

# **\* SUSPENSION UNIFORM INSPECTION GUIDELINES \***

1998 Toyota Supra

## GENERAL INFORMATION

Steering, Suspension, Wheel Alignment, Wheels and Tires  
Motorist Assurance Program  
Standards For Automotive Repair

All Makes and Models

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WHEEL ALIGNMENT

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## **MOTORIST ASSURANCE PROGRAM (MAP)**

### **OVERVIEW**

The Motorist Assurance Program 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.

Our organization's 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 greater responsibility for their vehicles—through proper, manufacturer-recommended, maintenance. We encourage participating service and repair shops (including franchisees and dealers) to adopt 1) a Pledge of Assurance to their Customers and 2) the Motorist Assurance Program Standards of Service. All participating service providers have agreed to subscribe to this Pledge and to adhere to the promulgated Standards of Service demonstrating 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 and the results communicated to the customer according to industry standards. Given that the industry did not have such standards, the Motorist Assurance Program successfully promulgated industry inspection communication standards in 1994-95 for the following systems: Exhaust, Brakes, ABS, Steering and Suspension, Engine Maintenance and Performance, HVAC, and Electrical Systems. Further, revisions to all of these inspection communication standards are continually re-published. In addition to these, standards for Drive Train and Transmissions have recently been promulgated. Participating shops utilize these Uniform Inspection & Communication Standards as part of the inspection process and for communicating their findings to their customers.

The Motorist Assurance Program continues to work cooperatively and proactively with government agencies and consumer groups toward solutions that both benefit the customer and are mutually acceptable to both regulators and industry. We maintain the belief that industry must retain control over how we conduct our business, and we must be viewed as part of the solution and not part of the problem. Meetings with state and other government officials (and their representatives), concerned with auto repair and/or consumer protection, are conducted. Feedback from these sessions is brought back to the association, 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 mediation and arbitration through MAP/BBB-CARE and other non-

profit organizations. MAP conducted pilot programs in twelve states before announcing the program nationally in October, 1998. During the pilots, participating repair shops demonstrated their adherence to the Pledge and Standards and agreed to follow the UICS in communicating the results of their inspection to their customers. To put some "teeth" in the program, an 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.

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.motorist.org](http://www.motorist.org) or contact us at:

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## **MAP UNIFORM INSPECTION GENERAL GUIDELINES**

### **OVERVIEW OF SERVICE REQUIREMENTS & SUGGESTIONS**

It is MAP policy that all exhaust, brake, steering, suspension, wheel alignment, drive-line, engine performance and maintenance, and heating, ventilation and air conditioning, and electrical services be offered and performed under the standards 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 requests expressed by the customer.

When a component is suggested or required to be repaired or replaced, the decision to repair or replace must be made in the customer's best interest, and at his or her choice given the options available.

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

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 discard 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 addresses a customer's need, convenience or request. If a customer's vehicle has one of these conditions, the procedure may be only 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 repair is required, a MAP shop must refuse partial service on that system if, in the judgment of the service provider, proceeding with the work could create or continue an unsafe condition. When a procedure states that required or suggested repair or replacement is recommended, the customer must be informed of the generally acceptable repair/replacement options whether or not performed by the shop.

When presenting suggested repairs to the customer, you must present the facts, allowing the customer to draw their own conclusions and make an informed decision about how to proceed.

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

Reasons to Require Repair or Replacement

- A - Part no longer performs intended purpose
- B - Part does not meet a design specification (regardless of performance)
- C - Part is missing

NOTE: When a repair is required, the shop must refuse partial service to the system in question, if the repair creates or continues an unsafe condition.

Reasons to Suggest Repair or Replacement

- 1 - Part is close to the end of its useful life (just above discard specifications, or weak; failure likely to occur soon, etc.)
- 2 - To address a customer need, convenience, or request (to stiffen ride, enhance performance, eliminate noise, etc.)
- 3 - To comply with maintenance recommended by the vehicle's Original Equipment Manufacturer (OEM)
- 4 - Technician's recommendation based on substantial and informed experience

NOTE: Suggested services are always optional. When presenting suggested repairs to the customer, you must present

the facts, allowing the customer to draw their own conclusions and make an informed decision about how to proceed.

## STEERING AND SUSPENSION

### SERVICE PROCEDURES REQUIRED AND 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.

**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 AND AIR STRUTS

**NOTE:** This section covers the air spring portion of the air shock or strut. For damping portion of shock or strut conditions and procedures, refer to the SHOCK ABSORBERS, STRUT CARTRIDGES AND STRUT ASSEMBLIES section.

#### AIR RIDE SUSPENSION - AIR SHOCK AND AIR STRUT INSPECTION

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

## AIR RIDE SUSPENSION - AIR SPRING VALVES

#### AIR RIDE SUSPENSION - AIR SPRING VALVE INSPECTION

Condition	Code	Procedure
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Attaching hardware incorrect .....	A	.....	Require replacement of incorrect part.
Attaching hardware loose .....	A	...	Require repair or replacement of loose part.
Attaching hardware missing .....	C	..	Require replacement of missing part.
Attaching hardware threads damaged .....	A	...	Require repair or replacement of part with damaged threads.
Attaching hardware threads stripped (threads missing) .....	A	.....	Require replacement of part with stripped threads.
Blocked .....	A	..	Require repair or replacement.
Connector bent .....	A	..	Require repair or replacement.
Connector broken .....	A	.....	Require replacement.
Connector loose .....	A	..	Require repair or replacement.
Inoperative .....	A	..	Require repair or replacement.
Leaking .....	A	..	Require repair or replacement.
Restricted .....	A	..	Require repair or replacement.

## AIR RIDE SUSPENSION - AIR SPRINGS

### AIR RIDE SUSPENSION – AIR SPRING INSPECTION

Condition	Code	Procedure
Attaching hardware broken .....	A	... Require replacement of broken part.
Attaching hardware incorrect .....	A	..... Require replacement of incorrect part.
Attaching hardware loose .....	A	... Require repair or replacement of loose part.
Attaching hardware missing .....	C	.. Require replacement of missing part
Attaching hardware threads damaged .....	A	... Require repair or replacement of part with damaged threads.
Attaching hardware threads stripped (threads missing) .....	A	..... Require replacement of part with stripped threads.
Collar cracked .....	A	..... Require replacement.
End cap cracked .....	A	..... Require replacement.
Inner fabric of bag damaged .....	A	..... Require replacement.
Leaking .....	A	.. Require repair or replacement.
Outer covering of air bag is cracked to the extent that inner fabric of air bag is visible .....	1	..... Suggest replacement.
Piston cracked .....	A	..... Require replacement.

## AIR RIDE SUSPENSION - COMPRESSORS

### AIR RIDE SUSPENSION - COMPRESSOR INSPECTION

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

(1) - If failure to build pressure is traced to the compressor, require replacement.

