

# **DPSAFT School Bus Inspection**

**Procedures, Repair Criteria, & Out Of Service Criteria**

**Underneath of School Bus**



Figure 1 - Column with Yoke or U-Joint Typical

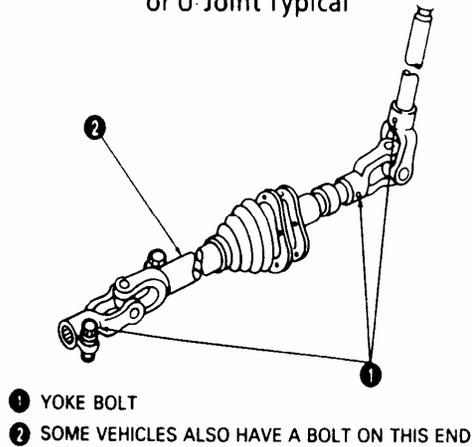
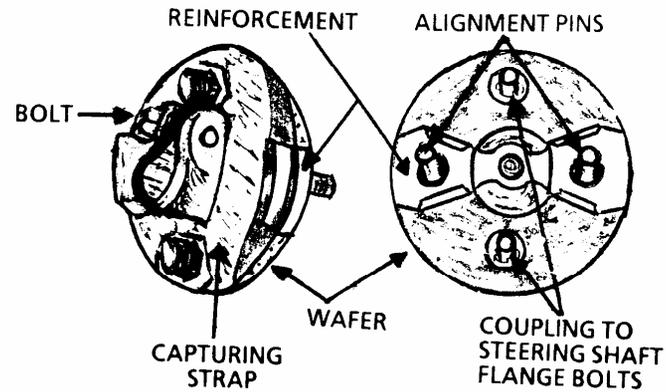
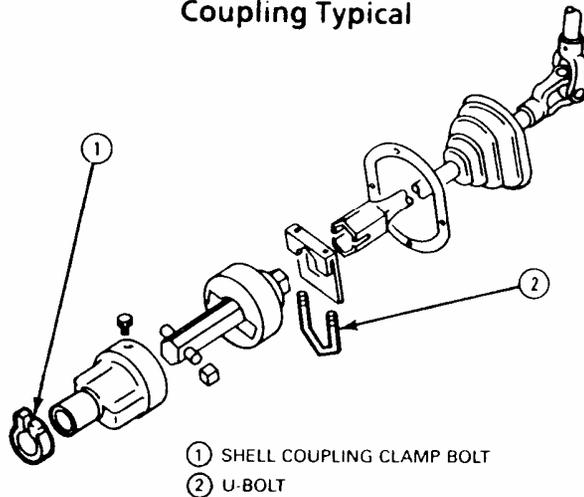


Figure 2 - Typical Flexible Type Steering Coupling



(rag joint)

Figure 3 - Column with Shell Coupling Typical



### TIGHTENING STEERING COLUMN JOINT BOLTS

**WARNING** -- FAILURE TO MAINTAIN THE STEERING SYSTEM IN PROPER CONDITION CAN CAUSE REDUCED STEERING ABILITY RESULTING IN PERSONAL INJURY AND PROPERTY DAMAGE.

As good maintenance practice, it is recommended that steering column joint bolts be checked for tightness every 80,000 km (50,000 miles) or annually, whichever occurs first. **DO NOT OVER TIGHTEN.**

**D. Underneath**  
**1. Steering (continued)**

**NOTE: b – g, Steering Gear Box and other external components will be checked using the following procedure:**

- 1) Vehicle should be on ground (not suspended).
- 2) With engine running have assistant move steering wheel back and forth repeatedly to load steering components.
- 3) Visually observe the following external steering and related suspension and frame components for looseness while assistant works steering (also see specific procedures under each component).
- 4) Have assistant carefully operate steering to full left and right turn and check for power assist pop-off and steering stops.
- 5) As follow-up to the above steering check, also perform a visual and hands-on check of each of the listed components.

Inspection Procedures:	Repair if:	Out of Service if:
<p><b>b. Steering Gear Box and Mounting:</b></p> <ol style="list-style-type: none"> <li>1) Check mounting, condition, and tightness of steering gear box, and check frame, frame braces, and associated rivets or fasteners for looseness and condition.</li> </ol>	<p>Steering gear box is damp at or near seals showing signs of seepage but no visible fluid is observed.</p>	<p>Steering gear box is loose on frame, or fasteners, or lock tabs are loose or missing.</p> <p>Mounting holes have visible cracks or are elongated.</p> <p>Steering gear box has any visible leaks.</p> <p>Any up-down or side to side motion of either shaft is observed (bearing or bushing wear).</p> <p>Any Navistar with a Saginaw gear box does not have a diamond (Dana) stamped on the end of the pitman shaft.</p> <p>There is any binding in steering gear box.</p>
<p><b>c. Pitman Arm:</b></p> <ol style="list-style-type: none"> <li>1) Check the pitman arm for looseness or misalignment at sector shaft splines and looseness at all joints. Check looseness of pinch bolt and fasteners and condition of pitman arm.</li> </ol>	<p>Pitman arm grease fitting (if originally equipped) is loose or missing.</p> <p><b>(Continued on Next Page)</b></p>	<p>Any play is observed between pitman arm and sector shaft.</p> <p>Pinch bolt at sector shaft is loose or missing.</p>

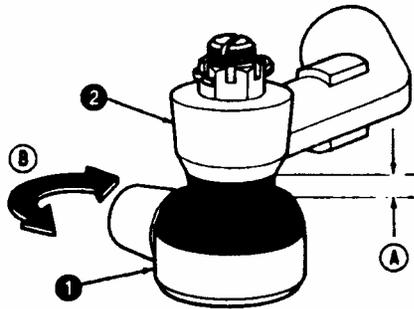
<b>D. Underneath</b>		
<b>1. Steering (continued)</b>		
<b>Inspection Procedures:</b>	<b>Repair if:</b>	<b>Out of Service if:</b>
<b>c. Pitman Arm: (continued)</b>		<p>Pitman arm to sector shaft timing marks are misaligned.</p> <p>Pitman arm ball-joint (if equipped) has more than 1/16 inch play (axial, i.e., in and out play between the ball stud and socket).</p> <p>Pitman arm ball-joint (if equipped) has loose or missing nut, or cotter pin is missing.</p> <p>Pitman arm is cracked or damaged.</p>
<b>d. Drag Link: (if equipped)</b> 1) Check the drag link ends, shaft, and fasteners for looseness and condition.	<p>Drag link end has more than 1/16 inch and less than 1/8 inch axial play.</p> <p>Any drag link end grease fitting (as equipped) is loose, or missing, or will not take grease.</p> <p>Drag link end boot is damaged or missing.</p> <p>Drag link needs lubrication.</p>	<p>Drag link ball stud is loose in pitman arm or upper steering arm.</p> <p>Any nut is loose or missing, or cotter pin is missing.</p> <p>Drag link shaft is damaged or bent.</p> <p>Drag link end has more than 1/8 inch axial play.</p> <p>Adjustable (length) drag link has loose clamp or damage to the threads or has any movement or play in the shaft.</p> <p>Any drag link that is installed improperly.</p>
	<b>(Continued on Next Page)</b>	

