SECTION 7
Preventive Maintenance

VISUAL INSPECTION

The AIRTEK is a low maintenance suspension, however, it is necessary to visually inspect the following items every 50,000 miles (80,450 km) or every six months, whichever comes first, to help ensure all such components function to their highest efficiency.

- **Wear and Damage** — Inspect all parts of suspension for wear and damage. Look for bent or cracked parts. Replace all worn or damaged parts.
- **Air Spring** — Look for chaffing or any signs of spring or component damage.
- **Rubber Axle Stop** — The rubber axle stop is exposed to contact forces in extreme jounce conditions. It will be necessary to visually inspect the rubber axle stop for wear at the specified inspection interval. The rubber axle stop must be replaced when the contact rubber is worn down to a 1/16" above the bump stop pedestal. See the Component Replacement Section in this publication for replacement.
- **Fasteners** — Look for any loose or damaged fasteners on the entire suspension. Make sure all fasteners are tightened to the specified torque. See Torque Specification Chart in this publication for recommended torque requirements. Use a calibrated torque wrench to check torque in a tightening direction. As soon as the fastener starts to move, record the torque. Correct the torque if necessary. Replace any worn or damaged fasteners.
- **Thrust Washers and Rear Shackle Bracket** — Look for any signs of excessive wear to the thrust washers, shackles and shackle bracket. See Thrust Washer Inspection detailed in this section.
- **STEERTEK Axle** — The axle should be free of any nicks or gouges. Inspect for any cracks or dents on axle.
- **Shocks** — Look for any signs of dents or leakage, misting is not considered a leak. See Shock Absorber Inspection in this section.
- **Top and Bottom Axle Wrap Liners** — Look for any cracking or broken pieces on liner in load bearing areas. See Axle Wrap Liner Inspection in this section.
- **Steel Leaf Spring** — Look for cracks. Replace if cracked or broken. Check the front and rear bushings for any wear or deterioration. See the Component Replacement Section in this publication for replacement procedure.
- **Front Hangers and Shackle Brackets** — Check for cracks or loose mounting hardware. Replace if necessary, see the Component Replacement Section in this publication for replacement procedure.
- **Top Spring Pad and Bump Stop** — Look for cracks and or missing rubber bump stops. Replace if necessary, see the Component Replacement Section in this publication for replacement procedure.
- **Steering Pivot Points** — Check for looseness at all pivot points. Inspect and lubricate all pivot points, maximum service interval is 25,000 miles. Refer to the Lubrication matrix in this section.
- **Operation** — All steering components must move freely through the full range of motion from axle stop to axle stop.
- **Tire Wear** — Inspect tires for wear patterns that may indicate suspension damage or misalignment. See Tire Inspection in this section.

CLAMP GROUP RE-TORQUE INTERVAL

1. Clamp group locknuts must be torqued to specification at preparation for delivery.
2. Clamp group locknuts must be re-torqued at 1,000 miles.
3. Thereafter follow the 6 month / 50,000 mile inspection and annual re-torque interval.
4. Ensure that the clamp group is properly aligned and the hex bolts are seated in the top spring pad, and the bottom axle wrap is centered on the top axle wrap. See Figures 7-1 and 7-2.

FIGURE 7-1

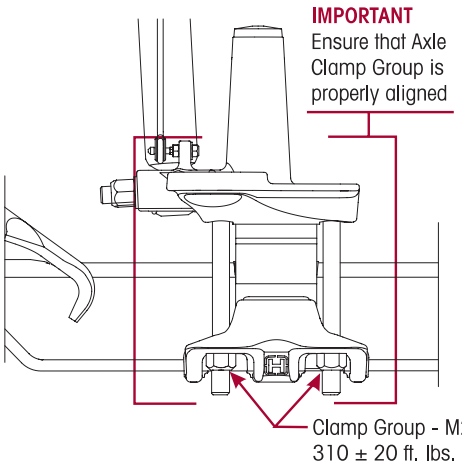
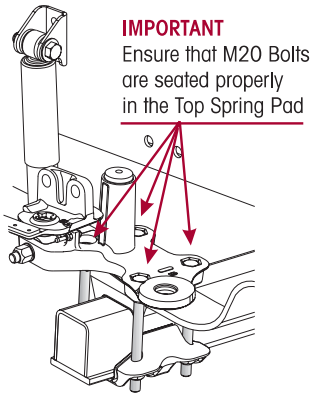
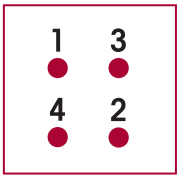


