SUSPENSION

Electronic Suspension Control - Escalade, Suburban, Tahoe, Yukon

SCHEMATIC WIRING DIAGRAMS

ELECTRONIC SUSPENSION CONTROL WIRING SCHEMATICS

Power, Ground, Serial Data and Controls (Z95)

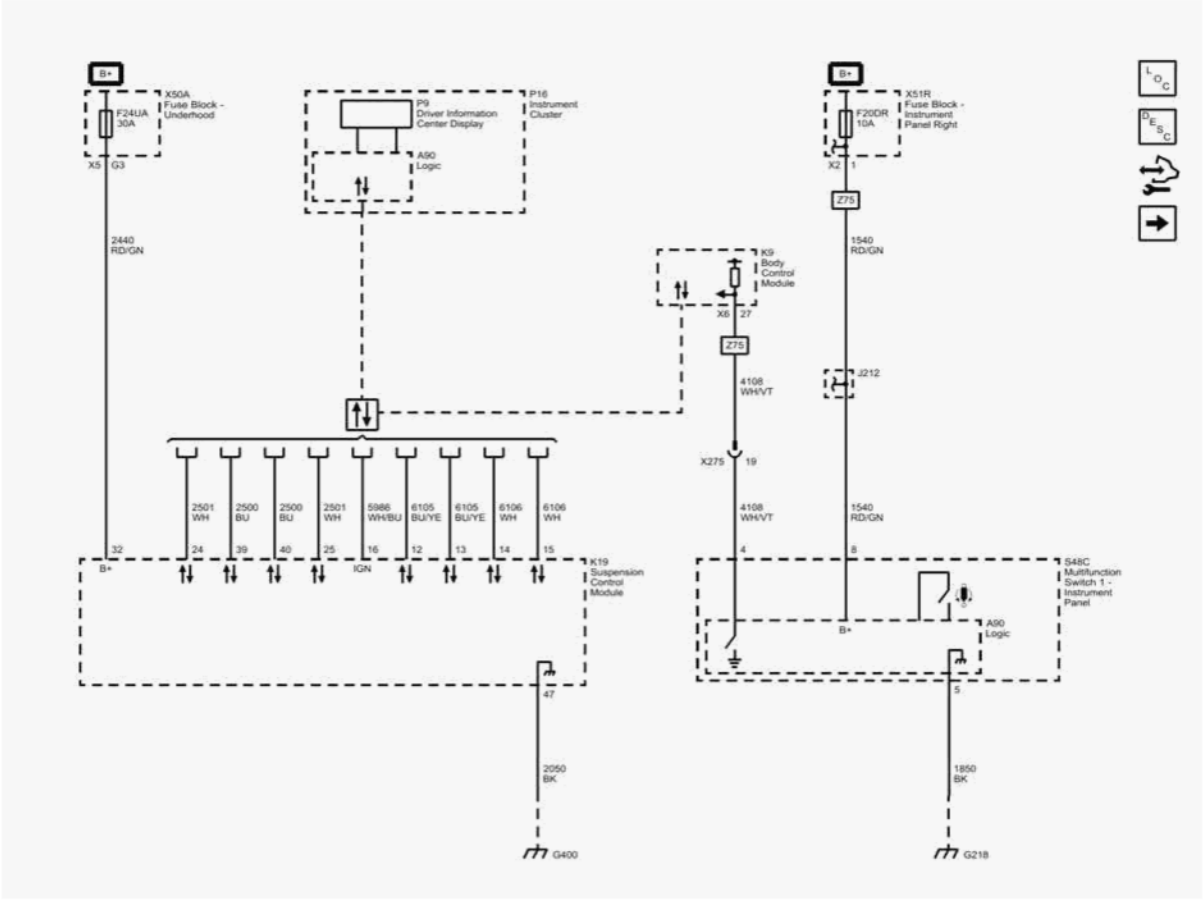

Fig. 1: Power, Ground, Serial Data and Controls (Z95)
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Position Sensors and Actuators (Z95)

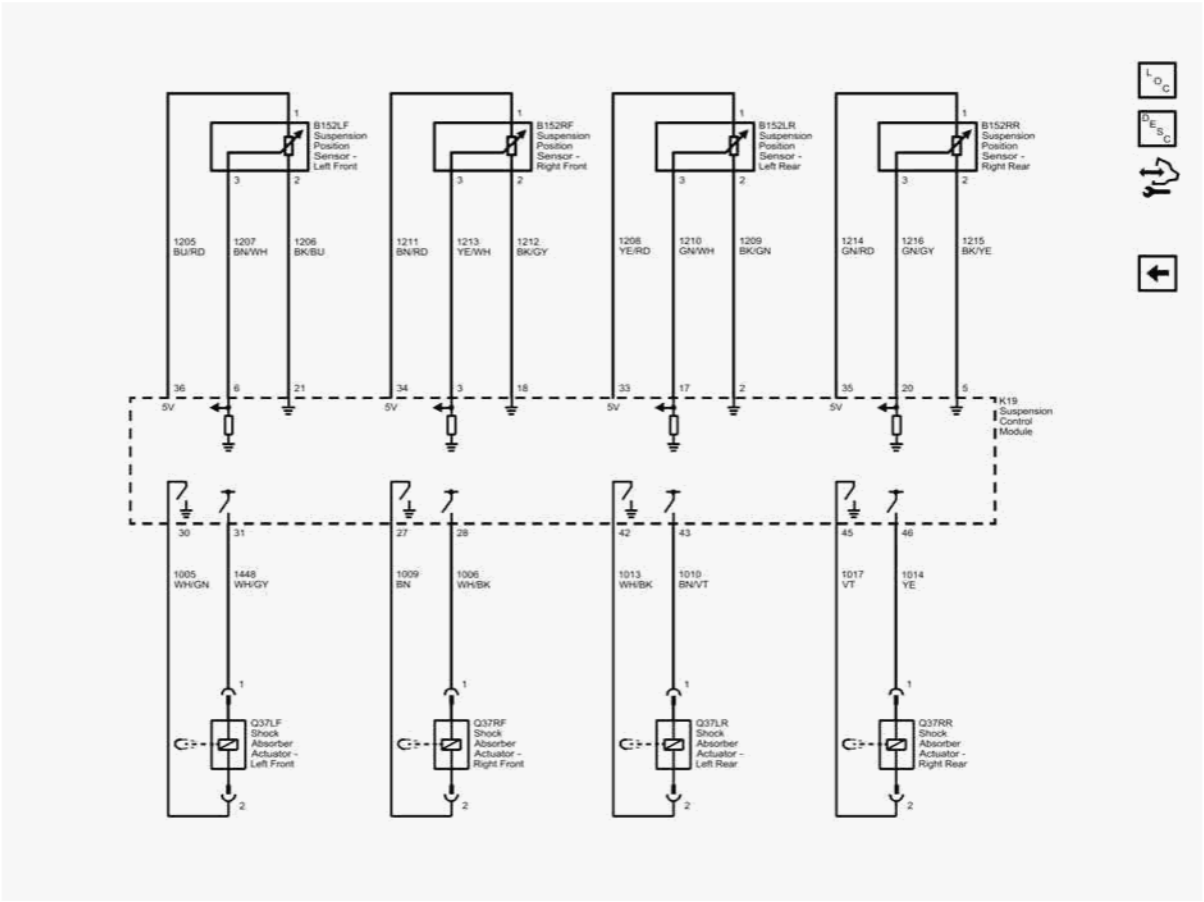

Fig. 2: Position Sensors and Actuators (Z95)
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DIAGNOSTIC INFORMATION AND PROCEDURES

DTC C0574: PRINTED CIRCUIT BOARD TEMPERATURE SENSOR

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.

