

*** STEERING UNIFORM INSPECTION GUIDELINES ***

Article Text

1993 Volkswagen Passat

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Wednesday, March 22, 2000 09:52PM

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

AA-

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

AA-

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

AA-

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

Condition				3	Code	3	Procedure
Inner fabric of air bag				3	A	3	Require replacement.
damaged				3		3	
Leaking				3	A	3	Require repair or replacement.
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	

AIR RIDE SUSPENSION - AIR SPRING VALVES

AIR RIDE SUSPENSION - AIR SPRING VALVES

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

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

AIR RIDE SUSPENSION - AIR SPRINGS

AIR RIDE SUSPENSION - AIR SPRINGS				
AA				
Condition	3	Code	3	Procedure
AA				
Attaching hardware broken	3	A	3	Require replacement of broken part.
AA				
Attaching hardware incorrect	3	A	3	Require replacement of incorrect part.
AA				
Attaching hardware loose	3	A	3	Require repair or replacement of loose part.
AA				
Attaching hardware missing	3	C	3	Require replacement of missing part.
AA				
Attaching hardware threads damaged	3	A	3	Require repair or replacement of part with damaged threads.
AA				
Attaching hardware threads stripped (threads missing)	3	A	3	Require replacement of part with stripped threads.
AA				
Collar cracked	3	A	3	Require replacement.
AA				
End cap cracked	3	A	3	Require replacement.
AA				
Inner fabric of bag damaged	3	A	3	Require replacement.
AA				
Leaking	3	A	3	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

3 3 bent part.

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

3 3 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
-----------	---	------	---	-----------

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.
-------------------	---	---	---	--------------------------------

[illegible]

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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

```

AIR RIDE SUSPENSION - WARNING LAMPS

AIR RIDE SUSPENSION - WARNING LAMPS

```

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
Warning light stays on after    3       3   determine cause.
initial bulb check              3       3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

```

AIR RIDE SUSPENSION - WIRING HARNESSSES

AIR RIDE SUSPENSION - WIRING HARNESSSES

```

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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Condition	Code	Procedure
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AA			
Attaching hardware bent	3 B	3	Require repair or replacement of
	3	3	bent part if available; otherwise,
	3	3	replace ball joint.
AA			
Attaching hardware broken	3 A	3	Require replacement of broken part
	3	3	if available; otherwise, replace
	3	3	ball joint.
AA			
Attaching hardware corroded	3 A	3	Require replacement of broken part
affecting structural	3	3	if available; otherwise, replace
integrity	3	3	ball joint.
AA			
Attaching hardware	3 A	3	Require replacement of incorrect
incorrect	3	3	part if available; otherwise,
	3	3	replace ball joint.
AA			
Attaching hardware loose	3 A	3	Require repair or replacement of
	3	3	loose part if available;
	3	3	otherwise, replace ball joint.
AA			
Attaching hardware missing	3 C	3	Require replacement of missing
	3	3	part if available; otherwise,
	3	3	replace ball joint.
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	ball joint.
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 ball joint.
AA			
Binding	3 A	3	Further inspection required.
	3	3	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
	3	3	fitting.
AA			
Grease fitting missing	3 C	3	Require replacement of grease
	3	3	fitting.
AA			
Grease fitting won't seal	3 A	3	Require replacement of grease
	3	3	fitting.
AA			

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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.

[illegible]

Nut on ball joint loose 3 A 3 Require repair or replacement.

³ See note (6) below.

[illegible]

Pre-load adjustment 3 B 3 Require repair or replacement.

incorrect	3	3
-----------	---	---

[illegible]

Seized 3 A 3 Require replacement.

[illegible]

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

[illegible]

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

[illegible]

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

[illegible]

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

missing) 3 3

[illegible]

Wear exceeds manufacturer's³ B ³ Require replacement.

```

specifications          3          3

```

[illegible]

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.

[illegible]

BUSHINGS

BUSHINGS

[illegible]

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

.....

Attaching hardware bent 3 B 3 Require repair or replacement of

3 bent part if available; otherwise,

3 3 replace bushing.

[illegible]

Attaching hardware broken 3 A 3 Require replacement of broken part

3 3 if available; otherwise, replace

3 3 bushing.

basilium.

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Attaching hardware corroded	³ A	³ Require replacement of corroded affecting structural integrity
incorrect	³	³ part if available; otherwise,
	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 loose part if available;
	³	³ otherwise, replace bushing.
~~~~~		
Attaching hardware missing	³ C	³ Require replacement of missing part if available; otherwise,
	³	³ replace bushing.
~~~~~		
Attaching hardware threads damaged	³ A	³ Require repair or replacement of part with damaged threads if available; otherwise, replace bushing.
~~~~~		
Attaching hardware threads stripped (threads missing)	³ A	³ Require replacement of part with stripped threads if available; otherwise, replace bushing.
~~~~~		
Binding	³ A	³ Require repair or replacement.
~~~~~		
Deteriorated, affecting performance	³ A	³ Require repair or replacement.
~~~~~		
Distorted, affecting performance	³ A	³ Require repair or replacement.
~~~~~		
Leaking (fluid-filled type)	³ A	³ Require replacement.
~~~~~		
Missing	³ A	³ Require replacement.
~~~~~		
Noisy	³ B,2	³ Further inspection required. ³ See note (1) and caution below.
~~~~~		
Rubber separating from internal metal sleeve on bonded bushing	³ A	³ Require replacement.
~~~~~		
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.

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

```

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

— see note (6) below.