FIGURE 7-2



5. Tighten the clamp group locknuts evenly to 310 ± 20 foot pounds torque in the proper sequence, see Figure 7-3.

FIGURE 7-3



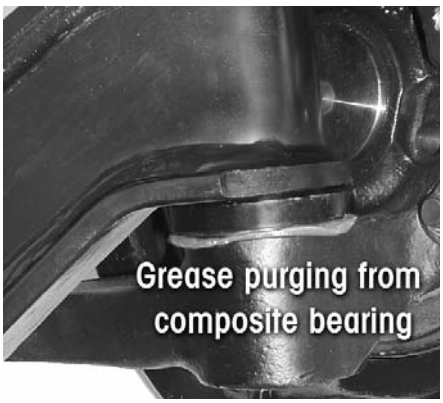
LUBRICATION

STEERTEK GREASING AND LUBRICATION SPECIFICATIONS				
Component	**Greasing Interval**	**Grease**	**NLGI Grade**	**Outside Temperature**
King Pin Bushings	Maximum of 25,000 miles (40,230 kilometers), or for 90 days, whichever comes first.	Multipurpose Grease	2	Refer to the lubricant manufacturer's specifications for the temperature service limits applicable to your area.
Tie Rod Ends				
Drag Link	See Vehicle Manufacturer			
NOTE: Lubrication greases acceptable for use on the STEERTEK axle will carry a designation of NLGI #2 EP and rated GC-LB or equivalent.				

KING PIN LUBRICATION

On the Hendrickson STEERTEK front axle the king pin grease fittings are located on the top and bottom of the king pin steering knuckle.

FIGURE 7-4



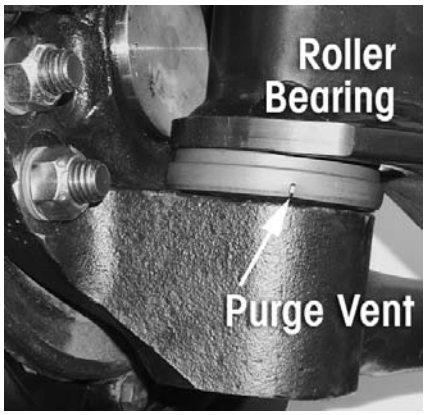
1. Place vehicle on the ground.
2. Prior to greasing the king pins on the vehicle, the suspension must be in a loaded condition.
3. Clean off all the grease fittings with a clean shop towel prior to lubrication.
4. Lubricate the king pins through the grease fittings on the top and bottom of the steering knuckle, see Lubrication Specification matrix above.
5. Force the required lubricant into the upper and lower king pin grease fittings, until new lubricant flows from grease purging locations, see Figure 7-4 and 7-6.
   - Upper axle beam and knuckle.
   - Thrust bearing purge locations (See Figure 7-5 and 7-6).

NOTE

Greasing at the lower zerk should purge grease from the thrust bearing shell. The left side of the axle has a composite style thrust bearing (See Figure 7-5) and the right hand side of the axle has a steel roller thrust bearing (See Figure 7-6). Both purge in the same area.