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

## AIR RIDE SUSPENSION - HEIGHT SENSORS

### AIR RIDE SUSPENSION - HEIGHT SENSOR INSPECTION

Condition	Code	Procedure
Attaching hardware bent .	B ...	Require repair or replacement of bent part.
Attaching hardware broken .....	A ...	Require replacement of broken part.
Attaching hardware corroded, affecting structural integrity ....	A .....	Require replacement of corroded part.
Attaching hardware loose .....	A ...	Require repair or replacement of loose part.
Attaching hardware missing .....	C ..	Require replacement of missing part.
Attaching hardware		

threads damaged .....	A	...	Require repair or replacement of part with damaged threads.
Attaching hardware threads stripped (threads missing) .....	A	.....	Require replacement of part with stripped threads.
Dust boot missing .....	2	.....	(1) Suggest replacement.
Dust boot split .....	2	.....	(1) Suggest replacement.
Dust boot torn .....	2	.....	(1) Suggest replacement.
Housing cracked .....	A	.....	Require replacement.
Lead routing incorrect ..	B	..	Require rerouting according to vehicle manufacturer's specifications.
Loose .....	B	...	Require adjustment to vehicle manufacturer's specifications.
Missing .....	C	.....	Require replacement.
Output signal incorrect .	A	..	Require repair or replacement.
Wire lead damaged .....	A	..	Require repair or replacement.

(1) - This condition can lead to damage of the sliding magnet, which, in turn, causes premature sensor failure.

## AIR RIDE SUSPENSION - MODULES

### AIR RIDE SUSPENSION - MODULE INSPECTION

Condition	Code	Procedure
Attaching hardware loose .....	A	... Require repair or replacement of loose part.
Attaching hardware missing .....	C	.. Require replacement of missing part.
Attaching hardware threads damaged .....	A	... Require repair or replacement of part with damaged threads.
Attaching hardware threads stripped (threads missing) .....	A	..... Require replacement of part with stripped threads.
Housing cracked .....	2	.. Suggest repair or replacement.
Inoperative .....	A	..... Require replacement.
Missing .....	C	..... Require replacement.

## AIR RIDE SUSPENSION - RELAYS (COMPRESSOR)

### AIR RIDE SUSPENSION - RELAY (COMPRESSOR) INSPECTION

Condition	Code	Procedure
Housing cracked .....	2	..... (1) Suggest replacement.
Intermittent .....	A	..... Require replacement.
Missing .....	C	..... Require replacement.
Output signal incorrect .	A	..... Require replacement.

(1) - If moisture enters the relay, it can reduce life expectancy or impair function.

## AIR RIDE SUSPENSION - SWITCHES (ON/OFF)



#### AIR RIDE SUSPENSION - SWITCH (ON/OFF) INSPECTION

Condition	Code	Procedure
Broken .....	A .....	Require replacement.
Missing .....	C .....	Require replacement.
Output signal incorrect .	A .....	Require replacement.

#### AIR RIDE SUSPENSION - TORSION SPRINGS (COUNTER BALANCING)

##### AIR RIDE SUSPENSION - TORSION SPRING (COUNTER BALANCING) INSPECTION

Condition	Code	Procedure
Attaching hardware bent .	B ...	Require repair or replacement of bent part.
Attaching hardware broken .....	A ...	Require replacement of broken part.
Attaching hardware incorrect .....	A .....	Require replacement of incorrect part.
Attaching hardware loose .....	A ...	Require repair or replacement of loose part.
Attaching hardware missing .....	C ..	Require replacement of missing part.
Attaching hardware threads damaged .....	A ...	Require repair or replacement of part with damaged threads.
Attaching hardware threads stripped (threads missing) .....	A .....	Require replacement of part with stripped threads.
Broken .....	A .....	Require replacement.
Missing .....	C .....	Require replacement.

#### AIR RIDE SUSPENSION - TUBING

##### AIR RIDE SUSPENSION - TUBING INSPECTION

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

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## AIR RIDE SUSPENSION - WARNING LAMPS

### AIR RIDE SUSPENSION - WARNING LAMP INSPECTION

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

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## AIR RIDE SUSPENSION - WIRING HARNESSSES

### AIR RIDE SUSPENSION - WIRING HARNESS INSPECTION

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Condition	Code	Procedure
Connector bent .....	A ..	Require repair or replacement.
Connector broken .....	A ..	Require repair or replacement.
Connector loose .....	A ..	Require repair or replacement.
Damaged (cut, burned, or chafed) .....	A ..	Require repair or replacement.
Excessive resistance ....	B ..	Require repair or replacement.
Fuse blown .....	A .....	Require replacement.
Fusible link blown .....	A .....	Require replacement.
Open .....	A ..	Require repair or replacement.
Poor ground .....	A ..	Require repair or replacement.
Routed incorrectly .....	B ..	Require rerouting according to vehicle manufacturer's specifications.
Shorted .....	A ..	Require repair or replacement.
Terminal bent .....	A ..	Require repair or replacement.
Terminal broken .....	A ..	Require repair or replacement.
Terminal corroded .....	A ..	Require repair or replacement.
Terminal loose .....	A ..	Require repair or replacement.

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## BALL JOINTS

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

**NOTE:** The term "perceptible movement," defined as any visible movement in any direction, has been the industry standard for determining the need for replacement of follower ball joints. Some vehicle manufacturers are now publishing specifications for follower ball joints that were

previously diagnosed by the "perceptible movement" standard. Before requiring or suggesting any parts be replaced based on "perceptible movement," consult your repair manual to determine if OEM specifications exist.

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

#### BALL JOINT INSPECTION

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

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

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

## BUSHINGS

### BUSHING INSPECTION

Condition	Code	Procedure
Attaching hardware bent .	B	... Require repair or replacement of bent part if available; otherwise, replace bushing.
Attaching hardware broken .....	A	... Require replacement of broken part if available; otherwise, replace bushing.
Attaching hardware corroded, affecting structural integrity ...	A	. Require replacement of corroded part if available; otherwise, replace bushing.
Attaching hardware incorrect .....	A	..... Require replacement of incorrect part if available; otherwise, replace bushing.
Attaching hardware loose .....	A	... Require repair or replacement of loose part if available; otherwise, replace bushing.
Attaching hardware missing .....	C	.. Require replacement of missing part if available; otherwise, replace bushing.
Attaching hardware threads damaged .....	A	... Require repair or replacement

of part with damaged threads if  
available; otherwise, replace  
bushing.

Attaching hardware threads stripped (threads missing) .....	A	.....	Require replacement of part with stripped threads if available; otherwise, replace bushing.
Binding .....	A	..	Require repair or replacement.
Deteriorated, affecting performance .....	A	..	Require repair or replacement.
Distorted, affecting performance .....	A	..	Require repair or replacement.
Leaking (fluid-filled type) .....	A	.....	Require replacement.
Missing .....	C	.....	Require replacement.
Noisy .....	2	.....	(1) Further inspection required.
Rubber separating from internal metal sleeve on bonded bushing .....	A	.....	Require replacement.
Seized .....	A	.....	Require replacement.
Shifted (out of position) .....	B	..	Require repair or replacement.
Split .....	A	.....	Require replacement.
Surface cracking (weather- checked) .....	..	.....	No service suggested or required.

