

2010 ACCESSORIES & EQUIPMENT

Secondary and Configurable Customer Controls - Equinox & Terrain

SCHEMATIC AND ROUTING DIAGRAMS

STEERING WHEEL SECONDARY/CONFIGURABLE CONTROL SCHEMATICS

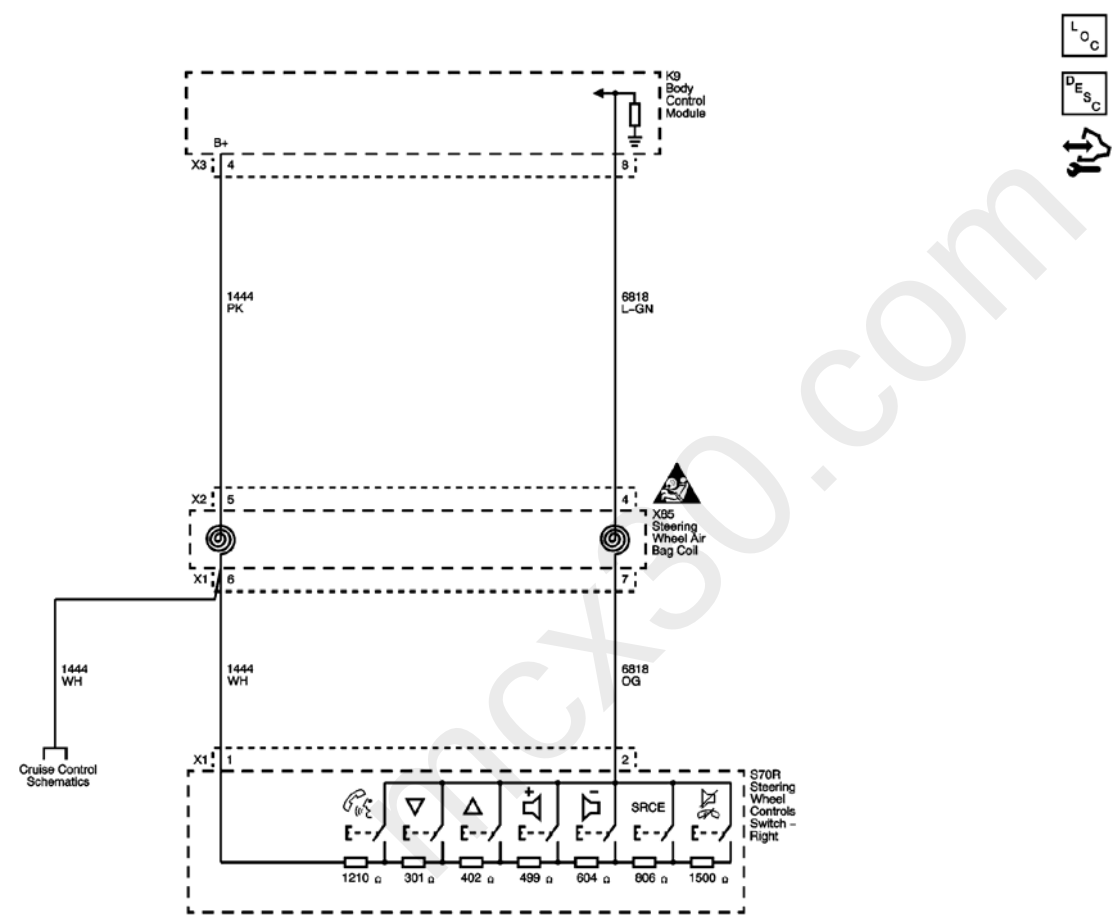


Fig. 1: View Of Steering Wheel Secondary/Configurable Control Schematic
Courtesy of GENERAL MOTORS CORP.

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC CODE INDEX

DIAGNOSTIC CODE INDEX

DTC	Description
DTC B1529	B1529 03: Control Module Voltage Reference Output 5 Circuit Low Voltage

	B1529 07: Control Module Voltage Reference Output 5 Circuit High Voltage
<u>DTC B3622</u>	B3622 07: Steering Wheel Controls Signal Circuit High Voltage

DTC B1529

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 B1529 03

Control Module Voltage Reference Output 5 Circuit Low Voltage

DTC B1529 07

Control Module Voltage Reference Output 5 Circuit High Voltage

Diagnostic Fault Information

Electrical DTCs

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
12V Reference	B1529 03, B1405 03	1	B1529 07	B1529 07
Steering Wheel Control Switch Signal	1	1	B3622 07	-
1. Steering Wheel Controls Inoperative				

Circuit/System Description

The body control module (BCM) supplies voltage to the steering wheel control switches and monitors the return signal. Each switch state is associated to a set resistance value and when pressed a specific voltage drop occurs across the resistor unique to the switch. The BCM identifies the switch selection and activates the feature.