FIGURE 7-5

FIGURE 7-6



TIE ROD END LUBRICATION

LUBRICATION PROCEDURE

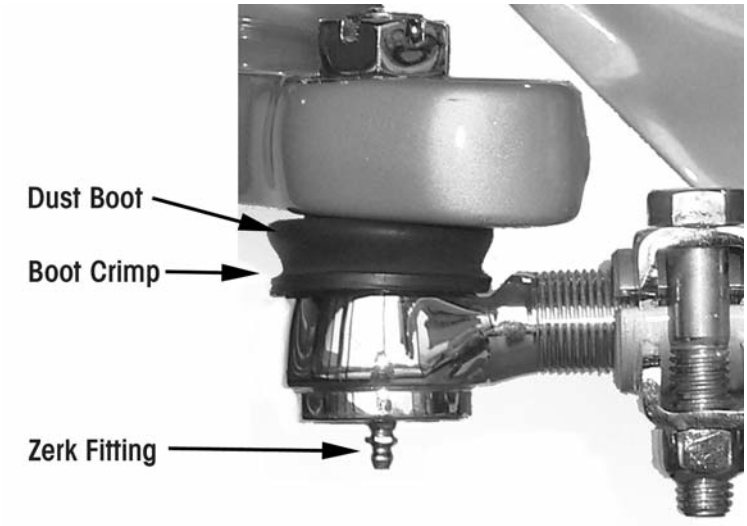
1. Turn the vehicle wheels straight ahead.
2. Wipe the zerk fitting clean with shop towels.
3. Wipe the seal/boot clean with shop towels.
4. Attach a grease gun to the zerk fitting. Either a hand or pneumatic grease gun is acceptable. If air operated grease gun is used, system air pressure should not exceed 150 psi (1035 kPa).

⚠ CAUTION

EXCEEDING THE MAXIMUM AIR PRESSURE TO THE ZERK FITTING CAN CAUSE DAMAGE TO THE DUST BOOT CAUSING COMPONENT FAILURE.

5. Dirt, water, and discolored old grease should flow from the relief vents or purge holes near the boot crimp or bellows area. See Figure 7-7.

FIGURE 7-7



6. If the tie rod end is designed for lube service and it will not accept grease proceed as follows:
   a. Remove the zerk fitting.
   b. Inspect the threaded zerk fitting hole in the tie rod end and remove any obstructions.
   c. Install a new zerk fitting.
   d. Continue the lubrication procedure.
   e. If the tie rod end will not accept grease following this procedure it will be necessary to replace the tie rod end, (see Tie Rod End replacement in the Component Replacement Section of this publication).
7. Apply grease until all the old grease is purged from the boot.

TIRE INSPECTION

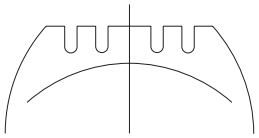
The leading causes of tire wear are the following in order of importance:

1. Tire Pressure
2. Toe Setting
3. Thrust Angle
4. Camber

- The following tire Inspection guidelines are based upon TMC (The Technology & Maintenance Council) recommended practices. Any issues regarding irregular tire wear where Hendrickson is asked for assistance, will require tire and alignment maintenance records as described in the TMC literature number RP642 or TMC "Guidelines for Total Vehicle Alignment" publication.
- Tire wear is normally the best indicator of vehicle alignment condition. If tires are wearing too rapidly or irregularly, alignment corrections may be needed. The tire wear patterns described below can help isolate specific alignment problems.
- The most common conditions of concern are:
  - Overall Fast Wear (Miles per 32nd)
  - Feather Wear
  - Cupping
  - Diagonal Wear
  - Rapid Shoulder Wear (One Shoulder Only)
  - One-Sided Wear

FIGURE 7-8

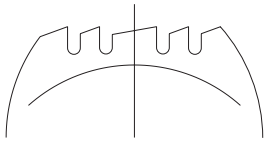
OVERALL FAST WEAR (Miles per 32nd)



Overall Fast Wear — Fast wear can be described as exhibiting a good, but accelerated wear pattern. It is typically caused by operating conditions, such as mountainous terrain, frequency and severity of turning, abrasive road surfaces in combination with vehicle configurations and their attributes-such as power steering, heavy axle loads, high wheel cuts, setback axles, short wheel base tractors, long wheel base straight trucks. To correct this problem, consult with vehicle and tire manufacturers when specifying equipment or replacing tires. For more information, see TMC RP 219 publication, page 11. For information on how to accurately measure and record tire rates, see TMC RP 230 publication.