(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 LINK INSPECTION

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

			available; otherwise, replace center link.
Bent .....	B .....		Require replacement.
Binding .....	A .....	(1)	Further inspection required.
Grease boot cracked .....	2 .....	(2)	Suggest replacement.
Grease boot missing .....	2 .....	(3)	Suggest replacement.
Grease boot torn .....	2 .....	(4)	Suggest replacement.
Grease fitting broken ...	A ...		Require replacement of grease fitting.
Grease fitting missing ..	C ...		Require replacement of grease fitting.
Grease fitting won't seal .....	A ...		Require replacement of grease fitting.
Grease seal missing .....	2 .....	(3)	Suggest replacement.
Grease seal torn .....	2 .....	(4)	Suggest replacement.
Looseness (perceptible horizontal movement) ...	1 .....	(5)	Suggest replacement.
Looseness that is excessive .....	B .....	(5) (6)	Require replacement.
Seized .....	A .....		Require replacement.
Stud bent .....	B .....	(7)	Require replacement.
Stud broken .....	A .....	(7)	Require replacement.
Stud loose in taper hole .....	A .....	(7)	Require repair or replacement.
Taper hole elongated ....	A .....	(8)	Require replacement.
Threads damaged .....	A ..		Require repair or replacement.
Threads stripped (threads missing) .....	A .....	(7)	Require replacement.
Wear exceeds manufacturer's specifications .....	B .....		Require replacement.

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

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

- (6) - Excessive looseness is defined as being significant enough to affect vehicle handling or structural integrity.
- (7) - Check for damaged taper hole.
- (8) - Check for damaged stud.

## CONTROL ARM SHAFTS

### CONTROL ARM SHAFT INSPECTION

Condition	Code	Procedure
Attaching hardware broken .....	A ...	Require replacement of broken

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

## CONTROL ARMS

### CONTROL ARM INSPECTION

Condition	Code	Procedure
Attaching hardware bent .....	B	... Require repair or replacement of bent part, if available; otherwise, replace control arm.
Attaching hardware broken .....	A	... Require replacement of broken part, if available; otherwise, replace control arm.
Attaching hardware corroded, affecting structural integrity ...	A	. Require replacement of corroded part, if available; otherwise, replace control arm.
Attaching hardware incorrect .....	A	..... Require replacement of incorrect part, if available; otherwise, replace control arm.
Attaching hardware loose .....	A	... Require repair or replacement of loose part, if available; otherwise, replace control arm.
Attaching hardware missing .....	C	.. Require replacement of missing part, if available; otherwise, replace control arm.
Attaching hardware threads damaged .....	A	... Require repair or replacement of part with damaged threads,

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

## DRAG LINKS

### DRAG LINK INSPECTION

Condition	Code	Procedure
Attaching hardware incorrect .....	A	..... Require replacement of incorrect part, if available; otherwise, replace drag link.
Attaching hardware loose .....	A	... Require repair or replacement of loose part, if available; otherwise, replace drag link.
Attaching hardware missing .....	C	.. Require replacement of missing part, if available; otherwise, replace drag link.
Attaching hardware threads damaged .....	A	... Require repair or replacement of part with damaged threads, if available; otherwise, replace drag link.
Attaching hardware threads stripped (threads missing) .....	A	..... Require replacement of part with stripped threads, if available; otherwise, replace drag link.
Bent .....	B	..... Require replacement.
Binding .....	A	..... (1) Further inspection required.
Grease boot cracked .....	2	..... (2) Suggest replacement.
Grease boot missing .....	2	..... (3) Suggest replacement.
Grease boot torn .....	2	..... (4) Suggest replacement.
Grease fitting broken ...	A	... Require replacement of grease fitting.



Grease fitting missing ..	C	...	Require replacement of grease fitting.
Grease fitting won't seal .....	A	...	Require replacement of grease fitting.
Grease seal missing .....	2	.....	(5) Suggest replacement.
Grease seal torn .....	2	.....	(4) Suggest replacement.
Looseness (perceptible horizontal movement) ...	1	.....	(6) Suggest replacement.
Looseness that is excessive .....	B	.....	(6) (7) Require replacement.
Seized .....	A	.....	Require replacement.
Stud bent .....	B	.....	(8) Require replacement.
Stud broken .....	A	.....	(8) Require replacement.
Stud loose in taper hole .....	A	.....	(8) Require repair or replacement.
Taper hole elongated ....	A	.....	(9) Require replacement.
Threads damaged .....	A	..	Require repair or replacement.
Threads stripped (threads missing) .....	A	.....	(8) Require replacement.
Wear exceeds manufacturer's specifications .....	B	.....	Require replacement.

- (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.

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

- (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 AND 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.

### ELECTRONIC RIDE CONTROL SHOCK AND STRUT INSPECTION

Condition	Code	Procedure
Connector bent .....	A ..	Require repair or replacement.
Connector broken .....	A ..	Require repair or replacement.
Connector loose .....	A ..	Require repair or replacement.
Electronic valve control		

inoperative .....	2	.....	(1) Suggest replacement.
Terminal bent .....	A	..	Require repair or replacement.
Terminal broken .....	A	..	Require repair or replacement.
Terminal corroded .....	A	..	Require repair or replacement.
Terminal loose .....	A	..	Require repair or replacement.

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

## IDLER ARMS

### IDLER ARM INSPECTION

Condition	Code	Procedure
Attaching hardware broken .....	A	... Require replacement of broken part, if available; otherwise, replace idler arm.
Attaching hardware incorrect .....	A	..... Require replacement of incorrect part, if available; otherwise, replace idler arm.
Attaching hardware loose .....	A	... Require repair or replacement of loose part, if available; otherwise, replace idler arm.
Attaching hardware missing .....	C	.. Require replacement of missing part, if available; otherwise, replace idler arm.
Attaching hardware threads damaged .....	A	... Require repair or replacement of part with damaged threads, if available; otherwise, replace idler arm.
Attaching hardware threads stripped (threads missing) .....	A	..... Require replacement of part with stripped threads, if available; otherwise, replace idler arm.
Binding .....	A	..... (1) Further inspection required.
Grease boot cracked .....	2	..... (2) Suggest replacement.
Grease boot missing .....	2	..... (3) Suggest replacement.
Grease boot torn .....	2	..... (4) Suggest replacement.
Grease fitting broken ...	A	... Require replacement of grease fitting.
Grease fitting missing ..	C	... Require replacement of grease fitting.
Grease fitting won't seal .....	A	... Require replacement of grease fitting.
Grease seal missing .....	2	..... (5) Suggest replacement.
Grease seal torn .....	2	..... (4) Suggest replacement.
Greaseable joint will not take grease .....	2	..... (1) Suggest replacement of grease fitting.
Looseness at frame bracket end .....	B	..... (6) (7) Require repair or replacement.

Looseness at link end (perceptible horizontal movement) .....	1	.....	(8) Suggest replacement.
Looseness at link end that is excessive .....	B	.....	(8) (9) Require replacement.
Mounted out of position (center link not parallel) .....	B	.....	Require repositioning.
Nut on stud loose .....	A	.....	(10) Require repair or replacement.
Seized .....	A	.....	Require replacement.
Stud bent .....	B	.....	(11) Require replacement.
Stud broken .....	A	.....	(11) Require replacement.
Taper hole elongated ....	A	.....	(12) Require replacement.
Threads damaged .....	A	..	Require repair or replacement.
Threads stripped (threads missing) .....	A	.....	(11) Require replacement.
Wear exceeds manufacturer's specifications .....	B	.....	Require replacement.

