

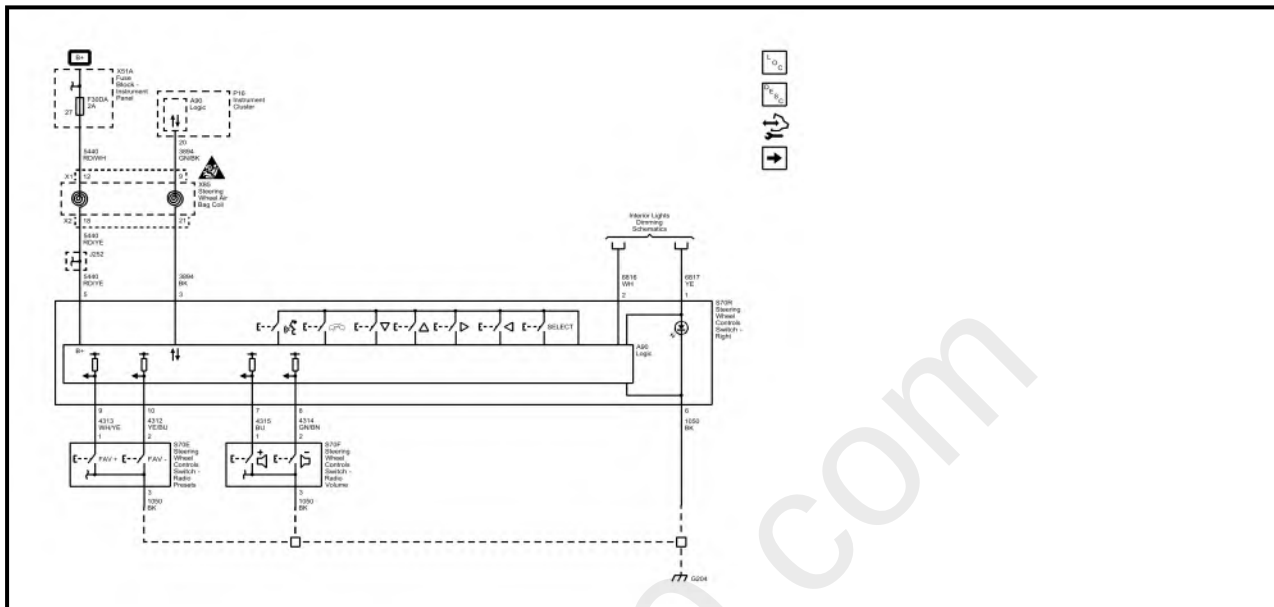
2018 ACCESSORIES & EQUIPMENT

Secondary And Configurable Customer Controls - Traverse

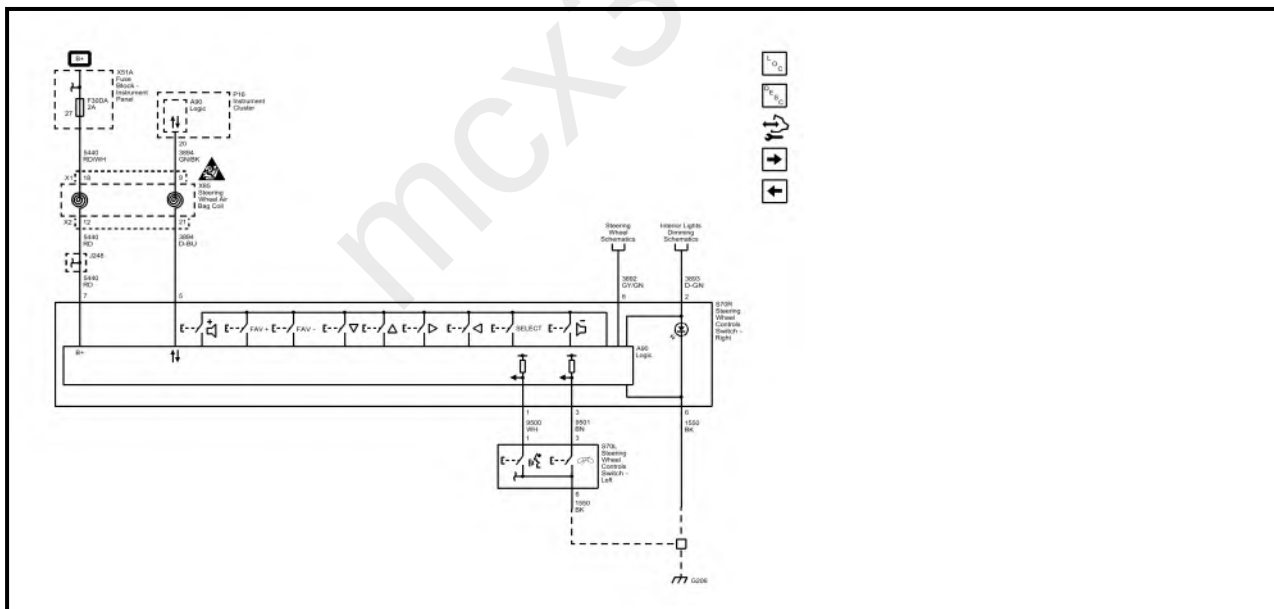
SCHEMATIC WIRING DIAGRAMS

STEERING WHEEL SECONDARY/CONFIGURABLE CONTROL WIRING SCHEMATICS

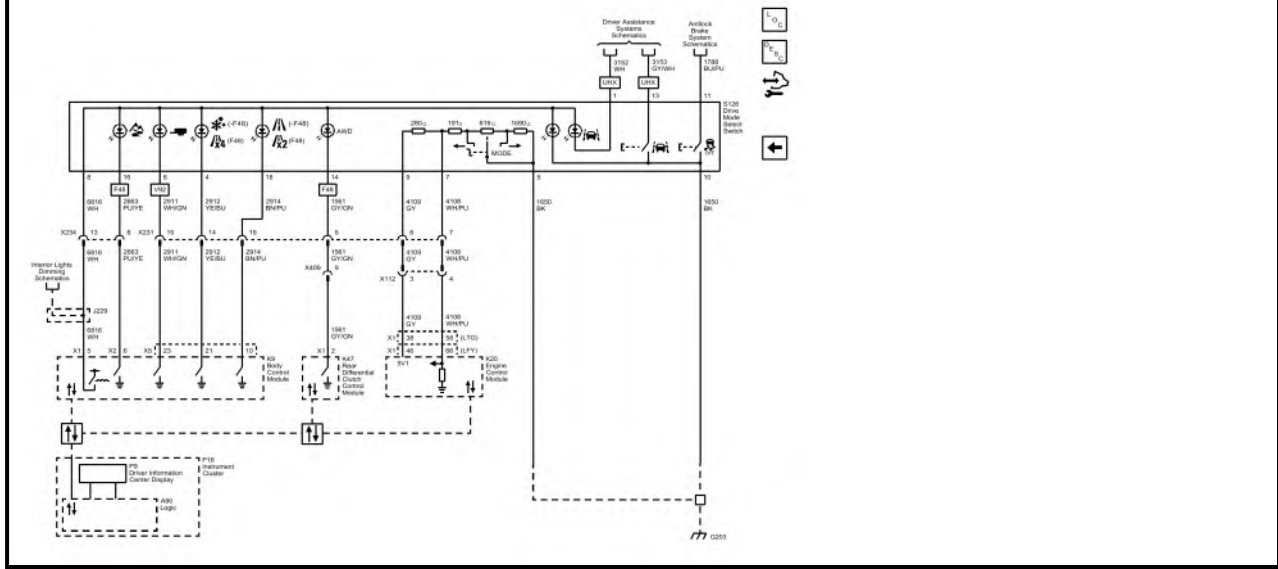
Steering Wheel Controls (X88)



Steering Wheel Controls (W49)



Ride Mode Controls (X88)



DIAGNOSTIC INFORMATION AND PROCEDURES

DTC B3622 (WITH X88)

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

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.

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 Wiring 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](#) .
 - **Go to next step: 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.

- **Go to next step: 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.

- **Go to next step: 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.

- **Go to next step: 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.

- **Go to next step: 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.
- Go to next step: 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.

- **Go to next step: 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 Up Button.

- **If not Volume Down Button**

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

- **Go to next step: 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 Down Button.

- **If not Volume Up Button**

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

- **Go to next step: 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.

- **Go to next step: 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.

- Go to next step: 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.

- **Go to next step: 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.

- **Go to next step: 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.

- **Go to next step: If Previous Preset**

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

S70R Steering Wheel Controls Switch-Right

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.
 - **Go to next step: 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.
 - **Go to next step: If infinite resistance**
6. Replace the S70R Steering Wheel Controls Switch - Right.