FIGURE 7-9

FEATHER WEAR



Feather Wear — Tread ribs or blocks worn so that one side is higher than the other resulting in step-offs across the tread face. Generally, ribs or blocks exhibit this wear. To spot this problem, do the following:

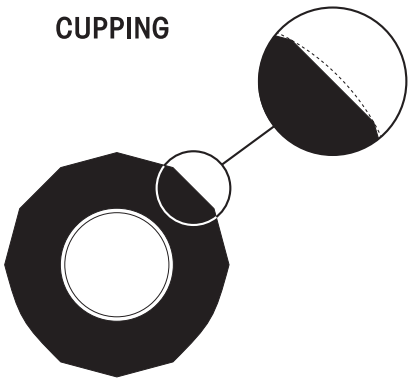
With one hand flat on the tread of the tire and a firm down pressure, slide your hand across the tread of the tire. In one direction, the tire will feel smooth and in the opposite direction there will be a sharp edge to the tread. Typical causes of feather wear include: excessive side force scrubbing, resulting from conditions of misalignment

such as excessive toe, drive axle misalignment, worn, missing or damaged suspension components, bent tie rods or other chassis misalignment.

To correct this problem, tires can be rotated to another axle for maximum utilization of remaining tread. Additionally, diagnose the vehicle itself and correct misalignment condition as required. If steer tire feathers are in opposite directions, an improper toe condition is most likely the cause. For more information, see TMC RP 219A publication, page 5.

If feather wear on both steer tires is in the same direction, drive axle or other chassis misalignment is indicated. If one steer tire shows feather wear and the other steer tire has normal wear, a combination of toe and drive axle or chassis misalignment is indicated.

FIGURE 7-10



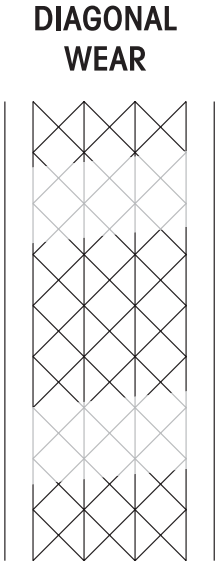
Cupping — Localized, dished out areas of fast wear creating a scalloped appearance around the tire. Cupping, which appears around the tire on the shoulder ribs, may also progress to adjoining ribs. See TMC RP 219A publication, page 7.

Cupping is usually a result of moderate-to-severe imbalance, improper rim/wheel mounting, excessive wheel endplay or other assembly non-uniformity. It can also be due to lack of shock absorber control on some suspension types.

To solve cupping problems:

- *Tires* – Correct mismount or balance problem. If ride complaints arise, steer tires may be rotated to drive or trailer axle.
- *Vehicle* – Diagnose component imbalance condition, i.e., wheel, rim, hub, brake, drum. Correct as necessary.

FIGURE 7-11



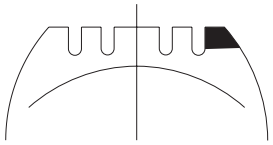
Diagonal Wear — Can be described as localized flat spots worn diagonally across the tread at approximately 25-35° angles, often repeating around the tread circumference. For more information, see TMC RP 219A publication, page 20.

Diagonal wear is usually caused by bad wheel bearings, toe-out, mismounting of tire and wheel assembly to axle, and mismatched duals for size and/or inflation pressures. It may start as brake skid. Diagonal wear is aggravated by high speed empty or light load hauls.