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- Refer to **Diagnostic Procedure Instructions** to provide an overview of each diagnostic category.

DTC Descriptors

DTC C0574

Printed Circuit Board Temperature Sensor

For symptom byte information, refer to **Symptom Byte List** .

Circuit/System Description

The internal temperature sensor inside the suspension control module determines that the internal ECU temperature has become too high and out of range.

Conditions for Running the DTC

Ignition ON/Vehicle in Service Mode.

Conditions for Setting the DTC

The suspension control module detects excessive ECU temperature.

Action Taken When the DTC Sets

- The electronic suspension dampening level is decreased or disabled.
- The Service Suspension System and Vehicle Speed Limited messages are displayed.

Conditions for Clearing the DTC

- The suspension control module clears the history DTC when a current DTC is not detected in 40 ignition cycles.
- The condition for the DTC is no longer present.

Diagnostic Aids

Depending on type of driving (rough road surfaces at high speed, etc.) and calibrations used, DTC may set to protect the ECU and not as a result of a failure in the electronics.

Reference Information

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Schematic Reference

Electronic Suspension Control Schematics.

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX .

Description and Operation

Electronic Suspension Control Description and Operation

Electrical Information Reference

- **Circuit Testing** .
- **Testing for Intermittent Conditions and Poor Connections** .
- **Wiring Repairs** .
- **Connector Repairs**

Scan Tool Reference

Control Module References for scan tool information.

Circuit/System Verification

1. Ignition ON/Vehicle in Service Mode.
2. Verify DTC C0574 is not set
   - **If the DTC is set**

     Replace K19 Suspension Control Module.

   - **If the DTC is not set**
3. All OK.

Repair Instructions

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

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Refer to **Control Module References** for suspension control module replacement, programming, and setup.

DTC C0575, C0580, C0585, OR C0590: SHOCK ABSORBER ACTUATOR CIRCUITS

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 Descriptors

DTC C0575

Left Front Shock Absorber Actuator Circuit

DTC C0580

Right Front Shock Absorber Actuator Circuit

DTC C0585

Left Rear Shock Absorber Actuator Circuit

DTC C0590

Right Rear Shock Absorber Actuator Circuit

For symptom byte information, refer to **Symptom Byte List** .

Diagnostic Fault Information

Circuit	Short to Voltage	Short to Ground	Open/High Resistance	Signal Performance
Left Front Shock Absorber Actuator Control High	C0575 01	C0575 02	C0575 04	C0575 0D, C0575 0E, C0575 1A
Left Front Shock Absorber Actuator Control Low	C0575 01	C0575 02	C0575 04	C0575 0D, C0575 0E, C0575 1A

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Circuit	Short to Voltage	Short to Ground	Open/High Resistance	Signal Performance
Right Front Shock Absorber Actuator Control High	C0580 01	C0580 02	C0580 04	C0580 0D, C0580 0E, C0580 1A
Right Front Shock Absorber Actuator Control Low	C0580 01	C0580 02	C0580 04	C0580 0D, C0580 0E, C0580 1A
Left Rear Shock Absorber Actuator Control High	C0585 01	C0585 02	C0585 04	C0585 0D, C0575 0E, C0575 1A
Left Rear Shock Absorber Actuator Control Low	C0585 01	C0585 02	C0585 04	C0585 0D, C0575 0E, C0575 1A
Right Rear Shock Absorber Actuator Control High	C0590 01	C0590 02	C0590 04	C0590 0D, C0575 0E, C0575 1A
Right Rear Shock Absorber Actuator Control Low	C0590 01	C0590 02	C0590 04	C0590 0D, C0575 0E, C0575 1A

Circuit/System Description

The suspension control module commands variable levels of current to each shock absorber actuator in response to rough road, braking or abrupt steering maneuver driving conditions. The current variation is performed by pulse width modulation (PWM) of the system voltage. The suspension control module continuously measures the actual current of each actuator. When a deviation between commanded and actual current is detected, a DTC is set.

Conditions for Running the DTC

System voltage is between 9-16 V.

Conditions for Setting the DTC

C0575 01, C0580 01, C0585 01, and C0590 01

- A short to voltage or short to ground on the control high circuit is detected.
- A short to ground on the control low circuit is detected.

C0575 02, C0580 02, C0585 02, and C0590 02

- An open or high resistance on the control high or control low circuit is detected.

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- A short to voltage on the control low circuit is detected.

C0575 0D, C0575 0E, C0575 1A, C0580 0D, C0580 0E, C0580 1A, C0585 0D, C0585 0E, C0585 1A, C0590 0D, C0590 0E, C0590 1A

An erratic current on the actuator circuit is detected.

Action Taken When the DTC Sets

- The electronic suspension control is disabled for the duration of the ignition cycle.
- The driver information center displays the SERVICE SUSPENSION SYSTEM message.

Conditions for Clearing the DTC

A present DTC will clear on the next consecutive malfunction-free ignition cycle.

Reference Information

Schematic Reference

Electronic Suspension Control Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Electronic Suspension Control Description and Operation

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

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Control Module References for scan tool information

Circuit/System Testing

1. Ignition OFF/Vehicle OFF, disconnect the harness connector at the appropriate Q37 Shock Absorber Actuator, Ignition ON/Vehicle in Service Mode.
2. Test for 9.5-11 V between the control circuit terminal 1 and ground.
    - **If less than 9.5 V**
    1. Ignition OFF/Vehicle OFF, disconnect the harness connector at the K19 Suspension Control Module.
    2. Test for infinite resistance between the control circuit and ground.
        - If less than infinite resistance, repair the short to ground on the circuit.
        - If infinite resistance
    3. Ignition OFF/Vehicle OFF, disconnect the harness connector at the K19 Suspension Control Module, Ignition ON/Vehicle in Service Mode.
    4. Test for less than 2 Ω in the control circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, replace the K19 Suspension Control Module.
    - **If greater than 11 V**
    1. Ignition OFF/Vehicle OFF, disconnect the harness connector at the K19 Suspension Control Module, Ignition ON/Vehicle in Service Mode.
    2. Test for less than 1 V between the control circuit and ground.
        - If 1 V or greater, repair the short to voltage on the circuit.
        - If less than 1 V, replace the K19 Suspension Control Module.
    - **If between 9.5-11 V**
3. Test for greater than 9.5 V between the control circuit terminal 1 and the low control circuit terminal 2.
    - **If less than 9.5 V**
    1. Ignition OFF/Vehicle OFF, disconnect the harness connector at the K19 Suspension Control Module.
    2. Test for less than 1 V between the low control circuit and ground.
        - If 1 V or greater, repair the short to voltage on the circuit.
        - If less than 1 V

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3. Test for less than 2 Ω in the low control circuit end to end.
    - If 2 Ω or greater, repair the open/high resistance in the circuit.
    - If less than 2 Ω, replace the K19 Suspension Control Module.
- **If greater than 9.5 V**

4. Ignition OFF/Vehicle OFF, disconnect the harness connector at the K19 Suspension Control Module, Ignition ON/Vehicle in Service Mode.
5. Test for infinite resistance between the low control circuit and ground.
    - **If less than infinite resistance**
    1. Repair the short to ground on the circuit.
    - **If infinite resistance**
6. Replace the Q37 Shock Absorber Actuator.
7. Verify the DTC does not set while operating the vehicle under Conditions for Running the DTC.
    - **If the DTC sets**

      Replace the K19 Suspension Control Module.

