ACCESSORIES & EQUIPMENT

Secondary and Configurable Customer Controls - Escalade, Suburban, Tahoe, Yukon

SCHEMATIC WIRING DIAGRAMS

STEERING WHEEL SECONDARY/CONFIGURABLE CONTROL WIRING SCHEMATICS

Steering Wheel Radio Controls (X88 or Z88 with UK3)

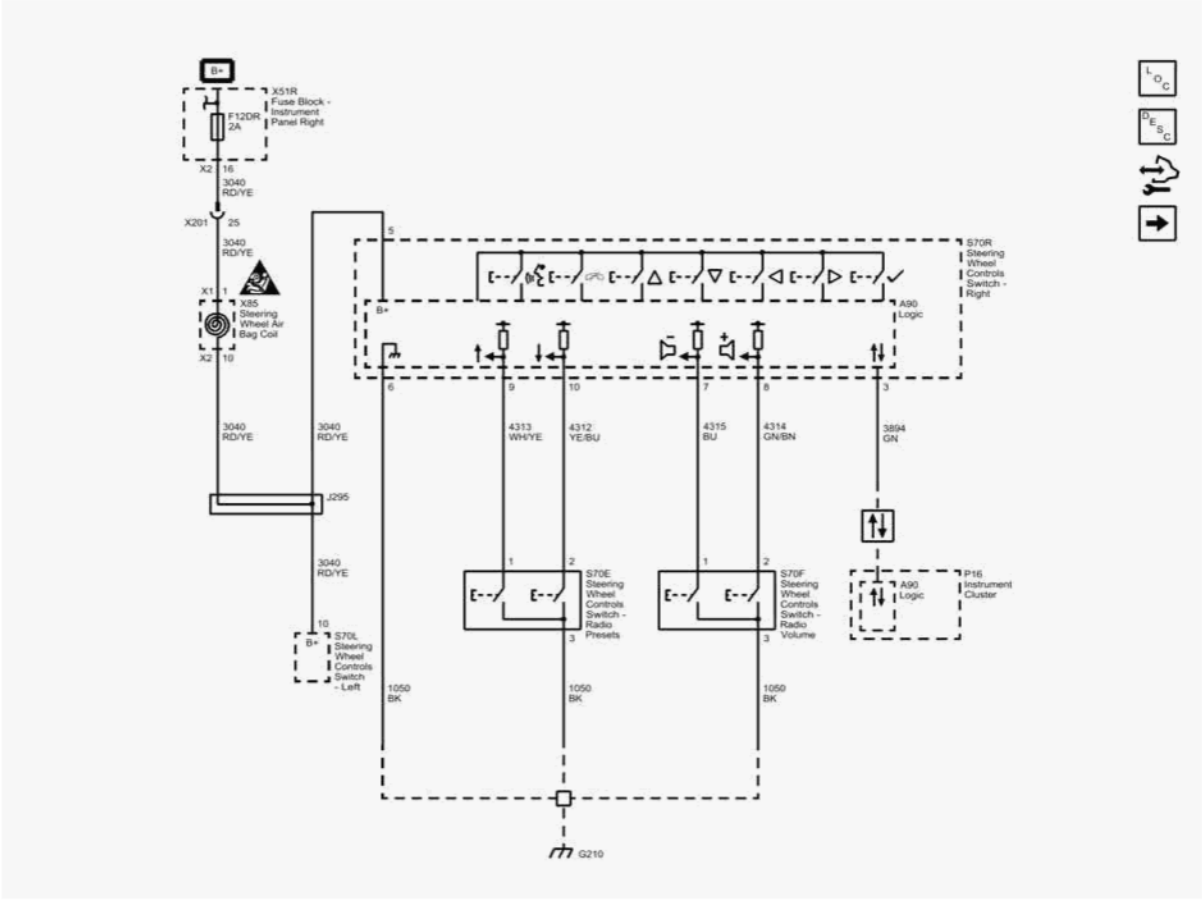

Fig. 1: Steering Wheel Radio Controls (X88 or Z88 with UK3)
Courtesy of GENERAL MOTORS COMPANY

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Steering Wheel Radio Controls (Z75)