- (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 manufacturer's procedures and specifications exist, use those procedures and specifications; otherwise, use an approved inspection method such as the dry park check.
- (7) - Looseness is defined as movement that creates excessive toe change.
- (8) - If manufacturer's procedures for inspection exist, use those procedures; otherwise, use an approved inspection method such as the dry park check.

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

Condition	Code	Procedure
Bearing balls pitted ....	A	..... Require replacement.
Bearing balls worn .....	A	..... Require replacement.
Bearing races pitted ....	A	..... Require replacement.

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

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

## PITMAN ARMS

### PITMAN ARM INSPECTION

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

replace pitman arm.

Attaching hardware threads stripped (threads missing) .....	A	.....	Require replacement of part with stripped threads, if available; otherwise, replace pitman arm.
Bent .....	B	.....	Require replacement.
Binding .....	A	.....	(1) Further inspection required.
Grease boot cracked .....	2	.....	(2) Suggest replacement.
Grease boot missing .....	2	.....	(3) Suggest replacement.
Grease boot torn .....	2	.....	(4) Suggest replacement.
Grease fitting broken ...	A	.....	Require replacement grease fitting.
Grease fitting missing ..	C	...	Require replacement of grease fitting.
Grease fitting won't seal .....	A	...	Require replacement of grease fitting.
Grease seal missing .....	2	.....	(3) Suggest replacement of seal.
Grease seal torn .....	2	.....	(4) Suggest replacement of seal.
Looseness (perceptible horizontal movement) ...	1	.....	(5) Suggest replacement.
Looseness that is excessive .....	B	.....	(5) (6) Require replacement.
Nut on stud loose .....	A	.....	(7) Require repair or replacement.
Seized .....	A	.....	Require replacement.
Splines damaged .....	A	..	Require repair or replacement.
Splines stripped (splines missing) .....	A	.....	Require replacement.
Stud bent .....	B	.....	(8) Require replacement.
Stud broken .....	A	.....	(8) Require replacement.
Stud loose in taper hole .....	A	.....	(8) Require repair or replacement.
Taper hole elongated ....	A	.....	(9) Require replacement.
Threads damaged .....	A	..	Require repair or replacement.
Threads stripped (threads missing) .....	A	.....	(8) Require replacement.

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

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

- (6) - Excessive looseness is defined as being significant enough to affect vehicle handling or structural integrity.
  - (7) - Check for bent stud of damaged taper hole.
  - (8) - Check for damaged taper hole.
  - (9) - Check for damaged stud.
-

## POWER STEERING HOSES

### POWER STEERING HOSE INSPECTION

Condition	Code	Procedure
Blistered .....	B	..... Require replacement.
Blocked .....	A	. Require repair or replacement.
Fitting threads damaged .	A	. Require repair or replacement.
Fitting threads stripped (threads missing) .....	A	..... Require replacement.
Inner fabric (webbing) cut .....	A	..... Require replacement.
Leaking .....	A	. Require repair or replacement.
Missing .....	C	..... Require replacement.
Outer covering is cracked to the extent that the inner fabric of hose is visible .....	B	..... Require replacement.
Restricted .....	A	. Require repair or replacement.

## 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) PUMP INSPECTION

Condition	Code	Procedure
Attaching hardware bent .	B	... Require repair or replacement of bent part.
Attaching hardware broken .....	A	... Require replacement of broken part.
Attaching hardware loose .....	A	... Require repair or replacement of loose part.
Attaching hardware missing .....	C	.. Require replacement of missing part.
Attaching hardware threads damaged .....	A	... Require repair or replacement of part with damaged threads.
Attaching hardware threads stripped (threads missing) .....	A	..... Require replacement of part with stripped threads.
Belt alignment incorrect .....	B	..... (1) Further inspection required.
Belt cracked .....	1	..... Suggest replacement.
Belt frayed .....	1	..... Suggest replacement.
Belt missing .....	C	..... Require replacement.
Belt noisy .....	2	..... (2) Further inspection required.
Belt plies separated ....	A	..... Require replacement.

Belt tension out of specification .....	B	.....	Require adjustment or replacement.
Belt worn beyond adjustment range .....	B	.....	Require replacement.
Belt worn so it contacts bottom of pulley .....	A	.....	Require replacement.
Binding .....	A	..	Require repair or replacement.
Fluid at or beyond service interval .....	3	.....	Suggest fluid change.
Fluid contaminated .....	B	.....	(3) Require flushing and refilling of the system.
Fluid level incorrect ...	B	.....	Require adjustment of fluid level.
Inadequate assist .....	A	.....	(4) Further inspection required.
Leaking .....	A	..	Require repair or replacement.
Noise .....	2	.....	(5) Further inspection required.
Pulley bent .....	A	...	Require repair or replacement of pulley.
Pulley missing .....	C	..	Require replacement of pulley.
Remote reservoir leaking .....	A	.....	Require replacement of reservoir,
Reservoir cap broken ....	A	.....	Require replacement of cap.
Reservoir cap missing ...	C	.....	Require replacement of cap.
Seized .....	A	.....	Require replacement.
Threads damaged .....	A	..	Require repair or replacement.
Threads stripped (threads missing) .....	A	.....	Require replacement.

- (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.

## RADIUS ARMS

### RADIUS ARM INSPECTION

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

Attaching hardware threads stripped (threads missing) .....	A	.....	Require replacement of part with stripped threads.
Bent .....	B	.....	Require replacement.
Corroded, affecting structural integrity ...	A	.....	Require replacement.
Holes distorted .....	A	.....	Require replacement.
Threads damaged .....	A	..	Require repair or replacement.
Threads stripped (threads missing) .....	A	.....	Require replacement.

## RELAY RODS

### RELAY ROD INSPECTION

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	..... (1) Further inspection required.
Grease boot cracked .....	2	..... (2) Suggest replacement.
Grease boot missing .....	2	..... (3) Suggest replacement.
Grease boot torn .....	2	..... (4) Suggest replacement.
Grease fitting broken ...	A	..... Require replacement grease fitting.
Grease fitting missing ..	C	... Require replacement of grease fitting.
Grease fitting won't seal .....	A	... Require replacement of grease fitting.
Grease seal missing .....	2	..... (3) Suggest replacement.
Grease seal torn .....	2	..... (4) Suggest replacement.
Looseness (perceptible horizontal movement) ...	1	..... (5) Suggest replacement.
Looseness that is excessive .....	B	..... (5) (6) Require replacement.
Seized .....	A	..... Require replacement.
Stud bent .....	B	..... (7) Require replacement.



Stud loose in taper hole .....	A .....	(7) Require repair or replacement.
Taper hole elongated ....	A .....	(8) Require replacement.
Threads damaged .....	A ..	Require repair or replacement.
Threads stripped (threads missing) .....	A .....	(7) Require replacement.
Wear exceeds manufacturer's specifications .....	B .....	Require replacement.

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

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

- (6) - Excessive looseness is defined as being significant enough to affect vehicle handling or structural integrity.
- (7) - Check for damaged taper hole.
- (8) - Check for damaged stud.

