Suspension System

Preliminary Inspection

1. Road test vehicle.
   - If any suspension alignment or ride height concerns are present, REFER to Symptom Chart: Suspension System Diagnosis and Testing.
   - The specifications shown in the manual are for vehicles equipped with new OEM components. REFER to Symptom Chart.
2. Inspect the tires.
   - Tires must be of the same size with all normal loads in the vehicle and the same OEM, REFER to the VIC label.
   - Verify that all tires are rated to specification. REFER to VIC 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.
   - Suspension fasteners.
   - Suspension bushings/mounts/springs.
   - Shock absorbers.
   - Struts.
   - Suspension bushings.

Sections

4. Inspect for aftermarket equipment.
   - Aftermarket equipment attached to the steering, suspension, and wheel and tire components (such as competition or heavy duty). The specifications shown in the manual are for vehicles equipped with new OEM components. REFER to Symptom Chart.

Symptom Chart: Suspension System

Diagnostics in the following charts assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to Diagnostic Methods (100-00 General Information, Description and Operation).

REFER to Diagnostic Methods (100-00 General Information, Description and Operation).

Condition	Possible Sources	Actions
Vehicle drifts/pulls	Refer to the Diagnostic Routine.	GO to Pinpoint Test A.
Harsh/bumpy/rough ride	Incorrect, unevenly or incorrectly loaded vehicle	ADJUST the suspension of incorrect vehicle loading.
	Bad struts	INSPECT bad struts. INSTALL new control arm(s) as necessary. REFER to Front Lower Arm (204-01 Front Suspension, Removal and Installation).
		REFER to Rear Lower Arm (204-01 Front Suspension, Removal and Installation).
	Damaged or missing front strut mount bearing(s)	INSPECT the front strut mount bearing(s) as necessary. REFER to Front Strut and Spring Assembly (204-01 Front Suspension, Removal and Installation).
	Loose, worn or damaged front wheel bearings	INSPECT the wheel bearings. INSTALL new wheel bearing as necessary. REFER to Front Wheel Bearing and Wheel Hub (204-01 Front Suspension, Removal and Installation).
	Loose, worn or damaged suspension component(s)	INSTALL new suspension component(s) as necessary.
	Loose, worn or damaged steering components	INSTALL new steering component(s) as necessary.
	Steering components	INSPECT the steering components. INSTALL new components as necessary.
	Incorrect wheel alignment (excessive toe out)	ADJUST the suspension alignment. REFER to Front Toe Adjustment (204-00 Suspension System - General Information, General Procedures).
Front bottoming-out/ rolling tire	Worn, damaged or incorrect steering gear	INSPECT the front and rear suspension system. REFER to INSTALL new components as necessary. REFER to Rack Bushing Service (211-02 Steering Gear, Removal and Installation).
		MEASURE the rack travel. REFER to Rack Bushing Service (211-02 Steering Gear, Removal and Installation).
Sticky steering/ poor returnability	Worn front strut mount bearing(s)	INSPECT the front strut mount bearing(s) as necessary. REFER to Front Strut and Spring Assembly (204-01 Front Suspension, Removal and Installation).
	Binding ball joints	INSPECT the ball joints. INSTALL new control arm(s) as necessary. REFER to Front Lower Arm (204-01 Front Suspension, Removal and Installation).
Abnormal/excessive/ intermittent tire tire wear	Incorrect tire pressure (report some tire tire wear under Abnormal)	ADJUST the tire pressure. REFER to VIC label.
	Incorrect tire rotation intervals	REFER to Owners Literature for correct tire rotation intervals.
	Steering components	INSPECT the steering system. INSTALL new components as necessary.
Steering wheel off-center	Overloaded, unevenly or incorrectly loaded vehicle	ADJUST the suspension of incorrect vehicle loading.
Steering pull	Loose wheel nuts	TIGHTEN the wheel nuts. REFER to Wheel and Tire (204-04 Suspension System - General Information, General Procedures).
	Steering components	INSPECT the steering components. INSTALL new components as necessary.
Steering components	Overloaded, unevenly or incorrectly loaded vehicle	ADJUST the suspension of incorrect vehicle loading.
	Loose wheel nuts	TIGHTEN the wheel nuts. REFER to Wheel and Tire (204-04 Suspension System - General Information, General Procedures).
	Struts or shock absorbers	INSPECT the front and rear suspension system. REFER to INSTALL new components as necessary. REFER to Front Strut and Spring Assembly (204-01 Front Suspension, Removal and Installation).
		REFER to Rear Shock Absorber (204-02 Rear Suspension, Removal and Installation).
	Loose stabilizer bracket-to-frame bolts	TIGHTEN the steering system. REFER to Front Stabilizer Bar (204-01 Front Suspension, Removal and Installation).
	Worn stabilizer bar bushings or links	INSTALL new stabilizer bar bushings, stabilizer bar links or stabilizer bar as necessary. REFER to Front Stabilizer Bar Bushing (204-01 Front Suspension, Removal and Installation).
		REFER to Front Stabilizer Bar (204-01 Front Suspension, Removal and Installation).
		REFER to Rear Stabilizer Bar (204-01 Front Suspension, Removal and Installation).
	Damaged or broken stabilizer bar	INSTALL a new stabilizer bar or stabilizer bar assembly as necessary. REFER to Front Stabilizer Bar (204-01 Front Suspension, Removal and Installation).
		REFER to Rear Stabilizer Bar (204-01 Front Suspension, Removal and Installation).
	Worn springs as necessary	REFER to Front Strut and Spring Assembly (204-01 Front Suspension, Removal and Installation).
		REFER to Spring (204-02 Rear Suspension, Removal and Installation).
Vehicle leans to one side	Unevenly loaded or overloaded vehicle	ADJUST the suspension of incorrect vehicle loading.
	Front or rear suspension components	INSPECT the front and rear suspension systems. INSTALL new suspension component(s) as necessary.
	Incorrect wheel alignment (excessive toe out)	ADJUST the suspension alignment. REFER to Front Toe Adjustment (204-00 Suspension System - General Information, General Procedures).
	Worn or damaged steering components	INSPECT the steering components. INSTALL new components as necessary. REFER to Rack Bushing Service (211-02 Steering Gear, Removal and Installation).