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.
 - **Go to next step: 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.
 - **Go to next step: 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.
 - **Go to next step: 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.

- Go to next step: If less than 10 Ω

7. All OK

Repair Instructions

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

Steering Wheel Spoke Cover Replacement

DTC B3622 (WITH W49)

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

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	-	-
Mute Signal	B3622 39, B3622 59	1	-	-
Speak 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.

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 Wiring 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](#) .
 - **Go to next step: 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.
 - **Go to next step: 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 Mute and Speak when depressing the S70L Steering Wheel Controls Switch - Left.
 - **If the parameter does not change**

- **Go to next step: If the parameter changes**

Circuit/System Testing

S70L Steering Wheel Controls Switch - Left

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S70L Steering Wheel Controls Switch - Left. 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 6 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.
 - **Go to next step: 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 3
 - **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.
 - Go to next step: 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.
 - **Go to next step: 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 6.
6. Verify the scan tool Steering Wheel Control Switches parameter is Speak.
 - **If not Speak**

Test or replace the S70R Steering Wheel Controls Switch - Right.
 - **Go to next step: If Speak**
7. Remove the jumper wire. Install a 3 A fused jumper wire between the signal circuit terminal 3 and the ground circuit terminal 6.
8. Verify the scan tool Steering Wheel Control Switches parameter is Mute.
 - **If not Mute**

Test or replace the S70R Steering Wheel Controls Switch - Right.
 - **Go to next step: If Mute**
9. Test or replace the S70L Steering Wheel Controls Switch - Left.

