

*** STEERING UNIFORM INSPECTION GUIDELINES ***

Article Text

1991 Volkswagen Vanagon
For Volkswagen Technical Site
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Saturday, March 18, 2000 08:48PM

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 to their customers.

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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 or contact us at:

808 17th Street, NW Suite 200
Washington, D.C. 20006
Ph. (202) 466-7050 Fax (202) 223-9569

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 recommended service interval.

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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.

A - PART NO LONGER PERFORMS INTENDED PURPOSE

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UAAA;

3	Reasons to Require Repair	3	Reasons to Suggest Repair	3
3	or Replacement	3	or Replacement	3

AAA-

3	A - Part no longer performs	3	1 - Part is close to the end of	3
3	intended purpose	3	its useful life (just above	3
3		3	discard specifications, or	3
3		3	weak; failure likely to	3
3		3	occur soon, etc.)	3

AAU

B - PART DOES NOT MEET DESIGN SPEC., REGARDLESS OF PERFORMANCE

UAAA;

3	Reasons to Require Repair	3	Reasons to Suggest Repair	3
3	or Replacement	3	or Replacement	3

AAA-

3	B - Part does not meet a design	3	2 - To address a customer need,	3
3	specification (regardless	3	convenience, or request (to	3
3	of performance)	3	stiffen ride, enhance	3
3		3	performance, eliminate noise	3
3		3	etc.)	3

AAU

C - PART IS MISSING

UAAA;

3	Reasons to Require Repair	3	Reasons to Suggest Repair	3
3	or Replacement	3	or Replacement	3

AAA-

3	C - Part is missing	3	3 - To comply with maintenance	3
3		3	recommended by the vehicle's	3
3		3	Original Equipment	3
3		3	Manufacturer (OEM)	3
3		3	4 - Technician's recommendation	3
3		3	based on substantial and	3
3		3	informed experience	3

AAU

STEERING & SUSPENSION

**SERVICE PROCEDURES REQUIRED & SUGGESTED FOR PROPER
VEHICLE OPERATION**

Steering and suspension are complex systems made up of a variety of interdependent components. For proper vehicle handling, ride, and tire wear, a thorough inspection is required whenever suspension work is being performed.

Conditions listed assume that the problem has been isolated to the specific component by proper testing procedures.

NOTE: 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.

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CAUTION: DO NOT use ride height altering or load compensating components, such as variable rate springs and coil over shocks, on vehicles with height or load sensing proportioning valve-equipped braking systems, unless these components are original equipment.

AIR RIDE SUSPENSION

NOTE: Depending on the air suspension design, there are some aftermarket products available to eliminate the air ride suspension on certain vehicles. If the system has been eliminated with one of these products, then no service is suggested or required.

AIR RIDE SUSPENSION - AIR SHOCKS & AIR STRUTS

NOTE: This section covers the air spring portion of the air shock or strut. For dampening portion of shock or strut conditions and procedures, refer to the "Shock Absorbers, Strut Cartridges, and Strut Assemblies" section.

AIR RIDE SUSPENSION - AIR SHOCKS & AIR STRUTS

AA			
Condition	3	Code	3 Procedure
AA			
Inner fabric of air bag	3	A	3 Require replacement.
damaged	3	3	
AA			
Leaking	3	A	3 Require repair or replacement.
AA			
Outer covering of air bag	3	A,1	3 Suggest replacement.
is cracked to the extent	3	3	
that inner fabric of air	3	3	
bag is visible	3	3	
AA			

AIR RIDE SUSPENSION - AIR SPRING VALVES

AIR RIDE SUSPENSION - AIR SPRING VALVES

AA			
Condition	3	Code	3 Procedure
AA			
Attaching hardware	3	A	3 Require replacement of incorrect
incorrect	3	3	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			

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Condition	Frequency	Severity	Action
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.
Blocked	3	A	3 Require repair or replacement.
Connector bent	3	A	3 Require repair or replacement.
Connector broken	3	A	3 Require replacement.
Connector loose	3	A	3 Require repair or replacement.
Inoperative	3	A	3 Require repair or replacement.
Leaking	3	A	3 Require repair or replacement.
Restricted	3	A	3 Require repair or replacement.

AIR RIDE SUSPENSION - AIR SPRINGS

AIR RIDE SUSPENSION - AIR SPRINGS

Condition	Code	Procedure
Attaching hardware broken	A	Require replacement of broken part.
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.
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.
Collar cracked	A	Require replacement.
End cap cracked	A	Require replacement.
Inner fabric of bag damaged	A	Require replacement.
Leaking	A	Require repair or replacement.

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Outer covering of air bag 3 A,1 3 Suggest replacement.

is cracked to the extent 3 3
that inner fabric of air 3 3
bag is visible 3 3

Piston cracked 3 A 3 Require replacement.

AIR RIDE SUSPENSION - COMPRESSORS

AIR RIDE SUSPENSION - COMPRESSORS

Condition 3 Code 3 Procedure

Attaching hardware bent 3 B 3 Require repair or replacement of

bent part.

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 3 A 3 Require repair or replacement of

damaged 3 3 part with damaged threads.

Attaching hardware threads 3 A 3 Require replacement of part with

stripped (threads missing) 3 3 stripped threads.

Connector bent 3 A 3 Require repair or replacement.

Connector broken 3 A 3 Require replacement.

Connector loose 3 A 3 Require repair or replacement.

Does not build pressure 3 A 3 Further inspection required.

3 3 See note (1) below.

Excessive run time 3 B 3 Further inspection required.

3 3 See note (2) below.

Inoperative 3 A 3 Require replacement.

Leaking 3 A 3 Require repair or replacement.

Missing 3 C 3 Require replacement.

NOTE: (1) If failure to build pressure is traced to the compressor,

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require replacement.

- (2) If excessive run time is traced to the compressor, require replacement.