## SHOCK ABSORBERS, STRUT CARTRIDGES AND STRUT ASSEMBLIES

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

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

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

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

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

NOTE: If vehicle is equipped with original equipment coil over shocks, apply the conditions for coil springs from the SPRINGS - COIL, LEAF AND TORSION BAR section of the STEERING AND SUSPENSION guidelines. If the vehicle is equipped with add-on coil over shocks, you may suggest replacing the shocks with standard shocks for any spring-related condition.

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## SHOCK ABSORBER, STRUT CARTRIDGE AND STRUT ASSEMBLY INSPECTION

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

Dust boot (bellows) missing .....	2	..... (2) Suggest replacement of boot.
Dust boot (bellows) torn .....	2	..... (2) Suggest replacement of boot.
Dust shield broken .....	2	..... (2) Suggest replacement.
Dust shield missing .....	2	..... (2) Suggest replacement.
Gland nut (strut housing cap) is not removable using appropriate tool .	A	.. (3) Require replacement of nut and/or housing.
Gland nut (strut housing cap) threads damaged ...	A	... Require repair or replacement of nut.
Gland nut (strut housing cap) threads stripped (threads missing) .....	A	..... Require replacement of nut.
Housing dented .....	A	..... (1) Further inspection required.
Housing punctured .....	A	..... Require replacement.
Jounce bumper missing ...	C	... Require replacement of jounce bumper.
Jounce bumper split .....	1	... Suggest replacement of jounce bumper.
Leaking oil, enough for fluid to be running down the body .....	A	..... (4) Require replacement.
Noise .....	2	..... (5) Further inspection required.
Piston rod bent .....	A	..... Require replacement.
Piston rod broken .....	A	..... Require replacement.
Piston rod has surface defect .....	2	..... Suggest replacement.
Piston rod threads damaged .....	A	.. Require repair or replacement.
Piston rod threads stripped (threads missing) .....	A	..... Require replacement.
Seized .....	A	..... Require replacement.
Shock missing .....	C	..... Require replacement.
Strut housing bent .....	A	..... Require replacement.
Strut housing cap (gland nut) is not removable using appropriate tool .	A	..... (3) Require replacement of nut and/or housing.
Strut housing cap (gland nut) threads damaged ...	A	... Require repair or replacement of nut.
Strut housing cap (gland nut) threads stripped (threads missing) .....	A	..... Require replacement of nut.
Strut housing severely corroded, affecting structural integrity ...	A	..... Require replacement.
Strut housing threads damaged .....	A	.. Require repair or replacement.
Strut housing threads stripped (threads missing) .....	A	..... Require replacement.
Tire cupping .....	A	..... (6) Further inspection required.

- (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) - Only required if replacing cartridge.
- (4) - 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.
- (5) - If noise is isolated to shock or strut, suggest replacement.
- (6) - Although shocks or struts may have contributed to tire cupping, an inspection is needed of the entire suspension system. If the shock or strut is found to be contributing to the tire cupping, require replacement.

## SPINDLES

### SPINDLE INSPECTION

Condition	Code	Procedure
Attaching hardware broken .....	A ...	Require replacement of broken part.
Attaching hardware loose .....	A ...	Require repair or replacement of loose part.
Attaching hardware missing .....	C ..	Require replacement of missing part.
Attaching hardware threads damaged .....	A ...	Require repair or replacement of part with damaged threads.
Attaching hardware threads stripped (threads missing) .....	A .....	Require replacement of part with stripped threads.
Bent .....	B .....	Require replacement.
Broken .....	A .....	Require replacement.
Race seat area		
undersized .....	B .....	Require replacement.
Scored .....	A ..	Require repair or replacement.
Threads damaged .....	A ..	Require repair or replacement.
Threads stripped (threads missing) .....	A .....	Require replacement.

## SPRINGS - COIL, LEAF AND TORSION BAR

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

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

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

### SPRING (COIL, LEAF AND TORSION BAR) INSPECTION

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

adjuster bent .....	A .....	(4) Require repair or replacement of adjuster.
Torsion bar adjuster seized .....	A ....	(4) Require repair or replacement of adjuster.
Torsion bar adjuster threads damaged .....	A ....	(4) Require repair or replacement of part with damaged threads.
Torsion bar adjuster threads stripped (threads missing) .....	A .....	Require replacement of part with stripped threads.
Vehicle suspension height not within OEM specifications .....	B .....	Require adjustment or replacement.

(1) - If vehicle is within manufacturer's height specifications, no service is suggested or required.

(2) - Some manufacturers require replacement under these conditions.

(3) - Check vehicle ride height. If ride height is OK, no service is suggested or required.

(4) - Only required if ride height needs to be adjusted.

## STEEL POWER STEERING LINES

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

### STEEL POWER STEERING LINE INSPECTION

Condition	Code	Procedure
Attaching hardware bent .....	B ...	Require repair or replacement of bent part.
Attaching hardware broken .....	A ...	Require replacement of broken part.
Attaching hardware loose .....	A ...	Require repair or replacement of loose part.
Attaching hardware missing .....	C ..	Require replacement of missing part.
Attaching hardware threads damaged .....	A ...	Require repair or replacement of part with damaged threads.
Attaching hardware threads stripped (threads missing) .....	A .....	Require replacement of part with stripped threads.
Blocked .....	A ..	Require repair or replacement.
Fitting incorrect (such as compression fitting) .....	B .....	Require replacement.
Flare type incorrect ....	B .....	Required replacement.
Leaking .....	A .....	Require tightening or replacement.
Line type incorrect .....	B .....	Require replacement.

Restricted .....	A .....	Require replacement.
Routed incorrectly .....	B .....	Require routing correction.
Rust-pitted .....	1 .....	Suggest replacement.
Rust pitted, affecting structural integrity ..	A .....	Require replacement.

## STEERING ARMS

### STEERING ARM INSPECTION

Condition	Code	Procedure
Attaching hardware bent .....	B ...	Require repair or replacement of bent part.
Attaching hardware broken .....	A ...	Require replacement of broken part.
Attaching hardware incorrect .....	A .....	Require replacement of incorrect part.
Attaching hardware loose .....	A ...	Require repair or replacement of loose part.
Attaching hardware missing .....	C ..	Require replacement of missing part.
Attaching hardware threads damaged .....	A ...	Require repair or replacement of part with damaged threads.
Attaching hardware threads stripped (threads missing) .....	A .....	Require replacement of part with stripped threads.
Bent .....	B .....	Require replacement.
Broken .....	A .....	Require replacement.
Taper hole elongated ....	A .....	(1) Require replacement.
Threads damaged .....	A ..	Require repair or replacement.
Threads stripped (threads missing) .....	A .....	Require replacement.

(1) - Check for damaged stud.

## STEERING DAMPERS

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

### STEERING DAMPER INSPECTION

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

replace steering damper.

