

2017 ACCESSORIES & EQUIPMENT

Secondary and Configurable Customer Controls - Impala

SCHEMATIC WIRING DIAGRAMS

STEERING WHEEL SECONDARY/CONFIGURABLE CONTROL WIRING SCHEMATICS

Steering Wheel Radio Controls

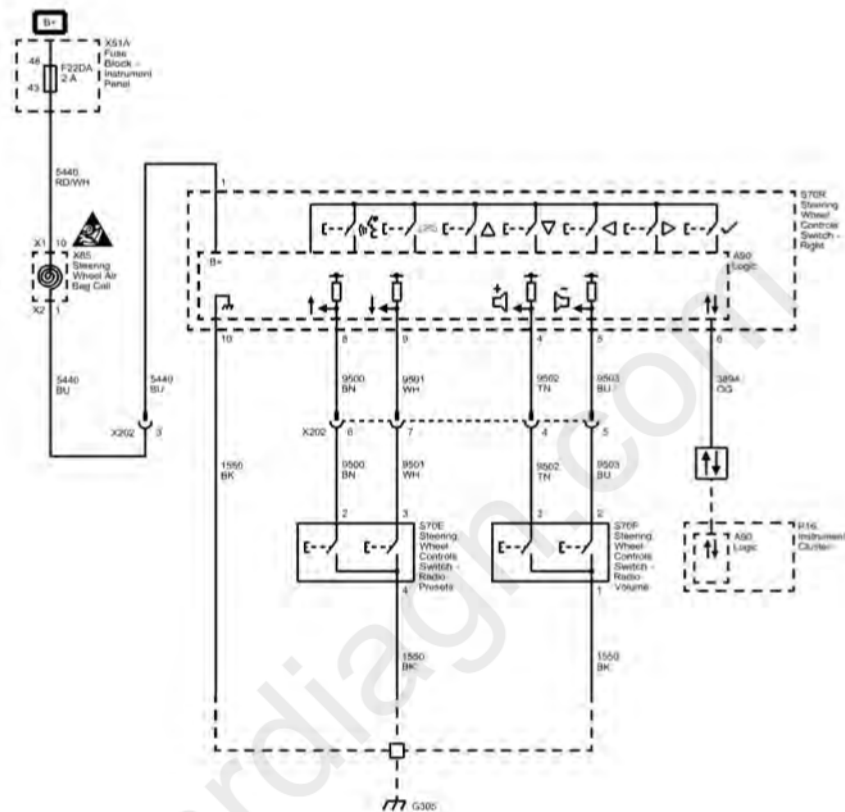


Fig. 1: Steering Wheel Radio Controls

Courtesy of GENERAL MOTORS COMPANY

DIAGNOSTIC INFORMATION AND PROCEDURES

DTC B3622: STEERING WHEEL CONTROLS 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 Descriptor

DTC B3622

Steering Wheel Controls 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
B+	U1510 00	U1510 00	-	-
Volume Up Signal-Terminal 4	B3622 39, B3622 59	1	1	-
Volume Down Signal-Terminal 5	B3622 39, B3622 59	1	1	-
Next Preset Signal-Terminal 8	B3622 39, B3622 59	1	1	-
Previous Preset Signal-Terminal 9	B3622 39, B3622 59	1	1	-
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 instrument cluster LIN serial data and provides input from the rear left - hand switch and rear right - hand switch. The instrument cluster 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

Description and Operation

Instrument Cluster 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 the scan tool Steering Wheel Control Switches parameter changes when pressing the S70R Steering Wheel Controls Switch - Right buttons.
 - **If the parameter does not change for all S70R Steering Wheel Controls Switch - Right switches**
Replace S70R Steering Wheel Controls Switch - Right.
 - **If the parameter changes for all S70R Steering Wheel Controls Switch - Right buttons**
4. Verify the scan tool Steering Wheel Control Switches parameter changes between Volume Up and Volume Down when depressing the S70F Steering Wheel Controls Switch - Radio Volume switch.
 - **If the parameter does not change**
Refer to S70F Steering Wheel Controls Switch - Radio Volume Circuit/System Testing.
 - **If the parameter changes**
5. Verify the scan tool Steering Wheel Control Switches parameter changes between Next Preset and Previous Preset when depressing the S70E Steering Wheel Controls Switch - Radio Presets switch.
 - **If the parameter does not change**
Refer to S70E Steering Wheel Controls Switch - Radio Presets Circuit/System Testing.
 - **If the parameter changes**
6. All OK.

