

2017 ACCESSORIES & EQUIPMENT

Cruise Control - Impala

SCHEMATIC WIRING DIAGRAMS

CRUISE CONTROL WIRING SCHEMATICS

Controls

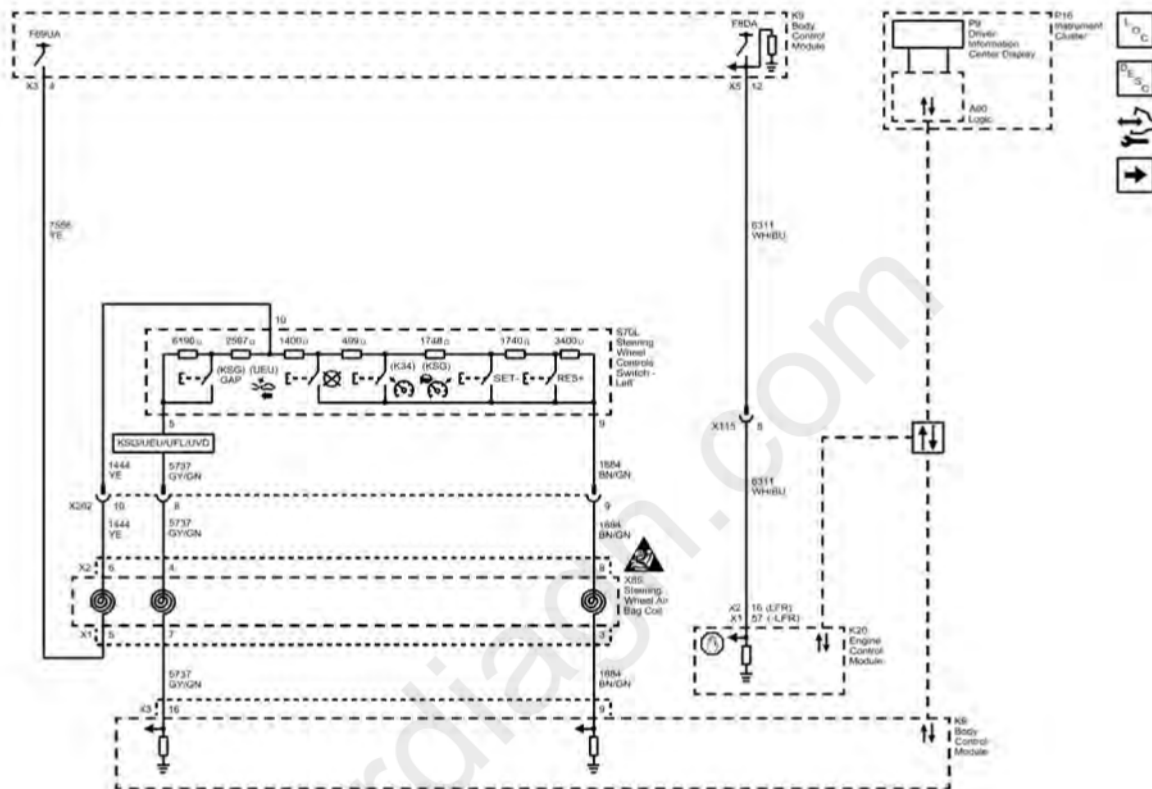


Fig. 1: Controls

Courtesy of GENERAL MOTORS COMPANY

Adaptive Cruise Module (KSG)

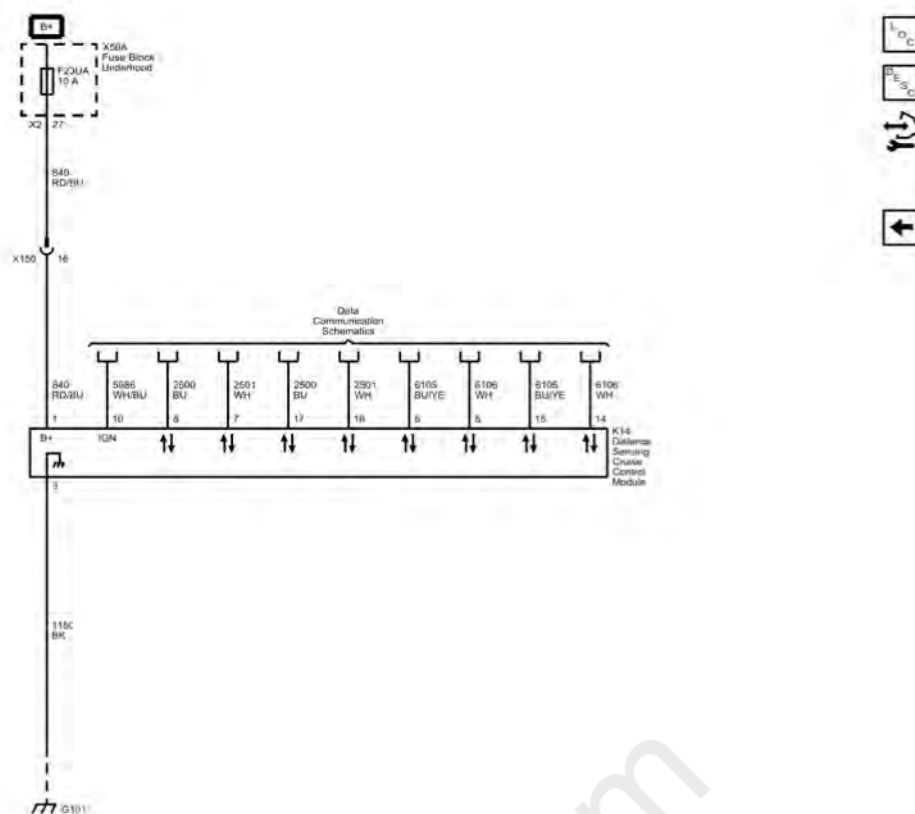


Fig. 2: Adaptive Cruise Module (KSG)
Courtesy of GENERAL MOTORS COMPANY

DIAGNOSTIC INFORMATION AND PROCEDURES

DTC B3623: STEERING WHEEL CONTROLS DISTANCE SENSING CRUISE CONTROL GAP UP/DOWN SIGNAL CIRCUIT

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptors

DTC B3623

Steering Wheel Controls Distance Sensing Cruise Control Gap Up/Down Signal Circuit

For symptom byte information, refer to [Symptom Byte List](#)

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition	1	B3623	-	-
Signal	B3623	B3623	1	B3623
1. Cruise Control Malfunction				

Circuit/System Description

The adaptive cruise control gap switch is used to select a following gap time (or distance) setting for the adaptive cruise control of far, medium, or near

Conditions for Running the DTC

- The cruise control switch is ON.
- The vehicle has the Ignition On/Vehicle On or the engine is running.

Conditions for Setting the DTC

B3623 08

The body control module detects an invalid voltage signal on the adaptive cruise control gap switch signal circuit for 1 s.

B3623 61

The adaptive cruise control gap switch is stuck in one position for 60 s.

Actions Taken When the DTC Sets

B3623

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

B3623

DTC B3623 is a type C DTC.

Conditions for Clearing the DTC

B3623

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

B3623

DTC B3623 is a type C DTC.

Reference Information

Schematic Reference

Cruise Control Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Cruise Control Description and Operation (Adaptive Cruise Control)

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. Ignition On/Vehicle in Service Mode.
2. Verify the scan tool Distance Sensing Cruise Control Module Following Distance Setting Parameter changes between Far, Medium or Near when pressing the adaptive cruise control gap switch.
 - **If the parameter does not change**
Refer to Circuit/System Testing.
 - **If the parameter changes**
3. All OK.

Circuit/System Testing

NOTE:

- **An open ignition circuit or fuse before the control module will cause communication DTCs or power mode mismatch DTCs to set against or in the control module. This failure mode will be diagnosed in the no communications diagnostic procedure or power mode mismatch.**
- **This test assumes the ignition circuit has a driver that will open under a high current condition before the fuse opens.**
- **The module driver can open under normal conditions such as battery run down protection or a retained accessory power mode.**

1. Ignition/Vehicle Off, disconnect the harness connector at the S70L Steering Wheel Controls Switch-Left, Ignition On/Vehicle in Service Mode.
2. Verify a test lamp illuminates between the ignition circuit terminal 10 and ground.
 - **If the test lamp does not illuminate**
 1. Ignition/Vehicle Off, disconnect the harness connector at the K9 Body Control Module.
 2. Test for greater than 100 Ω between the ignition circuit and ground.
 - If 100 Ω or less, repair the short to ground on the circuit.
 - If greater than 100 Ω
 3. Test for less than 2 Ω in the ignition circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , test or replace the K9 Body Control Module.
 - **If the test lamp illuminates**
3. Verify the scan tool body control module Cruise Control Switch 2 parameter is Open/High Resistance.
 - **If not Open/High Resistance**
 1. Ignition/Vehicle Off, disconnect the harness connector at the K9 Body Control Module, Ignition On/Vehicle in Service Mode.
 2. Test for less than 1 V between the signal circuit terminal 5 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 Body Control Module.
 - **If Open/High Resistance**
4. Install a 3 A fused jumper wire between the signal circuit terminal 5 and the ignition circuit terminal 10.
5. Verify the scan tool body control module Cruise Control Switch 2 parameter displays Short to Battery.
 - **If not Short to Battery**
 1. Ignition/Vehicle Off, disconnect the harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the signal circuit terminal 5 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.

- If infinite resistance
3. Test for less than 2 Ω in the signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
 - **If Short to Battery**
6. Test or replace the S70L Steering Wheel Controls Switch-Left.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

Refer to [Control Module References](#) for control module replacement, programming and setup.

DTC C0460: STEERING WHEEL ANGLE SENSOR MODULE - INCORRECT COMPONENT INSTALLED (DISTANCE SENSING CRUISE CONTROL)

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptor

DTC C0460 3A

Steering Wheel Angle Sensor Module - Incorrect Component Installed

For symptom byte information, refer to [Symptom Byte List](#)

Circuit/System Description

The distance sensing cruise control system has detected a problem with the steering wheel angle sensor signal.

Conditions for Running the DTC

Ignition voltage is between 9 - 16 V.

Conditions for Setting the DTC

The steering wheel angle sensor signal is invalid.

Action Taken When the DTC Sets

DTC C0460 is stored in memory.

Conditions for Clearing the DTC

A current DTC will clear on the next malfunction-free ignition cycle.

