794 08, P0567, P0568	B3794 61, P0564
1. Cruise Control Malfunction				

Circuit/System Description

The cruise control switch is an input to the body control module (BCM). The BCM monitors the cruise control on/off, set/coast, resume/accelerate and cancel switches via the cruise control switch signal circuit in order to

detect when the driver has requested to perform a cruise control function. The BCM detects a specific voltage signal on the cruise control switch signal circuit when a switch is applied. The BCM sends a serial data message to the engine control module (ECM) indicating the status of the cruise control switches.

Reference Information

Schematic Reference

Cruise Control Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Cruise Control Description and Operation

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

Engine ON, while rotating the steering wheel to both steering stops, observe the scan tool Cruise Control Switch parameter while pressing each of the cruise control switches. The parameter should toggle between On, Off, Resume, Set, and Cancel as the applicable switch is pressed.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the S70L steering wheel control switch-left.
2. Ignition ON, test for B+ between the B+ circuit terminal 1 and ground.
 - If less than the specified value, test the circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the K9 BCM.
3. Test for B+ between the B+ circuit terminal 1 and the signal circuit terminal 3.
 - If less than the specified value, test the signal circuit for a short to voltage or an open/high resistance. If the circuit tests normal, replace the K9 BCM.
4. Ignition OFF, disconnect the X3 harness connector at the K9 BCM.

5. Test for infinite resistance between the signal circuit terminal 9 and ground.
 - If less than the specified value, test the signal circuit for a short to ground.
6. If all circuits test normal, test or replace the S70L steering wheel control switch-left.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Cruise Control Switch Replacement (NK5)** or **Cruise Control Switch Replacement (NP5)**
- **Control Module References** for BCM replacement, setup, and programming

REPAIR INSTRUCTIONS

CRUISE CONTROL SWITCH REPLACEMENT (NK5)

