

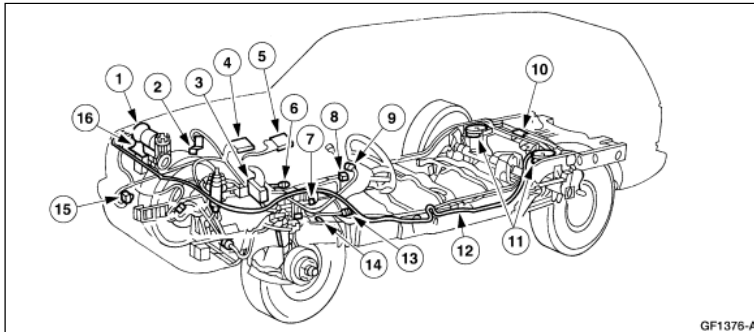
SECTION 204-05A: Suspension Load Leveling Control — Rear
DESCRIPTION AND OPERATION

1998 Expedition/Navigator Workshop Manual
Procedure revision date: 02/11/2000

Vehicle Dynamic Suspension

⚠ WARNING: Before replacing any air suspension components, disconnect power to the system by turning off the air suspension switch located in the rh kick panel area to prevent vehicle damage or personal injury.

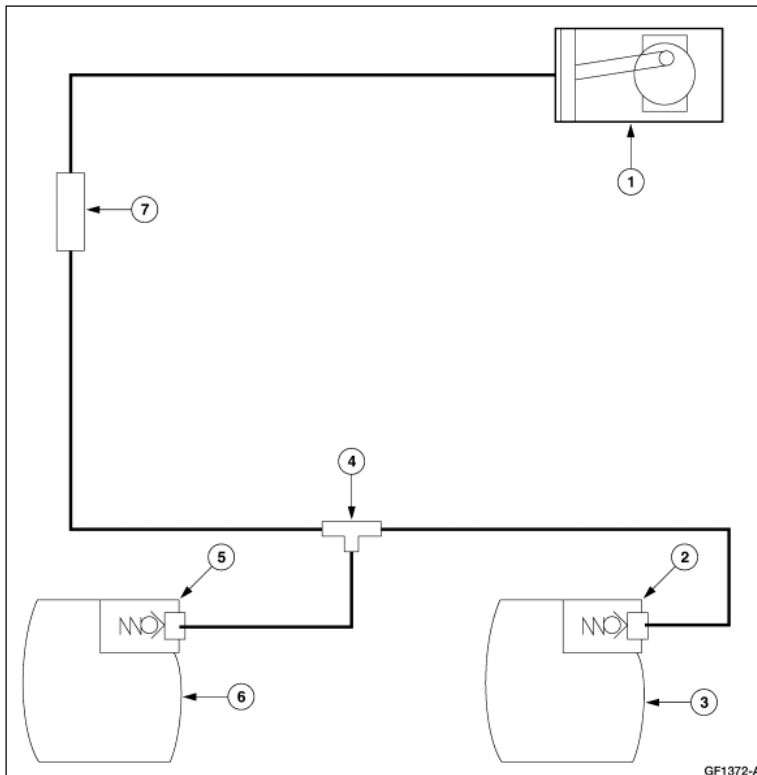
Rear Air Suspension Load Leveling Control Components



GF1376-A

Item	Part Number	Description
1	5346	Compressor Air Drier
2	5K761	Air Suspension Switch
3	14B205	Generic Electronic Module (GEM)
4	12A650	Powertrain Control Module
5	5A919	Air Suspension Control Module
6	—	Check Air Suspension Indicator
7	9E731	Vehicle Speed Sensor
8	18B015	Electronic Steering Sensor
9	11572	Ignition Switch
10	5359	Air Suspension Height Sensor— (Rear)
11	—	Rear Air Springs
12	—	Air Lines
13	—	Brake Pedal Position (BPP) Switch
14	—	Electronic Variable Orifice (EVO) Actuator
15	14N089	Air Compressor Relay
16	5319	Air Compressor