    - **If the DTC does not set**
8. All OK.

Repair Instructions

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

- Refer to **Shock Absorber Replacement (Z56, Z71, ZW7)** **Shock Absorber Replacement (Heavy Duty)**
- Refer to **Control Module References** for suspension control module replacement, programming and setup.

DTC C0615, C0620, C0625, OR C0630: POSITION SENSOR CIRCUITS

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 Descriptors

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DTC C0615

Left Front Position Sensor Circuit

DTC C0620

Right Front Position Sensor Circuit

DTC C0625

Left Rear Position Sensor Circuit

DTC C0630

Right Rear Position Sensor Circuit

For symptom byte information, refer to **Symptom Byte List** .

Diagnostic Fault Information

Circuit	Short to Voltage	Short to Ground	Open/High Resistance	Signal Performance
Left Front Position Sensor 5V Reference	C0696 00	C0696 00	C0615 06	C0615 55
Left Front Position Sensor Signal	C0615 01	C0615 06	C0615 06	C0615 55
Left Front Position Sensor Low Reference	-	-	C0615 06	C0615 55
Right Front Position Sensor 5V Reference	C0696 00	C0696 00	C0620 06	C0620 55
Right Front Position Sensor Signal	C0620 01	C0620 06	C0620 06	C0620 55
Right Front Position Sensor Low Reference	-	-	C0620 06	C0620 55
Left Rear Position Sensor 5V Reference	C0696 00	C0696 00	C0625 06	C0625 55
Left Rear Position Sensor Signal	C0625 01	C0625 06	C0625 06	C0625 55
Left Rear Position Sensor Low Reference	-	-	C0625 06	C0625 55
Right Rear Position Sensor 5V Reference	C0696 00	C0696 00	C0630 06	C0630 55
Right Rear Position Sensor Signal	C0630 01	C0630 06	C0630 06	C0630 55
Right Rear Position Sensor Low Reference	-	-	C0630 06	C0630 55

Circuit/System Description

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The suspension control module supplies a 5 V reference signal to each suspension position sensor. The suspension position sensors supply a signal of 0.35-4.75 V to the suspension control module which represents the position between the body and the wheel. The sensors are also grounded through the suspension control module.

Conditions for Running the DTC

- Battery voltage is between 9-16 V.
- Ignition is ON.

Conditions for Setting the DTC

The suspension control module measures a position sensor signal less than 0.3 V or greater than 4.7 V for more than 5 s while the vehicle is operated under normal driving conditions.

Action Taken When the DTC Sets

- The suspension control module will enter the speed dependent damping mode.
- The suspension control module sends a message to the instrument panel cluster to display SERVICE SUSPENSION SYSTEM message.

Conditions for Clearing the DTC

A history DTC will clear after 40 consecutive ignition cycles if the condition for the malfunction is no longer present.

Reference Information

Schematic Reference

Electronic Suspension Control Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Electronic Suspension Control Description and Operation

Electrical Information Reference

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- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF. Disconnect the harness connector at the appropriate B152 Suspension Position Sensor. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the low reference circuit terminal 2 and ground.
    - **If 10 Ω or greater**
    1. Ignition OFF, disconnect the harness connector at the K19 Suspension Control Module.
    2. Test for less than 2 Ω in the low reference circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, replace the K19 Suspension Control Module.
    - **If less than 10 Ω**
3. Ignition ON.
4. Test for 4.8-5.2 V between the 5 V reference circuit terminal 1 and ground.
    - **If less than 4.8 V**
    1. Ignition OFF, disconnect the harness connector at the K19 Suspension Control Module.
    2. Test for infinite resistance between the 5 V reference 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 5 V reference circuit end to end.
        - If 2 Ω or greater, repair the open/high resistance in the circuit.
        - If less than 2 Ω, replace the K19 Suspension Control Module.
    - **If greater than 5.2 V**

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1. Ignition OFF, disconnect the harness connector at the K19 Suspension Control Module, ignition ON.
2. Test for less than 1 V between the 5 V reference circuit and ground.
    - If 1 V or greater, repair the short to voltage on the circuit.
    - If less than 1 V, replace the K19 Suspension Control Module.

- **If within 4.8-5.2 V**

5. Ignition OFF, disconnect the harness connector at the K19 Suspension Control Module, ignition ON.
6. Test for less than 1 V between the appropriate B152 Suspension Position Sensor signal circuit terminal 3 and ground.

- **If greater than 1 V**

  Repair the short to voltage on the circuit.

- **If less than 1 V**

7. Ignition OFF.
8. Test for infinite resistance between the appropriate B152 Suspension Position Sensor signal circuit terminal 3 and ground.

- **If less than infinite resistance**

  Repair the short to ground on the circuit.

- **If infinite resistance**

9. Test for less than 2 Ω between the appropriate B152 Suspension Position Sensor signal circuit terminal 3 end to end.

- **If 2 Ω or greater**

  Repair the open/high resistance in the circuit.

- **If less than 2 Ω**

10. Replace the appropriate B152 Suspension Position Sensor.
11. Verify the DTC does not set while operating the vehicle under Conditions for Running the DTC.

- **If the DTC sets**

  Replace the K19 Suspension Control Module.

- **If the DTC does not set**

12. All OK.

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Repair Instructions

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

- Refer to **Electronic Suspension Front Position Sensor Replacement**
- Refer to **Electronic Suspension Rear Position Sensor Replacement - Left Side**, or **Electronic Suspension Rear Position Sensor Replacement - Right Side**
- Refer to **Control Module References** for suspension control module replacement, programming and setup.

