

# **\* STEERING UNIFORM INSPECTION GUIDELINES \***

## **Article Text**

1996 Volkswagen Golf

For Volkswagen Technical Site

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Thursday, August 19, 1999 11:53PM

## **ARTICLE BEGINNING**

### **GENERAL INFORMATION**

**Steering & Suspension Systems - (Including Wheels & Tires)**

**All Makes & Models**

**Updated: January, 1997**

## **MAP UNIFORM INSPECTION GENERAL GUIDELINES**

### **OVERVIEW OF MOTORIST ASSURANCE PROGRAM**

The Motorist Assurance Program (MAP) is the consumer outreach effort of the Automotive Maintenance and Repair Association, Inc. (AMRA). Participation in the Motorist Assurance Program is drawn from retailers, suppliers, independent repair facilities, vehicle manufacturers and industry associations.

The Motorist Assurance Program was established as an industry-wide effort to address concerns raised by regulators, the media and consumers questioning our ethics and methods of doing business. The automotive repair industry had been bombarded by months of negative stories in the media and scrutiny from state and federal regulators who focused on how the need for repairs is determined. MAP was formed as an industry response to this issue.

Our mission is to strengthen the relationship between the consumer and the auto repair industry. We produce materials that give motorists the information and encouragement to take responsibility for their vehicles - through proper, manufacturer-recommended, maintenance. We encourage participating service and repair shops (including franchisees and dealers) to adopt a Pledge to their Customers and the Motorist Assurance Program developed Standards of Service. All participating service providers have agreed to subscribe to this Pledge and to adhere to the promulgated Standards of Service which demonstrates to their customers that they are serious about customer satisfaction.

These Standards of Service require that an inspection of the vehicle's (problem) system be made according to industry guidelines. After learning that neither the car manufacturers nor any other source had complete guidelines, leading industry organizations, along with other industry participants banded together to address this challenging task. During the past two and a half years, they successfully developed industry inspection guidelines for the following systems: Exhaust, Brakes, ABS, Steering and Suspension, Engine Maintenance and Performance, HVAC, and Electrical systems. Guidelines for Drive Train and Transmission are currently being promulgated. Revisions to the inspection guidelines for Exhaust, Brakes/ABS and Steering and Suspension Systems, which were issued two years ago, are now being published for implementation beginning spring 1997. Participating shops utilize these Uniform Inspection Guidelines as part of the inspection process and for communicating their findings

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to their customers.

The Motorist Assurance Program continues to work cooperatively and proactively with government agencies and consumer groups toward solutions that both benefit the customer and are mutually acceptable to both regulators and industry. We maintain the belief that industry must retain control over how we conduct our business, and we must be viewed as part of the solution and not part of the problem. Meetings with state and other government officials concerned with auto repair and/or consumer protection are conducted. Feedback from these representatives are brought back to members, and the program adjusted as needed.

To assure auto repair customers recourse if they were not satisfied with a repair transaction, the Motorist Assurance Program offers arbitration through MAP/BBB-CARE in cooperation with the Council of Better Business Bureaus and individual participating Bureaus. MAP "piloted" in Indianapolis and Pittsburgh during spring, 1996 - and publicized "roll-outs" in New Jersey, Detroit (MI), Chicago (IL) and Richmond (VA) were conducted. To put some "teeth" in the program, and accreditation requirement for shops was initiated. The requirements are stringent and a self-policing method has been incorporated which includes the "mystery shopping" of outlets. In addition, a committee of service providers had been working diligently developing standards for newspaper, television and Internet advertising.

We welcome you to join us as we continue our outreach ... with your support, both the automotive repair industry and your customers will reap the benefits. Please visit MAP at our Internet site: [www.hunter.com/map.htm](http://www.hunter.com/map.htm) or contact us at:

808 17th Street, NW Suite 200

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**OVERVIEW OF SERVICE REQUIREMENTS & SUGGESTIONS**

It is MAP policy that all exhaust, brake, ABS, steering and suspension, wheel alignment, tires and wheels, driveline, engine performance and maintenance and heating, ventilation and air conditioning services be offered and performed under the guidelines and procedures specified in these sections.

Before any service is performed on a vehicle, an inspection of the appropriate system must be performed. The results of this inspection must be explained to the customer and documented on an inspection form. The condition of the vehicle and its components will indicate what services/part replacements may be required or suggested. In addition, suggestions may be made to satisfy the needs expressed by the customer.

This section lists the various parts and conditions that indicate required or suggested service or part replacement. Although this list is extensive, it is not inclusive. In addition to this list, a technician may make a suggestion. This suggestion must be based on substantial and informed experience or the vehicle manufacturer's

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recommended service interval.

Some conditions indicate that service or part replacement is required because the part in question is no longer providing the function for which it is intended, does not meet a vehicle manufacturer's design specification or is missing.

- \* Example: An exhaust pipe has corroded severely and has a hole in it through which exhaust gases are leaking. Replacement of the exhaust pipe in this case is required due to functional failure.
- \* Example: A brake rotor has been worn to the point where it measures less than the vehicle manufacturer's specifications. Replacement of the rotor is required because it does not meet design specifications.

Some conditions indicate that a service or part replacement is suggested because the part is close to the end of its useful life or to address a customer's need, convenience or request. If a customer's vehicle has one of these conditions, the procedure may only be to suggest service.

- \* Example: An exhaust pipe is rusted, corroded or weak, but no leaks are present. In this case, the exhaust pipe has not failed. However, there is evidence that the pipe may need replacement in the near future. Replacement of the pipe may be suggested for the customer's convenience in avoiding a future problem.
- \* Example: The customer desires improved ride and/or handling, but the vehicle's shocks or struts have not failed. In this case, replacement may be suggested to satisfy the customer's wishes. In this case, replacement of the shocks or struts may not be sold as a requirement.

A customer, of course, has the choice of whether or not a shop will service his or her vehicle. He or she may decide not to follow some of your suggestions. When a customer declines to authorize a service or repair indicated in the MAP Uniform Inspection Guidelines as "required," a MAP shop may refuse service on that system, if proceeding with the work could create or continue an unsafe or unsatisfactory condition.

The following reasons may be used for required and suggested services. These codes are shown in the "Code" column of the Uniform Inspection Guidelines that follow.

**PART REPLACEMENT CODE IDENTIFICATION**

**NOTE:** Refer to the following tables for definitions of the codes listed in the condition/procedure tables for the specific components that may need to be replaced.



Condition	Code	Procedure
Attaching hardware incorrect	A	Require replacement of incorrect part.
Attaching hardware loose	A	Require repair or replacement of loose part.
Attaching hardware missing	C	Require replacement of missing part.

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Attaching hardware threads damaged	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement of part with damaged threads.
Attaching hardware threads stripped (threads missing)	<sup>3</sup>	A	<sup>3</sup>	Require replacement of part with stripped threads.
Blocked	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement.
Connector bent	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement.
Connector broken	<sup>3</sup>	A	<sup>3</sup>	Require replacement.
Connector loose	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement.
Inoperative	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement.
Leaking	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement.
Restricted	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement.

**AIR RIDE SUSPENSION - AIR SPRINGS**

**AIR RIDE SUSPENSION - AIR SPRINGS**

Condition	<sup>3</sup>	Code	<sup>3</sup>	Procedure
Attaching hardware broken	<sup>3</sup>	A	<sup>3</sup>	Require replacement of broken part.
Attaching hardware incorrect	<sup>3</sup>	A	<sup>3</sup>	Require replacement of incorrect part.
Attaching hardware loose	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement of loose part.
Attaching hardware missing	<sup>3</sup>	C	<sup>3</sup>	Require replacement of missing part.
Attaching hardware threads damaged	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement of part with damaged threads.
Attaching hardware threads stripped (threads missing)	<sup>3</sup>	A	<sup>3</sup>	Require replacement of part with stripped threads.
Collar cracked	<sup>3</sup>	A	<sup>3</sup>	Require replacement.
End cap cracked	<sup>3</sup>	A	<sup>3</sup>	Require replacement.
Inner fabric of bag damaged	<sup>3</sup>	A	<sup>3</sup>	Require replacement.

Condition	Code	Procedure
Attaching hardware bent	B	Require repair or replacement of bent part.
Attaching hardware broken	A	Require replacement of broken part.
Attaching hardware loose	A	Require repair or replacement of loose part.
Attaching hardware missing	C	Require replacement of missing part.
Attaching hardware threads damaged	A	Require repair or replacement of part with damaged threads.
Attaching hardware threads stripped (threads missing)	A	Require replacement of part with stripped threads.
Connector bent	A	Require repair or replacement.
Connector broken	A	Require replacement.
Connector loose	A	Require repair or replacement.
Does not build pressure	A	Further inspection required. See note (1) below.
Excessive run time	B	Further inspection required. See note (2) below.
Inoperative	A	Require replacement.
Leaking	A	Require repair or replacement.
Missing	C	Require replacement.

[illegible]





Condition	Code	Procedure
Attaching hardware incorrect	A	Require replacement of incorrect part.
Attaching hardware loose	A	Require repair or replacement of

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	<sup>3</sup>		<sup>3</sup>	loose part.
Attaching hardware missing	<sup>3</sup>	C	<sup>3</sup>	Require replacement of missing part.
Blocked	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement.
Fitting incorrect	<sup>3</sup>	B	<sup>3</sup>	Require replacement.
Leaking	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement.
Line type incorrect	<sup>3</sup>	B	<sup>3</sup>	Require replacement.
Missing	<sup>3</sup>	C	<sup>3</sup>	Require replacement.
Restricted	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement.
Routed incorrectly	<sup>3</sup>	B	<sup>3</sup>	Require routing correction.

**AIR RIDE SUSPENSION - WARNING LAMPS**

**AIR RIDE SUSPENSION - WARNING LAMPS**

Condition	<sup>3</sup>	Code	<sup>3</sup>	Procedure
Bulb burned out	<sup>3</sup>	A	<sup>3</sup>	Require replacement.
Warning light does not come on during bulb check	<sup>3</sup>		<sup>3</sup>	
Warning light flashes	<sup>3</sup>		<sup>3</sup>	
Warning light is intermittent	<sup>3</sup>		<sup>3</sup>	Further inspection required to determine cause.
Warning light stays on after initial bulb check	<sup>3</sup>		<sup>3</sup>	

**AIR RIDE SUSPENSION - WIRING HARNESSES**

**AIR RIDE SUSPENSION - WIRING HARNESSES**

Condition	<sup>3</sup>	Code	<sup>3</sup>	Procedure
Connector bent	<sup>3</sup>	A	<sup>3</sup>	
Connector broken	<sup>3</sup>	A	<sup>3</sup>	
Connector loose	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement.
Damaged (cut, burned, or	<sup>3</sup>	A	<sup>3</sup>	

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chafed) 3 3  
AAA  
Excessive resistance 3 B 3  
AAA  
Fuse blown 3 A 3  
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA Require replacement.  
Fusible link blown 3 A 3  
AAA  
Open 3 A 3  
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA Require repair or replacement.  
Poor ground 3 A 3  
AAA  
Routed incorrectly 3 B 3 Require re-routing according to  
3 3 vehicle manufacturer's specs.  
AAA  
Shorted 3 A 3  
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  
Terminal bent 3 A 3  
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  
Terminal broken 3 A 3 Require repair or replacement.  
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  
Terminal corroded 3 A 3  
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  
Terminal loose 3 A 3  
AAA

**BALL JOINTS**

Before requiring or suggesting ball joint replacement, the approved OEM procedure must be used to measure ball joint wear. The measurement(s) obtained, along with the vehicle manufacturer's specifications, must be noted on the inspection report. Some states require that these measurements also appear on the invoice.

