



# SU21

## Twin I-Beam

**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 twin I-beam suspension system.



### 2. Purpose

The purpose of this procedure is to provide industry-accepted requirements for performing high-quality repair of twin I-beam 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
- 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:

- ball joint removal and pressing tool
- dial indicator
- coil spring compressor
- tie-rod end and ball joint puller
- tie-rod sleeve-adjusting tool



## 5. Damage Analysis

### 5.1 General Damage

Inspect the vehicle and twin I-beam suspension system for these conditions:

- visible damage to the frame rails or crossmembers
- visible damage to suspension system parts
- improper previous repairs
- worn, damaged, or leaking shock absorbers
- damaged or loose mountings
- worn or damaged bushings
- worn or damaged ball joints or kingpins (see **SR41**)
- worn, damaged or improperly seated coil springs
- obvious wheel misalignment

### 5.2 Twin I-Beam Suspension Damage Checks

Check the suspension for these conditions:

- improper ride height
- more than one bounce when the bumper is pushed downward at a corner and released
- noise or binding when the wheel is steered with the tie rod disconnected
- incorrect ball joint locations
- ball joint movement when the wheels are rocked sideways
- damaged steering knuckle or spindle (see **SR41**)
- suspension noise when wheels are steered through full range
- out-of-spec bushing movement when pried
- visible damage or misalignment of I-beam axle
- damaged or missing jounce bumper
- wheel misalignment (see **WA01**)
- unusual tire-wear patterns
- modifications to the suspension system
- radius rod movement and noise at frame bracket

Damaged parts must be replaced. Verify the availability of replacement parts. 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:

- I-beam axles
- radius rods
- coil springs
- shock absorbers
- stabilizer bar

**(cont'd)**



## 5. Damage Analysis (cont'd)

- bushings
- fasteners
- kingpins
- eccentric cams for caster/camber adjustment
- ball joints
- related steering 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 **11.2**.



## 6. Personnel Safety

### 6.1 General Safety

General safety information is in **PS01**.

### 6.2 Suspension Safety

To prevent injury when working with suspension systems:

- Properly lift and support the vehicle.
- Follow the vehicle maker's recommendations for drilling gas-filled shock absorbers before disposal.
- Do not attempt to remove a coil spring without first compressing the spring and supporting the I-beam.
- Follow the equipment and vehicle maker's recommendations, with the proper tools, when compressing springs.

### 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 System

To protect the I-beam suspension system 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 maker's recommendations.

### 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 locations are properly positioned.

### 9.1 Parts Replacement

To replace suspension parts:

1. Properly lift and support the vehicle.
2. Disconnect the brake lines, if required.
3. Disconnect the wiring for ABS and electronic ride control, if applicable.
4. Compress the coil spring, if required.
5. Remove the shock absorber, if required.
6. Remove fasteners and bushings, if required.
7. Remove the axle shaft on four-wheel drive vehicles.
8. Remove the damaged axle assembly.

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## 9. Repair Procedure (cont'd)

- 9. Install the replacement parts, duplicating the original mounting methods. Compress the replacement coil spring. Be sure the coil spring is properly seated. Replace all 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 to the junction block.
- 12. Bleed the brakes following the vehicle maker's recommendations.
- 13. Reconnect the ABS and electronic ride control wiring, if applicable.
- 14. Continue vehicle reassembly.
- 15. Lower the vehicle and verify the ride height to the vehicle maker's specifications.
- 16. Perform a two- or four-wheel alignment, as required.
- 17. 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 dye penetrant if necessary.

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 brake parts, wheel bearings, bushings, fasteners, ball joints, tie-rod ends, or shock absorbers.



## 11. Inspection And Testing

### 11.1 Twin I-Beam Suspension System Inspection

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

- proper installation of all fasteners, brackets, clamps, and retaining clips
- proper tire inflation
- proper ride height
- proper alignment and mounting of all parts
- fasteners torqued to the vehicle maker's recommendations
- proper lubrication of parts
- proper wheel and axle alignment
- steering wheel centered
- 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 Twin I-Beam Suspension 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
- 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.