AA

AIR RIDE SUSPENSION - HEIGHT SENSORS

AIR RIDE SUSPENSION - HEIGHT SENSORS

AA

Condition	3	Code	3	Procedure
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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 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		3	Require replacement of part with stripped threads.
---	---	--	---	--

AA

Dust boot missing	3	B,2	3	Suggest replacement. See note (1).
-------------------	---	-----	---	------------------------------------

AA

Dust boot split	3	B,2	3	Suggest replacement. See note (1).
-----------------	---	-----	---	------------------------------------

AA

Dust boot torn	3	B,2	3	Suggest replacement. See note (1).
----------------	---	-----	---	------------------------------------

AA

Housing cracked	3	A	3	Require replacement.
-----------------	---	---	---	----------------------

AA

Lead routing incorrect	3	B	3	Require re-routing according to vehicle manufacturer's specs.
------------------------	---	---	---	---

AA

Loose	3	B	3	Require adjustment to vehicle manufacturer's specifications.
-------	---	---	---	--

AA

Missing	3	C	3	Require replacement.
---------	---	---	---	----------------------

AA

Output signal incorrect	3	A	3	Require repair or replacement.
-------------------------	---	---	---	--------------------------------

AA

Wire lead damaged	3	A	3	Require repair or replacement.
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Condition	3	Code	3	Procedure
Broken	3	A	3	Require replacement.
Missing	3	C	3	Require replacement.
Output signal incorrect	3	A	3	Require replacement.

AIR RIDE SUSPENSION - TORSION SPRINGS (COUNTER BALANCING)

AIR RIDE SUSPENSION - TORSION SPRINGS (COUNTER BALANCING)				
Condition	3	Code	3	Procedure
Attaching hardware bent	3	B	3	Require repair or replacement of bent part.
Attaching hardware broken	3	A	3	Require replacement of broken part.
Attaching hardware incorrect	3	A	3	Require replacement of incorrect 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.
Broken	3	A	3	Require replacement.
Missing	3	C	3	Require replacement.

AIR RIDE SUSPENSION - TUBING

AIR RIDE SUSPENSION - TUBING				
Condition	3	Code	3	Procedure
Attaching hardware incorrect	3	A	3	Require replacement of incorrect part.
Attaching hardware loose	3	A	3	Require repair or replacement of loose part.

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

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AIR RIDE SUSPENSION - WARNING LAMPS

AIR RIDE SUSPENSION - WARNING LAMPS

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

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AIR RIDE SUSPENSION - WIRING HARNESSSES

AIR RIDE SUSPENSION - WIRING HARNESSSES

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AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Condition                        3   Code 3   Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Connector bent                  3   A   3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Connector broken                3   A   3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Connector loose                 3   A   3   Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Damaged (cut, burned, or       3   A   3
  chafed)                       3       3

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

```

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

Condition	Code	Procedure
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freeing:

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Greaseable ball joint will 3 B,2 3 Suggest replacement of grease
not take grease 3 3 fitting. See note (5) below.
Nut on ball joint loose 3 A 3 Require repair or replacement.
3 3 See note (6) below.
Pre-load adjustment 3 B 3 Require repair or replacement.
incorrect 3 3
Seized 3 A 3 Require replacement.
Stud bent 3 B 3 Require replacement. See note (7).
Stud broken 3 A 3 Require replacement. See note (7).
Threads damaged 3 A 3 Require repair or replacement.
Threads stripped (threads 3 A 3 Require replacement. See note (7).
missing) 3 3
Wear exceeds manufacturer's 3 B 3 Require replacement.
specifications 3 3

NOTE: (1) If greaseable, grease ball joint. If problem persists or
joint is non-greaseable, require replacement.
(2) Cracked grease boot will allow contaminants to enter the
ball joint and will accelerate wear.
(3) Lack of grease boot will allow contaminants to enter the
ball joint and will accelerate wear.
(4) Torn grease boot will allow contaminants to enter the ball
joint and will accelerate wear.
(5) If the greaseable ball joint still will not take grease
after replacing the grease fitting, suggest replacement of
ball joint.
(6) Check for bent stud or damaged taper hole.
(7) Check for damaged taper hole.

BUSHINGS

BUSHINGS

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

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Attaching hardware corroded	3	A	3	Require replacement of corroded
affecting structural	3		3	part if available; otherwise,
integrity	3		3	replace bushing.

Attaching hardware incorrect	3	A	3	Require replacement of incorrect
	3		3	part if available; otherwise,
	3		3	replace bushing.

Attaching hardware loose	3	A	3	Require repair or replacement of
	3		3	loose part if available;
	3		3	otherwise, replace bushing.

Attaching hardware missing	3	C	3	Require replacement of missing
	3		3	part if available; otherwise,
	3		3	replace bushing.

Attaching hardware threads damaged	3	A	3	Require repair or replacement of
	3		3	part with damaged threads if
	3		3	available; otherwise, replace
	3		3	bushing.

Attaching hardware threads stripped (threads missing)	3	A	3	Require replacement of part with
	3		3	stripped threads if available;
	3		3	otherwise, replace bushing.

Binding	3	A	3	Require repair or replacement.

Deteriorated, affecting performance	3	A	3	Require repair or replacement.
	3		3	

Distorted, affecting performance	3	A	3	Require repair or replacement.
	3		3	

Leaking (fluid-filled type)	3	A	3	Require replacement.

Missing	3	A	3	Require replacement.

Noisy	3	B,2	3	Further inspection required.
	3		3	See note (1) and caution below.

Rubber separating from internal metal sleeve on bonded bushing	3	A	3	Require replacement.
	3		3	
	3		3	

Seized	3	A	3	Require replacement.

Shifted (out of position)	3	B	3	Require repair or replacement.

Split	3	A	3	Require replacement.

Surface cracking (weather-checked)	3		3	No service suggested or required.
	3		3	

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NOTE: (1) If noise isolated to bushing, suggest repair or replacement.

CAUTION: Use only approved lubricant on rubber bushings. Petroleum-based lubricants may damage rubber bushings.

CENTER LINKS

CENTER LINKS

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

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3 3 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 (6).

AA

Looseness (perceptible 3 A,1 3 Suggest replacement. See note (7).

horizontal movement) 3 3

AA

CAUTION: DO NOT use pliers or pry bar to check ball and socket

movement. Use only moderate hand pressure.

AA

Looseness that is excessive 3 B 3 Require replacement. See notes (8)

3 3 and (9), caution below.

AA

CAUTION: DO NOT use pliers or pry bar to check ball and socket

movement. Use only moderate hand pressure.

AA

Seized 3 A 3 Require replacement.

AA

Stud bent 3 B 3 Require replacement. See note (10)

AA

Stud broken 3 A 3 Require replacement. See note (10)

AA

Stud loose in taper hole 3 A 3 Require repair or replacement.

3 3 See note (10) below.

AA

Taper hole elongated 3 A 3 Require replacement. See note (11)

AA

Threads damaged 3 A 3 Require repair or replacement.

AA

Threads stripped (threads 3 A 3 Require replacement. See note (10)

missing) 3 3

AA

Wear exceeds manufacturer's 3 B 3 Require replacement.

specifications 3 3

AA

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 such as the dry park check.

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- (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,
	3		3	replace control arm.

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```

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Attaching hardware corroded3 A 3 Require replacement of corroded
affecting structural 3 3 part, if available; otherwise,
integrity 3 3 replace control arm.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Attaching hardware 3 A 3 Require replacement of incorrect
incorrect 3 3 part, if available; otherwise,
3 3 replace control arm.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Attaching hardware loose 3 A 3 Require repair or replacement of
3 3 loose part, if available;
3 3 otherwise, replace control arm.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Attaching hardware missing 3 C 3 Require replacement of missing
3 3 part, if available; otherwise,
3 3 replace control arm.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
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 control arm.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Attaching hardware threads 3 A 3 Require replacement of part with
stripped (threads missing)3 3 stripped threads, if available;
3 3 otherwise, replace control arm.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Bent 3 B 3 Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Bushings hole oversized 3 B 3 Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Ball joint hole oversized 3 B 3 Further inspection required.
(loose interference or 3 3 See note (1) below.
press fit) 3 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Corroded, affecting 3 A 3 Require replacement.
structural integrity 3 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Holes distorted 3 A 3 Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Threads damaged 3 A 3 Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Threads stripped (threads 3 A 3 Require replacement.
missing) 3 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
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.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