<b>D. Underneath</b>		
<b>1. Steering (continued)</b>		
<b>Inspection Procedures:</b>	<b>Repair if:</b>	<b>Out of Service if:</b>
<b>e. Steering Arm</b> 1) Check upper steering arm (Ackerman arm) and left and right side lower steering arms for securement and condition.		Any steering arm has been bent, is cracked, or is damaged.  Any steering arm attachment point is loose, or any fasteners or cotter pin is missing.
2) Check condition and securement of steering stops and lock nuts.		Either steering stop or lock is loose, damaged, or missing.
<b>f. Tie Rod and Ends</b> 1) Check tie rod ends, tie rod, dust boots, and clamps or fasteners (as equipped) for looseness, damage, and condition.	Tie rod end dust boot is cut, damaged, or missing.  Tie rod end needs lubrication.  Any tie rod end grease fitting is loose, or missing, or will not take grease.  Any tie rod end has more than 1/16 inch and less than 1/8 inch axial play.	Tie rod clamps, fasteners, or cotter pin is stripped, missing, or loose.  Any clamp (as equipped) is mispositioned.  Any tie rod or end is cracked or damaged.  Any tie rod is bent, cracked, broken or threads are damaged in any way.  Any tie rod end has more than 1/8 inch axial play.  Tie rod end ball stud is loose in steering arm or idler arm.
	<b>(Continued on Next Page)</b>	

<b>D. Underneath</b> <b>1. Steering (continued)</b>		
<b>Inspection Procedures:</b>	<b>Repair if:</b>	<b>Out of Service if:</b>
<b>g. Idler Arm:</b> 1) Check idler arm assembly (as equipped) for looseness, damage, and condition.	Idler arm needs lubrication.  Idler arm grease fitting is loose, or missing, or will not take grease.  Idler arm up and down play is greater than 1/8 inch total (1/16 inch either direction) but less than 1/4 inch.	Any idler arm fasteners are loose or missing.  Idler arm is cracked, or damaged, or cotter pin is missing.  Idler arm up and down play is greater than 1/4 inch total (1/8 inch either direction).
<b>h. Alignment:</b> 1) Check for any obvious or abnormal front tire wear.	Any front tire wear indicates an alignment problem.	
2) Check for any visible alignment problems.	Any visible alignment problems <b><u>not</u></b> caused by faulty components.	

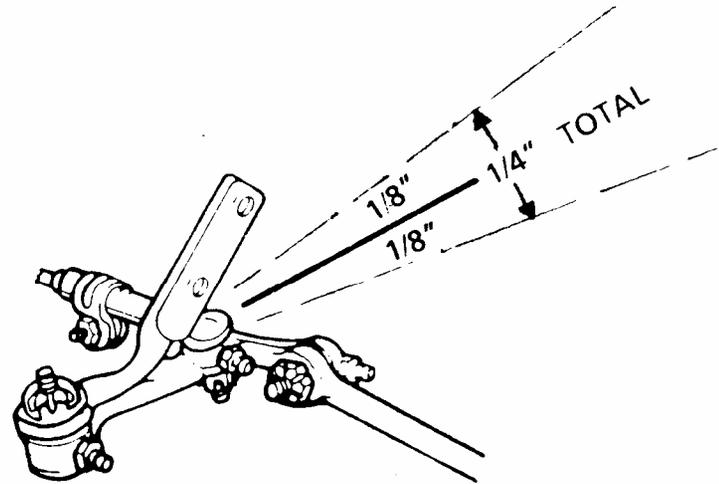
## STEERING JOINTS

FIGURE 4 - Checking the Rod and Drag Link End Movement



- A Movement in the axial direction must be less than 1/16 inch.
- B Tie rod/drag link free to rotate within steering arm socket
- 1 Tie rod/drag link end
- 2 Steering arm

FIGURE 5 - Checking Idler Movement, Typical



## TIRE WEAR

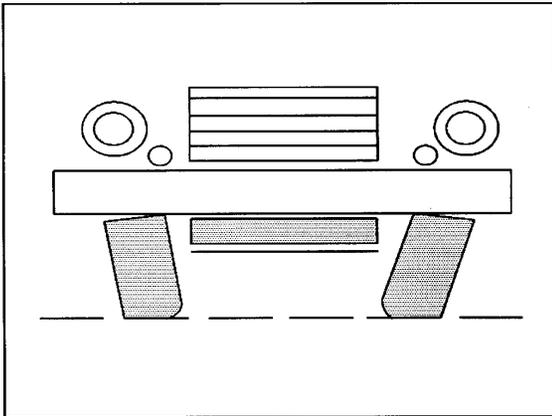
### Uneven Tire Wear

The following conditions may cause spotty or uneven wear.

- Unequal caster or camber
- Bent suspension parts
- Out-of-balance wheels
- Out-of-round brake drums
- Brakes drag
- Other mechanical conditions

Locate the mechanical condition that causes uneven wear.

Correct the condition.



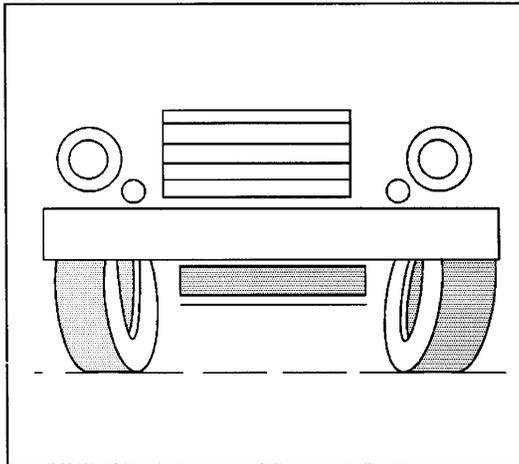
### Misalignment Wear

Too much toe-in or toe-out on the front axle tires causes misalignment wear. The tires revolve with a side motion, which scrapes off the tread rubber.

### Misalignment Wear (continued)

The scraping action against the face of the tire causes a small featheredge of rubber to appear on one side of the tread. This feathering is an indication of misalignment.

If the misalignment is severe, the rubber will be scraped off both tires. If the misalignment is slight, only one tire will be affected. In order to correct misalignment, adjust the toe-in or verify that the entire front-end alignment settings are correct. Refer to *Front Toe Adjustment* in Front Wheel Alignment.



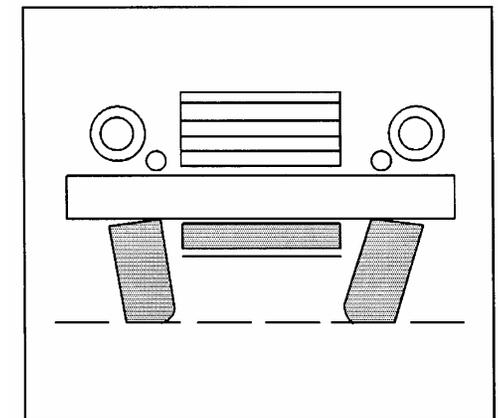
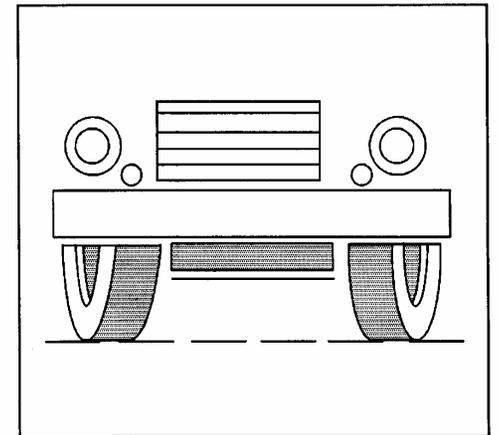
### Side Wear

Side wear may be caused by the following conditions:

- Incorrect wheel camber
- Under-inflation

### Side Wear (continued)

- High cambered roads
  - Excessive cornering speed
- Incorrect wheel camber and under-inflation are the most common causes of side wear.