Air Suspension Pneumatic Diagram



GF1372-A

Item	Part Number	Description
1	—	Compressor
2	—	RR Air Spring Solenoid
3	—	RR Air Spring
4	—	Air Line T-Fitting
5	—	LR Air Spring Solenoid
6	—	LR Air Spring
7	—	Union

The air suspension system is designed to improve ride, handling and general vehicle performance for static, on-road and off-road driving condition:

- Ride is improved by using an air type spring (the soft ride is inherent).
- Handling is improved by maintaining constant vehicle attitude.

The system consists of unique rear air springs, air compressor, air lines, air spring solenoids, height sensor, air suspension control module, attachments and associated signals derived from both driver and road inputs. With these components and signals, the air suspension control module commands changes in vehicle height that are necessary for the load leveling features.

The load leveling feature rear air suspension (RAS) systems shall automatically make adjustments in vehicle height so that the vehicle is always at trim height and constant front-to-rear vehicle attitudes are maintained over the expected load range of the vehicle. Adjustments in height that are necessary to correct height differences between the vehicle's left and right sides for RAS system shall be restricted to what can be reliably achieved with one air suspension height sensor.

The system uses one air suspension height sensor, a steering sensor, generic electronic module (GEM) transfer case inputs, and other vehicle sensors to measure driver and road inputs. The system changes vehicle height using an air compressor, two air lines, and the use of an air spring with an air spring solenoid.

The air suspension system holds vehicle height when the rear hatch or any door is opened. The system stores rear vehicle height the moment any open door is detected. The system then maintains this height regardless of the addition or removal of a load. The system will return to its commanded height when all doors are closed and the vehicle speed exceeds 16 km/h (10 mph).

Air Suspension Switch

The air suspension switch is located behind the RH kick panel on a mounting bracket. The switch interrupts power to the air suspension control module.

The air suspension switch supplies a signal to the air suspension control module. Without the air suspension control module receiving this signal the load leveling system is inoperative and will not react when rear of the vehicle is raised or lowered. If the air suspension system is disabled by turning off air suspension switch, a "CHECK SUSP" will appear in the RH corner of the instrument cluster with the ignition in the run position.

Air Compressor

The RAS air compressor:

- Is not interchangeable with four wheel air suspension (4WAS) compressor.
- Consists of the compressor and vent solenoid; neither are replaceable as individual items.
- Is mounted in the engine compartment between the washer fluid bottle and headlamp (RH front corner).
- Is a single cylinder electric motor driven unit that provides pressurized air as required.
- Is powered by a solid state relay, controlled by the air suspension control module.
- Passes pressurized air through the compressor air drier that contains silica gel (a drying agent). Moisture is then removed from the compressor air drier when vented air passes out of the system during vent operation.
- Air drier has a single port and is not interchangeable with 4WAS compressor air drier.
- Air drier may be replaced separately.
- Incorporates a snorkle that may be replaced separately.

The vent solenoid:

- Allows air to escape from the system during venting actions.
- Is located in the air compressor cylinder head.
- Has a 160 psi internal relief valve.
- Shares a common electrical connector with the air compressor motor.
- Is enclosed in the cylinder head casting, which forms an integral valve housing that allows the valve tip to enter the pressurized side of the system.
- Has an O-ring seal that prevents air leakage past the valve tip.
- Opens when the air suspension control module determines lowering is required.
- Provides an escape route for pressurized air that opens when system pressures exceed safe operating levels.
- Is replaced with the air compressor as a unit.

Air Spring

RAS vehicles use air springs in the rear. The air springs provide a varying spring rate proportional to the systems air pressure and volume. The air suspension system regulates the air pressure in each air spring by compressing and venting the system air. Increasing air pressure (compressing) raises the rear of the vehicle while decreasing air pressure (venting) lowers the rear of the vehicle. Vehicle height is maintained by the addition and removal of air in each air spring through an air spring solenoid installed in the upper spring cap and energized through the air suspension control module.