DTC C0696: POSITION SENSOR 5V SUPPLY

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 C0696

Position Sensor 5V Supply

For symptom byte information, refer to **Symptom Byte List**

Diagnostic Fault Information

Circuit	Short to Voltage	Short to Ground	Open/High Resistance	Signal Performance
Left Front Position Sensor 5V Reference	C0696 00	C0696 00	C0615 06	C0615 55
Left Front Position Sensor Signal	C0615 01	C0615 06	C0615 06	C0615 55
Left Front Position Sensor Low Reference	C0615 01	C0615 06	C0615 06	C0615 55
Right Front Position Sensor 5V Reference	C0696 00	C0696 00	C0620 06	C0620 55
Right Front Position Sensor Signal	C0620 01	C0620 06	C0620 06	C0620 55
Right Front Position Sensor Low Reference	C0620 01	C0620 06	C0620 06	C0620 55
Left Rear Position Sensor 5V Reference	C0696 00	C0696 00	C0625 06	C0625 55

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Circuit	Short to Voltage	Short to Ground	Open/High Resistance	Signal Performance
Left Rear Position Sensor Signal	C0625 01	C0625 06	C0625 06	C0625 55
Left Rear Position Sensor Low Reference	C0625 01	C0625 06	C0625 06	C0625 55
Right Rear Position Sensor 5V Reference	C0696 00	C0696 00	C0630 06	C0630 55
Right Rear Position Sensor Signal	C0630 01	C0630 06	C0630 06	C0630 55
Right Rear Position Sensor Low Reference	C0630 01	C0630 06	C0630 06	C0630 55
Air Suspension Pressure Sensor 5V Reference	C0696 00	C0696 00	Â	Â

Circuit/System Description

The suspension control module provides a common regulated reference voltage of approximately 5 V to all of the position sensors. The suspension control module monitors this power supply for a malfunction that could prevent it from correctly regulating the supply voltage.

Conditions for Running the DTC

- Battery voltage is between 9-16 V
- Ignition is ON

Conditions for Setting the DTC

- The suspension control module senses suspension position sensor supply voltage under 3.75 V or over 5.625 V.
- The condition is detected for 1 s in four consecutive ignition cycles.

Action Taken When the DTC Sets

- Commands speed dependent damping system and normal force signals to the default state.
- The suspension control module sends a message to the instrument panel cluster to display SERVICE SUSPENSION SYSTEM message.

Conditions for Clearing the DTC

- A history DTC will clear after 40 consecutive ignition cycles if the condition for the malfunction is no longer present.
- The suspension control module senses the correct sensor supply voltage.

Reference Information

Schematic Reference

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Electronic Suspension Control Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Electronic Suspension Control 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 scan tool information

Circuit/System Testing

1. Ignition OFF, disconnect the harness connectors at each of the B152 Suspension Position Sensors and the B196 Air Suspension Pressure Sensor.
2. Disconnect the harness connector at the K19 Suspension Control Module. Ignition ON.
3. Test for less than 1 V between the following K19 Suspension Control Module 5V reference circuits and ground.
    - Terminal 33
    - Terminal 34
    - Terminal 35
    - Terminal 36
    - Terminal 23
    - **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 following K19 Suspension Control Module 5V reference circuits and ground.
    - Terminal 33
    - Terminal 34
    - Terminal 35
    - Terminal 36
    - Terminal 23
    - **If less than infinite resistance**

      Repair the short to ground on the circuit.

    - **If infinite resistance**
6. Ignition OFF, connect the harness connector at the K19 Suspension Control Module. Ignition ON.
7. Verify the scan tool Suspension Position 5V Reference parameter is greater than 4.75 V.
    - **If 4.75 V or less**

      Replace the K19 Suspension Control Module.

    - **If greater than 4.75 V**
8. Clear the DTCs.
9. Connect each B152 Suspension Position Sensors and the B196 Air Suspension Pressure Sensor one at a time. Verify DTC C0696 is not set after each sensor is connected.
    - **If DTC C0696 is set**

      Replace the appropriate B152 Suspension Position Sensor or B196 Air Suspension Pressure Sensor that set the DTC.

    - **If DTC C0696 is not set**
10. All OK.

Repair Instructions

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

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- Refer to **Electronic Suspension Front Position Sensor Replacement**
- Refer to **Electronic Suspension Rear Position Sensor Replacement - Left Side**, or **Electronic Suspension Rear Position Sensor Replacement - Right Side**
- Refer to **Automatic Level Control Air Compressor Filter Replacement** for air suspension pressure sensor
- Refer to **Control Module References** suspension control module replacement, programming and setup.

REPAIR INSTRUCTIONS

ELECTRONIC SUSPENSION CONTROL MODULE REPLACEMENT

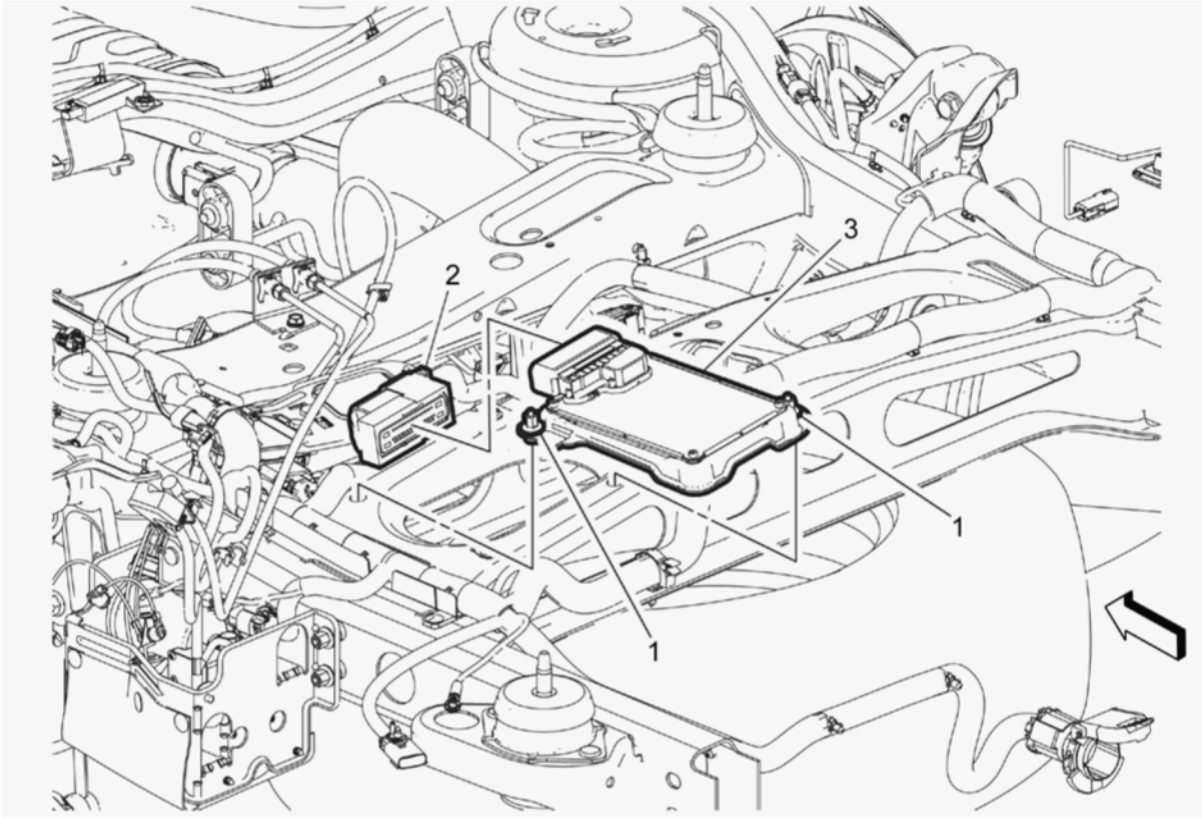

Fig. 3: Electronic Suspension Control Module
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Callout	Component Name