```

DRAG LINKS

DRAG LINKS

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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			
CAUTION: DO NOT use pliers or pry bar to check ball and socket			

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movement. Use only moderate hand pressure.

Looseness that is excessive³ B ³ Require replacement. See notes (6)

³ and (7), caution below.

CAUTION: DO NOT use pliers or pry bar to check ball and socket

movement. Use only moderate hand pressure.

Seized ³ A ³ Require replacement.

Stud bent ³ B ³ Require replacement. See note (8).

Stud broken ³ A ³ Require replacement. See note (8).

Stud loose in taper hole ³ A ³ Require repair or replacement.

³ See note (8) below.

Taper hole elongated ³ A ³ Require replacement. See note (9).

Threads damaged ³ A ³ Require repair or replacement.

Threads stripped (threads ³ A ³ Require replacement. See note (8).

missing) ³ ³

Wear exceeds manufacturer's³ B ³ Require replacement.

specifications ³ ³

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 Absorbers, Strut Cartridges, and Strut Assemblies" section.

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ELECTRONIC RIDE CONTROL SHOCKS & STRUTS

ELECTRONIC RIDE CONTROL SHOCKS & STRUTS			
Condition	3	Code 3	Procedure
Connector bent	3	A 3	Require repair or replacement.
Connector broken	3	A 3	Require repair or replacement.
Connector loose	3	A 3	Require repair or replacement.
Electronic valve control inoperative	3	B,2 3	Suggest replacement. See note (1).
Terminal bent	3	A 3	Require repair or replacement.
Terminal broken	3	A 3	Require repair or replacement.
Terminal corroded	3	A 3	Require repair or replacement.
Terminal loose	3	A 3	Require repair or replacement.
NOTE: (1) It is acceptable to replace with a non-electronically controlled unit, where available.			

IDLER ARMS

IDLER ARMS

IDLER ARMS			
Condition	3	Code 3	Procedure
Attaching hardware broken	3	A 3	Require replacement of broken part, if available; otherwise, replace idler arm.
Attaching hardware incorrect	3	A 3	Require replacement of incorrect part, if available; otherwise, replace idler arm.
Attaching hardware loose	3	A 3	Require repair or replacement of loose part, if available; otherwise, replace idler arm.
Attaching hardware missing	3	C 3	Require replacement of missing part, if available; otherwise, replace idler arm.
Attaching hardware threads damaged	3	A 3	Require repair or replacement of part with damaged threads, if available; otherwise, replace idler arm.

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Attaching hardware threads stripped (threads missing)	3 A 3	Require replacement of part with stripped threads, if available; otherwise, replace idler arm.
Binding	3 A 3	Further inspection required. See note (1) below.
Grease boot cracked	3 B,2 3	Suggest replacement. See note (2).
Grease boot missing	3 B,2 3	Suggest replacement. See note (3).
Grease boot torn	3 B,2 3	Suggest replacement. See note (4).
Grease fitting broken	3 A 3	Require replacement of grease fitting.
Grease fitting missing	3 C 3	Require replacement of grease fitting.
Grease fitting won't seal	3 A 3	Require replacement of seal.
Grease seal missing	3 B,2 3	Suggest replacement. See note (5).
Grease seal torn	3 B,2 3	Suggest replacement. See note (4).
Greaseable joint will not take grease	3 B,2 3	Suggest replacement of grease fitting. See note (6) below.
Looseness at frame bracket end	3 B 3	Require repair or replacement. See notes (7) and (8) below.
Looseness at link end (perceptible horizontal movement)	3 A,1 3	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 at link end that is excessive	3 B 3	Require replacement. See notes (7) and (9) and caution below.
CAUTION: DO NOT use pliers or pry bar to check ball and socket movement. Use only moderate hand pressure.		
Mounted out of position (center link not parallel)	3 B 3	Require repositioning.
Nut on stud loose	3 A 3	Require repair or replacement. See note (10) below.
Seized	3 A 3	Require replacement.

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

```

- 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          3 Code 3 Procedure
Bearing balls pitted 3 A 3 Require replacement.

