

2004 SUSPENSION

Automatic Level Control - C/K SUV

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Air Compressor to Frame Nuts	15 N.m	11 lb ft
Air Line Tube Repair Nut	8 N.m	70 lb in

SCHEMATIC AND ROUTING DIAGRAMS

AUTOMATIC LEVEL CONTROL SUSPENSION SCHEMATICS

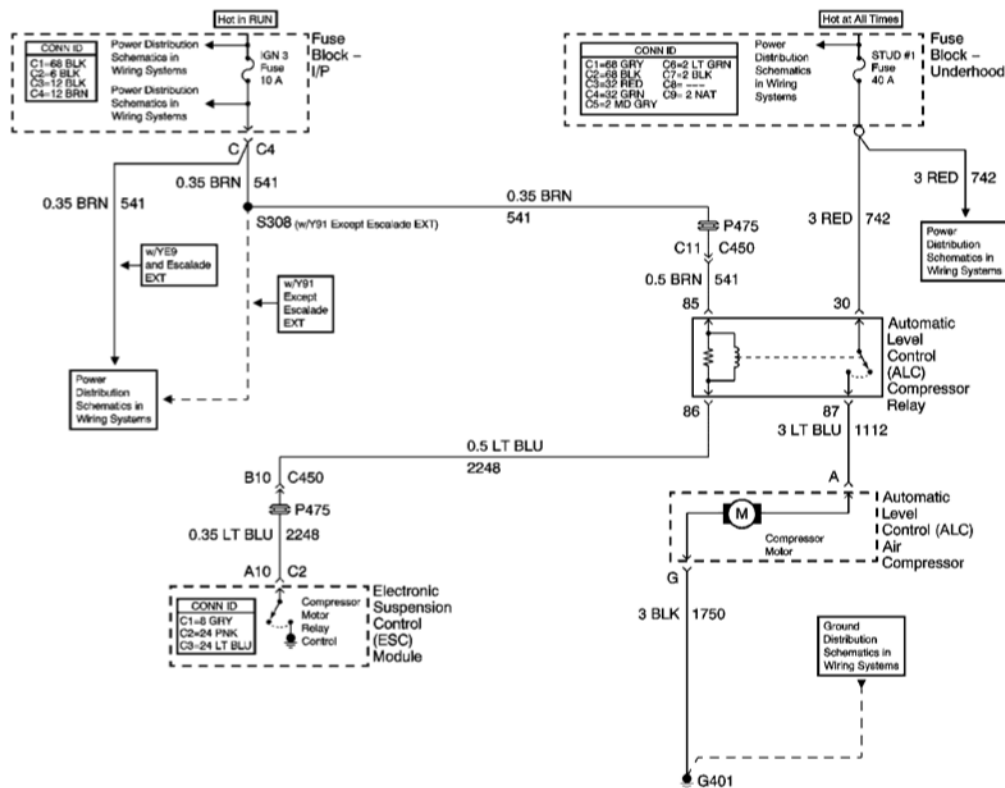


Fig. 1: Compressor Motor Control Schematics
Courtesy of GENERAL MOTORS CORP.

2004 Cadillac Escalade

2004 SUSPENSION Automatic Level Control - C/K SUV

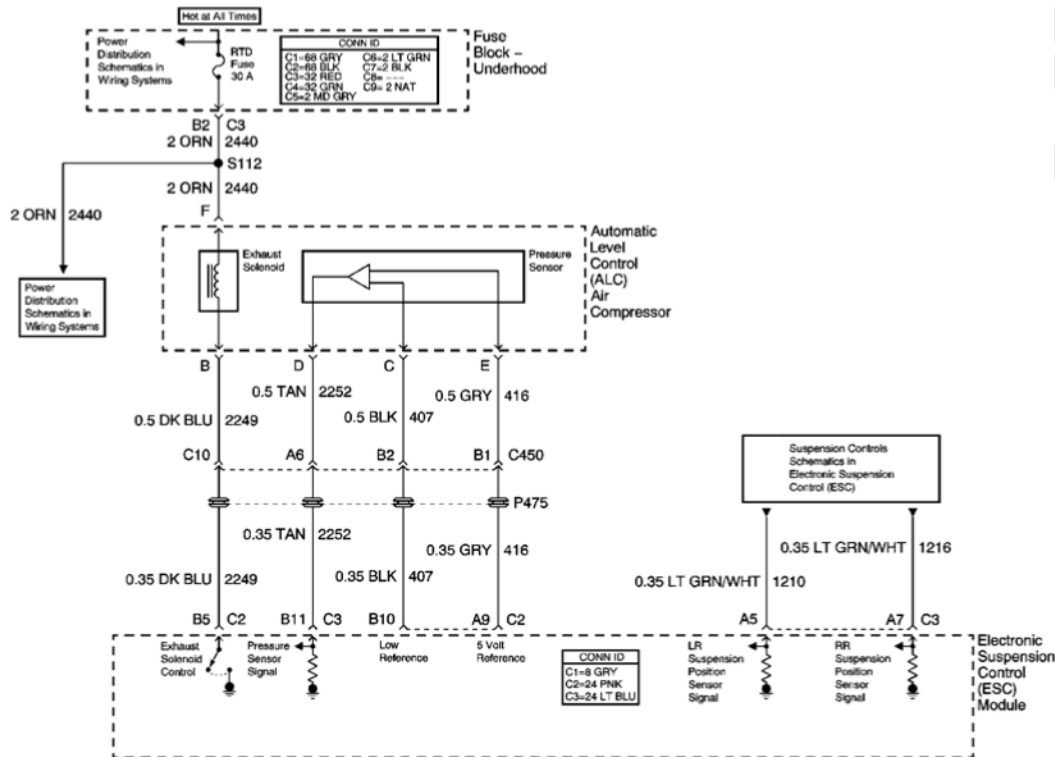


Fig. 2: Suspension Level Control Schematics
Courtesy of GENERAL MOTORS CORP.