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Callout	Component Name
Preliminary Procedures 1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** . 2. Remove the spare tire and wheel assembly to access the control module.	
1	Electronic Suspension Control Module Nut (Qty: 2) **CAUTION:** **Refer to Fastener Caution** . **Procedure** Loosen the electronic suspension control module nuts. **Tighten** 10 N.m (89 lb in)
2	Electronic Suspension Control Module (ESC) Connector **Procedure** Disconnect the electrical connector from the module.
3	Electronic Suspension Control (ESC) Module **Procedure** 1. Remove the ESC module from the slots in the frame. 2. Reprogram the ESC module. Refer to **Suspension Control Module Programming and Setup**

ELECTRONIC SUSPENSION FRONT POSITION SENSOR REPLACEMENT

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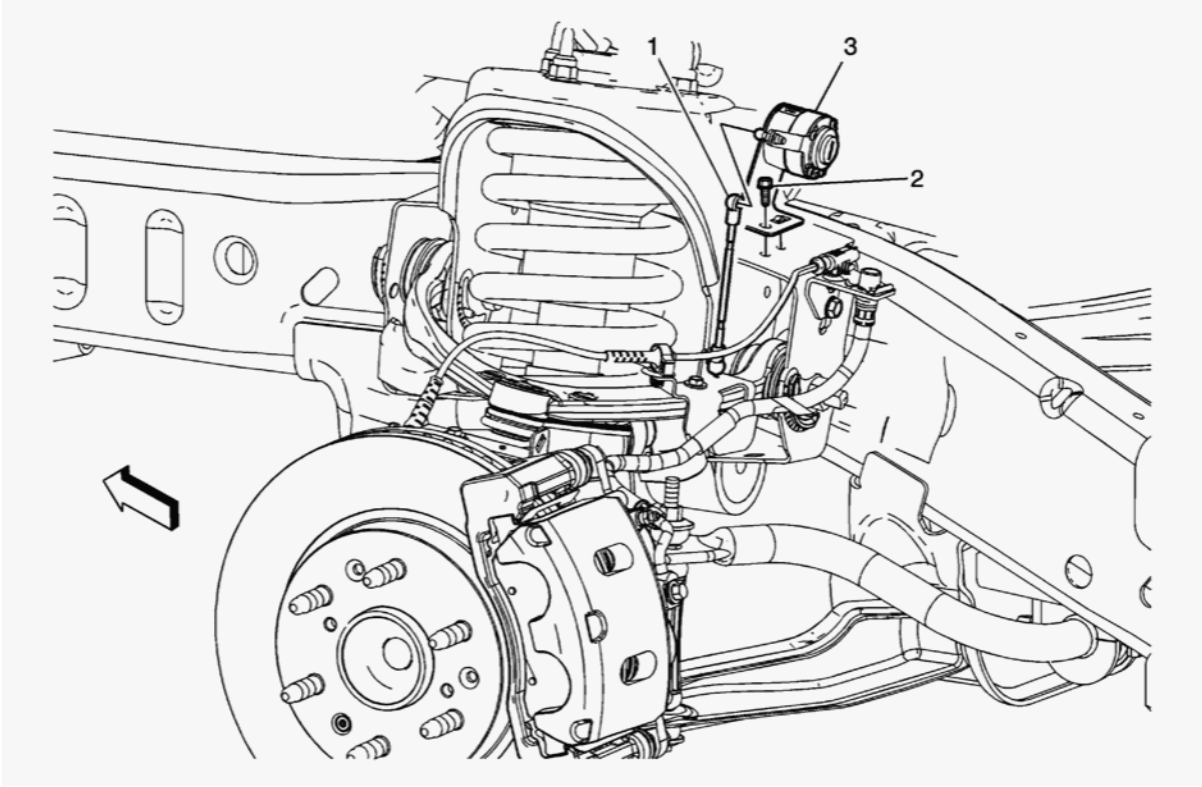

Fig. 4: Electronic Suspension Front Position Sensor
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures 1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** . 2. Remove the front tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation (6-Lug Wheel)** **Tire and Wheel Removal and Installation (8-Lug Wheel)** .	
1	Front Position Sensor Link **Procedure** Disconnect the front position sensor link from the sensor ball stud.
2	Front Position Sensor Bolt

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Callout	Component Name
	CAUTION: **Refer to** **Fastener** **Caution:** Remove the bolt from the sensor. **Tighten** 12 N.m (106 lb in)
3	Front Position Sensor **Procedures** 1. Disconnect the electrical connection. 2. Program the electronic suspension control module. Refer to **Control Module References** .

ELECTRONIC SUSPENSION FRONT POSITION SENSOR LINK ASSEMBLY REPLACEMENT

Tools Required

Tools Required

J 38185 Spring Hose Clamp Pliers

Removal Procedure

IMPORTANT: Do not attempt to pry the link rod from the electronic suspension control (ESC) ball stud. If the link rod needs to be replaced or disconnected, you must use the following procedure.

1. Remove the ESC sensor from the vehicle. Refer to **Electronic Suspension Front Position Sensor Replacement**.
2. While supporting the sensor lever by hand, twist the link rod to remove it from the ball stud.

Installation Procedure

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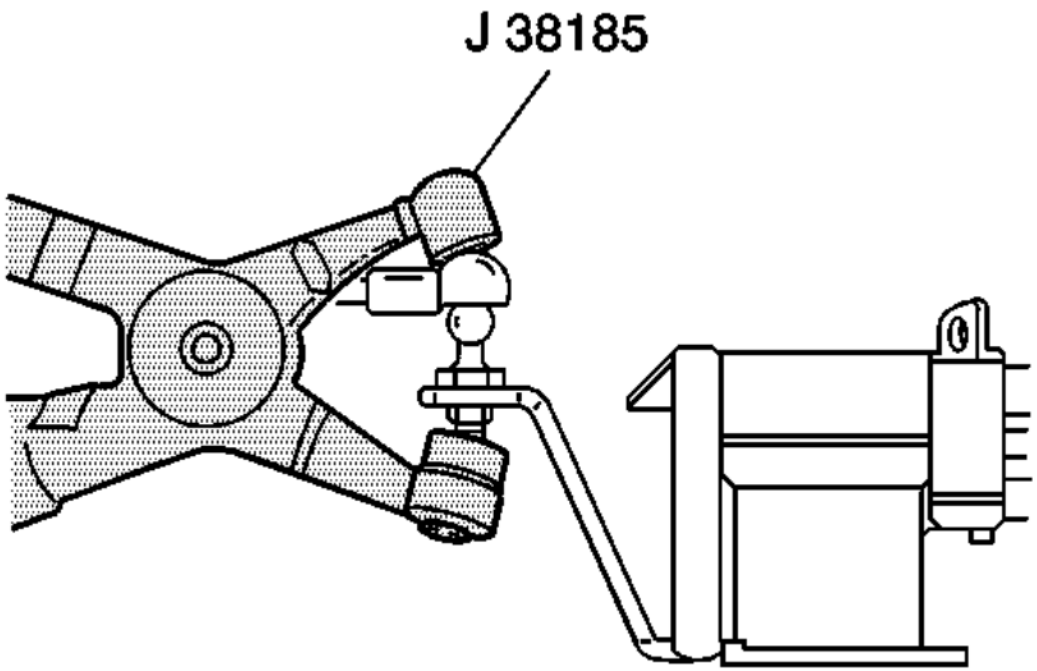

Fig. 5: Installing Link Rods To Ball Studs
Courtesy of GENERAL MOTORS COMPANY

1. Using the **J 38185** hose clamp pliers install to link rod to the ball stud on the sensor lever.
2. Install the ESC sensor to the vehicle. Refer to **Electronic Suspension Front Position Sensor Replacement**.