To correct diagonal wear, reverse direction of rotation of the tire. If wear is excessive, true or retread. If the source of trouble is the vehicle, diagnose cause and correct as needed.

FIGURE 7-12

RAPID SHOULDER WEAR (One Shoulder Only)



Rapid Shoulder Wear (One Shoulder Only) — Is defined as a tire worn on the edge of one shoulder, sometimes extending to inner ribs. It can progress to diagonal wipe-out. For more information, see TMC RP 219A publication, page 22.

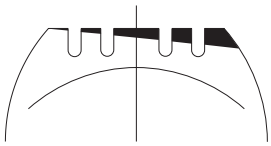
This wear condition is usually caused by excessive toe or excessive camber. These conditions can be created by a misaligned or bent axle and can also be caused by loose or worn wheel bearings.

To correct this type of rapid shoulder wear:

- *Tires* – Change direction of rotation of tire. If shoulder wear is severe, remove and retread.
- *Vehicle* – Diagnose misalignment and/or mechanical condition and correct.

FIGURE 7-13

ONE-SIDED WEAR



One-sided wear — Is excessive wear on one side of tire extending from the shoulder towards the center of the tread. For more information, see TMC RP 219A, page 26.

One-sided wear is usually caused by improper alignment, worn kingpins, loose wheel bearings, excessive camber, excessive axle loads, non-parallel axles, or non-uniform tire and wheel assembly caused by improper bead seating or bent wheel.

To correct one-sided wear:

- *Tires* – Depending on severity, rotate tires to another axle position or, if worn to minimum tread depths, submit for possible retreading.
- *Vehicle* – Diagnose mechanical problem and correct.

SHOCK ABSORBER INSPECTION

Hendrickson uses a long service life, premium shock absorber on all AIRTEK suspensions. When the shock absorber replacement is necessary, Hendrickson recommends that the shock absorbers be replaced with identical Hendrickson Genuine parts for servicing. Failure to do so will affect the suspension performance, durability, and will void the warranty.

Inspection of the shock absorber can be performed by doing a heat test, and a visual inspection. For instructions on shock absorber replacement see the Component Replacement Section of this publication. It is not necessary to replace shock absorbers in pairs if one shock absorber requires replacement.

FIGURE 7-14

HEAT TEST

1. Drive the vehicle at moderate speeds on rough road for minimum of fifteen minutes.

⚠ WARNING

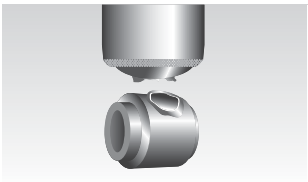
DO NOT GRAB THE SHOCK AS IT COULD POSSIBLY CAUSE PERSONAL INJURY.

2. Lightly touch the shock body carefully below the dust cover.
3. Touch the frame to get an ambient reference. A warm shock absorber is acceptable, a cold shock absorber should be replaced.
4. To inspect for an internal failure, remove and shake the suspected shock. Listen for the sound of metal parts rattling inside. Rattling of metal parts can indicate that the shock has an internal failure.

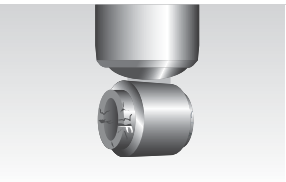
VISUAL INSPECTION

Look for these potential problems when doing a visual inspection. Inspect the shock absorbers fully extended. Replace as necessary.

