

2017 ACCESSORIES & EQUIPMENT

Secondary and Configurable Customer Controls - Encore, Trax

SCHEMATIC WIRING DIAGRAMS

STEERING WHEEL SECONDARY/CONFIGURABLE CONTROL WIRING SCHEMATICS (BUICK)

Steering Wheel Controls (Buick)

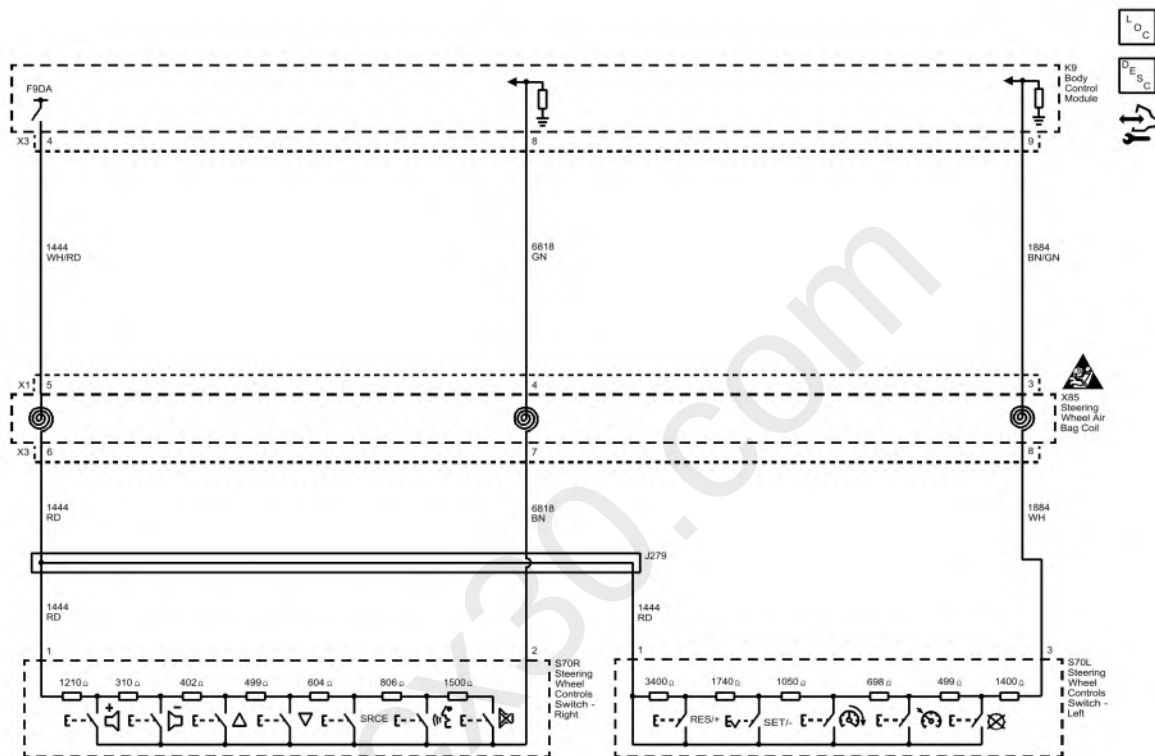


Fig. 1: Steering Wheel Controls (Buick)

Courtesy of GENERAL MOTORS COMPANY

STEERING WHEEL SECONDARY/CONFIGURABLE CONTROL WIRING SCHEMATICS (CHEVROLET)

Steering Wheel Controls (Chevrolet)

The body control module (BCM) monitors the system voltage to make sure that the voltage stays within the proper range. Damage to components and/or incorrect operation can occur when the voltage is out of range.

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 low/high voltage on the control circuit.

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 \(Buick\)](#)[Steering Wheel Secondary/Configurable Control Schematics \(Chevrolet\)](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX \(ENCORE\)](#) [COMPONENT CONNECTOR END VIEWS - INDEX \(TRAX\)](#)

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 Verification

Engine running, accessories OFF, measure and record the battery voltage at the battery terminals. The voltage should be between 12.6-15.0 V.

- If not within the specified range, refer to [Charging System Test](#) .

Circuit/System Testing

1. Ignition OFF, disconnect the X2 and the X1 harness connector at the K9 Body Control Module.
2. Test for less than 5 Ω between the X2 harness connector ground circuit terminal 2 and ground.
 - If greater than the specified range, test the ground circuit for an open/high resistance.
3. Test for less than 5 Ω between the X1 harness connector ground circuit terminal 1 and ground.
 - If greater than the specified range, test the ground circuit for an open/high resistance.
4. Ignition ON, test for more than 11 V between the X2 harness connector terminal 1 and ground.
 - If less than the specified value test the control circuit for an open/high resistance.
5. If all circuits test normal, replace the K9 Body Control Module.