ELECTRONIC SUSPENSION REAR POSITION SENSOR LINK ASSEMBLY REPLACEMENT

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Tools Required

J 38185 Spring Hose Clamp Pliers

Removal Procedure

IMPORTANT: Do not attempt to pry the link rod from the electronic suspension control (ESC) ball stud. If the link rod needs to be replaced or disconnected, you must use the following procedure.

1. Remove the ESC sensor from the vehicle. Refer to **Electronic Suspension Rear Position Sensor Replacement - Left Side**, or **Electronic Suspension Rear Position Sensor Replacement - Right Side**.
2. While supporting the sensor lever by hand, twist the link rod to remove it from the ball stud.
3. Remove the link rod from the frame bracket ball stud.

Installation Procedure

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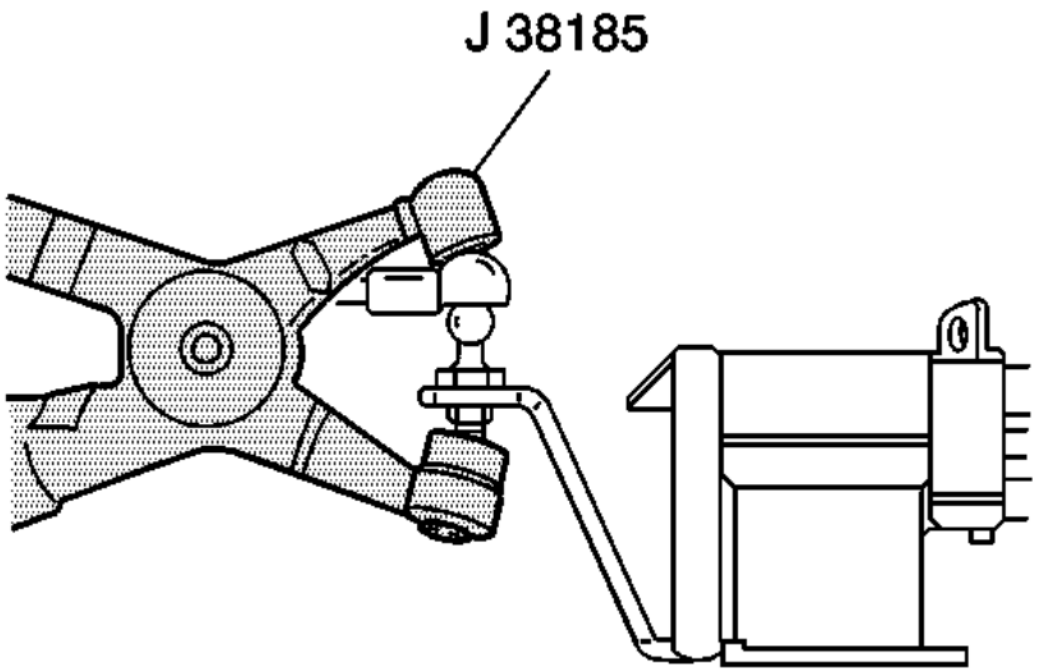

Fig. 6: Installing Link Rods To Ball Studs
Courtesy of GENERAL MOTORS COMPANY

1. Using the **J 38185** hose clamp pliers, install to link rod to the ball stud on the sensor lever and the frame bracket.
2. Install the ESC sensor to the vehicle. Refer to **Electronic Suspension Rear Position Sensor Replacement - Left Side**, or **Electronic Suspension Rear Position Sensor Replacement - Right Side**.

ELECTRONIC SUSPENSION REAR POSITION SENSOR REPLACEMENT - LEFT SIDE

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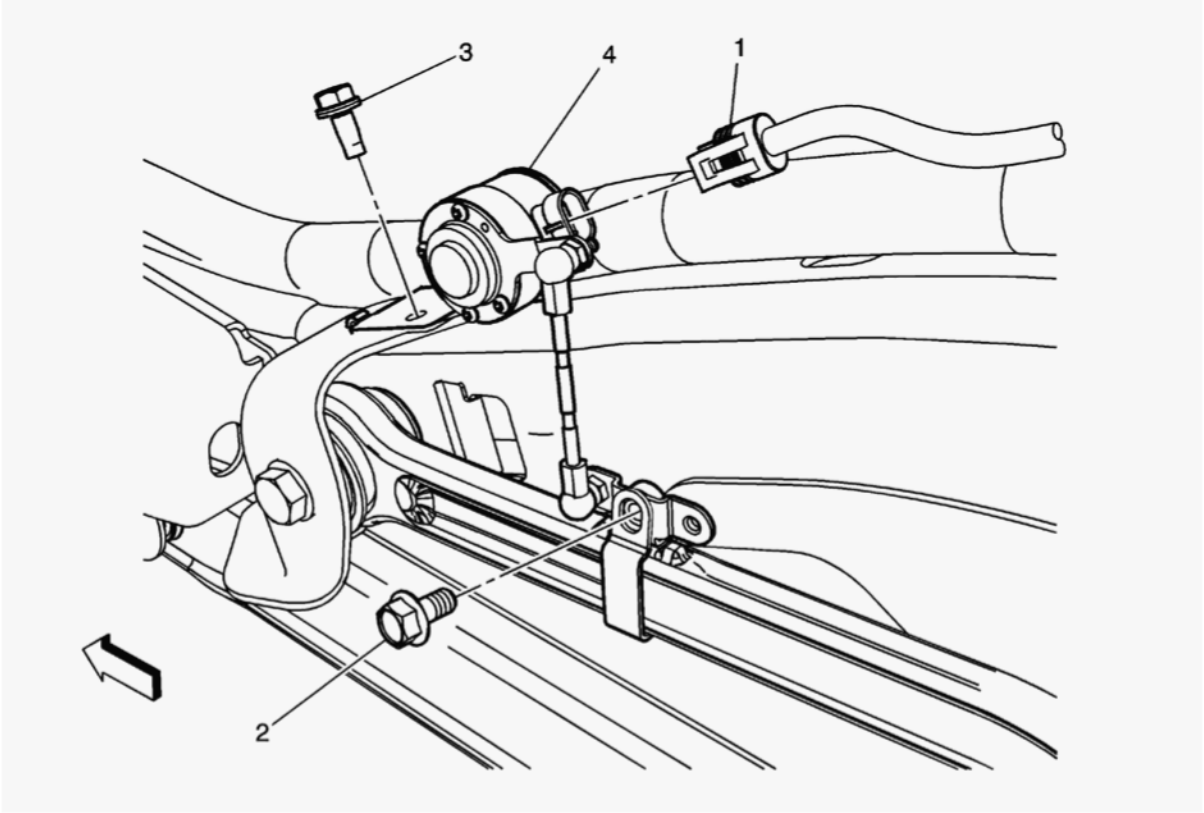