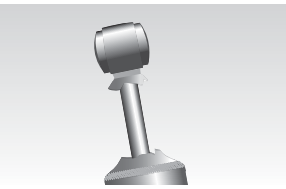
FIGURE 7-15



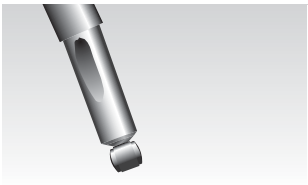
Damaged upper or lower mount



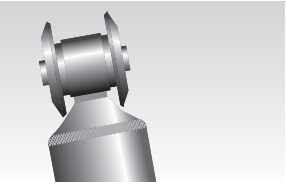
Damaged upper or lower bushing



Damaged dust cover and/or shock body



Bent or dented shock

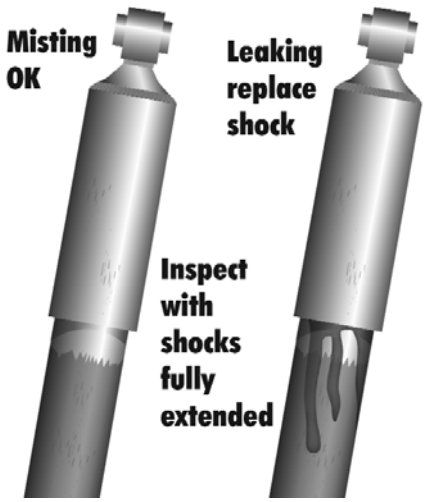


Improper installation example: Washers installed backwards

LEAKING VS. MISTING SHOCK VISUAL INSPECTION

The inspection must not be conducted after driving in wet weather or a vehicle wash. Shocks needs to be free from water. Many shocks are often mis-diagnosed as failures. Misting is the process whereby very small amounts of shock fluid evaporate at a high operating temperature through the upper seal of the shock. When the "mist" reaches the cooler outside air, it condenses and forms a film on the outside of the shock body. Misting is perfectly normal and necessary function of the shock. The fluid which evaporates through the seal area helps to lubricate and prolong the life of the seal.

FIGURE 7-16



A true shock that is leaking and needs to be replaced will show signs of fluid leaking in streams from the upper seal. These streams can easily be seen when the shock is fully extended, underneath the main body (dust cover) of the shock. Look for these potential problems when doing a visual inspection. Inspect the shock absorbers fully extended. Replaced as necessary.

NOTE

The AIRTEK suspension is equipped with a premium seal on the shock, however this seal will allow for misting to appear on the shock body (misting is not a leak and is considered acceptable).

If the shock is damaged install new shock absorber and replace as detailed in the Component Replacement Section of this publication.

THRUST WASHER INSPECTION

In normal use these components will function satisfactorily, even though the components may show some wear.

An indication that the thrust washers are worn, or need replacement is when the suspension exhibits one or more of the following conditions:

1. Excessive lateral movement of the spring.
2. The rear spring eye is in contact with the shackle bracket.
3. Thrust washers can be measured with a micrometer or a ruler. The normal thickness of a new thrust washer is ¼" (0.250") or 6.35 mm.
   - The minimum thickness allowable for a thrust washer is ⅛" (0.125") or 3.17mm.
   - If one or more of these conditions is experienced, disassembly of the rear shackle group is required to replace the thrust washers.
   - If one thrust washer is worn out, Hendrickson recommends both thrust washers on that side of the suspension be replaced. Inspect the thrust washers on the other side of the vehicle and replace if necessary. See Thrust Washer replacement procedure in the Component Replacement Section of this publication.

AXLE WRAP LINER INSPECTION

FIGURE 7-17

INSPECTION PROCEDURE

- Axle wrap liners are installed on the STEERTEK axle to help prevent any type of abrasion on the axle at the clamp group area. Any time an axle wrap is removed it is mandatory that the axle wrap liner be replaced.
- Liner Crack Criteria:

  It is possible for the axle wrap liner to crack during service. If the liner is cracked and all the pieces are intact it is not necessary to replace the liner. If the liner is broken out and there are pieces missing the liner must be replaced immediately. See Figure 7-17. See Axle Wrap replacement in the Component Replacement Section of this publication.

KING PIN BUSHING INSPECTION

INSPECTION PROCEDURE

1. Chock the wheels to help prevent the vehicle from moving. Set the parking brake.
2. Use a jack to raise the vehicle until the wheels are off the ground. Support the vehicle with safety stands.