```


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AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Bearing balls worn          3 A 3 Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Bearing races pitted       3 A 3 Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Bearing races worn         3 A 3 Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Bearing rollers pitted     3 A 3 Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Bearing rollers worn       3 A 3 Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Bearing seal bent          3 B,2 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA - Suggest replacement of seal or
Bearing seal missing        3 B,2 3 bearing.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA -
Bearing seal torn           3 B,2 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Binding                     3 A 3 Require repair or replacement of
                           3 3 affected parts.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
End caps missing           3 C 3 Require replacement of missing
                           3 3 part, if available; otherwise,
                           3 3 replace king pin.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
End play exceeds           3 B 3 Require repair.
specifications             3 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Grease fitting broken      3 A 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA -
Grease fitting missing     3 C 3 Require replacement of grease
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA - fitting.
Grease fitting won't seal  3 A 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Locating pins missing      3 C 3 Require replacement of missing
                           3 3 part, if available; otherwise,
                           3 3 replace king pin.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Looseness exceeds          3 B 3 Require replacement of worn parts.
manufacturer's specs       3 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Seized                     3 A 3 Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Threads damaged            3 A 3 Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Threads stripped (threads  3 A 3 Require replacement.
missing)                   3 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Will not take grease       3 B,2 3 Suggest replacement of grease
                           3 3 fitting. See note (1) below.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

```

NOTE: (1) If king pin will not take grease after replacement of grease fitting, suggest replacement of king pin.

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[illegible]

PITMAN ARMS

PITMAN ARMS

[illegible]

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

[illegible]

Attaching hardware	3	A	3	Require replacement of incorrect
incorrect	3		3	part, if available; otherwise,
	3		3	replace pitman arm.

[illegible]

Attaching hardware loose	3	A	3	Require repair or replacement of
	3		3	loose part, if available;
	3		3	otherwise, replace pitman arm.

[illegible]

Attaching hardware missing	3	C	3	Require replacement of missing
	3		3	part, if available; otherwise,
	3		3	replace pitman arm.

[illegible]

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	pitman arm.

[illegible]

Attaching hardware threads	3	A	3	Require replacement of part with
stripped (threads missing)	3		3	stripped threads, if available;
	3		3	otherwise, replace pitman arm.

[illegible]

Bent ^{**3**} B ^{**3**} Require replacement.

[illegible]

Binding	3	A	3	Further inspection required.
	3		3	See note (1) below.

[illegible]

Grease boot cracked 3 B,2 3 Suggest replacement. See note (2).

[illegible]

Grease boot missing ³ B,2 ³ Suggest replacement. See note (3).

[illegible]

Grease boot torn ³ B,2 ³ Suggest replacement. See note (4).

[illegible]

```
Grease fitting broken      3    A    3
```

[illegible]

Grease fitting missing 3 C 3 fitting.

[illegible]

Grease fitting won't seal 3 A 3

[illegible]

Grease seal missing 3 B.2 3 Suggest replacement of seal.

3 3 See note (5) below.

[illegible]

Grease seal torn 3 B,2 3 Suggest replacement of seal.

3 3 See note (6) below.

[illegible]

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Looseness (perceptible horizontal movement) 3 A,1 3 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 3 B 3 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 3 A 3 Require repair or replacement. See note (9) below.

Seized 3 A 3 Require replacement.

Splines damaged 3 A 3 Require repair or replacement.

Splines stripped (splines missing) 3 A 3 Require replacement.

Stud bent 3 B 3 Require replacement. See note (10)

Stud broken 3 A 3 Require replacement. See note (10)

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

Taper hole elongated 3 A 3 Require replacement. See note (11)

Threads damaged 3 A 3 Require repair or replacement.

Threads stripped (threads missing) 3 A 3 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.

(8) Excessive looseness is defined as being significant enough

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to affect vehicle handling or structural integrity.

(9) Check for bent stud of damaged taper hole.

(10) Check for damaged taper hole.

(11) Check for damaged stud.

AA

POWER STEERING HOSES

POWER STEERING HOSES

AA

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

AA

Blistered	3	B	3	Require replacement.
-----------	---	---	---	----------------------

AA

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

AA

Fitting threads damaged	3	A	3	Require repair or replacement.
-------------------------	---	---	---	--------------------------------

AA

Fitting threads stripped	3	A	3	Require replacement.
--------------------------	---	---	---	----------------------

(threads missing) 3 3

AA

Inner fabric (webbing) cut	3	A	3	Require replacement.
----------------------------	---	---	---	----------------------

AA

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

AA

Missing	3	C	3	Require replacement.
---------	---	---	---	----------------------

AA

Outer covering is cracked	3	B	3	Require replacement.
---------------------------	---	---	---	----------------------

to the extent that the 3 3

inner fabric of hose is 3 3

visible 3 3

AA

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

AA

POWER STEERING (HYDRAULIC) PUMPS

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.

POWER STEERING (HYDRAULIC) PUMPS

AA

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

AA

Attaching hardware bent	3	B	3	Require repair or replacement of
-------------------------	---	---	---	----------------------------------

3 3 bent part.

AA

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

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```

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

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3 3 See note (5) below.

AA

Pulley bent 3 A 3 Require repair or replacement of
3 3 pulley.

AA

Pulley missing 3 C? 3 Require replacement of pulley.

AA

Remote reservoir leaking 3 A 3 Require replacement of reservoir.

AA

Reservoir cap broken 3 A 3 Require replacement of cap.

AA

Reservoir cap missing 3 C 3 Require replacement of cap.

AA

Seized 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

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 3 Code 3 Procedure

AA

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

AA

Attaching hardware 3 A 3 Require replacement of incorrect
incorrect 3 3 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.

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TABLE 1. Damage to Components of a Bolted Steel Moment-Resisting Joint			
Damage	Severity	Repair/Replacement	Notes
Bent	3	B	3 Require replacement.
Corroded, affecting structural integrity	3	A	3 Require replacement.
Holes distorted	3	A	3 Require replacement.
Threads damaged	3	A	3 Require repair or replacement.
Threads stripped (threads missing)	3	A	3 Require replacement.

RELAY RODS

RELAY RODS

Condition	Code	Procedure
Attaching hardware incorrect	A	Require replacement of incorrect part, if available; otherwise, replace relay rod.
Attaching hardware loose	A	Require repair or replacement of loose part, if available; otherwise, replace relay rod.
Attaching hardware missing	C	Require replacement of missing part, if available; otherwise, replace relay rod.
Attaching hardware threads damaged	A	Require repair or replacement of part with damaged threads, if available; otherwise, replace relay rod.
Attaching hardware threads stripped (threads missing)	A	Require replacement of part with stripped threads, if available; otherwise, replace relay rod.
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).

(6) Torn grease seal will allow contaminants to enter joint and

[illegible]

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

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AA

Dust boot (bellows) missing³ B,2³ Suggest replacement of boot.

³ See (3) note below.

AA

Dust boot (bellows) torn³ B,2³ Suggest replacement of boot.

³ See note (4) below.

AA

Dust shield broken³ B,2³ Suggest replacement. See note (4).

AA

Dust shield missing³ B,2³ Suggest replacement. See note (4).

AA

Gland nut (strut housing³ A³ Require replacement of nut and/or

cap) is not removable³ ³ housing. See note (5) below.

using appropriate tool³ ³

AA

Gland nut (strut housing³ A³ Require repair or replacement of

cap) threads damaged³ ³ nut.

AA

Gland nut (strut housing³ A³ Require replacement of nut.

cap) threads stripped³ ³

(threads missing)³ ³

AA

Housing dented³ A³ Further inspection required.

³ See note (6) below.

AA

Housing punctured³ A³ Require replacement.

AA

Jounce bumper missing³ C³ Require replacement of jounce

³ bumper.

AA

Jounce bumper split³ 1?³ Suggest replacement of jounce

³ bumper.

AA

Leaking oil, enough for³ A³ Require replacement. See caution

fluid to be running down³ ³ below.

the body³ ³

AA

CAUTION: If the strut cartridge has been replaced previously, the oil

on the strut housing may be filler oil. The technician must

identify the source of the oil.

AA

Noise³ B,2³ Further inspection required.

³ See note (7) below.

AA

Piston rod bent³ A³ Require replacement.

AA

Piston rod broken³ A³ Require replacement.

AA

Piston rod has surface³ B,2³ Suggest replacement.

defect³ ³

AA

Piston rod threads damaged³ A³ Require repair or replacement.

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```

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Piston rod threads stripped3 A 3 Require replacement.
  (threads missing)          3      3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Seized                        3 A 3 Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Shock missing                 3 C 3 Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Strut housing bent            3 A 3 Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Strut housing cap (gland      3 A 3 Require replacement of nut and/or
nut) is not removable         3      3 housing. See note (5) below.
  using appropriate tool      3      3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Strut housing cap (gland      3 A 3 Require repair or replacement of
nut) threads damaged          3      3 nut.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Strut housing cap (gland      3 A 3 Require replacement of nut.
nut) threads stripped         3      3
  (threads missing)          3      3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Strut housing severely        3 A 3 Require replacement.
corroded, affecting           3      3
  structural integrity        3      3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Strut housing threads         3 A 3 Require repair or replacement.
damaged                       3      3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Strut housing threads         3 A 3 Require replacement.
stripped (threads missing)3      3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Tire cupping                  3 A 3 Further inspection required.
                              3      3 See note (8) below
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