NOTE: The term "perceptible movement," defined as any visible movement in any direction, has been the industry standard for determining the need for replacement of follower ball joints. Some vehicle manufacturers are now publishing specifications for follower ball joints that were previously diagnosed by the "perceptible movement" standard. Before requiring or suggesting any parts be replaced based on "perceptible movement," consult your repair manual to determine if OEM specifications exist.

You are not required to replace ball joints in axle sets. However, when replacing a ball joint due to wear exceeding manufacturer's specification, you may suggest replacement of the other ball joint if its measurement shows it is close to the end of its useful life, for preventive maintenance.

**BALL JOINTS**

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Condition	Code	Procedure
Attaching hardware bent	B	Require repair or replacement of bent part if available; otherwise, replace ball joint.
Attaching hardware broken	A	Require replacement of broken part if available; otherwise, replace ball joint.
Attaching hardware corroded affecting structural integrity	A	Require replacement of broken part if available; otherwise, replace ball joint.
Attaching hardware incorrect	A	Require replacement of incorrect part if available; otherwise, replace ball joint.
Attaching hardware loose	A	Require repair or replacement of loose part if available; otherwise, replace ball joint.
Attaching hardware missing	C	Require replacement of missing part if available; otherwise, replace ball joint.
Attaching hardware threads damaged	A	Require repair or replacement of part with damaged threads if available; otherwise, replace ball joint.
Attaching hardware threads stripped (threads missing)	A	Require replacement of part with stripped threads if available; otherwise, replace ball joint.
Binding	A	Further inspection required. See note (1) below.
Grease boot cracked	B, 2	Suggest replacement. See note (2).
Grease boot missing	B, 2	Suggest replacement. See note (3).
Grease boot torn	B, 2	Suggest replacement. See note (4).
Grease fitting broken	A	Require replacement of grease fitting.
Grease fitting missing	C	Require replacement of grease fitting.
Grease fitting won't seal	A	Require replacement of grease fitting.

Condition	Code	Procedure
Attaching hardware bent	B	Require repair or replacement of bent part if available; otherwise, replace bushing.
Attaching hardware broken	A	Require replacement of broken part if available; otherwise, replace bushing.

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AA			
Attaching hardware corroded <sup>3</sup>	A	<sup>3</sup>	Require replacement of corroded
affecting structural	<sup>3</sup>	<sup>3</sup>	part if available; otherwise,
integrity	<sup>3</sup>	<sup>3</sup>	replace bushing.
AA			
Attaching hardware	<sup>3</sup> A	<sup>3</sup>	Require replacement of incorrect
incorrect	<sup>3</sup>	<sup>3</sup>	part if available; otherwise,
	<sup>3</sup>	<sup>3</sup>	replace bushing.
AA			
Attaching hardware loose	<sup>3</sup> A	<sup>3</sup>	Require repair or replacement of
	<sup>3</sup>	<sup>3</sup>	loose part if available;
	<sup>3</sup>	<sup>3</sup>	otherwise, replace bushing.
AA			
Attaching hardware missing	<sup>3</sup> C	<sup>3</sup>	Require replacement of missing
	<sup>3</sup>	<sup>3</sup>	part if available; otherwise,
	<sup>3</sup>	<sup>3</sup>	replace bushing.
AA			
Attaching hardware threads	<sup>3</sup> A	<sup>3</sup>	Require repair or replacement of
damaged	<sup>3</sup>	<sup>3</sup>	part with damaged threads if
	<sup>3</sup>	<sup>3</sup>	available; otherwise, replace
	<sup>3</sup>	<sup>3</sup>	bushing.
AA			
Attaching hardware threads	<sup>3</sup> A	<sup>3</sup>	Require replacement of part with
stripped (threads missing)	<sup>3</sup>	<sup>3</sup>	stripped threads if available;
	<sup>3</sup>	<sup>3</sup>	otherwise, replace bushing.
AA			
Binding	<sup>3</sup> A	<sup>3</sup>	Require repair or replacement.
AA			
Deteriorated, affecting	<sup>3</sup> A	<sup>3</sup>	Require repair or replacement.
performance	<sup>3</sup>	<sup>3</sup>	
AA			
Distorted, affecting	<sup>3</sup> A	<sup>3</sup>	Require repair or replacement.
performance	<sup>3</sup>	<sup>3</sup>	
AA			
Leaking (fluid-filled type)	<sup>3</sup> A	<sup>3</sup>	Require replacement.
AA			
Missing	<sup>3</sup> A	<sup>3</sup>	Require replacement.
AA			
Noisy	<sup>3</sup> B, 2	<sup>3</sup>	Further inspection required.
	<sup>3</sup>	<sup>3</sup>	See note (1) and caution below.
AA			
Rubber separating from	<sup>3</sup> A	<sup>3</sup>	Require replacement.
internal metal sleeve on	<sup>3</sup>	<sup>3</sup>	
bonded bushing	<sup>3</sup>	<sup>3</sup>	
AA			
Seized	<sup>3</sup> A	<sup>3</sup>	Require replacement.
AA			
Shifted (out of position)	<sup>3</sup> B	<sup>3</sup>	Require repair or replacement.
AA			
Split	<sup>3</sup> A	<sup>3</sup>	Require replacement.
AA			
Surface cracking	<sup>3</sup>	<sup>3</sup>	No service suggested or required.

[illegible]



- NOTE:
- (1) If greaseable, grease joint. If problem persists or joint is non-greaseable, require replacement.
  - (2) Cracked grease boot will allow contaminants to enter the joint and will accelerate wear.
  - (3) Lack of grease boot will allow contaminants to enter the joint and will accelerate wear.
  - (4) Torn grease boot will allow contaminants to enter the joint and will accelerate wear.
  - (5) Lack of grease seal will allow contaminants to enter the joint and will accelerate wear.
  - (6) Torn grease seal will allow contaminants to enter the joint and will accelerate wear.
  - (7) If manufacturer's procedures for inspection exist, use those procedures; otherwise, use an approved inspection method

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such as the dry park check.

(8) Excessive looseness is defined as being significant enough to affect vehicle handling or structural integrity.

(9) If manufacturer's procedures for inspection exist, use those procedures; otherwise, use an approved inspection method such as the dry park check.

(10) Check for damaged taper hole.

(11) Check for damaged stud.

AA

**CONTROL ARM SHAFTS**

**CONTROL ARM SHAFTS**

AA

Condition	3	Code	3	Procedure
AA				
Attaching hardware broken	3	A	3	Require replacement of broken
	3		3	part, if available; otherwise,
	3		3	replace shaft.
Attaching hardware loose	3	A	3	Require repair or replacement of
	3		3	loose part, if available;
	3		3	otherwise, replace shaft.
Attaching hardware missing	3	C	3	Require replacement of missing
	3		3	part, if available; otherwise,
	3		3	replace shaft.
Attaching hardware threads	3	A	3	Require repair or replacement of
damaged	3		3	part with damaged threads, if
	3		3	available; otherwise, replace
	3		3	shaft.
Attaching hardware threads	3	A	3	Require replacement of part with
stripped (threads missing)	3		3	stripped threads, if available;
	3		3	otherwise, replace shaft.
Bent	3	B	3	Require replacement.
Shaft bushing surface	3	B	3	Require replacement.
undersized (worn)	3		3	
Threads damaged	3	A	3	Require repair or replacement.
Threads stripped	3	A	3	Require replacement.
(threads missing)	3		3	
AA				

**CONTROL ARMS**

**CONTROL ARMS**

AA

Condition	3	Code	3	Procedure
AA				
Attaching hardware bent	3	B	3	Require repair or replacement of
	3		3	bent part, if available;
	3		3	otherwise, replace control arm.
AA				
Attaching hardware broken	3	A	3	Require replacement of broken
	3		3	part, if available; otherwise,

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	3	3	replace control arm
Attaching hardware corroded affecting structural integrity	3 A 3	3	Require replacement of corroded part, if available; otherwise, replace control arm
Attaching hardware incorrect	3 A 3	3	Require replacement of incorrect part, if available; otherwise, replace control arm
Attaching hardware loose	3 A 3	3	Require repair or replacement of loose part, if available; otherwise, replace control arm
Attaching hardware missing	3 C 3	3	Require replacement of missing part, if available; otherwise, replace control arm
Attaching hardware threads damaged	3 A 3	3	Require repair or replacement of part with damaged threads, if available; otherwise, replace control arm
Attaching hardware threads stripped (threads missing)	3 A 3	3	Require replacement of part with stripped threads, if available; otherwise, replace control arm
Bent	3 B 3	3	Require replacement.
Bushing hole oversized	3 B 3	3	Require replacement.
Ball joint hole oversized (loose interference or press fit)	3 B 3	3	Further inspection required. See note (1) below.
Corroded, affecting structural integrity	3 A 3	3	Require replacement.
Holes distorted	3 A 3	3	Require replacement.
Threads damaged	3 A 3	3	Require repair or replacement.
Threads stripped (threads missing)	3 A 3	3	Require replacement.
NOTE: (1) If oversized ball joint is available, require replacement of ball joint. If oversized ball joint is not available, require replacement of control arm.			

DRAG LINKS

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**DRAG LINKS**

AA		
Condition	3 Code 3	Procedure
AA		
Attaching hardware incorrect	3 A 3	Require replacement of incorrect part, if available; otherwise, replace drag link.
AA		
Attaching hardware loose	3 A 3	Require repair or replacement of loose part, if available; otherwise, replace drag link.
AA		
Attaching hardware missing	3 C 3	Require replacement of missing part, if available; otherwise, replace drag link.
AA		
Attaching hardware threads damaged	3 A 3	Require repair or replacement of part with damaged threads, if available; otherwise, replace drag link.
AA		
Attaching hardware threads stripped (threads missing)	3 A 3	Require replacement of part with stripped threads, if available; otherwise, replace drag link.
AA		
Bent	3 B 3	Require replacement.
AA		
Binding	3 A 3	Further inspection required. See note (1) below.
AA		
Grease boot cracked	3 B, 2 3	Suggest replacement. See note (2).
AA		
Grease boot missing	3 B, 2 3	Suggest replacement. See note (3).
AA		
Grease boot torn	3 B, 2 3	Suggest replacement. See note (4).
AA		
Grease fitting broken	3 A 3	Require replacement of grease fitting.
AA		
Grease fitting missing	3 C 3	Require replacement of grease fitting.
AA		
Grease fitting won't seal	3 A 3	Require replacement of grease fitting.
AA		
Grease seal missing	3 B, 2 3	Suggest replacement. See note (5).
AA		
Grease seal torn	3 B, 2 3	Suggest replacement. See note (4).
AA		
Looseness (perceptible horizontal movement)	3 A, 1 3	Suggest replacement. See note (6).
AA		

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CAUTION: DO NOT use pliers or pry bar to check ball and socket movement. Use only moderate hand pressure.

Looseness that is excessive<sup>3</sup> B<sup>3</sup> Require replacement. See notes (6)  
<sup>3</sup> and (7), caution below.

CAUTION: DO NOT use pliers or pry bar to check ball and socket movement. Use only moderate hand pressure.

Seized<sup>3</sup> A<sup>3</sup> Require replacement.

Stud bent<sup>3</sup> B<sup>3</sup> Require replacement. See note (8).

Stud broken<sup>3</sup> A<sup>3</sup> Require replacement. See note (8).

Stud loose in taper hole<sup>3</sup> A<sup>3</sup> Require repair or replacement.  
<sup>3</sup> See note (8) below.

