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

#### 1995 Volvo 850

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

All Makes and Models

# INTRODUCTION TO MOTORIST ASSURANCE PROGRAM (MAP)

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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 or contact us at:

1444 I Street, NW Suite 700 Washington, DC 20005 Phone (202) 712-9042 Fax (202) 216-9646 January 1999

#### 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

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		
bag is visible	. 1	Suggest	replacement.

#### AIR RIDE SUSPENSION - AIR SPRING VALVES

AIR RIDE SUSPENSION - AIR SPRING VALVE 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	С	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)	А	Require replacement of part with stripped threads.
Blocked Connector bent Connector broken Connector loose Inoperative Leaking Restricted	A A A A 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 End cap cracked Inner fabric of bag		Require replacement.
damaged	. A	
bag is visible		Suggest replacement. Require replacement.

# AIR RIDE SUSPENSION - COMPRESSORS

AIR RIDE SUSPENSION - COMPRESSOR INSPECTION

Condition	Code	Procedure
Attaching hardware bent	. В	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 Connector broken Connector loose Does not build pressure	. A	Require repair or replacement.
Excessive run time	. В	(2) Further inspection required.
Inoperative Leaking Missing	. A	Require replacement Require repair or replacement.
(1) - If failure to build compressor, require (2) - If excessive run ti require replacement	repl me is	

# AIR RIDE SUSPENSION - HEIGHT SENSORS

AIR RIDE SUSPENSION - HEIGHT SENSOR INSPECTION

Procedure	è	Code		Condition
Require repair or replacement of bent part.		. В	hardware bent	Attaching
Require replacement of broken part.		А		Attaching broken
Require replacement of corroded part.		A	affecting	Attaching corroded, structural
Require repair or replacement of loose part.		А		Attaching loose .
Require replacement of missing part.		С		Attaching missing
F 3.2 5 V			hardware	Attaching

threads damaged	A	Require repair or replacement of part with damaged threads.
Attaching hardware threads stripped		
(threads missing)	А	Require replacement of part with stripped threads.
Dust boot missing	2	(1) Suggest replacement.
Dust boot split		(1) Suggest replacement.
Dust boot torn		(1) Suggest replacement.
Housing cracked		Require replacement.
Lead routing incorrect		Require rerouting according to
_		vehicle manufacturer's
		specifications.
Loose	В	Require adjustment to vehicle
		manufacturer's specifications.
Missing	С	Require replacement.
Output signal incorrect .		
Wire lead damaged		Require repair or replacement.
, ,		to damage of the sliding magnet, remature 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.
	. A	± ±

# AIR RIDE SUSPENSION - RELAYS (COMPRESSOR)

AIR RIDE SUSPENSION - RELAY (COMPRESSOR) INSPECTION

	Caala	D
Condition	Code	Procedure
Housing cracked Intermittent Missing Output signal incorrect	A C	 Require replacement. Require replacement.
(1) - If moisture enter expectancy or imp		educe life

Condition	Code	Procedure
Broken	. C	 Require replacement.

# AIR RIDE SUSPENSION - TORSION SPRINGS (COUNTER BALANCING)

AIR RIDE SUSPENSION - TORSION SPRING (COUNTER BALANCING) INSPECTION

Condition	Code	Procedure
Attaching hardware bent	. В	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.
		Require replacement. 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	B A B C A	Require repair or replacement. Require replacement. Require repair or replacement. Require repair or replacement. Require replacement. Require replacement. Require replacement. Require routing correction.

#### AIR RIDE SUSPENSION - WARNING LAMPS

AIR RIDE SUSPENSION - WARNING LAMP INSPECTION

Condition	Code	Procedure
Bulb burned out Warning light does not come on during	. A	Require replacement.
		. 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.

# AIR RIDE SUSPENSION - WIRING HARNESSES

AIR RIDE SUSPENSION - WIRING HARNESS INSPECTION

Condition	Code	Procedure
Connector bent	. A	<ul><li>Require repair or replacement.</li><li>Require repair or replacement.</li><li>Require repair or replacement.</li></ul>
chafed) Excessive resistance Fuse blown Fusible link blown Open Poor ground Routed incorrectly	<ul><li>B</li><li>A</li><li>A</li><li>A</li><li>A</li><li>A</li></ul>	Require repair or replacement. Require repair or replacement. Require replacement. Require replacement. Require replacement. Require repair or replacement. Require repair or replacement. Require rerouting according to vehicle manufacturer's
Shorted	. A . A . A	specifications.  Require repair or replacement.

### **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
, and the second	. В	Require repair or replacement of bent part if available; otherwise, replace ball joint.
Attaching hardware broken	А	Require replacement of broken part if available; otherwise, replace ball joint.
Attaching hardware corroded, affecting structural integrity .	А	. Require replacement of corroded part if available; otherwise, replace ball joint.
Attaching hardware incorrect	А	Require replacement of incorrect part if available; otherwise, replace ball joint.
Attaching hardware loose	А	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	
Grease boot cracked Grease boot missing Grease boot torn Grease fitting broken .	2 2	(2) Suggest replacement (3) Suggest replacement (4) Suggest replacement Require replacement of grease fitting.
Grease fitting missing	С	Require replacement of grease fitting.
<pre>Grease fitting won't seal Greaseable ball joint wi</pre>		Require replacement of grease fitting.