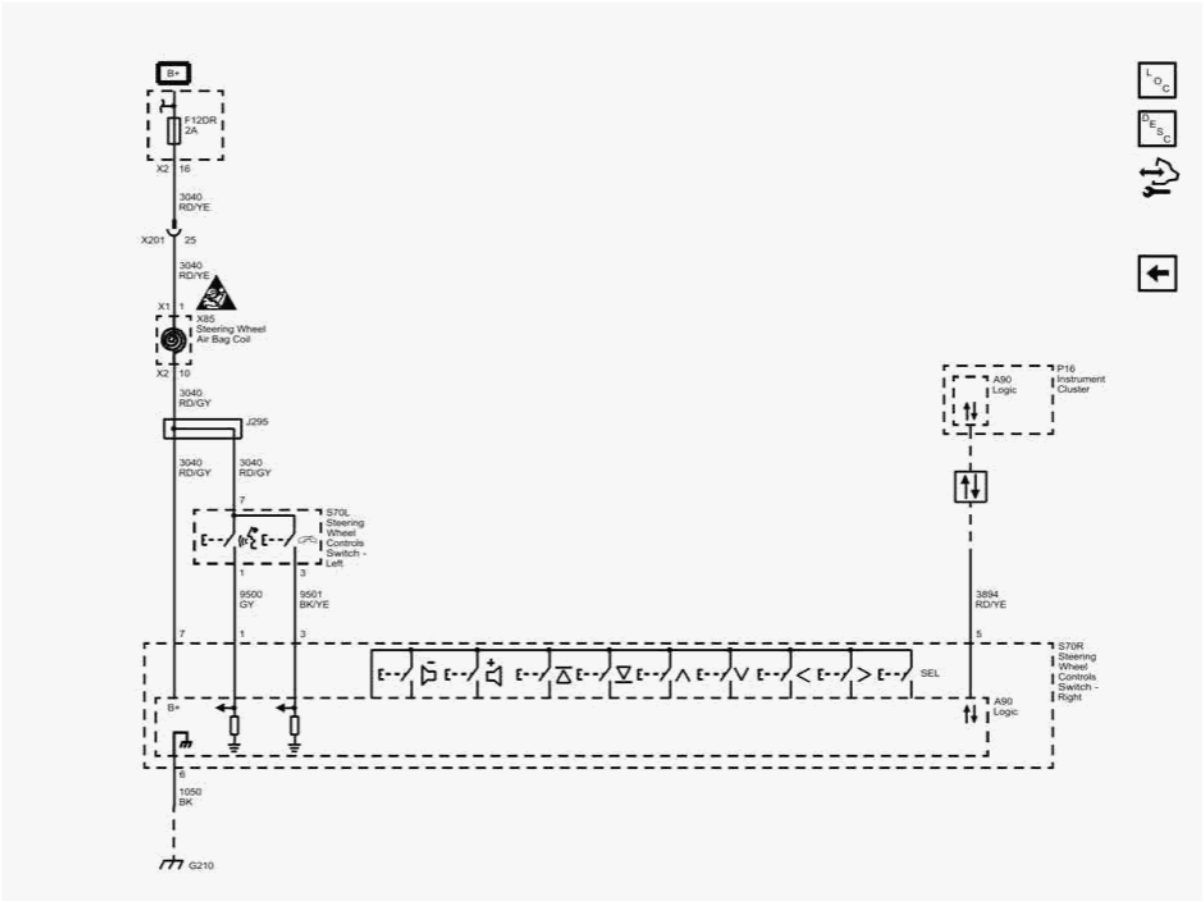

Fig. 2: Steering Wheel Radio Controls (Z75)
Courtesy of GENERAL MOTORS COMPANY

DIAGNOSTIC INFORMATION AND PROCEDURES

DTC B3622: STEERING WHEEL CONTROLS INTERNAL MALFUNCTION/STEERING WHEEL CONTROLS SIGNAL CIRCUIT PROTECTION TIME-OUT (WITH Z75)

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

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- 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 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	1, U1510 00	U1510 00	1. 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.

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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

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

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1. Verify DTC U1500-U15FF is not set.
    - **If any of the DTCs are set**

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

    - **If none of the DTCs are set**
2. Ignition ON.
3. 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**
4. 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 S70R Steering Wheel Controls Switch - Right Circuit/System Testing with UV6 or without UV6.

    - **If all functions on the S70R Steering Wheel Controls Switch - Right operate properly**
5. 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 S70L Steering Wheel Controls Switch - Left Malfunction in Circuit/System Testing.

