

ACCESSORIES & EQUIPMENT

Secondary and Configurable Customer Controls - CTS Sedan

SCHEMATIC WIRING DIAGRAMS

STEERING WHEEL SECONDARY/CONFIGURABLE CONTROL WIRING SCHEMATICS

Steering Wheel Control System

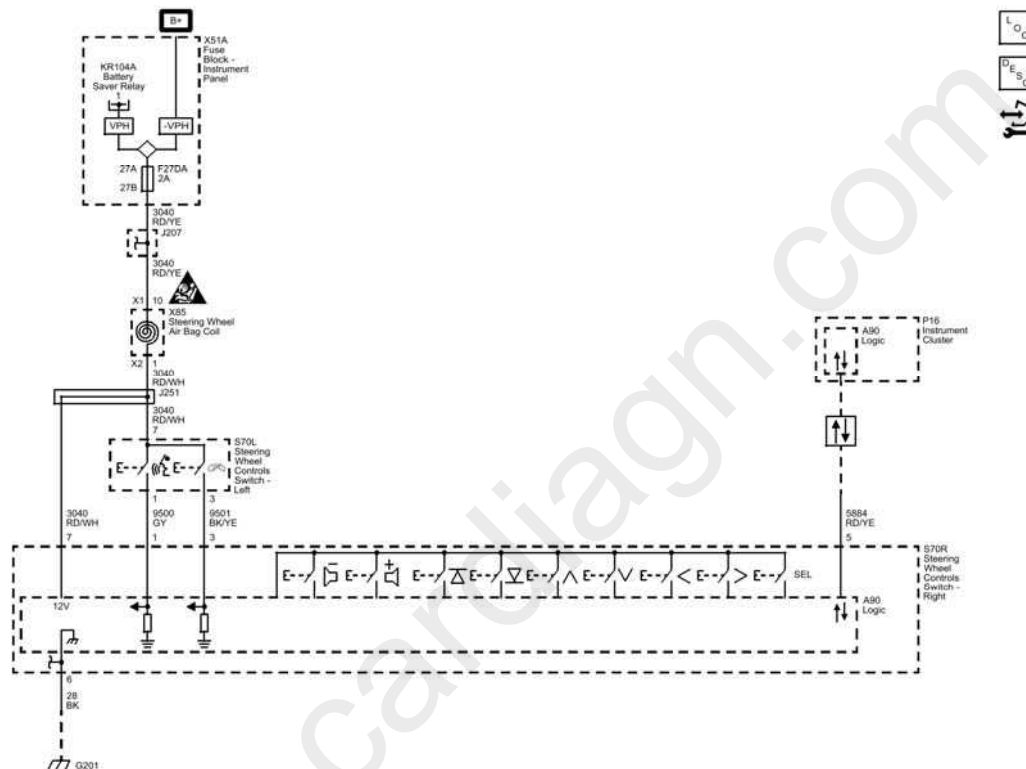


Fig. 1: Steering Wheel Control System

Courtesy of GENERAL MOTORS COMPANY

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC CODE INDEX

DIAGNOSTIC CODE INDEX

DTC	Description
DTC B3622	DTC B3622 39 Steering Wheel Controls Internal Malfunction
	DTC B3622 59 Steering Wheel Controls Signal Circuit Protection Time-Out

DTC B3622: HEATED SEAT MODULE/SIGNAL CIRCUIT PROTECTION TIME-OUT

Diagnostic Instructions

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

DTC Descriptor

DTC B3622 39

Steering Wheel Controls Internal Malfunction

DTC B3622 59

Steering Wheel Controls Signal Circuit Protection Time-Out

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+	U1510 00	U1510 00	-	-
Signal-Terminal 1	1	1	B3622 39, B3622 59	-
Signal-Terminal 3	1	1	B3622 39, B3622 59	-
Serial Data	U1510 00	U1510 00	U1510 00	-
Low Reference	-	U1510 00	-	-
1. Steering Wheel Controls Inoperative				

Circuit/System Description

The Steering Wheel Controls are divided into a right-hand set and left-hand set. The right-hand switch is connected to the IPC LIN serial data and provides input from the left-hand switches. The IPC identifies the switch selection and activates the feature.

Conditions for Running the DTC

Ignition ON.