COMPONENT LOCATOR

AUTOMATIC LEVEL CONTROL SUSPENSION COMPONENT VIEWS

2004 Cadillac Escalade

2004 SUSPENSION Automatic Level Control - C/K SUV

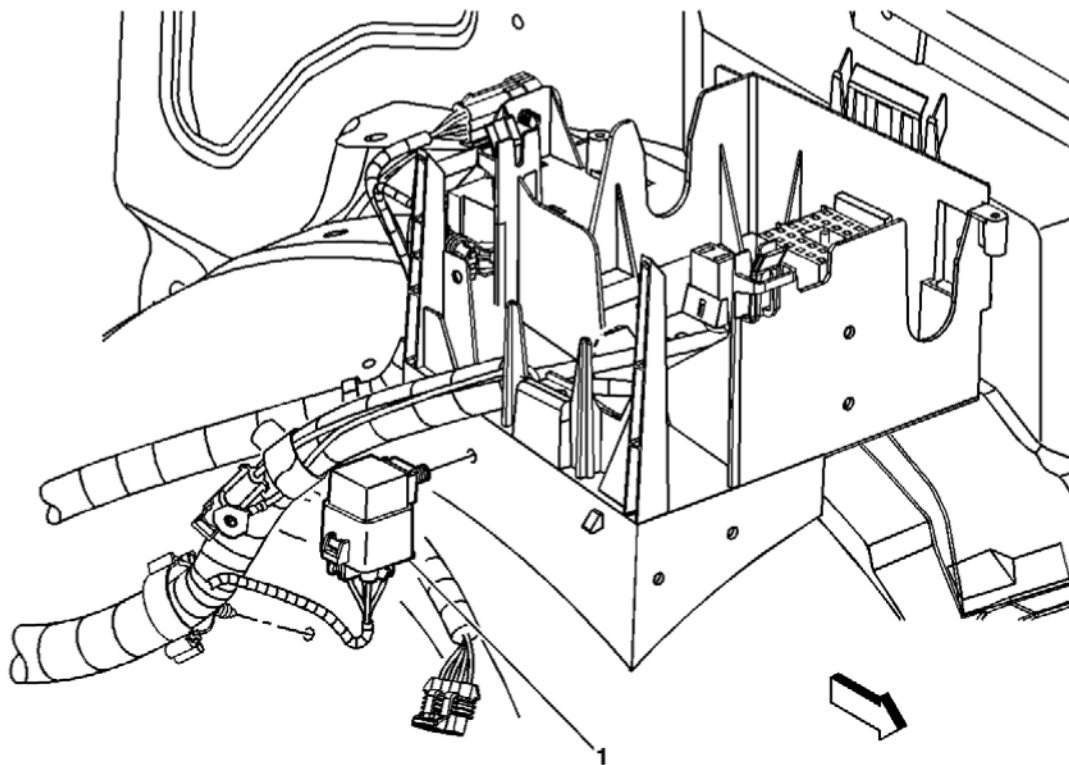


Fig. 3: Automatic Level Control (ALC) Compressor Relay
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 3

Callout	Component Name
1	Automatic Level Control (ALC) Compressor Relay

2004 Cadillac Escalade

2004 SUSPENSION Automatic Level Control - C/K SUV

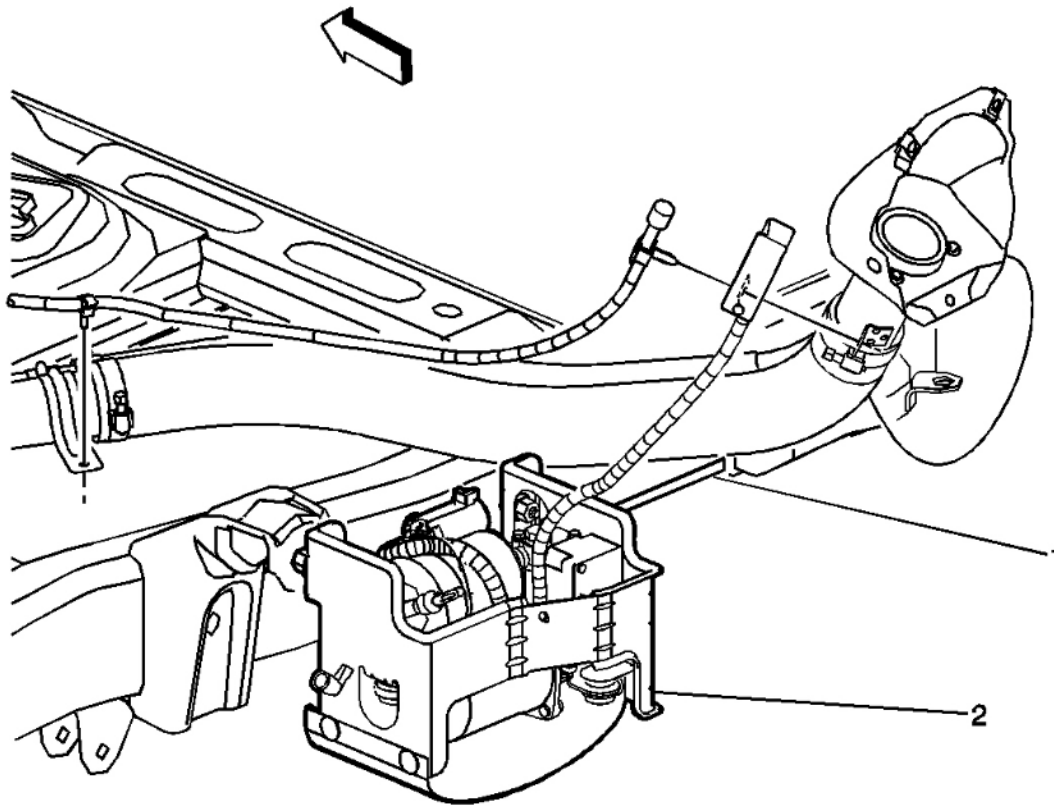


Fig. 4: Rear Suspension Components - ALC
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 4

Callout	Component Name
1	Rear Crossmember Frame
2	Automatic Level Control (ALC) Air Compressor

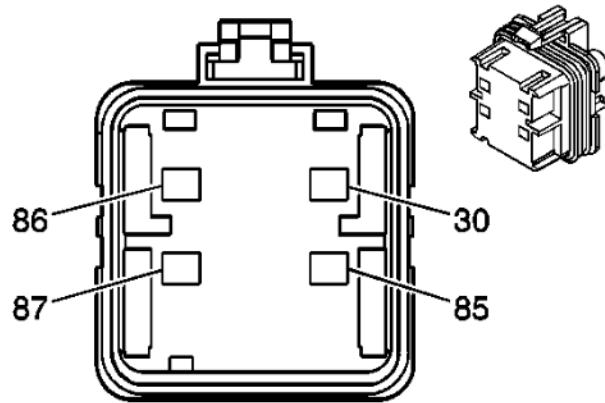
AUTOMATIC LEVEL CONTROL SUSPENSION CONNECTOR END VIEWS

Automatic Level Control (ALC) Compressor Relay Connector End Views



2004 Cadillac Escalade

2004 SUSPENSION Automatic Level Control - C/K SUV

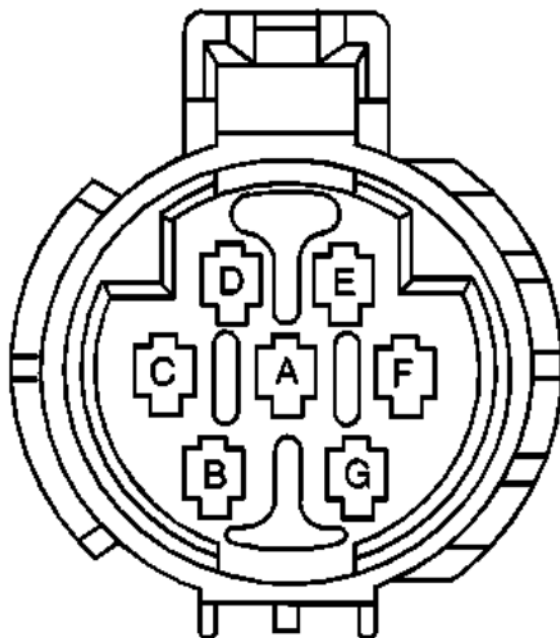


Connector Part Information		• 12129716 • 4-Way F Metri-Pack 280 Series (GRY)	
Pin	Wire Color	Circuit No.	Function
30	RED	742	Battery Positive Voltage
85	BRN	541	Ignition 3 Voltage
86	LT BLU	2248	Real Time Damping Compressor Relay Control
87	LT BLU	1112	Damping Relay Coil Control