S70R Steering Wheel Controls Switch-Right

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.

- **Go to next step: 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.

- **Go to next step: If infinite resistance**

6. Replace the S70R Steering Wheel Controls Switch - Right.

Component Testing

1. Ignition OFF, disconnect the harness connector at the S70L Steering Wheel Controls Switch - Left.

2. Test for infinite resistance between the following signal terminals and the ground terminal 6 with the switch in the open position.

- Terminal 1
- Terminal 3
- **If less than infinite resistance on either circuit**

Replace the S70L Steering Wheel Controls Switch - Left.

- **Go to next step: If infinite resistance**

3. Test for less than 10 Ω between the following signal terminals and the ground terminal 6 with the S70L Steering Wheel Controls Switch - Left in the Speak position or Mute position.

- Terminal 1
- Terminal 3
- **If 10 Ω or greater**

Replace the S70L Steering Wheel Controls Switch - Left.

- **Go to next step: If less than 10 Ω**

4. All OK

Repair Instructions

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

Steering Wheel Spoke Cover Replacement

DTC P159F, P15A0, OR P15A1

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

DTC Descriptor

DTC P159F

Fuel Economy Mode Switch Circuit Low Voltage

DTC P15A0

Fuel Economy Mode Switch Circuit High Voltage

DTC P15A1

Fuel Economy Mode Switch Performance

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
5 V Reference	P159F	P159F	P15A0	P15A1
Signal	P159F	P159F	P15A0	P15A1
Ground	-	P15A0	-	-

Circuit/System Description

For an overview of the component/system, refer to: [Drive Mode Description and Operation](#)

Circuit	Description
5 V Reference	Regulated voltage supplied by the control module.
Signal	The control module input circuit has an internal resistance connected to ground.
Ground	Chassis Ground

Component	Description
K20 Engine Control Module	The control module contains a microprocessor used to process input data to control outputs.
S126 Drive Mode Select Switch	The switch S126 has an internal resistor ladder network. A specific resistance is generated dependent on the position of the switch.

Conditions for Running the DTC

Ignition - On/Vehicle - In Service Mode

Conditions for Setting the DTC

Signal circuit - Voltage = Out Of Range

Actions Taken When the DTC Sets

DTCs listed in the DTC Descriptor Category = Type B

Conditions for Clearing the DTC

DTCs listed in the DTC Descriptor Category = Type B

Reference Information

Schematic Reference

[Steering Wheel Secondary/Configurable Control Wiring Schematics](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)

- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

DTC Type Reference

[Powertrain Diagnostic Trouble Code \(DTC\) Type Definitions](#)

Scan Tool Reference

[Control Module References](#)

[Circuit/System Verification](#)

1. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

Verify the DTC does not set.

- **If the DTC sets**

Refer to: Circuit/System Testing

- **Go to next step: If the DTC is not set**

2. All OK.

[Circuit/System Testing](#)

NOTE: It may take up to 2 min for all vehicle systems to power down before an accurate ground or low reference circuit continuity test can be performed.

1. Ignition/Vehicle & All vehicle systems - Off
2. Disconnect the electrical connector: S126 Drive Mode Select Switch
3. Test for less than 10 ohms between the test points: Ground circuit terminal 5 & Ground
 - **If 10 ohms or greater**
 1. Test for less than 2 ohms between the test points: Ground circuit terminal @ Component harness & Ground terminal
 - If 2 ohms or greater - Repair the open/high resistance in the circuit.
 - If less than 2 ohms - Repair the open/high resistance in the ground connection.
 - **Go to next step: If less than 10 ohms**
4. Ignition - On/Vehicle - In Service Mode
5. Test for 4.8 to 5.2 V between the test points: 5 V Reference circuit terminal 9 & Ground
 - **If less than 4.8 V**
 1. Ignition/Vehicle - Off
 2. Disconnect the electrical connector: K20 Engine Control Module
 3. Test for infinite resistance between the test points: 5 V Reference circuit terminal @ Component harness & Ground
 - If less than infinite resistance - Repair the short to ground on the circuit.
 - Go to next step: If infinite resistance
 4. Test for less than 2 ohms between the test points: 5 V Reference circuit terminal @ Component harness & The other end of the circuit @ Control module harness
 - If 2 ohms or greater - Repair the open/high resistance in the circuit.
 - If less than 2 ohms - Replace the component: K20 Engine Control Module
 - **If greater than 5.2 V**
 1. Ignition/Vehicle - Off
 2. Disconnect the electrical connector: K20 Engine Control Module
 3. Ignition - On/Vehicle - In Service Mode