Taper hole elongated<sup>3</sup> A<sup>3</sup> Require replacement. See note (9).

Threads damaged<sup>3</sup> A<sup>3</sup> Require repair or replacement.

Threads stripped (threads<sup>3</sup> A<sup>3</sup> Require replacement. See note (8).  
missing)<sup>3</sup>

Wear exceeds manufacturer's<sup>3</sup> B<sup>3</sup> Require replacement.  
specifications<sup>3</sup>

NOTE: (1) If greaseable, grease joint. If problem persists or joint is non-greaseable, require replacement.

- (2) Cracked grease boot will allow contaminants to enter the joint and will accelerate wear.
- (3) Lack of grease boot will allow contaminants to enter the joint and will accelerate wear.
- (4) Torn grease boot will allow contaminants to enter the joint and will accelerate wear.
- (5) Missing grease seal will allow contaminants to enter the joint and will accelerate wear.
- (6) If manufacturer's procedures for inspection exist, use those procedures; otherwise, use an approved inspection method such as the dry park check.
- (7) Excessive looseness is defined as being significant enough to affect vehicle handling or structural integrity.
- (8) Check for damaged taper hole.
- (9) Check for damaged stud.

**ELECTRONIC RIDE CONTROL SHOCKS & STRUTS**

NOTE: This section covers the electronic damping control portion of the electronic shock or strut. For dampening portion of shock or strut conditions and procedures, refer to the "Shock

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**Absorbers, Strut Cartridges, and Strut Assemblies" section.**

## ELECTRONIC RIDE CONTROL SHOCKS & STRUTS

Condition	Code	Procedure
Connector bent	A	Require repair or replacement.
Connector broken	A	Require repair or replacement.
Connector loose	A	Require repair or replacement.
Electronic valve control inoperative	B, 2	Suggest replacement. See note (1).
Terminal bent	A	Require repair or replacement.
Terminal broken	A	Require repair or replacement.
Terminal corroded	A	Require repair or replacement.
Terminal loose	A	Require repair or replacement.

NOTE: (1) It is acceptable to replace with a non-electronically controlled unit, where available.

## IDLER ARMS

## IDLER ARMS

Condition	Code	Procedure
Attaching hardware broken	A	Require replacement of broken part, if available; otherwise, replace idler arm
Attaching hardware incorrect	A	Require replacement of incorrect part, if available; otherwise, replace idler arm
Attaching hardware loose	A	Require repair or replacement of loose part, if available; otherwise, replace idler arm
Attaching hardware missing	C	Require replacement of missing part, if available; otherwise, replace idler arm
Attaching hardware threads damaged	A	Require repair or replacement of part with damaged threads, if available; otherwise, replace

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Seized	<sup>3</sup>	A	<sup>3</sup>	Require replacement.
Stud bent	<sup>3</sup>	B	<sup>3</sup>	Require replacement. See note (11)
Stud broken	<sup>3</sup>	A	<sup>3</sup>	Require replacement. See note (11)
Taper hole elongated	<sup>3</sup>	A	<sup>3</sup>	Require replacement. See note (12)
Threads damaged	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement.
Threads stripped (threads missing)	<sup>3</sup>	A	<sup>3</sup>	Require replacement. See note (11)
Wear exceeds manufacturer's specifications	<sup>3</sup>	B	<sup>3</sup>	Require replacement.

- NOTE: (1) If greaseable, grease joint. If problem persists or joint is non-greaseable, require replacement.
- (2) Cracked grease boot will allow contaminants to enter joint and will accelerate wear.
- (3) Lack of grease boot will allow contaminants to enter joint and will accelerate wear.
- (4) Torn grease boot will allow contaminants to enter joint and will accelerate wear.
- (5) Missing grease seal will allow contaminants to enter joint and will accelerate wear.
- (6) If greaseable joint will not take grease after replacing the grease fitting, suggest replacement of idler arm.
- (7) If manufacturer's procedures and specifications exist, use those procedures and specifications; otherwise, use an approved inspection method such as the dry park check.
- (8) Looseness is defined as movement that creates excessive toe change.
- (9) Excessive looseness is defined as significant enough to affect vehicle handling or structural integrity.
- (10) Check for bent stud or damaged taper hole.
- (11) Check for damaged taper hole.
- (12) Check for damaged stud.

**KING PINS**

You are not required to replace king pins in axle sets. However, when replacing a king pin due to wear exceeding manufacturer's specifications, you may suggest replacement of the other king pin on the axle if its measurement shows it is close to the end of its useful life.

**KING PINS**

Condition	<sup>3</sup>	Code	<sup>3</sup>	Procedure
-----------	--------------	------	--------------	-----------



**NOTE: (1) If king pin will not take grease after replacement of grease**

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fitting, suggest replacement of king pin.

**PITMAN ARMS**

**PITMAN ARMS**

Condition	Code	Procedure
Attaching hardware incorrect	A	Require replacement of incorrect part, if available; otherwise, replace pitman arm.
Attaching hardware loose	A	Require repair or replacement of loose part, if available; otherwise, replace pitman arm.
Attaching hardware missing	C	Require replacement of missing part, if available; otherwise, replace pitman arm.
Attaching hardware threads damaged	A	Require repair or replacement of part with damaged threads, if available; otherwise, replace pitman arm.
Attaching hardware threads stripped (threads missing)	A	Require replacement of part with stripped threads, if available; otherwise, replace pitman arm.
Bent	B	Require replacement.
Binding	A	Further inspection required. See note (1) below.
Grease boot cracked	B, 2	Suggest replacement. See note (2).
Grease boot missing	B, 2	Suggest replacement. See note (3).
Grease boot torn	B, 2	Suggest replacement. See note (4).
Grease fitting broken	A	Require replacement grease fitting.
Grease fitting missing	C	
Grease fitting won't seal	A	
Grease seal missing	B, 2	Suggest replacement of seal. See note (5) below.
Grease seal torn	B, 2	Suggest replacement of seal. See note (6) below.

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Looseness (perceptible horizontal movement) <sup>3</sup> A, 1 <sup>3</sup> Suggest replacement. See note (7)

CAUTION: DO NOT use pliers or pry bar to check ball and socket movement. Use only moderate hand pressure.

Looseness that is excessive <sup>3</sup> B <sup>3</sup> Require replacement. See notes (7) and (8), caution below.

CAUTION: DO NOT use pliers or pry bar to check ball and socket movement. Use only moderate hand pressure.

Nut on stud loose <sup>3</sup> A <sup>3</sup> Require repair or replacement. See note (9) below.

Seized <sup>3</sup> A <sup>3</sup> Require replacement.

Splines damaged <sup>3</sup> A <sup>3</sup> Require repair or replacement.

Splines stripped (splines missing) <sup>3</sup> A <sup>3</sup> Require replacement.

Stud bent <sup>3</sup> B <sup>3</sup> Require replacement. See note (10)

Stud broken <sup>3</sup> A <sup>3</sup> Require replacement. See note (10)

Stud loose in taper hole <sup>3</sup> A <sup>3</sup> Require repair or replacement. See note (10) below.

Taper hole elongated <sup>3</sup> A <sup>3</sup> Require replacement. See note (11)

Threads damaged <sup>3</sup> A <sup>3</sup> Require repair or replacement.

Threads stripped (threads missing) <sup>3</sup> A <sup>3</sup> Require replacement. See note (10)

- NOTE: (1) If greaseable, grease joint. If problem persists or joint is non-greaseable, require replacement.
- (2) Cracked grease boot will allow contaminants to enter joint and will accelerate wear.
- (3) Lack of grease boot will allow contaminants to enter joint and will accelerate wear.
- (4) Torn grease boot will allow contaminants to enter joint and will accelerate wear.
- (5) Lack of grease seal will allow contaminants to enter joint and will accelerate wear.
- (6) Torn grease seal will allow contaminants to enter joint and will accelerate wear.
- (7) If manufacturer's procedures for inspection exist, use those procedures; otherwise, use an approved inspection method such as the dry park check.

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Attaching hardware broken	3	A	3	Require replacement of broken part.
~~~~~				
Attaching hardware loose	3	A	3	Require repair or replacement of loose part.
~~~~~				
Attaching hardware missing	3	C	3	Require replacement of missing part.
~~~~~				
Attaching hardware threads damaged	3	A	3	Require repair or replacement of part with damaged threads.
~~~~~				
Attaching hardware threads stripped (threads missing)	3	A	3	Require replacement of part with stripped threads.
~~~~~				
Belt alignment incorrect	3	B	3	Further inspection required. See note (1) below.
~~~~~				
Belt cracked	3	A, 1	3	Suggest replacement.
~~~~~				
Belt frayed	3	A, 1	3	Suggest replacement.
~~~~~				
Belt missing	3	C	3	Require replacement.
~~~~~				
Belt noisy	3	B, 2	3	Further inspection required. See note (2) below.
~~~~~				
Belt plies separated	3	A	3	Require replacement.
~~~~~				
Belt tension out of spec	3	B	3	Require adjustment or replacement.
~~~~~				
Belt worn beyond adjustment range	3	B	3	Require replacement.
~~~~~				
Belt worn so it contacts bottom of pulley	3	A	3	Require replacement.
~~~~~				
Binding	3	A	3	Require repair or replacement.
~~~~~				
Fluid at or beyond service interval	3	C, 3	3	Suggest fluid change.
~~~~~				
Fluid contaminated	3	B	3	Require flushing and refilling of the system. See note (3) below.
~~~~~				
Fluid level incorrect	3	B	3	Require adjustment of fluid level.
~~~~~				
Inadequate assist	3	A	3	Further inspection required. See note (4) below.
~~~~~				
Leaking	3	A	3	Require repair or replacement.
~~~~~				

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Noise	<sup>3</sup>	B, 2	<sup>3</sup>	Further inspection required.
	<sup>3</sup>		<sup>3</sup>	See note (5) below.
AA				
Pulley bent	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement of
	<sup>3</sup>		<sup>3</sup>	pulley.
AA				
Pulley missing	<sup>3</sup>	C?	<sup>3</sup>	Require replacement of pulley.
AA				
Remote reservoir leaking	<sup>3</sup>	A	<sup>3</sup>	Require replacement of reservoir.
AA				
Reservoir cap broken	<sup>3</sup>	A	<sup>3</sup>	Require replacement of cap.
AA				
Reservoir cap missing	<sup>3</sup>	C	<sup>3</sup>	Require replacement of cap.
AA				
Seized	<sup>3</sup>	A	<sup>3</sup>	Require replacement.
AA				
Threads damaged	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement.
AA				
Threads stripped (threads missing)	<sup>3</sup>	A	<sup>3</sup>	Require replacement.
	<sup>3</sup>		<sup>3</sup>	
AA				
NOTE: (1) Determine cause of incorrect alignment and require repair.				
(2) Determine cause of noise and suggest repair.				
(3) Determine and correct source of contamination. OEM				
specifications must be followed for fluid type.				
(4) If pump is source of inadequate assist, require repair or				
replacement.				
(5) If noise is isolated to pump, suggest repair or replacement.				
AA				

