

# Air Suspension Description and Operation

## Air Suspension

The primary mission of the air suspension system is the following for the rear suspension under loaded and unloaded conditions:

- Keep vehicle visually level
- Maintain optimal ride height

The Air Suspension System consists of the following items:

- Air Suspension Compressor Assembly
- Air Suspension Module
- Electronically Controlled Air Suspension Relay
- Air Suspension Position Sensors
- Ride Height Switch
- Air Suspension Exhaust Valve
- Air Suspension Inflator switch and fill valve
- Air Suspension Pressure Sensor
- Air Suspension Inlet Valves
- Rear Air Springs

The air suspension module controls the inlet valves, the air suspension relay and the air suspension compressor to keep the rear suspension of the vehicle at the correct design height under loaded and unloaded conditions. The air suspension module will determine if the vehicle needs to be raised or lowered depending on the detected height changes determined by the left and right rear air suspension sensors. When the vehicle is raised, the inlet valves are opened and the relay is activated to start the compressor in order to inflate the rear air springs. Before the compressor is activated, the exhaust valve is opened momentarily to release air from a central chamber located within the valve assembly. Once the compressor is activated, the chamber is charged to a designed air pressure before the inlet valves are opened, which prevents lowering of the rear suspension caused by air exhausting from the rear air springs into the central chamber. As the rear suspension approaches the design height, the compressor will remain activated but only one inlet valve is open at any given time depending upon which side of the vehicle has not reached the correct design ride height. Each inlet valve is switched closed and the compressor is switched OFF as soon as the design ride height is achieved on both sides of the vehicle. When the vehicle is lowered, the inlet valves and the exhaust valve are opened so that air is exhausted from the rear air springs. As the rear suspension approaches the design height, the inlet valves are pulsed ON and OFF while the exhaust valve remains open until the rear height of the vehicle meets the designed ride height.

## Compressor Assembly

The air compressor is a positive displacement air pump, powered by a 12 V DC permanent magnet motor. A thermal limit switch protects the compressor. A thermal limit switch is included to protect the compressor from being damaged as a result of the compressor running so long

that it becomes overheated, which may be caused by excessive use of the inflator or a faulty air suspension relay. The thermal limit switch is normally closed and provides a ground signal to the air suspension module. If there is an over temperature condition the thermal limit switch will open and signals the air suspension module to deactivate the compressor relay. The compressor will stop running and a DTC will set. As long as the compressor has not been damaged, the thermal limit switch will close, clearing the DTC, as the over temperature condition returns to normal leading to the compressor operating under normal conditions. Intake air for the compressor is drawn through an intake filter and line that is attached to the fuel filler pipe in the left rear wheel area. The air compressor assembly is mounted to a bracket that is located under the rear center of the vehicle. The compressor air dryer is mounted next to the air compressor. It contains a moisture absorbing chemical that dries the compressed air before it is delivered to the rear air springs. Moisture is removed from the dryer and returned to the atmosphere when air is exhausted from the air springs during vehicle lowering.

## **Air Suspension Module**

The air suspension module will conduct several self test at every ignition activation, while other test do not commence until wheel speed is detected at the wheel speed sensors. During self test if any of the module components are found to be malfunctioning a DTC will set and the corresponding telltale is activated. The telltale message that the air suspension module can display is SERVICE SUSPENSION SYSTEM. Each DTC consists of one current and one history DTC. History codes will be cleared after 100 consecutive malfunction free ignition cycles or with a scan tool. The air suspension module communicates with other modules in the vehicle via class 2. There is a standby feature in the air suspension module whereby downward leveling is possible for 30 minutes after the ignition has been turned off. This is to allow the vehicle to level after a load has been removed. The leveling function will be disabled when any door is open or when the inflator is being used. To prevent energizing the electronically controlled air suspension relay or air suspension inlet valves during normal ride motions the air suspension module provides a calibrated delay before leveling the vehicle.

## **Electronically Controlled Air Suspension Relay**

The compressor is controlled by the air suspension module by the use of a relay. The relay and wiring are protected with a 60-amp fuse. The air suspension module will only activate the compressor relay when the engine is running.

## **Air Suspension Sensors**

The rear air suspension sensors are potentiometers which detect height changes at the rear of the vehicle. The sensors relay the height changes to the air suspension module. The sensors are mounted to the frame at the rear wheel area on the left and right sides. The activation arm is attached to the upper control arms of the rear suspension.