4. Test for less than 1 V between the test points: 5 V Reference circuit terminal @ Component harness & Ground
 - If 1 V or greater - Repair the short to voltage on the circuit.
 - If less than 1 V - Replace the component: K20 Engine Control Module
- **Go to next step: If between 4.8 and 5.2 V**
6. Test for less than 1 V between the test points: Signal circuit terminal 7 & Ground
 - **If 1 V or greater**
 1. Ignition/Vehicle - Off
 2. Disconnect the electrical connector: K20 Engine Control Module
 3. Ignition - On/Vehicle - In Service Mode
 4. Test for less than 1 V between the test points: Signal circuit terminal @ Component harness & Ground
 - If 1 V or greater - Repair the short to voltage on the circuit.
 - If less than 1 V - Replace the component: K20 Engine Control Module
 - **Go to next step: If less than 1 V**
7. Ignition/Vehicle & All vehicle systems - Off
8. Disconnect the electrical connector: K20 Engine Control Module
9. Test for infinite resistance between the test points: Signal circuit terminal 7 @ Component harness & Ground
 - **If less than infinite resistance**

Repair the short to ground on the circuit.
 - **Go to next step: If infinite resistance**
10. Test for less than 2 ohms between the test points: Signal circuit terminal 7 @ Component harness & The other end of the circuit @ Control module harness
 - **If less than infinite resistance**

Repair the open/high resistance in the circuit.
 - **Go to next step: If infinite resistance**
11. Test or replace the component: S126 Drive Mode Select Switch
12. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

Verify the DTC does not set.

 - **If the DTC sets**

Replace the component: K20 Engine Control Module
 - **Go to next step: If the DTC is not set**
13. All OK.

Repair Instructions

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

- [Ride Control Switch Replacement - Center Console](#)
- For control module replacement, programming, and setup refer to: [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 \(with X88\)](#) [Steering Wheel Controls Malfunction \(with W49\)](#) in order to diagnose the symptom.

DRIVE MODE SWITCH MALFUNCTION

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
5 V Reference - Terminal 9 @ S126 Drive Mode Select Switch	P159F	P159F	P15A0	P15A1
Signal Terminal 7 @ S126 Drive Mode Select Switch	P159F	P159F	P15A0	P15A1
Ground Terminal 10 @ S126 Drive Mode Select Switch	-	P15A0	-	-
Control - Terminal 8 @ S126 Drive Mode Select Switch	2	2	-	-
Control - Terminal 4 @ S126 Drive Mode Select Switch	2	1	2	-
Control - Terminal 6 @ S126 Drive Mode Select Switch	2	1	2	-
Control - Terminal 16 @ S126 Drive Mode Select Switch	2	1	2	-
Control - Terminal 18 @ S126 Drive Mode Select Switch	2	1	2	-
1. Drive Mode - LED (Light Emitting Diode) = Always On 2. Drive Mode - LED (Light Emitting Diode) = Always Off				

Circuit/System Description

For an overview of the component/system, refer to: [Drive Mode Description and Operation](#)

Circuit	Description
5 V Reference	Regulated voltage supplied by the control module.
Signal	The control module input circuit has an internal resistance connected to ground.
Ground	Chassis Ground

Component	Description
K20 Engine Control Module	The control module contains a microprocessor used to process input data to control outputs.
S126 Drive Mode Select Switch	The switch S126 has an internal resistor ladder network. A specific resistance is generated dependent on the position of the switch.

Reference Information

Schematic Reference

[Steering Wheel Secondary/Configurable Control Wiring Schematics](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

DTC Type Reference

[Powertrain Diagnostic Trouble Code \(DTC\) Type Definitions](#)

Scan Tool Reference

[Control Module References](#)

Circuit/System Verification

1. Ignition - On/Vehicle - In Service Mode
2. Operate the component: S126 Drive Mode Select Switch - Rotate Left & Rotate Right

Verify the following information is correctly displayed: Drive Mode @ A5 Driver Information Center

- **If the component does not work as specified**

Refer to: Circuit/System Testing - Test 1

- **Go to next step: If the component works as specified**

3. Operate the component: S126 Drive Mode Select Switch - Rotate Left & Rotate Right

Verify the following information is correctly displayed: Drive Mode - LED (Light Emitting Diode) @ S126 Drive Mode Select Switch

- **If the component does not work as specified**

Refer to: Circuit/System Testing - Test 2

- **Go to next step: If the component works as specified**

4. All OK.

Circuit/System Testing

Test 1

NOTE: It may take up to 2 min for all vehicle systems to power down before an accurate ground or low reference circuit continuity test can be performed.