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

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).

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(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 housing. See note (5) below.

using appropriate tool³

AA

Gland nut (strut housing³ A³ Require repair or replacement of

cap) threads damaged³ nut.

AA

Gland nut (strut housing³ A³ Require replacement of nut.

cap) threads stripped³

(threads missing)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 below.

the body³

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

AA

Piston rod threads damaged³ A³ Require repair or replacement.

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AA

Piston rod threads stripped³ A ³ Require replacement.

(threads missing) ³ ³

AA

Seized ³ A ³ Require replacement.

AA

Shock missing ³ C ³ Require replacement.

AA

Strut housing bent ³ A ³ Require replacement.

AA

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

AA

Strut housing cap (gland ³ A ³ Require repair or replacement of
nut) threads damaged ³ ³ nut.

AA

Strut housing cap (gland ³ A ³ Require replacement of nut.
nut) threads stripped ³ ³
(threads missing) ³ ³

AA

Strut housing severely ³ A ³ Require replacement.
corroded, affecting ³ ³
structural integrity ³ ³

AA

Strut housing threads ³ A ³ Require repair or replacement.
damaged ³ ³

AA

Strut housing threads ³ A ³ Require replacement.
stripped (threads missing)³ ³

AA

Tire cupping ³ A ³ Further inspection required.
³ ³ See note (8) below

AA

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

[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.

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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

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
	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.
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
Bent 3 B 3 Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Broken 3 A 3 Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Taper hole elongated 3 A 3 Require replacement. See note (1).
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) Check for damaged stud.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
```

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

```

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

[illegible]

Piston rod has surface ³ B, 2 ³ Suggest replacement.

defect	3	3
--------	---	---

[illegible]

Piston rod threads stripped³ A ³ Require replacement.

```
(threads missing)          3      3
```

[illegible]

Piston rod threads damaged ³ A ³ Require repair or replacement.

[illegible]

Seized 3 A 3 Require replacement.

[illegible]

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.

[illegible]

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)

[illegible]

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

[illegible]

Attaching hardware broken 3 A 3 Require replacement of broken

3 3 part.

[illegible]

Attaching hardware loose 3 A 3 Require repair or replacement of

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]

Binding 3 A 3 Require repair or replacement

[illegible]

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

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

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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>		

```

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

```

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

```

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
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.

```

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

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

```

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

[illegible]

Housing leaking 3 A 3 Require replacement.

[illegible]

Inadequate power assist	3	A	3	Further inspection required.
	3		3	See note (3) below.

[illegible]

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

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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```

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Attaching hardware missing      3   C   3   Require replacement of missing
                                   3   3   part, if available; otherwise,
                                   3   3   replace strut rod.
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   strut rod.
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 strut rod.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Attaching (mating) hole        3   A   3   Require repair or replacement of
oversized                     3   3   frame.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Attaching point on frame       3   A   3   Require repair of frame.
corroded, affecting           3   3
structural integrity          3   3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Bent                           3   A   3   Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Mating (attaching) hole        3   A   3   Require repair or replacement of
oversized                     3   3   frame.
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) Only required if an alignment is being performed.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

```

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

```

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

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.

[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 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.

[illegible]

Broken ³ A ³ Require replacement.

[illegible]

Threads damaged 3 A 3 Require repair or replacement.

Threads damaged. It requires repair or replacement.

```
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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Grease boot cracked 3 3 Suggest replacement. See note (3).

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

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

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 fitting.

Grease seal missing 3 B,2 3 Suggest replacement of seal. See note (4) below.

Grease seal torn 3 B,2 3 Suggest replacement of seal. See note (5) below.

Greaseable tie rod end 3 B,2 3 Suggest replacement of grease will not take grease 3 fitting. See note (6) below.

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

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

Looseness exceeds 3 B 3 Require replacement. manufacturer's specs 3

Looseness that is excessive 3 B 3 Require replacement. See notes (7) and (8), caution.

Nut on stud loose 3 A 3 Require repair or replacement of nut. See note (9) below.

Seized 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)

Threads damaged 3 A 3 Require repair or replacement.

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

NOTE: (1) Only required if toe needs to be adjusted.

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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.

AA

TRACK BARS

TRACK BARS

AA

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

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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.
Bushings 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			3	B	3	Require alignment check.
Pull, shown to be caused by faulty alignment			3	B	3	Require alignment.
Steering wheel off-center			3	B,2	3	Suggest alignment.
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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has meaning surface

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

END OF ARTICLE