	2 (5) Suggest replacement of grease fitting.
	A (6) Require repair or replacement.
Seized	Require repair or replacement. Require replacement. Require replacement. Require replacement. Require replacement. Require repair or replacement. Require repair or replacement. Require replacement.
Wear exceeds manufacturer's specifications	3 Require replacement.
	pall joint. If problem persists able, require replacement.
	ll allow contaminants to enter
	ll allow contaminants to enter
	allow contaminants to enter the
(5) - If the greaseable ball	joint still will not take grease ease fitting, suggest replacement
(6) - Check for bent stud or (7) - Check for damaged taper	

# **BUSHINGS**

# BUSHING INSPECTION

Condition	Code	Procedure
J.	. В	Require repair or replacement of bent part if available; otherwise, replace bushing.
Attaching hardware broken	. А	Require replacement of broken part if available; otherwise, replace bushing.
Attaching hardware corroded, affecting		replace bashing.
structural integrity	. A	. Require replacement of corroded part if available; otherwise, replace bushing.
Attaching hardware incorrect	. А	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	7\	Poquiro ropair or roplacement
threads damaged	. A	Require repair or replacement

		available; otherwise, replace bushing.
Attaching hardware threads stripped		-
(threads missing)	A	Require replacement of part with stripped threads if available; otherwise, replace
D' 1'	-	bushing.
Deteriorated, affecting	А	Require repair or replacement.
performance Distorted, affecting	А	Require repair or replacement.
,	А	Require repair or replacement.
	А	Require replacement.
		Require replacement.
		(1) Further inspection required.
Rubber separating from internal metal sleeve on		-
bonded bushing	А	Require replacement.
SeizedShifted (out of		
	_	-

position) ...... B .. Require repair or replacement. Split ..... Require replacement.

checked) ...... No service suggested or

of part with damaged threads if

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**

Surface cracking (weather-

#### CENTER LINK INSPECTION

Condition	Code	Procedure
Attaching hardware incorrect	. А	Require replacement of incorrect part, if available;
Attaching hardware loose	. A	<ul><li>otherwise, replace center link.</li><li> Require repair or replacement of loose part, if available; otherwise, replace center link.</li></ul>
Attaching hardware missing	. C	Require replacement of missing part, if available; otherwise, replace center link.
Attaching hardware threads damaged	. А	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. A
Grease boot cracked Grease boot missing Grease boot torn Grease fitting broken	2 (2) Suggest replacement. 2 (3) Suggest replacement. 2 (4) Suggest replacement.
Grease fitting missing	C Require replacement of grease fitting.
Grease fitting won't seal	
Grease seal missing Grease seal torn Looseness (perceptible	2 (3) Suggest replacement. 2 (4) Suggest replacement.
horizontal movement) Looseness that is	1 (5) Suggest replacement.
excessive Seized Stud bent Stud broken Stud loose in	B (5)(6) Require replacement. A Require replacement. B (7) Require replacement. A (7) Require replacement.
taper hole	A (7) Require repair or replacement.
Taper hole elongated Threads damaged Threads stripped	
(threads missing) Wear exceeds manufacturer's	A (7) Require replacement.
specifications	B Require replacement.
	joint. If problem persists or le, require replacement.
(2) - Cracked grease boot withe joint and will acc	ill allow contaminants to enter
	ill allow contaminants to enter
	allow contaminants to enter the
(5) - If manufacturer's prod	cedures for inspection exist, use erwise, use an approved inspection
CAUTION: DO NOT use pliers	or pry bar to check ball and socket moderate hand pressure.
(6) - Excessive looseness is	s defined as being significant cle handling or structural
(7) - Check for damaged tape (8) - Check for damaged stud	er hole. d.

# CONTROL ARM SHAFTS

CONTROL ARM SHAFT INSPECTION

Condition	l	Code			Pro	ocedure
Attaching	hardware					
broken		. A	 Require	replacement	of	broken

		<pre>part, if available; otherwise, replace shaft.</pre>
Attaching hardware loose	А	Require repair or replacement
		of loose part, if available; otherwise, replace shaft.
Attaching hardware		
missing	С	Require replacement of missing part, if available; otherwise, replace shaft.
Attaching hardware		
threads damaged	А	Require repair or replacement of part with damaged threads, if available; otherwise, replace shaft.
Attaching hardware		ropiaco onare.
threads stripped		
(threads missing)	А	Require replacement of part with stripped threads, if
		available; otherwise, replace shaft.
Bent	В	
undersized (worn)	В	Require replacement.
Threads damaged Threads stripped (threads	A	
missing)	А	Require replacement.

# **CONTROL ARMS**

# CONTROL ARM INSPECTION

Condition	Code	Procedure
Attaching hardware bent	. В	of bent part, if available;
Attaching hardware broken	. A	<ul><li>otherwise, replace control arm.</li><li> Require replacement of broken part, if available; otherwise, replace control arm.</li></ul>
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	. А	Require repair or replacement of part with damaged threads,

if available; otherwise, replace control arm.

		replace control arm.
Attaching hardware		
threads stripped (threads missing)	Δ	Require replacement of part
(enreads missing)		with stripped threads, if
		available; otherwise, replace
Dont	D	control arm.
Bent	B	Require replacement. Require replacement.
Ball joint hole oversized	ב	Require repracement.
(loose interference or		
press fit)	В	(1) Further inspection
Corroded, affecting		required.
	А	Require replacement.
		Require replacement.
	Α	Require repair or replacement.
Threads stripped (threads	7\	Doguino nonlacement
missing)	А	Require replacement.
(1) - If oversized ball joi	nt	is available, require
		t. If oversized ball joint
is not available, req	uir	e 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	. А	
Attaching hardware threads stripped (threads missing)	. А	Require replacement of part with stripped threads, if available; otherwise, replace drag link.
Bent	. В . А	Require replacement(1) Further inspection required.
Grease boot cracked Grease boot missing Grease boot torn Grease fitting broken	. 2	(2) Suggest replacement (3) Suggest replacement (4) Suggest replacement Require replacement of grease fitting.