1. Ignition/Vehicle & All vehicle systems - Off
2. Disconnect the electrical connector: S126 Drive Mode Select Switch
3. Test for less than 10 ohms between the test points: Ground circuit terminal 5 & Ground
 - **If 10 ohms or greater**
 1. Test for less than 2 ohms between the test points: Ground circuit terminal @ Component harness & Ground terminal
 - If 2 ohms or greater - Repair the open/high resistance in the circuit.
 - If less than 2 ohms - Repair the open/high resistance in the ground connection.
 - **Go to next step: If less than 10 ohms**
4. Ignition - On/Vehicle - In Service Mode
5. Test for 4.8 to 5.2 V between the test points: 5 V Reference circuit terminal 9 & Ground
 - **If less than 4.8 V**
 1. Ignition/Vehicle - Off
 2. Disconnect the electrical connector: K20 Engine Control Module
 3. Test for infinite resistance between the test points: 5 V Reference circuit terminal @ Component harness & Ground
 - If less than infinite resistance - Repair the short to ground on the circuit.
 - Go to next step: If infinite resistance
 4. Test for less than 2 ohms between the test points: 5 V Reference circuit terminal @ Component harness & The other end of the circuit @ Control module harness
 - If 2 ohms or greater - Repair the open/high resistance in the circuit.
 - If less than 2 ohms - Replace the component: K20 Engine Control Module
 - **If greater than 5.2 V**
 1. Ignition/Vehicle - Off
 2. Disconnect the electrical connector: K20 Engine Control Module
 3. Ignition - On/Vehicle - In Service Mode
 4. Test for less than 1 V between the test points: 5 V Reference circuit terminal @ Component harness & Ground
 - If 1 V or greater - Repair the short to voltage on the circuit.
 - If less than 1 V - Replace the component: K20 Engine Control Module
 - **Go to next step: If between 4.8 and 5.2 V**
6. Test for less than 1 V between the test points: Signal circuit terminal 7 & Ground
 - **If 1 V or greater**
 1. Ignition/Vehicle - Off
 2. Disconnect the electrical connector: K20 Engine Control Module
 3. Ignition - On/Vehicle - In Service Mode
 4. Test for less than 1 V between the test points: Signal circuit terminal @ Component harness & Ground
 - If 1 V or greater - Repair the short to voltage on the circuit.
 - If less than 1 V - Replace the component: K20 Engine Control Module
 - **Go to next step: If less than 1 V**

7. Ignition/Vehicle & All vehicle systems - Off
8. Disconnect the electrical connector: K20 Engine Control Module
9. Test for infinite resistance between the test points: Signal circuit terminal 7 @ Component harness & Ground
 - **If less than infinite resistance**

Repair the short to ground on the circuit.
 - **Go to next step: If infinite resistance**
10. Test for less than 2 ohms between the test points: Signal circuit terminal 7 @ Component harness & The other end of the circuit @ Control module harness
 - **If less than infinite resistance**

Repair the open/high resistance in the circuit.
 - **Go to next step: If infinite resistance**
11. Test or replace the component: S126 Drive Mode Select Switch
12. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

Verify the DTC does not set.
 - **If the DTC sets**

Replace the component: K20 Engine Control Module
 - **Go to next step: If the DTC is not set**
13. All OK.

Test 2

1. Ignition - On/Vehicle - In Service Mode
2. Headlamp Switch = On
3. Verify a test lamp turns On between the test points: Control circuit terminal 8 & Ground
 - **If the test lamp does not turn On**

Refer to: [Interior Backlighting Malfunction](#)
 - **Go to next step: If the test lamp turns On**
4. Ignition/Vehicle - Off & Remove - Test lamp
5. Connect the electrical connector: S126 Drive Mode Select Switch
6. Disconnect the electrical connector: X2 & X5 @ K9 Body Control Module
7. Ignition - On/Vehicle - In Service Mode
8. Test for less than 1 V between the test points:
 - Signal circuit terminal 10 X5 & Ground
 - Signal circuit terminal 21 X5 & Ground
 - {With V92} Signal circuit terminal 23 X5 & Ground
 - {With F48} Signal circuit terminal 6 X2 & Ground
 - **If 1 V or greater**
 1. Disconnect the electrical connector: S126 Drive Mode Select Switch
 2. Test for less than 1 V between the test points:
 - Signal circuit terminal 10 X5 & Ground
 - Signal circuit terminal 21 X5 & Ground
 - {With V92} Signal circuit terminal 23 X5 & Ground
 - {With F48} Signal circuit terminal 6 X2 & Ground

- If 1 V or greater - Repair the short to voltage on the circuit.
 - If less than 1 V - Replace the component: S126 Drive Mode Select Switch
 - **Go to next step: If less than 1 V**
9. Ignition/Vehicle - Off
10. Test for infinite resistance between the test points:
- Signal circuit terminal 10 X5 & Ground
 - Signal circuit terminal 21 X5 & Ground
 - {With V92} Signal circuit terminal 23 X5 & Ground
 - {With F48} Signal circuit terminal 6 X2 & Ground
 - **If less than infinite resistance**
 1. Disconnect the electrical connector: S126 Drive Mode Select Switch
 2. Test for infinite resistance between the test points:
 - Signal circuit terminal 10 X5 & Ground
 - Signal circuit terminal 21 X5 & Ground
 - {With V92} Signal circuit terminal 23 X5 & Ground
 - {With F48} Signal circuit terminal 6 X2 & Ground
 - If less than infinite resistance - Repair the short to ground on the circuit.
 - If infinite resistance - Replace the component: S126 Drive Mode Select Switch
 - **Go to next step: If infinite resistance**
11. Connect a 3 A fused jumper wire between each of the following circuit pairs, one at a time:
- Signal circuit terminal 10 X5 & Ground
 - Signal circuit terminal 21 X5 & Ground
 - {With V92} Signal circuit terminal 23 X5 & Ground
 - {With F48} Signal circuit terminal 6 X2 & Ground
12. Verify the component works as specified: Drive Mode - LED (Light Emitting Diode) @ S126 Drive Mode Select Switch = On
- **If the component does not work as specified**
 1. Disconnect the electrical connector: S48E Multifunction Switch - Center Console
 2. Ignition/Vehicle - Off
 3. Test for less than 2 ohms between the test points:
 - Signal circuit terminal 10 X5 & Ground
 - Signal circuit terminal 21 X5 & Ground
 - {With V92} Signal circuit terminal 23 X5 & Ground
 - {With F48} Signal circuit terminal 6 X2 & Ground
 - If 2 ohms or greater - Repair the open/high resistance in the circuit.
 - If less than 2 ohms - Replace the component: S48E Multifunction Switch - Center Console
 - **Go to next step: If the component works as specified**
13. Replace the component: K9 Body Control Module