<b>D. Underneath</b> <b>2. Frame</b>		
<b>Inspection Procedures:</b>	<b>Repair if:</b>	<b>Out of Service if:</b>
<b>a. Vehicle frame:</b> 1) Check frame rails, extensions, modular sections, cross-members, braces, gussets, liners, and any and all fasteners for damage, condition and mounting.		Frame, frame braces, and associated rivets or fasteners are loose, damaged, or missing.  Frame, extensions, liners, or modular sections are damaged, cracked, or broken.  Frame braces or cross-members are damaged, cracked, or broken.  Rivets or other fasteners at frame braces or cross-members are loose or missing.  Any axle or suspension component is loose beyond specifications prescribed elsewhere in this manual.  Any unauthorized modifications (welding, drilling, etc.).
<b>D. UNDERNEATH</b> <b>3. Front Suspension</b>		
<b>a. Wheel Bearings:</b> 1) Inspect front wheel bearings and related components for condition and proper adjustment of bearings. Grasp tire and attempt to rock wheel to check for movement. <b>NOTE: It is important to correctly identify the source of any play. To determine if the play is in wheel bearings, have an assistant fully apply brakes while rechecking play. If movement disappears with brakes applied, then play was in wheel bearings.</b>	There is minor seepage of grease around dust cover.  Dust cover fasteners are missing or loose	Any noise, binding, or roughness is discovered in bearings.  Wheel bearing, end play exceeds manufacturer's specifications (maximum of .010" in and out play measured at bearing hub).  There is leaking or dripping of grease or oil around dust covers or dust cover is damaged or missing.

<b>D. UNDERNEATH</b>		
<b>3. Front Suspension (continued)</b>		
<b>Inspection Procedures:</b>	<b>Repair if:</b>	<b>Out of Service if:</b>
<b>b. I-Beam:</b> 1) Inspect I-beam axle assembly		I-beam has been cut, modified, or is damaged.  There is any bluing or other evidence that I-beam has been heated.
<b>c. King Pins:</b> 1) Inspect king pin assemblies for condition and play as follows: Grasp tire at top and attempt to move the wheel assembly in and out.	One locking pin (draw key) is loose (dual).  End cap O-rings or bolts are loose or missing.	Locking pin (draw key) is backing out, loose (single, both for dual), or missing.  King pin movement is more than 1/4 inch measured at outside edge of tire.
2) Preliminary inspection of thrust bearings, visually inspect thrust bearing area for uneven gap, improper installation, wear, or damage.		Vertical (up and down) play in king pin assembly is greater than .030", and/or thrust bearing is damaged or missing.  If side play at outside edge of tire is greater than 1/4 inch.

D. UNDERNEATH		
3. Front Suspension (continued)		
Inspection Procedures:	Repair if:	Out of Service if:
<p><b>d. Shackles:</b></p> <p>1) Inspect condition of shackles, spring hangers, and pinch bolts.</p> <p><b>NOTE: Shackles types vary from manufacturer and year models. Bolted, pinned, pinch pinned, combination etc.</b></p>		<p>Any front spring shackle or hanger is cracked or broken.</p> <p>Any front spring shackle or hanger has significant side wear at spring eye.</p> <p>Any front spring shackle or hanger is worn, or pinch bolt is stripped or missing, so that spring pin cannot be clamped tightly.</p> <p>Any front spring or shackle eye bolt is loose, worn, broken, damaged or missing.</p>
<p><b>e. Spring Mounts</b></p> <p>1) Inspect spring mount bracket(s) for condition and securement.</p>	<p>Any slipper type pad (insulator) that has significant wear, damage, or is missing (Ford).</p>	<p>Any front spring mount is broken or cracked.</p> <p>Any front spring mount-to-frame fastener is loose or missing.</p> <p>Frame is cracked at any spring or shock mounting location.</p>
<b>(Continued on Next Page)</b>		

<b>D. UNDERNEATH</b>		
<b>3. Front Suspension (continued)</b>		
<b>Inspection Procedures:</b>	<b>Repair if:</b>	<b>Out of Service if:</b>
<p><b>f. Pins and Bushings</b></p> <p>1) Inspect pins and bushings as follows: Inspect front spring pins and bushings for wear and lubrication. Check for wear with front axle loaded, look for off center spring eye, rubbing shackle, or non-symmetric joint.</p>	<p>Zerk (grease) fitting is damaged or missing.</p> <p>Inner sleeve or rubber bushing type spring pin assembly(ies) is worn through, or rubber bushing is excessively worn (rubber is compacted or deteriorated, resulting in free play between rubber and spring eye or inner sleeve).</p>	<p>Total free play (up and down) of pins and bushings exceeds 1/4 inch.</p> <p>Any pin is loose, damaged, or worn, or cannot be properly clamped by pinch type shackles. On vehicles equipped with bolt instead of pin, bolt is loose, damaged or worn or the nut is not a locking type or is missing.</p> <p>Pin is cutting into spring, shackle, or mount.</p>
<p><b>g. A-Frames and Bushings: (upper and/or lower control arms, struts)</b></p> <p>1) Inspect A-frames and bushings for condition and securement.</p>	<p>Rubber bushing(s) is split, badly deteriorated or badly extruded from suspension joints.</p>	<p>Rubber bushing(s) is missing.</p> <p>Any A-frame, control arm, or strut assembly is bent, missing, broken, or any fasteners or U-bolt(s) are loose or missing.</p> <p>Any A-frame, bushing, or pivot arm has more than .050" free play at pivot point.</p> <p>Mounting of assemblies is not secure.</p>
<b>(Continued on Next Page)</b>		

<b>D. UNDERNEATH</b> <b>3. Front Suspension (continued)</b>		
<b>Inspection Procedures:</b>	<b>Repair if:</b>	<b>Out of Service if:</b>
<b>h. Ball Joints:</b> 1) Inspect ball joint(s) for condition, securement, and lubrication.	Zerk (grease) fitting is missing or damaged.	Any ball joint has more than 3/32 inch axial play.  Any ball joint nut is loose or missing, or cotter pin is missing.  Ball joint to A-frame mounting is cracked or loose, or has been welded.
<b>i. U-Bolts:</b> 1) Inspect spring U-bolts for condition and securement.	There is rust underneath U-bolt nuts indicating possibility of looseness.	Any U-bolt, seating plate, shock mount bracket, or nut is loose or missing, cracked, or stripped.
<b>j. Shocks</b> 1) Inspect shocks for condition and securement.	There is wetness around shock body due to leaking shock fluid.  Any shock mounting or fastener is loose.	Any shock or mount is missing, cracked, or broken.