3	fitting.
Grease fitting	,
won't seal	A Require replacement of grease fitting.
Grease seal missing	2 (5) Suggest replacement.
Grease seal torn Looseness (perceptible	2 (4) Suggest replacement.
horizontal movement)	1 (6) Suggest replacement.
excessive	B (6)(7) Require replacement.
Seized	A Require replacement.
Stud bent	B (8) Require replacement.
Stud broken	B (8) Require replacement. A (8) Require replacement.
taper hole	A (8) Require repair or
	replacement.
Taper hole elongated	A (9) Require replacement.
Threads damaged Threads stripped (threads	A Require repair or replacement.
missing)	A (8) Require replacement.
Wear exceeds	
manufacturer's	
specifications	B Require replacement.
	joint. If problem persists or le, require replacement.
	ill allow contaminants to enter
(3) - Lack of grease boot w.	ill allow contaminants to enter
the joint and will acc	celerate wear. allow contaminants to enter the
joint and will accele:	
	ill allow contaminants to enter
the joint and will ac	
	cedures for inspection exist, use
	erwise, use an approved inspection
method such as the dry	
CAUTION: DO NOT use pliers	or pry bar to check ball and
	only moderate hand pressure.
	s defined as being significant
	cle handling or structural
integrity.	
(8) - Check for damaged tape	
(O) Classis for alamanasi at	_1

Grease fitting missing  $\dots$  C  $\dots$  Require replacement of grease

# ELECTRONIC RIDE CONTROL SHOCKS AND STRUTS

(9) - Check for damaged stud.

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 Connector broken Connector loose Electronic valve control	. A	 Require	repair	or	replacement.

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

	1	(8) Suggest replacement.
Looseness at link end that is excessive  Mounted out of position (center link	В	(8)(9) Require replacement.
not parallel)  Nut on stud loose	Α	Require repositioning (10) Require repair or replacement.
Stud bent Stud broken Taper hole elongated	B A A	Require replacement.  (11) Require replacement.  (11) Require replacement.  (12) Require replacement.  Require repair or replacement.
± ± ·	A	(11) Require replacement.
-		Require replacement.
(1) - II greaseable, grease ioint is non-greaseab	_	int. If problem persists or require replacement.

- oint 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	worn A	 Require replacement. Require replacement. Require replacement.

Bearing races worn Bearing rollers pitted Bearing rollers worn Bearing seal bent	A A A 2	Require replacement. Require replacement. Require replacement. Suggest replacement of seal or
Bearing seal missing	2	bearing. 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	С	Require replacement of missing part, if available; otherwise, replace king pin.
End play exceeds		1
specifications  Grease fitting broken		Require repair Require replacement of grease fitting.
Grease fitting missing	С	Require replacement of grease fitting.
Grease fitting		5
won't seal	А	Require replacement of grease fitting.
Locating pins missing	С	. Require replacement of missing part, if available; otherwise, replace king pin.
Looseness exceeds manufacturer's		F
	В	Require replacement of worn parts.
Seized Threads damaged Threads stripped (threads		Require replacement. Require replacement.
missing)	A 2	Require replacement (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,

Attaching hardware	replace pitman arm.
threads stripped	
(threads missing)	A Require replacement of part with stripped threads, if available; otherwise, replace pitman arm.
Bent Binding	B Require replacement. A (1) Further inspection required.
Grease boot cracked Grease boot missing Grease boot torn Grease fitting broken	2 (2) Suggest replacement. 2 (3) Suggest replacement. 2 (4) Suggest replacement. A Require replacement grease fitting.
-	C Require replacement of grease fitting.
Grease fitting won't seal	fitting
Grease seal missing	2 (3) Suggest replacement of seal.
Grease seal torn	
Looseness (perceptible horizontal movement) Looseness that is	1 (5) Suggest replacement.
excessive Nut on stud loose	B (5)(6) Require replacement. A (7) Require repair or
Seized	replacement. A Require replacement.
Splines damaged Splines stripped	A Require repair or replacement.
(splines missing) Stud bent	A Require replacement.  B (8) Require replacement.
Stud broken	A (8) Require replacement.
taper hole	A (8) Require repair or replacement.
Taper hole elongated Threads damaged	A (9) Require replacement. A Require repair or replacement.
Threads stripped (threads missing)	A (8) Require replacement.
	joint. If problem persists or
(2) - Cracked grease boot w	le, require replacement. ill allow contaminants to enter
joint and will accele (3) - Lack of grease boot w joint and will accele	ill allow contaminants to enter
(4) - Torn grease boot will	allow contaminants to enter joint
	ear. cedures for inspection exist, use erwise, use an approved inspection
method such as the dr	
	moderate hand pressure. s defined as being significant
(7) - Check for bent stud o	
(8) - Check for damaged tap (9) - Check for damaged stu	

# **POWER STEERING HOSES**

#### POWER STEERING HOSE INSPECTION

Condition	Code		Procedure
Blistered	. A	. Require repair or . Require repair or	replacement. replacement.
(webbing) cut Leaking Missing Outer covering is cracked to the extent that the inner fabric of	. A	. Require repair or	replacement.
hose is visible			