Reference Information

Schematic Reference

[Cruise Control Schematics](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX](#)

Description and Operation

[Cruise Control Description and Operation \(Adaptive Cruise Control\)](#)

- [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. Vehicle in Service Mode.
2. Verify that DTC C0460 3A is not set.
 - **If the DTC is set**
 1. Install the correct part number B99 Steering Wheel Angle Sensor. Clear DTCs and retest.
 2. Verify the DTC does not set while operating the vehicle within the Conditions for Running the DTC.
 - If the DTC sets, replace the K14 Distance Sensing Cruise Control Module.
 - If the DTC is not set.
 - 3. All OK.
- **If the DTC is not set**
3. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

Refer to [Control Module References](#) for distance sensing cruise control module replacement, programming and setup.

DTC C0561: DRIVEN WHEEL SPEED - NON DRIVEN WHEEL SPEED NOT PLAUSIBLE

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptor

DTC C0561 00

Driven Wheel Speed - Non Driven Wheel Speed Not Plausible

Circuit/System Description

The distance sensing cruise control module has the exclusive function of detecting, tracking and classifying targets within its specified field of view. The distance sensing cruise control module has the ability to detect and react to objects of interest in its detection zone and is critical to the proper operation of the adaptive cruise control system.

Conditions for Running the DTC

Engine is running.

Conditions for Setting the DTC

The mismatch between the vehicle speed information of the front and rear wheels is greater than 15 km/h (9 MPH).

Action Taken When the DTC Sets

- Loss of adaptive cruise control function.
- Service Adaptive Cruise Control message is displayed in the driver information center.

Conditions for Clearing the DTC

The condition responsible for setting the DTC no longer exists.

Diagnostic Aids

When the Service Adaptive Cruise Control message is displayed in the driver information center the disable reason is stored in the scan tool Cruise Control Disengage History parameters.

The scan tool Cruise Control Disengage History parameters are a list of the previous reasons the adaptive cruise control system was disabled. These parameters may help in the diagnosis of an intermittent concern or a customer concern which is the result of normal system operation.

Reference Information

Schematic Reference

Cruise Control Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Cruise Control Description and Operation (Conventional Cruise Control)Cruise Control Description and Operation (Adaptive Cruise Control)

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 Testing

1. Program the K14 Distance Sensing Cruise Control Module.
2. Road test the vehicle and verify the adaptive cruise control system functions normally and DTC C0561 does not set. Refer to Cruise Control Description and Operation (Conventional Cruise Control)Cruise Control Description and Operation (Adaptive Cruise Control).
 - **If DTC C0561 sets**

Refer to Diagnostic Aids and the scan tool Cruise Control Disengage History parameters to determine the cause of the inhibit.
 - **If DTC C0561 does not set**
3. All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.

Refer to Control Module References for control module replacement, programming and setup.

DTC C0565: VEHICLE IDENTIFICATION NUMBER 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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptor

DTC C0565 00

Vehicle Identification Number Malfunction

Circuit/System Description

The vehicle identification number (VIN) is programmed into the distance sensing cruise control module during initial programming of the module.

Conditions for Running the DTC

Ignition ON

Conditions for Setting the DTC

The distance sensing cruise control module is not properly programmed.

Action Taken When the DTC Sets

- Loss of adaptive cruise control function.
- Service Adaptive Cruise Control message is displayed in the driver information center.

Conditions for Clearing the DTC

The condition responsible for setting the DTC no longer exists.

Reference Information

Schematic Reference

Cruise Control Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Cruise Control Description and Operation (Conventional Cruise Control)Cruise Control Description and Operation (Adaptive Cruise Control)

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. Verify that DTC C0565 is not set.

- **If DTC C0565 is set**

1. Program the K14 Distance Sensing Cruise Control Module.

2. Verify the DTC does not set

- If the DTC sets, replace the K14 Distance Sensing Cruise Control Module.
- If the DTC does not set

3. All OK.

- **If DTC C0565 is not set**

2. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

Refer to **Control Module References** for distance sensing cruise control module replacement, programming and setup

DTC C056E: ELECTRONIC CONTROL UNIT SOFTWARE - CALIBRATION NOT LEARNED (DISTANCE SENSING CRUISE CONTROL)

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.
- Refer to **Diagnostic Procedure Instructions** to provide an overview of each diagnostic category.

DTC Descriptor

DTC C056E 4B

Electronic Control Unit Software - Calibration Not Learned

For symptom byte information, refer to **Symptom Byte List** .

Circuit/System Description

The distance sensing cruise control module has detected that the learn procedure has not been performed or completed.

Conditions for Running the DTC

Battery voltage is between 9 - 16 V and data link communications operate normally.

Conditions for Setting the DTC

The device is not configured properly.

Conditions for Clearing the DTC

- A current DTC clears when the malfunction is no longer present.
- A history DTC clears when the device ignition cycle counter reaches the reset threshold, without a repeat of the malfunction.

Reference Information

Schematic Reference

Data Communication Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Data Link Communications Description and Operation

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool References

[Control Module References](#) for scan tool information

Circuit/System Verification

NOTE: If DTC C056 with failure type byte 4B is the only DTC set, all that should be needed is to perform the distance sensing cruise control module learn procedure.

1. Verify DTC C056E 4B is not set.
 - **If DTC C056E 4B is set**
 1. Perform the distance sensing cruise control module learn procedure. Refer to [Distance Sensing Cruise Control Module Learn Procedure](#).
 2. Verify the DTC C056E 4B does not set.
 - If the DTC C056E 4B sets, replace the K14 Distance Sensing Cruise Control Module.
 - If the DTC C056E 4B does not set
 3. All OK.
 - **If DTC C056E 4B is not set**
2. All OK

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Distance Sensing Cruise Control Module Learn Procedure](#) for distance sensing cruise control module learn procedure.
- Refer to [Forward Range Radar Module Replacement](#) for K14 Distance Sensing Cruise Control Module replacement.
- Refer to [Forward Range Radar Module Alignment](#) for K14 Distance Sensing Cruise Control Module alignment.
- Refer to [Forward Range Radar Module Inspection](#) for K14 Distance Sensing Cruise Control Module inspection.
- Refer to [Control Module References](#) for device replacement, programming and setup.

DTC C1002: DISTANCE SENSING CRUISE CONTROL MODULE PERFORMANCE

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptor

DTC C1002 00

Distance Sensing Cruise Control Module Performance - Malfunction

DTC C1002 66

Distance Sensing Cruise Control Module Performance - Incorrect Mounting

DTC C1002 67

Distance Sensing Cruise Control Module Performance - Incorrect Assembly

Circuit/System Description

The distance sensing cruise control module has the exclusive function of detecting, tracking and classifying targets within its specified field of view. The distance sensing cruise control module has the ability to detect and react to objects of interest in its detection zone and is critical to the proper operation of the adaptive cruise control system. When the distance sensing cruise control module detects that it is out of alignment, DTC C1002 sets.

Conditions for Running the DTC

The ignition is ON.

Conditions for Setting the DTC

The alignment angle is outside allowed range.

Action Taken When the DTC Sets

C1002 00

- Loss of adaptive cruise control function.
- Cruise Not Ready message is displayed in the driver information center.

C1002 66

- Loss of adaptive cruise control function.
- Service Adaptive Cruise Control message is displayed in the driver information center.

C1002 67

- Loss of adaptive cruise control function.
- Service Adaptive Cruise Control message is displayed in the driver information center.

Conditions for Clearing the DTC

The condition responsible for setting the DTC no longer exists.

Diagnostic Aids

An out of alignment condition may be a result of tampering with the structures/brackets or the adjuster settings of the distance sensing cruise control module. Also, damage to the front section of the vehicle or to the distance sensing cruise control module may cause an out of alignment condition.

Reference Information

Schematic Reference

Cruise Control Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Cruise Control Description and Operation (Adaptive Cruise Control)

- [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 Testing

1. Perform the Distance Sensing Cruise Control Service Alignment learn procedure with scan tool.
2. Road test the vehicle and verify the adaptive cruise control system functions normally and DTC C1002 does not set. Refer to [Cruise Control Description and Operation \(Adaptive Cruise Control\)](#).
 - **If DTC C1002 sets**
 1. Align the K14 Distance Sensing Cruise Control Module. Refer to [Forward Range Radar Module Alignment](#).
 - If alignment cannot be achieved within the limits of the available adjustment, inspect the mounting structures and brackets for damage or tampering and repair as necessary to achieve proper alignment.
 - If alignment is OK
 2. Road test the vehicle and verify the adaptive cruise control system functions normally and DTC C1002 does not set.
 - If DTC C1002 sets, replace the K14 Distance Sensing Cruise Control Module.
 - If DTC C1002 does not set.
 3. All OK.
 - **If DTC C1002 does not set**
3. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

Refer to [Control Module References](#) for control module replacement, programming and setup.

DTC P0571: CRUISE CONTROL BRAKE SWITCH CIRCUIT

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptor

DTC P0571

Cruise Control Brake Switch Circuit

Circuit/System Description

The engine control module (ECM) monitors the brake pedal position sensor. When the brake pedal is applied, the ECM detects a predetermined voltage signal. The ECM sends a serial data message to the body control module (BCM) indicating the status of the stop lamps.

This diagnostic test functions on the assumption that a sudden decrease in vehicle speed is caused by a brake pedal application. When the ECM detects that there is a 4.2 km/h (2.6 mph) or greater decrease in

vehicle speed within 0.25 s without a transition of the stop lamp switch, the ECM sets DTC P0571.

Conditions for Running the DTC

- The engine speed is greater than 700 RPM.
- The traction control system or the antilock brake system are not active and have not malfunctioned.
- The vehicle speed is greater than 48 km/h (30 mph).
- The diagnostic will disable when the wheel speed is less than 16 km/h (10 mph).

Conditions for Setting the DTC

The BCM detects either a low voltage signal on the stop lamp switch signal circuit when the serial data message from the ECM indicates the brakes are applied, or a high voltage signal on the stop lamp switch signal circuit when the serial data message from the ECM indicates the brakes are not applied.

Actions Taken When the DTC Sets

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

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](#)
- [Exterior Lights Schematics](#)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

[Cruise Control Description and Operation \(Conventional Cruise Control\)](#)[Cruise Control Description and Operation \(Adaptive Cruise Control\)](#)

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. Verify that the stop lamps operate properly and that no B22 Brake Pedal Position Sensor related DTCs are set.
 - **If brake pedal position sensor related DTCs are set**
Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#)
 - **If no brake pedal position sensor related DTCs are set**

2. Verify that no DTCs are set, except DTC P0571.

- If any other DTC is set, except DTC P0571

Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#).