Circuit/System Testing

S70F Steering Wheel Controls Switch - Radio Volume

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S70F Steering Wheel Controls Switch - Radio Volume. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the ground circuit terminal 1 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF.
 2. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , repair the open/high resistance in the ground connection.
 - **If less than 10 Ω**
3. Ignition ON.
4. Test for greater than 10 V between the signal circuit terminals listed below and ground:
 - Terminal 2
 - Terminal 3

- **If 10 V or less**

1. Ignition OFF, disconnect the harness connector at the S70R Steering Wheel Controls Switch - Right.
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
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 , test or replace the S70R Steering Wheel Controls Switch - Right.
- **If greater than 10 V**
5. Install a 3 A fused jumper wire between the signal circuit terminal 2 and the ground circuit terminal 1.
6. Verify the scan tool Steering Wheel Control Switches parameter is Volume Down Button.
 - **If not Volume Down Button**

Test or replace the S70R Steering Wheel Controls Switch - Right.
 - **If Volume Down Button**
7. Remove the jumper wire. Install a 3 A fused jumper wire between the signal circuit terminal 3 and the ground circuit terminal 1.
8. Verify the scan tool Steering Wheel Control Switches parameter is Volume Up Button.
 - **If not Volume Up Button**

Test or replace the S70R Steering Wheel Controls Switch - Right.
 - **If Volume Up Button**
9. Test or replace the S70F Steering Wheel Controls Switch - Radio Volume.

S70E Steering Wheel Controls Switch - Radio Presets

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S70E Steering Wheel Controls Switch - Radio Presets. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the ground circuit terminal 4 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF.
 2. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , repair the open/high resistance in the ground connection.
 - **If less than 10 Ω**
3. Ignition ON.
4. Test for greater than 10 V between the signal circuit terminals listed below and ground:
 - Terminal 2
 - Terminal 3
 - **If 10 V or less**
 1. Ignition OFF, disconnect the harness connector at the S70R Steering Wheel Controls Switch - Right.
 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
 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 , test or replace the S70R Steering Wheel Controls Switch - Right.

- **If greater than 10 V**

5. Install a 3 A fused jumper wire between the signal circuit terminal 2 and the ground circuit terminal 4.

6. Verify the scan tool Steering Wheel Control Switches parameter is Next Preset.

- **If not Next Preset**

Test or replace the S70R Steering Wheel Controls Switch - Right.

- **If Next Preset**

7. Remove the jumper wire. Install a 3 A fused jumper wire between the signal circuit terminal 3 and the ground circuit terminal 4.

8. Verify the scan tool Steering Wheel Control Switches parameter is Previous Preset.

- **If not Previous Preset**

Test or replace the S70R Steering Wheel Controls Switch - Right.

- **If Previous Preset**

9. Test or replace the S70E Steering Wheel Controls Switch - Radio Presets.

Component Testing

1. Ignition OFF, disconnect the harness connector at the S70F Steering Wheel Controls Switch - Radio Volume.

2. Test for infinite resistance between the following signal terminals and the ground terminal 1 with the switch in the open position.

- Terminal 2
- Terminal 3
- **If less than infinite resistance on either circuit**

Replace the S70F Steering Wheel Controls Switch - Radio Volume.

- **If infinite resistance**

3. Test for less than 10 Ω between the following signal terminals and the ground terminal 1 with the S70F Steering Wheel Controls Switch - Radio Volume in the Up position or Down position.