```

- 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 cupping, an inspection is needed of the entire suspension

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system. If the shock or strut is found to be contributing to the tire cupping, require replacement.

[illegible]

SPINDLES

SPINDLES

[illegible]

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

[illegible]

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

[illegible]

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

[illegible]

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

[illegible]

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

[illegible]

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

[illegible]

Bent 3 B 3 Require replacement.

[illegible]

Broken 3 A 3 Require replacement.

[illegible]

Race seat area undersized 3 B 3 Require replacement.

[illegible]

Scored 3 A 3 Require repair or replacement.

[illegible]

Threads damaged ³ A ³ Require repair or replacement.

[illegible]

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

[illegible]

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

[illegible]

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

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

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Attaching hardware broken	3	A	3	Require replacement of broken
	3		3	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				
Blocked	3	A	3	Require repair or replacement.
AA				
Fitting incorrect (such as	3	B	3	Require replacement.
compression fitting)	3		3	
AA				
Flare type incorrect	3	B	3	Required replacement.
AA				
Leaking	3	A	3	Require tightening or replacement.
AA				
Line type incorrect	3	B	3	Require replacement.
AA				
Restricted	3	A	3	Require replacement.
AA				
Routed incorrectly	3	B	3	Require routing correction.
AA				
Rust-pitted	3	A,1	3	Suggest replacement.
AA				
Rust pitted affecting	3	A	3	Require replacement.
structural integrity	3		3	
AA				

STEERING ARMS

STEERING ARMS

Condition	3	Code	3	Procedure
AA				
Attaching hardware bent	3	B	3	Require repair or replacement of
	3		3	bent part.
AA				
Attaching hardware broken	3	A	3	Require replacement of broken
	3		3	part.
AA				
Attaching hardware	3	A	3	Require replacement of incorrect
incorrect	3		3	part.
AA				
Attaching hardware loose	3	A	3	Require repair or replacement of

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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

Taper hole elongated 3 A 3 Require replacement. See note (1).

AA

Threads damaged 3 A 3 Require repair or replacement.

AA

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

AA

NOTE: (1) Check for damaged stud.

AA

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

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 steering
3 3 damper.

AA

Attaching hardware broken 3 A 3 Require replacement of broken
3 3 part, if available; otherwise,
3 3 replace steering damper.

AA

Attaching hardware corroded 3 A 3 Require replacement of corroded
affecting structural 3 3 part, if available; otherwise,
integrity 3 3 replace steering damper.

AA

Attaching hardware 3 A 3 Require replacement of incorrect
incorrect 3 3 part, if available; otherwise,
3 3 replace steering damper.

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[illegible]

Attaching hardware loose	3	A	3	Require repair or replacement of
	3		3	loose part, if available;
	3		3	otherwise, replace steering
	3		3	damper.

[illegible]

Attaching hardware missing	3	C	3	Require replacement of missing
	3		3	part, if available; otherwise,
	3		3	replace steering damper.

[illegible]

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	steering damper.

[illegible]

Attaching hardware threads	3	A	3	Require replacement of part with
stripped (threads missing)	3		3	stripped threads, if available;
	3		3	otherwise, replace steering
	3		3	damper.

[illegible]

Binding 3 A 3 Require replacement.

[illegible]

Damper body dented	3	A	3	Further inspection required.
	3		3	See note (1) below.

[illegible]

Damper body punctured 3 A 3 Require replacement.

[illegible]

Damping (none) 3 A 3 Require replacement.

[illegible]

Dust boot (bellows) missing³ B,2 ³ Suggest replacement of boot.
³ ³ See note (2) below.

[illegible]

Dust boot (bellows) split 3 B,2 3 Suggest replacement of boot.
3 3 See note (2) below.

[illegible]

Dust shield broken 3 B,2 3 Suggest replacement. See note (2).

[illegible]

Dust shield missing 3 B,2 3 Suggest replacement. See note (2).

[illegible]

Leaking oil, enough for	3	A	3	Require replacement.
fluid to be running down	3		3	
the body	3		3	

[illegible][illegible][illegible]

Missing 3 C 3 Require replacement.

[illegible]

Noise 3 B,2 3 Further inspection required.
 3 3 See note (3) below.