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

Circuit/System Testing

S70R Steering Wheel Controls Switch-Right without UV6

1. Ignition OFF, disconnect the harness connector X1 at the P16 Instrument Cluster.

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2. Disconnect the harness connector at the S70R Steering Wheel Controls Switch - Right. Ignition ON.
3. Test for less than 1 V between the S70R Steering Wheel Controls Switch - Right serial data circuit terminal 5 and ground.
    - **If greater than 1 V**

      Repair the short to voltage on the circuit.

    - **If less than 1 V**
4. Ignition OFF.
5. Test for infinite resistance between the serial data circuit terminal 5 and ground.
    - **If less than infinite resistance**

      Repair the short to ground on the circuit.

    - **If infinite resistance**
6. Replace the S70R Steering Wheel Controls Switch - Right.

S70R Steering Wheel Controls Switch-Right with UV6

1. Ignition OFF, disconnect the harness connector X1 at the P16 Instrument Cluster.
2. Disconnect the harness connector at the S70R Steering Wheel Controls Switch - Right. Ignition ON.
3. Test for less than 1 V between the S70R Steering Wheel Controls Switch - Right serial data circuit terminal 5 and ground.
    - **If greater than 1 V**

      Repair the short to voltage on the circuit.

    - **If less than 1 V**
4. Ignition OFF.
5. Test for infinite resistance between the serial data circuit terminal 5 and ground.
    - **If less than infinite resistance**

      Repair the short to ground on the circuit.

    - **If infinite resistance**
6. Ignition OFF, disconnect the harness connector X1 at the P29 Head-Up Display.

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7. Test for less than 1 V between the serial data circuit terminal 1 and ground.
    - **If greater than 1 V**

      Repair the short to voltage on the circuit.

    - **If less than 1 V**
8. Ignition OFF.
9. Test for infinite resistance between the serial data circuit terminal 1 and ground.
    - **If less than infinite resistance**

      Repair the short to ground on the circuit.

    - **If infinite resistance**
10. Connect the harness connector at the P16 Instrument Cluster and S70R Steering Wheel Controls Switch - Right. Ignition ON.
11. Verify steering wheel controls function properly.
    - **If steering wheel controls function properly**

      Replace P29 Head-Up Display.

    - **If steering wheel controls do not function properly**
12. Ignition OFF. Disconnect harness connector at the S70R Steering Wheel Controls Switch - Right. Connect the harness connector at the and P29 Head-Up Display. Ignition ON.
13. Verify head-up display functions properly.
    - **If head-up display functions properly**

      Replace S70R Steering Wheel Controls Switch - Right.

    - **If head-up display does not function properly**
14. Replace P16 Instrument Cluster.

S70L Steering Wheel Controls Switch - Left 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

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- 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 Ω 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 Ω or greater**

     Repair the open/high resistance in the circuit.

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

Repair Instructions

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

- Refer to **Steering Wheel Spoke Cover Replacement (LH with Cruise Control Switch)** **Steering Wheel Spoke Cover Replacement (RH with Radio Control Switch)** **Steering Wheel Spoke Cover Replacement (Cadillac)**

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- Refer to **Control Module References** for Instrument Cluster replacement, programming, and setup

DTC B3622: STEERING WHEEL CONTROLS SIGNAL CIRCUIT (WITHOUT Z75)

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	B3622 39, B3622 59	1	-	-
Volume Down Signal	B3622 39, B3622 59	1	-	-
Next Preset Signal	B3622 39, B3622 59	1	-	-
Previous Preset Signal	B3622 39, B3622 59	1	-	-
Serial Data	U1510 00, B3622 59	U1510 00	U1510 00, B3622 59	-
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 communicates with the instrument cluster through 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.

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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**

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- **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 some of the S70R Steering Wheel Controls Switch - Right switches**

     Replace S70R Steering Wheel Controls Switch - Right.
   - **If the parameter does not change for all of the S70R Steering Wheel Controls Switch - Right switches**

     Refer to S70R Steering Wheel Controls Switch Circuit/System Testing with UV6 or without UV6.
   - **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.

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- **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 3 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 4.5 V between the signal circuit terminals listed below and ground:
   - Terminal 1
   - Terminal 2
   - **If 4.5 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.