Attaching hardware corroded, affecting structural integrity ...	A	.	Require replacement of corroded part, if available; otherwise, replace steering damper.
Attaching hardware incorrect .....	A	.....	Require replacement of incorrect part, if available; otherwise, replace steering damper.
Attaching hardware loose .....	A	...	Require repair or replacement of loose part, if available; otherwise, replace steering damper.
Attaching hardware missing .....	C	..	Require replacement of missing part, if available; otherwise, replace steering damper.
Attaching hardware threads damaged .....	A	...	Require repair or replacement of part with damaged threads, if available; otherwise, replace steering damper.
Attaching hardware threads stripped (threads missing) .....	A	.....	Require replacement of part with stripped threads, if available; otherwise, replace steering damper.
Binding .....	A	.....	Require replacement.
Damper body dented .....	A	.....	(1) Further inspection required.
Damper body punctured ...	A	.....	Require replacement.
Damping (none) .....	A	.....	Require replacement.
Dust boot (bellows) missing .....	2	.....	(2) Suggest replacement of boot.
Dust boot (bellows) split .....	2	.....	(2) Suggest replacement of boot.
Dust shield broken .....	2	.....	(2) Suggest replacement.
Dust shield missing .....	2	.....	(2) Suggest replacement.
Leaking oil, enough for fluid to be running down the body .....	A	.....	Require replacement.
Loose .....	A	..	Require repair or replacement.
Missing .....	C	.....	Require replacement.
Noise .....	2	.....	(3) Further inspection required.
Piston rod bent .....	A	.....	Require replacement.
Piston rod broken .....	A	.....	Require replacement.
Piston rod has surface defect .....	2	.....	Suggest replacement.
Piston rod threads stripped (threads missing) .....	A	.....	Require replacement.
Piston rod threads damaged .....	A	..	Require repair or replacement.
Seized .....	A	.....	Require replacement.

(1) - Require replacement of units where dents restrict damper



piston rod movement. If dents don't restrict movement, no service is suggested or required. Especially critical on mono-tube dampers.

- (2) - This condition can lead to damage of the piston rod, which, in turn, causes premature piston rod seal wear.
- (3) - If noise is isolated to damper, suggest replacement.

## STEERING GEARS (EXCEPT RACK AND 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 GEAR (EXCEPT RACK AND PINION) INSPECTION

Condition	Code	Procedure
Attaching hardware broken .....	A ..	Require replacement of broken part.
Attaching hardware loose .....	A ..	Require repair or replacement of loose part.
Attaching hardware missing .....	C .....	Require replacement of missing part.
Attaching hardware threads damaged .....	A ..	Require repair or replacement of part with damaged threads.
Attaching hardware threads stripped (threads missing) .....	A ....	Require replacement of part with stripped threads.
Binding .....	A ...	Require repair or replacement
Flex coupler binding ....	A ...	Require repair or replacement of coupler.
Flex coupler loose .....	A ...	Require repair or replacement of coupler.
Flex coupler missing parts .....	A ...	Require repair or replacement of coupler.
Flex coupler soft/spongy .....	A .	Require replacement of coupler.
Flex coupler torn .....	A .	Require replacement of coupler.
Fluid contaminated .....	B .....	(1) Require flushing and refilling of the system.
Gasket leaking .....	A ...	Require repair or replacement of gasket.
Housing leaking .....	A .....	Require replacement.
Hydraulic fittings leaking .....	A ...	Require repair or replacement of fittings.
Inadequate power assist .	A .....	(2) Further inspection required. See note below.
Lash exceeds manufacturer's specifications .....	B ..	Require repair or replacement.
Seal leaking .....	A ...	Require repair or replacement

Splines damaged	.....	A	... of seal and/or mating part. Require repair or replacement of splines.
Splines stripped	.....	A	. Require replacement of splines.
Steering coupler shield cracked	.....	2	..... Suggest replacement.
Steering coupler shield missing	.....	C	..... Require replacement.
Threads damaged	.....	A	... Require repair or replacement of part with damaged threads.
Threads stripped (threads missing)	.....	A	..... Require replacement of part with stripped threads.
U-joint binding	.....	A	... Require repair or replacement of joint.
U-joint loose	.....	A	... Require repair or replacement of joint.
Unequal power assist	....	A	.. Require repair or replacement.
(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 AND 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 AND PINION INSPECTION

Condition	Code	Procedure
Attaching hardware broken	..... A	..... Require replacement of broken part.
Attaching hardware loose	..... A	.. Require repair or replacement of loose part.
Attaching hardware missing	..... C	..... Require replacement of missing part.
Attaching hardware threads damaged	..... A	.. Require repair or replacement of part with damaged threads.
Attaching hardware threads stripped (threads missing)	..... A	.... Require replacement of part with stripped threads.
Balance tube blocked	.... A	.. Require repair or replacement of balance tube.
Balance tube missing	.... C	.. Require replacement of balance tube.
Balance tube restricted	. A	... Require repair or replacement of balance tube.
Bellows boot clamp missing	..... C	... Require replacement of clamp.
Bellows boot cracked		

(not through) .....	2	..	Suggest replacement of bellows boot.
Bellows boot missing ....	C	..	Require replacement of bellows boot.
Bellows boot not sealing .....	A	...	Require repair or replacement of bellows boot.
Bellows boot torn .....	A	..	Require replacement of bellows boot.
Bellows boot twisted (from toe adjustment) ..	B	.....	Require repair.
Fitting leaking .....	A	..	Require repair or replacement.
Fitting missing .....	A	.	Require replacement of fitting.
Fitting threads damaged .....	A	...	Require repair or replacement of part with damaged threads.
Fitting threads stripped (threads missing) .....	A	.....	Require replacement of part with stripped threads.
Flex coupler binding ....	A	...	Require repair or replacement of coupler.
Flex coupler loose .....	A	...	Require repair or replacement of coupler.
Flex coupler missing parts .....	A	...	Require repair or replacement of coupler.
Flex coupler soft/spongy .....	A	.	Require replacement of coupler.
Flex coupler torn .....	A	.	Require replacement of coupler.
Fluid contaminated .....	B	.....	(1) Require flushing and refilling of the system.
Gasket leaking .....	A	..	Require repair or replacement.
Hard steering on cold start-up .....	1	.....	(2) Suggest repair or replacement.
Housing cracked, affecting structural integrity .....	B	.....	Require replacement.
Housing leaking .....	A	.....	Require replacement.
Inadequate power assist .	A	.....	(3) Further inspection required.
Lash exceeds manufacturer's specifications .....	B	..	Require repair or replacement.
Seal leaking .....	A	..	Require repair or replacement.
Splines damaged .....	A	..	Require repair or replacement.
Splines stripped (splines missing) .....	A	.....	Require replacement.
Steel line blocked .....	A	...	Require repair or replacement of line.
Steel line leaking .....	A	...	Require repair or replacement of line.
Steel line missing .....	C	....	Require replacement of line.
Steel line restricted ...	A	...	Require repair or replacement of line.
Steering coupler shield cracked .....	2	.....	Suggest replacement.
Steering coupler shield missing .....	C	.....	Require replacement.
Steering coupler shield torn .....	2	.....	Suggest replacement.
Threads damaged .....	A	...	Require repair or replacement of part with damaged threads.

Threads stripped (threads missing) .....	A	.....	Require replacement of part with stripped threads.
U-joint binding .....	A	...	Require repair or replacement of joint.
U-joint loose .....	A	...	Require repair or replacement of joint.
Unequal power assist ....	A	..	Require repair or replacement.

- (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.