Conditions for Setting the DTC

B3622 39

An internal electrical malfunction has been detected in the steering wheel controls switch.

B3622 59

A stuck switch has been detected in the steering wheel controls switch.

Action Taken When the DTC Sets

No action is taken.

Conditions for Clearing the DTC

The DTC will clear when the conditions for setting the DTC are no longer present.

Reference Information

Schematic Reference

Steering Wheel Secondary/Configurable Control Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

Description and Operation

Steering Wheel Controls Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify all the associated primary controls on the radio (Volume, Mute, Seek, etc.) operate properly.
 - **If any of the primary controls do not function properly**

Refer to **Symptoms - Entertainment**

- **If all of the primary controls function properly**

3. Refer to Circuit/System Testing.

Circuit/System Testing

1. Ignition ON.
2. Verify all S70R Steering Wheel Controls Switch - Right functions operate properly.
 - **If any S70R Steering Wheel Controls Switch - Right function does not operate properly**

Replace S70R Steering Wheel Controls Switch - Right.

 - **If all S70R Steering Wheel Controls Switch - Right functions operate properly**
3. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S70L Steering Wheel Controls Switch - Left, ignition ON.
4. Test for less than 1V between the following signal circuits and ground
 - Voice - Terminal 1
 - Mute - Terminal 3
 - **If 1 volt or greater**

Repair the short to voltage on the circuit.

 - **If less than 1 volt**
5. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S70R Steering Wheel Controls Switch - Right.
6. Test for infinite resistance between the following signal circuit terminals and ground.
 - Voice - Terminal 1
 - Mute - Terminal 3
 - **If less than infinite resistance**

Repair the short to ground on the circuit

 - **If infinite resistance**
7. Test for less than 2 ohms between the following signal circuit terminals
 - S70R Steering Wheel Controls Switch - Right signal circuit terminal 1 and S70L Steering Wheel Controls Switch - Left signal circuit terminal 1
 - S70R Steering Wheel Controls Switch - Right signal circuit terminal 3 and S70L Steering Wheel Controls Switch - Left signal circuit terminal 3
 - **If 2 ohms or greater**

Repair the open/high resistance in the circuit.

 - **If less than 2 ohms**
8. Replace the S70L Steering Wheel Controls Switch - Left.

Repair Instructions

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

SYMPTOMS - SECONDARY AND CONFIGURABLE CUSTOMER CONTROLS

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

1. Perform the **Diagnostic System Check - Vehicle** before using the symptom tables in order to verify that all of the following are true:
 - There are no DTCs set.
 - The control modules can communicate via the serial data link.
2. Review the system description and operation in order to familiarize yourself with the system functions. Refer to **Steering Wheel Controls Description and Operation**.

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the steering wheel controls. Refer to **Checking Aftermarket Accessories**.
- Inspect the easily accessible or visible system components, for obvious damage or conditions, which could 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:

Refer to **Steering Wheel Controls Malfunction** in order to diagnose the symptom.

STEERING WHEEL CONTROLS MALFUNCTION

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+	-	U1510 00	-	-

Signal-Terminal 1	1	1	B3622 39, B3622 59	-
Signal-Terminal 3	1	1	B3622 39, B3622 59	-
Serial Data	U1510 00	U1510 00	U1510 00	-
Low Reference	-	U1510 00	-	-
1. Steering Wheel Controls Inoperative				

Circuit/System Description

The Steering Wheel Controls are divided into a right-hand set and left-hand set. The right-hand switch is connected to the IPC LIN serial data and provides input from the left-hand switches. The IPC identifies the switch selection and activates the feature.

Reference Information

Schematic Reference

Steering Wheel Secondary/Configurable Control Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

Description and Operation

Steering Wheel Controls Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify all the associated primary controls on the radio (Volume, Mute, Seek, etc.) operate properly.
 - **If any of the primary controls do not function properly**

Refer to **Symptoms - Entertainment**

- **If all of the primary controls function properly**

3. Verify all functions on the S70R Steering Wheel Controls Switch - Right operate properly.

- **If some, but not all, functions on the S70R Steering Wheel Controls Switch - Right do not operate**

Test or replace the S70R Steering Wheel Controls Switch - Right

- **If all functions on the S70R Steering Wheel Controls Switch - Right do not operate**

Refer to All Controls Malfunction in Circuit/System Testing.