Conditions for Running the DTC

- The system voltage is between 9-16 V.
- The ignition is ON.

Conditions for Setting the DTC

B1529 03

- The BCM detects a short to ground in the 12 V reference circuit.
- The above condition is present for greater than 30 s.

B1529 07

- The BCM detects a short to voltage in the 12 V reference circuit.
- The above condition is present for greater than 30 seconds.

Action Taken When the DTC Sets

The BCM will ignore switch inputs.

Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear once 100 consecutive malfunction free ignition cycles have occurred.

Reference Information

Schematic Reference

Steering Wheel Secondary/Configurable Control Schematics

Connector End View Reference

Component Connector End Views

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 Testing

1. Ignition OFF, disconnect the X1 harness connector at the X85 Steering Wheel Air Bag Coil.

2. Ignition ON, test for greater than 11 V between the voltage reference circuit terminal 6 male side and ground.
 - If less than the specified value, test the voltage reference circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the K9 Body Control Module.
3. Test for greater than 11 V between the voltage reference circuit terminal 6 male side and the signal circuit terminal 7 male side.
 - If less than the specified value, test the signal circuit for a short to voltage or an open/high resistance. If the circuit tests normal, replace the K9 Body Control Module.
4. Ignition OFF, disconnect the X3 harness connector at the K9 Body Control Module.
5. Test for infinite resistance between the signal circuit terminal 7 male side at the X85 Steering Wheel Air Bag Coil and ground.
 - If less than the specified value, test the signal circuit for a short to ground.
6. If all circuits test normal, test or replace the S70R Steering Wheel Controls Switch - Right.

Component Testing

Static Test

1. Disconnect the X1 harness connector at the X85 Steering Wheel Air Bag Coil.
2. Test the resistance between the terminals 6 female side and 7 female side of the X85 Steering Wheel Air Bag Coil.
 - If any of the resistance measurements for the individual switches are not within the specified resistance values, replace the S70R Steering Wheel Controls Switch - Right.

Function Switch	Minimum Resistance Value	Maximum Resistance Value
Volume Up	1.0 kohms	1.4 kohms
Volume Down	1.3 kohms	1.7 kohms
Seek Up	1.7 kohms	2.1 kohms
Seek Down	2.2 kohms	2.6 kohms
Source	2.8 kohms	3.2 kohms
Phone/Push to Talk	3.6 kohms	4.0 kohms
Hang Up/Audio Mute	5.1 kohms	5.5 kohms
No Switch Pressed	O.L.	O.L.

Repair Procedures

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

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

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 07

Steering Wheel Controls Signal Circuit High Voltage

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
12V Reference	B1529 03, B1405 03	1	B1529 07	B1529 07
Steering Wheel Control Switch Signal	1	1	B3622 07	-
1. Steering Wheel Controls Inoperative				

Circuit/System Description

The body control module (BCM) monitors the steering wheel control signal circuit voltage. If the voltage level is too high, damage may result in the system. When a high voltage condition is detected, the BCM will ignore the switch command.

Conditions for Running the DTC

- Battery voltage is between 9-16 V.
- The ignition is ON.

Conditions for Setting the DTC

The BCM detects a short to voltage in the steering wheel control switch signal circuit.

Action Taken When the DTC Sets

The BCM will ignore switch inputs.

Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear once 100 consecutive malfunction free ignition cycles have occurred.

Reference Information

Schematic Reference

Steering Wheel Secondary/Configurable Control Schematics

Connector End View Reference

Component Connector End Views

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

Circuit/System Testing

1. Ignition OFF, disconnect the X1 harness connector at the X85 Steering Wheel Air Bag Coil.
2. Ignition ON, test for greater than 11 V between the voltage reference circuit terminal 6 male side and ground.
 - If less than the specified value, test the voltage reference circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the K9 Body Control Module.
3. Test for greater than 11 V between the voltage reference circuit terminal 6 male side and the signal circuit terminal 7 male side.
 - If less than the specified value, test the signal circuit for a short to voltage or an open/high resistance. If the circuit tests normal, replace the K9 Body Control Module.
4. Ignition OFF, disconnect the X3 harness connector at the K9 Body Control Module.
5. Test for infinite resistance between the signal circuit terminal 7 male side at the X85 Steering Wheel Air Bag Coil and ground.
 - If less than the specified value, test the signal circuit for a short to ground.
6. If all circuits test normal, test or replace the S70R Steering Wheel Controls Switch - Right.