Automatic Level Control (ALC) Air Compressor Connector End Views

2004 Cadillac Escalade

2004 SUSPENSION Automatic Level Control - C/K SUV



Connector Part Information		12110751 7-Way F Metri-Pack 280 Series (BLK)	
Pin	Wire Color	Circuit No.	Function
A	LT BLU	1112	Damping Relay Coil Control
B	DK BLU	2249	Exhaust Solenoid Control
C	BLK	407	Low Reference
D	TAN	2252	Pressure Sensor Signal
E	GRY	416	5-Volt Reference
F	ORN	2440	Battery Positive Voltage
G	BLK	1750	Ground

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC STARTING POINT - AUTOMATIC LEVEL CONTROL

Begin the system diagnosis with the **Diagnostic System Check - Automatic Level Control** . You may want to review the **Automatic Level Control Description and Operation** before beginning the diagnosis. The Diagnostic System Check will provide the following information:

- The identification of the control modules which command the system

2004 Cadillac Escalade

2004 SUSPENSION Automatic Level Control - C/K SUV

- The ability of the control modules to communicate through the serial data circuit
- The identification of any stored diagnostic trouble codes (DTCs) and their status

The use of the Diagnostic System Check will identify the correct procedure for diagnosing the system and where the procedure is located.

DIAGNOSTIC SYSTEM CHECK - AUTOMATIC LEVEL CONTROL

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2: Lack of communication may be due to a partial malfunction of the class 2 serial data circuit or due to a total malfunction of the class 2 serial data circuit. The specified procedure will determine the particular condition.

3: Check for the presence of DTCs.

4: The presence of DTCs which begin with "U" indicate some other module is not communicating. The specified procedure will compile all the available information before tests are performed.

5: Check for the presence of DTCs in Body Control system.

6: Check for the presence of DTCs in Automatic Level Control system.

Diagnostic System Check - Automatic Level Control

Step	Action	Yes	No
Schematic Reference: <u>Automatic Level Control Suspension Schematics</u>			
1	Install a scan tool. Does the scan tool power up?	Go to Step 2	Go to <u>Scan Tool Does Not Power Up</u> in Data Link Communications
2	1. Turn ON the ignition, with the engine OFF. 2. Attempt to establish communication with the suspension control module. Does the scan tool communicate with the suspension control module?	Go to Step 3	Go to <u>Scan Tool Does Not Communicate with Class 2 Device</u> in Data Link Communications
3	Select the suspension control module display DTCs function on the scan tool. Does the scan tool display any DTCs?	Go to Step 4	Go to <u>Symptoms - Automatic Level Control</u>
4	Does the scan tool display any DTCs which begin with a "U"?	Go to <u>Scan Tool Does Not Communicate with Class 2 Device</u> in Data Link Communications	Go to Step 5
	Does the scan tool display DTC B1000?	Go to Diagnostic	

2004 Cadillac Escalade

2004 SUSPENSION Automatic Level Control - C/K SUV

5		<u>Trouble Code (DTC) List</u> in Body Control System	Go to Step 6
6	Does the scan tool display DTC C0655, C0660, or C0711?	Go to <u>Diagnostic Trouble Code (DTC) List</u>	Go to <u>Diagnostic Trouble Code (DTC) List</u> in Real Time Damping

SCAN TOOL OUTPUT CONTROLS

Scan Tool Output Controls

Scan Tool Output Control	Additional Menu Selection(s)	Description
Compressor Test	-	Commands the air compressor ON and OFF.
Exhaust Solenoid	-	Commands the air compressor exhaust solenoid ON and OFF.
Recalibration	-	Performs calibration on the suspension control module.

SCAN TOOL DATA LIST

Scan Tool Data List

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Operating Conditions: Park brake set with ignition switch ON			
Compressor Signal	Data Display	ON/OFF	OFF
Controller Battery Volts	Data Display	Volts	12-14.7
Exhaust Signal	Data Display	ON/OFF	OFF
Left Rear Position Sensor	Data Display	Volts	0.5-4.85
Rear Leveling Air Press	Data Display	psi/kpa	-16.0-187.8
Rear Leveling Air Press	Data Display	Volts	0.15-4.85
Right Rear Position Sensor	Data Display	Volts	0.5-4.85
Sensor Supply Voltage	Data Display	Volts	4.85
Vehicle Speed	Data Display	mph/kmph	0

SCAN TOOL DATA DEFINITIONS

Compressor Signal

Indicates when the compressor relay is activated.

Controller Battery Volts

Range 10.0 V - 16.0 V. This data refers to the battery system voltage as measured by the suspension control module.

2004 Cadillac Escalade

2004 SUSPENSION Automatic Level Control - C/K SUV

Exhaust Signal

Indicates when the exhaust solenoid is commanded on or off.

Left Rear Position Sensor

Range 0.5 V - 4.85 V. This data refers to vehicle height measured in volts.

Rear Leveling Air Press

Indicates the system pressure in psi.

Rear Leveling Air Press

Indicates the system pressure in volts.

Right Rear Position Sensor

Range 0.5 V - 4.85 V. This data refers to vehicle height measured in volts.

Sensor Supply Voltage

Indicates the voltage being supplied to the sensors from the suspension control module.

Vehicle Speed

The speed of the vehicle.

DIAGNOSTIC TROUBLE CODE (DTC) LIST

DIAGNOSTIC TROUBLE CODE (DTC) LIST

DTC	Module(s)
<u>C0655</u>	RTD
<u>C0660</u>	RTD
<u>C0711</u>	RTD

DTC C0655

Circuit Description

The vehicle's rear leveling compressor motor is switched on and off via a compressor motor relay which is controlled by the suspension control module. The suspension control module provides a switched path to ground whenever compressor activity is required. The suspension control module continually monitors the compressor motor relay circuitry to determine if the voltage level agrees with the commanded state.

Conditions for Running the DTC

2004 Cadillac Escalade

2004 SUSPENSION Automatic Level Control - C/K SUV

Whenever the compressor is activated.

Conditions for Setting the DTC

- Open in the control circuit of the compressor motor relay
- Short to ground in the control circuit of the compressor motor relay
- Short to battery in the control circuit of the compressor motor relay
- Open in the ignition 3 voltage circuit of the compressor motor relay
- Open IGN 3 fuse
- A malfunctioning compressor motor relay

Action Taken When the DTC Sets

- The compressor motor relay is disabled for the remainder of the ignition cycle.
- Stores a DTC C0655 in the suspension control module memory

Conditions for Clearing the DTC

- The suspension control module no longer detects a open, short to ground, or a short to battery in the control circuit of the compressor motor relay.
- Using a scan tool
- A history DTC will clear after 100 consecutive ignition cycles if the condition for the malfunction is no longer present.

Diagnostic Aids

IMPORTANT: A leak in the air tube between the rear shocks and compressor will cause excessive running of the compressor motor. After approximately 5 minutes of continuous running without a change in body-to-wheel height or system pressure, the suspension control module will command the compressor motor relay to the off state for the remainder of the ignition cycle.

The following conditions may cause a malfunction to occur in the compressor motor relay:

- A short to ground in the control circuit
- An open in the control circuit
- A short to battery in the control circuit
- An open in the ignition 3 voltage circuit

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2: Command both the ON and OFF states. Repeat the commands as necessary.