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- **If greater than 4.5 V**

5. Install a 3 A fused jumper wire between the signal circuit terminal 1 and the ground circuit terminal 3.
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 2 and the ground circuit terminal 3.
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 3 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 4.5 V between the signal circuit terminals listed below and ground:
   - Terminal 1
   - Terminal 2

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- **If 4.5 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 4.5 V**

5. Install a 3 A fused jumper wire between the signal circuit terminal 1 and the ground circuit terminal 3.
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 2 and the ground circuit terminal 3.
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.

S70R Steering Wheel Controls Switch-Right without UV6

1. Ignition OFF, disconnect the harness connector X1 at the P16 Instrument Cluster.
2. Disconnect the harness connector at the S70R Steering Wheel Controls Switch - Right. Ignition ON.
3. Test for less than 1 V between the S70R Steering Wheel Controls Switch - Right serial data circuit terminal 3 and ground.
    - **If greater than 1 V**

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Repair the short to voltage on the circuit.

- **If less than 1 V**

4. Ignition OFF.
5. Test for infinite resistance between the serial data circuit terminal 3 and ground.
   - **If less than infinite resistance**

     Repair the short to ground on the circuit.

   - **If infinite resistance**
6. Replace the S70R Steering Wheel Controls Switch - Right.

S70R Steering Wheel Controls Switch-Right with UV6

1. Ignition OFF, disconnect the harness connector X1 at the P16 Instrument Cluster.
2. Disconnect the harness connector at the S70R Steering Wheel Controls Switch - Right. Ignition ON.
3. Test for less than 1 V between the S70R Steering Wheel Controls Switch - Right serial data circuit terminal 3 and ground.
   - **If greater than 1 V**

     Repair the short to voltage on the circuit.

   - **If less than 1 V**
4. Ignition OFF.
5. Test for infinite resistance between the serial data circuit terminal 3 and ground.
   - **If less than infinite resistance**

     Repair the short to ground on the circuit.

   - **If infinite resistance**
6. Ignition OFF, disconnect the harness connector X1 at the P29 Head-Up Display.
7. Test for less than 1 V between the serial data circuit terminal 1 and ground.
   - **If greater than 1 V**

     Repair the short to voltage on the circuit.

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- **If less than 1 V**

8. Ignition OFF.
9. Test for infinite resistance between the serial data circuit terminal 1 and ground.
    - **If less than infinite resistance**

      Repair the short to ground on the circuit.

    - **If infinite resistance**
10. Connect the harness connector at the P16 Instrument Cluster and S70R Steering Wheel Controls Switch - Right. Ignition ON.
11. Verify steering wheel controls function properly.
    - **If steering wheel controls function properly**

      Replace P29 Head-Up Display.

    - **If steering wheel controls do not function properly**
12. Ignition OFF. Disconnect harness connector at the S70R Steering Wheel Controls Switch - Right. Connect the harness connector at the and P29 Head-Up Display. Ignition ON.
13. Verify head-up display functions properly.
    - **If head-up display functions properly**

      Replace S70R Steering Wheel Controls Switch - Right.

    - **If head-up display does not function properly**
14. Replace P16 Instrument Cluster.

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 3 with the switch in the open position.
    - Terminal 1
    - Terminal 2
    - **If less than infinite resistance on either circuit**

      Replace the S70F Steering Wheel Controls Switch - Radio Volume.

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- **If infinite resistance**

3. Test for less than 10 Ω between the following signal terminals and the ground terminal 3 with the S70F Steering Wheel Controls Switch - Radio Volume in the Up position or Down position.
   - Terminal 1
   - Terminal 2
   - **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 3 with the switch in the open position.
   - Terminal 1
   - Terminal 2
   - **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 3 with the S70E Steering Wheel Controls Switch - Radio Presets in the Up position or Down position.
   - Terminal 1
   - Terminal 2
   - **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.

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Refer to **Steering Wheel Spoke Cover Replacement (LH with Cruise Control Switch)** **Steering Wheel Spoke Cover Replacement (RH with Radio Control Switch)** **Steering Wheel Spoke Cover Replacement (Cadillac)**

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 (With Z75)** **Steering Wheel Controls Malfunction (Without Z75)** in order to diagnose the symptom.

STEERING WHEEL CONTROLS MALFUNCTION (WITH Z75)

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.