<b>D. UNDERNEATH</b> <b>3. Front Suspension (continued)</b>		
<b>Inspection Procedures:</b>	<b>Repair if:</b>	<b>Out of Service if:</b>
<b>k. Springs:</b> 1) Inspect front springs for condition, securement, and alignment.	There are any loose, missing, broken or worn springs clips.  Missing insulators between leafs.  Any coil or leaf spring has weakened and causing vehicle to lean excessively.  Either front spring saddle (if equipped) is worn out or missing.  Rubber bumper is missing.  Ride height not adjusted properly (air suspension).	Any leaf spring(s) is broken, cracked, or missing.  Spring eye is worn or spread such that bushings are loose in spring eye.  Any coil spring(s) is broken, insecurely mounted, non-OEM type or non-OEM blocks or spacers are installed.  There is any misalignment of spring leaves or other evidence that center pin is loose or broken.  Either front coil or leaf spring is worn so that rubber frame bumper is damaged or worn due to frequent bottoming of front suspension.  Any alignment wedge is loose or damaged.  On any air bag type spring assembly, air bag is damaged or leaking. Any problem with ride height control valve other than adjustment.
<b>l. Anti roll bar/Sway bar (If equipped)</b> 1) Inspect for mounting and condition.	Rubber mounting bushings are cracked, compressed or deteriorated to the point of allowing movement of bar.	Bar is bent, broken or missing.  Any mounting hardware is broken or missing.  Any rubber bushings or grommets are missing.
<b>m. Wheel Seals</b> 1) Check for condition and leakage.		Either front wheel seal is damaged or leaking.

<b>D. UNDERNEATH</b>		
<b>4. Brakes</b>		
<b>Inspection Procedures:</b>	<b>Repair if:</b>	<b>Out of Service if:</b>
<p><b>a. Brake Hoses</b></p> <p>1) Inspect flexible brake hoses for condition, securement, and routing.</p>	<p>Separator bracket on dual hoses loose or out of position.</p> <p>Any brake flex hose supporting brackets are damaged or have loose fasteners.</p> <p>Any brake flex hose is rubbing on or routed against other components.</p>	<p>Any brake flex hose or connection is leaking fluid or air pressure.</p> <p>Any brake flex hose is kinked, cracked, collapsed, bulging, has damaged plies or cord, or is damaged below outer covering.</p> <p>Any brake hose fittings are damaged or rusted so as to weaken the crimp.</p>
<p><b>b. Lines:</b></p> <p>1) Inspect air and hydraulic brake lines for routing, securement, and condition.</p>	<p>Brake line bracket(s) or securement system is loose or missing and line is not in contact with any other component.</p> <p>Any brake line is rubbing on other components or is abraded.</p>	<p>Any brake line is bent, crimped, or damaged restricting or leaking air pressure or hydraulic fluid.</p> <p>Any brake line or connection is leaking air pressure or hydraulic fluid.</p> <p>Any brake line is not OEM material, size, or type.</p>
<b>(Continued on Next Page)</b>		

<b>D. UNDERNEATH</b>		
<b>4. Brakes</b>		
<b>Inspection Procedures:</b>	<b>Repair if:</b>	<b>Out of Service if:</b>
<p><b>c. Chambers:</b></p> <p>1) Inspect brake chamber assembly (ies) for securement, condition, and proper size.</p>	<p>Any missing or damaged spring brake caging bolts.</p>	<p>Any brake chamber mounting bracket is cracked, bent, or broken.</p> <p>Any brake chamber or mounting fastener is damaged or loose.</p> <p>Any brake chamber is not original size, or size of chambers is not matched left and right (both sides same size).</p> <p>Any leak is detected in chamber.</p> <p>Any wear to chamber or rod (where rod exits chamber).</p> <p>Any spring brake chamber is bent, damaged or corroded and may lose containment of spring.</p>
<p><b>d. Slack Adjusters:</b></p> <p>1) Inspect slack adjusters and S-cam assemblies for wear, condition, operation, and securement.</p> <p><b>NOTE: Check operation of Slack Adjusters.</b></p>	<p>(Continued on Next Page)</p>	<p>Slack adjuster is not mounted properly or anchor bracket is loose or damaged (Haldex).</p> <p>Any portion of slack adjuster or S-cam is missing, broken, cracked, or badly worn.</p> <p>S-cam shaft and/or S-cam bushing total wear (up and down) is greater than .030 inch.</p> <p>Manual adjusters have a problem with the locking mechanism on the adjusting bolt.</p> <p>S-cam snap ring is broken or missing.</p>

<b>D. UNDERNEATH</b>		
<b>4. Brakes (continued)</b>		
<b>Inspection Procedures:</b>	<b>Repair if:</b>	<b>Out of Service if:</b>
<b>d. Slack Adjusters: (continued)</b>		Any slack adjuster is not operating properly. Any slack adjuster is not adjusted properly.
<b>e. Pushrods:</b> 1) Inspect pushrod assembly(ies) for condition, securement, and alignment.		Any portion of pushrod assembly (locknut, pushrod, clevis and pin, or cotter pin) is loose, missing, or damaged. Pushrod is rubbing against body of chamber, or chamber is misaligned. Pushrod on left and right sides are not mounted in identical (same) slack adjuster location hole (same effective slack adjuster length). Push rod length is not the same on each side.
<b>f. Linings</b> 1) Inspect linings and foundation brake hardware for contamination, wear, damage, and securement.		Brake lining is worn to or beyond 20% allowable limits. Lining is broken, cracked, or loose on shoe. Friction surface is contaminated with oil, grease, or brake fluid. Lining is not proper size. Shoe platform or web is cracked or damaged. There is any loose, damaged, or missing foundation brake hardware within the drum.

<b>D. UNDERNEATH</b>		
<b>4. Brakes (continued)</b>		
<b>Inspection Procedures:</b>	<b>Repair if:</b>	<b>Out of Service if:</b>
<b>g. Drums</b> 1) Inspect the brake drum(s) for condition.		There is any crack (other than heat checks) in any drum.  There is any grease, oil, or brake fluid on inside of drum.  Drum is not mounted securely to hub, or fasteners are loose.
<b>h. Rotors</b> 1) Inspect brake rotor(s) for mounting, thickness, and condition.		Rotor mounting is not secure.  Rotor has cracks (other than heat checks) or other mechanical defects.  Friction surface is contaminated with oil, grease, or brake fluid.  Any rotor friction surface is significantly grooved or damaged.
<b>i. Wheel Cylinders or Calipers</b> 1) Inspect wheel cylinder(s) or caliper(s) for leaks, mounting, and condition.	Any caliper dust boot is damaged or missing.	Any wheel cylinder or caliper is not securely mounted or has loose or missing fasteners.  Any wheel cylinder or caliper is leaking.  There is uneven lining or pad wear, rotor or drum damage, or evidence of dragging, or other evidence that any wheel cylinder or caliper may be sticking.