[illegible]

Piston rod bent	3	A	3	Require replacement.
-----------------	---	---	---	----------------------

[illegible]

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Piston rod broken 3 A 3 Require replacement.
Piston rod has surface 3 B,2 3 Suggest replacement.
defect 3 3
Piston rod threads stripped 3 A 3 Require replacement.
(threads missing) 3 3
Piston rod threads damaged 3 A 3 Require repair or replacement.
Seized 3 A 3 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 3 Code 3 Procedure
Attaching hardware broken 3 A 3 Require replacement of broken
3 3 part.
Attaching hardware loose 3 A 3 Require repair or replacement of
3 3 loose part.
Attaching hardware missing 3 C 3 Require replacement of missing
3 3 part.
Attaching hardware threads 3 A 3 Require repair or replacement of
damaged 3 3 part with damaged threads.
Attaching hardware threads 3 A 3 Require replacement of part with
stripped (threads missing) 3 3 stripped threads.
Binding 3 A 3 Require repair or replacement
Flex coupler binding 3 A 3 Require repair or replacement of

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U-joint loose	3	A	3	Require repair or replacement of
	3		3	joint.

Unequal power assist 3 A 3 Require repair or replacement.

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.

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

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

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

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

```

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

```

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

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

Balance tube blocked					
3	A	3	Require repair or replacement of		
3		3	balance tube.		

```

Balance tube missing      3 C      3 Require replacement of balance
                             3      3 tube.

```

[illegible]

Bellows boot clamp missing ³ C ³ Require replacement of clamp.

Bellows boot cracked (not through) ³ B,2 ³ Suggest replacement of bellows boot.

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[illegible]

Bellows boot missing	3	C	3	Require replacement of bellows
	3		3	boot.

[illegible]

Bellows boot not sealing	3	A	3	Require repair or replacement of
	3		3	bellows boot.

[illegible]

Bellows boot torn	3	A	3	Require replacement of bellows
	3		3	boot.

[illegible]

Bellows boot twisted (from toe adjustment)	3	B	3	Require repair.
	3		3	

[illegible]

Fitting leaking 3 A 3 Require repair or replacement.

[illegible]

Fitting missing	3	A	3	Require replacement of fitting.
-----------------	---	---	---	---------------------------------

[illegible]

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

[illegible]

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

[illegible]

Flex coupler binding	3	A	3	Require repair or replacement of
	3		3	coupler.

[illegible]

Flex coupler loose	3	A	3	Require repair or replacement of
	3		3	coupler.

[illegible]

Flex coupler missing parts	3	A	3	Require repair or replacement of
	3		3	coupler.

[illegible]

Flex coupler soft/spongy	3	A	3	Require replacement of coupler.
--------------------------	---	---	---	---------------------------------

[illegible]

Flex coupler torn	3	A	3	Require replacement of coupler.
-------------------	---	---	---	---------------------------------

[illegible]

Fluid contaminated	3	B	3	Require flushing and refilling of
	3		3	the system. See note (1) below.

[illegible]

Gasket leaking 3 A 3 Require repair or replacement.

[illegible]

Hard steering on cold ³ A,1 ³ Suggest repair or replacement.

start-up 3 3 See note (2) below.

[illegible]

Housing cracked, affecting 3 B 3 Require replacement.

structural integrity 3 3

[illegible]

Housing leaking 3 A 3 Require replacement.

[illegible]

Inadequate power assist	3	A	3	Further inspection required.
-------------------------	---	---	---	------------------------------

³ See note (3) below.

[illegible]

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Lash exceeds manufacturer's³ B ³ Require repair or replacement.
specifications ³ ³
AAAAAA
Seal leaking ³ A ³ Require repair or replacement.
AAAAAA
Splines damaged ³ A ³ Require repair or replacement.
AAAAAA
Splines stripped (splines ³ A ³ Require replacement.
missing) ³ ³
AAAAAA
Steel line blocked ³ A ³ Require repair or replacement of
AAAAAA line.
Steel line leaking ³ A ³
AAAAAA
Steel line missing ³ C ³ Require replacement of line.
AAAAAA
Steel line restricted ³ A ³ Require repair or replacement of
³ ³ line.
AAAAAA
Steering coupler shield ³ B,2 ³ Suggest replacement.
cracked ³ ³
AAAAAA
Steering coupler shield ³ C ³ Require replacement.
missing ³ ³
AAAAAA
Steering coupler shield ³ B,2 ³ Suggest replacement.
torn ³ ³
AAAAAA
Threads damaged ³ A ³ Require repair or replacement of
³ ³ part with damaged threads.
AAAAAA
Threads stripped (threads ³ A ³ Require replacement of part with
missing) ³ ³ stripped threads.
AAAAAA
U-joint binding ³ A ³ Require repair or replacement of
³ ³ joint.
AAAAAA
U-joint loose ³ A ³ Require repair or replacement of
³ ³ joint.
AAAAAA
Unequal power assist ³ A ³ Require repair or replacement.
AAAAAA
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.
AAAAAA

STEERING KNUCKLES

STEERING KNUCKLES

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Condition			3	Code	3	Procedure
Attaching hardware bent			3	B	3	Require repair or replacement of bent part.
Attaching hardware broken			3	A	3	Require replacement of broken part.
Attaching hardware incorrect			3	A	3	Require replacement of incorrect 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.
Bent			3	B	3	Require replacement.
Broken			3	A	3	Require replacement.
Pinch bolt incorrect			3	B	3	Require replacement with bolt that meets OE design.
Pinch bolt loose			3	B	3	Require repair.
Pinch bolt missing			3	B	3	Require replacement.
Pinch bolt tabs deformed (pinched together), .032" or more before clamping			3	B	3	Require replacement. See note (1) below.
Taper hole elongated			3	A	3	Require replacement. See note (2).
Threads damaged			3	A	3	Require repair or replacement.
Threads stripped (threads missing)			3	A	3	Require repair or replacement.
NOTE: (1) Steering knuckle deformation can cause pinch bolt breakage.						
(2) Check for damaged stud.						

STRIKE OUT BUMPERS

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STRIKE OUT BUMPERS

AA			
Condition	3	Code	3 Procedure
AA			
Attaching hardware broken	3	A	3 Require replacement of broken
	3		3 part.
AA			
Attaching hardware corroded	3	A	3 Require replacement of corroded
affecting structural	3		3 part.
integrity	3		3
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			
Missing	3	C	3 Require replacement.
AA			
Split	3	A,1	3 Suggest replacement.
AA			

STRUT RODS

STRUT RODS

AA			
Condition	3	Code	3 Procedure
AA			
Adjusting nut seized	3	A	3 Require repair or replacement.
	3		3 See note (1) below.
AA			
Attaching hardware bent	3	B	3 Require repair or replacement of
	3		3 bent part, if available;
	3		3 otherwise, replace strut rod.
AA			
Attaching hardware broken	3	A	3 Require replacement of broken
	3		3 part, if available; otherwise,
	3		3 replace strut rod.
AA			
Attaching hardware	3	A	3 Require replacement of incorrect
incorrect	3		3 part, if available; otherwise,
	3		3 replace strut rod.
AA			
Attaching hardware loose	3	A	3 Require repair or replacement of
	3		3 loose part, if available;
	3		3 otherwise, replace strut rod.