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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	1, U1510 00	U1510 00	1, 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

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**

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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 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 S70R Steering Wheel Controls Switch - Right Circuit/System Testing with UV6 or without UV6.

    - **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 S70L Steering Wheel Controls Switch - Left 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

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S70R Steering Wheel Controls Switch-Right without UV6

1. Ignition OFF, disconnect the harness connector X1 at the P16 Instrument Cluster.
2. Disconnect the harness connector at the S70R Steering Wheel Controls Switch - Right. Ignition ON.
3. Test for less than 1 V between the S70R Steering Wheel Controls Switch - Right serial data circuit terminal 5 and ground.
    - **If greater than 1 V**

      Repair the short to voltage on the circuit.

    - **If less than 1 V**
4. Ignition OFF.
5. Test for infinite resistance between the serial data circuit terminal 5 and ground.
    - **If less than infinite resistance**

      Repair the short to ground on the circuit.

    - **If infinite resistance**
6. Replace the S70R Steering Wheel Controls Switch - Right.

S70R Steering Wheel Controls Switch-Right with UV6

1. Ignition OFF, disconnect the harness connector X1 at the P16 Instrument Cluster.
2. Disconnect the harness connector at the S70R Steering Wheel Controls Switch - Right. Ignition ON.
3. Test for less than 1 V between the S70R Steering Wheel Controls Switch - Right serial data circuit terminal 5 and ground.
    - **If greater than 1 V**

      Repair the short to voltage on the circuit.

    - **If less than 1 V**
4. Ignition OFF.
5. Test for infinite resistance between the serial data circuit terminal 5 and ground.
    - **If less than infinite resistance**

      Repair the short to ground on the circuit.

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- **If infinite resistance**

6. Ignition OFF, disconnect the harness connector X1 at the P29 Head-Up Display.
7. Test for less than 1 V between the serial data circuit terminal 1 and ground.
    - **If greater than 1 V**

      Repair the short to voltage on the circuit.

    - **If less than 1 V**
8. Ignition OFF.
9. Test for infinite resistance between the serial data circuit terminal 1 and ground.
    - **If less than infinite resistance**

      Repair the short to ground on the circuit.

    - **If infinite resistance**
10. Connect the harness connector at the P16 Instrument Cluster and S70R Steering Wheel Controls Switch - Right. Ignition ON.
11. Verify steering wheel controls function properly.
    - **If steering wheel controls function properly**

      Replace P29 Head-Up Display.

    - **If steering wheel controls do not function properly**
12. Ignition OFF. Disconnect harness connector at the S70R Steering Wheel Controls Switch - Right. Connect the harness connector at the and P29 Head-Up Display. Ignition ON.
13. Verify head-up display functions properly.
    - **If head-up display functions properly**

      Replace S70R Steering Wheel Controls Switch - Right.

    - **If head-up display does not function properly**
14. Replace P16 Instrument Cluster.

S70L Steering Wheel Controls Switch - Left Malfunction

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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 Ω 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 Ω or greater**

      Repair the open/high resistance in the circuit.

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

Repair Instructions

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

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- Refer to **Steering Wheel Spoke Cover Replacement (LH with Cruise Control Switch)** **Steering Wheel Spoke Cover Replacement (RH with Radio Control Switch)** **Steering Wheel Spoke Cover Replacement (Cadillac)**
- Refer to **Control Module References** for Instrument Cluster replacement, programming, and setup

STEERING WHEEL CONTROLS MALFUNCTION (WITHOUT Z75)

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	B3622 39, B3622 59	1	-	-
Volume Down Signal	B3622 39, B3622 59	1	-	-
Next Preset Signal	B3622 39, B3622 59	1	-	-
Previous Preset Signal	B3622 39, B3622 59	1	-	-
Serial Data	U1510 00, B3622 59	U1510 00	U1510 00, B3622 59	-
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 communicates with the instrument cluster through 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.

Reference Information

Schematic Reference

Steering Wheel Secondary/Configurable Control Schematics

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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. Verify the driver information center (DIC) illuminates.
   - **If the DIC does not illuminate**

     Test or replace the instrument cluster.

   - **If the DIC illuminates**
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 some of the S70R Steering Wheel Controls Switch - Right switches**

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Replace S70R Steering Wheel Controls Switch - Right.