**RADIUS ARMS**

RADIUS ARMS				
AA				
Condition	<sup>3</sup>	Code	<sup>3</sup>	Procedure
AA				
Attaching hardware broken	<sup>3</sup>	A	<sup>3</sup>	Require replacement of broken
	<sup>3</sup>		<sup>3</sup>	part.
AA				
Attaching hardware incorrect	<sup>3</sup>	A	<sup>3</sup>	Require replacement of incorrect
	<sup>3</sup>		<sup>3</sup>	part.
AA				
Attaching hardware loose	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement of
	<sup>3</sup>		<sup>3</sup>	loose part.
AA				
Attaching hardware missing	<sup>3</sup>	C	<sup>3</sup>	Require replacement of missing
	<sup>3</sup>		<sup>3</sup>	part.
AA				
Attaching hardware threads damaged	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement of
	<sup>3</sup>		<sup>3</sup>	part with damaged threads.
AA				
Attaching hardware threads	<sup>3</sup>	A	<sup>3</sup>	Require replacement of part with

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stripped (threads missing)	<sup>3</sup>	<sup>3</sup>	stripped threads.
AA			
Bent	<sup>3</sup>	B	<sup>3</sup> Require replacement.
AA			
Corroded, affecting structural integrity	<sup>3</sup>	A	<sup>3</sup> Require replacement.
AA			
Holes distorted	<sup>3</sup>	A	<sup>3</sup> Require replacement.
AA			
Threads damaged	<sup>3</sup>	A	<sup>3</sup> Require repair or replacement.
AA			
Threads stripped (threads missing)	<sup>3</sup>	A	<sup>3</sup> Require replacement.
AA			

**RELAY RODS**

RELAY RODS			
AA			
Condition	<sup>3</sup>	Code	<sup>3</sup> Procedure
AA			
Attaching hardware incorrect	<sup>3</sup>	A	<sup>3</sup> Require replacement of incorrect part, if available; otherwise, replace relay rod.
AA			
Attaching hardware loose	<sup>3</sup>	A	<sup>3</sup> Require repair or replacement of loose part, if available; otherwise, replace relay rod.
AA			
Attaching hardware missing	<sup>3</sup>	C	<sup>3</sup> Require replacement of missing part, if available; otherwise, replace relay rod.
AA			
Attaching hardware threads damaged	<sup>3</sup>	A	<sup>3</sup> Require repair or replacement of part with damaged threads, if available; otherwise, replace relay rod.
AA			
Attaching hardware threads stripped (threads missing)	<sup>3</sup>	A	<sup>3</sup> Require replacement of part with stripped threads, if available; otherwise, replace relay rod.
AA			
Bent	<sup>3</sup>	B	<sup>3</sup> Require replacement.
AA			
Binding	<sup>3</sup>	A	<sup>3</sup> Further inspection required.
AA			
Grease boot cracked	<sup>3</sup>	B, 2	<sup>3</sup> Suggest replacement. See note (2).
AA			
Grease boot missing	<sup>3</sup>	B, 2	<sup>3</sup> Suggest replacement. See note (3).
AA			
Grease boot torn	<sup>3</sup>	B, 2	<sup>3</sup> Suggest replacement. See note (4).

(5) Lack of grease seal will allow contaminants to enter joint and will accelerate wear.



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- (6) Torn grease seal will allow contaminants to enter joint and will accelerate wear.
- (7) If manufacturer's procedures for inspection exist, use those procedures; otherwise, use an approved inspection method such as the dry park check.
- (8) Excessive looseness is defined as being significant enough to affect vehicle handling or structural integrity.
- (9) Check for damaged taper hole.
- (10) Check for damaged stud.

AA

**SHOCK ABSORBERS, STRUT CARTRIDGES, & STRUT ASSEMBLIES**

You are not required to replace shocks or struts in axle sets. However, when replacing a shock or strut due to the conditions that follow, you may suggest replacement of the other shock or strut on the same axle for improved performance and preventive maintenance.

- \* part is close to the end of its useful life
- \* to extend tire life
- \* to balance ride and handling
- \* to improve stopping distance

When replacing steering and/or suspension components which may affect an alignment angle, you are required to check and adjust alignment as needed. Refer to the OEM specifications.

Under no circumstances should a technician bend struts or strut housings.

A vehicle's load-carrying and handling abilities are limited by its suspension, tires, brakes, and driveline. Installing coil over shocks or any other load assist device does not increase the vehicle's load capacity. See the vehicle owner's manual for more details.

**NOTE:** If vehicle is equipped with original equipment coil over shocks, apply the conditions for coil springs from the "Springs: Coil, Leaf, and Torsion Bar" section of the Steering and Suspension guidelines. If the vehicle is equipped with add-on coil over shocks, you may suggest replacing the shocks with standard shocks for any spring-related condition.

**SHOCK ABSORBERS, STRUT CARTRIDGES, & STRUT ASSEMBLIES**

AA

Condition	Code	Procedure
Attaching hardware bent	B	Require repair or replacement of bent part, if available; otherwise, replace shock or strut.
Attaching hardware broken	A	Require replacement of broken part, if available; otherwise, replace shock or strut.

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AA			
Attaching hardware corroded <sup>3</sup>	A	<sup>3</sup>	Require replacement of corroded
affecting structural	<sup>3</sup>	<sup>3</sup>	part, if available; otherwise,
integrity	<sup>3</sup>	<sup>3</sup>	replace shock or strut.
AA			
Attaching hardware	<sup>3</sup> A	<sup>3</sup>	Require replacement of incorrect
incorrect	<sup>3</sup>	<sup>3</sup>	part, if available; otherwise,
	<sup>3</sup>	<sup>3</sup>	replace shock or strut.
AA			
Attaching hardware loose	<sup>3</sup> A	<sup>3</sup>	Require repair or replacement of
	<sup>3</sup>	<sup>3</sup>	loose part, if available;
	<sup>3</sup>	<sup>3</sup>	otherwise, replace shock or strut.
AA			
Attaching hardware missing	<sup>3</sup> C	<sup>3</sup>	Require replacement of missing
	<sup>3</sup>	<sup>3</sup>	part, if available; otherwise,
	<sup>3</sup>	<sup>3</sup>	replace shock or strut.
AA			
Attaching hardware threads	<sup>3</sup> A	<sup>3</sup>	Require repair or replacement of
damaged	<sup>3</sup>	<sup>3</sup>	part with damaged threads, if
	<sup>3</sup>	<sup>3</sup>	available; otherwise, replace
	<sup>3</sup>	<sup>3</sup>	shock or strut.
AA			
Attaching hardware threads	<sup>3</sup> A	<sup>3</sup>	Require replacement of part with
stripped (threads missing)	<sup>3</sup>	<sup>3</sup>	stripped threads, if available;
	<sup>3</sup>	<sup>3</sup>	otherwise, replace shock or strut.
AA			
Binding	<sup>3</sup> A	<sup>3</sup>	Require replacement.
AA			
Body dented	<sup>3</sup> A	<sup>3</sup>	Further inspection required.
	<sup>3</sup>	<sup>3</sup>	See note (1) below.
AA			
Body punctured	<sup>3</sup> A	<sup>3</sup>	Require replacement.
AA			
Brake hose bracket bent	<sup>3</sup> B	<sup>3</sup>	Require repair or replacement.
AA			
Brake hose bracket missing	<sup>3</sup> C	<sup>3</sup>	Require replacement.
AA			
Brake hose bracket threads	<sup>3</sup> C	<sup>3</sup>	Require repair or replacement.
damaged	<sup>3</sup>	<sup>3</sup>	
AA			
Brake hose bracket threads	<sup>3</sup> C	<sup>3</sup>	Require replacement.
stripped (threads missing)	<sup>3</sup>	<sup>3</sup>	
AA			
Compression bumper missing	<sup>3</sup> C	<sup>3</sup>	Require replacement of compression
	<sup>3</sup>	<sup>3</sup>	bumper.
AA			
Compression bumper split	<sup>3</sup> A, 1	<sup>3</sup>	Suggest replacement of compression
	<sup>3</sup>	<sup>3</sup>	bumper.
AA			
Damping (none)	<sup>3</sup> A	<sup>3</sup>	Require replacement.
AA			
Dust boot (bellows) split	<sup>3</sup> B, 2	<sup>3</sup>	Suggest replacement of boot.

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Piston rod threads damaged <sup>3</sup> A <sup>3</sup> Require repair or replacement.  
Piston rod threads stripped<sup>3</sup> A <sup>3</sup> Require replacement.  
(threads missing) <sup>3</sup> <sup>3</sup>  
Seized <sup>3</sup> A <sup>3</sup> Require replacement.  
Shock missing <sup>3</sup> C <sup>3</sup> Require replacement.  
Strut housing bent <sup>3</sup> A <sup>3</sup> Require replacement.  
Strut housing cap (gland <sup>3</sup> A <sup>3</sup> Require replacement of nut and/or  
nut) is not removable <sup>3</sup> <sup>3</sup> housing. See note (5) below.  
using appropriate tool <sup>3</sup> <sup>3</sup>  
Strut housing cap (gland <sup>3</sup> A <sup>3</sup> Require repair or replacement of  
nut) threads damaged <sup>3</sup> <sup>3</sup> nut.  
Strut housing cap (gland <sup>3</sup> A <sup>3</sup> Require replacement of nut.  
nut) threads stripped <sup>3</sup> <sup>3</sup>  
(threads missing) <sup>3</sup> <sup>3</sup>  
Strut housing severely <sup>3</sup> A <sup>3</sup> Require replacement.  
corroded, affecting <sup>3</sup> <sup>3</sup>  
structural integrity <sup>3</sup> <sup>3</sup>  
Strut housing threads <sup>3</sup> A <sup>3</sup> Require repair or replacement.  
damaged <sup>3</sup> <sup>3</sup>  
Strut housing threads <sup>3</sup> A <sup>3</sup> Require replacement.  
stripped (threads missing)<sup>3</sup> <sup>3</sup>  
Tire cupping <sup>3</sup> A <sup>3</sup> Further inspection required.  
<sup>3</sup> <sup>3</sup> See note (8) below

- NOTE: (1) Require replacement of units where dents restrict shock or strut piston rod movement. If dents don't restrict movement, no service is suggested or required. Especially critical on mono-tube shocks.
- (2) This condition can lead to damage of the piston rod, which, in turn, causes premature piston rod seal wear.
- (3) This condition can lead to damage of the piston rod, which causes piston rod seal wear.
- (4) This condition can lead to damage of the piston rod, which, in turn, causes premature piston rod seal wear.
- (5) Only required if replacing cartridge.
- (6) Require replacement of units where dents restrict shock or strut piston rod movement. If dents don't restrict movement, no service is suggested or required. Especially critical on mono-tube shocks.
- (7) If noise is isolated to shock or strut, suggest replacement.
- (8) Although shocks or struts may have contributed to tire

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cupping, an inspection is needed of the entire suspension system. If the shock or strut is found to be contributing to the tire cupping, require replacement.

AA

**SPINDLES**

**SPINDLES**

AA

Condition	3	Code	3	Procedure
-----------	---	------	---	-----------

AA

Attaching hardware broken	3	A	3	Require replacement of broken part
---------------------------	---	---	---	------------------------------------

AA

Attaching hardware loose	3	A	3	Require repair or replacement of
	3		3	loose part.

AA

Attaching hardware missing	3	C	3	Require replacement of missing
	3		3	part.

AA

Attaching hardware threads	3	A	3	Require repair or replacement of
damaged	3		3	part with damaged threads.

AA

Attaching hardware threads	3	A	3	Require replacement of part with
stripped (threads missing)	3		3	stripped threads.