- If only DTC P0571 is set

3. Replace the K20 Engine Control Module.

4. Verify DTC P0571 does not set when operating the vehicle within the conditions for running the DTC.

- If the DTC sets

Replace the K9 Body Control Module.

- If the DTC does not set

5. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

Refer to [Control Module References](#) for BCM or ECM replacement, programming and setup.

DTC P0572 OR P0573: BRAKE SWITCH CIRCUIT 1 LOW/HIGH VOLTAGE

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptors

DTC P0572

Brake Switch Circuit 1 Low Voltage

DTC P0573

Brake Switch Circuit 1 High Voltage

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Stop Lamp Switch Signal	C0297, P0572	P0572	P0573	P0703

Circuit/System Description

The brake pedal position sensor signal circuit is a B+ input from the body control module (BCM) to the engine control module (ECM). The BCM and ECM monitor the brake pedal position sensor signal circuit to detect when the brake pedal has been applied. When the brake pedal is applied, the BCM supplies B+ on the stop lamp signal circuit and also sends a serial data message to the ECM indicating that the brake pedal has been applied.

Conditions for Running the DTC

- The engine is running.
- Battery voltage is greater than 11.5 V.
- Brakes applied.

Conditions for Setting the DTC

P0572

This DTC will set when the ECM detects a short to ground or an open on the discrete brake signal circuit when the serial data message from the BCM indicates the brakes are applied. This diagnostic will run when the serial data message and the voltage signal on the brake switch signal circuit do not match for 8 out 10 times, and the condition is present for greater than 2 s.

P0573

This DTC will set when the ECM detects a short to voltage on the discrete brake signal circuit when the serial data message from the BCM indicates the brakes are not applied. This diagnostic will run when the serial data message and the voltage signal on the brake switch signal circuit do not match for 8 out 10 times, and the condition is present for greater than 2 s.

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 - INDEX

Description and Operation

Cruise Control Description and Operation (Conventional Cruise Control)Cruise Control Description and Operation (Adaptive Cruise Control)

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/Vehicle in Service Mode.
2. Verify that the stop lamps operate properly and that no B22 Brake Pedal Position Sensor related DTCs are set.

- **If brake pedal position sensor related DTCs are set**

Refer to Diagnostic Trouble Code (DTC) List - Vehicle

- **If no brake pedal position sensor related DTCs are set**

3. Refer to Circuit/System Testing.

Circuit/System Testing

NOTE:

All components may need to be disconnected on the cruise control brake signal circuit to isolate a short to voltage, short to ground or an open/high resistance condition. Use the schematic to identify the proper brake signal terminal (circuit 6311) at the K20 Engine Control Module.

1. Ignition/Vehicle Off, disconnect the harness connector at the K20 Engine Control Module, Ignition On/Vehicle in Service Mode.
2. Connect a test lamp between the signal circuit terminal and ground.
3. Verify the test lamp turns ON and OFF when pressing and releasing the brake pedal.
 - **If the test lamp is always OFF**
 1. Ignition/Vehicle Off, disconnect the harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the signal circuit and ground.
 - If not infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance.
 3. Test for less than 2 Ω in the signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
 - **If the test lamp is always ON**
 1. Ignition/Vehicle Off, disconnect the harness connector at the K9 Body Control Module, Ignition On/Vehicle in Service Mode.
 2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the source of voltage on the circuit.
 - If less than 1 V replace the K9 Body Control Module.
 - **If the test lamp turns ON and OFF**
4. Replace the K20 Engine Control Module.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

Refer to [Control Module References](#) for control module replacement, programming, and setup.

DTC P0575: CRUISE CONTROL SWITCH SIGNAL MESSAGE COUNTER INCORRECT**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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptor**DTC P0575**

Cruise Control Switch Signal Message Counter Incorrect

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.
- The vehicle speed is greater than 40 km/h (25 MPH) and the cruise control is engaged.

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 - INDEX

Description and Operation

Cruise Control Description and Operation (Conventional Cruise Control)**Cruise Control Description and Operation (Adaptive Cruise Control)**

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 no DTCs are set, except DTC P0575.
 - **If any other DTC is set, except DTC P0575**
 Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .
 - **If only DTC P0575 is set**
2. Replace the K9 Body Control Module.
3. Verify DTC P0575 does not set when operating the vehicle within the Conditions for Running the DTC.
 - **If the DTC sets**
 Replace the K20 Engine Control Module.
 - **If the DTC does not set**
4. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

Refer to [Control Module References](#) for BCM or ECM replacement, programming, and setup.

DTC P0703: BRAKE SWITCH SIGNAL MESSAGE COUNTER INCORRECT

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptor

DTC P0703

Brake Switch Signal Message Counter Incorrect

Circuit/System Description

The body control module (BCM) monitors the brake pedal position sensor. When the brake pedal is applied, the BCM detects a predetermined voltage signal. The BCM sends a serial data message to the engine control module (ECM) indicating the status of the stop lamps.

Conditions for Running the DTC

The engine is ON.

Conditions for Setting the DTC

- The ECM receives an invalid brake pedal status serial data message from the BCM.
- This diagnostic runs continuously.

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 - INDEX

Description and Operation

Cruise Control Description and Operation (Conventional Cruise Control)Cruise Control Description and Operation (Adaptive Cruise Control)

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

Circuit/System Verification

1. Verify that no DTCs are set, except DTC P0703.

- **If any other DTC is set, except DTC P0703**

Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#) .

- **If only DTC P0703 is set**

2. Replace the K9 Body Control Module.

3. Verify DTC P0703 does not set when operating the vehicle within the conditions for running the DTC.

- **If the DTC sets**

Replace the K20 Engine Control Module.

- **If the DTC does not set**

4. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

Refer to [Control Module References](#) for BCM or ECM replacement, programming, and setup.

DTC P1553: DISTANCE SENSING CRUISE CONTROL SIGNAL MESSAGE COUNTER INCORRECT

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptor

DTC P1553

Distance Sensing Cruise Control Signal Message Counter Incorrect

Circuit/System Description

The engine control module (ECM) detects a serial communication failure associated with the adaptive cruise control axle torque request.

Conditions for Running the DTC

The ignition is ON.

Conditions for Setting the DTC

- The ECM detects a serial communication failure associated with the adaptive cruise control axle torque request.
- This diagnostic runs continuously.

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.

Diagnostic Aid

DTCs P1553 and/or P15F6 may be set by the ECM against the distance sensing cruise control module if an engine crank is made in conjunction to a bus wake up versus prior to a bus wake up (which occurs when a customer first opens the door and then cranks the engine). When the distance sensing cruise control module first wakes up, the internal microprocessor goes through an initialization that lasts less than 2 seconds. The DTCs can also be set if the battery voltage drops below 7 volts during a cranking condition. Under these conditions, the rolling count signal transmitted to the ECM for the distance sensing cruise control module may freeze while the microprocessor re-initializes. No driver information center (DIC) service messages or tell-tales will be displayed.

Reference Information

Schematic Reference

Cruise Control Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Cruise Control Description and Operation (Adaptive Cruise Control)

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

NOTE:

- Do not replace the K14 Distance Sensing Cruise Control Module if DTCs P1553 and/or P15F6 are observed briefly as current DTCs after an ignition cycle and then transition to history DTCs.
- DTCs P1553 and/or P15F6 may reappear, as described above, after a "clear DTC". This is not an indication of a defective K14 Distance Sensing Cruise Control Module and it should not be replaced.
- Only replace the K14 Distance Sensing Cruise Control Module if DTCs P1553 and/or P15F6 remain as current DTCs for more than one minute.
- The conditions described above are a known issue that has no impact to system function and does not require any additional repair, reprogramming or module replacement.
- DTC P1553 is an informational DTC.
- Diagnose all other K20 Engine Control Module DTCs prior to DTC P1553.

1. Verify there are no other K20 Engine Control Module or communication DTCs set.

- If a DTC is set

Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#) .

- **If a DTC is not set**

2. Complete the diagnosis by looking for an intermittent serial data circuit fault. Refer to [Scan Tool Does Not Communicate with High Speed GMLAN Device](#) .

- **If an intermittent serial data circuit fault is found**

Repair as necessary.

- **If an intermittent serial data circuit fault is not found**

3. Clear DTCs and operate the vehicle in the conditions that the customer experienced.

4. Verify that DTC P1553 is not set as current after 1 min.

NOTE:

- DTC P15F6 and/or P1553 can reappear after an ignition cycle as a current code but, under normal circumstances, will transition to a history code in less than one minute. This can occur even after a clear DTCs. This is a known condition and the K14 Distance Sensing Cruise Control Module should not be replaced.
- Only replace the K14 Distance Sensing Cruise Control Module if DTC P15F6 and/or P1553 remain as current DTCs beyond one minute after an ignition cycle.

- **If DTC P1553 is set as current after 1 minute**

Replace K14 Distance Sensing Cruise Control Module.

- **If the DTC P1553 is not set as current after 1 minute**

5. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

Refer to [Control Module References](#) for control module replacement, programming, and setup.

DTC P158A: CRUISE CONTROL CALIBRATION INCORRECT

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptor

DTC P158A

Cruise Control Calibration Incorrect

Circuit/System Description

The type of cruise control system the vehicle has is programmed into the body control module and the engine control module. If this information is not the same in both modules DTC P158A will set.

Conditions for Running the DTC

This diagnostic runs continuously.

Conditions for Setting the DTC

The type of cruise control system programmed into the body control module does not match what is programmed into the engine control module.

Actions Taken When the DTC Sets

DTC P158A is a Type C DTC.

Conditions for Clearing the DTC

DTC P158A is a Type C DTC.

Reference Information

Schematic Reference

Cruise Control Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Cruise Control Description and Operation (Conventional Cruise Control) **Cruise Control Description and Operation (Adaptive Cruise Control)**

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 no DTCs are set, except DTC P158A.
 - **If any other DTC is set, except DTC P158A**
Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .
 - **If only DTC P158A is set**
2. Reprogram the K9 Body Control Module and the K20 Engine Control Module one after the other. Do not place the Ignition On/Vehicle in Service Mode between each programming event.
3. Verify DTC P158A does not set when operating the vehicle within the conditions for running the DTC.
 - **If the DTC does not set**
4. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

Refer to **Control Module References** for control module replacement, programming, and setup.

DTC P15F6: FRONT OBJECT DETECTION CONTROL MODULE TORQUE REQUEST SIGNAL MESSAGE COUNTER INCORRECT (DISTANCE SENSING CRUISE CONTROL)

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptors

DTC P15F6

Front Object Detection Control Module Torque Request Signal Message Counter Incorrect

Circuit/System Description

The distance sensing cruise control module is constantly sending a serial data message to the engine control module requesting engine speed or torque reduction. The engine control module sets DTC P15F6 when it detects a discrepancy in the structure of the message causing the integrity of the message to be questioned. An intermittent fault in the serial data circuits will cause the engine control module to set DTC P15F6.