<b>D. UNDERNEATH</b>		
<b>4. Brakes (continued)</b>		
<b>Inspection Procedures:</b>	<b>Repair if:</b>	<b>Out of Service if:</b>
<b>j. Brake Adjustment:</b> 1) For hydraulic drum brakes, check condition.		There is any damage or condition, which prevents proper adjustment of hydraulic drum brakes.
2) For air brakes, check and record brake chamber pushrod travel at all four (4) wheel positions.		There is any damage or condition, which prevents proper adjustment of S-cam.  Adjusted stroke (pushrod travel) of any slack adjuster is at or beyond stroke limits in chart.
<b>k. Air Dryer</b> 1) Check dryer for securement and condition.	Dryer has loose or missing mounting bolts but not in danger of falling off.  Canister portion of dryer is bent or damaged but is not leaking or loose.	Dryer has loose or missing mounting bolts and is in danger of falling off.  Canister portion of dryer is bent or damaged and is leaking or loose.
2) Check dryer fittings, plumbing and connections.	Electrical connection for heating element Loose or damaged.  Air line to dryer has a loop or low spot (sump) that can collect water and freeze.	Any air line connection is loose or has an audible leak.
3) Check purge valve for operation and contamination.  <b>Note: There may be dampness and oil residue on and around valve. A slight leak is acceptable from valve during charging cycle or if shut down prior to purge cycle.</b>		Valve is contaminated by solid material (desiccant, cloth, rubber, metal, etc.), which would prevent it from seating.  Valve continues to leak after purge cycle.
<b>(Continued on Next Page)</b>		

<b>D. UNDERNEATH</b>		
<b>4. Brakes (continued)</b>		
<b>Inspection Procedures:</b>	<b>Repair if:</b>	<b>Out of Service if:</b>
<b>i. Brake Valves</b> 1) Inspect all brake system valves for securement and condition.		There are any audible air leaks or visible hydraulic fluid leaks from any brake valve.  Any brake valve is not mounted securely, is cracked, or damaged.  Any valve exhaust port is obstructed.
<b>m. Reservoir Mounting</b> 1) Inspect reservoirs (air, vacuum tanks) for securement and condition.		Any reservoir mounting strap or fastener is cracked, loose, or missing.  Any leaking, damaged, or cracked tank.
<b>n. Bleed Air Reservoirs</b> 1) With air system fully charged, check manual operation of safety relief valve.  2) Partially open manual petcock valve on the first (wet) tank.  3) Allow any moisture (water) or contamination to drain.	There is excessive moisture in reservoir (desiccant type air dryer equipped vehicles only).  Refer to service manual for guidelines on allowable water volume.	Safety relief valve leaks or does not release pressure.  There is excessive sludge or oil contamination in the reservoir.  Reservoir leaks due to corrosion or is cracked.

<b>D. UNDERNEATH</b>		
<b>4. Brakes (continued)</b>		
<b>Inspection Procedures:</b>	<b>Repair if:</b>	<b>Out of Service if:</b>
<p><b>o. Hydrovac Booster</b></p> <p>1) Inspect booster system for securement and condition.</p>		<p>There is any visible hydraulic brake fluid leakage.</p> <p>There is any audible vacuum leakage.</p> <p>Any brake line or vacuum hose is routed subject to excessive heat or abrasion.</p> <p>Any brake line or hose is deteriorated or damaged to the point that failure could occur (cord frayed, wall thickness thin, rubber contaminated with oil, crimped, blistered, cracked, rusted or corroded crimp, etc.).</p> <p>Any brake line or hose connection is loose.</p> <p>Any booster is not mounted securely, is cracked, or damaged.</p> <p>Any vent port is not properly plumbed or is obstructed or filter is clogged.</p>

## AIR BRAKE ADJUSTMENT CHART

Chamber Type	Maximum Legal Stroke
12	1 3/8"
16	1 3/4"
24	1 3/4"
30	2"

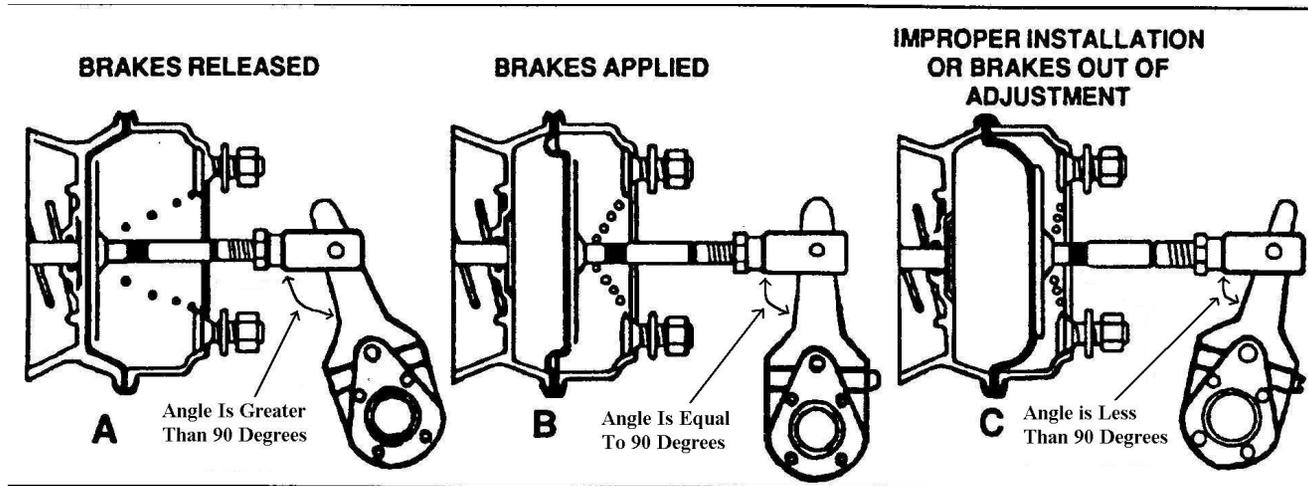
### PROCEDURE FOR MEASURING PUSH ROD TRAVEL

Brake chamber push rod travel shall not exceed those specifications relating to maximum stroke at which brakes should be readjusted. Performance of the brake push rod travel inspection should be done with the brake application air pressure in the range of 80 - 90 pounds per square inch (psi), when measuring total stroke to determine proper brake adjustment.

**CAUTION:** Chock wheels before commencing this inspection as vehicle emergency brake(s) must be released.

1) With brakes off, mark push rod at chamber. 2) Apply brakes, measure distance of mark from chamber.

**Note:** When brakes are properly adjusted and fully applied, the slack adjuster should be at an angle of 90° or greater, measured from centerline of adjuster to push rod.



<b>D. UNDERNEATH</b>		
<b>5. Mounts</b>		
<b>Inspection Procedures:</b>	<b>Repair if:</b>	<b>Out of Service if:</b>
<p><b>a. Engine/Transmission Mounts</b></p> <p>1) Inspect engine and transmission mounts for condition and securement.</p>	<p>Replace the mount if any of the following conditions exist:</p> <p>Hard rubber surface covered with heat check cracks.</p> <p>The rubber cushion separated from the metal plate of the mount.</p> <p>The rubber cushion is split through the center.</p>	<p>Any mounting fasteners are loose, missing, or broken.</p> <p>Any mount is cracked or has missing rubber cushion.</p>
<p><b>b. Starter Mounting</b></p> <p>1) Inspect starter for securement and condition. Check for presence of heat shield (if equipped).</p>	<p>Heat shield is loose or missing (if equipped).</p> <p>Any starter mounting bolt, stud, or nut is loose, damaged, broken, or missing.</p> <p>Starter is damaged or loose.</p> <p>Heat shield looseness or damage could short positive terminal to ground or damage any other component.</p>	