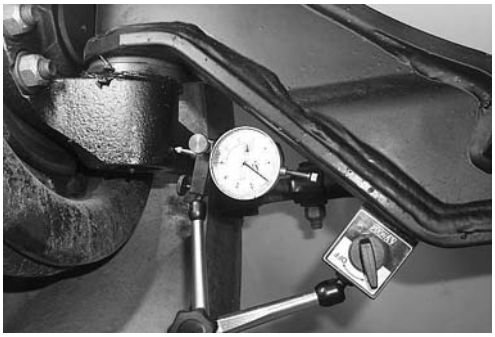
FIGURE 7-18

3. Checking the upper king pin bushing. Install the base of a dial indicator onto the axle beam. See Figure 7-18.
4. Set the dial indicator to "0" zero.
5. Move the top of the tire in and out by applying reasonable constant pressure and then release, see Figure 7-19.
6. Check the reading on the dial indicator. If the dial indicator moves more than 0.015", the upper bushing is worn or damaged. Replace both bushings. Refer to the King Pin Bushing replacement procedure in the Component Replacement Section of this publication.
7. **CHECKING THE LOWER KING PIN BUSHING**. Install a dial indicator so that the base is on the axle and the indicator tip is against the inside of the bottom of the knuckle. See Figure 7-20.
8. Set the dial indicator to "0" zero.

9. Move the bottom of the tire in and out. If the dial indicator moves more than 0.015", the lower bushing is worn or damaged. Replace both king pin bushings. Refer to the Component Replacement Section of this publication.

FIGURE 7-19

FIGURE 7-20



NOTE If one bushing is worn or damaged, it is mandatory to replace both the top and bottom bushings on that knuckle assembly.

STEERING KNUCKLE INSPECTION

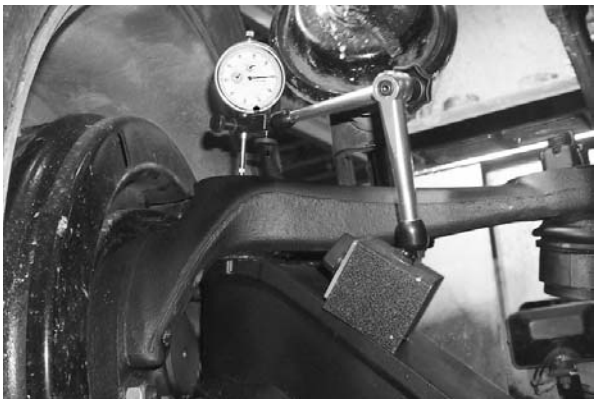
CHECKING VERTICAL END PLAY (UP AND DOWN MOVEMENT)

The operating spec for vertical clearance on the steering knuckle is 0.008" to 0.030".

1. Chock the rear tires to help prevent the vehicle from moving.
2. Set the parking brakes.
3. Use a jack to raise the vehicle until both tires are 1" off the ground.
4. Place a dial indicator on each side of the axle as follows:
   a. Index the wheels slightly (left or right).
   b. Place the magnetic dial indicator base on the axle.
   c. Place the tip of the dial indicator on the top of the upper steering knuckle.
5. Set the dial indicator to "0" (zero).
6. Lower the jack.
7. If vertical clearance is greater than 0.030" install shims (Hendrickson part no. 60259-002) between the top of the axle and the bottom of the upper steering knuckle to obtain the proper clearance specification. See Steering Knuckle Assembly in the Component Replacement Section of this publication for proper shim installation.

8. If vertical clearance is below 0.008", adjust the upper steering knuckle to obtain the proper clearance specification. See Steering Knuckle Assembly in the Component Replacement Section of this publication for proper shim removal.

FIGURE 7-21



TIE ROD END INSPECTION

INSPECTION PROCEDURE

Before beginning this inspection procedure, the entire system must be unloaded (i.e., the front end of the vehicle must be raised and supported with safety stands).