2004 Cadillac Escalade

2004 SUSPENSION Automatic Level Control - C/K SUV

- 3:** Tests the coil of the relay for continuity.
- 4:** Tests for voltage at the coil side of the compressor motor relay. The IGN 3 fuse supplies power to the coil side of the compressor motor relay.
- 5:** Verifies that the suspension control module is providing ground to the compressor motor relay.
- 6:** Tests if ground is constantly being applied to the compressor motor relay.
- 7:** Test for a short to voltage or an open in the control circuit of the compressor motor relay.
- 13:** The replacement suspension control module must be calibrated.

DTC C0655

Step	Action	Value(s)	Yes	No
Schematic Reference: <u>Automatic Level Control Suspension Schematics</u>				
1	Did you perform the Automatic Level Control Diagnostic System Check?	-	Go to Step 2	Go to <u>Diagnostic System Check - Automatic Level Control</u>
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. With a scan tool, command the compressor ON and OFF. Does the compressor turn ON and OFF with each command?	-	Go to Diagnostic Aids	Go to Step 3
3	1. Turn OFF the ignition. 2. Disconnect the compressor motor relay. 3. Measure the resistance of the relay coil. Does the resistance measure within the specified value?	30-90 ohm	Go to Step 4	Go to Step 12
4	1. Turn ON the ignition, with the engine OFF. 2. Probe the coil side feed circuit of the compressor motor relay with a test lamp that is connected to a good ground. Refer to <u>Circuit Testing</u> in Wiring Systems. Does the test lamp illuminate?	-	Go to Step 5	Go to Step 11
	1. Connect a test lamp between the control circuit of the compressor motor relay and the coil side feed circuit of the compressor motor relay. Refer to <u>Circuit Testing</u> in			

2004 Cadillac Escalade

2004 SUSPENSION Automatic Level Control - C/K SUV

5	Wiring Systems. 2. With a scan tool, command the compressor ON and OFF. Does the test lamp turn ON and OFF with each command?	-	Go to Step 9	Go to Step 6
6	Does the test lamp remain illuminated with each command?	-	Go to Step 8	Go to Step 7
7	Test the control circuit of the compressor motor relay for a short to voltage and an open. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 14	Go to Step 10
8	Test the control circuit of the compressor motor relay for a short to ground. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 14	Go to Step 10
9	Inspect for poor connections at the compressor motor relay. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 14	Go to Step 12
10	Inspect for poor connections at the harness connector of the suspension control module. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 14	Go to Step 13
11	Repair the coil side feed circuit of the compressor motor relay. Refer to <u>Wiring Repairs</u> in Wiring Systems. Did you complete the repair?	-	Go to Step 14	-
12	Replace the compressor motor relay. Did you complete the replacement?	-	Go to Step 14	-
13	IMPORTANT: After replacement, use the scan tool to perform the calibration procedure for the suspension control module, located under Special Functions: Recalibration. Replace the suspension control module. Refer to <u>Electronic Suspension Control Module Replacement (Tahoe/Yukon/Escalade)</u> or <u>Electronic Suspension Control Module Replacement (Escalade EXT)</u> in Electronic Suspension Control (ESC). Did you complete the	-		

2004 Cadillac Escalade

2004 SUSPENSION Automatic Level Control - C/K SUV

	replacement?		Go to Step 14	-
14	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions for Running the DTC as specified in the supporting text.	-		
	Does the DTC reset?		Go to Step 2	System OK

DTC C0660

Circuit Description

The exhaust solenoid valve is switched on and off via the suspension control module. The suspension control module provides a switched path to ground whenever exhaust activity is required and during a compressor "head-relief" sequence which occurs at compressor start-up if system pressure is lower than 68.95 kPa (10 psi). The suspension control module continually monitors the exhaust solenoid valve circuitry to determine if the voltage level agrees with the commanded state.

Conditions for Running the DTC

Whenever the exhaust solenoid valve is activated.

Conditions for Setting the DTC

- An open in the control circuit of the exhaust solenoid valve
- A short to ground in the control circuit of the exhaust solenoid valve
- A short to battery in the control circuit of the exhaust solenoid valve
- An open in the battery positive voltage circuit of the exhaust solenoid valve
- An open RTD fuse
- A malfunctioning exhaust solenoid valve

Action Taken When the DTC Sets

- The exhaust solenoid valve is disabled for the remainder of the ignition cycle.
- Stores a DTC C0660 in the suspension control module memory

Conditions for Clearing the DTC

- The suspension control module no longer detects a open, short to ground, or a short to battery in the control circuit of the exhaust solenoid valve.
- Using a scan tool
- A history DTC will clear after 100 consecutive ignition cycles if the condition for the malfunction is no longer present.

2004 Cadillac Escalade

2004 SUSPENSION Automatic Level Control - C/K SUV

Diagnostic Aids

The following conditions may cause a malfunction to occur in the exhaust solenoid valve:

- A short to ground in the control circuit
- An open in the control circuit
- A short to battery in the control circuit
- An open in the battery positive voltage circuit

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2: Command both the ON and OFF states. Repeat the commands as necessary.

3: Test the exhaust solenoid valve resistance.

4: Tests for voltage at the coil side of the exhaust solenoid valve. The RTD fuse supplies power to the coil side of the exhaust solenoid valve.

5: Verifies that the suspension control module is providing ground to the exhaust solenoid valve.

6: Tests if ground is constantly being applied to the exhaust solenoid valve.

7: Test the control circuit of the exhaust solenoid valve for a short to voltage and an open.

13: The replacement suspension control module must be calibrated.

DTC C0660

Step	Action	Values	Yes	No
Schematic Reference: <u>Automatic Level Control Suspension Schematics</u>				
1	Did you perform the Automatic Level Control Diagnostic System Check?	-	Go to Step 2	Go to <u>Diagnostic System Check - Automatic Level Control</u>
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. With a scan tool, command the exhaust ON and OFF. Does the exhaust solenoid valve turn ON and OFF with each command?	-	Go to Diagnostic Aids	Go to Step 3
3	1. Turn OFF the ignition. 2. Disconnect the automatic level control (ALC) compressor harness connector. 3. Measure the resistance of the exhaust	18-45 ohm		

2004 Cadillac Escalade

2004 SUSPENSION Automatic Level Control - C/K SUV

	solenoid valve.			
	Does the resistance measure within the specified value?		Go to Step 4	Go to Step 12
4	1. Turn ON the ignition, with the engine OFF. 2. Probe the positive battery voltage circuit of the exhaust solenoid valve with a test lamp that is connected to a good ground. Refer to <u>Circuit Testing</u> in Wiring Systems.	-		
	Does the test lamp illuminate?		Go to Step 5	Go to Step 11
5	1. Connect a test lamp between the control circuit of the exhaust solenoid valve and the positive battery voltage circuit of the exhaust solenoid valve, harness side. Refer to <u>Circuit Testing</u> in Wiring Systems. 2. With a scan tool, command the exhaust ON and OFF.	-		
	Does the test lamp turn ON and OFF with each command?		Go to Step 9	Go to Step 6
6	Does the test lamp remain illuminated with each command?	-	Go to Step 8	Go to Step 7
7	Test the control circuit of the exhaust solenoid valve for a short to voltage and an open. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 14	Go to Step 10
8	Test the control circuit of the exhaust solenoid valve for a short to ground. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 14	Go to Step 10
9	Inspect for poor connections at the exhaust solenoid valve. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 14	Go to Step 12
10	Inspect for poor connections at the harness connector of the ESC module. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 14	Go to Step 13
	Repair the positive battery voltage circuit of the			