Conditions for Running the DTC

Engine running.

Conditions for Setting the DTC

The engine control module detects that the engine speed and torque modification messages from the distance sensing cruise control module are either corrupted or intermittently missing.

Action Taken When the DTC Sets

- The distance sensing cruise control module sends a serial data message to display the appropriate indicator message
- The distance sensing cruise control module features are unavailable.

Conditions for Clearing the DTC

- The condition for the DTC is no longer present.
- The engine control module clears the history DTC when a current DTC is not detected in 40 consecutive drive cycles.

Diagnostic Aid

This is an informational DTC set by the engine control module. It is set to provide an indication that the distance sensing cruise control module will not be able to perform as intended. Diagnose any other DTCs first.

DTCs P1553 and/or P15F6 may be set by the ECM against the distance sensing cruise control module if an engine crank is made in conjunction to a bus wake up versus prior to a bus wake up (which occurs when a customer first opens the door and then cranks the engine). When the distance sensing cruise control module first wakes up, the internal microprocessor goes through an initialization that lasts less than 2 seconds. The DTCs can also be set if the battery voltage drops below 7 volts during a cranking condition. Under these conditions, the rolling count signal transmitted to the ECM for the distance sensing cruise control module may freeze while the microprocessor re-initializes. No driver information center (DIC) service messages or tell-tales will be displayed.

Reference Information

Schematic Reference

Cruise Control Schematics

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Cruise Control Description and Operation (Adaptive Cruise Control)

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

NOTE:

- Do not replace the K14 Distance Sensing Cruise Control Module if DTCs P1553 and/or P15F6 are observed briefly as current DTCs after an ignition cycle and then transition to history DTCs.
- DTCs P1553 and/or P15F6 may reappear, as described above, after a "clear DTC". This is not an indication of a defective K14 Distance Sensing Cruise Control Module and it should not be replaced.
- Only replace the K14 Distance Sensing Cruise Control Module if DTCs P1553 and/or P15F6 remain as current DTCs for more than one minute.
- The conditions described above are a known issue that has no impact to system function and does not require any additional repair, reprogramming or module replacement.
- DTC P15F6 is an informational DTC.
- Diagnose all other K20 Engine Control Module DTCs prior to DTC P15F6.

1. Verify there are no other K20 Engine Control Module or communication DTCs set.

- **If a DTC is set**

Refer to **Diagnostic Trouble Code (DTC) List - Vehicle**

- **If a DTC is not set**

2. Complete the diagnosis by looking for an intermittent serial data circuit fault. Refer to **Scan Tool Does Not Communicate with High Speed GMLAN Device**.

- **If an intermittent serial data circuit fault is found**

Repair as necessary.

- **If an intermittent serial circuit fault is not found**

3. Clear DTCs and operate the vehicle in the conditions that the customer experienced.

4. Verify DTC P15F6 is not set as current after 1 min.

NOTE:

- DTC P15F6 and/or P1553 can reappear after an ignition cycle as a current code but, under normal circumstances, will transition to a history code in less than one minute. This can occur even after a clear DTCs. This is a known condition and

the K14 Distance Sensing Cruise Control Module should not be replaced.

- Only replace the K14 Distance Sensing Cruise Control Module if DTC P15F6 and/or P1553 remain as current DTCs beyond one minute after an ignition cycle.

- If DTC P15F6 is set as current after 1 minute

Replace K14 Distance Sensing Cruise Control Module.

- If the DTC P15F6 is not set as current after 1 minute

5. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

Refer to [Control Module References](#) for module replacement, programming, and setup.

SYMPTOMS - CRUISE CONTROL

NOTE: 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.
2. Review the system operation in order to understand the system functions. Refer to [Cruise Control Description and Operation \(Conventional Cruise Control\)](#)[Cruise Control Description and Operation \(Adaptive Cruise Control\)](#).

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 - DTC B3794, P0564, P0565, P0567, P0568, P056C, P0580, P0581, P155A-P155C, or P162C](#)
- [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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

Circuit/System Description

The instrument cluster 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 - INDEX

Description and Operation

Cruise Control Description and Operation (Conventional Cruise Control)Cruise Control Description and Operation (Adaptive Cruise Control)

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. Verify the cruise control indicator turns ON and OFF when commanding the All Indicators ON and OFF with a scan tool.
 - **If the indicator does not turn ON and OFF**
Replace the P16 Instrument Cluster.
 - **If the indicator turns ON and OFF**
2. All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.

Refer to Control Module References for instrument cluster replacement, programming and setup.

DTC B3794, P0564, P0565, P0567, P0568, P056C, P0580, P0581, P155A-P155C, OR P162C: 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.
- Refer to Diagnostic Procedure Instructions to provide an overview of each diagnostic category.

DTC Descriptors

DTC B3794 08

Cruise Control Function Request Circuit

DTC B3794 61

DTC P0564

Cruise Control Multifunction Switch Circuit

DTC P0565

Cruise Control Switch Circuit

DTC P0567

Cruise Control Resume Switch Circuit

DTC P0568

Cruise Control Set Switch Circuit

DTC P056C

Cruise Control Cancel Switch Circuit

DTC P0580

Cruise Control Multifunction Switch Circuit Low Voltage

DTC P0581

Cruise Control Multifunction Switch Circuit High Voltage

DTC P155A

Cruise Control Switch State Undetermined

DTC P155B

Cruise Control Set/Coast Switch 2 Circuit

DTC P155C

Cruise Control Resume/Acceleration Switch 2 Circuit

DTC P162C

Vehicle Speed Limiting/Warning Switch Circuit

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition	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 engine control module (ECM) receives the requested cruise control switch function from the BCM via a serial data message.

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 s.

B3794 61

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

P0564, P0565, P0567, P0568, P056C

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

P0580, P0581

- The ECM detects an invalid voltage signal on the cruise control switch signal circuit.
- The above condition is present for greater than 2 s.
- The ECM runs this diagnostic continuously.

P155A

The ECM is unable to determine the state of the cruise control switch.

P162C

The ECM is unable to determine the state of the vehicle speed limiting switch.

Actions Taken When the DTC Sets

B3794

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

P0564, P0565, P0567, P0568, P056C, P0580, P0581, P155A, P162C

DTCs P0564, P0565, P0567, P0568, P056C, P0580, P0581, P155A and P162C are type C DTCs

Conditions for Clearing the DTC

B3794

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

P0564, P0565, P0567, P0568, P056C, P0580, P0581, P155A, P162C

DTCs P0564, P0565, P0567, P0568, P056C, P0580, P0581, P155A and P162C are type C DTCs.

Reference Information

Schematic Reference

Cruise Control Schematics

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Cruise Control Description and Operation (Conventional Cruise Control)**Cruise Control Description and Operation (Adaptive Cruise Control)**

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.
2. Verify that the stop lamps operate properly and that no B22 Brake Pedal Position Sensor related DTCs are set.
 - **If brake pedal position sensor related DTCs are set**
Refer to **Diagnostic Trouble Code (DTC) List - Vehicle**
 - **If no brake pedal position sensor related DTCs are set**
3. Verify the scan tool BCM Cruise Control Switch Status parameter changes between Off and On, Resume and Set when switching between each position on the cruise control switch.
 - **If the parameter does not change**
Refer to Circuit/System Testing.
 - **If the parameter changes**
4. Verify that no conditions that may inhibit cruise control operation are present. Refer to the ECM scan tool data list Cruise Control Inhibit Reason parameter. Refer to the **Cruise Control Description and Operation (Conventional Cruise Control)****Cruise Control Description and Operation (Adaptive Cruise Control)** for a list of inhibit reasons.
 - **If the cruise control system has a reason why it is inhibited**
Repair the condition that is causing the inhibit reason.
 - **If the cruise control system does not have any reasons why it may be inhibited**
5. Verify that no cruise control related DTCs are set.
 - **If any cruise control related DTCs are set**
Refer to Circuit/System Testing.
 - **If no cruise control related DTCs are set**
6. All OK.

Circuit/System Testing

NOTE:

- **An open ignition circuit or fuse before the control module will cause communication DTCs or power mode mismatch DTCs to set against or in the control module. This failure mode will be diagnosed in the no communications diagnostic procedure or power mode mismatch.**

- **This test assumes the ignition circuit has a module driver that will open under a high current condition before the fuse opens.**
- **The module driver can open under normal conditions such as battery run down protection or a retained accessory power mode.**

1. Ignition OFF, disconnect the harness connector at the S70L Steering Wheel Controls Switch-Left, ignition ON.
2. Verify a test lamp illuminates between the ignition circuit terminal 10 and ground.
 - **If the test lamp does not illuminate**
 1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module.
 2. Test for greater than 100 Ω between the ignition circuit and ground.
 - If 100 Ω or less, repair the short to ground on the circuit.
 - If greater than 100 Ω
 3. Test for less than 2 Ω in the ignition circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , test or replace the K9 Body Control Module.
 - **If the test lamp illuminates**
3. Verify the scan tool BCM Cruise Control Switch Status parameter is Open/High Resistance.
 - **If not Open/High Resistance**
 1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module, ignition ON.
 2. Test for less than 1 V between the signal circuit terminal 9 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 Body Control Module.
 - **If Open/High Resistance**
4. Install a 3 A fused jumper wire between the signal circuit terminal 9 and the ignition circuit terminal 10.
5. Verify the scan tool BCM Cruise Control Switch Status parameter is Short to Battery.
 - **If not Short to Battery**
 1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the signal circuit terminal 9 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
 - **If Short to Battery**
6. Test or replace the S70L Steering Wheel Controls Switch-Left.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Cruise Control Switch Replacement](#)
- Refer to [Control Module References](#) for control module replacement, programming and setup.

REPAIR INSTRUCTIONS

DISTANCE SENSING CRUISE CONTROL MODULE LEARN PROCEDURE

After replacing and programming the K14 Distance Sensing Cruise Control Module, it is necessary to perform a learn procedure to align the radar. This is indicated to the technician by DTC C056E 4B. The learn procedure is performed while driving the vehicle with the scan tool connected. The learn procedure

is initialized using a scan tool and the scan tool must remain connected until the learn procedure is complete. During this time a Vehicle Ahead tell-tale will be displayed on the Instrument Panel Cluster (IPC) and it will flash. Once the learn procedure is complete, the Vehicle Ahead tell-tale on the IPC will turn off.