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[illegible]

Attaching hardware missing	3	C	3	Require replacement of missing
	3		3	part, if available; otherwise,
	3		3	replace strut rod.

[illegible]

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	strut rod.

[illegible]

Attaching hardware threads	3	A	3	Require replacement of part with
stripped (threads missing)	3		3	stripped threads, if available;
	3		3	otherwise, replace strut rod.

[illegible]

Attaching (mating) hole	3	A	3	Require repair or replacement of
oversized	3		3	frame.

[illegible]

Attaching point on frame	3	A	3	Require repair of frame.
corroded, affecting	3		3	
structural integrity	3		3	

[illegible]

Bent 3 A 3 Require replacement.

[illegible]

Mating (attaching) hole	3	A	3	Require repair or replacement of
oversized	3		3	frame.

[illegible]

Threads damaged ³ A ³ Require repair or replacement.

[illegible]

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

[illegible]

NOTE: (1) Only required if an alignment is being performed.

[illegible]

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

[illegible]

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

[illegible]

Attaching hardware broken	3	A	3	Require replacement of broken
	3		3	part, if available; otherwise,
	3		3	replace bearing plate assembly.

[illegible]

Attaching hardware loose	3	A	3	Require repair or replacement of
	3		3	loose part, if available;
	3		3	otherwise, replace bearing plate

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			3	3	assembly.
AA					

SWAY BAR LINKS

Condition	3	Code	3	Procedure
Attaching hardware	3	A	3	Require replacement of incorrect
incorrect	3		3	part, if available; otherwise,
	3		3	replace link.
Attaching hardware loose	3	A	3	Require repair or replacement of
	3		3	loose part, if available;
	3		3	otherwise, replace link.
Attaching hardware missing	3	C	3	Require replacement of missing

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3 3 part, if available; otherwise,
3 3 replace link.

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
3 3 link.

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 link.

AA

Ball and socket has 3 A,1 3 Suggest replacement. See note (1).
looseness (perceptible 3 3
vertical movement) 3 3

AA

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

AA

Ball and socket has 3 B 3 Require replacement. See notes (1)
looseness that is 3 3 and (2) and caution.
excessive 3 3

AA

Bent 3 B 3 Require replacement.

AA

Broken 3 A 3 Require replacement.

AA

Corroded, affecting 3 A 3 Require replacement.
structural integrity 3 3

AA

Grease boot cracked 3 B,2 3 Suggest replacement. See note (3).

AA

Grease boot missing 3 B,2 3 Suggest replacement. See note (4).

AA

Grease boot torn 3 B,2 3 Suggest replacement. See note (5).

AA

Missing 3 C 3 Require replacement.

AA

Nut on stud loose 3 A 3 Require repair. See note (6).

AA

Stud bent 3 B 3 Require replacement. See note (7).

AA

Stud broken 3 A 3 Require replacement. See note (7).

AA

Threads damaged 3 A 3 Require repair or replacement.

AA

Threads stripped (threads 3 A 3 Require replacement. See note (7).
missing) 3 3

AA

NOTE: (1) 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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- (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.

[illegible]

SWAY BARS

SWAY BARS

[illegible]

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

[illegible]

Attaching hardware broken	3	A	3	Require replacement of broken
	3		3	part, if available; otherwise,
	3		3	replace sway bar.

[illegible]

Attaching hardware corroded ³	A	³ Require replacement of corroded
affecting structural	³	³ part, if available; otherwise,
integrity	³	³ replace sway bar.

[illegible]

Attaching hardware loose	3	A	3	Require repair or replacement of
	3		3	loose part, if available;
	3		3	otherwise, replace sway bar.

[illegible]

Attaching hardware missing	3	C	3	Require replacement of missing
	3		3	part, if available; otherwise,
	3		3	replace sway bar.

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.

[illegible]

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.

[illegible]

Bent ³ B ³ Require replacement.

Bene **D** require replacement.

Broken 3 A 3 Require replacement.

[illegible]

```
Threads damaged          3  A    3  Require repair or replacement
```

Threads damaged. A repair or replacement is required.

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

[illegible]

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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. See note (2) below.

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

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- (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.

[illegible]

TRACK BARS

TRACK BARS

[illegible]

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

[illegible]

Attaching hardware	3	A	3	Require replacement of incorrect
incorrect	3		3	part, if available; otherwise,

3 3 replace track bar.

[illegible]

Attaching hardware loose	3	A	3	Require repair or replacement of loose part, if available;
--------------------------	---	---	---	--

3 3 otherwise, replace track bar.

[illegible]

Attaching hardware missing ³ C ³ Require replacement of missing
³ part, if available; otherwise,

3 3 replace track bar.

[illegible]

Attaching hardware threads to damaged	3	A	3	Require repair or replacement of part with damaged threads, if
---------------------------------------	---	---	---	--

3 3 available; otherwise, replace

3 3 track bar.

[illegible]

Attaching hardware threads ³	A	³ Require replacement of part with stripped (threads missing) ³
		³ stripped threads, if available;

3 otherwise, replace track bar.

[illegible]

Bent 3 B 3 Require replacement.

[illegible]

Corroded, affecting	3	A	3	Require replacement
---------------------	---	---	---	---------------------

corroded, affecting	3	3
structural integrity	3	3

structural integrity

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NOTE:

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

TRAILING ARMS

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

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.

Failure to replace or correct suggested or required parts or

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service may prevent a proper alignment.

Before performing an alignment check, inspect and verify the following:

- * Tire pressure and size
- * Vehicle loading
- * Ride height
- * Steering and suspension parts

Only if the inspection reveals that all the above are within published specifications, should a wheel alignment check and an alignment, if needed, be performed.

CAUTION: Under no circumstances should a technician bend or heat any steering or suspension component, unless specified by the vehicle manufacturer, for example, Ford forged twin "I" beam axles. All measurements and suggestions must be noted on the inspection report.