2004 Cadillac Escalade

2004 SUSPENSION Automatic Level Control - C/K SUV

11	exhaust solenoid valve. Refer to <u>Wiring Repairs</u> in Wiring Systems. Did you complete the repair?	-	Go to Step 14	-
12	Replace the exhaust solenoid valve. Did you complete the replacement?	-	Go to Step 14	-
13	IMPORTANT: After replacement, use the scan tool to perform the calibration procedure for the suspension control module, located under Special Functions: Recalibration. Replace the suspension control module. Refer to <u>Electronic Suspension Control Module Replacement (Tahoe/Yukon/Escalade)</u> or <u>Electronic Suspension Control Module Replacement (Escalade EXT)</u> in Electronic Suspension Control (ESC).Did you complete the replacement?	-	Go to Step 14	-
14	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions for Running the DTC as specified in the supporting text. Does the DTC reset?	-	Go to Step 2	System OK

DTC C0711

Circuit Description

The suspension control module uses a 5 volt analog air pressure sensor to determine the amount of air pressure in the Automatic Level Control (ALC) system. The valid signal voltage range of the sensor is 0.15-4.85 volts. The sensor signal voltage will increase and decrease within the valid voltage range as system pressure increases and decreases.

Conditions for Running the DTC

The Ignition is On.

Conditions for Setting the DTC

- The air pressure sensor's signal voltage is out of the valid range.
- A short to ground, short to voltage, or an open in the pressure sensor, or the circuits to the sensor.

Action Taken When the DTC Sets

2004 Cadillac Escalade

2004 SUSPENSION Automatic Level Control - C/K SUV

- DTC C0711 is stored in memory.
- ALC system pressure is set to a default value.
- The ALC system is disabled.

Conditions for Clearing the DTC

- A current DTC will clear when the malfunction is no longer present.
- A history DTC will clear after 100 malfunction free ignition cycles.
- Using a scan tool.

Diagnostic Aids

If DTC C0870 is present, perform the diagnosis for that DTC first.

The following conditions may cause a malfunction to occur:

- An open in the 5 volt reference circuit of the air pressure sensor
- A short to ground in the 5 volt reference circuit of the air pressure sensor
- An open in the signal circuit of the air pressure sensor
- A short to ground in the signal circuit of the air pressure sensor
- An open in the low reference circuit of the air pressure sensor
- A malfunction in the air pressure sensor
- A leak in the air tube at the air pressure sensor may cause a faulty sensor voltage reading

Test Description

The numbers below refer to the step numbers on the diagnostic table.

- 2:** Tests for a high resistance or an open in the ground circuit.
- 7:** Check for open or high resistance in the sensor ground circuit.
- 13:** The replacement suspension control module must be calibrated.

DTC C0711

Step-	Action	Value(s)	Yes	No
Schematic Reference: <u>Automatic Level Control Suspension Schematics</u>				
1	IMPORTANT: If DTC C0870 is present, perform the diagnosis for DTC C0870 first. Did you perform the Automatic Level Control Diagnostic System Check?	-	Go to Step 2	Go to <u>Diagnostic System Check - Automatic Level Control</u>
	1. Install a scan tool.			

2004 Cadillac Escalade

2004 SUSPENSION Automatic Level Control - C/K SUV

2	2. Turn ON the ignition, with the engine OFF. 3. With the scan tool, observe the Air Pressure Sensor data parameter in the ALC data list. Does the scan tool indicate that the Air Pressure Sensor parameter is within the specified range?	0.15 - 4.85 V	Go to <u>Testing for Intermittent Conditions and Poor Connections</u> in Wiring Systems.	Go to Step 3
3	1. Turn OFF the ignition. 2. Disconnect the ALC compressor connector. 3. Turn ON the ignition, with the engine OFF. 4. With the scan tool, observe the air pressure sensor data parameter. Does the scan tool indicate that the air pressure sensor data parameter is at the specified value?	0.0 V	Go to Step 4	Go to Step 6
4	Connect a 3 amp fused jumper wire between the 5 volt reference and signal circuit of the ALC compressor harness connector. Does the scan tool indicate that the Air Pressure Sensor data parameter is within the specified range?	4.8-5.2 V	Go to Step 9	Go to Step 5
5	Test the pressure sensor signal circuit for an open, or short to ground. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 14	Go to Step 6
6	Test the pressure sensor signal circuit for a short to voltage. Refer to <u>Testing for a Short to Voltage</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 14	Go to Step 7
7	Test the pressure sensor 5 volt reference circuit an open, or short to ground. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 14	Go to Step 8
8	Test the pressure sensor 5 volt reference circuit for a short to voltage. Refer to <u>Testing for a Short to Voltage</u> and <u>Wiring Repairs</u> in Wiring Systems.	-		

2004 Cadillac Escalade

2004 SUSPENSION Automatic Level Control - C/K SUV

	Did you find and correct the condition?		Go to Step 14	Go to Step 10
9	Test the pressure sensor low reference circuit for an open, or short to voltage. Did you find and correct the condition?	-	Go to Step 14	Go to Step 12
10	Inspect for poor connections at the ALC compressor harness connector. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 14	Go to Step 11
11	Inspect for poor connections at the suspension control module harness connector. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 14	Go to Step 13
12	Replace the pressure sensor. Refer to <u>Automatic Level Control Air Dryer and Pressure Sensor Replacement</u> in Automatic Level Control. Did you complete the replacement?	-	Go to Step 14	-
13	IMPORTANT: After replacement, use the scan tool to perform the calibration procedure for the suspension control module, located under Special Functions: Recalibration. Replace the suspension control module. Refer to <u>Electronic Suspension Control Module Replacement (Tahoe/Yukon/Escalade)</u> or <u>Electronic Suspension Control Module Replacement (Escalade EXT)</u> in Electronic Suspension Control (ESC). Did you complete the replacement?	-	Go to Step 14	-
14	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions for Running the DTC as specified in the supporting text. Does the DTC reset?	-	Go to Step 2	System OK

SYMPTOMS - AUTOMATIC LEVEL CONTROL

IMPORTANT: The following steps must be completed before using the symptom tables.

2004 Cadillac Escalade

2004 SUSPENSION Automatic Level Control - C/K SUV

1. Perform the Automatic Level Control Diagnostic System Check before using the symptom table 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 operation in order to familiarize yourself with the system functions. Refer to Automatic Level Control Description and Operation .

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the Automatic Level Control System. Refer to Checking Aftermarket Accessories in Wiring Systems.
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.
- Inspect the connectors to be properly seated and free of corrosion.

Intermittent

Faulty electrical connections or wiring may be the cause of intermittent conditions. Refer to Testing for Intermittent Conditions and Poor Connections in Wiring Systems.