## **Ride Height Switch**

Extended ride height is used to increase vehicle ground clearance. When the ERH switch is activated the vehicle will raise 2 inches at the rear. The extended ride height will only occur if vehicle speed is less than 64 km/h (40 mph) with all doors closed and the engine running. When the switch is activated the switch LED will flash while the vehicle is transitioning to extended ride height. When the vehicle reaches extended ride height switch LED will be on continuously. The vehicle will return to normal height when the switch is activated again and the switch LED will go off. The vehicle will automatically return to normal height if vehicle speed increases over 64 km/h (40 mph) and the switch LED will turn off.

## **Air Suspension Exhaust Valve**

The air suspension exhaust valve is used to exhaust air from the air springs and lower the vehicle. The air suspension exhaust valve is mounted on the head of the compressor. The air suspension exhaust valve is controlled by the air suspension module.

### **Air Suspension Inflator Switch and Fill Valve**

The inflator system consist of a inflator hose to provide a means of inflating objects and a switch with a LED located in the rear compartment. The inflator will only function when the engine is running and the vehicle is in park. The switch LED will be illuminated with the inflator on. The inflator function will have priority over leveling functions.

### **Air Suspension Pressure Sensor**

The air suspension system uses the air pressure sensor to monitor system pressure. The air suspension module uses that signal to determine if there is a leak in the system and to maintain a minimum air pressure in the system.