- **If all functions on the S70R Steering Wheel Controls Switch - Right operate properly**

4. Verify the voice and mute functions of the S70L Steering Wheel Controls Switch - Left operate properly.

- **If either the voice or mute function does not operate from the S70L Steering Wheel Controls Switch - Left**

Refer to Left Controls Malfunction in Circuit/System Testing.

- **If both the voice and mute functions of the S70L Steering Wheel Controls Switch - Left operate properly**

5. All OK.

Circuit/System Testing

All Controls Malfunction

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S70R Steering Wheel Controls Switch - Right, ignition ON.

2. Test for 2-10 V between the serial data circuit terminal 5 and ground.

- **If less than 2 V**

1. Ignition OFF, disconnect the harness connector at the P16 Instrument Cluster.

2. Test for infinite resistance between the serial data circuit and ground.

- If less than infinite resistance, repair the short to ground on the circuit.

- If infinite resistance

3. Test for less than 2 ohms in the serial data circuit end to end.

- If 2 ohms or greater, repair the open/high resistance in the circuit.

- If less than 2 ohms, replace the P16 Instrument Cluster.

- **If greater than 10 V**

1. Ignition OFF, disconnect the harness connector at the P16 Instrument Cluster, ignition ON.

2. Test for less than 1 V between the serial data circuit and ground.

- If 1 V or greater, repair the short to voltage on the circuit.

- If less than 1 V, replace the P16 Instrument Cluster.
 - **If between 2-10 V**
3. Test or replace S70R Steering Wheel Controls Switch - Right

Left Controls Malfunction

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S70L Steering Wheel Controls Switch - Left, ignition ON.
2. Test for less than 1 volt between the following signal circuits and ground
 - Voice - Terminal 1
 - Mute - Terminal 3
 - **If 1 volt or greater**

Repair the short to voltage on the circuit.

- **If less than 1 volt**
3. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S70R Steering Wheel Controls Switch - Right.
 4. Test for infinite resistance between the following signal circuit terminals and ground.
 - Voice - Terminal 1
 - Mute - Terminal 3
 - **If less than infinite resistance**

Repair the short to ground on the circuit

- **If infinite resistance**
5. Test for less than 2 ohms on the following signal circuit terminals
 - S70R Steering Wheel Control Switch - Right signal circuit terminal 1 and S70L Steering Wheel Control Switch - Left signal circuit terminal 1
 - S70R Steering Wheel Control Switch - Right signal circuit terminal 3 and S70L Steering Wheel Control Switch - Left signal circuit terminal 3
 - **If 2 ohms or greater**

Repair the open/high resistance in the circuit.

- **If less than 2 ohms**
6. Replace the S70L Steering Wheel Controls Switch - Left.

Repair Instructions

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

Control Module References for Instrument Cluster replacement, programming, and setup

DESCRIPTION AND OPERATION

STEERING WHEEL CONTROLS DESCRIPTION AND OPERATION

Steering Wheel Controls Block Diagram

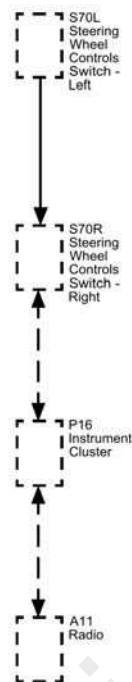


Fig. 2: Steering Wheel Controls Block Diagram
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
HW	Hard-Wired
DA	Serial Data
DA	Serial Data
S70L	S70L Steering Wheel Controls Switch - Left
S70R	S70R Steering Wheel Controls Switch - Right
P16	P16 Instrument Cluster
A11	A11 Radio

The steering wheel control switches duplicate the function of the primary controls of the associated component. The Steering Wheel Controls are divided into a right-hand set and left-hand set. The right -hand switch is connected to the IPC LIN serial data and provides hardwired serial data input from the left-hand switches. The IPC identifies the switch selected and sends a serial data message to the component controlled by the switch, activating the feature.

This section is intended to diagnose the circuits between the IPC and the steering wheel control switches. If the primary control for the device is inoperative, refer to the appropriate section for the component the steering wheel control switch is used for.

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