AA

Bent	3	B	3	Require replacement.
------	---	---	---	----------------------

AA

Broken	3	A	3	Require replacement.
--------	---	---	---	----------------------

AA

Race seat area undersized	3	B	3	Require replacement.
---------------------------	---	---	---	----------------------

AA

Scored	3	A	3	Require repair or replacement.
--------	---	---	---	--------------------------------

AA

Threads damaged	3	A	3	Require repair or replacement.
-----------------	---	---	---	--------------------------------

AA

Threads stripped (threads	3	A	3	Require replacement.
missing)	3		3	

AA

**SPRINGS: COIL, LEAF, & TORSION BAR**

When springs are replaced, it is suggested, but not required, that both springs on an axle be replaced to maintain equal height from side to side and to provide a balanced ride and proper handling.

When variable rate springs are installed in place of conventional coil springs, they must be installed in axle sets to ensure proper handling, uniform ride, and proper chassis height.

Erroneous height measurements may result from improper tire inflation, non-standard tire or wheel size, and heavy load in vehicle or trunk.

**SPRINGS: COIL, LEAF, & TORSION BAR**

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AA		
Condition	3 Code 3	Procedure
AA		
Attaching hardware bent	3 B 3	Require repair or replacement of bent part.
AA		
Attaching hardware broken	3 A 3	Require replacement of broken part.
AA		
Attaching hardware corroded affecting structural integrity	3 A 3	Require replacement of corroded part.
AA		
Attaching hardware incorrect	3 A 3	Require replacement of incorrect part.
AA		
Attaching hardware loose	3 A 3	Require repair or replacement of loose part.
AA		
Attaching hardware missing	3 C 3	Require replacement of missing part.
AA		
Attaching hardware threads damaged	3 A 3	Require repair or replacement of part with damaged threads.
AA		
Attaching hardware threads stripped (threads missing)	3 A 3	Require replacement of part with stripped threads.
AA		
Broken (all springs except secondary leave(s) on multi-leaf springs)	3 A 3	Require replacement.
AA		
Coil clash	3 3	Require ride height check. See note (1) below.
AA		
Coil spring insulator deteriorated	3 B, 2 3	Suggest replacement of insulator.
AA		
Coil spring insulator missing	3 B, 2 3	Suggest replacement of insulator.
AA		
Coil spring insulator split	3 B, 2 3	Suggest replacement of insulator.
AA		
Coil spring plastic coating deteriorated - rust present	3 A 3	Refer to manufacturer's service requirements. See note (2) below.
AA		
Composite spring damaged	3 A 3	Further inspection required. See note (3) below.
AA		
Cracked (all springs except composite leaf and	3 A 3	Require replacement.

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secondary leave(s) on multi-leaf springs)	3	3	
Installed incorrectly	3	B	3 Require repair.
Leaf spring insulators missing	3	B, 2	3 Suggest replacement of insulators.
Secondary leaf on multi-leaf spring broken	3	A, 1	3 Suggest repair or replacement
Secondary leaf on multi-leaf spring cracked	3	A, 1	3 Suggest repair or replacement
Torsion bar adjuster bent	3	A	3 Require repair or replacement of adjuster. See note (4) below.
Torsion bar adjuster seized	3	A	3 Require repair or replacement of adjuster. See note (4) below.
Torsion bar adjuster threads damaged	3	A	3 Require repair or replacement of part with damaged threads. See note (4) below.
Torsion bar adjuster threads stripped (threads missing)	3	A	3 Require replacement of part with stripped threads.
Vehicle suspension height not within OEM specs	3	B	3 Require adjustment or replacement.

- NOTE: (1) If vehicle is within manufacturer's height specifications, no service is suggested or required.
- (2) Some manufacturers require replacement under these conditions.
- (3) Check vehicle ride height. If ride height is OK, no service is suggested or required.
- (4) Only required if ride height needs to be adjusted.

### STEEL POWER STEERING LINES

**CAUTION:** When replacing steel power steering lines, be sure to use a replacement product that meets or exceeds OEM design specifications.

### STEEL POWER STEERING LINES

Condition	3	Code	3	Procedure
Attaching hardware bent	3	B	3	Require repair or replacement of bent part.

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AA		
Attaching hardware broken	<sup>3</sup> A <sup>3</sup>	Require replacement of broken part.
AA		
Attaching hardware loose	<sup>3</sup> A <sup>3</sup>	Require repair or replacement of loose part.
AA		
Attaching hardware missing	<sup>3</sup> C <sup>3</sup>	Require replacement of missing part.
AA		
Attaching hardware threads damaged	<sup>3</sup> A <sup>3</sup>	Require repair or replacement of part with damaged threads.
AA		
Attaching hardware threads stripped (threads missing)	<sup>3</sup> A <sup>3</sup>	Require replacement of part with stripped threads.
AA		
Blocked	<sup>3</sup> A <sup>3</sup>	Require repair or replacement.
AA		
Fitting incorrect (such as compression fitting)	<sup>3</sup> B <sup>3</sup>	Require replacement.
AA		
Flare type incorrect	<sup>3</sup> B <sup>3</sup>	Required replacement.
AA		
Leaking	<sup>3</sup> A <sup>3</sup>	Require tightening or replacement.
AA		
Line type incorrect	<sup>3</sup> B <sup>3</sup>	Require replacement.
AA		
Restricted	<sup>3</sup> A <sup>3</sup>	Require replacement.
AA		
Routed incorrectly	<sup>3</sup> B <sup>3</sup>	Require routing correction.
AA		
Rust- pitted	<sup>3</sup> A, 1 <sup>3</sup>	Suggest replacement.
AA		
Rust pitted affecting structural integrity	<sup>3</sup> A <sup>3</sup>	Require replacement.
AA		

**STEERING ARMS**

**STEERING ARMS**

AA		
Condition	<sup>3</sup> Code <sup>3</sup>	Procedure
AA		
Attaching hardware bent	<sup>3</sup> B <sup>3</sup>	Require repair or replacement of bent part.
AA		
Attaching hardware broken	<sup>3</sup> A <sup>3</sup>	Require replacement of broken part.
AA		
Attaching hardware incorrect	<sup>3</sup> A <sup>3</sup>	Require replacement of incorrect part.
AA		



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Attaching hardware loose	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement of loose part.
~~~~~				
Attaching hardware missing	<sup>3</sup>	C	<sup>3</sup>	Require replacement of missing part.
~~~~~				
Attaching hardware threads damaged	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement of part with damaged threads.
~~~~~				
Attaching hardware threads stripped (threads missing)	<sup>3</sup>	A	<sup>3</sup>	Require replacement of part with stripped threads.
~~~~~				
Bent	<sup>3</sup>	B	<sup>3</sup>	Require replacement.
~~~~~				
Broken	<sup>3</sup>	A	<sup>3</sup>	Require replacement.
~~~~~				
Taper hole elongated	<sup>3</sup>	A	<sup>3</sup>	Require replacement. See note (1).
~~~~~				
Threads damaged	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement.
~~~~~				
Threads stripped (threads missing)	<sup>3</sup>	A	<sup>3</sup>	Require replacement.

NOTE: (1) Check for damaged stud.

**STEERING DAMPERS**

The following procedures are only required if the vehicle was originally equipped from the factory with a steering damper. If the steering damper is an add-on unit, then the unit may be removed instead of repairing or replacing.

**STEERING DAMPERS**

Condition	<sup>3</sup>	Code	<sup>3</sup>	Procedure
~~~~~				
Attaching hardware bent	<sup>3</sup>	B	<sup>3</sup>	Require repair or replacement of bent part, if available; otherwise, replace steering damper.
~~~~~				
Attaching hardware broken	<sup>3</sup>	A	<sup>3</sup>	Require replacement of broken part, if available; otherwise, replace steering damper.
~~~~~				
Attaching hardware corroded affecting structural integrity	<sup>3</sup>	A	<sup>3</sup>	Require replacement of corroded part, if available; otherwise, replace steering damper.
~~~~~				
Attaching hardware incorrect	<sup>3</sup>	A	<sup>3</sup>	Require replacement of incorrect part, if available; otherwise,

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	<sup>3</sup>		<sup>3</sup>	replace steering damper.
Attaching hardware loose	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement of loose part, if available; otherwise, replace steering damper.
Attaching hardware missing	<sup>3</sup>	C	<sup>3</sup>	Require replacement of missing part, if available; otherwise, replace steering damper.
Attaching hardware threads damaged	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement of part with damaged threads, if available; otherwise, replace steering damper.
Attaching hardware threads stripped (threads missing)	<sup>3</sup>	A	<sup>3</sup>	Require replacement of part with stripped threads, if available; otherwise, replace steering damper.
Binding	<sup>3</sup>	A	<sup>3</sup>	Require replacement.
Damper body dented	<sup>3</sup>	A	<sup>3</sup>	Further inspection required. See note (1) below.
Damper body punctured	<sup>3</sup>	A	<sup>3</sup>	Require replacement.
Damping (none)	<sup>3</sup>	A	<sup>3</sup>	Require replacement.
Dust boot (bellows) missing	<sup>3</sup>	B, 2	<sup>3</sup>	Suggest replacement of boot. See note (2) below.
Dust boot (bellows) split	<sup>3</sup>	B, 2	<sup>3</sup>	Suggest replacement of boot. See note (2) below.
Dust shield broken	<sup>3</sup>	B, 2	<sup>3</sup>	Suggest replacement. See note (2).
Dust shield missing	<sup>3</sup>	B, 2	<sup>3</sup>	Suggest replacement. See note (2).
Leaking oil, enough for fluid to be running down the body	<sup>3</sup>	A	<sup>3</sup>	Require replacement.
Loose	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement.
Missing	<sup>3</sup>	C	<sup>3</sup>	Require replacement.
Noise	<sup>3</sup>	B, 2	<sup>3</sup>	Further inspection required. See note (3) below.
Piston rod bent	<sup>3</sup>	A	<sup>3</sup>	Require replacement.

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Piston rod broken			<sup>3</sup> A	<sup>3</sup> Require replacement.
Piston rod has surface defect			<sup>3</sup> B, 2	<sup>3</sup> Suggest replacement.
Piston rod threads stripped (threads missing)			<sup>3</sup> A	<sup>3</sup> Require replacement.
Piston rod threads damaged			<sup>3</sup> A	<sup>3</sup> Require repair or replacement.
Seized			<sup>3</sup> A	<sup>3</sup> Require replacement.
NOTE: (1) Require replacement of units where dents restrict damper piston rod movement. If dents don't restrict movement, no service is suggested or required. Especially critical on mono-tube dampers.				
(2) This condition can lead to damage of the piston rod, which, in turn, causes premature piston rod seal wear.				
(3) If noise is isolated to damper, suggest replacement.				

**STEERING GEARS (EXCEPT RACK & PINION)**

If diagnosis has determined that complete disassembly is necessary to determine the extent of the system failure, the suggestion may be made to rebuild or replace the power steering pump. Repair or replacement of the following components may be required, if performed as part of a power steering pump overhaul or rebuild service to meet a minimum rebuild standard.