# 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	. В	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.
-	. A	Require replacement of part with stripped threads.
Belt alignment incorrect	. В	(1) Further inspection required.
Belt cracked	. 1 . C	Suggest replacement. Suggest replacement. Require replacement. (2) Further inspection required.
Belt plies separated	. A	

Belt tension out of specification	в.	Require adjustment or replacement.
Belt worn beyond adjustment range Belt worn so it contacts	в.	Require replacement.
bottom of pulley Binding Fluid at or beyond		Require replacement Require repair or replacement.
service interval Fluid contaminated		Suggest fluid change (3) Require flushing and refilling of the system.
Fluid level incorrect	в.	Require adjustment of fluid level.
Inadequate assist	Α.	(4) Further inspection required.
Leaking Noise		Require repair or replacement (5) Further inspection required.
Pulley bent	Α.	Require repair or replacement of pulley.
Pulley missing	С.	. Require replacement of pulley.
leaking	Α.	Require replacement of reservoir,
Reservoir cap broken Reservoir cap missing Seized Threads damaged Threads stripped	C . A . A .	Require replacement of cap Require replacement of cap Require replacement Require repair or replacement.
(threads missing)	Α.	Require replacement.
<ul><li>(2) - Determine cause of no</li><li>(3) - Determine and correct</li></ul>	ise a sour e fol inade	cce of contamination. OEM lowed for fluid type. equate assist, require

# 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.
	. 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)	Α	Require replacement of part
		with stripped threads.
Bent	В	Require replacement.
Corroded, affecting		
structural integrity	Α	Require replacement.
Holes distorted	Α	Require replacement.
		Require repair or replacement.
Threads stripped		
(threads missing)	Α	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)	. А	
Bent		Require replacement(1) Further inspection required.
Grease boot cracked Grease boot missing Grease boot torn Grease fitting broken	. 2	(2) Suggest replacement (3) Suggest replacement (4) Suggest replacement Require replacement grease fitting.
Grease fitting missing .	. C	
Grease fitting won't seal	. A	Require replacement of grease fitting.
Grease seal missing Grease seal torn Looseness (perceptible		(3) Suggest replacement (4) Suggest replacement.
horizontal movement) Looseness that is	. 1	(5) Suggest replacement.
excessive	. A	(5)(6) Require replacement Require replacement (7) 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.

SHOCK ABSORBER, STRUT CARTRIDGE AND STRUT ASSEMBLY INSPECTION

Condition	Code	Procedure
Attaching hardware bent	. В	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)	. А	Require replacement of part with stripped threads, if available; otherwise, replace
Binding		shock or strut
Body punctured Brake hose bracket		Require replacement.
bent		<pre> Require repair or replacement Require replacement.</pre>
Brake hose bracket threads damaged		
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
Damping (none) Dust boot (bellows)	. A	compression bumper Require replacement.
split	. 2	(2) Suggest replacement of boot.

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

- (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		Parc.
loose	. A	Require repair or replacement of loose part.
Attaching hardware		-
missing	. C	Require replacement of missing part.
Attaching hardware		Ţ
threads damaged	. A	Require repair or replacement of part with damaged threads.
Attaching hardware threads stripped		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	. A	Require replacement of part with stripped threads.
Rent	В	Require replacement.
Broken		
Race seat area	•	noquito ropinocuone.
undersized	. B	Require replacement.
Scored	. A	Require repair or replacement.
Threads damaged Threads stripped (threads		Require repair or replacement.
missing)		Require replacement.
=		<u>-</u>

#### 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.

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

adjuster bent A (4) Require repair or replacement of adjuster.	
Torsion bar adjuster seized A (4) Require repair or replaceme of adjuste.	
Torsion bar adjuster threads damaged A (4) Require repair or replaceme of part with damaged threads	nt
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.	
<ul> <li>(1) - If vehicle is within manufacturer's height specifications, no service is suggested or required.</li> <li>(2) - Some manufacturers require replacement under these</li> </ul>	
<ul> <li>conditions.</li> <li>(3) - Check vehicle ride height. If ride height is OK, no service is suggested or required.</li> <li>(4) - Only required if ride height needs to be adjusted.</li> </ul>	

# 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	. В	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
Fitting incorrect	. A	with stripped threads Require repair or replacement.
(such as compression fitting)	. В	Required replacement. Require tightening or
Line type incorrect	. В	replacement Require replacement.

		Require replacement.
Routed incorrectly	В	Require routing correction.
Rust-pitted	1	Suggest replacement.
Rust pitted, affecting		
structural integrity	Α	Require replacement.

# STEERING ARMS

### STEERING ARM INSPECTION

Condition	Code	Procedure
Attaching hardware bent	. В	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 Broken Taper hole elongated Threads damaged Threads stripped (threads	. A . A . A	Require replacement
missing)		Require replacement.