If the learn procedure is not successful, it could be due to an improper driving environment, a module and bracket assembly bent out of position or an incorrect module mounting. A typical driving environment is usually sufficient to learn the module within 10 - 30 minutes.

Module Learn Procedure

1. Verify no other DTCs except for C056E 4B Electronic Control Unit Software are present. Repair any other DTCs before performing this learn procedure.
2. Prior to driving the vehicle make sure the surface in front of the distance sensing cruise control module is clean. Also verify the mounting area is not damaged and allows the module to face in the intended direction.
3. Prepare the scan tool to be mobile for the driving phase of the learn procedure. The scan tool needs to stay connected during the driving phase of the learn procedure.
4. Start the engine.
5. Initiate the learn procedure on the scan tool by selecting the Configuration/Reset Functions, then select Distance Sensing Cruise Control Module. The IPC will display "Service Adaptive Cruise Control" and the Vehicle Ahead tell-tale will flash during the procedure. Do not back out of this screen or press any other buttons until the learn procedure is complete.
6. Drive the vehicle within the following conditions for 10 - 30 minutes or until the learn procedure is complete. The Service Adaptive Cruise Control message and the Vehicle Ahead tell-tale will turn off when the learn procedure is complete.
 - Drive at speeds greater than 50 kph (30 mph).
 - Minimize tight curves.
 - Avoid extreme acceleration or deceleration.
 - Drive in an environment that has stationary objects on the side of the road (street signs, guard rails, mail boxes, fences, etc.).
7. The learn procedure is complete when the Vehicle Ahead tell-tale stops flashing and the Service Adaptive Cruise Control messages turn off.
8. If the Vehicle Ahead tell-tale and the Service Adaptive Cruise Control messages fail to turn off:
 - Verify correct learn procedure operating conditions were followed. If necessary repeat the learn procedure while following the recommended learn procedure operating conditions
 - Verify that DTC C1002 Distance Sensing Cruise Control Module Performance is not set. Repair any DTCs that may have set before repeating the learn procedure.
9. Once the learn procedure is complete drive the vehicle at speeds greater than 40 kph (25 mph) and verify engagement of the adaptive cruise control system. Refer to the owner's manual for instructions on how to engage the adaptive cruise control system.

If Module is Slow to Calibrate

One or more of the following conditions may increase the length of time required to complete the learn procedure:

- Heavy traffic. Following too close behind vehicles for long periods of time (more than 40 minutes).
- Stop and go or very slow traffic.
- Mountain roads.
- Constant sharp curves in roadway.
- No traffic. If no traffic is available, the vehicle ahead may need to be added to support learning.
- Limited or no stationary structures on the side of the road. Structures such as street signs, guard rails, mail boxes and parked cars are needed to complete the learn procedure.
- Driving in tunnels.

CRUISE CONTROL SWITCH REPLACEMENT

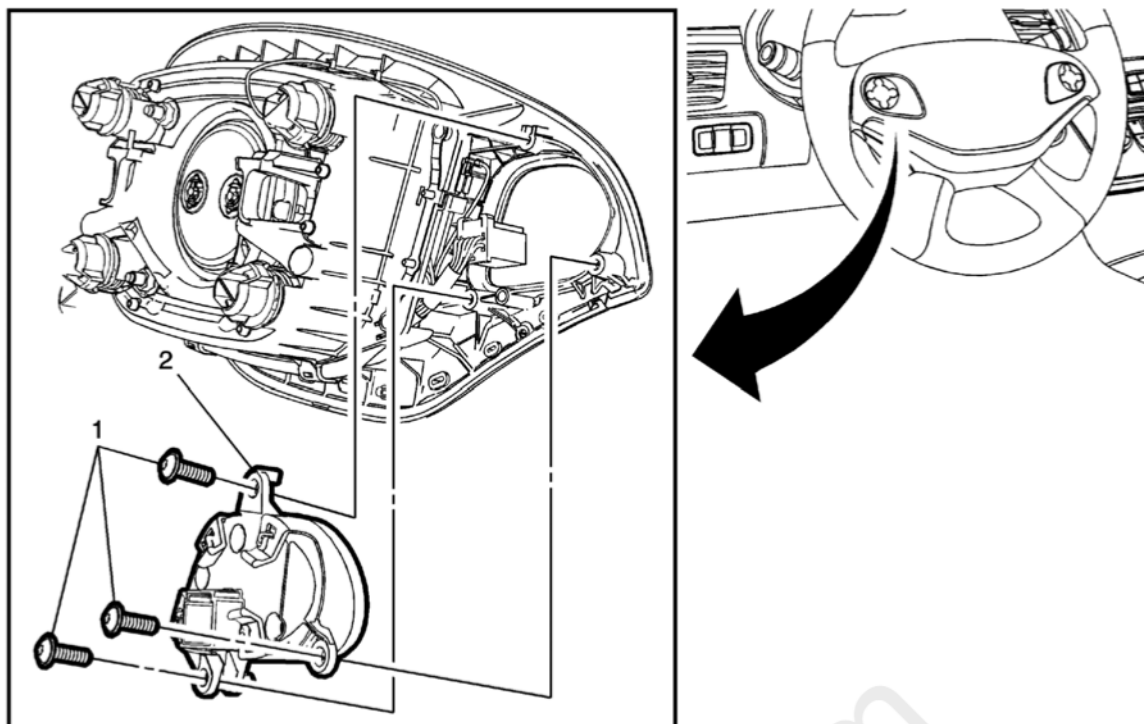


Fig. 3: Cruise Control Switch Assembly

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove Steering Wheel Airbag. Refer to Steering Wheel Airbag Replacement	
1	Cruise Control Switch Fastener (Qty: 3) CAUTION: Refer to Fastener Caution .
2	Cruise Control Switch Assembly Procedure Disconnect the electrical connector.

DESCRIPTION AND OPERATION

CRUISE CONTROL DESCRIPTION AND OPERATION (CONVENTIONAL CRUISE CONTROL)

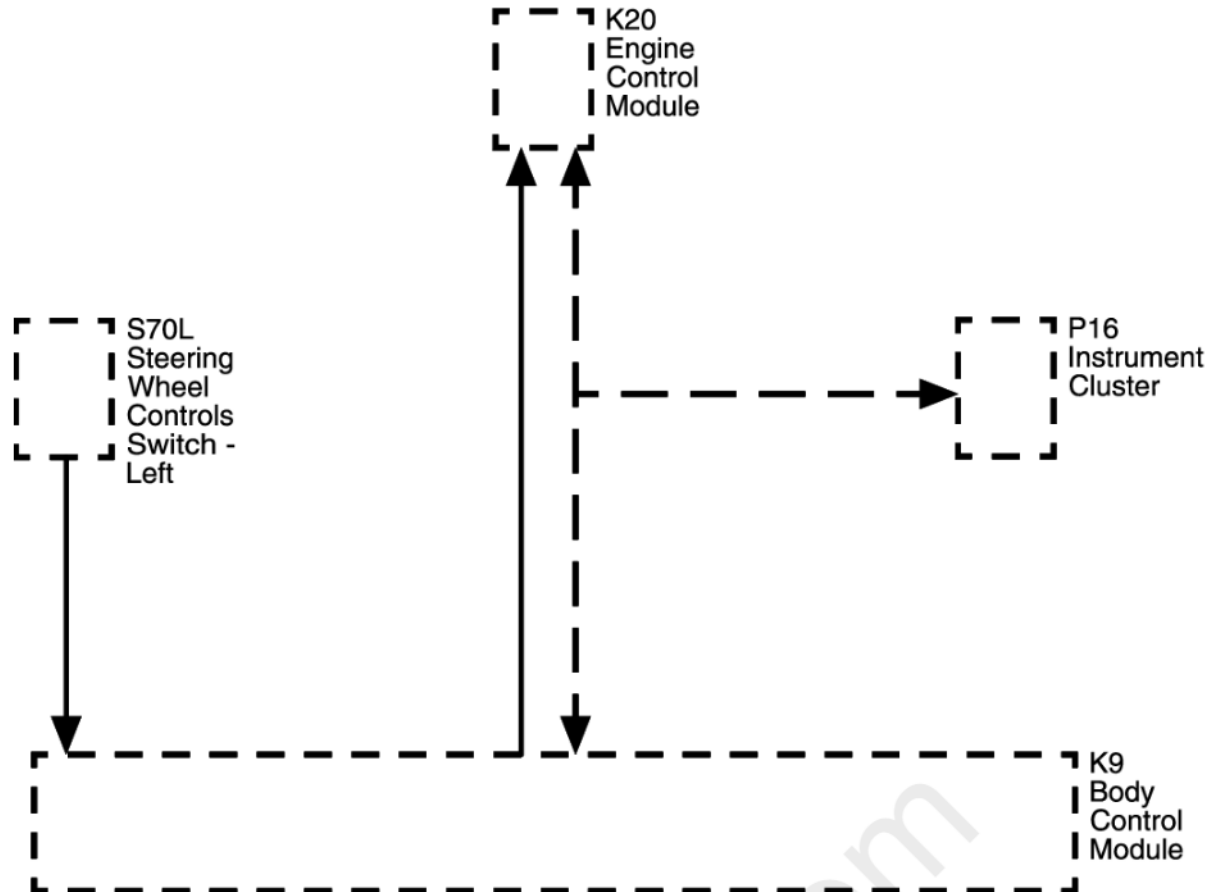


Fig. 4: Cruise Control System Block Diagram
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
K20	K20 Engine Control Module
S70L	S70L Steering Wheel Controls Switch - Left
P16	P16 Instrument Cluster
K9	K9 Body Control Module

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/accelerate switch)
- The - SET switch (equivalent to set/coast switch)
- The engine control module (ECM)
- The throttle actuator control (TAC) motor (gasoline engines only)
- 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.

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.

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. Refer to the vehicle owner's manual for the location and operation of the cruise control On/Off indicators and driver information center (DIC) messages.

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 a vehicle specific calibratable increment, commonly 1 km/h or 1 mph, each time that the - SET is momentarily pressed, with a minimum vehicle speed of 38 km/h (24 mph). Refer to the vehicle Owner's Manual for more information.

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 a vehicle specific calibratable increment, commonly 1 km/h or 1 mph, each time that the + RES switch is momentarily pressed. Momentarily activating the + RES switch will recall the previous vehicle speed, after the cruise control system has been disengaged by pressing the brake pedal, or CANCEL switch. Refer to the vehicle Owner's Manual for more information.

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 is further applied. The ECM monitors the BPP signal through a discrete input and a serial data message signal from the BCM indicating the brake status. When either signal indicates 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. 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 the Cruise Control System is active and disengagement is requested.