- Terminal 2
- Terminal 3
- **If 10 Ω or greater**

Replace the S70F Steering Wheel Controls Switch - Radio Volume.

- **If less than 10 Ω**

4. Ignition OFF, disconnect the harness connector at the S70E Steering Wheel Controls Switch - Radio Presets.

5. Test for infinite resistance between the following signal terminals and the ground terminal 4 with the switch in the open position.

- Terminal 2
- Terminal 3
- **If less than infinite resistance on either circuit**

Replace the S70E Steering Wheel Controls Switch - Radio Presets.

- **If infinite resistance**

6. Test for less than 10 Ω between the following signal terminals and the ground terminal 1 with the S70E Steering Wheel Controls Switch - Radio Presets in the Up position or Down position.

- Terminal 2
- Terminal 3
- **If 10 Ω or greater**

- If less than 10 Ω

7. All OK

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+	U1510 00	U1510 00	-	-
Volume Up Signal-Terminal 4	B3622 39, B3622 59	1	1	-
Volume Down Signal-Terminal 5	B3622 39, B3622 59	1	1	-
Next Preset Signal-Terminal 8	B3622 39, B3622 59	1	1	-
Previous Preset Signal-Terminal 9	B3622 39, B3622 59	1	1	-
Serial Data	U1510 00	U1510 00	U1510 00	-
Low Reference	-	U1510 00	-	-

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
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 rear left - hand switch and rear right - hand switch. The IPC identifies the switch selection and activates the feature.

Reference Information

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Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

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Instrument Cluster 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. Verify the driver information center (DIC) illuminates.
 - **If the DIC does not illuminate**
Test or replace the instrument cluster.
 - **If the DIC does illuminate**
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 the scan tool Steering Wheel Control Switches parameter changes when depressing the S70R Steering Wheel Controls Switch - Right buttons.
 - **If the parameter does not change for all S70R Steering Wheel Controls Switch - Right switches**
Replace S70R Steering Wheel Controls Switch - Right.
 - **If the parameter changes for all S70R Steering Wheel Controls Switch - Right buttons**
4. Verify the scan tool Steering Wheel Control Switches parameter changes between Volume Up and Volume Down when depressing the S70F Steering Wheel Controls Switch - Radio Volume switch.
 - **If the parameter does not change**

- **If the parameter changes**

5. Verify the scan tool Steering Wheel Control Switches parameter changes between Next Preset and Previous Preset when depressing the S70E Steering Wheel Controls Switch - Radio Presets switch.

- **If the parameter does not change**

Refer to S70E Steering Wheel Controls Switch - Radio Presets Circuit/System Testing.

- **If the parameter changes**

6. All OK.

Circuit/System Testing

S70F Steering Wheel Controls Switch - Radio Volume

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S70F Steering Wheel Controls Switch - Radio Volume. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the ground circuit terminal 1 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF.
 2. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , repair the open/high resistance in the ground connection.
 - **If less than 10 Ω**
3. Ignition ON.
4. Test for greater than 10 V between the signal circuit terminals listed below and ground:
 - Terminal 2
 - Terminal 3
 - **If 10 V or less**
 1. Ignition OFF, disconnect the harness connector at the S70R Steering Wheel Controls Switch - Right.
 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
 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 , test or replace the S70R Steering Wheel Controls Switch - Right.
 - **If greater than 10 V**
5. Install a 3 A fused jumper wire between the signal circuit terminal 2 and the ground circuit terminal 1.
6. Verify the scan tool Steering Wheel Control Switches parameter is Volume Down Button.
 - **If not Volume Down Button**

Test or replace the S70R Steering Wheel Controls Switch - Right.
 - **If Volume Down Button**
7. Remove the jumper wire. Install a 3 A fused jumper wire between the signal circuit terminal 3 and the ground circuit terminal 1.
8. Verify the scan tool Steering Wheel Control Switches parameter is Volume Up Button.
 - **If not Volume Up Button**

Test or replace the S70R Steering Wheel Controls Switch - Right.