# 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	. В	•••	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,

-		
ranlaca	steering	damnar
TCPTacc	SCCCLTIIG	damper

7++aghing hardware		
Attaching hardware		
corroded, affecting	-	D ' 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
structural integrity	А	. Require replacement of corroded
		part, if available; otherwise,
		replace steering damper.
Attaching hardware		
incorrect	Α	Require replacement of
		incorrect part, if available;
		otherwise, replace steering
		damper.
Attaching hardware		damper.
Attaching hardware	70	D '
loose	А	Require repair or replacement
		of loose part, if available;
		otherwise, replace steering
		damper.
Attaching hardware		
missing	С	Require replacement of missing
,	_	part, if available; otherwise,
		replace steering damper.
Attaching hardware		reprace sceering damper.
Attaching hardware	70	Demine manin an manlesement
threads damaged	А	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
(enreads missing)		with stripped threads, if
		available; otherwise, replace
	_	steering damper.
Binding	А	Require replacement.
Damper body dented	Α	(1) Further inspection
		required.
Damper body punctured	A	Require replacement.
Damping (none)	Α	Require replacement.
Dust boot (bellows)		111111111111111111111111111111111111111
missing	2	(2) Suggest replacement
missing	_	of boot.
D		01 0000.
Dust boot (bellows)		
split	_	(0) 0
ı	2	(2) Suggest replacement
-		of boot.
Dust shield broken	2	
Dust shield broken		of boot (2) Suggest replacement.
Dust shield broken Dust shield missing	2	of boot.
Dust shield broken Dust shield missing Leaking oil, enough for	2	of boot (2) Suggest replacement.
Dust shield broken  Dust shield missing  Leaking oil, enough for fluid to be running	2 2	of boot (2) Suggest replacement (2) Suggest replacement.
Dust shield broken  Dust shield missing  Leaking oil, enough for fluid to be running down the body	2 2 A	of boot(2) Suggest replacement(2) Suggest replacement
Dust shield broken  Dust shield missing  Leaking oil, enough for fluid to be running down the body  Loose	2 2 A A	of boot (2) Suggest replacement (2) Suggest replacement Require replacement Require replacement.
Dust shield broken  Dust shield missing  Leaking oil, enough for fluid to be running down the body  Loose	2 2 A A C	of boot.  (2) Suggest replacement.  (2) Suggest replacement.  Require replacement.  Require replacement.  Require replacement.
Dust shield broken  Dust shield missing  Leaking oil, enough for fluid to be running down the body  Loose	2 2 A A	of boot.  (2) Suggest replacement.  (2) Suggest replacement.  Require replacement.  Require replacement.  Require replacement.  (3) Further inspection
Dust shield broken  Dust shield missing  Leaking oil, enough for fluid to be running down the body  Loose	2 2 A A C	of boot.  (2) Suggest replacement.  (2) Suggest replacement.  Require replacement.  Require replacement.  Require replacement.
Dust shield broken  Dust shield missing  Leaking oil, enough for fluid to be running down the body  Loose	2 2 A A C	of boot.  (2) Suggest replacement.  (2) Suggest replacement.  Require replacement.  Require replacement.  Require replacement.  (3) Further inspection required.
Dust shield broken Dust shield missing Leaking oil, enough for fluid to be running down the body Loose Missing Noise Piston rod bent	2 2 A A C 2	of boot.  (2) Suggest replacement.  (2) Suggest replacement.  Require replacement.  Require replacement.  Require replacement.  (3) Further inspection required.  Require replacement.
Dust shield broken Dust shield missing Leaking oil, enough for fluid to be running down the body Loose Missing Noise  Piston rod bent Piston rod broken	2 2 A A C 2	of boot.  (2) Suggest replacement.  (2) Suggest replacement.  Require replacement.  Require replacement.  Require replacement.  (3) Further inspection required.  Require replacement.
Dust shield broken Dust shield missing Leaking oil, enough for fluid to be running down the body Loose Missing Noise  Piston rod bent Piston rod broken Piston rod has surface	2 2 A A C 2	of boot.  (2) Suggest replacement.  (2) Suggest replacement.  Require replacement.  Require replacement.  Require replacement.  (3) Further inspection required.  Require replacement.  Require replacement.  Require replacement.
Dust shield broken Dust shield missing Leaking oil, enough for fluid to be running down the body Loose Missing Noise  Piston rod bent Piston rod broken Piston rod has surface defect	2 2 A A C 2	of boot.  (2) Suggest replacement.  (2) Suggest replacement.  Require replacement.  Require replacement.  Require replacement.  (3) Further inspection required.  Require replacement.
Dust shield broken Dust shield missing Leaking oil, enough for fluid to be running down the body Loose Missing Noise  Piston rod bent Piston rod broken Piston rod has surface defect Piston rod threads	2 2 A A C 2	of boot.  (2) Suggest replacement.  (2) Suggest replacement.  Require replacement.  Require replacement.  Require replacement.  (3) Further inspection required.  Require replacement.  Require replacement.  Require replacement.
Dust shield broken Dust shield missing Leaking oil, enough for fluid to be running down the body Loose Missing Noise  Piston rod bent Piston rod broken Piston rod has surface defect Piston rod threads stripped (threads	2 2 A A C 2 A A	of boot.  (2) Suggest replacement.  (2) Suggest replacement.  Require replacement.  Require replacement.  Require replacement.  (3) Further inspection required.  Require replacement.  Require replacement.  Suggest replacement.
Dust shield broken Dust shield missing Leaking oil, enough for fluid to be running down the body Loose Missing Noise  Piston rod bent Piston rod broken Piston rod has surface defect Piston rod threads stripped (threads missing)	2 2 A A C 2	of boot.  (2) Suggest replacement.  (2) Suggest replacement.  Require replacement.  Require replacement.  Require replacement.  (3) Further inspection required.  Require replacement.  Require replacement.  Require replacement.
Dust shield broken Dust shield missing Leaking oil, enough for fluid to be running down the body Loose Missing Noise  Piston rod bent Piston rod broken Piston rod has surface defect Piston rod threads stripped (threads missing) Piston rod threads	2 2 A A C 2 A A	of boot.  (2) Suggest replacement.  (2) Suggest replacement.  Require replacement.  Require replacement.  Require replacement.  (3) Further inspection required.  Require replacement.  Suggest replacement.  Suggest replacement.  Require replacement.
Dust shield broken Dust shield missing Leaking oil, enough for fluid to be running down the body Loose Missing Noise  Piston rod bent Piston rod broken Piston rod has surface defect Piston rod threads stripped (threads missing)	2 2 A A C 2 A A	of boot.  (2) Suggest replacement.  (2) Suggest replacement.  Require replacement.  Require replacement.  Require replacement.  (3) Further inspection required.  Require replacement.  Suggest replacement.  Suggest replacement.  Require replacement.
Dust shield broken Dust shield missing Leaking oil, enough for fluid to be running down the body Loose Missing Noise  Piston rod bent Piston rod broken Piston rod has surface defect Piston rod threads stripped (threads missing) Piston rod threads	2 2 2 A C 2 A A 2	of boot.  (2) Suggest replacement.  (2) Suggest replacement.  Require replacement.  Require replacement.  Require replacement.  (3) Further inspection required.  Require replacement.  Suggest replacement.  Suggest replacement.  Require replacement.  Require replacement.