<b>D. UNDERNEATH</b>		
<b>6. Transmission</b>		
<b>Inspection Procedures:</b>	<b>Repair if:</b>	<b>Out of Service if:</b>
<b>a. Transmission Bolts</b> 1) Inspect transmission assembly and mounting fasteners for condition and securement.		Transmission is not mounted securely to flywheel housing.  There is any external indication that any torque converter bolt(s) are loose or missing.
<b>b. Linkage</b> 1) Inspect transmission linkage for routing, condition, and securement.  <b>Note: Mechanical modulator cable should have 1/16 to 1/8 inch clearance at full throttle.</b>	Modulator cable or vacuum hose is routed where it is subject to excessive heat or abrasion.  Any linkage hardware or fasteners are loose.  Dust/moisture boots on cable missing or torn.  Modulator cable is exposed or casing is damaged.  Modulator cable is out of adjustment.  Modulator vacuum hose is deteriorated or loose.	Linkage is bent, damaged, or binding, or severely misadjusted.  Any linkage hardware or fasteners are missing or linkage is damaged so as to cause a sticking or binding condition.  Modulator vacuum hose is leaking or not connected.  Air modulator or air line leaking.
<b>c. Lines</b> 1) Inspect transmission lines for securement, routing, and condition.	Any transmission line(s) is unsecured or routed subject to excessive heat or abrasion.  There is any transmission line of improper type.	Any transmission line is crimped.  Any transmission line or fitting is leaking.  Any transmission line is worn or deteriorated to the point that failure could occur. (leaking)
<b>(Continued on Next Page)</b>		

<b>D. UNDERNEATH</b>		
<b>6. Transmission (continued)</b>		
<b>Inspection Procedures:</b>	<b>Repair if:</b>	<b>Out of Service if:</b>
<b>d. Filter</b> 1) Inspect transmission external filter assembly (if equipped) for securement and condition	External filter mounting is insecure or has loose or missing fasteners.  Pall filter monitor indicates need for change.  Filter canister is damaged (no leak).	Body of transmission filter, including all hose connections, is cracked or damaged and is leaking.
<b>e. Cooler</b> 1) Inspect transmission cooler		Any external leak or transmission fluid in cooling system (internal leak).
<b>f. Clutch</b> 1. Operation a) Check pedal, linkage, clutch, and throw-out bearing for wear, slippage, and abnormal noises in the engaged and released positions.	Loose nuts and bolts.  Noisy throw-out bearing.  Clutch out of adjustment.	Cannot adjust clutch to specs.  Excessively noisy throw-out bearing.  Clutch slipping, grabbing, or has excessive chatter when engaging clutch.  Binding or sticking clutch linkage or return spring.  Hard to shift transmission.
b) Visually check clutch pedal pad for wear.	Worn pedal cover pad.  Missing pedal cover pad.	
c) Check clutch master and slave cylinders for hydraulic leaks and operation (if equipped).		Leaking master or slave cylinder or line and/or inoperable.
<b>(Continued on Next Page)</b>		

<b>D. UNDERNEATH</b>		
<b>6. Transmission (continued)</b>		
<b>Inspection Procedures:</b>	<b>Repair if:</b>	<b>Out of Service if:</b>
<b>f. Clutch (continued)</b> 2) Adjustment a) Check “free play” travel of the clutch pedal. This is the first easy movement of the clutch pedal and should be no more than 1-1/2 and no less than 3/4 an inch of travel.	Free play is out of adjustment.	Clutch slips, grabs, or chatters after adjusting “free play” travel.  No adjustments can be made (if it is an adjustable clutch).
<b>D. UNDERNEATH</b>		
<b>7. Fluid Leaks</b>		
<b>a. Oil</b> 1) Inspect for engine oil leaks at all potential locations and determine severity.	Engine oil leakage is causing deterioration of any rubber parts, such as steering linkage boots, hoses, etc.  Engine oil is dripping at any location <u>except</u> on exhaust system.	Leakage is excessive and could result in imminent engine failure.  Engine oil is dripping on any portion of exhaust system.
<b>b. Coolant</b> 1) Inspect all potential locations for coolant leaks.	There is coolant seepage at radiator, hoses, heater core, engine oil cooler, thermostat housing, head gaskets, freeze plugs, reservoir, water pump, or other potential locations.	Leakage is excessive and could result in imminent engine failure.
<b>c. Transmission</b> 1) Inspect for transmission fluid leaks at all potential locations and determine severity.	Transmission fluid is seeping at any location <u>except</u> on exhaust system.	Leakage is excessive and could result in imminent transmission failure.  Transmission fluid is dripping on any portion of exhaust system.
<b>(Continued on Next Page)</b>		

<b>D. UNDERNEATH 7. Fluid Leaks (continued)</b>		
<b>Inspection Procedures:</b>	<b>Repair if:</b>	<b>Out of Service if:</b>
<b>d. Power Steering</b> 1) Inspect for power steering fluid leaks at all potential locations and determine severity	Power steering fluid is seeping or dripping.	
<b>D. UNDERNEATH 8. Fuel Tank(s)</b>		
<b>a. Leaks</b> 1) Inspect fuel tank assembly for leaks.		There is any fuel leakage from the tank, connections, or cap.  The fuel tank has any cracks.  Any connection(s) are loose at the tank.
<b>b. Mounting</b> 1) Inspect fuel tank mounting system and barrier for securement and condition.		Any portion of fuel tank mounting system (including support brackets, retaining straps, and chassis frame) is missing, loose, cracked, or broken.  Any fuel tank mounting fasteners are loose or missing.  Barrier assembly is damaged, insecurely mounted, or missing.  Fuel tank is not OEM, been modified, or extra tank(s) have been added.
<b>(Continued on Next Page)</b>		

<b>D. UNDERNEATH</b>		
<b>8. Fuel Tank(s) (continued)</b>		
<b>Inspection Procedures:</b>	<b>Repair if:</b>	<b>Out of Service if:</b>
<b>c. Hoses</b> 1) Inspect all fuel lines, hoses, and under-bus fuel system components, for routing, securement, and condition (including vents, fill, and crossover).		Any fuel line or hose is unsecured or is routed subject to excessive heat or abrasion.  Any fuel line or hose is deteriorated or damaged (including cracks or any damage which may cause potential leakage) or clamps are loose or missing.  Any under-bus fuel system filter, water separator, or other components are insecurely mounted, cracked, or damaged.
<b>d. Wiring</b> 1) Inspect fuel tank sender unit wiring for securement, routing, and condition.	Any portion of sending unit wiring (including ground) or connections is unsecured or is routed subject to excessive heat or abrasion.	Any wiring or connection has damaged or missing insulation.
2) Inspect electric fuel pump wiring for securement, routing, and condition.		Any portion of fuel pump wiring (including ground) or connections is unsecured or is routed subject to excessive heat or abrasion.  Any wiring or connection has damaged or missing insulation.

<b>D. UNDERNEATH</b>		
<b>9. Driveline</b>		
<b>Inspection Procedures:</b>	<b>Repair if:</b>	<b>Out of Service if:</b>
<b>a. Driveshafts</b> 1) Inspect driveshafts and damper for condition.	There is any foreign matter wrapped around driveshaft.	Any driveshaft balancing weight (if originally equipped) is missing.  Any driveshaft is bent or seriously dented.  Any loose, damaged, or leaking Damper.  There are any cracks or other damage to driveshaft, which could cause structural failure.
<b>b. U-Joints</b> 1) Prior to lubrication, inspect U-joints or constant velocity (CV) joints (if equipped) for condition, phasing (alignment of joints), lubrication, and presence of all hardware.	Shaft is out of Phase.  U-joints or constant velocity joints are dry of lubrication, or zerk (grease) fitting (if equipped) is missing, clogged, or inaccessible.	There is any missing hardware or fasteners in any U-joint or CV joint assembly.  Any U-joint has significant cross-shaft-to-bearing cup play, or CV joint has significant play.  Any U-joint or CV joint shows evidence of significant rusting of bearings.  Any bearing cup is loose in yoke.  Any mismatched or wrong type cup straps or bolts.
	<b>(Continued on Next Page)</b>	

