

Suspension System

Inspection and Verification

1. Road test the vehicle.
 - If any suspension alignment or ride height concerns are present, GO to [Symptom Chart — Suspension System](#).
 - Verify the customer concern by carrying out a road test on a smooth road. If any vibrations are present, GO to [Symptom Chart - NVH](#).
2. Inspect the tires.
 - Check the tire pressures with all normal loads in the vehicle and the tires cold. Refer to the Vehicle Certification (VC) label.
 - Verify that all tires are sized to specification. Refer to the VC label.
 - Inspect the tires for incorrect wear and damage. Install new tires as necessary.
3. Inspect the chassis and underbody.
 - Remove any excessive accumulation of mud, dirt or road deposits from the chassis and underbody.
4. Inspect for aftermarket equipment.
 - Check for aftermarket changes to the steering, suspension, and wheel and tire components (such as competition or heavy duty). The specifications shown in this manual do not apply to vehicles equipped with aftermarket equipment.

Visual Inspection Chart

Mechanical

- Front or rear suspension components
- Suspension fastener(s)
- Incorrect spring usage
- Spring(s)
- Shock absorber(s)
- Strut(s)
- Suspension bushing(s)
- Steering system components
- Wheel bearing(s)
- Non-OEM parts or modifications

5. If an obvious cause for an observed or reported condition is found, correct the cause (if possible) before proceeding to the next step.
6. If the fault is not visually evident, GO to [Symptom Chart — Suspension System](#) or GO to [Symptom Chart - NVH](#).

Symptom Chart — Suspension System

Symptom Chart — Suspension System

Condition	Possible Causes	Action
<ul style="list-style-type: none"> • Incorrect thrust angle (dogtracking) 	<ul style="list-style-type: none"> • Rear suspension components 	<ul style="list-style-type: none"> • INSPECT the rear suspension system. CHECK the rear alignment for the correct thrust angle. REPAIR or INSTALL new suspension components as necessary. REFER to Section 204-02.
<ul style="list-style-type: none"> • Vehicle drifts/pulls 	<ul style="list-style-type: none"> • Unevenly loaded or overloaded vehicle • Tires/tire pressure • Alignment is not within specification 	<ul style="list-style-type: none"> • GO to Pinpoint Test A.

	<ul style="list-style-type: none"> • Brake drag • Steering components 	
<ul style="list-style-type: none"> • Front bottoming or riding low 	<ul style="list-style-type: none"> • Worn, damaged or incorrect springs • Worn front strut(s) 	<ul style="list-style-type: none"> • MEASURE the ride height. REFER to Ride Height Measurement in this section. INSTALL new springs as necessary. REFER to Section 204-01. • If the ride height is OK, INSTALL new struts as necessary. REFER to Section 204-01.
<ul style="list-style-type: none"> • Abnormal/incorrect tire wear 	<ul style="list-style-type: none"> • Incorrect tire pressure (rapid center rib or inner and outer edge wear) • Incorrect tire rotation intervals • High-speed cornering • Excessive front or rear toe (inner or outer edge wear) • Alignment out of specification (inner or outer edge wear) • Front or rear suspension components 	<ul style="list-style-type: none"> • REFER to Section 204-04 Diagnosis and Testing for further tire wear diagnosis. • INSPECT the front and rear suspension system. REPAIR or INSTALL new suspension components as necessary. REFER to Section 204-01 for front suspension or Section 204-02 for rear suspension.
<ul style="list-style-type: none"> • Poor returnability/sticky steering 	<ul style="list-style-type: none"> • Damaged or worn front strut mount bearing(s) • Binding ball joints • Steering components • Caster out of specification 	<ul style="list-style-type: none"> • INSTALL a new front strut mount bearing(s) as necessary. REFER to Section 204-01. • REFER to the Ball Joint Inspection component test in this section. • INSPECT the steering system. INSTALL new components as necessary. REFER to Section 211-02. • CHECK the wheel alignment. REFER to Caster Adjustment — Front in this section. ADJUST as necessary.
<ul style="list-style-type: none"> • Steering wheel off-center 	<ul style="list-style-type: none"> • Unequal front toe setting (side-to-side) • Steering components 	<ul style="list-style-type: none"> • CHECK the wheel alignment. REFER to Toe Adjustment — Front in this section. ADJUST as necessary. • INSPECT the steering system. INSTALL new components as necessary. REFER to Component Tests in Section 211-00.
<ul style="list-style-type: none"> • Sway or roll 	<ul style="list-style-type: none"> • Overloaded, unevenly or incorrectly loaded vehicle • Loose wheel nut(s) • Strut(s) or shock absorber(s) • Loose stabilizer bracket-to-frame bolts • Worn stabilizer bar bushings or links • Damaged or broken stabilizer bar • Damaged spring(s) 	<ul style="list-style-type: none"> • NOTIFY the customer of incorrect vehicle loading. • TIGHTEN the wheel nut(s) to specification. REFER to Section 204-04. • INSTALL new struts or shock absorbers as necessary. REFER to Section 204-01 for front suspension or Section 204-02 for rear suspension. • TIGHTEN the bolts to specification. REFER to Section 204-01. • INSTALL new stabilizer bar bushings or links as necessary. REFER to Section 204-01. • INSTALL a new stabilizer bar as necessary. REFER to Section 204-01. • MEASURE the ride height. REFER to Ride Height Measurement in this section. • INSTALL new springs as necessary. REFER to Section 204-01 for front suspension or Section 204-02 for rear suspension.
<ul style="list-style-type: none"> • Vehicle leans to one side 	<ul style="list-style-type: none"> • Unevenly loaded or overloaded vehicle 	<ul style="list-style-type: none"> • NOTIFY the customer of incorrect vehicle loading.