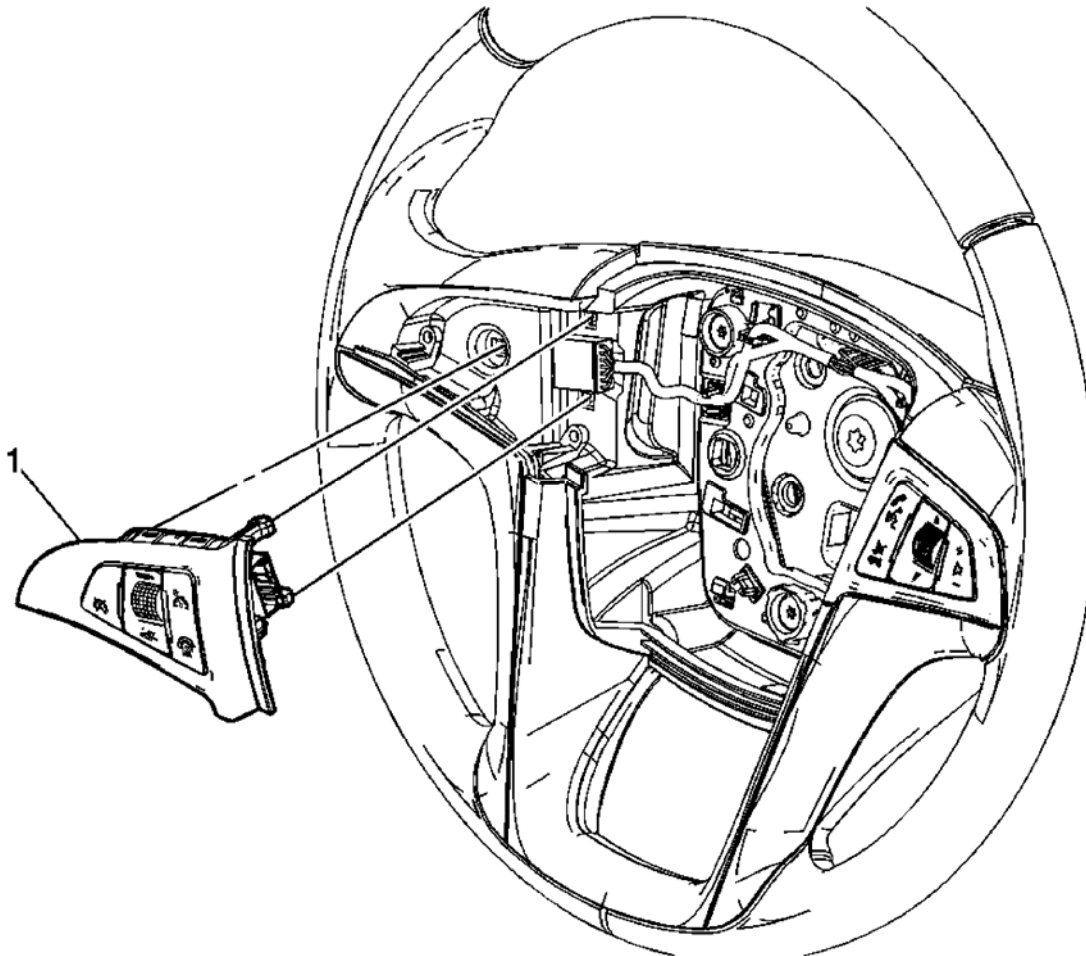


Fig. 2: Identifying Cruise Control Switch (NK5)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the inflatable restraint steering wheel module. Refer to <u>Steering Wheel Inflatable Restraint Module Replacement</u> .	
1	Cruise Control Switch Procedure 1. Use flat bladed tool to release the switch from steering wheel. 2. Disconnect the electrical connector.

CRUISE CONTROL SWITCH REPLACEMENT (NP5)