When engagement of the system is requested but an engagement inhibit is present, the most recent inhibit reason is recorded in the ECM history. The scan tool will display the most recent inhibit reason, in which one out of approximately 50 possible reasons will be displayed.

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) this ignition cycle.
- A Cruise Control System DTC has been set.
- The vehicle speed is less than 38.6 km/h (24 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 a calibratable time (typically 0.3 to 0.7 seconds).

Cruise Control Inhibit Reasons

This is a general list of inhibit reasons. Not every inhibit reason is applicable to all vehicles. Refer to the scan tool inhibit reason list for the last 8 reasons that have been recorded during the current ignition cycle.

Scan Tool Name	Description	Long Description
Acceleration Rate too High	High acceleration	The vehicle acceleration rate is too high.
Acceleration Time	Rate limiting fault	Cruise torque request rate limiting active too long.
Adaptive Cruise Control Configuration Incorrect	Adaptive cruise control option mismatch	The cruise control type (adaptive cruise or conventional cruise) is mismatched between the engine control module (ECM) and the body control module (BCM).
Antilock Braking System Active	Antilock Braking System Active	The antilock braking system was active. Only reported on enhanced cruise control vehicles.

Scan Tool Name	Description	Long Description
Automatic Braking Engine Torque Request Signal Communication Malfunction	Automatic braking engine torque request signal communication malfunction	An engine control module to electronic brake control module (EBCM) serial data fault is active or communication has been lost between the modules.
Automatic Braking Malfunction	Brake system malfunction	The electronic brake control module has detected a failure that does not allow automatic braking to be performed.
Axle Torque Serial Communication Malfunction	Axle Torque Serial Communication Malfunction	The adaptive cruise control is being inhibited by the ECM because a serial data signal timeout error has occurred with the hybrid max/min torque signals.
Battery Voltage Too High	Voltage above high voltage threshold	The ignition voltage is too high at the engine control module (typically 18 volts).
Battery Voltage Too Low	Voltage below low voltage threshold	The ignition voltage is low at the engine control module (typically 9 volts).
Brake Pedal Applied	Brake pedal apply	The brake pedal was applied.
Brake Pedal Not Initialized	Brake before cruise	The brake pedal has not been seen as applied prior to driver request to engage cruise with set switch. A brake pedal apply must be seen before allowing cruise engagement during each key cycle. On a vehicle equipped with a manual transmission, a clutch pedal apply may satisfy the brake pedal apply criteria.
Brake Pedal Position Malfunction	Brake pedal position signal invalid	A brake pedal apply circuit fault has been detected.
Brake Pedal Position Signal Malfunction	DTC P0703 is active or maximum time elapsed without receiving a valid Brake Pedal Position signal.	A serial data fault is active or communication has been lost with the module sending the brake pedal apply state.
Brake Pedal Pressure Detected	Brake pedal driver applied pressure detected	A brake pedal apply has been detected based on brake pedal pressure as measured by the electronic brake control module.
Brake Pedal Released Position Not Learned	Brake apply sensor home position not learned	The brake pedal position sensor released position is not learned.
Brake System Malfunction	Adaptive cruise control automatic braking failed	Adaptive cruise control automatic braking inoperative.
Calculated Torque	Calculated engine torque	The engine torque calculation is incorrect.
Clutch Pedal Applied	Clutch switch active	The clutch pedal was applied.
Coast Below Minimum Speed	Coast below low speed inhibit	The Set/Coast switch was depressed and the vehicle slowed below the minimum cruise control operating speed.
Coast Mode	Coast disengage	Cruise control is in coast mode with the Set/Coast switch depressed and is requesting no throttle.
Control Function Active	DLC override	A scan tool is plugged into the Data Link Connector (DLC) connector.

Scan Tool Name	Description	Long Description
Control Module Memory Malfunction	Memory failure	A control module memory failure has been detected.
Control Module Processor Malfunction	Processor integrity fault (random access memory corruption)	An engine control module software error has occurred.
Crawl Mode Active	Crawl Mode Active	Crawl mode is active and inhibiting cruise control.
Cruise Control Cancel Switch Active	Cancel switch active	The cruise control cancel switch was depressed.
Cruise Control Software Malfunction	Sequence of completion checks	A cruise control software execution error has occurred.
Cruise Control Switch Inactive	On/Off switch in Off state	The cruise control On/Off switch is turned off.
Cruise Control Switch Invalid	Analog cruise switch input out of range	The cruise control switch voltage signal is in an invalid range.
Cruise Control Switch Serial Communication Malfunction	Serial data fault (cruise switch serial communication fault)	The cruise control switch serial data fault is active or communication has been lost with the module sending cruise control switch states.
Deceleration Rate Too High	High deceleration	The vehicle deceleration rate is too high.
Diagnostic Trouble Code (DTC) Set	Malfunction in PCM/ECM (DTC active)	A DTC is active or in history that inhibits cruise control operation.
Distance Sensing Cruise Control Brake Pedal Applied	Distance Sensing Cruise Control Brake Pedal Applied	Adaptive cruise control is being inhibited by the ECM because a brake pedal apply has occurred.
Distance Sensing Cruise Control Cancel Switch Active	Distance Sensing Cruise Control Cancel Switch Active	Adaptive cruise control is being inhibited by the ECM because the driver applied the cancel switch.
Distance Sensing Cruise Control Data	Serial data fault for adaptive cruise control throttle control and brake control signals sent by the distance sensing cruise control module	A distance sensing cruise control module serial data fault is active or communication has been lost between the distance sensing cruise control module and the engine control module.
Distance Sensing Cruise Control Inhibit	Distance sensing cruise control inhibited	The distance sensing cruise control system is inhibited.
Distance Sensing Cruise Control Invalid Engage	Distance Sensing Cruise Control Invalid Engage	Adaptive cruise control is being inhibited by the ECM because an invalid sequence of cruise control applies, brake pedal applies, or an invalid speed range has been detected.
Distance Sensing Cruise Control Off	Distance Sensing Cruise Control Off	Adaptive cruise control is being inhibited by the ECM because the driver has turned off the cruise on/off switch.
Distance Sensing Cruise Control Reduced Engine Power	Distance Sensing Cruise Control Reduced Engine Power	Adaptive cruise control is being inhibited by the ECM due to a fault resulting in "Reduced Engine Power".
Driven Wheel Speed Higher Than Non Driven Wheel Speed	Driven wheel speed greater (wheel slip detection)	The driven wheel speed is greater than the non driven wheel speed (slip detection).
Engine Control Module	PCM/ECM inhibit (RAM corruption)	Engine control module internal communication error.

Scan Tool Name	Description	Long Description
Engine Control Module (ECM) Reset	ECM running reset	An engine control module running reset has occurred.
Engine Overspeed Protection Active	Injectors disabled (engine overspeed fuel cut-off active)	Engine RPM limiter active with fuel cut off active.
Engine Overtemperature Protection Active	Engine metal overtemp active	The engine is over temperature. The engine is overheated.
Engine Run Time	Engine run time not elapsed	The engine has not been running long enough, typically five seconds.
Engine Speed	Engine speed too low or too high	The engine RPM is too low (near stall) or too high (near engine RPM fuel shutoff).
Excessive Accelerator Position Override	Pedal greater than cruise (override)	The driver has overridden cruise control set speed with accelerator pedal for greater than an allowable time.
1st Gear	First Gear	Transmission is engaged in 1st gear.
Gear Change without Applied Clutch Pedal	Manual transmission out of gear with no clutch pedal apply	Manual transmission shifted to Neutral without clutch pedal being applied.
Hill Descent Control Active	Hill Descent Control System Active	The hill descent control system has gone active.
Hill Descent Control Serial Communication Malfunction	Hill Descent Control Serial Communication Malfunction	An electronic brake control module serial data fault is active or communication has been lost between the EBCM and ECM.
Hybrid/EV System	Hybrid Cruise Disengage	Cruise control is inhibited on hybrid applications when "Regen on Demand" is requested by the driver via the tap-up/tap-down paddles.
Illegal Mode	Illegal cruise mode	The cruise control mode is incorrect based on switch states.
Lane Center Control Serial Data Error	Lane Center Control Serial Communication Malfunction	Adaptive cruise control is being inhibited by the ECM because a serial data error has been detected on a vehicle with Lane Center Control.
Non Driven Wheel Speed Higher Than Drive Wheel Speed	Non-driven wheel speed greater	The non driven wheel speed is greater than the driven wheel speed.
None	None	This disengagement reason may be displayed after a dead battery repair or module replacement.
Park Brake Applied	Park brake switch signal active	The parking brake is applied.
Power Take-Off Active	Power Take Off active	The Power Take Off (PTO) system is active.
Rear Axle in Low Range	Rear axle in low	The rear axle is in low range.
Set/Coast and Resume/Accelerate Switches Active Simultaneously	SET and RESUME switches simultaneously active	The Set/Coast and Resume/Accelerate switches were pressed simultaneously.
Set/Coast Switch Active With Vehicle Speed Higher Than Set Point	Over schedule tap-down	The Set/Coast switch is selected, vehicle speed is above set speed and does not decrease. May be due to traveling down hill.

Scan Tool Name	Description	Long Description
Speed Limiting/Warning System On	Speed limiter/warning On/Off switch turned on	Driver has turned on the Speed Limiter/Warning on/off switch. Cruise is disabled/inhibited and cruise on/off switch will be set to Off.
Throttle Actuator Control System	Electronic throttle control prevents cruise operation	The electronic throttle control system has detected a failure in the throttle control hardware.
Traction Control Active	Traction control active	The traction control system was active.
Traction Control System Malfunction	Traction Control System Malfunction	A fault is present in the traction control system.
Traction Control System Off	Traction Control System Off	The traction control system has been turned off by the driver.
Transfer Case in 4WD Low Range	Transfer case in 4WD Low	The transfer case is in low range.
Transmission Gear Ratio Malfunction	Transmission gear fault	A transmission DTC is active or in history, that inhibits cruise control operation.
Transmission Not in Forward Gear	Transmission in neutral, reverse or park	The transmission gear selector is not in a forward gear.
Vehicle Overspeed Protection Active	MPH limited fuel (vehicle overspeed fuel cut-off active)	The vehicle overspeed protection is active with fuel cut off active.
Vehicle Speed Higher Than Set Point	Over schedule	Vehicle speed has exceeded driver selected set speed by more than an allowable amount. This may occur while driving down a significant grade or driver overriding cruise while performing a passing maneuver.
Vehicle Speed Lower Than Set Point	Under schedule	The vehicle speed is below cruise control set speed by more than an allowable amount.
Vehicle Speed Too High	Vehicle speed exceeds high speed threshold	Vehicle speed has exceeded maximum cruise operating speed.
Vehicle Speed Too Low	Vehicle speed drops below low speed threshold	Vehicle speed dropped below the cruise control minimum operating speed. May be due to hilly terrain and low vehicle speed. Manual transmission gear selection and engine torque may contribute to this disengagement reason.
Vehicle Stability System Active	Vehicle stability control active	The vehicle stability control system was active.
Vehicle Stability System Malfunction	Vehicle Stability System Malfunction	A fault has been detected in the vehicle stability control system.
Vehicle Stability System Off	Vehicle Stability System Off	The vehicle stability control system has been turned off by the driver.