- **If the parameter does not change for all of the S70R Steering Wheel Controls Switch - Right switches**

  Refer to S70R Steering Wheel Controls Switch Circuit/System Testing with UV6 or without UV6.

- **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 3 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.

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- **If less than 10 Ω**

3. Ignition ON.
4. Test for greater than 4.5 V between the signal circuit terminals listed below and ground:
    - Terminal 1
    - Terminal 2
    - **If 4.5 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 4.5 V**
5. Install a 3 A fused jumper wire between the signal circuit terminal 1 and the ground circuit terminal 3.
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 2 and the ground circuit terminal 3.
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

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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 3 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 4.5 V between the signal circuit terminals listed below and ground:
    - Terminal 1
    - Terminal 2
    - **If 4.5 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 4.5 V**
5. Install a 3 A fused jumper wire between the signal circuit terminal 1 and the ground circuit terminal 3.
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 2 and the ground circuit terminal 3.

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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.

S70R Steering Wheel Controls Switch-Right without UV6

1. Ignition OFF, disconnect the harness connector X1 at the P16 Instrument Cluster.
2. Disconnect the harness connector at the S70R Steering Wheel Controls Switch - Right. Ignition ON.
3. Test for less than 1 V between the S70R Steering Wheel Controls Switch - Right serial data circuit terminal 3 and ground.
    - **If greater than 1 V**

      Repair the short to voltage on the circuit.

    - **If less than 1 V**
4. Ignition OFF.
5. Test for infinite resistance between the serial data circuit terminal 3 and ground.
    - **If less than infinite resistance**

      Repair the short to ground on the circuit.

    - **If infinite resistance**
6. Replace the S70R Steering Wheel Controls Switch - Right.

S70R Steering Wheel Controls Switch-Right with UV6

1. Ignition OFF, disconnect the harness connector X1 at the P16 Instrument Cluster.
2. Disconnect the harness connector at the S70R Steering Wheel Controls Switch - Right. Ignition ON.
3. Test for less than 1 V between the S70R Steering Wheel Controls Switch - Right serial data circuit terminal 3 and ground.
    - **If greater than 1 V**

      Repair the short to voltage on the circuit.

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- **If less than 1 V**

4. Ignition OFF.
5. Test for infinite resistance between the serial data circuit terminal 3 and ground.
   - **If less than infinite resistance**

     Repair the short to ground on the circuit.

   - **If infinite resistance**
6. Ignition OFF, disconnect the harness connector X1 at the P29 Head-Up Display.
7. Test for less than 1 V between the serial data circuit terminal 1 and ground.
   - **If greater than 1 V**

     Repair the short to voltage on the circuit.

   - **If less than 1 V**
8. Ignition OFF.
9. Test for infinite resistance between the serial data circuit terminal 1 and ground.
   - **If less than infinite resistance**

     Repair the short to ground on the circuit.

   - **If infinite resistance**
10. Connect the harness connector at the P16 Instrument Cluster and S70R Steering Wheel Controls Switch - Right. Ignition ON.
11. Verify steering wheel controls function properly.
    - **If steering wheel controls function properly**

      Replace P29 Head-Up Display.

    - **If steering wheel controls do not function properly**
12. Ignition OFF. Disconnect harness connector at the S70R Steering Wheel Controls Switch - Right. Connect the harness connector at the and P29 Head-Up Display. Ignition ON.
13. Verify head-up display functions properly.
    - **If head-up display functions properly**

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Replace S70R Steering Wheel Controls Switch - Right.

- **If head-up display does not function properly**

14. Replace P16 Instrument Cluster.

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 3 with the switch in the open position.
   - Terminal 1
   - Terminal 2
   - **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 3 with the S70F Steering Wheel Controls Switch - Radio Volume in the Up position or Down position.
   - Terminal 1
   - Terminal 2
   - **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 3 with the switch in the open position.
   - Terminal 1
   - Terminal 2
   - **If less than infinite resistance on either circuit**

     Replace the S70E Steering Wheel Controls Switch - Radio Presets.