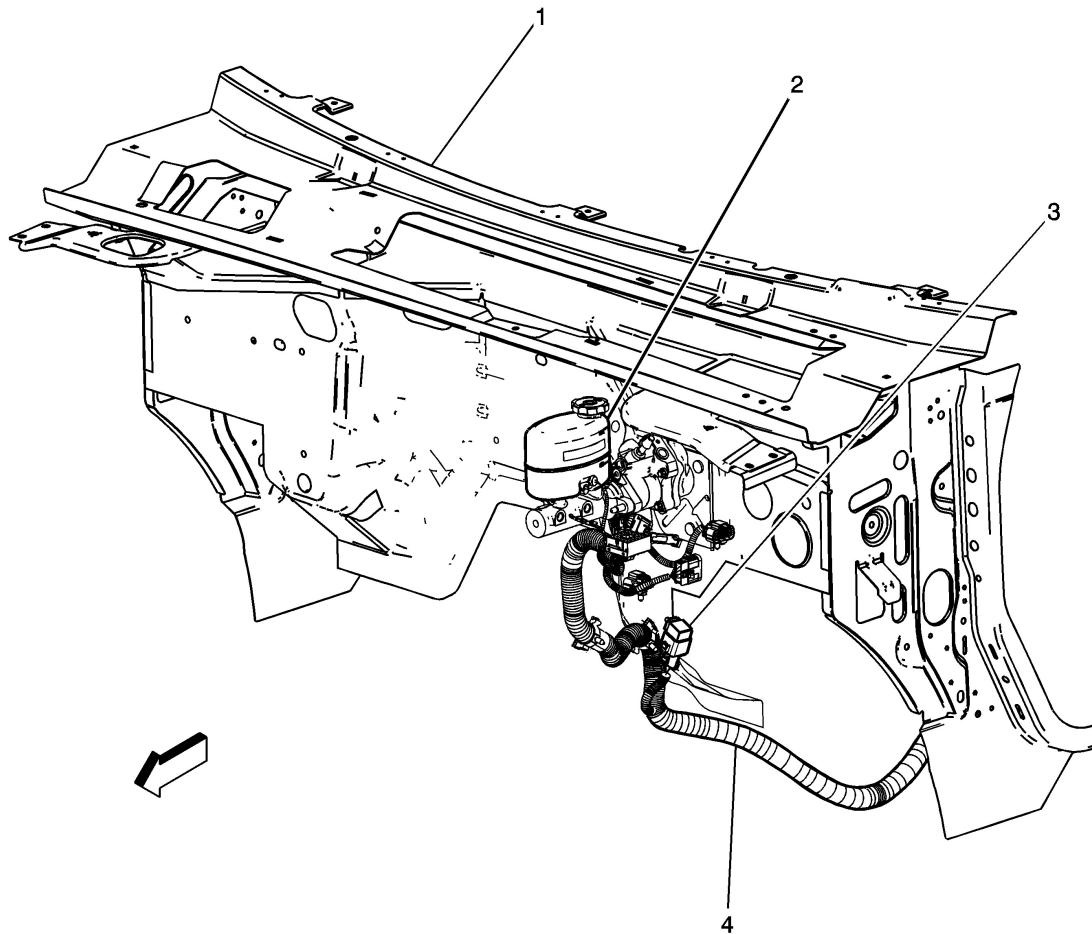
### **Air Suspension Inlet Valves**

The air suspension system has two inlet valves. One for the right air spring and one for the left air spring. The valves are mounted to the valve block with the air suspension pressure sensor and is located next to the compressor. The valves are activated and controlled independently by the air suspension module.

### **Rear Air Springs**

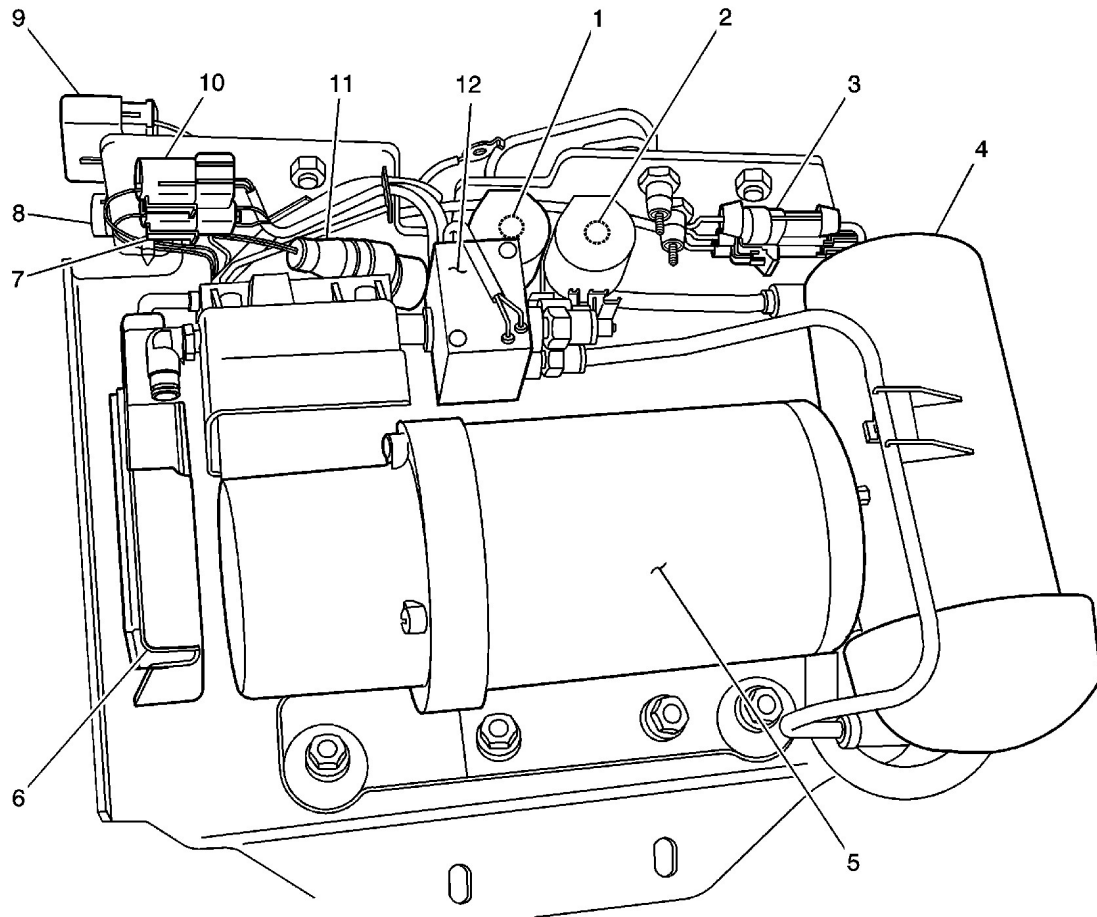
The air springs are mounted in the frame in the same location were the coil spring is mounted for a vehicle without air suspension. Support pieces are affixed to the axle for the air springs.