Repair Instructions

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

- [Ride Control Switch Replacement - Center Console](#)
- For control module replacement, programming, and setup refer to: [Control Module References](#)

STEERING WHEEL CONTROLS MALFUNCTION (WITH X88)

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

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.

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 Wiring Schematics](#)

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](#) .
 - **Go to next step: 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.
 - **Go to next step: 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.
 - **Go to next step: 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.
 - **Go to next step: 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.
 - **Go to next step: 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.
 - Go to next step: 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.
 - **Go to next step: 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 Up Button.
 - **If not Volume Down Button**

Test or replace the S70R Steering Wheel Controls Switch - Right.
 - **Go to next step: 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 Down Button.
 - **If not Volume Up Button**

Test or replace the S70R Steering Wheel Controls Switch - Right.
 - **Go to next step: 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.
 - **Go to next step: 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.
 - Go to next step: 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.
 - **Go to next step: 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.
- **Go to next step: 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.
- **Go to next step: If Previous Preset**
9. Test or replace the S70E Steering Wheel Controls Switch - Radio Presets.

S70R Steering Wheel Controls Switch-Right

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.

 - **Go to next step: 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.

 - **Go to next step: If infinite resistance**
6. Replace the S70R Steering Wheel Controls Switch - Right.

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.

- **Go to next step: 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.

- **Go to next step: 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.

- **Go to next step: 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.

- **Go to next step: If less than 10 Ω**

7. All OK

Repair Instructions

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

[Steering Wheel Spoke Cover Replacement](#)

STEERING WHEEL CONTROLS MALFUNCTION (WITH W49)

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

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	-	-
Mute Signal	B3622 39, B3622 59	1	-	-
Speak 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.

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 Wiring 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](#) .
 - **Go to next step: 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.
 - **Go to next step: 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 Mute and Speak when depressing the S70L Steering Wheel Controls Switch - Left.
 - **If the parameter does not change**
Refer to S70L Steering Wheel Controls Switch - Left Circuit/System Testing.
 - **Go to next step: If the parameter changes**

Circuit/System Testing

S70L Steering Wheel Controls Switch - Left

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S70L Steering Wheel Controls Switch - Left. 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 6 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.
 - **Go to next step: 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 3
 - **If 4.5 V or less**

1. Ignition OFF, disconnect the harness connector at the S70R Steering Wheel Controls Switch - Right.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - Go to next step: If infinite resistance
2. Test for infinite resistance between the signal circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - Go to next step: 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.
 - **Go to next step: 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 6.
6. Verify the scan tool Steering Wheel Control Switches parameter is Speak.
 - **If not Speak**

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

 - **Go to next step: If Speak**
7. Remove the jumper wire. Install a 3 A fused jumper wire between the signal circuit terminal 3 and the ground circuit terminal 6.
8. Verify the scan tool Steering Wheel Control Switches parameter is Mute.
 - **If not Mute**

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

 - **Go to next step: If Mute**
9. Test or replace the S70L Steering Wheel Controls Switch - Left.

S70R Steering Wheel Controls Switch-Right

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.

 - **Go to next step: 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.

 - **Go to next step: If infinite resistance**
6. Replace the S70R Steering Wheel Controls Switch - Right.

Component Testing

1. Ignition OFF, disconnect the harness connector at the S70L Steering Wheel Controls Switch - Left.
2. Test for infinite resistance between the following signal terminals and the ground terminal 6 with the switch in the open position.
 - Terminal 1
 - Terminal 3

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

Replace the S70L Steering Wheel Controls Switch - Left.

- **Go to next step: If infinite resistance**

3. Test for less than 10 Ω between the following signal terminals and the ground terminal 6 with the S70L Steering Wheel Controls Switch - Left in the Speak position or Mute position.

- Terminal 1
- Terminal 3
- **If 10 Ω or greater**

Replace the S70L Steering Wheel Controls Switch - Left.