	<ul style="list-style-type: none"> • Front or rear suspension components • Incorrect ride height. Side-to-side lean out of specification 	<ul style="list-style-type: none"> • INSPECT the front and rear suspension systems. INSTALL new suspension components as necessary. REFER to Section 204-01 for front suspension or Section 204-02 for rear suspension. • MEASURE the ride height. REFER to Ride Height Measurement in this section. INSPECT the front and rear suspension systems. REPAIR or INSTALL new components as necessary. REFER to Section 204-01 for front suspension or Section 204-02 for rear suspension.
<ul style="list-style-type: none"> • Wander 	<ul style="list-style-type: none"> • Overloaded, unevenly or incorrectly loaded vehicle • Ball joint(s) • Damaged or missing front strut mount bearing(s) • Loose, worn or damaged front wheel bearing(s) • Steering components • Wheel alignment (excessive total front toe out) 	<ul style="list-style-type: none"> • NOTIFY the customer of incorrect vehicle loading. • INSPECT the ball joints. REFER to the Ball Joint Inspection component test in this section. • INSTALL a new front strut mount bearing(s) as necessary. REFER to Section 204-01. • INSPECT the wheel bearings. INSTALL new wheel bearings as necessary. • INSPECT the steering system. INSTALL new components as necessary. REFER to Section 211-00. • ADJUST as necessary. REFER to Toe Adjustment — Front in this section.

Symptom Chart — NVH

Symptom Chart — NVH

Condition	Possible Causes	Action
<p>NOTE: NVH symptoms should be identified using the diagnostic tools that are available. For a list of these tools, an explanation of their uses and a glossary of common terms, refer to Section 100-04. Since it is possible any one of multiple systems may be the cause of a symptom, it may be necessary to use a process of elimination type of diagnostic approach to pinpoint the responsible system. If this is not the causal system for the symptom, refer back to Section 100-04 for the next likely system and continue diagnosis.</p>		
<ul style="list-style-type: none"> • Squeak or grunt — noise from the front or rear suspension, occurs more in cold ambient temperatures. More noticeable over rough roads or when turning 	<ul style="list-style-type: none"> • Front stabilizer bar insulators • Rear stabilizer bar insulators 	<ul style="list-style-type: none"> • Under these conditions, the noise is acceptable.
<ul style="list-style-type: none"> • Clunk — noise from the front suspension, occurs in and out of turns 	<ul style="list-style-type: none"> • Loose front suspension 	<ul style="list-style-type: none"> • INSPECT for loose nuts or bolts. TIGHTEN to specifications. REFER to Section 204-01 for front suspension.
<ul style="list-style-type: none"> • Clunk — noise from the rear suspension, occurs when shifting from REVERSE to drive 	<ul style="list-style-type: none"> • Loose rear suspension components 	<ul style="list-style-type: none"> • INSPECT for loose or damaged rear suspension components. REPAIR or INSTALL new components as necessary. REFER to Section 204-02.
<ul style="list-style-type: none"> • Click or pop — noise from the front suspension. More noticeable over rough roads or over bumps 	<ul style="list-style-type: none"> • Worn or damaged ball joint(s) 	<ul style="list-style-type: none"> • CARRY OUT a ball joint inspection. INSTALL new ball joint(s) or control arm(s) as necessary. REFER to Section 204-01.
<ul style="list-style-type: none"> • Squeak, creak or rattle noise. Occurs mostly over bumps or rough roads 	<ul style="list-style-type: none"> • Front or rear suspension components • Loose or damaged front struts, shock absorber(s) or shock absorber bushing(s) • Damaged spring or spring mount(s) • Damaged or worn control/radius arm 	<ul style="list-style-type: none"> • INSPECT the front and rear suspension. INSTALL new components as necessary. REFER to Section 204-01 for front suspension or Section 204-02 for rear suspension.