## LR of Engine Compartment



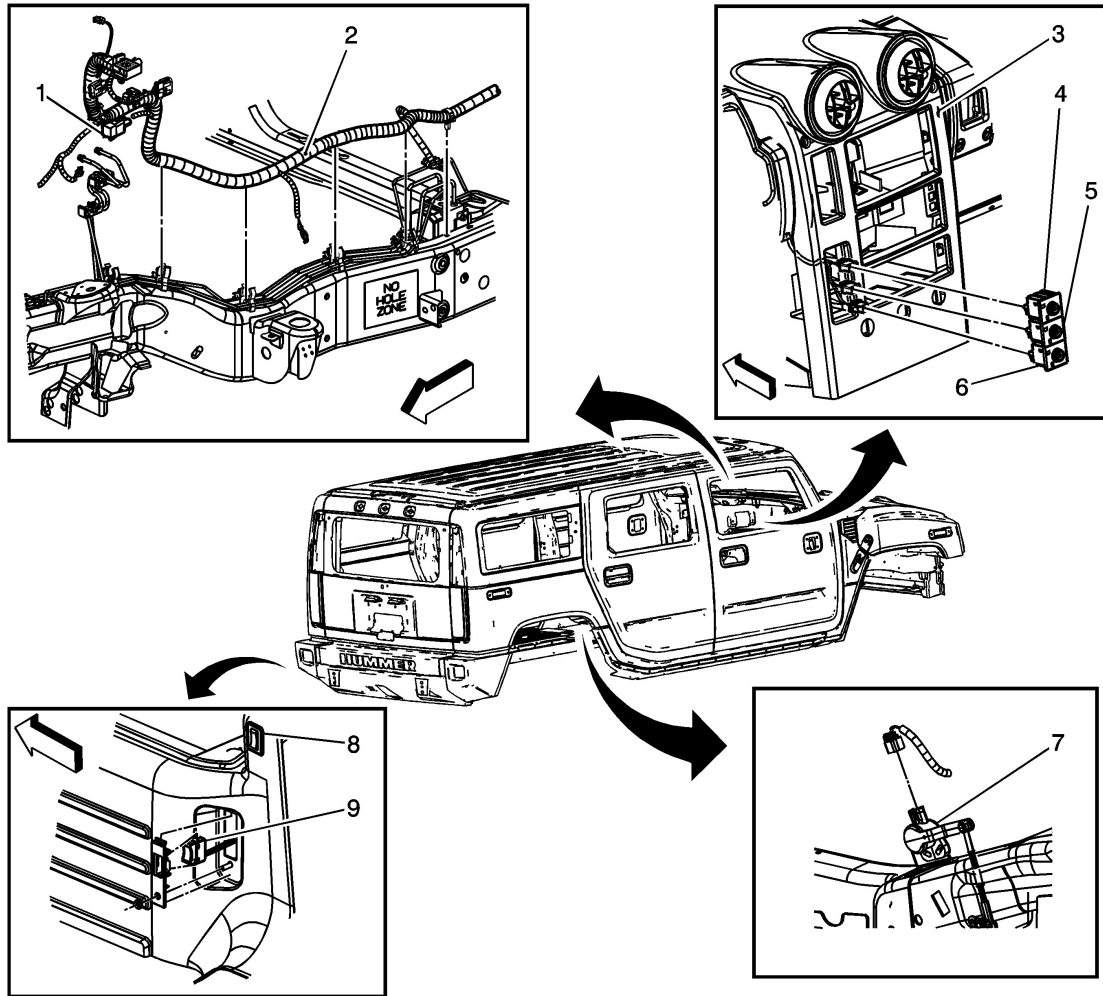
- (1) Dash-Upper Plenum
- (2) Master Cylinder
- (3) Electronically Controlled Air Suspension Relay
- (4) Chassis Harness

## Air Suspension Sub-System Components 1 of 2



- (1) Air Suspension Inlet Valve-LR
- (2) Air Suspension Inlet Valve-RR
- (3) Compressor Connector
- (4) Air Suspension Air Dryer
- (5) Air Suspension Compressor
- (6) Air Suspension Module
- (7) Air Suspension Exhaust Valve Connector
- (8) C450
- (9) C451
- (10) Air Suspension Inlet Valve Connector-LR/RR
- (11) Air Suspension Pressure Sensor
- (12) Air Suspension Exhaust Valve