<b>D. UNDERNEATH</b>		
<b>9. Driveline (continued)</b>		
<b>Inspection Procedures:</b>	<b>Repair if:</b>	<b>Out of Service if:</b>
<b>c. Yokes</b> 1) Inspect driveshaft yokes for condition and lubrication.	Driveshaft splines are unlubricated.  Dust cap on yoke is loose or missing.  Zerk (grease) fitting is missing or clogged.  Packing in dust cap is missing.	Any yoke has significant play in splines.  Any yoke is cracked or damaged.
<b>d. Midshaft (Midship) Bearings</b> 1) Inspect midshaft (midship) bearings and rubber insulators for condition and securement.	Midshaft (midship) bearing rubber insulator is deteriorated, damaged, or oil soaked.  Midshaft (midship) bearing support is misaligned.	Bearing outer race is loose in insulator, or inner race is loose on shaft.  There is significant play in midshaft (midship) bearing.  There is any missing or damaged hardware or fasteners in midshaft (midship) bearing or support assembly.
<b>e. Guards</b> 1) Inspect for presence and condition of driveshaft guards (if originally equipped).	Any driveshaft guard is bent or damaged. (not rubbing)	Any driveshaft guard is missing, or has loose or damaged mounting fasteners or is rubbing shaft.
<b>(Continued on Next Page)</b>		

<b>D. UNDERNEATH</b> <b>9. Driveline (continued)</b>		
<b>Inspection Procedures:</b>	<b>Repair if:</b>	<b>Out of Service if:</b>
<b>f. Driveshaft Park Brake</b> 1) Inspect driveshaft park brake assembly for condition, mounting, securement, and adjustment of linings, drum, linkage, and all other related hardware.		Lining is worn beyond allowable limits.  Lining is contaminated with grease or oil.  Lining is broken, cracked, or loose.  Drum is cracked or has excessive heat damage or scoring of friction surface.  Any actuating or mounting hardware or fastener is damaged, loose, or missing.  Park brake is not adjusted per manufacturer's specifications.
<b>D. UNDERNEATH</b> <b>10. Rear Suspension</b>		
<b>a. Axle Housing</b> 1) Inspect axle housing for condition and leakage.	(Continued on Next Page)	Any portion of axle housing is cracked or bent.  Any portion of axle housing is leaking lubricant due to cracks, porous metal, or defective weld.  There is any leakage at or around axle housing ends.



<b>D. UNDERNEATH</b>		
<b>10. Rear Suspension (continued)</b>		
<b>Inspection Procedures:</b>	<b>Repair if:</b>	<b>Out of Service if:</b>
<p><b>d. Springs:</b></p> <p>1) Inspect rear springs for condition, securement, and alignment.</p>	<p>There are any loose, missing, broken or worn springs clips.</p> <p>Missing insulators between leafs.</p> <p>Any coil or leaf spring has weakened, and vehicle is leaning excessively.</p> <p>Either rear spring saddle (if equipped) is worn out or missing (repair).</p> <p>Rubber frame bumper is missing.</p> <p>Ride height not adjusted properly (air suspension).</p>	<p>Any leaf spring(s) is broken, cracked, or missing.</p> <p>Spring eye is worn or spread such that bushings are loose in spring eye.</p> <p>Any coil spring(s) is broken, insecurely mounted, non-OEM type or non-OEM blocks or spacers are installed.</p> <p>There is any misalignment of spring leaves or other evidence that center pin is loose or broken.</p> <p>Either coil or leaf spring is worn so that rubber frame bumper is damaged or worn due to frequent bottoming of rear suspension.</p> <p>Any alignment shim or wedge is loose or damaged.</p> <p>On any air bag type spring assembly, air bag, or air lines and valving is damaged or leaking. Any problem with ride height control valve other than adjustment.</p> <p>Air ride pivot pins and bushings are loose.</p>
<p><b>e. Anti roll bar/Sway bar (If equipped)</b></p> <p>1) Inspect for mounting and condition.</p>	<p>Rubber mounting bushings are cracked, Compressed or deteriorated to the point of allowing movement of bar.</p> <p><b>(Continued on Next Page)</b></p>	<p>Bar is bent, broken or missing.</p> <p>Any mounting hardware is broken or missing.</p> <p>Any rubber bushings or grommets are missing.</p>



<b>D. UNDERNEATH</b>		
<b>10. Rear Suspension (continued)</b>		
<b>Inspection Procedures:</b>	<b>Repair if:</b>	<b>Out of Service if:</b>
<p><b>i. Pins and Bushings</b></p> <p>1) Inspect rear spring pins and bushings for wear and lubrication. (same as front) For other types of pin and bushing configurations, see manufacturer's Service Manual.</p> <p><b>NOTE: any questionable condition is found, jack rear of bus up and identify source of play or movement.</b></p>	<p>Any Zerk (grease) fitting is damaged or missing.</p> <p>Inner sleeve or rubber bushing type spring pin assembly(ies) is worn through, or rubber bushing is excessively worn (rubber is compacted or deteriorated, resulting in free play between rubber and spring eye or inner sleeve).</p>	<p>Pin is cutting into spring, shackle, or mount.</p> <p>Any pin is loose, damaged, or worn, or cannot be properly clamped by pinch type shackles. On Vehicles equipped with bolt instead of pin, bolt is loose, damaged or worn or the nut is not a locking type or is missing.</p> <p>Rear spring pin bushing (metal type bushing) is worn through.</p> <p>Total free play (up and down) of pin and bushing exceeds 1/8 inch.</p> <p>On system using two pins and bushings, combined free play exceeds 1/4 inch.</p>
<p><b>j. Hangers</b></p> <p>1) Inspect hangers for mounting and condition.</p>		<p>Any spring hanger or bracket is cracked or broken, or any mounting fastener is loose or missing.</p>
<p><b>k. Control arms/rods</b></p> <p>1) Inspect rear axle control, torque, stabilizer, etc. arms/rods (if equipped) for condition and mounting.</p>	<p>Rubber mounting bushings are cracked, Compressed or deteriorated to the point of allowing movement of bar.</p> <p><b>(Continued on Next Page)</b></p>	<p>Bar is bent, broken or missing.</p> <p>Any mounting hardware is broken or missing.</p> <p>Any rubber bushings or grommets are missing.</p>

<b>D. UNDERNEATH</b>		
<b>10. Rear Suspension (continued)</b>		
<b>Inspection Procedures:</b>	<b>Repair if:</b>	<b>Out of Service if:</b>
<b>I. Seals</b> 1) Inspect rear wheel seals and gaskets for condition and leakage.	There is wetness or leaking of gear oil around axle flange.	Either rear wheel seal is damaged or leaking.  Any axle flange stud or nut is loose or missing.
<b>D. UNDERNEATH</b>		
<b>11. Body Securement and Structure</b>		
<b>a. Body Mounts</b> 1) Inspect for securement and condition of all body mounts, chassis cowl mounts, and frame pads. Body mounts include any J-bolt, U-bolt, shear bolt or clamp type mounts used to secure body to chassis frame.	Padding between frame rails and floor sills is missing or grossly misaligned.  Any isolators (donuts) are split, cracked or deteriorated so as not to be effective.	<b>Any combination of the following conditions are found for 25% or more of the body mounts: (if less than 25% repair or note)</b>  Originally installed body mount or cowl mount is missing.  Body mount has missing hardware.  Body mount is cracked, damaged or stripped.  Body mount is loose or misaligned.  Isolators (donuts) are missing.
	<b>(Continued on Next Page)</b>	