<sup>(1) -</sup> 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.

Procedure

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

Code

Condition

0011011011	0000	110000010
	. A	Require replacement of broken part.
Attaching hardware loose	. А	Require repair or replacement of loose part.
Attaching hardware missing	. С	Require replacement of missing part.
<del>-</del>	. А	Require repair or replacement of part with damaged threads.
Attaching hardware threads stripped (threads missing)	. А	Require replacement of part
Binding		with stripped threads Require repair or replacement Require repair or replacement of coupler.
	. A	Require repair or replacement of coupler.
	. A	Require repair or replacement of coupler.
Flex coupler soft/spongy Flex coupler torn Fluid contaminated	. A	1 1
Gasket leaking	. A	Require repair or replacement of gasket.
Housing leaking		Require replacement.
leaking		Require repair or replacement of fittings.
Inadequate power assist	. А	(2) Further inspection required.
Lash exceeds manufacturer's		See note below.
specifications		

Splines damaged	of seal and/or mating part. A Require repair or replacement of splines.
Splines stripped Steering coupler	A . Require replacement of splines.
shield cracked Steering coupler	2 Suggest replacement.
	C Require replacement.
Threads damaged	A Require repair or replacement of part with damaged threads.
Threads stripped	1
(threads missing)	A Require replacement of part with stripped threads.
U-joint binding	A Require repair or replacement
TT delah Teres	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

- (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
Balance tube blocked	. A	<pre>with stripped threads Require repair or replacement</pre>
Balance tube missing	. C	Require replacement of balance tube.
Balance tube restricted	. A	Require repair or replacement of balance tube.
Bellows boot clamp missing Bellows boot cracked	. C	Require replacement of clamp.

(not through)	2	Suggest replacement of bellows
Dallace back onlands	~	boot.
Bellows boot missing	C	Require replacement of bellows
Bellows boot		boot.
	7\	Doguiro ropair or roplacement
not searing	А	Require repair or replacement of bellows boot.
Pollows boot torn	7\	Require replacement of bellows
bellows book colli	A	boot.
Bellows boot twisted		. 3000
	B	Require repair.
		Require repair or replacement.
		. Require replacement of fitting.
Fitting threads		
	Α	Require repair or replacement
_		of part with damaged threads.
Fitting threads stripped		
(threads missing)	Α	Require replacement of part
		with stripped threads.
Flex coupler binding	А	Require repair or replacement
	_	of coupler.
Flex coupler loose	А	Require repair or replacement
T1 1		of coupler.
Flex coupler	7\	Doguino rensin en renlacement
missing parts	А	Require repair or replacement of coupler.
Flex coupler		or coupler.
	Δ	. Require replacement of coupler.
Flex coupler torn	Δ	Require replacement of coupler.
		(1) Require flushing and
		refilling of the system.
Gasket leaking	Α	Require repair or replacement.
Hard steering on cold		
start-up	1	(2) Suggest repair or
		replacement.
Housing cracked,		
affecting structural		
		Require replacement.
		Require replacement.
Inadequate power assist .	А	(3) Further inspection
Lash exceeds		required.
manufacturer's		
	В	Require repair or replacement.
Seal leaking		Require repair or replacement.
Splines damaged		Require repair or replacement.
Splines stripped		
(splines missing)	Α	Require replacement.
Steel line blocked	Α	1 1 1
		of line.
Steel line leaking	A	± ± ±
Q1 1 1 1 1 1	~	of line.
Steel line missing		± ±
Steel line restricted	A	Require repair or replacement
Steering counter shield		of line.
Steering coupler shield cracked	2	Suggest replacement.
Steering coupler shield	_	buggest repracement.
missing	С	Require replacement.
Steering coupler shield	J	
torn	2	Suggest replacement.
	Α	
		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 specifications for flu		arce of contamination. Follow OE
(2) - Indicates internal wea	ar. ourd	ce of inadequate assist, require

# STEERING KNUCKLES

### STEERING KNUCKLE INSPECTION

Condition	Code	Procedure
Attaching hardware bent	. В	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	. A	Require replacement.
Pinch bolt tabs deformed (pinched together), .032"		Require replacement.
or more before clamping	. A	(1) Require replacement (2) Require replacement Require repair or replacement Require repair or replacement.