**STEERING GEARS (EXCEPT RACK & PINION)**

Condition	<sup>3</sup> Code	<sup>3</sup> Procedure
Attaching hardware broken	<sup>3</sup> A	<sup>3</sup> Require replacement of broken part.
Attaching hardware loose	<sup>3</sup> A	<sup>3</sup> Require repair or replacement of loose part.
Attaching hardware missing	<sup>3</sup> C	<sup>3</sup> Require replacement of missing part.
Attaching hardware threads damaged	<sup>3</sup> A	<sup>3</sup> Require repair or replacement of part with damaged threads.
Attaching hardware threads stripped (threads missing)	<sup>3</sup> A	<sup>3</sup> Require replacement of part with stripped threads.
Binding	<sup>3</sup> A	<sup>3</sup> Require repair or replacement

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Flex coupler binding	3	A	3	Require repair or replacement of
	3		3	coupler.
AA				
Flex coupler loose	3	A	3	Require repair or replacement of
	3		3	coupler.
AA				
Flex coupler missing parts	3	A	3	Require repair or replacement of
	3		3	coupler.
AA				
Flex coupler soft/spongy	3	A	3	Require replacement of coupler.
AA				
Flex coupler torn	3	A	3	Require replacement of coupler.
AA				
Fluid contaminated	3	B	3	Require flushing and refilling
	3		3	of the system. See note (1) below.
AA				
Gasket leaking	3	A	3	Require repair or replacement of
	3		3	gasket.
AA				
Housing leaking	3	A	3	Require replacement.
AA				
Hydraulic fittings leaking	3	A	3	Require repair or replacement of
	3		3	fittings.
AA				
Inadequate power assist	3	A	3	Further inspection required.
	3		3	See note (2) below.
AA				
Lash exceeds manufacturer's	3	B	3	Require repair or replacement.
specifications	3		3	
AA				
Seal leaking	3	A	3	Require repair or replacement of
	3		3	seal and/or mating part.
AA				
Splines damaged	3	A	3	Require repair or replacement of
	3		3	splines.
AA				
Splines stripped	3	A	3	Require replacement of splines.
AA				
Steering coupler shield	3	B, 2	3	Suggest replacement.
cracked	3		3	
AA				
Steering coupler shield	3	C	3	Require replacement.
missing	3		3	
AA				
Threads damaged	3	A	3	Require repair or replacement of
	3		3	part with damaged threads.
AA				
Threads stripped (threads	3	A	3	Require replacement of part with
missing)	3		3	stripped threads.
AA				
U-joint binding	3	A	3	Require repair or replacement of
	3		3	joint.

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AA

U-joint loose	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement of
	<sup>3</sup>		<sup>3</sup>	joint.

AA

Unequal power assist	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement.
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AA

NOTE: (1) Determine and correct source of contamination.

OEM specifications must be followed for fluid type.

(2) If steering gear is source of inadequate assist, require repair or replacement.

AA

**STEERING GEARS: RACK & PINION**

If diagnosis has determined that complete disassembly is necessary to determine the extent of the system failure, the suggestion may be made to rebuild or replace the power steering pump. Repair or replacement of the following components may be required, if performed as part of a power steering pump overhaul or rebuild service to meet a minimum rebuild standard.

**STEERING GEARS: RACK & PINION**

AA

Condition	<sup>3</sup>	Code	<sup>3</sup>	Procedure
-----------	--------------	------	--------------	-----------

AA

Attaching hardware broken	<sup>3</sup>	A	<sup>3</sup>	Require replacement of broken
	<sup>3</sup>		<sup>3</sup>	part.

AA

Attaching hardware loose	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement of
	<sup>3</sup>		<sup>3</sup>	loose part.

AA

Attaching hardware missing	<sup>3</sup>	C	<sup>3</sup>	Require replacement of missing
	<sup>3</sup>		<sup>3</sup>	part.

AA

Attaching hardware threads	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement of
damaged	<sup>3</sup>		<sup>3</sup>	part with damaged threads.

AA

Attaching hardware threads	<sup>3</sup>	A	<sup>3</sup>	Require replacement of part with
stripped (threads missing)	<sup>3</sup>		<sup>3</sup>	stripped threads.

AA

Balance tube blocked	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement of
	<sup>3</sup>		<sup>3</sup>	balance tube.

AA

Balance tube missing	<sup>3</sup>	C	<sup>3</sup>	Require replacement of balance
	<sup>3</sup>		<sup>3</sup>	tube.

AA

Balance tube restricted	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement of
	<sup>3</sup>		<sup>3</sup>	balance tube.

AA

Bellows boot clamp missing	<sup>3</sup>	C	<sup>3</sup>	Require replacement of clamp.
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AA

Bellows boot cracked (not	<sup>3</sup>	B, 2	<sup>3</sup>	Suggest replacement of bellows
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through)	3	3	boot.
AA			
Bellows boot missing	3	C	3 Require replacement of bellows
	3		3 boot.
AA			
Bellows boot not sealing	3	A	3 Require repair or replacement of
	3		3 bellows boot.
AA			
Bellows boot torn	3	A	3 Require replacement of bellows
	3		3 boot.
AA			
Bellows boot twisted (from	3	B	3 Require repair.
toe adjustment)	3		3
AA			
Fitting leaking	3	A	3 Require repair or replacement.
AA			
Fitting missing	3	A	3 Require replacement of fitting.
AA			
Fitting threads damaged	3	A	3 Require repair or replacement of
	3		3 part with damaged threads.
AA			
Fitting threads stripped	3	A	3 Require replacement of part with
(threads missing)	3		3 stripped threads.
AA			
Flex coupler binding	3	A	3 Require repair or replacement of
	3		3 coupler.
AA			
Flex coupler loose	3	A	3 Require repair or replacement of
	3		3 coupler.
AA			
Flex coupler missing parts	3	A	3 Require repair or replacement of
	3		3 coupler.
AA			
Flex coupler soft/spongy	3	A	3 Require replacement of coupler.
AA			
Flex coupler torn	3	A	3 Require replacement of coupler.
AA			
Fluid contaminated	3	B	3 Require flushing and refilling of
	3		3 the system. See note (1) below.
AA			
Gasket leaking	3	A	3 Require repair or replacement.
AA			
Hard steering on cold	3	A, 1	3 Suggest repair or replacement.
start-up	3		3 See note (2) below.
AA			
Housing cracked, affecting	3	B	3 Require replacement.
structural integrity	3		3
AA			
Housing leaking	3	A	3 Require replacement.
AA			
Inadequate power assist	3	A	3 Further inspection required.
	3		3 See note (3) below.

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AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Lash exceeds manufacturer's3 B3 Require repair or replacement.
specifications3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Seal leaking3 A3 Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Splines damaged3 A3 Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Splines stripped (splines3 A3 Require replacement.
missing)3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Steel line blocked3 A3 Require repair or replacement of
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA' line.
Steel line leaking3 A3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Steel line missing3 C3 Require replacement of line.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Steel line restricted3 A3 Require repair or replacement of
3 line.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Steering coupler shield3 B, 23 Suggest replacement.
cracked3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Steering coupler shield3 C3 Require replacement.
missing3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Steering coupler shield3 B, 23 Suggest replacement.
torn3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Threads damaged3 A3 Require repair or replacement of
3 part with damaged threads.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Threads stripped (threads3 A3 Require replacement of part with
missing)3 stripped threads.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
U-joint binding3 A3 Require repair or replacement of
3 joint.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
U-joint loose3 A3 Require repair or replacement of
3 joint.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Unequal power assist3 A3 Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
NOTE: (1) Determine and correct source of contamination.
Follow OE specifications for fluid type.
(2) Indicates internal wear.
(3) If steering gear is source of inadequate assist, require
repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

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**STEERING KNUCKLES**

AA		
Condition	3 Code 3	Procedure
AA		
Attaching hardware bent	3 B 3	Require repair or replacement of bent part.
AA		
Attaching hardware broken	3 A 3	Require replacement of broken part.
AA		
Attaching hardware incorrect	3 A 3	Require replacement of incorrect part.
AA		
Attaching hardware loose	3 A 3	Require repair or replacement of loose part.
AA		
Attaching hardware missing	3 C 3	Require replacement of missing part.
AA		
Attaching hardware threads damaged	3 A 3	Require repair or replacement of part with damaged threads.
AA		
Attaching hardware threads stripped (threads missing)	3 A 3	Require replacement of part with stripped threads.
AA		
Bent	3 B 3	Require replacement.
AA		
Broken	3 A 3	Require replacement.
AA		
Pinch bolt incorrect	3 B 3	Require replacement with bolt that meets OE design.
AA		
Pinch bolt loose	3 B 3	Require repair.
AA		
Pinch bolt missing	3 B 3	Require replacement.
AA		
Pinch bolt tabs deformed (pinched together), .032" or more before clamping	3 B 3	Require replacement. See note (1) below.
AA		
Taper hole elongated	3 A 3	Require replacement. See note (2).
AA		
Threads damaged	3 A 3	Require repair or replacement.
AA		
Threads stripped (threads missing)	3 A 3	Require repair or replacement.
AA		

NOTE: (1) Steering knuckle deformation can cause pinch bolt breakage.  
(2) Check for damaged stud.

AA

**STRIKE OUT BUMPERS**



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Condition	3	Code	3	Procedure
Attaching hardware broken	3	A	3	Require replacement of broken part.
Attaching hardware corroded affecting structural integrity	3	A	3	Require replacement of corroded part.
Attaching hardware loose	3	A	3	Require repair or replacement of loose part.
Attaching hardware missing	3	C	3	Require replacement of missing part.
Attaching hardware threads damaged	3	A	3	Require repair or replacement of part with damaged threads.
Attaching hardware threads stripped (threads missing)	3	A	3	Require replacement of part with stripped threads.
Missing	3	C	3	Require replacement.
Split	3	A, 1	3	Suggest replacement.

Condition	Code	Procedure
Adjusting nut seized	A	Require repair or replacement. See note (1) below.
Attaching hardware bent	B	Require repair or replacement of bent part, if available; otherwise, replace strut rod.
Attaching hardware broken	A	Require replacement of broken part, if available; otherwise, replace strut rod.
Attaching hardware incorrect	A	Require replacement of incorrect part, if available; otherwise, replace strut rod.
Attaching hardware loose	A	Require repair or replacement of loose part, if available;

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	<sup>3</sup>		<sup>3</sup>	otherwise, replace strut rod.
Attaching hardware missing	<sup>3</sup>	C	<sup>3</sup>	Require replacement of missing
	<sup>3</sup>		<sup>3</sup>	part, if available; otherwise,
	<sup>3</sup>		<sup>3</sup>	replace strut rod.
Attaching hardware threads	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement of
damaged	<sup>3</sup>		<sup>3</sup>	part with damaged threads, if
	<sup>3</sup>		<sup>3</sup>	available; otherwise, replace
	<sup>3</sup>		<sup>3</sup>	strut rod.
Attaching hardware threads	<sup>3</sup>	A	<sup>3</sup>	Require replacement of part with
stripped (threads missing)	<sup>3</sup>		<sup>3</sup>	stripped threads, if available;
	<sup>3</sup>		<sup>3</sup>	otherwise, replace strut rod.
Attaching (mating) hole	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement of
oversized	<sup>3</sup>		<sup>3</sup>	frame.
Attaching point on frame	<sup>3</sup>	A	<sup>3</sup>	Require repair of frame.
corroded, affecting	<sup>3</sup>		<sup>3</sup>	
structural integrity	<sup>3</sup>		<sup>3</sup>	
Bent	<sup>3</sup>	A	<sup>3</sup>	Require replacement.
Mating (attaching) hole	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement of
oversized	<sup>3</sup>		<sup>3</sup>	frame.
Threads damaged	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement.
Threads stripped (threads	<sup>3</sup>	A	<sup>3</sup>	Require replacement.
missing)	<sup>3</sup>		<sup>3</sup>	
NOTE: (1) Only required if an alignment is being performed.				

**STRUT UPPER BEARING PLATE ASSEMBLIES**

NOTE: When the following guidelines indicate replacement of bearing, only the bearing should be replaced if it is available separately; otherwise, replace the bearing plate assembly.