The air springs are mounted between the axle spring seats and the frame upper spring seats.

The two air springs replace the conventional rear coil springs.

Air Suspension Height Sensor

When the air suspension height sensor indicates that the rear of the vehicle is lower than trim under normal driving conditions, the air compressor will turn on and pump compressed air to the air springs. When the sensor indicates that the rear of the vehicle is raised above trim under normal driving conditions, this will cause the air to be vented from the air springs to lower the vehicle back to its trim height level.

One air suspension height sensor is mounted on the vehicle. The air suspension height sensor sends a voltage signal to the air suspension control module. The output ranges from approximately 4.75 volts at minimum height (when the vehicle is low or in full jounce), to 0.25 volts at maximum height (when the vehicle is high or in full rebound). The air suspension height sensor has a useable range of 80 mm (3 in) compared to total suspension travel of 200-250 mm (8 to 10 in) at the wheel. Therefore, the air suspension height sensor is mounted to the suspension at a point where full rear suspension travel at the wheel is relative to 80 mm of travel at the air suspension height sensor. The air suspension height sensor is attached between the No. 5 frame crossmember (upper socket) and the panhard rod (lower socket). Replace the air suspension height sensor as a unit.

Compressor Relay

The compressor relay is energized by the air suspension control module to allow high current to flow from the battery to the compressor motor.

- A solid state relay is used in the air suspension system for air compressor control. The relay incorporates a custom power metal oxide semi-conductor field effect transistor (MOSFET) and ceramic hybrid circuitry. The relay switches high current loads in response to low power signals and is controlled by the logic of the air suspension control module.

Air Suspension Control Module

NOTE: The 4WAS air suspension control module is used for the RAS system. The internal processor recognizes external circuitry to determine if it is installed in a 4WAS or a RAS equipped vehicle.

NOTE: The air suspension control module is calibrated with information from the air suspension height sensor. A new or exchanged air suspension control module requires a ride height adjustment calibration process to be performed.

The air suspension control module controls the air compressor motor (through a solid state relay), and the air spring solenoids. The air suspension control module also provides power to the air suspension height sensor. The air suspension control module controls vehicle height adjustments by monitoring the air suspension height sensor, vehicle speed, a steering sensor, acceleration input, the door ajar signal, transfer case signals, and the brake pedal position (BPP) switch. The air suspension control module also conducts all fail-safe and diagnostic strategies and contains self-test and communication software for testing of the vehicle and related components.

The air suspension control module is mounted in the passenger compartment inside the instrument panel above the radio and temperature controls.

The air suspension control module monitors and controls the air suspension system through a 32-pin two-way connector. The air suspension control module is keyed so that the air suspension control module cannot be plugged into an incorrect harness. There are two sides of the harness connection to the air suspension control module.

Each is uniquely colored and keyed to prevent reversing the connections.

Solenoid Valve, Air Spring



WARNING: Never rotate an air spring solenoid valve to the release slot in the end cap fitting until all pressurized air has escaped from the spring to prevent damage or injury.

The air spring solenoid:

- allows air to enter and exit the air spring during leveling operations.
- is electrically operated and controlled by the air suspension control module.

Air Suspension Diagnostic Connector

The air suspension diagnostic connector is used to aid the technician in diagnosing the air suspension system. It is also used to vent the system of compressed air when air suspension system components need to be repaired or replaced. The air suspension diagnostic connector is located under steering column.

Steering Sensor

The steering sensor is mounted inside the passenger compartment on the steering column. It provides steering rate and position to the air suspension control module through two signals.

Air Lines

The air lines are connected to the air compressor and routed through the chassis of the vehicle to the air springs. There are two air lines on the air load leveling suspension system. The air lines cannot be spliced or repaired if the air lines have been cut or ruptured.