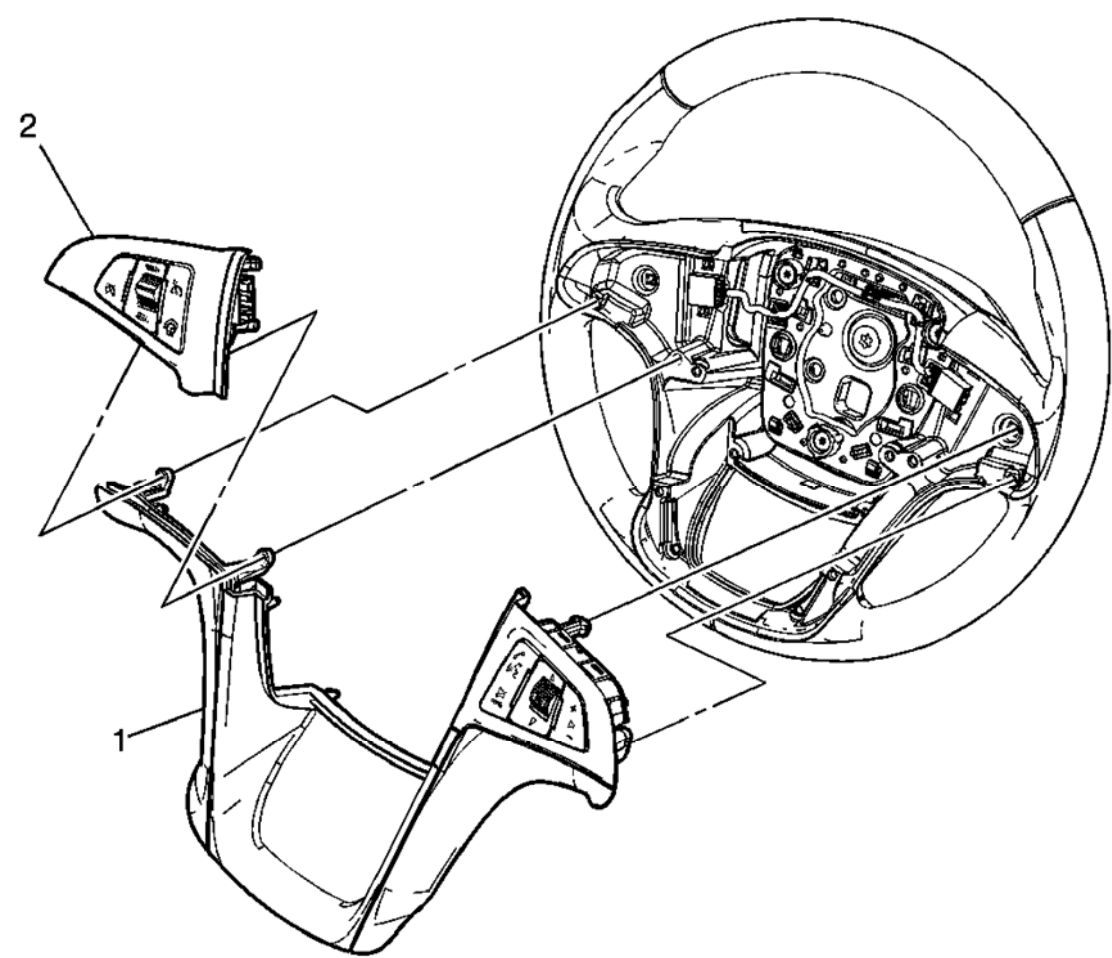


Fig. 3: Identifying Cruise Control Switch Components (NP5)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure:	

Remove the inflatable restraint steering wheel module. Refer to **Steering Wheel Inflatable Restraint Module Replacement** .

1	Steering Wheel Spoke Cover
2	Cruise Control Switch Procedure 1. Use flat bladed tool to release the switch from steering wheel. 2. Disconnect the electrical connector.

DESCRIPTION AND OPERATION

CRUISE CONTROL DESCRIPTION AND OPERATION

Cruise control is a speed control system that maintains a desired vehicle speed under normal driving conditions at speeds above 40 km/h (25 mph). Steep grades may cause variations in the selected vehicle speeds.

The following are the main components of the Cruise Control System:

- The accelerator pedal
- The brake pedal position (BPP) sensor
- The body control module (BCM)
- The cruise on/off switch
- The cruise control cancel switch
- The + RES switch (equivalent to resume/accel switch)
- The - SET switch (equivalent to set/coast switch)
- The engine control module (ECM)
- The throttle actuator control (TAC) motor
- The vehicle speed sensor

The body control module (BCM) monitors the signal circuit of the cruise control switches, which are located on the steering wheel. The BCM relays the cruise control switch status to the engine control module (ECM) via the serial data circuit. The ECM uses the status of the cruise control switch to determine when to capture and maintain the vehicle speed. The ECM monitors the vehicle speed signal circuit in order to determine the desired vehicle speed. The ECM uses the TAC motor in order to maintain the vehicle speed.

Voltage is supplied to the cruise control switch via the steering wheel control switch reference voltage circuit supplied by the BCM. The cruise control function switches are arranged in a resistive ladder design, with each cruise control function switch having a different resistance value. The BCM detects a specific voltage value that is associated with the cruise control function switch being activated. The BCM sends a serial data message to the ECM indicating that the on/off switch is active. Similarly, when the normally open + RES switch or the normally open - SET switch are pressed, the switch closes and the BCM detects the predetermined voltage signal on the cruise control resume/accel and set/coast switch signal circuit. The BCM sends a serial data message to the ECM indicating that the + RES switch or the - SET switch is active. The + RES switch or the -

SET switch will remain inactive when the BCM has not received the predetermined voltage signal from the on/off switch.

Cruise Control Engaged

The Cruise Control System will engage and adjust vehicle speeds, based on the activation of the following cruise control switches, which are located on the steering wheel:

- On/Off
- + RES
- - SET

To engage the Cruise Control System, ensure that the vehicle speed is above 40.2 km/h (25 mph), turn the cruise On/Off switch ON and momentarily press the - SET switch. The ECM will engage the Cruise Control System and record the vehicle speed. The ECM sends a serial data message to the instrument panel cluster (IPC) in order to illuminate the Cruise Engaged indicator in the IPC.