**STRUT UPPER BEARING PLATE ASSEMBLIES**

Condition	<sup>3</sup>	Code	<sup>3</sup>	Procedure
Attaching hardware broken	<sup>3</sup>	A	<sup>3</sup>	Require replacement of broken
	<sup>3</sup>		<sup>3</sup>	part, if available; otherwise,
	<sup>3</sup>		<sup>3</sup>	replace bearing plate assembly.
Attaching hardware loose	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement of
	<sup>3</sup>		<sup>3</sup>	loose part, if available;

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	<sup>3</sup>		<sup>3</sup>	otherwise, replace bearing plate
	<sup>3</sup>		<sup>3</sup>	assembly.
Attaching hardware missing	<sup>3</sup>	C	<sup>3</sup>	Require replacement of missing
	<sup>3</sup>		<sup>3</sup>	part, if available; otherwise,
	<sup>3</sup>		<sup>3</sup>	replace bearing plate assembly.
Attaching hardware threads	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement of
damaged	<sup>3</sup>		<sup>3</sup>	part with damaged threads, if
	<sup>3</sup>		<sup>3</sup>	available; otherwise, replace
	<sup>3</sup>		<sup>3</sup>	bearing plate assembly.
Attaching hardware threads	<sup>3</sup>	A	<sup>3</sup>	Require replacement of part with
stripped (threads missing)	<sup>3</sup>		<sup>3</sup>	stripped threads, if available;
	<sup>3</sup>		<sup>3</sup>	otherwise, replace bearing plate
	<sup>3</sup>		<sup>3</sup>	assembly.
Bearing axial or radial	<sup>3</sup>	B	<sup>3</sup>	Require replacement of bearing.
movement exceeds vehicle	<sup>3</sup>		<sup>3</sup>	
manufacturer's specs	<sup>3</sup>		<sup>3</sup>	
Bearing binding	<sup>3</sup>	A	<sup>3</sup>	Require replacement of bearing.
Bearing missing	<sup>3</sup>	C	<sup>3</sup>	Require replacement of bearing.
Bearing seized	<sup>3</sup>	A	<sup>3</sup>	Require replacement of bearing.
Bent	<sup>3</sup>	B	<sup>3</sup>	Require replacement.
Holes distorted	<sup>3</sup>	A	<sup>3</sup>	Require replacement.
Missing	<sup>3</sup>	C	<sup>3</sup>	Require replacement.
Severely corroded,	<sup>3</sup>	A	<sup>3</sup>	Require replacement.
affecting structural	<sup>3</sup>		<sup>3</sup>	
integrity	<sup>3</sup>		<sup>3</sup>	

**SWAY BAR LINKS**

**SWAY BAR LINKS**

Condition	<sup>3</sup>	Code	<sup>3</sup>	Procedure
Attaching hardware	<sup>3</sup>	A	<sup>3</sup>	Require replacement of incorrect
incorrect	<sup>3</sup>		<sup>3</sup>	part, if available; otherwise,
	<sup>3</sup>		<sup>3</sup>	replace link.
Attaching hardware loose	<sup>3</sup>	A	<sup>3</sup>	Require repair or replacement of
	<sup>3</sup>		<sup>3</sup>	loose part, if available;
	<sup>3</sup>		<sup>3</sup>	otherwise, replace link.

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Attaching hardware missing	<sup>3</sup> C	<sup>3</sup> Require replacement of missing part, if available; otherwise, replace link.
~~~~~		
Attaching hardware threads damaged	<sup>3</sup> A	<sup>3</sup> Require repair or replacement of part with damaged threads, if available; otherwise, replace link.
~~~~~		
Attaching hardware threads stripped (threads missing)	<sup>3</sup> A	<sup>3</sup> Require replacement of part with stripped threads, if available; otherwise, replace link.
~~~~~		
Ball and socket has looseness (perceptible vertical movement)	<sup>3</sup> A, 1	<sup>3</sup> Suggest replacement. See note (1).
~~~~~		
CAUTION: DO NOT use pliers or pry bar to check ball and socket movement. Use only moderate hand pressure.		
~~~~~		
Ball and socket has looseness that is excessive	<sup>3</sup> B	<sup>3</sup> Require replacement. See notes (1) and (2) and caution.
~~~~~		
Bent	<sup>3</sup> B	<sup>3</sup> Require replacement.
~~~~~		
Broken	<sup>3</sup> A	<sup>3</sup> Require replacement.
~~~~~		
Corroded, affecting structural integrity	<sup>3</sup> A	<sup>3</sup> Require replacement.
~~~~~		
Grease boot cracked	<sup>3</sup> B, 2	<sup>3</sup> Suggest replacement. See note (3).
~~~~~		
Grease boot missing	<sup>3</sup> B, 2	<sup>3</sup> Suggest replacement. See note (4).
~~~~~		
Grease boot torn	<sup>3</sup> B, 2	<sup>3</sup> Suggest replacement. See note (5).
~~~~~		
Missing	<sup>3</sup> C	<sup>3</sup> Require replacement.
~~~~~		
Nut on stud loose	<sup>3</sup> A	<sup>3</sup> Require repair. See note (6).
~~~~~		
Stud bent	<sup>3</sup> B	<sup>3</sup> Require replacement. See note (7).
~~~~~		
Stud broken	<sup>3</sup> A	<sup>3</sup> Require replacement. See note (7).
~~~~~		
Threads damaged	<sup>3</sup> A	<sup>3</sup> Require repair or replacement.
~~~~~		
Threads stripped (threads missing)	<sup>3</sup> A	<sup>3</sup> Require replacement. See note (7).
~~~~~		

NOTE: (1) If manufacturer's procedures for inspection exist, use those procedures; otherwise, use an approved inspection method

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such as the dry park check.

- (2) Excessive looseness is defined as being significant enough to affect vehicle handling or structural integrity.
- (3) Cracked grease boot will allow contaminants to enter the joint and will accelerate wear.
- (4) Lack of grease boot will allow contaminants to enter the joint and will accelerate wear.
- (5) Torn grease boot will allow contaminants to enter the joint and will accelerate wear.
- (6) Check for bent stud or damaged taper hole.
- (7) Check for damaged taper hole.

AA

**SWAY BARS**

**SWAY BARS**

AA

Condition	3	Code	3	Procedure
AA				
Attaching hardware broken	3	A	3	Require replacement of broken
	3		3	part, if available; otherwise,
	3		3	replace sway bar.
AA				
Attaching hardware corroded	3	A	3	Require replacement of corroded
affecting structural	3		3	part, if available; otherwise,
integrity	3		3	replace sway bar.
AA				
Attaching hardware loose	3	A	3	Require repair or replacement of
	3		3	loose part, if available;
	3		3	otherwise, replace sway bar.
AA				
Attaching hardware missing	3	C	3	Require replacement of missing
	3		3	part, if available; otherwise,
	3		3	replace sway bar.
AA				
Attaching hardware threads	3	A	3	Require repair or replacement of
damaged	3		3	part with damaged threads, if
	3		3	available; otherwise, replace sway
	3		3	bar.
AA				
Attaching hardware threads	3	A	3	Require replacement of part with
stripped (threads missing)	3		3	stripped threads, if available;
	3		3	otherwise, replace sway bar.
AA				
Bent	3	B	3	Require replacement.
AA				
Broken	3	A	3	Require replacement.
AA				
Threads damaged	3	A	3	Require repair or replacement.
AA				
Threads stripped (threads	3	A	3	Require replacement.
missing)	3		3	

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AA

**TIE ROD ENDS (INNER & OUTER)**

**TIE ROD ENDS (INNER & OUTER)**

AA

Condition	3	Code	3	Procedure
AA				
Attaching hardware incorrect	3	A	3	Require replacement of incorrect part, if available; otherwise, replace tie rod end.
AA				
Attaching hardware loose	3	A	3	Require repair or replacement of loose part, if available; otherwise, replace tie rod end.
AA				
Attaching hardware missing	3	C	3	Require replacement of missing part, if available; otherwise, replace tie rod end.
AA				
Attaching hardware threads damaged	3	A	3	Require repair or replacement of part with damaged threads, if available; otherwise, replace tie rod end.
AA				
Attaching hardware threads stripped (threads missing)	3	A	3	Require replacement of part with stripped threads, if available; otherwise, replace tie rod end.
AA				
Adjusting sleeve bent	3	B	3	Require replacement of sleeve or tie rod end.
AA				
Adjusting sleeve clamps out of position	3	B	3	Require repair.
AA				
Adjusting sleeve corroded, affecting structural integrity	3	A	3	Require replacement of sleeve or tie rod end.
AA				
Adjusting sleeve missing	3	C	3	Require replacement of sleeve or tie rod end.
AA				
Adjusting sleeve seized	3	A	3	Require repair or replacement. See note (1) below.
AA				
Adjusting sleeve threads damaged	3	A	3	Require repair or replacement of sleeve or tie rod end.
AA				
Adjusting sleeve threads stripped (threads missing)	3	A	3	Require replacement of sleeve or tie rod end.
AA				
Binding	3	A	3	Further inspection required.

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	<sup>3</sup>	<sup>3</sup> See note (2) below.
Grease boot cracked	<sup>3</sup>	<sup>3</sup> Suggest replacement. See note (3).
Grease boot missing	<sup>3</sup>	<sup>3</sup> Suggest replacement. See note (4).
Grease boot torn	<sup>3</sup>	<sup>3</sup> Suggest replacement. See note (5).
Grease fitting broken	<sup>3</sup> A	<sup>3</sup> Require replacement of grease fitting.
Grease fitting missing	<sup>3</sup> C	<sup>3</sup> Require replacement of grease fitting.
Grease fitting won't seal	<sup>3</sup> A	<sup>3</sup> Require replacement of grease fitting.
Grease seal missing	<sup>3</sup> B, 2	<sup>3</sup> Suggest replacement of seal. See note (4) below.
Grease seal torn	<sup>3</sup> B, 2	<sup>3</sup> Suggest replacement of seal. See note (5) below.
Greaseable tie rod end will not take grease	<sup>3</sup> B, 2	<sup>3</sup> Suggest replacement of grease fitting. See note (6) below.
Looseness (perceptible horizontal movement)	<sup>3</sup> A, 1	<sup>3</sup> Suggest replacement. See note (7).
CAUTION: DO NOT use pliers or pry bar to check ball and socket movement. Use only moderate hand pressure.		
Looseness exceeds manufacturer's specs	<sup>3</sup> B	<sup>3</sup> Require replacement.
Looseness that is excessive	<sup>3</sup> B	<sup>3</sup> Require replacement. See notes (7) and (8), caution.
Nut on stud loose	<sup>3</sup> A	<sup>3</sup> Require repair or replacement of nut. See note (9) below.
Seized	<sup>3</sup> A	<sup>3</sup> Require replacement
Stud bent	<sup>3</sup> B	<sup>3</sup> Require replacement. See note (10)
Stud broken	<sup>3</sup> A	<sup>3</sup> Require replacement. See note (10)
Threads damaged	<sup>3</sup> A	<sup>3</sup> Require repair or replacement.
Threads stripped (threads missing)	<sup>3</sup> A	<sup>3</sup> Require replacement. See note (10)

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- NOTE: (1) Only required if toe needs to be adjusted.  
(2) If greaseable, grease joint. If problem persists or joint is non-greaseable, require replacement.  
(3) Cracked grease boot will allow contaminants to enter joint and will accelerate wear.  
(4) Lack of grease boot will allow contaminants to enter joint and will accelerate wear.  
(5) Torn grease boot will allow contaminants to enter joint and will accelerate wear.  
(6) If greaseable tie rod end will not take grease after replacing the grease fitting, suggest replacement of tie rod end.  
(7) If manufacturer's procedures for inspection exist, use those procedures; otherwise, use an approved inspection method such as the dry park check.  
(8) Excessive looseness is defined as being significant enough to affect vehicle handling or structural integrity.  
(9) Check for bent stud or damaged taper hole.  
(10) Check for damaged taper hole.