- **If Volume Up Button**

9. Test or replace the S70F Steering Wheel Controls Switch - Radio Volume.

S70E Steering Wheel Controls Switch - Radio Presets

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S70E Steering Wheel Controls Switch - Radio Presets. It may take up to 2 min for all vehicle systems to power down.

2. Test for less than 10 Ω between the ground circuit terminal 4 and ground.

- **If 10 Ω or greater**

1. Ignition OFF.

2. Test for less than 2 Ω in the ground circuit end to end.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , repair the open/high resistance in the ground connection.

- **If less than 10 Ω**

3. Ignition ON.

4. Test for greater than 10 V between the signal circuit terminals listed below and ground:

- Terminal 2
- Terminal 3

- **If 10 V or less**

1. Ignition OFF, disconnect the harness connector at the S70R Steering Wheel Controls Switch - Right.

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

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 , test or replace the S70R Steering Wheel Controls Switch - Right.

- **If greater than 10 V**

5. Install a 3 A fused jumper wire between the signal circuit terminal 2 and the ground circuit terminal 4.

6. Verify the scan tool Steering Wheel Control Switches parameter is Next Preset.

- **If not Next Preset**

Test or replace the S70R Steering Wheel Controls Switch - Right.

- **If Next Preset**

7. Remove the jumper wire. Install a 3 A fused jumper wire between the signal circuit terminal 3 and the ground circuit terminal 4.

8. Verify the scan tool Steering Wheel Control Switches parameter is Previous Preset.

- **If not Previous Preset**

Test or replace the S70R Steering Wheel Controls Switch - Right.

- **If Previous Preset**

9. Test or replace the S70E Steering Wheel Controls Switch - Radio Presets.

Component Testing

1. Ignition OFF, disconnect the harness connector at the S70F Steering Wheel Controls Switch - Radio Volume.

2. Test for infinite resistance between the following signal terminals and the ground terminal 1 with the switch in the open position.

- Terminal 2

- Terminal 3
- **If less than infinite resistance on either circuit**

Replace the S70F Steering Wheel Controls Switch - Radio Volume.

- **If infinite resistance**

3. Test for less than 10 Ω between the following signal terminals and the ground terminal 1 with the S70F Steering Wheel Controls Switch - Radio Volume in the Up position or Down position.

- Terminal 2
- Terminal 3
- **If 10 Ω or greater**

Replace the S70F Steering Wheel Controls Switch - Radio Volume.

- **If less than 10 Ω**

4. Ignition OFF, disconnect the harness connector at the S70E Steering Wheel Controls Switch - Radio Presets.

5. Test for infinite resistance between the following signal terminals and the ground terminal 4 with the switch in the open position.

- Terminal 2
- Terminal 3
- **If less than infinite resistance on either circuit**

Replace the S70E Steering Wheel Controls Switch - Radio Presets.

- **If infinite resistance**

6. Test for less than 10 Ω between the following signal terminals and the ground terminal 1 with the S70E Steering Wheel Controls Switch - Radio Presets in the Up position or Down position.

- Terminal 2
- Terminal 3
- **If 10 Ω or greater**

Replace the S70E Steering Wheel Controls Switch - Radio Presets.