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## STEERING KNUCKLES

### STEERING KNUCKLE INSPECTION

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

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

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## STRIKE OUT BUMPERS

### STRIKE OUT BUMPER INSPECTION

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

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## STRUT RODS

### STRUT ROD INSPECTION

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

if available; otherwise,  
replace strut rod.

Attaching hardware threads stripped (threads missing) .....	A	.....	Require replacement of part with stripped threads, if available; otherwise, replace strut rod.
Attaching (mating) hole oversized .....	A	...	Require repair or replacement of frame.
Attaching point on frame corroded, affecting structural integrity ...	A	.....	Require repair of frame.
Bent .....	A	.....	Require replacement.
Mating (attaching) hole oversized .....	A	...	Require repair or replacement of frame.
Threads damaged .....	A	..	Require repair or replacement.
Threads stripped (threads missing) .....	A	.....	Require replacement.

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

## STRUT UPPER BEARING PLATE ASSEMBLIES

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

### STRUT UPPER BEARING PLATE ASSEMBLY INSPECTION

Condition	Code	Procedure
Attaching hardware broken .....	A	... Require replacement of broken part, if available; otherwise, replace bearing plate assembly.
Attaching hardware loose .....	A	... Require repair or replacement of loose part, if available; otherwise, replace bearing plate assembly.
Attaching hardware missing .....	C	.. Require replacement of missing part, if available; otherwise, replace bearing plate assembly.
Attaching hardware threads damaged .....	A	... Require repair or replacement of part with damaged threads, if available; otherwise, replace bearing plate assembly.
Attaching hardware threads stripped (threads missing) .....	A	..... Require replacement of part with stripped threads, if available; otherwise, replace bearing plate assembly.
Bearing axial or radial movement exceeds vehicle manufacturer's		

specifications .....	B	.....	Require replacement of bearing.
Bearing binding .....	A	.....	Require replacement of bearing.
Bearing missing .....	C	.....	Require replacement of bearing.
Bearing seized .....	A	.....	Require replacement of bearing.
Bent .....	B	.....	Require replacement.
Holes distorted .....	A	.....	Require replacement.
Missing .....	C	.....	Require replacement.
Severely corroded, affecting structural integrity .....	A	.....	Require replacement.

## SWAY BAR LINKS

### SWAY BAR LINK INSPECTION

Condition	Code	Procedure
Attaching hardware incorrect .....	A	..... Require replacement of incorrect part, if available; otherwise, replace link.
Attaching hardware loose .....	A	... Require repair or replacement of loose part, if available; otherwise, replace link.
Attaching hardware missing .....	C	.. Require replacement of missing part, if available; otherwise, replace link.
Attaching hardware threads damaged .....	A	... Require repair or replacement of part with damaged threads, if available; otherwise, replace link.
Attaching hardware threads stripped (threads missing) .....	A	..... Require replacement of part with stripped threads, if available; otherwise, replace link.
Ball and socket has looseness (perceptible vertical movement) .....	1	..... (1) Suggest replacement.
Ball and socket has looseness that is excessive .....	B	..... (1)(2) Require replacement.
Bent .....	B	..... Require replacement.
Broken .....	A	..... Require replacement.
Corroded, affecting structural integrity ...	A	..... Require replacement.
Grease boot cracked .....	2	..... (3) Suggest replacement.
Grease boot missing .....	2	..... (4) Suggest replacement.
Grease boot torn .....	2	..... (5) Suggest replacement.
Missing .....	C	..... Require replacement.
Nut on stud loose .....	A	..... (6) Require repair.
Stud bent .....	B	..... (7) Require replacement.
Stud broken .....	A	..... (7) Require replacement.
Threads damaged .....	A	.. Require repair or replacement.

Threads stripped (threads missing) ..... A ..... (7) Require replacement.

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

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

- (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.

## SWAY BARS

### SWAY BAR INSPECTION

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

## TIE ROD ENDS (INNER AND OUTER)



## TIE ROD END (INNER AND OUTER) INSPECTION

Condition	Code	Procedure
Attaching hardware incorrect .....	A	..... Require replacement of incorrect part, if available; otherwise, replace tie rod end.
Attaching hardware loose .....	A	... Require repair or replacement of loose part, if available; otherwise, replace tie rod end.
Attaching hardware missing .....	C	.. Require replacement of missing part, if available; otherwise, replace tie rod end.
Attaching hardware threads damaged .....	A	... Require repair or replacement of part with damaged threads, if available; otherwise, replace tie rod end.
Attaching hardware threads stripped (threads missing) .....	A	..... Require replacement of part with stripped threads, if available; otherwise, replace tie rod end.
Adjusting sleeve bent ...	B	... Require replacement of sleeve or tie rod end.
Adjusting sleeve clamps out of position .....	B	..... Require repair.
Adjusting sleeve corroded, affecting structural integrity ...	A	... Require replacement of sleeve or tie rod end.
Adjusting sleeve missing .....	C	... Require replacement of sleeve or tie rod end.
Adjusting sleeve seized .....	A	..... (1) Require repair or replacement.
Adjusting sleeve threads damaged .....	A	... Require repair or replacement of sleeve or tie rod end.
Adjusting sleeve threads stripped (threads missing) .....	A	... Require replacement of sleeve or tie rod end.
Binding .....	A	..... (2) Further inspection required.
Grease boot cracked .....	2	..... (3) Suggest replacement.
Grease boot missing .....	2	..... (4) Suggest replacement.
Grease boot torn .....	2	..... (5) Suggest replacement.
Grease fitting broken ...	A	... Require replacement of grease fitting.
Grease fitting missing ..	C	... Require replacement of grease fitting.
Grease fitting won't seal .....	A	... Require replacement of grease fitting.
Grease seal missing .....	2	..... (4) Suggest replacement of seal.

Grease seal torn .....	2	.....	(5) Suggest replacement of seal.
Greaseable tie rod end won't take grease .....	2	.....	(6) Suggest replacement of grease fitting.
Looseness (perceptible horizontal movement) ...	1	.....	(7) Suggest replacement.
Looseness exceeds manufacturer's specifications .....	B	.....	Require replacement.
Looseness that is excessive .....	B	.....	(7) (8) Require replacement.
Nut on stud loose .....	A	.....	(9) Require repair or replacement of nut.
Seized .....	A	.....	Require replacement
Stud bent .....	B	.....	(10) Require replacement.
Stud broken .....	A	.....	(10) Require replacement.
Threads damaged .....	A	..	Require repair or replacement.
Threads stripped (threads missing) .....	A	.....	(10) Require replacement.

- (1) - Only required if toe needs to be adjusted.
  - (2) - If greaseable, grease joint. If problem persists or joint is non-greaseable, require replacement.
  - (3) - Cracked grease boot will allow contaminants to enter joint and will accelerate wear.
  - (4) - Lack of grease boot will allow contaminants to enter joint and will accelerate wear.
  - (5) - Torn grease boot will allow contaminants to enter joint and will accelerate wear.
  - (6) - If greaseable tie rod end will not take grease after replacing the grease fitting, suggest replacement of tie rod end.
  - (7) - If manufacturer's procedures for inspection exist, use those procedures; otherwise, use an approved inspection method such as the dry park check.
- CAUTION: DO NOT use pliers or pry bar to check ball and socket movement. Use only moderate hand pressure.
- (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.