Fig. 7: Electronic Suspension Rear Position Sensor - Left Side
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures 1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** 2. Remove the left rear tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation (6-Lug Wheel)** **Tire and Wheel Removal and Installation (8-Lug Wheel)**	
1	Electrical Connector
2	Position Sensor Servo Arm Bracket Bolt **CAUTION:**

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Callout	Component Name
	Refer to **Fastener Caution** **Tighten** 17 N.m (13 lb ft)
3	Position Sensor Bracket Bolt **Tighten** 12 N.m (106 lb in)
4	Electronic Suspension Position Sensor **Procedure** Perform the Suspension Position Sensor Trim Height Calibration. Refer to **Suspension Position Calibration (With Z95)** **Suspension Position Calibration (With Z85)**

ELECTRONIC SUSPENSION REAR POSITION SENSOR REPLACEMENT - RIGHT SIDE

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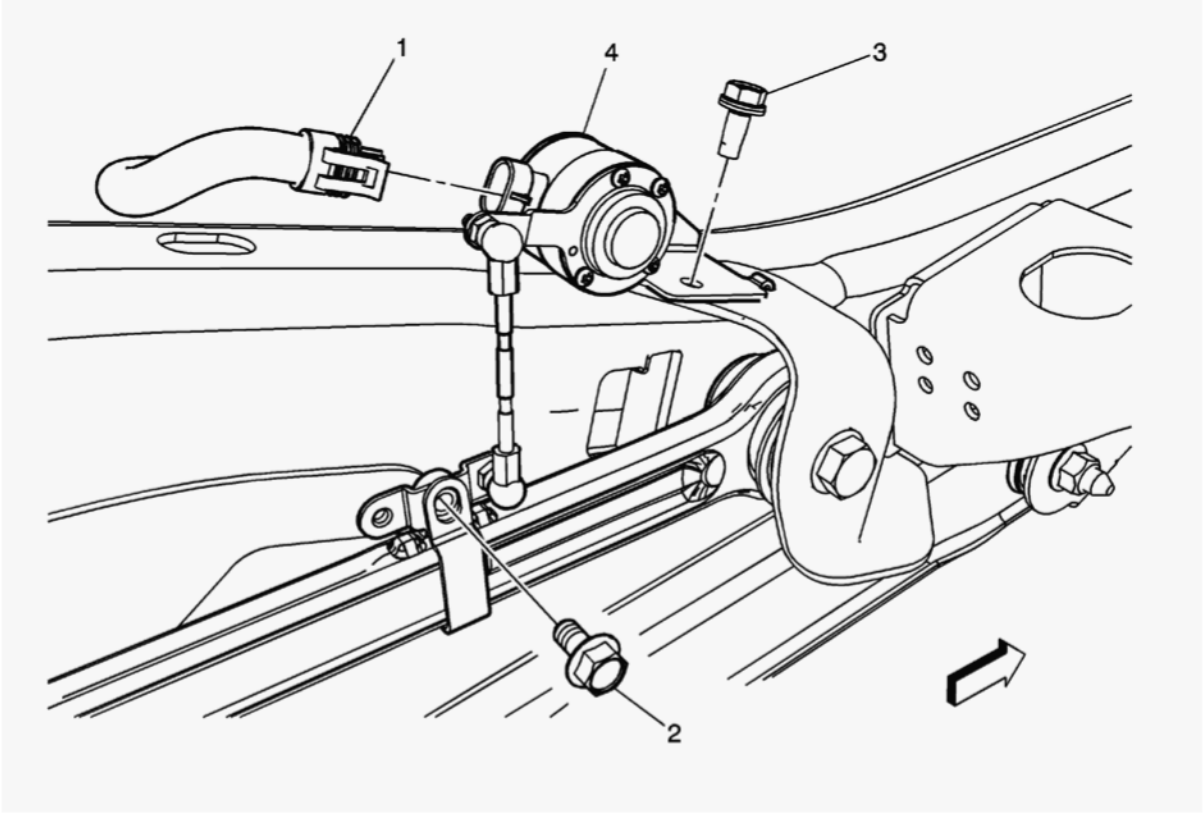

Fig. 8: Electronic Suspension Rear Position Sensor - Right Side
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Callout	Component Name
Preliminary Procedures 1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** 2. Remove the right rear tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation (6-Lug Wheel)** **Tire and Wheel Removal and Installation (8-Lug Wheel)**	
1	Electrical Connector
2	Position Sensor Servo Arm Bracket Bolt **CAUTION:**

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Callout	Component Name
	Refer to **Fastener Caution** **Tighten** 17 N.m (13 lb ft)
3	Position Sensor Bracket Bolt **Tighten** 12 N.m (106 lb in)
4	Electronic Suspension Position Sensor **Procedure** Perform the Suspension Position Sensor Trim Height Calibration. Refer to **Suspension Position Calibration (With Z95)** **Suspension Position Calibration (With Z85)**

ELECTRONIC SUSPENSION POSITION SENSOR TRIM HEIGHT CALIBRATION

Suspension Position Sensor Trim Height Calibration

The Suspension Position Sensor Trim Height Calibration must be performed anytime a Suspension Position Sensor is either removed/reinstalled or replaced.

1. Remove any excess weight from vehicle.
2. Connect scan tool
3. From scan tool menu, select Suspension Control Module,
4. Select Configuration/Reset Functions
5. Select Suspension Position Sensor Trim Height and follow the on screen instructions