<b>D. UNDERNEATH</b>		
<b>11. Body Securement and Structure (continued)</b>		
<b>Inspection Procedures:</b>	<b>Repair if:</b>	<b>Out of Service if:</b>
<b>b. Floor</b> 1) Inspect condition of floor structure, sills, and braces.	There are any minor cracks in floor sills or braces or in welds.	There are any holes or cracks in floor sheet metal creating an opening to the passenger compartment.  Entire cross section of any floor sill or brace is broken.  There is any broken weld or mounting of a floor sill or brace resulting in complete separation more than one (1) foot in length.
<b>c. Outriggers</b> 1) Inspect body outriggers and hardware for condition and securement.	Any installed (as required by manufacturer) outrigger is missing.  Any body outrigger is cracked or has loose or missing hardware.	
<b>d. Braces</b> 1) Inspect for condition and securement of all chassis and body braces.	Any bumper brace is broken, cracked, or missing.  There is any cracked brace underneath the body.  <p style="text-align: center;"><b>(Continued on Next Page)</b></p>	

<b>D. UNDERNEATH</b> <b>11. Body Securement and Structure</b> <b>(continued)</b>		
<b>Inspection Procedures:</b>	<b>Repair if:</b>	<b>Out of Service if:</b>
<b>e. Skirts</b> 1) Inspect body skirts and gussets for securement and condition.	Any body skirt, brace, or gusset has cracked or broken sheet metal or mounting points.	Any skirt, brace, or gusset is bent, damaged or deformed to the point of being hazardous.
<b>D. UNDERNEATH</b> <b>12. Exhaust Systems</b>		
<b>a. Exhaust Leaks:</b> 1) With engine running and at operating temperature, inspect exhaust system for leaks, condition, and securement.	There is any physical damage to exhaust system that is adding restriction or back pressure but no leak.	There is any leakage, which is audible or can be felt around any portion of the exhaust system including manifold(s), pipe sections, or any junction.
<b>b. Mounting</b> 1) Inspect mounting of the exhaust system	There is any exhaust system hanger, which is not securely mounted.  There is any originally installed exhaust hanger, which is missing, broken, or detached from exhaust system or frame mounting point.  Any exhaust pipe or clamp is loose.	Any clamp is missing.
<b>c. Mufflers</b> 1) Inspect for presence and condition of the muffler.	There is significant physical damage to the muffler.  <b>(Continued on Next Page)</b>	The muffler is leaking.  The muffler is missing.

<b>D. UNDERNEATH 12. Exhaust Systems (continued)</b>		
<b>Inspection Procedures:</b>	<b>Repair if:</b>	<b>Out of Service if:</b>
<b>d. Tailpipe</b> 1) Inspect condition of tailpipe.	There is any physical damage to tail pipe that is adding restriction or back pressure but no leak.  The tailpipe extends more than 2 inches beyond bumper.	The tailpipe is leaking.  The tailpipe does not extend at least to the edge of the rear bumper or the rearmost OEM mounting position.  Exhaust discharges under occupant compartment.
<b>e. Catalytic converter:</b> 1) Inspect for presence and condition of converter if applicable.	There is any physical damage to converter that is adding restriction or back pressure but no leak.	The converter is leaking.  The converter is missing
<b>D. UNDERNEATH 13. Wheels and Tires</b>		
<b>a. Tread Depth</b> 1) Visually inspect and measure any tire that is questionable (including spare if equipped).  <b>NOTE:</b> Measurement shall be taken at the major tread groove exhibiting the greatest amount of wear. Measure at three (3) points spaced equally around the circumference of the tire in the same groove. Do not measure at wear bars.		Measured tread depth of either front tire (virgin carcass) at three measured points is less than 4/32 inch.  Measured tread depth of either rear tire at three measured points is less than 2/32 inch.
<b>b. Pressure</b> 1) Visually inspect tires for obvious inflation problems (including spare if equipped).		Any tire that is obviously low in pressure or flat.  Any tire that has an audible or visible a leak.

**(Continued on Next Page)**

<b>D. UNDERNEATH</b> <b>13. Wheels and Tires (continued)</b>		
<b>Inspection Procedures:</b>	<b>Repair if:</b>	<b>Out of Service if:</b>
<b>c. Alignment</b> 1) Inspect tires for evidence of proper alignment.	Any tire is feather-edged, cupped, or has uneven tread wear.	Tires/wheels are grossly misaligned, affecting steering control.
<b>d. Damage</b> 1) Inspect for damage to wheels and tires. (including spare if equipped)  <b>NOTE: Refer to Tire and Rim Manufacturer's Association manual for correct procedures in demounting and mounting of tires and rims.</b>	There is foreign material in the tire tread, which could cause damage or loss of air pressure.  Any valve cap is missing or not metal.  Any valve stem is damaged or mislocated so that tire cannot be filled with air.	There are any cuts, abrasion, or other damage to tire sidewall resulting in exposed or damaged cord.  There is any evidence of separation, bulges (other than normal manufacturer bulge), or other damage within the carcass of the tire.  There are any cracks, which run around the bead or sidewall of the tire.  There is anything wedged between the dual rear wheels.  On a retread there is any separation of the tire tread from the tire carcass, which could result in tire or tread failure.  There is any damage to the lock ring assembly or lock ring groove of a multi-piece rim, including rust or corrosion, which could cause the lock ring not to seal fully.
<b>(Continued on Next Page)</b>		

<b>D. UNDERNEATH</b> <b>13. Wheels and Tires (continued)</b>		
<b>Inspection Procedures:</b>	<b>Repair if:</b>	<b>Out of Service if:</b>
<b>d. Damage (continued)</b>		<p>There are any cracks or breaks at the lug holes or any other part of a rim or cast spokes.</p> <p>There are any dents or bends in a rim, which could result in failure of the rim or separation of the tire from the rim.</p>
<b>e. Matching</b> 1) Inspect for matching of tire construction, design, size, and load rating on each axle.		<p>There is mismatching of inner and outer dual tire diameter greater than 3/8 inch.</p> <p>There is any tire marked for other than highway use.</p> <p>Any tire is not of proper type, size, and minimum load rating. All tires on an axle are not of same type (e.g., lug or rib).</p> <p>All tires on an axle are not the same size.</p> <p>Any tire is below minimum load rating.</p> <p>Radial and bias ply tires are intermixed on the same vehicle.</p> <p>Any front tire is recapped.</p>

<b>D. UNDERNEATH</b> <b>13. Wheels and Tires (continued)</b>		
<b>Inspection Procedures:</b>	<b>Repair if:</b>	<b>Out of Service if:</b>
<b>f. Wheel Hardware</b> 1) Inspect for presence, type, condition, and securement of all wheel hardware.	Lateral run out of any tire/rim assembly exceeds 1/4 inch.	There is improper matching of rims and lock rings.  There is evidence of slippage of wheel assembly on cast spoke hub.  Stud holes are elongated.  Any wheel nut, stud, or clamp is loose, or there is rust or corrosion indicating possible looseness.  Any wheel, nut, stud, or clamp is broken or missing.
2) Check for proper spacing of rear dual wheels and tires (proper spacer width).		Any improper spacer is installed between dual wheels.

**End of Section**