## TRACK BARS

### TRACK BAR INSPECTION

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

threads damaged .....	A	...	Require repair or replacement of part with damaged threads, if available; otherwise, replace track bar.
Attaching hardware threads stripped (threads missing) .....	A	.....	Require replacement of part with stripped threads, if available; otherwise, replace track bar.
Bent .....	B	.....	Require replacement.
Corroded, affecting structural integrity ...	A	.....	Require replacement.
Grease boot cracked .....	2	.....	(1) Suggest replacement.
Grease boot missing .....	2	.....	(2) Suggest replacement.
Grease boot torn .....	2	.....	(3) Suggest replacement.
Holes distorted .....	A	.....	Require replacement.
Looseness (perceptible horizontal movement) ...	1	.....	(4) Suggest replacement.
Looseness that is excessive .....	B	.....	(4) (5) Require replacement.
Nut on stud loose .....	A	.....	(6) Require repair or replacement of nut.
Seized .....	A	.....	Require replacement.
Stud bent .....	B	.....	(7) Require replacement.
Stud broken .....	A	.....	(7) Require replacement.
Threads damaged .....	A	..	Require repair or replacement.
Threads stripped (threads missing) .....	A	.....	(7) Require replacement.
Wear exceeds manufacturer's specifications .....	B	.....	Require replacement.

- (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.

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

- (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

### TRAILING ARM INSPECTION

Condition	Code	Procedure
Attaching hardware broken .....	A	... Require replacement of broken part, if available; otherwise, replace trailing arm.
Attaching hardware loose .....	A	... Require repair or replacement of loose part, if available;

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

## WHEEL BEARINGS, RACES AND 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 BEARING, RACE AND SEAL INSPECTION

Condition	Code	Procedure
Rear axle seal on rear-wheel drive leaking ....	A	..... Require replacement of seal and inspection of axle, bearing, housing, and vent tube.
Seal bent .....	1	..... Suggest replacement.
Seal leaking .....	A	. Require replacement of seal and inspection of bearings.
Seal missing .....	C	..... Require replacement.
Seal torn .....	A	..... Require replacement.
Wheel bearing assembly feels rough when rotated .....	A	.. Require replacement of bearing assembly.
Wheel bearing balls are pitted .....	A	.. Require replacement of bearing assembly.
Wheel bearing balls are worn .....	A	.. Require replacement of bearing assembly.
Wheel bearing end-play exceeds vehicle manufacturer's specifications .....	B	.. Require adjustment of bearing,

if possible. If proper adjustment cannot be obtained, require repair or replacement of worn component.

Wheel bearing race is loose in the hub bore .....	A	.....	Require replacement of hub assembly and wheel bearings.
Wheel bearing races are pitted .....	A	..	Require replacement of bearing assembly.
Wheel bearing races are worn .....	A	..	Require replacement of bearing assembly.
Wheel bearing rollers are pitted .....	A	..	Require replacement of bearing assembly.
Wheel bearing rollers are worn .....	A	..	Require replacement of bearing assembly.

## 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 parts or 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

If the inspection reveals that all the above are within published specifications, a wheel alignment check and an alignment, if needed, may 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 specifications must be noted on the inspection report.

### WHEEL ALIGNMENT INSPECTION

Condition	Code	Procedure
Dog tracking, shown to be caused by faulty alignment .....	2	Suggest repair.
Lead, shown to		

be caused by faulty alignment	.....	A	.....	Require alignment.
Part has been changed, affecting alignment	....	A	.....	Require alignment check.
Pull, shown to be caused by faulty alignment	....	A	.....	Require alignment.
Steering wheel off-center	.....	2	.....	Suggest alignment.
Tire wear, shown to be caused by faulty alignment	.....	A	.....	Require alignment.
Wander, shown to be caused by faulty alignment	.....	A	.....	Require alignment.

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## WHEELS AND TIRES

### TIRES

These guidelines do not apply to split rims. Some vehicle manufacturers restrict replacement of tires to specific brands, types, or sizes.

**WARNING:** 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.

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

**WARNING:** 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

**WARNING:** 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.

**WARNING:** 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.

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

### TIRE INSPECTION

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

- (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 STEM INSPECTION

Condition	Code	Procedure
Bent .....	1	Suggest replacement.
Broken .....	A	Require replacement.
Cut, but not leaking ....	1	Suggest replacement.
Deteriorated (cracking, dry rot) ....	1	Suggest replacement.
Leaking .....	A	Require repair or replacement.
Missing .....	C	Require replacement.
Threads damaged .....	A	Require repair or replacement.
Threads stripped .....	A	Require replacement.
Valve cap missing .....	C	Require replacement of cap.
Weather-checking .....	1	Suggest replacement.
Won't take air .....	A	Require repair or replacement.

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

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

Condition	Code	Procedure
Bent .....	A .....	Require replacement.
Broken .....	A ..... (1)	Require replacement.



Loose .....	B	...	Require repair or replacement of affected component.
Lug nut installed backward .....	B	..	Require repair or replacement.
Lug nut mating type incorrect .....	B	.....	Require replacement of nut.
Lug nut mating surface dished .....	A	.....	Require replacement of nut.
Lug nut rounded .....	A	.	(2) Require replacement of nut.
Lug nut seized .....	A	.	(2) Require replacement of nut.
Stud incorrect .....	B	....	Require replacement of stud.
Threads damaged .....	A	...	Require repair or replacement of component with damaged threads.
Threads stripped .....	A	.....	Require replacement of component with stripped threads.

- (1) - Some manufacturers require replacement of all studs on that wheel if two or more studs or nuts on the same wheel are broken or missing.
- (2) - Only required if removing wheel.
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## WHEELS (RIMS)

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

### WHEEL (RIM) INSPECTION

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Condition	Code	Procedure
Bead leaking, caused by wheel .....	A	..... (1) Require repair or replacement.
Bent hub mounting surface .....	A	..... Require replacement.
Bent rim, causing vibration .....	2	..... (1) Suggest replacement.
Broken .....	A	..... Require replacement.
Cast wheel porous, causing a leak .....	A	.. Require repair or replacement.
Clip-on balance weight is incorrect type for rim flange .....	2	..... Suggest replacement.
Corrosion, affecting structural integrity ...	A	..... Require replacement.
Corrosion build-up on wheel mounting surface .....	A	..... Require repair.
Cracked .....	A	..... Require replacement.
Directional/asymmetrical wheels mounted incorrectly .....	B	..... Require remounting and/or repositioning.

Load capacity less than OEM specifications .....	B	.....	Require replacement.
Offset mismatched on same axle .....	B	.....	Require replacement.
Rivets leaking .....	A	.....	Require replacement.
Run-out beyond OEM specs .....	B	.....	Require replacement.
Stud holes elongated ....	A	..... (2)	Require replacement.
Welded or brazed repair .....	2	.....	Suggest replacement.
Welds leaking .....	A	.....	Require replacement.
Wheel centering (pilot) hole incorrect .....	B	.....	Require replacement.

(1) - CAUTION: DO NOT attempt to correct a bent rim.

(2) - Inspect wheel attaching hardware for damage.

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