## Air Suspension Sub-System Components 2 of 2

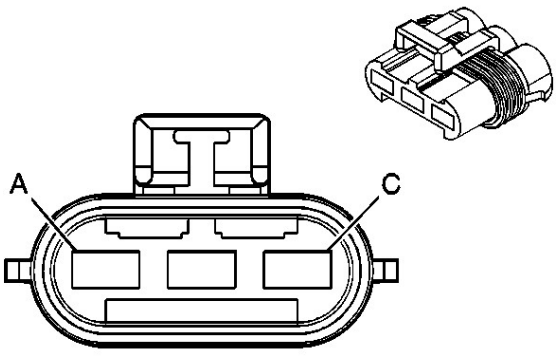


- (1) Electronically Controlled Air Suspension Relay
- (2) Chassis Harness
- (3) I/P Compartment
- (4) Traction Control Switch
- (5) Tow/Haul Switch
- (6) Ride Height Switch
- (7) Air Suspension Sensor - LR
- (8) Door Lock Switch - Rear
- (9) Air Suspension Inflater Switch

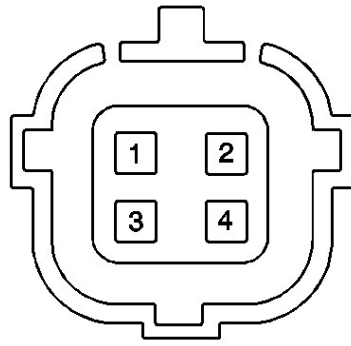
# Suspension Controls Connector End Views

- Table 1:** [Air Suspension Compressor \(ZM6\)](#)
- Table 2:** [Air Suspension Exhaust Valve \(ZM6\)](#)
- Table 3:** [Air Suspension Inflator Switch \(ZM6\)](#)
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## Air Suspension Compressor (ZM6)

			
<b>Connector Part Information</b>		<ul style="list-style-type: none"> <li>● <b>12124685</b></li> <li>● <b>3-Way F Metri-Pack 680 Series Sealed (BK)</b></li> </ul>	
Pin	Wire Color	Circuit No.	Function
A	RD	1A	Compressor Battery Positive Voltage
B	BK	2A	Ground
C	YE	3L	Over Temperature Signal

**Air Suspension Exhaust Valve (ZM6)**

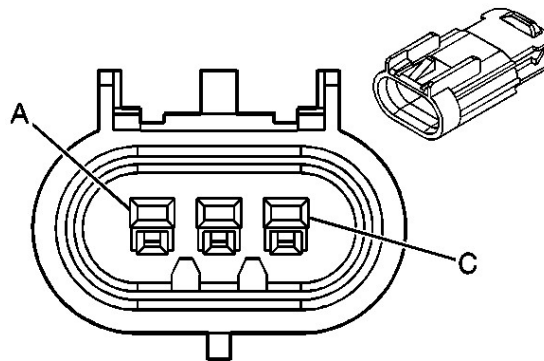


**Connector Part Information**

- 344270-3
- 4-Way F AMP 070 Series Sealed (BU)

Pin	Wire Color	Circuit No.	Function
1	--	--	Not Used
2	YE	3P	Air Suspension Exhaust Valve Control
3	YE	3U	Ground
4	--	--	Not Used

**Air Suspension Inflator Switch (ZM6)**



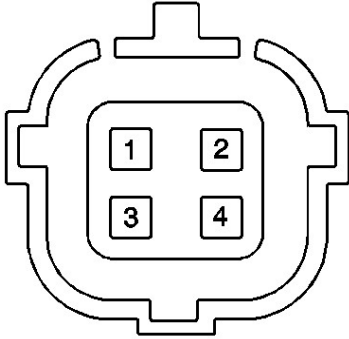
**Connector Part Information**

- 15326813
- 3-Way M 150 Sealed (BK)



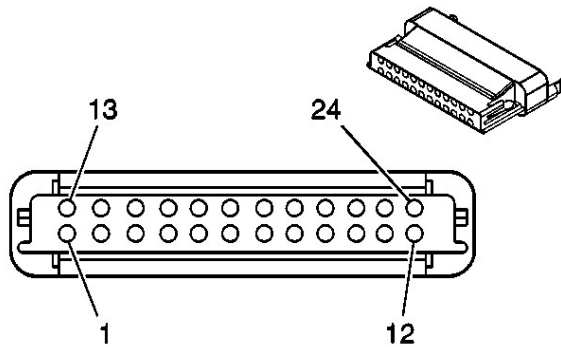
Pin	Wire Color	Circuit No.	Function
A	PU	5523	Inflator Switch Signal
B	L-GN	5522	Inflator Switch Low Reference
C	OR	5524	Inflator Switch Indicator Control