- If an obvious cause for an observed or reported condition is found, correct the cause (if possible) before proceeding to the next step.
- If the fault is not found in the Symptom Chart, GO to Pinpoint Test A.

Symptom Chart: NVH

Diagnostics in the following charts assume a certain skill level and knowledge of Ford-specific diagnostic practices.

REFER to Diagnostic Methods (100-00 General Information, Description and Operation).

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 description of common terms, Glossary of Terms.

REFER to Noise, Vibration and Harshness (NVH) (100-04 Noise, Vibration and Harshness, Description and Operation).

Before attempting to diagnose a vehicle with an NVH condition, it is important to verify the customer's complaint. Ask the customer to describe the apparent sound or to duplicate the reported condition. If this is not the sound system, the NVH may be caused by Noise, Vibration and Harshness (NVH) (100-04 Noise, Vibration and Harshness, Diagnosis and Testing).

Refer to the Symptom Chart: Suspension System Diagnosis and Testing.

Additional diagnostics may be necessary to further isolate the concern. An electronic listening tool such as Chassis Ear® may be used. Follow the tool manufacturer's instructions and the Possible Sources found in the following NVH chart to determine the correction points.

Condition	Possible Sources	Actions
Front suspension noise — a squeak, creak or rattle noise that is caused by movement of the front coil springs or the suspension moving in an up/down motion.	Front strut bearing	INSPECT and TIGHTEN to specification. REFER to Front Strut and Spring Assembly (204-01 Front Suspension, Removal and Installation).
	Jounce bumper	INSPECT the jounce bumper. INSTALL new jounce bumper as necessary.
	Stabilizer bar insulators and/or stabilizer bar links	INSPECT for out-of-position bushings. TIGHTEN to specification. REFER to Front Stabilizer Bar (204-01 Front Suspension, Removal and Installation). REFER to Front Stabilizer Bar Bushing (204-01 Front Suspension, Removal and Installation).
		REFER to Front Stabilizer Bar Link (204-01 Front Suspension, Removal and Installation).
	Steering gear and/or tie rod ends	INSPECT the steering gear and tie rod ends. INSTALL new components as necessary. REFER to Rack Bushing Service (211-02 Steering Gear, Removal and Installation).
	Front brake caliper	INSPECT the front brake caliper(s). INSTALL new caliper(s) as necessary. REFER to Front Brake Caliper (206-03 Front Brake Caliper, Removal and Installation, Overhaul).
	Lower control arm / ball joint	INSPECT ball joints. INSTALL new control arm(s) as necessary. REFER to Front Lower Arm (204-01 Front Suspension, Removal and Installation).
		REFER to Engine Mount LH (303-01A Engine - 3.7L Duratec-20/5.0L/5.0L SC, Removal and Installation).
		REFER to Engine Mount LH (303-01B Engine - 5.4L Duratec-20 SOHC, Removal and Installation).
	Hub	INSPECT hub. REMOVE or REPLACE as necessary. REFER to Front Wheel Bearing and Wheel Hub - Vehicles With: ECT Perform Package (204-01 Front Suspension, Removal and Installation).
	Exhaust system	INSPECT the exhaust system. REFER to Exhaust System (309-00 Exhaust System - General Information, Description and Operation). REFER to Exhaust System - 2.3L Duratec-20/2.5L Duratec-20 (309-00 Exhaust System - General Information, Description and Operation). REFER to Exhaust System - 2.5L Duratec-20 (309-00 Exhaust System - General Information, Description and Operation).
	Powertrain mounts	INSPECT the powertrain mounts. REFER to Engine Mount LH (303-01A Engine - 3.7L Duratec-20/5.0L/5.0L SC, Removal and Installation). REFER to Engine Mount LH (303-01B Engine - 5.4L Duratec-20 SOHC, Removal and Installation). REFER to Engine Mount RH (303-01B Engine - 5.4L Duratec-20 SOHC, Removal and Installation).
	Subframe welds or insulators	INSPECT the subframe welds and insulators. REPAIR or REPLACE as necessary.
Rear suspension noise — a squeak, creak or rattle noise that is caused by movement of the rear coil springs or the suspension moving in an up/down motion.	Loose or damaged rear shock absorber or shock absorber mounting components	INSPECT the rear shock absorbers or shock absorber mounting components as necessary. REFER to Rear Shock Absorber (204-02 Rear Suspension, Removal and Installation).
	Damaged springs or spring insulators	INSPECT the rear springs and spring insulators. REFER to Spring (204-02 Rear Suspension, Removal and Installation).