CRUISE CONTROL DESCRIPTION AND OPERATION (ADAPTIVE CRUISE CONTROL)

Adaptive Cruise Control (ACC)

The Adaptive Cruise Control System (ACC) is an enhanced Cruise Control System with the ability to sense and react to forward traffic. Compared to the common Cruise Control System found on many vehicles, the main functional enhancement of the ACC System is the ability to detect the presence of a vehicle in the path of the ACC vehicle. The ACC retains the existing cruise control feature that controls the vehicle speed to the driver selected speed. However, ACC allows a driver to set and maintain a following distance to the preceding nearest vehicle in the ACC vehicle path. The cruise control vehicle

distance sensor module calculates a follow speed limit to ensure an acceptable distance is maintained to the preceding vehicle in front, should one be present. The ACC System automatically adjusts the speed of an ACC vehicle when the vehicle comes up behind a slower travelling vehicle in front. The ACC System applies limited automatic braking and throttle control without driver input when necessary to maintain the set following distance of the ACC vehicle. The preceding vehicle's speed and acceleration along with the ACC vehicle speed and acceleration and the distance between the two vehicles are factors used by the cruise control vehicle distance sensor module to determine the ACC follow speed limit. The ACC vehicle speeds up to the original driver selected set speed when the pathway becomes clear without driver input.

Adaptive Cruise Control (ACC) System Description

The Adaptive Cruise Control (ACC) System depends on various modules on the vehicle to function and each module performs a function that is critical to the proper operation of the ACC System. ACC will not operate if any components fail. Communication between modules is via the High-Speed GMLAN serial data circuit. The GMLAN utilizes the controller area network (CAN) communications protocol. The following is a functional description of the cruise control vehicle distance sensor module and the other associated components:

Cruise Control Vehicle Distance Sensor Module

The cruise control vehicle distance sensor module contains the radar and the controller. The cruise control vehicle distance sensor module utilizes the radar to identify and classify objects in the road environment. The radar scans the road environment to detect targets within its specified field of view. The controller then makes throttle and/or brake commands to the engine control module (ECM) and electronic brake control module (EBCM) via the GMLAN serial data circuit in order to control the vehicle acceleration/deceleration based on the data from the radar. The ECM and EBCM provide throttle control and automatic braking needed for proper cruise speed adjustment. The following is a list of the cruise control vehicle distance sensor module functions:

- The radar processes the road environment to get data concerning any vehicle ahead of the ACC vehicle. Detection, parameter estimation, tracking, object classification and diagnostics are the primary radar functions. When an object is detected, the controller calculates the object range, range rate, acceleration and azimuth angle parameters.
- The cruise control vehicle distance sensor module performs ACC state processing automatically - distance control or speed control. The ACC System operates in 2 possible states - Cruise or Follow. The normal operating state is Cruise, whereby the vehicle speed is controlled to match the driver selected set speed. When a preceding forward target is identified by the radar, the ACC System will automatically transition into the follow speed state to provide proper lane spacing behind the target vehicle in front. The preceding vehicle's speed and acceleration, with the ACC vehicle speed, acceleration and distance between the two vehicles will be used to determine the ACC follow speed limit. The ACC follow speed limit will ensure that an acceptable distance is maintained to the preceding vehicle.
- The cruise control vehicle distance sensor module determines the follow speed limit for throttle control by the ECM.
- The cruise control vehicle distance sensor module arbitrates the ACC System brake and throttle control between the EBCM and the ECM.
- The cruise control vehicle distance sensor module requests brake light activation during automatic braking.
- The cruise control vehicle distance sensor module provides operational feedback to the vehicle driver. The cruise control vehicle distance sensor module sends signals for telltales and messages to be displayed on the instrument cluster or driver information center.

Body Control Module (BCM)

The following are the ACC System functions provided by the BCM:

- The BCM provides a translating gateway for the high speed GMLAN serial data circuit.
- The BCM reads all cruise control switches and the gap switch. The cruise control vehicle distance sensor module monitors a variety of user operated switches from the BCM switch status information sent via the GMLAN serial data circuit.

- The BCM illuminates the brake light based on a GMLAN message from the cruise control vehicle distance sensor module during automatic braking.
- The BCM measures the brake pedal position and sends brake pedal travel status via GMLAN serial data circuit to the ECM. The ECM disengages the ACC System when the brake is applied by the driver pressing the brake pedal.
- The BCM serves as a gateway to the instrument cluster and driver information center. The BCM will generate visual warnings based on high speed GMLAN serial data messages from the cruise control vehicle distance sensor module.

Engine Control Module (ECM)

The following are the ACC System functions performed by the ECM:

- The ECM provides the electronic throttle control to the ACC System. The ECM is also responsible for determining when a driver is overriding the adaptive cruise control throttle position by pressing the accelerator pedal.
- The ECM processes the cruise control switch requests received via the GMLAN serial data circuit from the BCM. Engaging and disengaging the ACC System are functions performed by the ECM.
- The ECM determines the driver selected vehicle speed. Unless the ACC module requests a lower vehicle speed, the ECM will control the vehicle speed to the driver selected set speed.
- The ECM allows automatic braking without disengaging the ACC.

Antilock Brake System (ABS)

The following are the ACC System functions performed by the EBCM:

- The EBCM controls the operation of the Antilock Brake System.
- The EBCM provides automatic braking for the ACC System. The cruise control vehicle distance sensor module will request vehicle deceleration via high speed GMLAN serial data circuit.
- The EBCM determines when the driver - applied brake pressure is active. The EBCM will communicate this status via the GMLAN serial data circuit to the BCM.
- The EBCM releases vehicle automatic braking when there is a throttle override by the driver pressing the accelerator.
- The EBCM predicts brake temperatures. Due to automatic braking, the brake system may overheat. When the brakes are overheated, the EBCM requests the ACC System to be temporarily shut down by the ECM until the brakes cool to a normal operating temperature.

Transmission Control Module (TCM)

The transmission control module (TCM) provides a down shift to protect the brakes. When the TCM detects some driver braking activity or ACC automatic braking activity, the TCM down shifts the vehicle transmission to increase engine braking. This helps reduce braking activity, extend brake pad life and reduce brake system overheating.

Driver Information Center

The driver information center is a part of the instrument cluster and displays the ACC System warning messages. The cruise control vehicle distance sensor module requests messages to be displayed on the driver information center by sending a GMLAN request to the BCM. The BCM sends a GMLAN serial data request to the instrument cluster demanding the display of the warning message. When the message is acknowledged by the driver and the cause of the message resolved, the driver information center turns the message off. The ACC System will not operate if the driver information center fails. The following are the ACC messages that can be displayed on the driver information center:

- Service ACC
- Front Radar Blocked Clean Front of Vehicle

Brake Pedal Position Sensor

The BCM monitors the brake pedal position sensor in order to determine when pressure is being applied to the brake by the driver stepping on the brake pedal. The brake pedal position sensor receives a low

reference signal and a 5 V reference from the BCM. When the brake is applied, a signal is applied from the brake pedal position sensor through the brake pedal position sensor signal circuit to the BCM. The BCM utilizes this signal in deciding when to command the activation of the stop lamps. The BCM continuously sends signals via the GMLAN serial data circuit to the EBCM and the ECM reflecting the brake pedal position status. This will include the initial brake travel signal required for the activation of the ACC System. The ACC System will not engage unless the initial brake pedal travel signal is valid and received by the BCM. When the BCM brake pedal position signal indicates that brake pedal pressure is being applied by the driver when the ACC System is engaged, the ECM immediately disengages the ACC System. Re-engaging the ACC System will require the driver pressing the set or resume switch. Refer to [Brake Pedal Position Sensor Calibration](#) , and to [Exterior Lighting Systems Description and Operation](#) for more information on the brake pedal pressure sensor.

Accelerator Pedal

Deceleration of the ACC vehicle to maintain a certain distance and speed while a slower moving vehicle is in its path is achieved through throttle control by the ECM and the application of light automatic braking by the EBCM. During automatic braking the ECM is commanded to release the throttle from the currently controlled cruise position by the cruise control vehicle distance sensor module. At the end of automatic braking, the ECM will control the vehicle speed to the current set vehicle speed. Driver throttle override occurs when the driver of the ACC vehicle depresses the accelerator pedal with the intention of requesting greater speed than the current throttle position. An example is an ACC vehicle driver stepping on the accelerator for a passing maneuver. The ECM continuously monitors the throttle and reports a throttle override condition. When no throttle override is present, automatic braking is allowed. When throttle override is detected by the ECM, automatic braking is not allowed to affect the vehicle acceleration.

Cruise Control Switch

The cruise control switch, functionally is a common feature that is shared between the Adaptive Cruise Control (ACC) System and the regular Cruise Control System. The ACC System will not operate if any cruise switch fails. The cruise control switch comprises the following cruise control function switches:

- On/Off switch
- Set/decrease switch
- Resume/increase switch

The cruise control function switches are arranged in a resistive ladder design whereby each switch function is set up with different resistance values. The BCM through the cruise control switch signal circuit detects a predetermined voltage value when any cruise control switch function is activated. The associated cruise control function signal detected by the BCM is then sent to the engine control module (ECM) as a GMLAN serial data circuit message. The ECM on receiving the message provides the cruise control function requested by the BCM. The ECM is responsible for recognizing and responding to cruise control switch requests sent by the BCM. The cruise control function switches are used by the ECM to communicate to the cruise control vehicle distance sensor module the driver selected vehicle speed. The driver selected vehicle speed is communicated through GMLAN serial data circuit to the cruise control vehicle distance sensor module and the BCM. The ACC System engages and adjusts vehicle speeds based on the activation of the following cruise control function switches:

On/Off Switch

The BCM monitors the switch signal circuit in order to determine when the On/Off switch is disabled or activated. The BCM detects a predetermined voltage value on the switch signal circuit. The On/Off switch state is then relayed to the ECM via the GMLAN serial data circuit. The ECM sends the On/Off switch input status to the cruise control vehicle distance sensor module. When the On/Off switch is turned ON, the ACC System enters either a standby enabled or a standby disabled mode. The standby enabled mode indicates that every condition required for the ACC System to function has been met, but the ACC is not engaged. When the ACC is in the standby disabled mode, the conditions necessary for the ACC System to function has not been met. When the On/Off switch is turned OFF, the ACC will enter the disabled mode. The ACC will not activate in the disabled mode.