**Air Suspension Inlet Valve - LR/RR (ZM6)**

			
<b>Connector Part Information</b>		<ul style="list-style-type: none"> <li>• 344270-1</li> <li>• 4-Way F AMP 070 Series Sealed (BK)</li> </ul>	
Pin	Wire Color	Circuit No.	Function
1	YE	3S	Ground
2	YE	3N	Inlet Valve-LR Control
3	YE	3T	Ground
4	YE	3O	Inlet Valve-RR Control

**Air Suspension Module (ZM6)**

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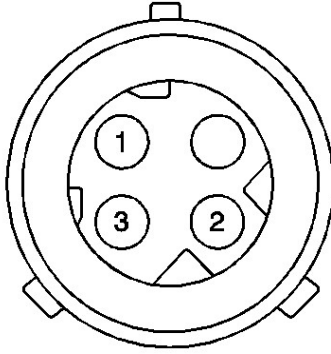
**Connector Part Information**

- **12129225**
- **24-Way F Micro-Pack 100 Series (GY)**

Pin	Wire Color	Circuit No.	Function
1	YE	3P	Air Suspension Exhaust Valve Control
2	YE	3O	Air Suspension Inlet Valve-RR Control
3	YE	3A	5-Volt Reference
4	YE	3C	Air Suspension Sensor Signal-RR
5	YE	3B	Air Suspension Sensor Signal-LR
6	YE	3G	Ride Height Switch Signal
7	YE	2D	Low Reference
8	YE	2B	Ground
9	--	--	Not Used
10	YE	3J	SCM (Suspension) Class 2 Serial Data
11	YE	3K	Air Suspension Pressure Sensor Signal

12	YE	1B	Battery Positive Voltage
13	YE	3M	Air Suspension Relay Control
14	YE	3N	Air Suspension Inlet Valve-LR Control
15	YE	3E	Ride Height Active Indicator Control
16	YE	3D	Inflator Switch Indicator Control
17	YE	3H	Inflator Switch Signal
18	YE	3L	Over Temperature Signal
19	YE	2E	Low Reference
20	YE	2C	Inflator Switch Low Reference
21	YE	3F	Ignition 3 Voltage
22	--	--	Not Used
23	YE	3R	Ground
24	--	--	Not Used

**Air Suspension Pressure Sensor (ZM6)**

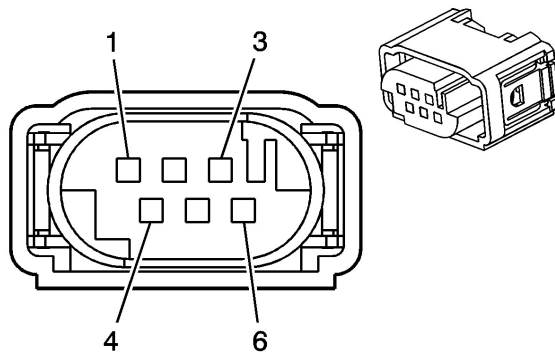


**Connector Part Information**

- **9800426**
- **4-Way F Schlemmer DIN Sealed (GN)**

Pin	Wire Color	Circuit No.	Function
1	YE	3A	5-Volt Reference
2	YE	2E	Low Reference
3	YE	3K	Air Suspension Pressure Sensor Signal
4	--	--	Not Used