WHEEL ALIGNMENT

Condition			3	Code	3	Procedure
Dog tracking, shown to be caused by faulty alignment						
Lead, shown to be caused by faulty alignment			3	B	3	Require alignment.
Part has been changed that may affect alignment						
Pull, shown to be caused by faulty alignment			3	B	3	Require alignment.
Steering wheel off-center						
Tire wear, shown to be caused by faulty alignment			3	B	3	Require alignment.
Wander, shown to be caused by faulty alignment						
			3	B	3	Require alignment.

WHEEL BEARINGS, RACES, & SEALS

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.

WHEEL BEARINGS, RACES, & SEALS

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AA			
Condition	3	Code	3 Procedure
AA			
Rear axle seal on rear-wheel drive leaking	3	A	3 Require replacement of seal and inspection of axle, bearing, housing, and vent tube
AA			
Seal bent	3	A,1	3 Suggest replacement.
AA			
Seal leaking	3	A	3 Require replacement of seal and inspection of bearings.
AA			
Seal missing	3	C	3 Require replacement.
AA			
Seal torn	3	A	3 Require replacement.
AA			
Wheel bearing assembly feels rough when rotated	3	A	3 Require replacement of bearing assembly.
AA			
Wheel bearing balls are pitted	3	A	3 Require replacement of bearing assembly.
AA			
Wheel bearing balls are worn	3	A	3 Require replacement of bearing assembly.
AA			
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.
AA			
Wheel bearing race is loose in the hub bore	3	A	3 Require replacement of hub assembly and wheel bearings.
AA			
Wheel bearing races are pitted	3	A	3 Require replacement of bearing assembly.
AA			
Wheel bearing races are worn	3	A	3 Require replacement of bearing assembly.
AA			
Wheel bearing rollers are pitted	3	A	3 Require replacement of bearing assembly.
AA			
Wheel bearing rollers are worn	3	A	3 Require replacement of bearing assembly.
AA			

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

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specifications	3	3	
AA			
Mixed tire size designations	3	A	3 Require rotation or
on same axle	3		3 replacement.
AA			
Mixed tread types (all season,	3	A	3 Require rotation or
performance, mud and snow)	3		3 replacement.
on same axle	3		3
AA			
Number of punctures exceeds	3	B	3 Require replacement.
manufacturer's limit	3		3
AA			
Out of balance	3	B	3 Require rebalance of tire/wheel
	3		3 assembly.
AA			
Ply separation	3	A	3 Require replacement.
AA			
Pull or lead, caused by tire	3	A	3 Require rotation or
	3		3 replacement.
AA			
Radial and bias or bias-belted	3	B	3 Require rotation or
ply tires on same axle	3		3 replacement.
AA			
Radials are on the front and	3	B	3 Require rotation or
not on the rear	3		3 replacement. See note (2).
AA			
Run flat damage	3	A	3 Require replacement.
AA			
Shoulder cut	3	A	3 Require replacement.
AA			
Shoulder puncture	3	A	3 Require replacement.
AA			
Shoulder with plug	3	A	3 Require replacement.
AA			
Sidewall bulge	3	A	3 Require replacement.
AA			
Sidewall cut	3	A	3 Require replacement.
AA			
Sidewall indentation	3		3 No service required/suggested.
AA			
Sidewall puncture	3	A	3 Require replacement.
AA			
Sidewall with plug	3	A	3 Require replacement.
AA			
Speed rating designations	3	B	3 Suggest rotation or
different on same axle	3		3 replacement.
AA			
Tire and wheel assembly has	3	B	3 Require repair or replacement
excessive run-out	3		3 of appropriate part. See note
	3		3 (3) below.
AA			
Tires with more than 1/4"	3	B	3 Require replacement.

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diameter difference on a	3	3	
four-wheel drive vehicle	3	3	
Tread area puncture larger in 3 B 3 Require replacement.			
diameter than tire	3	3	
manufacturer's specifications	3	3	
Tread missing pieces 3 A 3 Require replacement.			
(chunking), exposing cord	3	3	
Tread missing pieces 3 A 3 Suggest replacement.			
(chunking), not exposing cord	3	3	
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.			
Leaking 3 A 3 Require repair/replacement.			

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Missing	3	C	3 Require replacement.

Threads damaged	3	A	3 Require repair/replacement.

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

Valve cap missing	3	C	3 Require replacement of cap.

Weather-checking	3	A,1	3 Suggest replacement.

Won't take air	3	A	3 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	Code	Procedure
Bent	A	Require replacement.
Broken	A	Require replacement.
		See note (1) below.
Loose	B	Require repair or replacement of affected component.
Lug nut installed backward	B	Require repair.
Lug nut mating type incorrect	B	Require replacement of nut.
Lug nut mating surface dished	A	Require replacement of nut.
Lug nut flats rounded	A	Require replacement of nut.
		See note (2) below.
Lug nut seized	A	Require replacement of nut and/or stud. See note (2) below.
Stud incorrect	B	Require replacement of stud.
Threads damaged	A	Require repair or replacement of component with damaged threads.

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Threads stripped (threads 3 A 3 Require replacement of

missing) 3 3 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 3 Code 3 Procedure

Bead leaking, caused by 3 A 3 Require repair or replacement.
wheel rim flange 3 3 See caution below.

CAUTION: DO NOT attempt to correct a bent wheel rim.

Bent wheel hub mounting 3 A 3 Require replacement.
surface 3 3

Bent wheel rim, causing 3 B,2 3 Suggest replacement.
vibration 3 3 See caution above.

Broken 3 A 3 Require replacement.

Cast wheel porous, causing 3 A 3 Require repair or replacement.
a leak 3 3

Clip-on balance weight is 3 B,2 3 Suggest replacement.
incorrect type for wheel 3 3
rim flange 3 3

Corrosion, affecting 3 A 3 Require replacement.
structural integrity 3 3

Corrosion build-up on wheel 3 A 3 Require repair.
hub mounting surface 3 3

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Cracked	3	A	3	Require replacement.
Directional/asymmetrical wheels mounted incorrectly	3	B	3	Require remounting and/or repositioning.
Load capacity less than OEM specifications	3	B	3	Require replacement.
Offset mismatched on same axle	3	B	3	Require replacement.
Rivets leaking	3	A	3	Require replacement.
Run-out beyond OEM specs	3	B	3	Require replacement.
Stud holes elongated	3	A	3	Require replacement. See note (1)
Welded or brazed repair	3	B,2	3	Suggest replacement.
Welds leaking	3	A	3	Require replacement.
Wheel hub centering (pilot) hole incorrect	3	B	3	Require replacement.

NOTE: (1) Inspect wheel attaching hardware for damage.

END OF ARTICLE