Pressing the accelerator pedal while the Cruise Control System is engaged, allows the driver to override the Cruise Control System in order to accelerate the vehicle beyond the current set vehicle speed. When the accelerator pedal is released, the vehicle will decelerate and resume the current set vehicle speed. The driver can also override the current set vehicle speed via the - SET switch and the + RES switch. When the Cruise Control System is engaged, pressing and holding the - SET switch will allow the vehicle to decelerate from the current set vehicle speed without deactivating the Cruise Control System. When the - SET switch is released, the ECM will record the vehicle speed and maintain the vehicle speed as the new set vehicle speed. When the Cruise Control System is engaged, momentarily pressing the - SET switch will allow the vehicle to decelerate at 1.6 km/h (1 mph) increments for each time that the - SET is momentarily pressed, with a minimum vehicle speed of 37 km/h (23 mph).

Pressing and holding the + RES switch, when the Cruise Control System is engaged, will allow the vehicle to accelerate to a greater vehicle speed than the current set vehicle speed. When the + RES switch is released, the ECM will record the vehicle speed and maintain the vehicle speed as the new set vehicle speed. When the Cruise Control System is engaged, momentarily pressing the + RES switch will allow the vehicle to accelerate at 1.6 km/h (1 mph) increments for each time that the + RES switch is momentarily pressed, with the maximum acceleration total of 16 km/h (10 mph) over the current set vehicle speed. Momentarily activating the + RES switch will recall the previous vehicle speed, after the cruise control system is disengaged by pressing the brake pedal, or CANCEL switch.

Cruise Control Disengaged

The engine control module (ECM) disengages the cruise control operation based on the signals from the following switches:

- The brake pedal position (BPP) sensor
- The On/Off switch
- The cruise control cancel switch

The Cruise Control System will disengage when the brake pedal is applied. The body control module (BCM)

monitors the BPP sensor via the BPP sensor signal circuit as the voltage signal increases while the pedal reaches the fully applied position. The ECM monitors the BPP signal through a discrete input and a serial data message signal from the BCM indicating the brake status. When both signals indicate the brake pedal is applied, the ECM will disengage the cruise control system.

The Cruise Control System will also disengage when the cruise control on/off switch is switched OFF, or the cruise control cancel switch is activated. The body control module (BCM) determines when the cruise control cancel switch is activated. When the normally open cancel switch is closed, the BCM detects the predetermined voltage signal on the cruise control function switch circuit. The vehicle speed stored in the memory of the engine control module will be erased when the cruise control On/Off switch is turned OFF, or the ignition switch is turned OFF. The BCM sends a serial data message to the ECM in order to disengage the cruise control system. The Cruise Control System will disengage when the ECM detects that a driver override function has been active for approximately 60 seconds. When the Cruise Control System has been disengaged, the ECM sends a serial message to the instrument panel cluster (IPC) in order to turn OFF the Cruise Engaged indicator.

Every time the Cruise Control System is disengaged, the ECM will keep track of the reason for system disengagement. The last 8 disengagement reasons will be recorded within the ECM memory. The scan tool will display the last 8 Cruise Disengage History parameters, in which one out of approximately 50 possible reasons will be displayed in each of these 8 parameters. For the disengagement reason to be displayed within the scan tool parameter either the Cruise Control System is active and disengagement is requested, or engagement of the system is requested but a fault is present.

Cruise Control Inhibited

The engine control module (ECM) inhibits the cruise control operation when any of the following conditions exist:

- The ECM has not detected a brake pedal activation from the body control module (BCM).
- A Cruise Control System DTC has been set.
- The vehicle speed is less than 40.2 km/h (25 mph).
- The vehicle speed is too high.
- The vehicle is in PARK, REVERSE, NEUTRAL, or 1st gear.
- The engine RPM is low.
- The engine RPM is high.
- The system voltage is not between 9 volts and 16 volts.
- The Antilock Brake System (ABS)/Traction Control System (TCS) is active for more than 2 seconds.