   - **If infinite resistance**

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6. Test for less than 10 Ω between the following signal terminals and the ground terminal 3 with the S70E Steering Wheel Controls Switch - Radio Presets in the Up position or Down position.
    - Terminal 1
    - Terminal 2
    - **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 **Steering Wheel Spoke Cover Replacement (LH with Cruise Control Switch)** **Steering Wheel Spoke Cover Replacement (RH with Radio Control Switch)** **Steering Wheel Spoke Cover Replacement (Cadillac)**

DESCRIPTION AND OPERATION

STEERING WHEEL CONTROLS DESCRIPTION AND OPERATION

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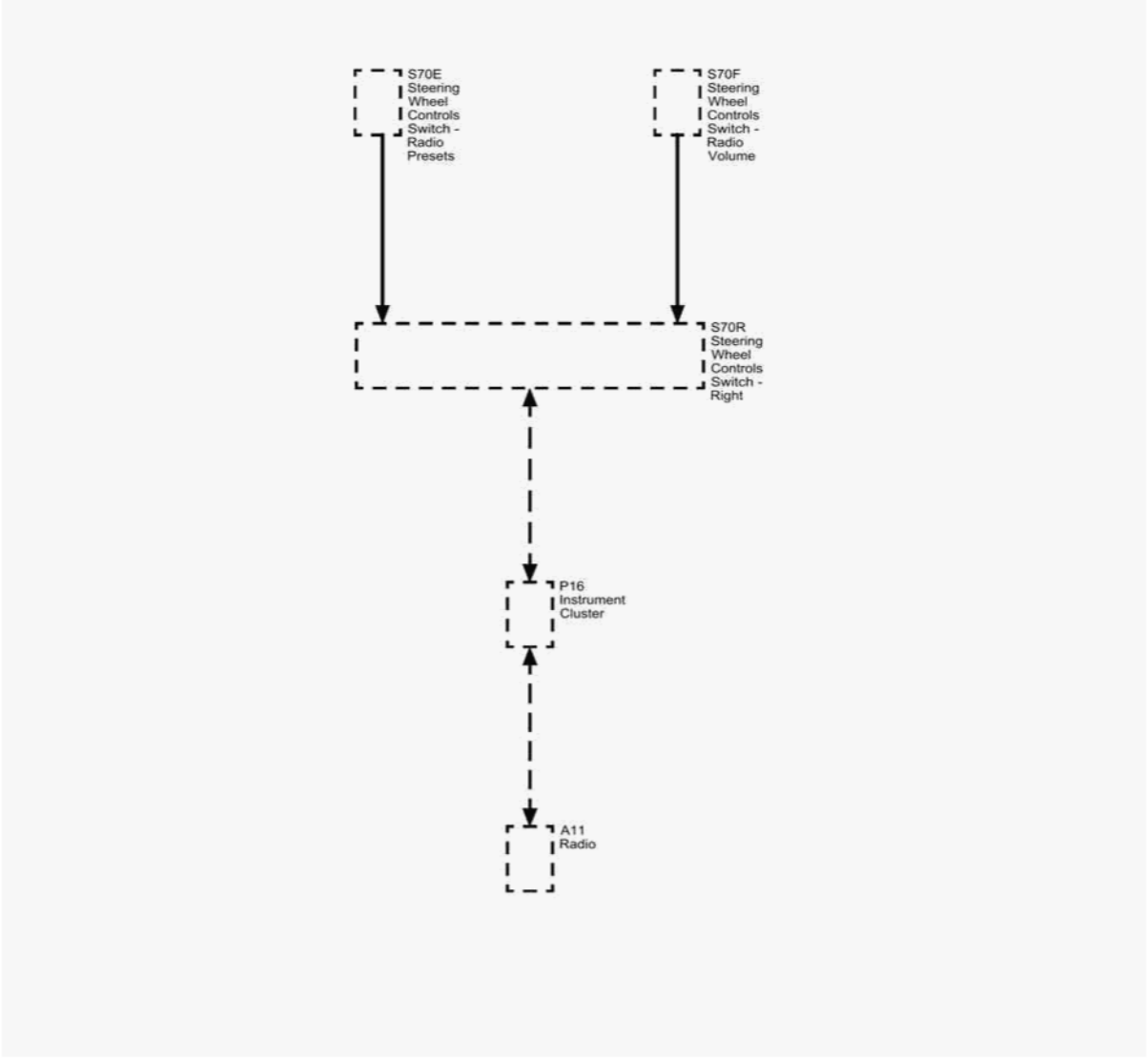

Fig. 3: Secondary Controls Block Diagram

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

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Callout	Component Name
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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