	Worn or damaged stabilizer bar bushing(s) or link(s)	INSPECT the stabilizer bar bushing(s) or link(s). REPLACE damaged or worn bushing(s) or link(s). REFER to Rear Stabilizer Bar (204-01 Front Suspension, Removal and Installation). REFER to Rear Stabilizer Bar Link (204-01 Front Suspension, Removal and Installation).
	Worn or damaged trailer tow hitch receiver	INSPECT the trailer tow hitch receiver. REPLACE damaged or worn components as necessary.
	Loose or damaged rear shock absorber mounting components	INSPECT the rear shock absorber mounting components. TIGHTEN to specification. REPLACE damaged or worn components as necessary.
Front suspension noise when turning — crunch or ratcheting noise. Occurs as a result of the suspension bending and flexing.	Strut top nut	INSPECT the strut top nut. TIGHTEN to specification. REFER to Front Strut and Spring Assembly (204-01 Front Suspension, Removal and Installation).
	Worn or damaged strut mount bearing(s)	INSPECT for worn or damaged strut bearing(s). REFER to Front Strut and Spring Assembly (204-01 Front Suspension, Removal and Installation).
	Coil Spring	INSPECT coil springs for damage. REFER to Front Strut and Spring Assembly (204-01 Front Suspension, Removal and Installation).
	Strut brackets or weld(s)	INSPECT strut brackets or weld(s). REPAIR as necessary.
	Stabilizer bar	INSPECT the stabilizer bar. REFER to Front Stabilizer Bar (204-01 Front Suspension, Removal and Installation).
	Steering gear	INSPECT the steering gear. REFER to Power Steering (211-00 Power Steering, Diagnosis and Testing).
	Tie rod ends	INSPECT the tie rod ends. REFER to Tie Rod End (211-02 Power Steering Gear, Removal and Installation).
	Hub	INSPECT hub. REMOVE or REPLACE as necessary. REFER to Front Wheel Bearing and Wheel Hub - Vehicles With: ECT Perform Package (204-01 Front Suspension, Removal and Installation).
	Lower control arm / ball joint	INSPECT ball joints. INSTALL new control arm(s) as necessary. REFER to Front Lower Arm (204-01 Front Suspension, Removal and Installation). REFER to Rear Lower Arm (204-01 Front Suspension, Removal and Installation).
Noise from front suspension when turning — Crunch clunk or groan noise from the front suspension occurring when turning. Occurs at low speeds.	Steering stops	INSPECT the steering stops. INSTALL new components as necessary.
Condition result from rearward and downward force applied to the lower control arm.	Front lower control arm	INSPECT the front lower control arm. REFER to Front Lower Arm (204-01 Front Suspension, Removal and Installation).
	Hub	INSPECT hub. REMOVE or REPLACE as necessary. REFER to Front Wheel Bearing and Wheel Hub - Vehicles With: ECT Perform Package (204-01 Front Suspension, Removal and Installation).
	Lower control arm / ball joint	INSPECT ball joints. INSTALL new control arm(s) as necessary. REFER to Front Lower Arm (204-01 Front Suspension, Removal and Installation). REFER to Rear Lower Arm (204-01 Front Suspension, Removal and Installation).
	Powertrain mounts	INSPECT the powertrain mounts. REFER to Engine Mount LH (303-01A Engine - 3.7L Duratec-20/5.0L/5.0L SC, Removal and Installation). REFER to Engine Mount LH (303-01B Engine - 5.4L Duratec-20 SOHC, Removal and Installation). REFER to Engine Mount RH (303-01B Engine - 5.4L Duratec-20 SOHC, Removal and Installation).
	Subframe welds or insulators	INSPECT the subframe welds and insulators. REPAIR or REPLACE as necessary.
Noise while entering/exiting — Noises occurring during the condition result from powertrain torque and flex, such as torque on the powertrain mounts during acceleration.	Body (inner fender, subframe, rocker seams and pinch welds)	INSPECT body. REPAIR or REPLACE as necessary.
	Hub	INSPECT hub. REMOVE or REPLACE as necessary. REFER to Front Wheel Bearing and Wheel Hub - Vehicles With: ECT Perform Package (204-01 Front Suspension, Removal and Installation).
	Powertrain mounts	INSPECT the powertrain mounts. REFER to Engine Mount LH (303-01A Engine - 3.7L Duratec-20/5.0L/5.0L SC, Removal and Installation). REFER to Engine Mount LH (303-01B Engine - 5.4L Duratec-20 SOHC, Removal and Installation). REFER to Engine Mount RH (303-01B Engine - 5.4L Duratec-20 SOHC, Removal and Installation).