Symptom List

Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:

- Automatic Level Control Compressor Motor Always On
- Automatic Level Control Compressor Motor Inoperative

AUTOMATIC LEVEL CONTROL COMPRESSOR MOTOR ALWAYS ON

Automatic Level Control Compressor Motor Always On

Step	Action	Yes	No
Schematic Reference: <u>Automatic Level Control Suspension Schematics</u>			
1	Did you perform the Automatic Level Control Diagnostic System Check?	Go to Step 2	Go to <u>Diagnostic System Check - Automatic Level Control</u>
2	Is the rear of the vehicle too high?	Go to Step 3	Go to <u>Testing for Intermittent Conditions and Poor Connections</u> in Wiring Systems
3	Disconnect the air tube from the compressor.		

2004 Cadillac Escalade

2004 SUSPENSION Automatic Level Control - C/K SUV

	Does the rear of the vehicle drop?	Go to Step 4	Go to Step 6
4	Disconnect the compressor motor relay. Does the compressor motor continue to run?	Go to Step 5	Go to Step 7
5	Test the battery positive voltage circuit of the compressor motor for a short to voltage. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 8	-
6	Inspect all air tubes for kinked, bent and blockage. Check the exhaust valve for blockage. Did you find and correct the condition?	Go to Step 8	-
7	Replace the compressor motor relay. Did you complete the replacement?	Go to Step 8	-
8	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

AUTOMATIC LEVEL CONTROL COMPRESSOR MOTOR INOPERATIVE

Automatic Level Control Compressor Motor Inoperative

Step	Action	Yes	No
Schematic Reference: <u>Automatic Level Control Suspension Schematics</u>			
1	Did you perform the Automatic Level Control Diagnostic System Check?	Go to Step 2	Go to Diagnostic System Check - Automatic Level Control
2	Is the rear of the vehicle low?	Go to Step 3	Go to Testing for Intermittent Conditions and Poor Connections in Wiring Systems
3	Inspect all air tubes and fittings for leaks. Did you find and correct the condition?	Go to Step 12	Go to Step 4
4	1. Connect a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. Use the scan tool to turn ON and OFF the compressor motor. Does the compressor turn ON and OFF with each command?	Go to Step 5	Go to Step 7
5	1. Turn OFF the ignition. 2. Disconnect the compressor motor relay. 3. Probe the battery positive voltage circuit of the compressor relay with a test lamp that is		

2004 Cadillac Escalade

2004 SUSPENSION Automatic Level Control - C/K SUV

	connected to a good ground. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems.		
	Does the test lamp illuminate?	Go to Step 6	Go to Step 7
6	Connect a 20A fused jumper wire between the battery positive voltage circuit of the compressor motor relay and the compressor control circuit of the compressor motor relay. Does the compressor motor turn on?	Go to Step 11	Go to Step 8
7	Test the compressor control circuit of the compressor motor relay for an open, short to ground and high resistance. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 12	Go to Step 8
8	Test the positive battery voltage circuit of the compressor motor for an open and high resistance. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 12	Go to Step 9
9	Test the ground circuit of the compressor motor for an open and high resistance. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 12	Go to Step 10
10	Replace the compressor leveling module. Refer to <u>Air Compressor Replacement</u> . Did you complete the replacement?	Go to Step 12	-
11	Replace the compressor motor relay. Did you complete the replacement?	Go to Step 12	-
12	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

REPAIR INSTRUCTIONS

AUTOMATIC LEVEL CONTROL AIR DRYER AND PRESSURE SENSOR REPLACEMENT

Removal Procedure

1. Remove the automatic level control air compressor from the vehicle. Refer to **Air Compressor Replacement** .
2. Clean the area around the connection of the automatic level control air dryer to the automatic level control air compressor body.
3. Disconnect the electrical connector from the pressure sensor.
4. Remove the air dryer/pressure sensor assembly retaining screw.
5. Push the air dryer/pressure sensor assembly in while rotating the air dryer/pressure sensor assembly clockwise until the assembly detaches from the automatic level control air compressor body.

6. Remove the automatic level control air dryer from the automatic level control air compressor.

Installation Procedure

1. Install the automatic level control air dryer to the automatic level control air compressor.
2. Push the air dryer/pressure sensor assembly in while rotating the air dryer/pressure sensor assembly counterclockwise until the assembly attaches to the automatic level control air compressor body.
3. Install the air dryer/pressure sensor assembly retaining screw.
4. Connect the electrical connector to the pressure sensor.
5. Install the automatic level control air compressor to the vehicle. Refer to **Air Compressor Replacement**.

AIR LINE TUBING REPAIR

1. Locate the leaking area with soap and water or a stethoscope.

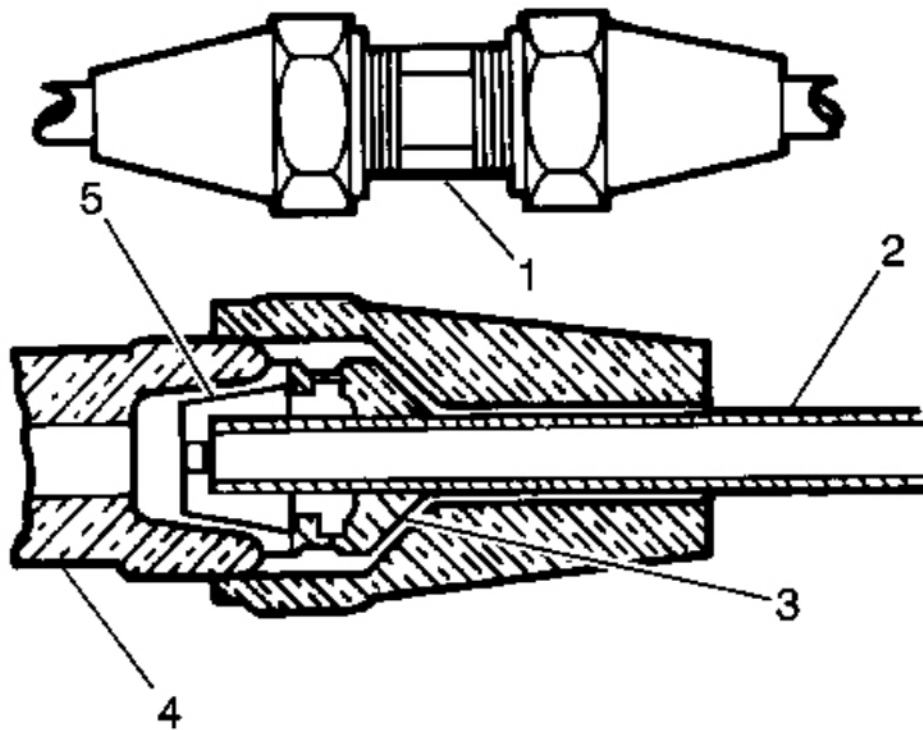


Fig. 5: Air Line Components

Courtesy of GENERAL MOTORS CORP.

2004 Cadillac Escalade

2004 SUSPENSION Automatic Level Control - C/K SUV

2. Cut and remove the leaking line (2) section.
3. Remove the plastic retainer pin from one of the nuts.
4. Slide the air line tube onto the nut until the line bottoms in the rubber seal (5).

NOTE: Refer to Fastener Notice in Cautions and Notices.

5. Hold the air line tube in position.

Tighten: Tighten the air line tube repair nut to 8 N.m (70 lb in).