	<ul style="list-style-type: none"> bushing(s) Worn or damaged stabilizer bar bushings or link(s) 	
<ul style="list-style-type: none"> Shudder — occurs during acceleration from a slow speed or stop 	<ul style="list-style-type: none"> Incorrect ride height causing incorrect driveline angle 	<ul style="list-style-type: none"> REFER to Section 205-00 for driveline angle diagnosis.
<ul style="list-style-type: none"> Shimmy 	<ul style="list-style-type: none"> Loose wheel nut(s) Loose front suspension fastener(s) Worn front wheel bearing(s) Strut(s) or shock absorber(s) 	<ul style="list-style-type: none"> TIGHTEN the nut(s) to specification. REFER to Section 204-04. TIGHTEN the fastener(s) to specification. REFER to Section 204-01. INSPECT the front wheel bearing(s). INSTALL new bearing(s) as necessary. REFER to Section 204-01. INSTALL new struts or shock absorbers as necessary. REFER to Section 204-01 for front suspension or Section 204-02 for rear suspension.
<ul style="list-style-type: none"> Shimmy — most noticeable on coast/deceleration. Also hard steering condition 	<ul style="list-style-type: none"> Excessive positive caster 	<ul style="list-style-type: none"> CHECK the wheel alignment. REFER to Caster Adjustment — Front in this section. ADJUST as necessary.
<ul style="list-style-type: none"> Rough/harsh ride 	<ul style="list-style-type: none"> Incorrect tire pressure Strut(s) or shock absorber(s) Spring(s) Damaged suspension component(s) 	<ul style="list-style-type: none"> ADJUST the tire pressure. REFER to the Vehicle Certification (VC) label. INSTALL new struts or shock absorbers as necessary. REFER to Section 204-01 for front suspension or Section 204-02 for rear suspension. INSPECT for broken springs. MEASURE the ride height. REFER to Ride Height Measurement in this section. INSTALL new springs as necessary. REFER to Section 204-01 for front suspension or Section 204-02 for rear suspension. INSTALL new suspension component(s) as necessary. REFER to Section 204-01 for front suspension or Section 204-02 for rear suspension.

Pinpoint Tests

Pinpoint Test A: Vehicle Drifts/Pulls

This pinpoint test is intended to diagnose the following:

- Unevenly loaded vehicle
- Tire pressure
- Tire forces
- Brake drag
- Incorrect vehicle alignment
- Steering system

PINPOINT TEST A : VEHICLE DRIFTS/PULLS

A1 CHECK FOR UNEVENLY LOADED VEHICLE	
<ul style="list-style-type: none"> • Visually check the vehicle for an uneven loading condition. 	
Is the vehicle unevenly loaded?	
Yes	ADVISE the customer of uneven loading condition.
No	GO to A2 .

A2 CHECK THE TIRE PRESSURES AND TIRE CONDITIONS

- Check the tire pressures. Refer to the Vehicle Certification (VC) label located on the driver door jamb. Check the tires for uneven/abnormal wear. Refer to Diagnosis and Testing—Wheels and Tires in [Section 204-04](#).

Are the tire pressures and tire conditions OK?

Yes	GO to A3 .
No	ADJUST the tire pressures to the specified pressure or INSTALL new tires as necessary.

A3 ISOLATE TIRE DRIFT/PULL CONDITION

- **NOTE:** *It is important to determine if tire forces are the cause of a drift/pull condition. Changing the position of the wheel and tire assemblies on the vehicle may correct a pull/drift condition, however the tire drift/pull may return if the wheel and tire assemblies are repositioned during future service. A tire or tires that are causing a drift/pull should not be removed from service unless it has been determined that the tire(s) are worn beyond specification. Refer to Diagnosis and Testing — Wheels and Tires in [Section 204-04](#).*

Cross the front wheel and tire assemblies from left-to-right. Refer to [Section 204-04](#).

Does the vehicle drift/pull?

Yes	If the vehicle drifts/pulls in the opposite direction, tire forces are causing the drift/pull. ROTATE the wheel and tire assemblies from front-to-rear. REFER to Section 204-04 . If the vehicle drifts/pulls in the same direction, GO to A4 .
No	Tire forces were causing the drift/pull and the concern has been corrected.

A4 CHECK FOR BRAKE DRAG

- Spin all 4 wheel and tire assemblies by hand and check for brake drag.

Do the wheels spin freely?

Yes	GO to A5 .
No	REFER to Section 206-00 to diagnose brake drag condition.

A5 CHECK THE WHEEL ALIGNMENT

- Using alignment equipment and the manufacturer's instructions, check the wheel alignment.