Repair Instructions

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

DTC B1529: CONTROL MODULE VOLTAGE REFERENCE OUTPUT 5

Diagnostic Instructions

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

DTC Descriptors

DTC 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 \(Buick\)](#)[Steering Wheel Secondary/Configurable Control Schematics \(Chevrolet\)](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX \(ENCORE\)](#) [COMPONENT CONNECTOR END VIEWS - INDEX \(TRAX\)](#)

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 S70R Steering Wheel Controls Switch - Right.
2. Ignition ON, test for greater than 11 V between the voltage reference circuit terminal 1 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 1 and the signal circuit terminal 2.
 - 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 2 at the S70R Steering Wheel Controls Switch - Right 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.

Repair Instructions

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

[Control Module References](#) for BCM replacement, setup, and programming

DTC B3622: STEERING WHEEL CONTROLS SIGNAL CIRCUIT 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.
- [Diagnostic Procedure Instructions](#) provides an overview of each diagnostic category.

DTC Descriptor

DTC B3622 07

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 \(Buick\)](#)[Steering Wheel Secondary/Configurable Control Schematics \(Chevrolet\)](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX \(ENCORE\)](#), [COMPONENT CONNECTOR END VIEWS - INDEX \(TRAX\)](#)

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 S70R Steering Wheel Controls Switch - Right.
2. Ignition ON, test for greater than 11 V between the voltage reference circuit terminal 1 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 1 and the signal circuit terminal 2.
 - 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 2 at the S70R Steering Wheel Controls Switch - Right 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.

Repair Instructions

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

[Control Module References](#) for BCM replacement, setup, and programming

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
12 V Reference	B1529 03, B1405 03	1	B1529 07	B1529 07
Signal	1	1	B3622 07	-
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.

Reference Information

Schematic Reference

[Steering Wheel Secondary/Configurable Control Schematics \(Buick\)](#)[Steering Wheel Secondary/Configurable Control Schematics \(Chevrolet\)](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX \(ENCORE\)](#) [COMPONENT CONNECTOR END VIEWS - INDEX \(TRAX\)](#)

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 the primary controls of the associated component are functioning 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. Ensure a battery charger is not connected to the battery.
2. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S70R Steering Wheel Controls Switch - Right, ignition ON.
3. Test for 11-12.2 V between the reference voltage circuit terminal 1 and ground.
 - **If less than 11 V**
 1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the reference voltage 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 Ω in the reference voltage 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 greater than 12.2 V**
 1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module, ignition ON.
 2. Test for less than 1 V between the reference voltage circuit 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 between 11-12.2 V**
 4. Test for 11-12.2 V between the reference voltage circuit terminal 1 and signal circuit terminal 2.
 - **If not between 11-12.2 V**
 1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module.
 2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 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 between 11-12.2 V**
 1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the signal circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the S70R Steering Wheel Controls Switch - Right.

Component Testing

1. Ignition OFF, disconnect the harness connector at the S70R Steering Wheel Controls Switch - Right.
2. Test the resistance between the signal terminal 2 and the reference voltage terminal 1 while pressing the appropriate steering wheel controls switch button listed below:
 - **If not the specified value**

Replace the S70R Steering Wheel Controls Switch - Right.
 - **If the specified value**
3. All OK

Function Switch	Minimum Resistance Value	Maximum Resistance Value
Hang Up-Mute	5.0 k Ω	5.5 k Ω
Telephone Switch	3.6 k Ω	4 k Ω
Source Switch	2.8 k Ω	3.1 k Ω
Arrow Down	2.2 k Ω	2.6 k Ω
Arrow Up	1.7 k Ω	2 k Ω
Volume Down	1.4 k Ω	1.6 k Ω
Volume Up	1.1 k Ω	1.3 k Ω
No Switch Pressed	Infinite	Infinite

Repair Instructions

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

DESCRIPTION AND OPERATION

STEERING WHEEL CONTROLS DESCRIPTION AND OPERATION

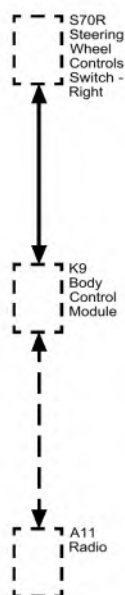


Fig. 3: Steering Wheel Controls Block Diagram
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
S70R	S70R Steering Wheel Controls Switch - Right
K9	K9 Body Control Module
A11	A11 Radio

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.