- **Go to next step: If less than 10 Ω**

4. All OK

Repair Instructions

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

Steering Wheel Spoke Cover Replacement

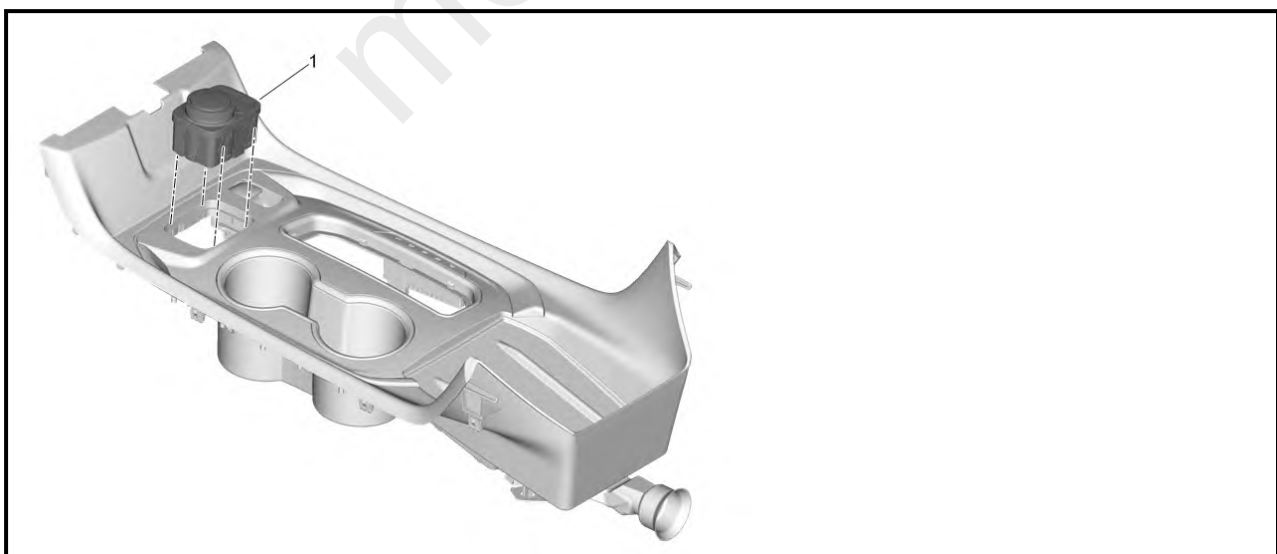
REPAIR INSTRUCTIONS

RESET TEEN DRIVER KEY PIN

If the PIN has been lost the only way to clear a Teen Key is to follow the Body Control Module (BCM) Configuration/Reset Functions Reset Teen Driver Key PIN procedure in the scan tool. This procedure will clear all Teen Keys

1. Connect a scan tool to the vehicle.
2. Select the Reset Teen Driver Key PIN.
3. After resetting the PIN, all teen keys will be cleared.
4. Verify teen keys are cleared.

RIDE CONTROL SWITCH REPLACEMENT - CENTER CONSOLE



Callout	Component Name
Preliminary Procedure	
<u>Front Floor Console Cup Holder Plate Replacement</u>	
1	Ride Control Switch Procedure Release the retaining tabs.

DESCRIPTION AND OPERATION

DRIVE MODE DESCRIPTION AND OPERATION

The drive mode system is a customer configurable control that allows the vehicle operator to tailor the vehicle operation and driveability parameters based on driving conditions. The drive mode is controlled by the vehicle operator through the S126 Drive Mode Select Switch. The S126 Drive Mode Select Switch is a momentary rotary knob with two internal switches and up to four LED indicators. Rotating the knob left or right will change to the next drive mode and the corresponding drive mode indicator on the switch will illuminate.

The S126 Drive Mode Select Switch is an input to the K20 Engine Control Module. When the knob is rotated, the K20 Engine Control Module will broadcast a message to all modules indicating the requested drive mode. Control modules that are involved in changing their operation based on differing drive modes will then change their operating values. The K9 Body Control Module will illuminate the appropriate drive mode indicator on the S126 Drive Mode Select Switch.

The components of the drive mode are:

- S126 Drive Mode Select Switch
- K20 Engine Control Module
- K9 Body Control Module

Other control modules or components that may respond to the commanded drive mode are:

- K17 Electronic Brake Control Module
- K43 Power Steering Control Module
- K47 Rear Differential Clutch Control Module
- K71 Transmission Control Module

S126 Drive Mode Select Switch

The S126 Drive Mode Select Switch is a momentary rotary knob with two switches and up to four indicators. At rest, the S126 Drive Mode Select Switch remains in a neutral position with both switches open. When rotated to the left or right, the corresponding switch is closed. When released, the rotary knob returns to the neutral position and both switch will again be open. The two switches are situated within a resistor ladder. The K20 Engine Control Module applies 5 volts to the resistor ladder, which also receives a constant ground. The K20 Engine Control Module monitors the signal voltage. The signal voltage is measured within the resistor ladder. As each switch is closed, current flows through a different number of resistors, changing the voltage drop across the resistors and changing the voltage monitored by the K20 Engine Control Module.