DESCRIPTION AND OPERATION

ELECTRONIC SUSPENSION CONTROL DESCRIPTION AND OPERATION

Electronic Suspension Control

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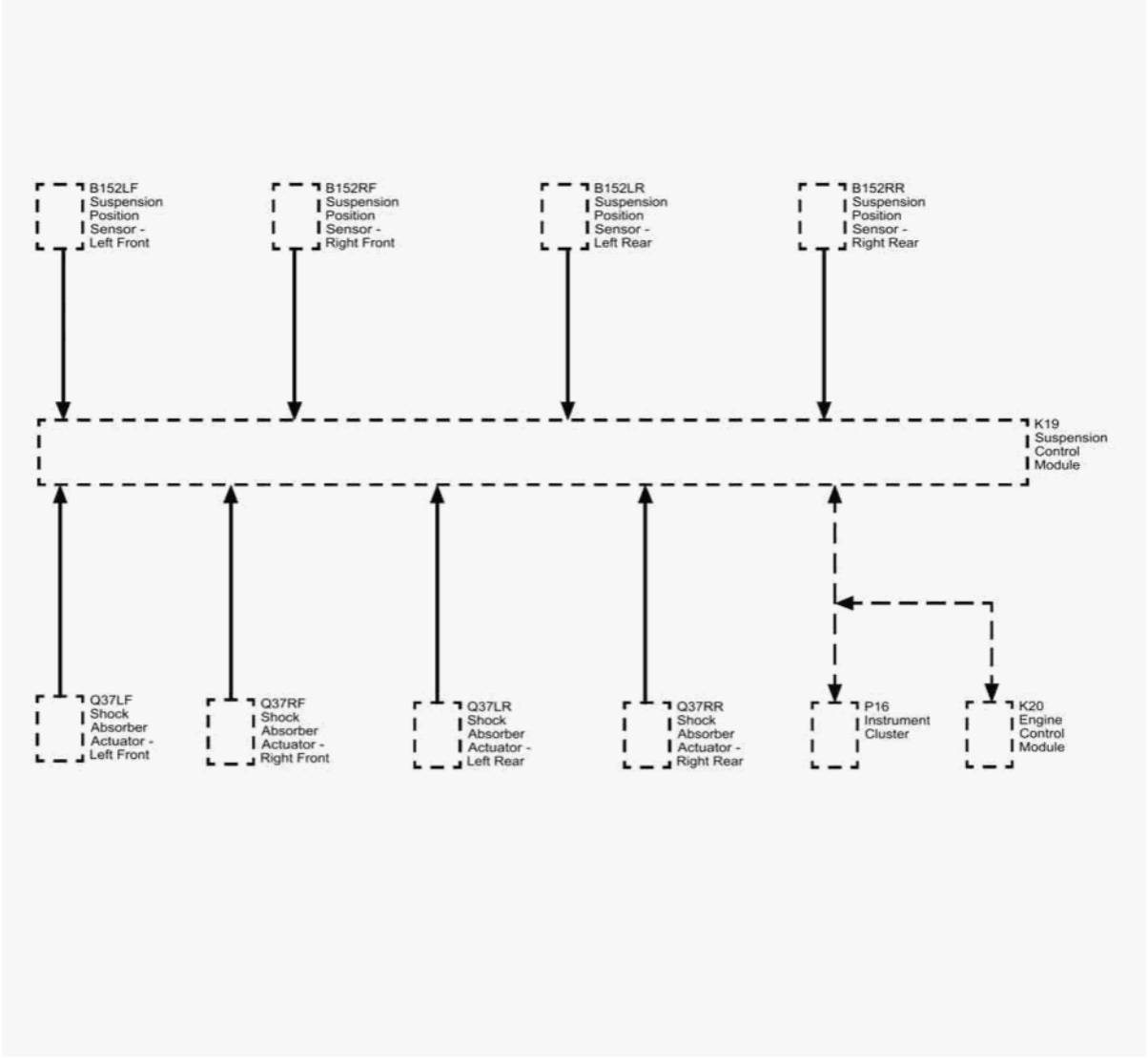

Fig. 9: Electronic Suspension Control Block Diagram
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
B152LF	B152LF Suspension Position Sensor - Left Front
B152RF	B152RF Suspension Position Sensor - Right Front
B152LR	B152LR Suspension Position Sensor - Left Rear

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Callout	Component Name
B152RR	B152RR Suspension Position Sensor - Right Rear
K19	K19 Suspension Control Module
Q37LF	Q37LF Shock Absorber Actuator - Left Front
Q37RF	Q37RF Shock Absorber Actuator - Right Front
Q37LR	Q37LR Shock Absorber Actuator - Left Rear
Q37RR	Q37RR Shock Absorber Actuator - Right Rear
P16	P16 Instrument Cluster
K20	K20 Engine Control Module

The electronic suspension control system independently controls each of the 4 shock absorbers in order to control the vehicle ride characteristics. The electronic suspension control (ESC) system is capable of making these changes within milliseconds. The ESC system consists of the following major components:

- The electronic suspension (ESC) module
- The front/rear position sensors
- The front/rear adjustable shock absorbers
- The shock absorber electrical actuators, which are integrated within the shock absorbers
- The rear air springs

The ESC controls the damping mode selection according to the following factors:

- Vehicle information received from the GMLAN High-Speed and Chassis-Expansion Communication Buses, such as, vehicle speed, steering wheel angle, etc.
- Data from the four body to wheel displacement sensors.

The ESC module evaluates these inputs in order to separately control the shock absorbers, providing an enhanced ride and comfort level over the widest possible range of operating conditions.

Electronic Suspension Control Module

The electronic suspension control (ESC) module provides electronic control logic and output drive for each shock absorber. The ESC module makes decisions due to road and driving conditions based on various inputs. The ESC module receives input information by sensors that are directly connected to the ESC module or by other systems through the serial data line and uses these inputs to independently control the shock absorbers at

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each corner.

Electronic Suspension Control Position Sensors

The electronic suspension control (ESC) position sensors provide the ESC module with the body to wheel displacement input. The ESC module uses this and other inputs in order to control the stiffness of the shock absorber. If any body or wheel motion is detected, the ESC module will determine how soft or firm each shock absorber should be to provide the best ride. The ESC position sensors are mounted at each corner of the vehicle between the control arm and the body/frame.

Electronic Suspension Control Shock Absorber or Strut

The electronic suspension control (ESC) shock absorbers provide variable damping to resist suspension movement. The ESC shock absorber has the capability of providing multiple modes or values of damping forces, in both compression and rebound direction. The damping forces are modified utilizing electrical actuators located internally within the shock absorbers.

Electronic Suspension Control Operation

The electronic suspension control (ESC) system uses the information from other systems in order to execute certain functions.

The ESC system does not have a malfunction indicator lamp, but instead uses the instrument panel cluster (IPC) for the display functions. When the ESC system detects a malfunction that sets a DTC, the ESC system sends a message on the serial data line directly or through the powertrain control module (PCM) to the IPC, which will display one of the following messages:

- SERVICE SUSPENSION SYSTEM or SERVICE RIDE CONTROL
- SPEED LIMITED

The SERVICE SUSPENSION SYSTEM or SERVICE RIDE CONTROL message will only be displayed if the ESC system detects any malfunction that sets a DTC. The ESC system will send a message on the serial data line to the IPC to display this message.

The SPEED LIMITED message will only be displayed if the ESC system detects a malfunction that sets a DTC and causes the ESC system to disable all 4 shock absorbers. The ESC system will send a message on the serial data line to the PCM indicating that 2 o more shock absorbers were disabled. The PCM then sends a message to the IPC to display this message.

The ESC module has the ability to store DTCs as current or history codes. Most ESC system malfunctions will display a message in the IPC and set a DTC. The message will remain ON until the RESET button is pressed on the driver information center (DIC). As long as the DTC is current, the message will be displayed after every ignition cycle and the RESET button must be pressed to bypass the message.

The ESC system uses an ignition cycling diagnostic approach in order to reduce the occurrence of false or intermittent DTCs that do not affect the

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functionality of the ESC system. This allows for the fail-soft actions to be taken whenever a malfunction condition is current, but requires the malfunction to be current for a certain number of ignition cycles before the corresponding malfunction code and message will be stored or displayed.

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