6. Install the air line tube to the other end of the coupling.
7. Repeat Steps 3 through 5.

IMPORTANT: Ensure that the repaired air line tube is secured in a location where the line is not pinched, or kinked, and will not contact the exhaust system.

8. Install the air line tube to the vehicle.
9. Inflate the real time damping level control system and inspect for leaks.

AIR COMPRESSOR REPLACEMENT

Removal Procedure

1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle in General Information.

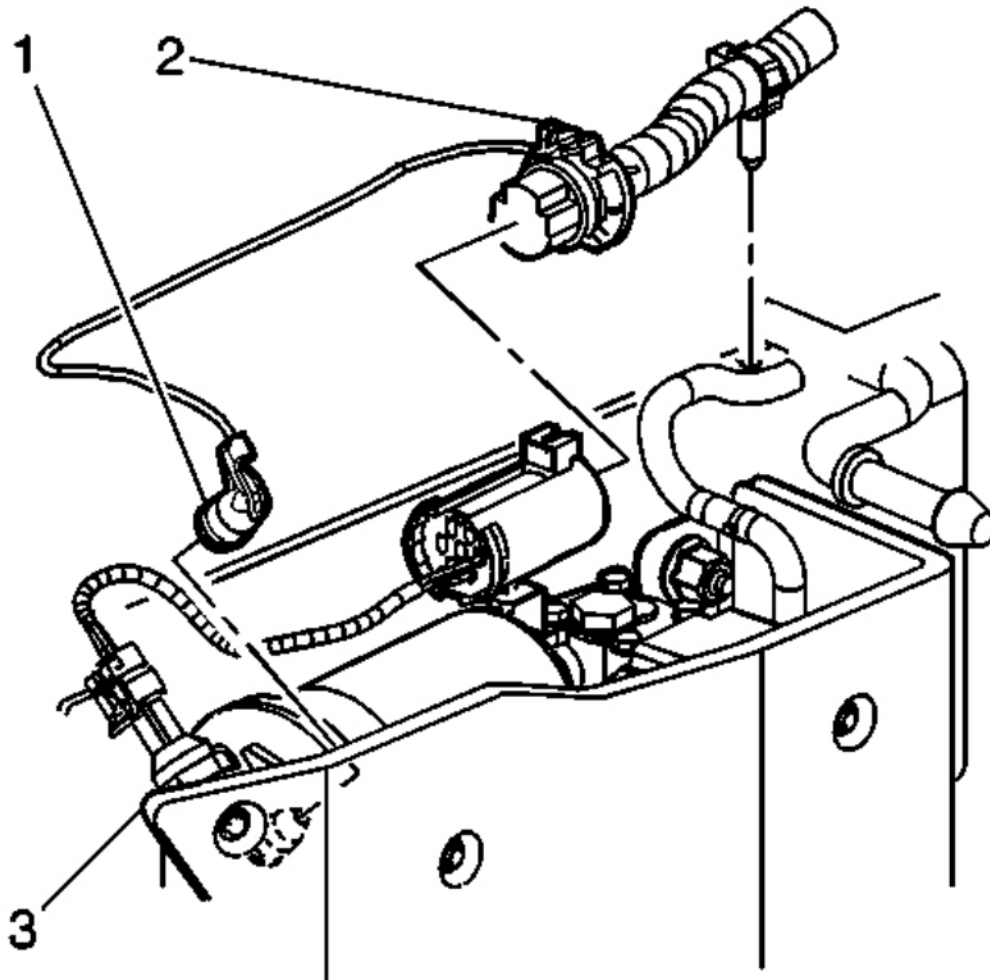


Fig. 6: Air Tube At Air Dryer & Electrical Connection
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Clean the components and the surrounding area to prevent dirt from entering the air system before disconnecting the air hose from the air compressor.

2. Disconnect the air tube (1) from the air dryer.
3. Disconnect the electrical connection (2).

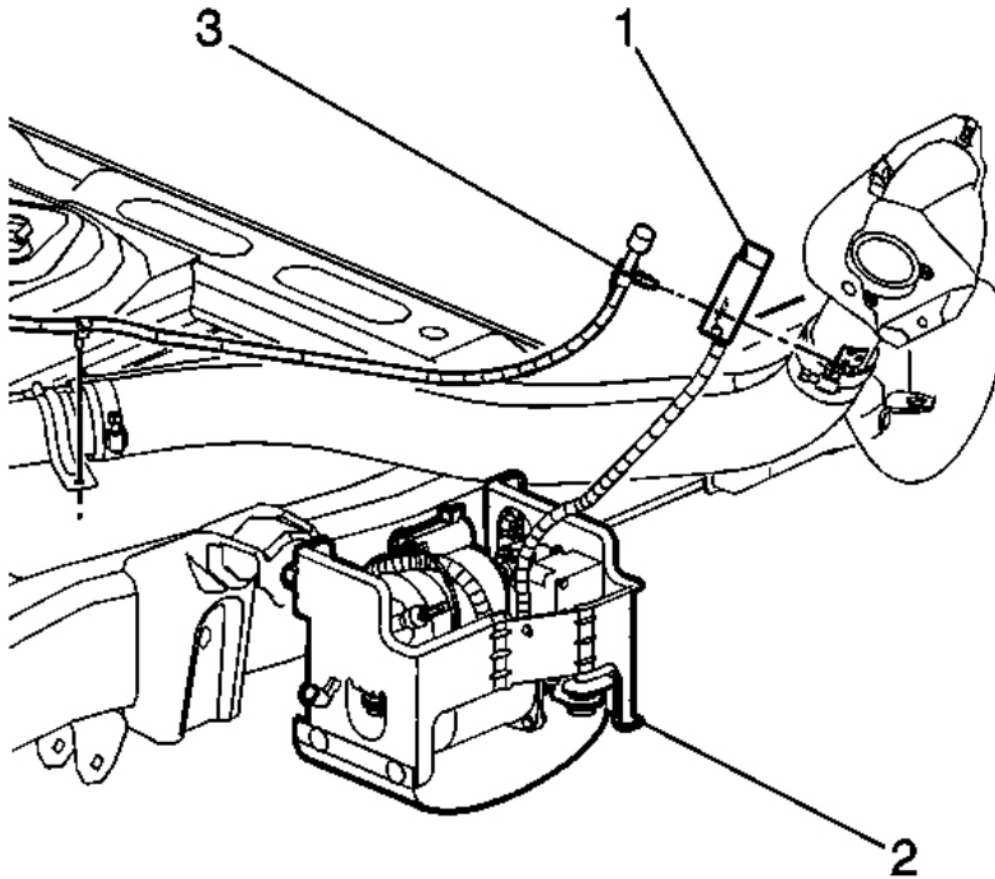


Fig. 7: Air Compressor & Air Inlet Hose
Courtesy of GENERAL MOTORS CORP.

4. Remove the air inlet and hose (1) from the fuel filler neck bracket.
5. Loosen the mounting nuts.
6. Slide the air compressor (2) rearward to clear the frame slots.
7. Remove the air compressor from the vehicle.

