



1. Description

This procedure describes the diagnosis, repair, and inspection of suspension air springs.



2. Purpose

The purpose of this procedure is to provide industry-accepted requirements for performing high-quality repair of suspension air springs. This procedure is intended for use by professionals who are qualified through training and experience.



3. Referenced Documents

The following documents are considered part of this procedure by reference.

3.1 Procedures

EL21 Self-Diagnostics
PS01 Personnel Safety
WA01 Wheel Alignment, Front
WA11 Wheel Alignment, Rear
WH01S Wheel

3.2 Other Information

Equipment-specific information
Vehicle-specific dimension specifications
Vehicle-specific repair information



4. Equipment And Material Requirements

4.1 Equipment

The use of this equipment is included in this procedure:

- digital volt-ohmmeter (DVOM)
- jumper wires

Some suspension air springs may require these additional items:

- OEM specialty testers
- universal or vehicle-specific scan tools with air-suspension diagnostic programming
- universal or vehicle-specific breakout boxes



5. Damage Analysis

5.1 General Damage

Inspect the air springs for these conditions:

- visible damage
- improper previous repairs
- disconnected, pinched, or cut air lines
- air leaks
- improper ride height
- damaged or corroded wiring connectors

Damaged air lines may be repairable. Follow the vehicle maker's recommendations.

If the air-spring dash warning lamp does not light, flashes, or stays on continuously, inspect for these conditions:

- burned out indicator lamp
- blown fuses
- damaged, disconnected, or corroded wiring, connectors, or terminals
- damaged relays or switches
- damaged sensors
- damaged control module
- damaged air lines
- damaged air compressor
- damaged air-spring bags
- modifications to the suspension system

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5. Damage Analysis (cont'd)

If no damage is identified, perform the vehicle maker's air-spring suspension diagnostic tests. See **EL21**. Replace any parts, or correct the conditions, that cause the diagnostic tests to fail. Verify the availability of replacement parts.

Further checks may be required to determine the location and extent of damage. Follow the vehicle maker's recommendations. If there are no visible indications of damage, road-test the vehicle to confirm the diagnosis or verify proper operation of the suspension system. See **11.3**.



6. Personnel Safety

6.1 General Safety

General safety information is in **PS01**.

6.2 Air Pressure Safety

To prevent injury from air springs under pressure:

- Make sure the air-suspension switch is OFF before the vehicle is lifted.
- Follow the vehicle maker's recommendations for depressurizing the air springs before disassembling.

6.3 Anti-Lock Brake System (ABS) High-Pressure Safety

ABS systems use brake fluid under extremely high pressure. To prevent injury from high brake-fluid pressures, follow the vehicle maker's recommendations for depressurizing the system.



7. Environmental Safety

Does not apply



8. Vehicle Protection

8.1 Suspension System

To protect the air springs from damage:

- Make sure the ignition and air-suspension switches are OFF before towing or lifting the vehicle, or servicing the system.
- Release the air pressure from the air springs before removing any parts. Follow the vehicle maker's recommendations.
- Do not apply heat to suspension parts unless recommended by the vehicle maker.
- Properly lift and support the vehicle.

8.2 Electronic Parts

To protect computers and other sensitive parts from damage:

- Follow the vehicle maker's recommendations for recording and resetting electronic memories.
- Ensure that the ignition switch is in the LOCK position, and the key is removed.
- Disconnect and isolate the negative battery cable, and disarm the passive restraint system, if required. Follow the vehicle maker's recommendations.
- Carefully remove computer modules when welding or heating within 300 mm (12"). Some vehicle makers specify greater distances.
- Protect modules, connectors, and wiring from dirt, heat, static electricity, and moisture.
- Loosen or remove any wiring harnesses or electrical parts that could be damaged during the repair process.



9. Repair Procedure

Ensure that the vehicle structure is aligned to the vehicle maker's dimension specifications, and all suspension mounting points are properly positioned.