K20 Engine Control Module

The K20 Engine Control Module monitors the S126 Drive Mode Select Switch as an input. The K20 Engine Control Module applies 5 volts to the switch resistor ladder and monitors the signal voltage from the switch. As the switch is rotated to the left or right, current flows through different resistors and the voltage monitored at the K20 Engine Control Module also changes. The K20 Engine Control Module uses this voltage change to determine if the rotary knob is in the at rest position or has been turned left/right. The K20 Engine Control Module will change the drive mode based on this input.

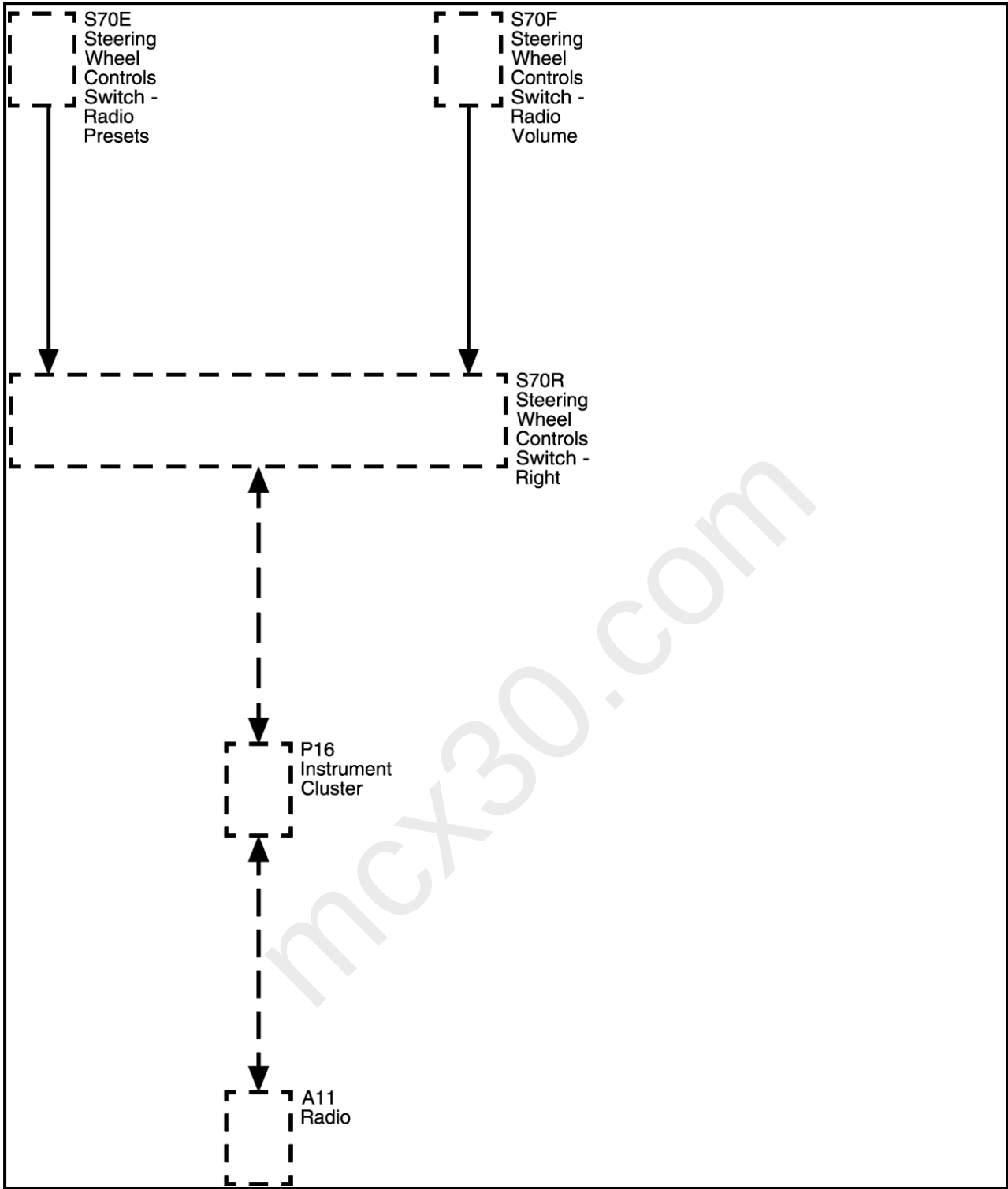
When a drive mode change is requested by the driver through the S126 Drive Mode Select Switch, the K20 Engine Control Module will broadcast a message to all modules indicating the requested drive mode. Control modules that are involved in changing their operation based on differing drive modes will then change their operating values. The K20 Engine Control Module may also change operating values based on the drive mode, such as a more or less aggressive throttle profile.

K9 Body Control Module

The K9 Body Control Module responds to the selected drive mode by illuminating the appropriate drive mode indicator on the S126 Drive Mode Select Switch. All indicators receive voltage via an indicator control circuit from a PWM high side driver in the K9 Body Control Module. Ground to each indicator

is individually controlled by a K9 Body Control Module low side driver via a control circuit. For the selected drive mode, the K9 Body Control Module will ground the appropriate control circuit and the indicator will illuminate.

STEERING WHEEL CONTROLS DESCRIPTION AND OPERATION



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-

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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