AA

**TRACK BARS**

**TRACK BARS**

AA

Condition	3	Code	3	Procedure
AA				
Attaching hardware incorrect	3	A	3	Require replacement of incorrect part, if available; otherwise, replace track bar.
AA				
Attaching hardware loose	3	A	3	Require repair or replacement of loose part, if available; otherwise, replace track bar.
AA				
Attaching hardware missing	3	C	3	Require replacement of missing part, if available; otherwise, replace track bar.
AA				
Attaching hardware threads damaged	3	A	3	Require repair or replacement of part with damaged threads, if available; otherwise, replace track bar.
AA				
Attaching hardware threads stripped (threads missing)	3	A	3	Require replacement of part with stripped threads, if available; otherwise, replace track bar.
AA				
Bent	3	B	3	Require replacement.
AA				
Corroded, affecting structural integrity	3	A	3	Require replacement.



## TRAILING ARMS

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**TRAILING ARMS**

AA		
Condition	3 Code 3	Procedure
AA		
Attaching hardware broken	3 A 3	Require replacement of broken
	3	part, if available; otherwise,
	3	replace trailing arm
AA		
Attaching hardware loose	3 A 3	Require repair or replacement of
	3	loose part, if available;
	3	otherwise, replace trailing arm
AA		
Attaching hardware missing	3 C 3	Require replacement of missing
	3	part, if available; otherwise,
	3	replace trailing arm
AA		
Attaching hardware threads	3 A 3	Require repair or replacement of
damaged	3	part with damaged threads, if
	3	available; otherwise, replace
	3	trailing arm
AA		
Attaching hardware threads	3 A 3	Require replacement of part with
stripped (threads missing)	3	stripped threads, if available;
	3	otherwise, replace trailing arm
AA		
Bent	3 B 3	Require replacement.
AA		
Bushing hole oversized	3 B 3	Require replacement.
AA		
Corroded, affecting	3 A 3	Require replacement.
structural integrity	3	
AA		
Holes distorted	3 A 3	Require replacement.
AA		
Threads damaged	3 A 3	Require repair or replacement.
AA		
Threads stripped (threads	3 A 3	Require replacement.
missing)	3	
AA		

**WHEEL ALIGNMENT**

**WHEEL ALIGNMENT**

Wheel alignment is defined as the measurement, analysis, and adjustment of steering and suspension angles to conform to OEM specifications. These angles usually include, but are not limited to: caster, camber, toe, and thrust angle. Where these angles are not adjustable and not in specification, component replacement or correction kits may be required. Errors in set-back and steering axis inclination (SAI) are often attributable to failed or damaged components and must be corrected prior to performing an alignment.

**NOTE:** When replacing or repacking wheel bearings, grease seal replacement is required. You are not required to replace these components in axle sets. Determine the need to replace based upon the individual component conditions that follow.

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**WHEEL BEARINGS, RACES, & SEALS**

Condition			3	Code	3	Procedure
Rear axle seal on rear-wheel drive leaking						
			3	A	3	Require replacement of seal and inspection of axle, bearing, housing, and vent tube
Seal bent						
			3	A, 1	3	Suggest replacement.
Seal leaking						
			3	A	3	Require replacement of seal and inspection of bearings.
Seal missing						
			3	C	3	Require replacement.
Seal torn						
			3	A	3	Require replacement.
Wheel bearing assembly feels rough when rotated						
			3	A	3	Require replacement of bearing assembly.
Wheel bearing balls are pitted						
			3	A	3	Require replacement of bearing assembly.
Wheel bearing balls are worn						
			3	A	3	Require replacement of bearing assembly.
Wheel bearing end-play exceeds vehicle manufacturer's specs						
			3	A	3	Require adjustment of bearing, if possible. If proper adjustment cannot be obtained, require repair or replacement of worn component.
Wheel bearing race is loose in the hub bore						
			3	A	3	Require replacement of hub assembly and wheel bearings.
Wheel bearing races are pitted						
			3	A	3	Require replacement of bearing assembly.
Wheel bearing races are worn						
			3	A	3	Require replacement of bearing assembly.
Wheel bearing rollers are pitted						
			3	A	3	Require replacement of bearing assembly.
Wheel bearing rollers are worn						
			3	A	3	Require replacement of bearing assembly.

**WHEELS & TIRES**

**TIRES**

**WARNING:** These guidelines do not apply to split rims.

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Some vehicle manufacturers restrict replacement of tires to specific brands, types, or sizes.

High pressure temporary compact spare tires should not be used with any other rims or wheels, nor should standard tires, snow tires, wheel covers, or trim rings be used with high pressure compact spare rims or wheels.

Attempting to mount a tire of one diameter on a wheel of a different diameter or flange type may result in serious injury or death.

Only specially trained persons should de-mount or mount tires. Explosions of tire and wheel assembly can result from improper mounting, possibly causing serious injury or death.

Consult the vehicle owner's manual or vehicle placard for correct size, speed rating, designation, and cold inflation pressure of the original tires. DO NOT exceed the maximum load or inflation capacity of the tire specified by the Tire and Rim Association

When replacing tires, it is suggested that the replacement tires match or exceed the OEM speed rating designation. If tires of different speed rating designations are mixed on the same vehicle, the tires may vary in handling characteristics. DO NOT mix different speed rating designations on the same axle.

DO NOT mix radials with non-radial tires on the same axle, as this may affect vehicle handling and stability. If radial tires and bias or bias-belted ply tires are mixed on the same vehicle, the radials must be on the rear. High-pressure temporary compact spare tires are exempt from this rule.

DO NOT mix size or type (all season, performance, mud and snow) of tires on the same axle.

**TIRES**

Condition	3	Code	3	Procedure
Air pressure incorrect	3	B	3	Require repair
Bead broken	3	A	3	Require replacement.
Bead leaking, caused by tire	3	A	3	Require repair or replacement.
Bead wire/cord exposed	3	A	3	Require replacement.
Cord or belt material exposed	3	A	3	Require replacement.
Cord ply separations	3	A	3	Require replacement.
Directional/asymmetrical tires mounted incorrectly	3	B	3	Require remounting and/or repositioning.
Irregular tread wear, affecting performance	3	A	3	Suggest replacement. See note (1) below.

[illegible]

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Tires with more than 1/4" diameter difference on a four-wheel drive vehicle	3	B	3	Require replacement.
Tread area puncture larger in diameter than tire manufacturer's specifications				
	3	B	3	Require replacement.
Tread missing pieces (chunking), exposing cord				
	3	A	3	Require replacement.
Tread missing pieces (chunking), not exposing cord				
	3	A	3	Suggest replacement.
Tread separations				
	3	A	3	Require replacement.
Tube in tubeless tire				
	3	C, 3	3	Suggest removal of tube.
	3		3	See note (4) below.
Weather-checking				
	3		3	No service required/suggested.
Worn to tread wear indicators				
	3	B	3	Require replacement.
NOTE: (1) Determine and correct cause of irregular tire wear.				
(2) If radials and bias or bias-belted ply tires are on the same vehicle, the radials must be on the rear axle, except for high-pressure temporary spares.				
(3) Excessive is defined as enough to contribute to performance problems. Match mounting may correct run-out. If not, require replacement of appropriate part. Refer to manufacturer's specifications.				
(4) Most manufacturers do not recommend tubes in tubeless tires. Inspect tire and wheel assembly to determine the reason for a tube in tubeless tire. Recommendation for repair or replacement should be based upon condition of tires and/or wheel listed in these guidelines.				

**VALVE STEMS**

VALVE STEMS				
Condition				
	3	Code	3	Procedure
Bent				
	3	A, 1	3	Suggest replacement.
Broken				
	3	A	3	Require replacement.
Cut, but not leaking				
	3	A, 1	3	Suggest replacement.
Deteriorated (cracking, dry rot)				
	3	A, 1	3	Suggest replacement.

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Leaking	<sup>3</sup> A	<sup>3</sup> Require repair/replacement.
Missing	<sup>3</sup> C	<sup>3</sup> Require replacement.
Threads damaged	<sup>3</sup> A	<sup>3</sup> Require repair/replacement.
Threads stripped (threads missing)	<sup>3</sup> A	<sup>3</sup> Require replacement.
Valve cap missing	<sup>3</sup> C	<sup>3</sup> Require replacement of cap.
Weather- checking	<sup>3</sup> A, 1	<sup>3</sup> Suggest replacement.
Won't take air	<sup>3</sup> A	<sup>3</sup> Require repair/replacement.

**WHEEL ATTACHMENT HARDWARE**

For conditions noted below, also check conditions of wheel stud holes.

**CAUTION:** Proper lug nut torque is essential. Follow manufacturer's torque specifications and tightening sequence. DO NOT lubricate threads unless specified by the vehicle manufacturer.

**WHEEL ATTACHMENT HARDWARE**

Condition	<sup>3</sup> Code	<sup>3</sup> Procedure
Bent	<sup>3</sup> A	<sup>3</sup> Require replacement.
Broken	<sup>3</sup> A	<sup>3</sup> Require replacement.
	<sup>3</sup>	<sup>3</sup> See note (1) below.
Loose	<sup>3</sup> B	<sup>3</sup> Require repair or replacement of affected component.
Lug nut installed backward	<sup>3</sup> B	<sup>3</sup> Require repair.
Lug nut mating type incorrect	<sup>3</sup> B	<sup>3</sup> Require replacement of nut.
Lug nut mating surface dished	<sup>3</sup> A	<sup>3</sup> Require replacement of nut.
Lug nut flats rounded	<sup>3</sup> A	<sup>3</sup> Require replacement of nut.
	<sup>3</sup>	<sup>3</sup> See note (2) below.
Lug nut seized	<sup>3</sup> A	<sup>3</sup> Require replacement of nut and/or stud. See note (2) below.
Stud incorrect	<sup>3</sup> B	<sup>3</sup> Require replacement of stud.
Threads damaged	<sup>3</sup> A	<sup>3</sup> Require repair or replacement of



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Threads stripped (threads missing) 3 A 3 component with damaged threads. Require replacement of component with stripped threads.

NOTE: (1) Some manufacturers require replacement of all studs on that wheel if two or more studs or nuts on the same wheel are broken or missing.

(2) Only required if removing wheel.

**WHEELS**

**WARNING:** Mounting a regular tire on a high-pressure compact spare wheel is not permitted. Attempting to mount a tire of one diameter on a wheel of a different diameter or flange type may result in serious injury or death. If the wheel identification stamp is not legible, or cannot be found, DO NOT use the wheel until the size and type have been properly identified. Wheels of different diameter, offset, or width cannot be mixed on the same axle. Bead seat tapers cannot be interchanged.

**WHEELS**

Condition	Code	Procedure
Bead leaking, caused by wheel rim flange	A	Require repair or replacement. See caution below.
CAUTION: DO NOT attempt to correct a bent wheel rim.		
Bent wheel hub mounting surface	A	Require replacement.
Bent wheel rim, causing vibration	B, 2	Suggest replacement. See caution above.
Broken	A	Require replacement.
Cast wheel porous, causing a leak	A	Require repair or replacement.
Clip-on balance weight is incorrect type for wheel rim flange	B, 2	Suggest replacement.
Corrosion, affecting structural integrity	A	Require replacement.
Corrosion build-up on wheel hub mounting surface	A	Require repair.

**END OF ARTICLE**