Is the wheel alignment out of specification?

Yes	ADJUST the alignment as necessary. REFER to General Procedures in this section.
No	REFER to Section 211-00 to diagnose steering system drift/pull/wander condition.

Component Tests

Ball Joint Inspection

1. Prior to inspecting the ball joints for wear, inspect the wheel bearings. Install a new wheel bearing as necessary. Refer to [Section 204-01](#).
2. **NOTE:** *In order to obtain accurate measurements, the suspension must be in full rebound with the weight of the vehicle supported by the frame.*

Raise and support the vehicle by the frame to allow the wheels to hang in the rebound position.

3. Inspect the ball joint and ball joint boot for damage.

- If the ball joint or ball joint boot is damaged, install a new ball joint as necessary. Refer to [Section 204-01](#).

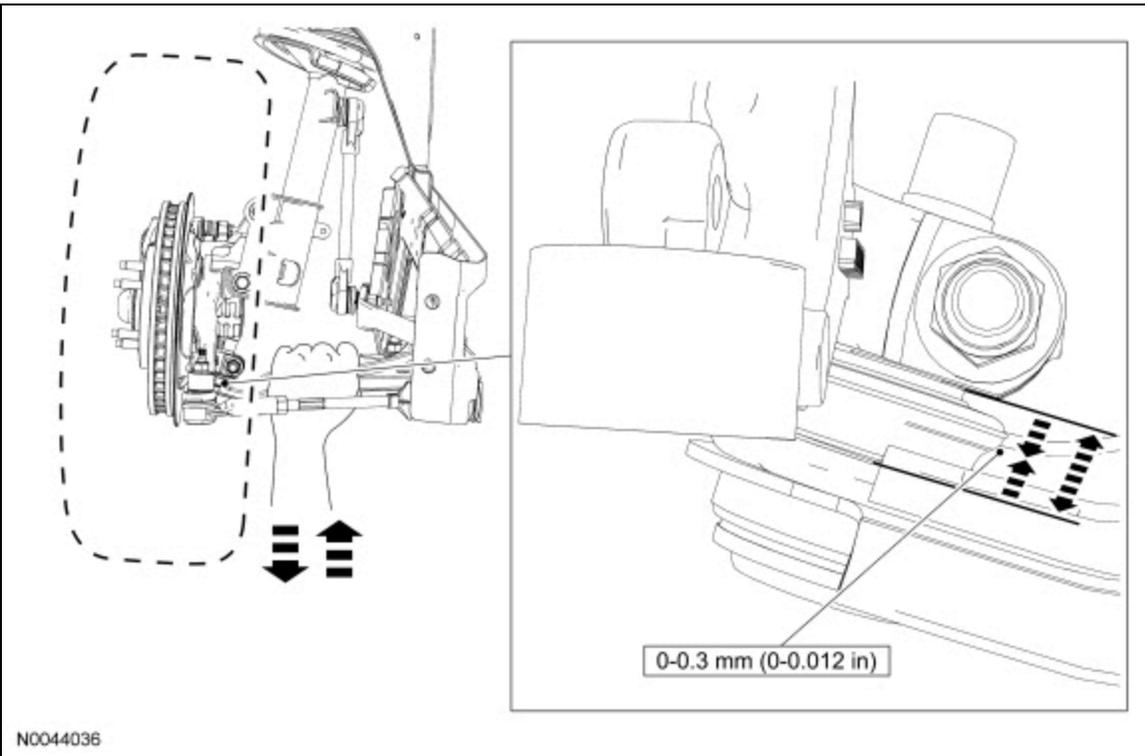
4. **NOTICE:** Do not use any tools or equipment to move the wheel and tire assembly or suspension components while checking for relative movement. Suspension damage may occur. The use of tools or equipment will also create relative movement that may not exist when using hand force. Relative movement must be measured using hand force only.

Inspect the ball joint for relative movement by alternately pulling downward and pushing upward on the lower control arm by hand. Note any relative vertical movement between the wheel knuckle and lower arm at the lower ball joint.

- If relative movement is not felt or seen, the ball joint is OK. Do not install a new ball joint.
- If relative movement is found, continue with Step 5.

5. **NOTE:** In order to obtain an accurate measurement, the dial indicator should be aligned as close as possible with the vertical axis (center line) of the ball joint.

To measure ball joint deflection, attach a suitable dial indicator with a flexible arm between the lower control arm and the wheel knuckle or ball joint stud.



6. Measure the ball joint deflection while an assistant pushes up and pulls down on the lower control arm, by hand.

- If the deflection exceeds the specification, a new ball joint must be installed. Refer to [Section 204-01](#).
- If the deflection meets the specification, no further action is required.