Set/Decrease Switch

The ACC System is engaged when the ACC On/Off switch is turned ON and the set/decrease switch is momentarily pressed and released. When the set/decrease switch is pressed, the selected vehicle speed is set to the current vehicle speed by the ECM. The vehicle speed must be at or greater than 40 km/h (25 MPH). The selected vehicle speed is displayed by the driver information center. While in the engaged state, the selected vehicle speed and the following distance can be adjusted. Pressing and holding the set/decrease switch, when the ACC System is engaged, will decrease the selected vehicle speed without deactivating the ACC. Momentarily pressing and releasing the set/decrease switch, when the adaptive cruise control is engaged, will decrease the vehicle speed by a calibrated amount. Refer to the vehicle Owner's Manual for the specific amount of speed reduction for each switch press.

Resume/Increase Switch

The resume/increase switch is used in order to increase the selected vehicle speed when ACC is active. The amount selected vehicle speed can be increased from the resume/increase switch depends on how long the switch is pressed. The presence of a slower moving vehicle in the path of the ACC vehicle will limit the extent to which the selected vehicle speed can be achieved. If there is no preceding vehicle in front, limiting the ACC vehicle acceleration, then the vehicle speed that is attained is the new selected vehicle speed. The current selected vehicle speed is displayed by the driver information center. Acceleration is terminated when the resume/increase switch is released. Momentarily pressing and releasing the resume/increase switch, when the adaptive cruise control is engaged, will increase the vehicle speed by a calibrated amount. Refer to the vehicle Owner's Manual for the specific amount of speed increase for each switch press.

Gap Switch

The gap switch allows the driver to determine how closely the adaptive cruise control (ACC) vehicle follows a target vehicle while ACC is engaged. When the ACC vehicle speed is being limited due to a slower travelling vehicle, the ACC vehicle speed is automatically controlled to the follow speed limit. The gap switch has 3 following distance selections that range from 1 - 2 s. The gap switch following distance between the ACC vehicle and the target vehicle is expressed in time as opposed to actual distance. The distance maintained for a selected gap will vary based on vehicle speed. The faster the vehicle speed, the further back you will follow. The gap setting can only be adjusted when the ACC System is engaged. The gap switch is hard-wired to the BCM. Based on voltage variations, the BCM is able to read the gap switch selection and communicates the switch status on the GMLAN serial data circuit to the cruise control vehicle distance sensor module. The gap switch is a momentary switch.

The initial push of the gap switch recalls the current setting and activates the display. Subsequent pushes of the gap switch will change the gap setting.

Cruise Indicators and Messages

SERVICE ACC

The cruise control vehicle distance sensor module commands the display of the SERVICE ACC message in the driver information center when it detects a malfunction in the Adaptive cruise control (ACC) System. The cruise control vehicle distance sensor module sends a request to the instrument cluster via the GMLAN serial data circuit to display the SERVICE ACC message in the driver information center. The SERVICE ACC is displayed in the driver information center only when a diagnostic condition is present. When the message is displayed in the driver information center the ACC System disengages.

FRONT RADAR BLOCKED CLEAN FRONT of VEHICLE

The FRONT RADAR BLOCKED CLEAN FRONT of VEHICLE message displays in the driver information center when the cruise control vehicle distance sensor module detects a blockage of the radar. The radar may be blocked by snow, ice, dirt, heavy rain or road spray. In rare instances, a vertically misaligned radar may trigger the activation of the FRONT RADAR BLOCKED CLEAN FRONT of VEHICLE message in the driver information center. The cruise control vehicle distance sensor module commands the display of the FRONT RADAR BLOCKED CLEAN FRONT of VEHICLE message via a GMLAN serial data circuit request to the instrument cluster. When the FRONT RADAR BLOCKED CLEAN FRONT of VEHICLE message is displayed in the driver information center, safely park the vehicle and turn OFF the ignition. Clean the front fascia cover to eliminate the blockage. It may also be necessary to clean both the outside surface of the cover, the inside

surface of the cover and the cruise control vehicle distance sensor module surface. It is important to turn the ignition OFF before cleaning any of the named surfaces. This is because the FRONT RADAR BLOCKED CLEAN FRONT of VEHICLE message may still display in the driver information center after cleaning the three surfaces. Cycling the ignition to OFF for 10 s is necessary to clear the FRONT RADAR BLOCKED CLEAN FRONT of VEHICLE indicator if the indicator remains ON in the driver information center. If the FRONT RADAR BLOCKED CLEAN FRONT of VEHICLE indicator still remains ON after cleaning the radar and cycling the ignition, then the radar alignment will need to be checked and verified. Perform the **Forward Range Radar Module Alignment** , if the radar is misaligned.

Cruise Engaged Indicator

The ACC engaged indicator is displayed in the instrument cluster when the ACC is engaged by pressing the set/decrease switch. When the set/decrease switch is pressed by the driver, the BCM forwards the switch state to the engine control module (ECM) over the GMLAN serial data circuit. The ECM will use the switch input information from the BCM to determine the driver intended vehicle speed. The ECM communicates to the cruise control vehicle distance sensor module over the GMLAN serial data circuit the ACC engaged state and the driver selected speed. When the cruise control vehicle distance sensor module receives the ECM message indicating that ACC is active, the cruise control vehicle distance sensor module commands the display of the ACC engaged indicator via a GMLAN serial data message to the instrument cluster.

Set Speed

The ACC vehicle set speed is displayed at all times in the driver information center when ACC is engaged. The cruise control vehicle distance sensor module set speed display request is sent to the instrument cluster via the GMLAN serial data circuit.

Follow Distance

The driver information center displays the driver selected following distance when ACC is engaged and the gap switch is active. The current follow distance setting is displayed in the driver information center for a few seconds after the gap switch is pressed to increase or decrease the following distance. The cruise control vehicle distance sensor module follow distance display request is sent to the instrument cluster via the GMLAN serial data circuit.

Vehicle Ahead Indicator

The vehicle ahead indicator is displayed in the instrument cluster when the radar identifies an in-path vehicle. The vehicle ahead indicator is a warning to the driver that a vehicle is ahead. The indicator also serves as a feedback to the driver that the radar is functioning properly. The cruise control vehicle distance sensor module commands the display of the vehicle ahead indicator via a GMLAN serial data message to the instrument cluster. The vehicle ahead indicator only displays with the ACC active and may sometimes display for stationary road objects.

Cruise Engaged

The Adaptive Cruise Control (ACC) System will engage and adjust vehicle speeds based on the activation of the following cruise switches:

- On/off
- Set/decrease
- Resume/increase

ACC will not engage if any inhibit criteria is active. Also, the driver must step on the brakes at each ignition cycle before attempting to engage ACC. The engine control module (ECM) looks to the BCM for the brake initial travel achieved signal indicating that the driver has stepped on the brakes before attempting to engage ACC.

The vehicle speed must be above 45 km/h (28 MPH) and below 190 km/h (118 MPH) for the ACC System to be engaged. In the engaged state, the ACC System allows the driver to override the controlled vehicle speed temporarily while still remaining in the engaged state.

Cruise Inhibited

Cruise Control Vehicle Distance Sensor Module Inhibits

The cruise control vehicle distance sensor module inhibits the Adaptive Cruise Control (ACC) System when any of the following conditions exists:

- The SERVICE ACC message is active in the driver information center.
- Initial brake pedal travel signal from brake pedal position sensor is not present
- An ACC System malfunction and/or failure is present.
- The FRONT RADAR BLOCKED CLEAN FRONT of VEHICLE indicator is active in the driver information center.
- An invalid vehicle speed
- The Antilock Brake System (ABS) is active during automatic braking.
- The Cruise Switch failed message from the BCM is sent to the cruise control vehicle distance sensor module.
- Automatic braking failure - A GMLAN signal from the electronic brake control module (EBCM) to the cruise control vehicle distance sensor module indicating an automatic braking failure
- The brakes overheated signal from ABS
- The cruise control vehicle distance sensor module transceiver temperature is hot.
- The driver applied brake pressure.

ECM Inhibits

The ECM inhibits the ACC System operation when any of the following conditions exists:

- The ACC inhibited signal from cruise control vehicle distance sensor module is present.
- The vehicle speed is less than 45 km/h (28 MPH).
- The vehicle speed is greater than 190 km/h (118 MPH).
- Automatic braking failure - A GMLAN signal from EBCM to the ECM indicating an automatic braking failure
- The ACC present signal from the BCM is false.
- The driver applied brake pressure.
- A cruise control switch failure is present.
- The park brake switch signal from the IPM is active.
- A Throttle Actuator Control System failure is present.
- The Traction Control System is active.
- The ABS is active.
- The engine speed protection is active.
- The vehicle speed protection is active.
- The engine speed is too high or too low.
- The automatic transmission is in first gear, Park, Neutral or Reverse.
- The initial brake pedal travel signal from the brake pedal position sensor is not present.
- The system voltage is too low.

Cruise Disengaged

The Adaptive Cruise Control (ACC) System disengages when any of the following occurs:

- The driver depresses the brake pedal.
- The driver turns the ACC On/Off switch OFF.

Pressing the brake pedal while the ACC is engaged will disengage the ACC System.

Other Adaptive Cruise Control (ACC) Features

Mechanical Alignment

When the radar is out of alignment, DTC C1002 is set by the cruise control vehicle distance sensor module. When DTC C1002 is set, it becomes necessary to mechanically align the radar using the special alignment tool. Refer to [**DTC C1002**](#). For further information on how to aim and align the radar, refer to [**Forward Range Radar Module Alignment**](#). An out of alignment condition may be as a result of tampering or damage to the cruise control vehicle distance sensor module mounting structures or the adjuster settings. An out of alignment condition may also be as a result of damage to the front end of the vehicle or merely as a result of wear and tear. Refer to [**Forward Range Radar Module Replacement**](#) on how to properly mount and adjust the cruise control vehicle distance sensor module. Performance of the ACC System may be degraded after a cruise control vehicle distance sensor module replacement. Normal vehicle driving will correct the performance of the ACC System.

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