- **If less than 10 Ω**

7. 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

DESCRIPTION AND OPERATION

STEERING WHEEL CONTROLS DESCRIPTION AND OPERATION

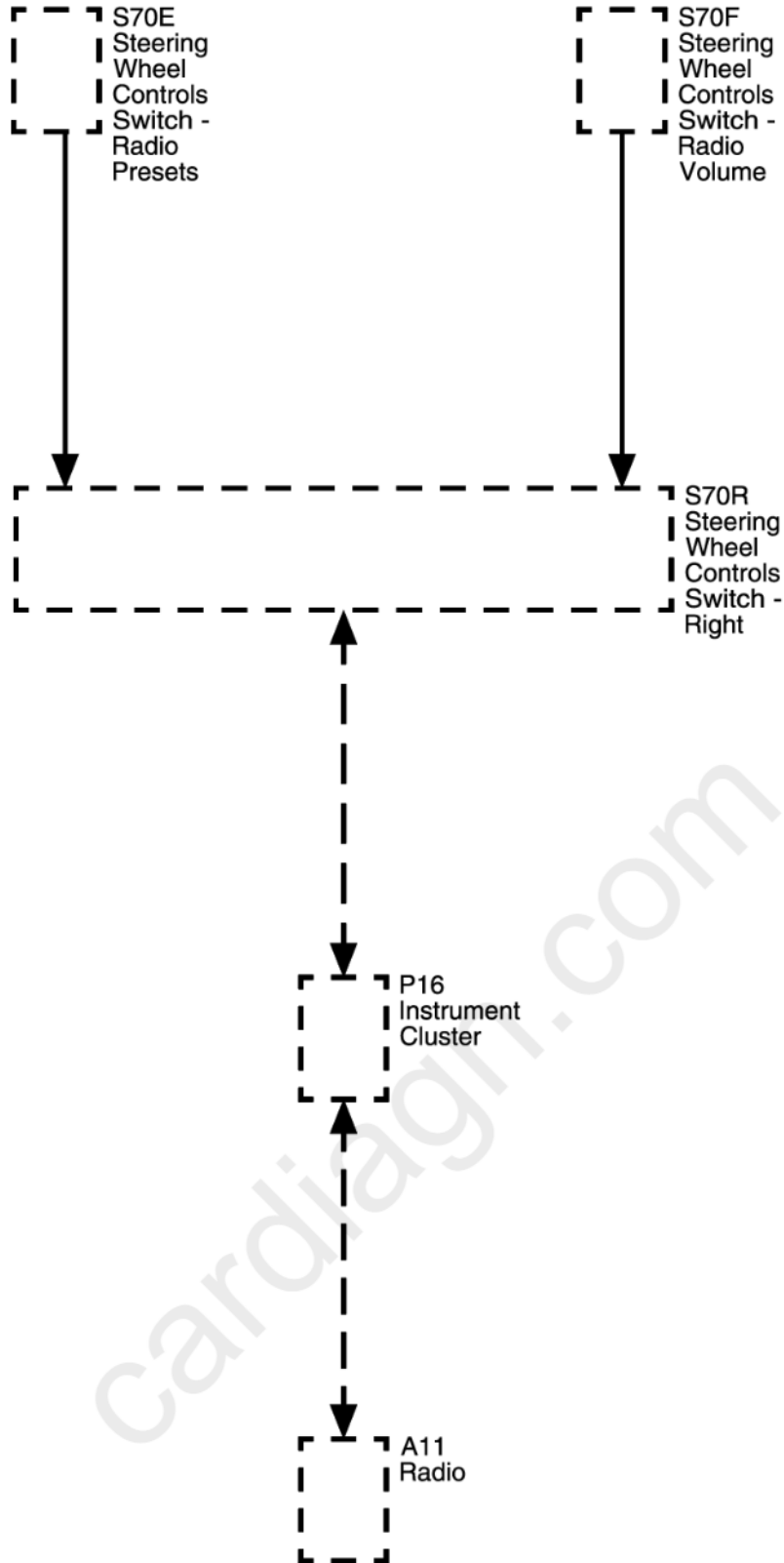


Fig. 2: Secondary Controls Block Diagram

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
S70E	Steering Wheel Controls Switch - Radio Presets
S70F	Steering Wheel Controls Switch - Radio Volume
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, through a network of momentary contact switches.

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, left-hand rear, and right-hand rear switches

The right-hand switch controller consists of UP/DOWN/LEFT/RIGHT directional, center "select", Push-to-Talk, and Mute buttons. The LEFT/RIGHT buttons navigate the display regions of the cluster. The UP/DOWN buttons navigate the menus. The right-hand rear switch consists of volume up and volume down buttons. The left-hand rear switch consists of favorite up and favorite down buttons.

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