	Exhaust system	INSPECT the exhaust system. REFER to Exhaust System (309-00 Exhaust System - General Information, Description and Operation). REFER to Exhaust System - 2.3L Duratec-20/2.5L Duratec-20 (309-00 Exhaust System - General Information, Description and Operation). REFER to Exhaust System - 2.5L Duratec-20 (309-00 Exhaust System - General Information, Description and Operation).
	Subframe welds or insulators	INSPECT the subframe welds and insulators. REPAIR or REPLACE as necessary.
Noise while entering driveways or driving over dips or depressions — Noises occurring during the condition result from the suspension bottoming out, such as driving such as the tires on rocky structure welds.	Body (inner fender, subframe, rocker seams and pinch welds)	INSPECT body. REPAIR or REPLACE as necessary.
	Stabilizer bar links	INSPECT the stabilizer bar links. REFER to Front Stabilizer Bar Link (204-01 Front Suspension, Removal and Installation). REFER to Rear Stabilizer Bar Link (204-01 Front Suspension, Removal and Installation).
	Subframe welds or insulators	INSPECT subframe. REPAIR or REPLACE as necessary. REFER to Rear Subframe - 2.3L Duratec-20/2.5L Duratec-20 (501-05 Body Subframe and Mounting System, Removal and Installation).
Clunk or pop or thump/knock — noise may be thought of as a shock absorber noise. Occurs when driving over bumps or rough road surfaces. A clunk is often a hydraulic, repairable and metallic in nature.	Loose fasteners	INSPECT for loose nuts or bolts. TIGHTEN to specification.
	Worn or damaged bushings	INSPECT bushings. REPLACE as necessary.
	Struts & shocks	INSPECT for worn or damaged struts or shocks. REFER to Front Strut and Spring Assembly (204-01 Front Suspension, Removal and Installation). REFER to Rear Shock Absorber (204-02 Rear Suspension, Removal and Installation).
	Coil spring or spring seat out of position	INSPECT coil springs and spring seats. REPLACE components. ADJUST or REPLACE as necessary.
	Worn or damaged ball joint(s)	INSPECT ball joints. INSTALL new control arm(s) as necessary. REFER to Front Lower Arm (204-01 Front Suspension, Removal and Installation). REFER to Rear Lower Arm (204-01 Front Suspension, Removal and Installation).
Rattle — noise occurs mostly over bumps, rough roads or uneven surfaces at low speeds (i.e. parking lots). It is often a rapid, repetitive noise that can be metallic or non-metallic.	Loose fasteners or components (i.e. shock absorber bushing(s), dust boot(s), bump stop(s), spring insulator(s) or spring mounts)	INSPECT for loose fasteners or damaged components. ADJUST or REPLACE components as necessary.
	Loose or damaged front stabilizer bar bushings or links	INSPECT the stabilizer bar bushings or links. REPLACE as necessary.
Whine, roar or groan — noise generally occurs over 30 mph and is often more noticeable with steering input.	Loose wheel nuts	TIGHTEN the front or rear wheel lug(s) to specification. REFER to Wheel and Tire (204-04 Suspension System - General Information, General Procedures).
	Worn or damaged front wheel bearings	INSPECT the front wheel bearings. REFER to Front Wheel Bearing and Wheel Hub - Vehicles With: ECT Perform Package (204-01 Front Suspension, Removal and Installation).
Shimmy	Loose wheel nut(s)	TIGHTEN the wheel nut(s) to specification. REFER to Wheel and Tire (204-04 Suspension System - General Information, General Procedures).
	Loose front suspension components	TIGHTEN the fastener(s) to specification.
	Loose front wheel bearing(s)	INSPECT the front wheel bearing(s). REFER to Front Wheel Bearing and Wheel Hub - Vehicles With: ECT Perform Package (204-01 Front Suspension, Removal and Installation).
	Struts or shock absorber(s)	INSPECT the front struts or shock absorbers as necessary. REFER to Front Strut and Spring Assembly (204-01 Front Suspension, Removal and Installation).
		REFER to Rear Shock Absorber (204-02 Rear Suspension, Removal and Installation).
Roughness/rough ride	Incorrect tire pressure	ADJUST the tire pressure. REFER to VIC label.
	Struts or shock absorber(s)	INSPECT struts, new struts or shock absorbers as necessary. REFER to Front Strut and Spring Assembly (204-01 Front Suspension, Removal and Installation).
		REFER to Rear Shock Absorber (204-02 Rear Suspension, Removal and Installation).
	Springs	REFER to Front Strut and Spring Assembly (204-01 Front Suspension, Removal and Installation).
		REFER to Spring (204-02 Rear Suspension, Removal and Installation).
	Damaged suspension component(s)	INSPECT the suspension components as necessary.