Installation Procedure

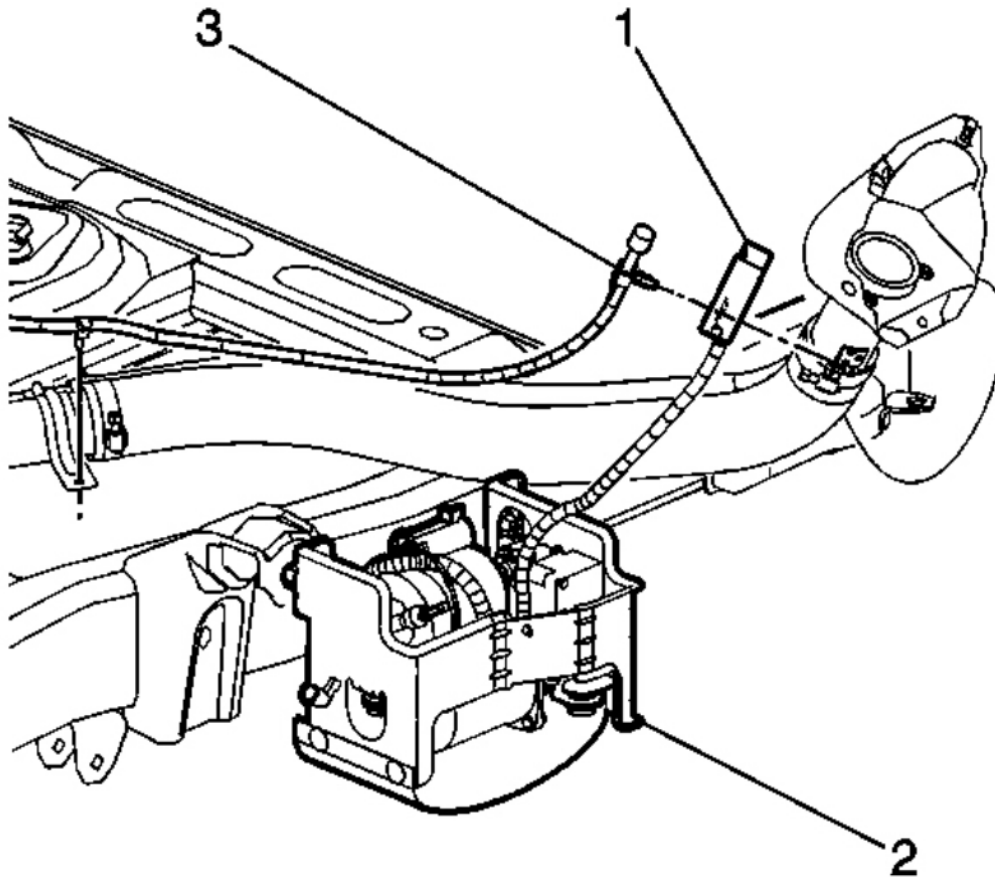


Fig. 8: Air Compressor & Air Inlet Hose
Courtesy of GENERAL MOTORS CORP.

1. Install the air compressor (2) to the vehicle.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Slide the air compressor forward to secure the fasteners into the frame slots and tighten the mounting nuts.

Tighten: Tighten the nuts to 15 N.m (11 lb ft).

3. Install the air inlet hose (1) to the fuel filler neck bracket.

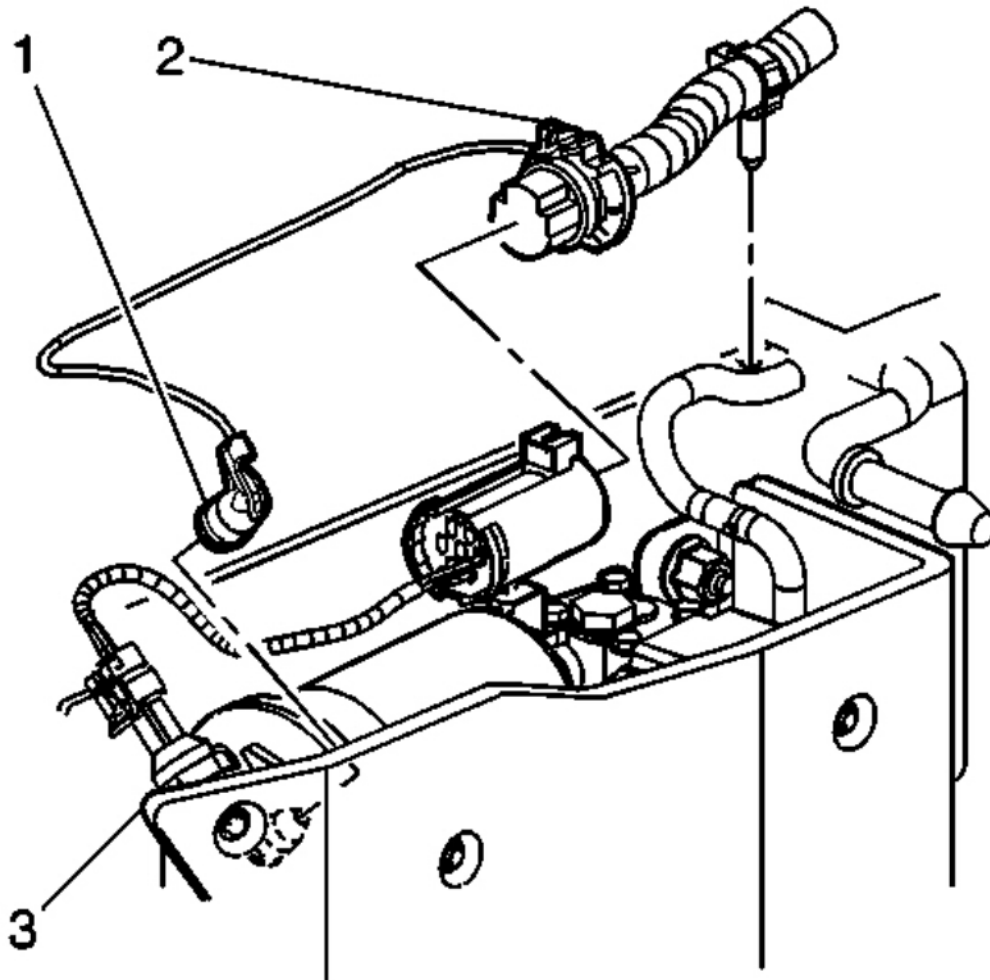


Fig. 9: Air Tube At Air Dryer & Electrical Connection
Courtesy of GENERAL MOTORS CORP.

4. Connect the air tube (1) to the air dryer.
5. Connect the electrical connection (2).

IMPORTANT: Before driving the vehicle, turn the ignition on and wait approximately 45 seconds. This will ensure that the air adjustable shock absorbers are filled with residual pressure.

6. Lower the vehicle.

DESCRIPTION AND OPERATION

AUTOMATIC LEVEL CONTROL DESCRIPTION AND OPERATION

The RTD system is bi-state real time damping system. The Suspension Control module controls the suspension damper solenoids and suspension position sensors, along with parts of the automatic level control (ALC) system and electronic variable orifice (EVO) power steering system.

The Automatic Level Control system consists of the following:

- Suspension Control Module
- Compressor/Leveling Module
 - Air Pressure Sensor
 - Exhaust Solenoid
- Compressor Motor Relay

The objective of the Automatic Level Control System is to provide constant ride height at all load conditions. The Suspension Control module monitors body-to-wheel height, and vehicle speed.

The Suspension Control module will use the rear body-to-wheel displacements and vehicle speed inputs to keep the rear trim height of the vehicle at its desired level.