9.1 Parts Replacement

To replace air-spring suspension parts:

1. Turn the air-suspension switch OFF.
2. Properly lift and support the vehicle.
3. Remove the damaged parts.
4. Install the replacement parts, duplicating the original mounting methods.
5. Torque all fasteners to the vehicle maker's recommendations.
6. Refill the air springs with compressed air, following the vehicle maker's pressure recommendations.

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9. Repair Procedure (cont'd)

- 7. Lower the vehicle.
- 8. Reconnect the negative battery cable.
- 9. Turn the air-suspension switch ON.
- 10. Adjust the ride height, following the vehicle maker's recommendations.
- 11. Start the vehicle and check the air-suspension dash warning lamp operation.
- 12. Perform a two- or four-wheel alignment, as required.
- 13. Continue vehicle reassembly.
- 14. Road-test the vehicle. See **11.3**.

9.2 Control Module Replacement

To replace a control module:

- 1. Turn the air-suspension switch OFF.
- 2. Disconnect the negative battery cable.
- 3. Remove access panels, if required.
- 4. Disconnect the electrical connector from the module.
- 5. Remove all mounting fasteners.
- 6. Remove the control module.
- 7. Position the replacement control module in the proper location.
- 8. Install all mounting fasteners, duplicating the original mounting method.
- 9. Torque the fasteners to the vehicle maker's recommendations.
- 10. Reconnect the electrical connector.
- 11. Reconnect the negative battery cable.
- 12. Turn the air-suspension switch ON.
- 13. Check for air leaks in the system. Follow the vehicle maker's recommendations.
- 14. Adjust the ride height, following the vehicle maker's recommendations.
- 15. Start the vehicle and check the air-suspension dash warning lamp operation.
- 16. Continue vehicle reassembly.
- 17. Road-test the vehicle. See **11.3**.

9.3 Air Compressor Replacement

To replace an air-compressor assembly:

- 1. Turn the air-suspension switch OFF.
- 2. Disconnect the negative battery cable.
- 3. Properly lift and support the vehicle.
- 4. Remove the air-compressor cover.
- 5. Disconnect the air lines and electrical connectors from the air compressor.
- 6. Remove the mounting fasteners holding the compressor and lower the assembly from the vehicle.
- 7. Install the replacement compressor, duplicating the original mounting method.
- 8. Torque the fasteners to the vehicle maker's recommendations.

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9. Repair Procedure (cont'd)

- 9. Reconnect the electrical connectors and the air lines.
- 10. Reconnect the negative battery cable.
- 11. Lower the vehicle.
- 12. Start the vehicle and check the air-suspension dash warning lamp operation.
- 13. Turn the air-suspension switch ON.
- 14. Adjust the ride height, following the vehicle maker's recommendations.
- 15. Continue vehicle reassembly.
- 16. Road-test the vehicle. See **11.3**.



10. Use Of Recycled (Salvage) Parts

10.1 Condition Of Salvage Parts

Use extreme care in selecting and using salvage air springs. Whenever possible, compare salvage parts to new parts.

Do not install salvage suspension parts with these defects:

- evidence of damage or previous repairs
- evidence of having been heated, welded, or straightened

Do not install salvage bushings or fasteners.



11. Inspection And Testing

11.1 Air-Spring Suspension System Inspection

When repairs are completed, inspect the vehicle for these conditions:

- proper ride height
- no creases in the air-spring membrane
- proper routing of air lines and electrical wiring
- proper connection of all electrical connectors
- proper installation of fasteners, brackets, clamps, and retaining clips
- fasteners torqued to the vehicle maker's recommendations
- proper lubrication of parts
- proper wheel alignment
- steering wheel centered
- no air leaks
- proper routing of brake lines and hoses

Correct any defects.

11.2 Air-Spring Suspension Diagnostics

To test air springs:

- 1. Follow the vehicle maker's diagnostic procedures. A vehicle-specific scan tool or breakout box may be required.
- 2. Check for proper operation of the air-suspension dash warning lamp.

Correct any defects.

11.3 Road-Test

Road-test the vehicle and check for these conditions:

- abnormal steering effort or handling
- body roll or sway when cornering
- body dive when braking
- unusual noises when accelerating, turning, or braking
- proper operation of the air-suspension dash warning lamp

Correct any defects.