**Air Suspension Sensor - LR (ZM6)**

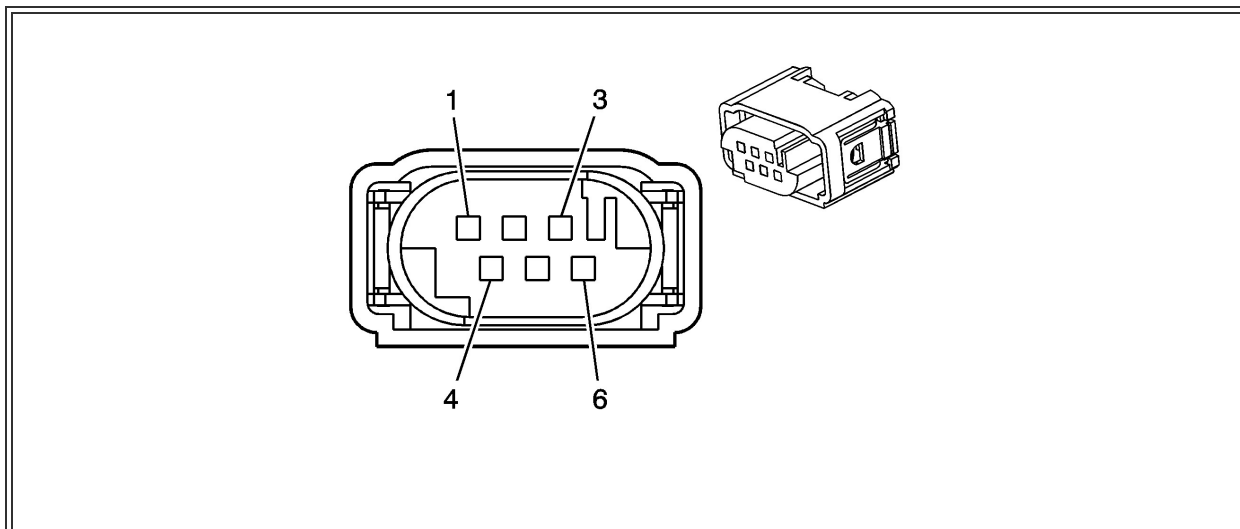


**Connector Part Information**

- **15355474**
- **6-Way F MQS SLD (BK)**

Pin	Wire Color	Circuit No.	Function
1	GY	2165	5-Volt Reference
2	BN	2184	Air Suspension Sensor Signal-LR
3	PU	2185	Low Reference
4-6	--	--	Not Used

**Air Suspension Sensor - RR (ZM6)**

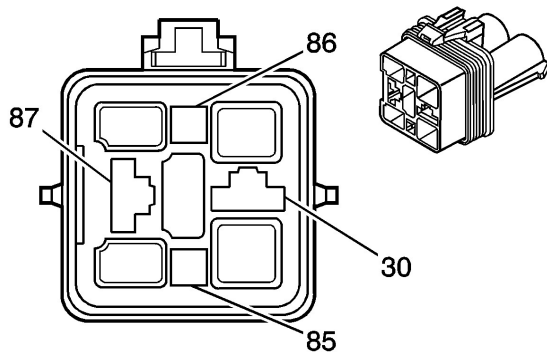


**Connector Part Information**

- 15355474
- 6-Way F MQS SLD (BK)

Pin	Wire Color	Circuit No.	Function
1	PU	2185	Low Reference
2	BN	2227	Air Suspension Sensor Signal - RR
3	GY	2165	5-Volt Reference
4-6	--	--	Not Used

**Electronically Controlled Air Suspension Compressor Relay (ZM6)**

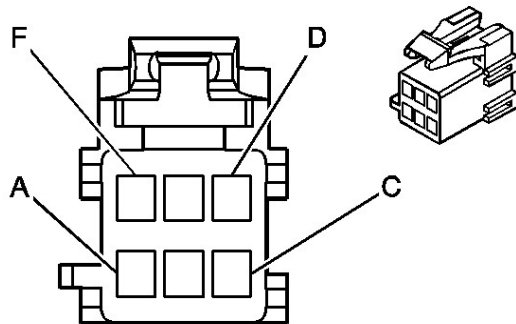


**Connector Part Information**

- **15336745**
- **4-Way F GR 280 Series Metri-Pack 800 Sealed (GY)**

Pin	Wire Color	Circuit No.	Function
30	D-GN	322	Air Suspension Compressor Motor Control
85	GY	2672	Air Suspension Relay Control
86	YE	321	Air Suspension Relay Ground
87	RD	4042	Air Suspension Relay Supply Voltage

**Air Suspension Ride Height Switch (ZM6)**



- **12177194**

Connector Part Information		● 6-Way F Metri-Pack 150 Series (WH)	
Pin	Wire Color	Circuit No.	Function
A	L-BU	5521	Ride Height Switch Signal
B	BK	1050	Ground
C	WH	5520	Ride Height Active Indicator Control
D	PU/WH	1382	LED Dimming Signal
E	BN/WH	230	Instrument Panel Lamps Dimming Control
F	BN	241	Ignition 3 Voltage