Component Testing

Static Test

1. Disconnect the X1 harness connector at the X85 Steering Wheel Air Bag Coil.

2. Test the resistance between the terminals 6 female side and 7 female side of the X85 Steering Wheel Air Bag Coil.
 - If any of the resistance measurements for the individual switches are not within the specified resistance values, replace the S70R Steering Wheel Controls Switch - Right.

Function Switch	Minimum Resistance Value	Maximum Resistance Value
Volume Up	1.0 kohms	1.4 kohms
Volume Down	1.3 kohms	1.7 kohms
Seek Up	1.7 kohms	2.1 kohms
Seek Down	2.2 kohms	2.6 kohms
Source	2.8 kohms	3.2 kohms
Phone/Push to Talk	3.6 kohms	4.0 kohms
Hang Up/Audio Mute	5.1 kohms	5.5 kohms
No Switch Pressed	O.L.	O.L.

Repair Procedures

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

- **Radio and Telephone Control Switch Replacement (NK5)** or **Radio and Telephone Control Switch Replacement (NP5)**
- **Control Module References**

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
Steering Wheel Control Switch Ignition	B1529 03, B1405 03	1	B1529 07	B1529 07
Steering Wheel Control Switch Signal	1	1	1	-
1. Steering Wheel Controls Inoperative				

Circuit/System Description

The body control module (BCM) supplies voltage to the audio steering wheel control switches and monitors the return signal. Each switch state is associated to a set resistance value and when pressed a specific voltage drop occurs across the resistor unique to the switch. The BCM identifies the switch selection and activates the feature.

Diagnostic Aids

- This diagnostic is for the audio steering wheel controls.
- Before diagnosis of the steering wheel controls, ensure the primary controls of the associated component are functioning properly.
- If a single switch function is inoperative, test the suspect switch. Refer to component testing.

Reference Information

Schematic Reference

Steering Wheel Secondary/Configurable Control Schematics

Connector End View Reference

Component Connector End Views

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 Testing

1. Ignition OFF, disconnect the X1 harness connector at the X85 Steering Wheel Air Bag Coil.
2. Ignition ON, test for B+ between the ignition circuit terminal 6 male side and ground.
 - If less than the specified value, test the voltage reference circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the K9 Body Control Module.
3. Test for B+ between the ignition circuit terminal 6 male side and the signal circuit terminal 7 male side.
 - If less than the specified value, test the signal circuit for a short to voltage or an open/high resistance. If the circuit tests normal, replace the K9 Body Control Module.
4. Ignition OFF, disconnect the X3 harness connector at the K9 Body Control Module.
5. Test for infinite resistance between the signal circuit terminal 7 male side at the X85 Steering Wheel Air Bag Coil and ground.
 - If less than the specified value, test the signal circuit for a short to ground.
6. If all circuits test normal, test or replace the S70R Steering Wheel Controls Switch - Right.

Component Testing

Static Test

1. Disconnect the X1 harness connector at the X85 Steering Wheel Air Bag Coil.
2. Test the resistance between the terminals 6 female side and 7 female side of the X85 Steering Wheel Air Bag Coil.
 - If any of the resistance measurements for the individual switches are not within the specified resistance values, replace the S70R Steering Wheel Controls Switch - Right.

Function Switch	Minimum Resistance Value	Maximum Resistance Value
Volume Up	1.0 kohms	1.4 kohms

Volume Down	1.3 kohms	1.7 kohms
Seek Up	1.7 kohms	2.1 kohms
Seek Down	2.2 kohms	2.6 kohms
Source	2.8 kohms	3.2 kohms
Phone/Push to Talk	3.6 kohms	4.0 kohms
Hang Up/Audio Mute	5.1 kohms	5.5 kohms
No Switch Pressed	O.L.	O.L.

Repair Procedures

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

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

DESCRIPTION AND OPERATION

STEERING WHEEL CONTROLS DESCRIPTION AND OPERATION

The steering wheel control switches duplicate the function of the primary controls of the associated component, through a network of momentary contact switches and a series of resistors. The body control module (BCM) supplies voltage to the switches and monitors the return signal. When a switch is pressed, a specific voltage drops across the resistor unique to that switch. The BCM 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 BCM 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.