



SU41

Solid Axle, Leaf Springs

**Uniform
Procedures For
Collision Repair
UPCR**

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v.4.0



1. Description

This procedure describes the diagnosis, repair, and inspection of a solid-axle, leaf-spring suspension system.



2. Purpose

The purpose of this procedure is to provide industry-accepted requirements for performing high-quality repair of solid-axle, leaf-spring suspension systems. 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

- BR11 Brakes
- BR51 Brakes, Anti-Lock And Traction Control
- DT21 Halfshafts
- DT31 Driveshaft
- HM01 Hazardous Materials
- ME01 Three-Dimensional Measuring
- PS01 Personnel Safety
- SR41 Knuckle And Spindle
- ST11 Structural Straightening
- WA01 Wheel Alignment, Front
- WA11 Wheel Alignment, Rear
- WH01S Wheel

3.2 Other Information

- Equipment-specific information
- Recycled parts 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:

- dial indicator
- control-arm bushing replacement tool
- special service tools



5. Damage Analysis

5.1 General Damage

Inspect the vehicle and suspension system for these conditions:

- visible damage to the structural rails and crossmembers
- visible damage to or misalignment of suspension system parts
- improper previous repairs
- worn, damaged, or leaking shock absorbers
- damaged or loose mountings
- worn or damaged bushings
- worn, broken, or damaged leaf springs
- leaf separation or misalignment
- worn or damaged plastic silencers, if applicable
- obvious wheel misalignment
- damaged or loose axle U-bolts or nuts

5.2 Solid-Axle, Leaf-Spring Suspension Damage Checks

Check the suspension system for these conditions:

- improper ride height
- more than one bounce when the bumper is pushed downward at a corner and released
- incorrect ball joint locations
- visible axle or housing damage or misalignment
- damaged steering knuckle or spindle (see **SR41**)
- damaged or broken spring center bolt or center plate on the axle
- damaged or missing jounce bumper
- wheel misalignment (see **WA01** or **WA11**)
- unusual tire-wear patterns
- modifications to the suspension system
- lubricant leaks at the axle end seals

Damaged parts must be replaced. Verify the availability of replacement parts. Plan to replace shackle bushings, brackets, or mounts if there is movement in the spring shackle. Replacement of worn parts will be necessary to restore proper suspension system performance. It may be necessary to replace parts on both sides of the vehicle (in axle sets) to restore ride height and proper suspension performance. Follow the vehicle maker's recommendations and procedures for the replacement of suspension parts, which may include the following:

- leaf springs
- spring shackles
- spring spacers
- spring center bolt

(cont'd)



5. Damage Analysis (cont'd)

- anchor plates
- shock absorbers
- axle housing
- related steering parts
- bushings
- fasteners
- U-bolts

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 **11.2**.



6. Personnel Safety

6.1 General Safety

General safety information is in **PS01**.

6.2 Suspension Safety

To prevent injury when working with leaf-spring suspension systems:

- Properly lift and support the vehicle.
- Follow the vehicle maker's recommendations for drilling gas-filled shock absorbers before disposal.
- Use the proper tools and follow the equipment and vehicle maker's recommendations.

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

7.1 Shock Absorber Disposal

Shock absorbers that contain hydraulic fluid must be disposed of following local hazardous waste regulations.

Hazardous material safety information is in **HM01**.



8. Vehicle Protection

8.1 Suspension And Underbody Parts

To protect the vehicle suspension and other underbody parts from damage:

- Do not weld or apply heat to any suspension part, unless recommended by the vehicle maker.
- Use the proper tools, and follow the equipment and vehicle makers' recommendations.
- Disable electronically modulated suspension and traction control systems, if recommended by the vehicle maker.

8.2 ABS Parts

Follow ABS system protection requirements as described in **BR51**.



9. Repair Procedure

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

9.1 Parts Replacement

To replace suspension parts:

1. Properly lift and support the vehicle.
2. Disconnect and seal the brake lines, if required.
3. Disconnect the wiring for ABS and electronic ride control, if applicable.
4. Disconnect the emergency brake cable, if required.
5. Remove the driveshaft, if applicable.
6. Disconnect the shock absorbers, if required.
7. Remove fasteners and bushings, if required.

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9. Repair Procedure (cont'd)

- 8. Remove the damaged axle assembly.
- 9. Install the replacement parts, duplicating the original mounting methods. Replace one-time or damaged fasteners. If the tie-rod ends were disconnected from the steering knuckles, make sure the wheels are straight ahead before reattaching the tie-rod ends to the steering knuckles. Use replacement fasteners that are the same grade, size, and type as the original fasteners. Do not reuse cotter pins. Use a thread-locking material if recommended by the vehicle maker.
- 10. Torque all fasteners to the vehicle maker's recommendations.
- 11. Reconnect the brake lines.
- 12. Bleed the brakes following the vehicle maker's recommendations.
- 13. Reconnect the emergency brake cable, if required.
- 14. Reconnect the ABS and electronic ride control wiring, if applicable.
- 15. Install the driveshaft, if applicable.
- 16. Continue vehicle reassembly.
- 17. Lower the vehicle and verify the ride height to the vehicle maker's specifications.
- 18. Perform a two- or four-wheel alignment, as required.
- 19. Road-test the vehicle. See **11.2**.



10. Use Of Recycled (Salvage) Parts

10.1 Condition Of Salvage Parts

Use extreme care in selecting and using salvage suspension parts. Whenever possible, compare salvage parts to new parts. Inspect salvage parts for bends or cracks. Use a dye penetrant if necessary.

Remove the axle inspection cover. Inspect for water and damaged or worn gear teeth.

Do not install salvage suspension parts with these defects:

- evidence or damage of previous repair
- evidence of having been heated, welded, or straightened
- evidence of water in the axle housings
- evidence of lubricant leaks at axle end or where axle tubes connect to the center gear housing

Do not install salvage brake parts, bushings, fasteners, or shock absorbers.



11. Inspection And Testing

11.1 Solid-Axle, Leaf-Spring Suspension System Inspection

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

- proper installation of all fasteners, brackets, clamps, and retaining clips
- proper leaf alignment
- proper ride height
- proper mounting and position of all parts
- fasteners torqued to the vehicle maker's recommendations
- proper lubrication of parts
- proper wheel and axle alignment
- steering wheel centered
- proper routing of brake hoses and lines
- no brake fluid leakage
- ability to move wheels lock-to-lock without any signs of binding or interference
- noises such as rubbing, squeaking, or popping
- proper clearance between moving parts and fixed parts
- proper operation of all dash warning lamps

Correct any defects.

11.2 Road-Test

Road-test the vehicle and inspect for these conditions:

- vehicle wander
- pulling to one side
- abnormal steering effort or handling
- poor steering return
- steering wheel shimmy
- bump steer conditions
- body roll or sway when cornering
- body dive when braking
- dogtracking
- unusual noises when accelerating, turning, or braking
- off-center steering wheel
- improper braking action
- proper operation of ABS and electronic ride control systems

Correct any defects.