PINPOINT TEST A : VEHICLE DRIFTS, PULLS

A1: CHECK FOR OBVIOUSLY LOADED VEHICLE

- This step checks the vehicle for an uneven loading condition.

Is the vehicle unevenly loaded?

Yes	REDISTRIBUTE the customer's load.
No	GO to A2.

A2: CHECK THE TIRE PRESSURES AND CONDITION

- Check the tire pressures. REFER to VIC label. REFER to Wheel and Tire (204-04 Suspension System - General Information, Description and Operation).
- Check the tires for uneven wear. REFER to Wheels and Tires (204-04 Wheels and Tires, Diagnosis and Testing).

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 DIRECTIONAL CONDITION

- Cross the front wheels and test the suspension for drift.

Does the vehicle drift/pull?

Yes	If the vehicle drift/pulls in the opposite direction, the tires are causing the drift/pull. ROTATE the wheel and tire assemblies front-to-rear. If the vehicle drift/pulls in the same direction, GO to A4.
No	The tires are causing the drift/pull and the concern has been corrected.

A4: CHECK FOR BRAKE DRAG

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

Do the wheels brake drag?

Yes	GO to A5.
No	REFER to: Brake System (206-00 Brake System - General Information, Diagnosis and Testing). Diagnose brake drag concern.

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: Front Toe Adjustment (204-00 Suspension System - General Information, General Procedures).
No	REFER to: Power Steering (211-00 Power Steering, Diagnosis and Testing). Diagnose steering system drift/pull/pull concern.