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

# STRIKE OUT BUMPERS

### STRIKE OUT BUMPER INSPECTION

Condition	Code	Procedure
Attaching hardware broken	. A	Require replacement of broken part.
Attaching hardware corroded, affecting structural integrity	. A	Require replacement of
Attaching hardware loose	. A	corroded part.  Require repair or replacement of loose part.
<del>-</del>	. 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)	Α	Require replacement of part
_	. C	with stripped threads Require replacement.

# STRUT RODS

#### STRUT ROD INSPECTION

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
1005e	• A	of loose part, if available; otherwise, replace strut rod.
Attaching hardware	C	-
missing	. C	Require replacement of missing part, if available; otherwise, replace strut rod.
Attaching hardware	70	Demokratina na na la sanah
threads damaged	. A	Require repair or replacement of part with damaged threads,

if available; otherwise, replace strut rod.

Attaching banduana		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		Serue rou.
oversized	A	$\ldots$ Require repair or replacement of frame.
Attaching point on frame corroded, affecting		
		Require repair of frame.
Bent	A	Require replacement.
oversized	A	Require repair or replacement of frame.
Threads damaged Threads stripped	A	Require repair or replacement.
	A	Require replacement.
(1) - Only required if an all	lign	ment is being performed.

# STRUT UPPER BEARING PLATE ASSEMBLIES

NOTE:

manufacturer's

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	. А	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	. А	Require repair or replacement of part with damaged threads, if available; otherwise, replace bearing plate assembly.
Attaching hardware threads stripped		repriese searing prace account;
(threads missing)	. A	Require replacement of part with stripped threads, if available; otherwise, replace bearing plate assembly.
Bearing axial or radial movement exceeds vehicle		

specifications	В	 Require replacement of bearing.
Bearing binding	A	 
Bearing missing	С	 
Bearing seized	A	 Require replacement of bearing.
Bent	В	 Require replacement.
Holes distorted	Α	 Require replacement.
Missing Severely corroded, affecting structural		Require replacement.
integrity	Α	 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	. С	Require replacement of missing part, if available; otherwise, replace link.
Attaching hardware threads damaged	. А	Require repair or replacement of part with damaged threads, if available; otherwise,
Attaching hardware threads stripped (threads missing)	. А	replace link.  Require replacement of part with stripped threads, if available; otherwise, replace link.
Ball and socket has looseness (perceptible vertical movement) Ball and socket has looseness that is	. –	(1) Suggest replacement.
excessive	. B	(1)(2) Require replacement Require replacement Require replacement.
structural integrity Grease boot cracked Grease boot missing Grease boot torn Missing Nut on stud loose Stud bent Stud broken Threads damaged	. 2 . 2 . 2 . C . A . B	Require replacement.  (3) Suggest replacement.  (4) Suggest replacement.  (5) Suggest replacement.  Require replacement.  (6) Require repair.  (7) Require replacement.  (7) Require replacement.  Require replacement.

Threads st	ripped	(threads				
missing)			Α	 (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	. А	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
Bent		sway bar Require replacement Require replacement
(threads missing)	. A	Require replacement.

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	~	
	. C	Require replacement of missing part, if available; otherwise, replace tie rod end.
Attaching hardware	73.	Danidas assais sa santas assas
Attaching hardware	. A	Require repair or replacement of part with damaged threads, if available; otherwise, replace tie rod end.
threads stripped		
	. A	Require replacement of part with stripped threads, is available; otherwise, replace tie rod end.
	. В	Require replacement of sleeve or tie rod end.
Adjusting sleeve clamps out of position Adjusting sleeve corroded, affecting	. В	Require repair.
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 of 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
Binding	. A	or tie rod end(2) Further inspection required.
		(3) Suggest replacement
Grease boot missing	. 2	(4) Suggest replacement
Grease boot torn Grease fitting broken	. 2	(5) Suggest replacement Require replacement of grease
_		fitting 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
Seized
(threads missing) A (10) Require replacement.
<ol> <li>(1) - Only required if toe needs to be adjusted.</li> <li>(2) - If greaseable, grease joint. If problem persists or joint is non-greaseable, require replacement.</li> <li>(3) - Cracked grease boot will allow contaminants to enter joint and will accelerate wear.</li> <li>(4) - Lack of grease boot will allow contaminants to enter joint and will accelerate wear.</li> <li>(5) - Torn grease boot will allow contaminants to enter joint and will accelerate wear.</li> <li>(6) - If greaseable tie rod end will not take grease after replacing the grease fitting, suggest replacement of tie rod end.</li> <li>(7) - If manufacturer's procedures for inspection exist, use those procedures; otherwise, use an approved inspection method such as the dry park check.</li> <li>CAUTION: DO NOT use pliers or pry bar to check ball and socket movement. Use only moderate hand pressure.</li> </ol>
<ul> <li>(8) - Excessive looseness is defined as being significant enough to affect vehicle handling or structural integrity.</li> <li>(9) - Check for bent stud or damaged taper hole.</li> <li>(10) - Check for damaged taper hole.</li> </ul>

# TRACK BARS

TRACK BAR INSPECTION

THEOR BING THOU BOTTON		
Condition	Code	Procedure
Attaching hardware incorrect	. A	Require replacement of incorrect part, if available; otherwise, replace track bar.
	. 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 i	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
Bent I	track bar.  B Require replacement.
structural integrity Grease boot cracked Grease boot missing Grease boot torn	Require replacement.  (1) Suggest replacement.  (2) Suggest replacement.  (3) Suggest replacement.  Require replacement.
	1 (4) Suggest replacement.
excessive	B (4)(5) Require replacement.  A (6) Require repair or replacement of nut.
Stud bent	Require replacement.  B
manufacturer's specifications	B Require replacement.
joint and will accelerate (2) - Lack of grease boot will joint and will accelerate (3) - Torn grease boot will a	ll allow contaminants to enter ate wear. allow contaminants to enter joint
and will accelerate weat  (4) - If manufacturer's proceedures; other  method such as the dry	edures for inspection exist, use rwise, use an approved inspection
CAUTION: DO NOT use pliers of	r pry bar to check ball and socket
	defined as being significant le handling or structural integrity. damaged taper hole.

# TRAILING ARMS

### TRAILING ARM INSPECTION

Condition	Code	Procedure
	. А	 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.
С	Require replacement of missing part, if available; otherwise, replace trailing arm.
A	Require repair or replacement of part with damaged threads, if available; otherwise, replace trailing arm.
	-
А	Require replacement of part with stripped threads, if available; otherwise, replace trailing arm.
В	
	± . ± <u>-</u>
Α	Require replacement.
Α	Require replacement.
A	Require repair or replacement.
А	Require replacement.
	A A B B A A

# 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		Suggest replacement.
Seal missing		Require replacement.
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	. В	Require adjustment of bearing,
-1	-	

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

Wheel bearing race			
is loose in the			
hub bore	А	• • •	Require replacement of hub assembly and wheel bearings.
Wheel bearing races			
are pitted	А	• •	Require replacement of bearing assembly.
Wheel bearing races			1
are worn	А	• •	Require replacement of bearing assembly.
Wheel bearing rollers			
_	A	• •	Require replacement of bearing
Wheel hearing rollers			abbenibly.
_	A	• •	Require replacement of bearing assembly.
Wheel bearing rollers are pitted Wheel bearing rollers	Α		assembly.  Require replacement of bearing assembly.  Require replacement of bearing

#### 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.

be caused by		
faulty alignment	Α	Require alignment.
Part has been changed,		1
_ ·	Α	Require alignment check.
Pull, shown to be caused		1
·	Α	Require alignment.
Steering wheel		
2	2	Suggest alignment.
Tire wear, shown		
to be caused by		
2	Δ	Require alignment.
Wander, shown		Require arrymment.
to be caused by		
<u> </u>	Δ	Require alignment.
raurcy arranmence	7.7	Require arrigination.

#### 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

Condition	Code	Procedure
Air pressure incorrect . Bead broken Bead leaking, caused		Require repair Require repair
by tire	. A	Require repair or replacement Require replacement.
exposed		Require replacement. Require replacement.
tires mounted incorrectly	. В	Require remounting and/or repositioning.
Load ratings less	. 2	(1) Suggest replacement.
than OEM specifications Mixed tread types (all season, performance, mud		Require replacement.
and snow) on same axle Number of punctures exceeds manufacturer's		Require replacement.
limit		Require replacement Require rebalance of tire/wheel assembly.
Ply separation Pull or lead, caused	. A	Require replacement.
by tire	. A	Require repair or replacement.
on same axle	. B	Require repair or replacement.
and not on the rear	. В	(2) Require repair or replacement.
Run flat damage		Require replacement.
Shoulder cut		Require replacement.
Shoulder puncture Shoulder with plug	. A	Require replacement.
Sidewall bulge		Require replacement Require replacement.
Sidewall cut		Require replacement.
Sidewall indentation		No service required or
	_	suggested.
Sidewall puncture Sidewall with plug Speed rating designations		
different on same axle	. 2	Suggest repair or replacement.
Tire and wheel assembly has excessive run-out .	. В	(3) Require repair or replacement of appropriate part.
Tires with more than 1/4" diameter difference on a four-wheel drive		parc.
<pre>vehicle Tread area puncture large in diameter than manufacturer's</pre>		Require replacement.
specifications Tread missing pieces	. В	Require replacement.

of tires and/or wheel listed in these guidelines.

# **VALVE STEMS**

# VALVE STEM INSPECTION

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

# WHEEL ATTACHMENT HARDWARE

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.

### WHEEL ATTACHMENT HARDWARE INSPECTION

Condition	Code	Procedure
Bent Broken		± ±

Loose	В	Require repair or replacement of affected component.
Lug nut installed backward Lug nut mating type	В	Require repair or replacement.
3 11	В	Require replacement of nut.
dished	Α	. (2) Require replacement of nut Require replacement of stud.
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.

# 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

Condition	Code	Procedure
Bead leaking, caused by wheel	. A	(1) Require repair or replacement.
Bent hub mounting		1
surface	. A	Require replacement.
vibration		(1) Suggest replacement.
Broken	. A	Require replacement.
causing a leak		Require repair or replacement.
Clip-on balance weight is incorrect type		
for rim flange	. 2	Suggest replacement.
Corrosion, affecting	7\	Doguiro replacement
Corrosion build-up on	. A	Require replacement.
wheel mounting		
		Require repair.
Directional/asymmetrical	• A	Require replacement.
wheels mounted		
incorrectly	. В	Require remounting and/or repositioning.

Load capacity less than				
OEM specifications	В		Require	replacement.
Offset mismatched			±	-
on same axle	В		Require	replacement.
Rivets leaking				
Run-out beyond			-	-
OEM specs	В		Require	replacement.
Stud holes elongated	Α	(2)	Require	replacement.
Welded or brazed			_	_
repair	2		Suggest	replacement.
Welds leaking	Α		Require	replacement.
Wheel centering (pilot)			_	_
hole incorrect	В		Require	replacement.
(1) - CAUTION: DO NOT attempt to correct a bent rim.				
(2) - Inspect wheel attaching hardware for damage.				