⚠ CAUTION

DO NOT GREASE THE TIE ROD ASSEMBLY BEFORE PERFORMING THE INSPECTION. DOING SO MAY PROVIDE INACCURATE RESULTS TO DETERMINE WEAR.

⚠ CAUTION

REPLACE THE ENTIRE TIE ROD END IF THE BOOT IS TORN OR MISSING, FAILURE TO DO SO WILL CAUSE PREMATURE WEAR OF THE TIE ROD END.

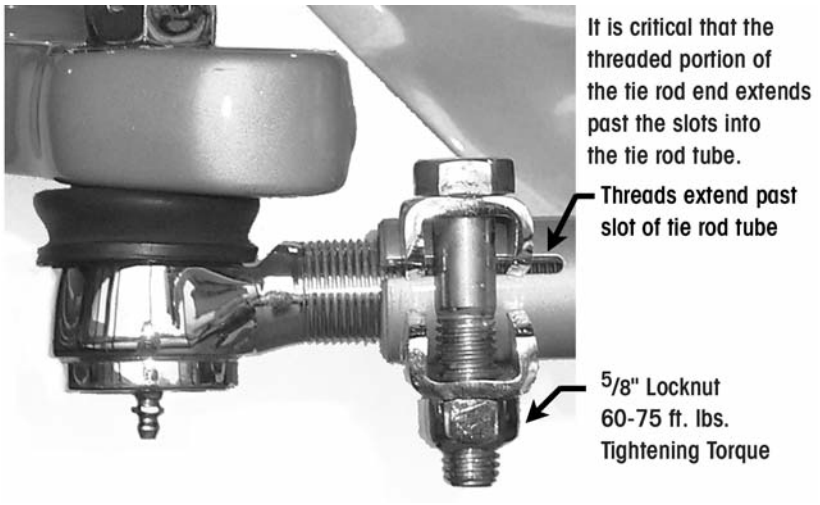
1. Block rear wheels of vehicle. Using the bottom of the axle beam or the frame rails, raise the front end off the ground and support with stands.
2. With the engine off, turn the wheels from full left to full right and then return to the straight-ahead position.
3. Check that the boots are in place and completely installed over the tie rod ends.
4. Check for cracking or tears in the boots. Also check the boot seals for damage. Replace the entire tie rod end if the boot is damaged.

⚠ WARNING

A COTTER PIN MUST BE INSTALLED THROUGH THE TIE ROD END WITH THE CASTLE NUT TIGHTENED TO TORQUE SPECIFICATION TO SECURELY ATTACH THE TIE ROD. LOSS OF THE COTTER PIN WILL ALLOW THE TIE ROD END NUT TO BECOME LOOSE AND AFFECT VEHICLE STEERING AND POSSIBLY RESULT IN TOTAL LOSS OF STEERING CONTROL.

5. Check that the tie rod end nut is installed and secured with a cotter pin. If the cotter pin is missing, check the nut torque specification and then install a new cotter pin. Always tighten the castle nut to specified torque when setting the cotter pin. Do not back off the nut to insert cotter pin.
6. Check that the tie rod end is threaded correctly into the cross tube and is engaged deeper than the end of the cross tube slot. The tie rod end must be visible the entire length of the cross tube slot. See Figure 7-22.

FIGURE 7-22



7. Check that zerk fittings are installed. Replace a damaged zerk fitting with a new one. Some tie rod ends are non-greaseable and will not have zerk fittings. Do not install fitting if tie rod end is a non-greaseable type.

CAUTION

DO NOT USE THE FOLLOWING ITEMS OR METHODS TO CHECK FOR MOVEMENT OF THE TIE ROD ASSEMBLY. DAMAGE TO COMPONENTS CAN RESULT IF:

- A CROW BAR, PICKLE FORK OR 2 x 4 ARE USED.
- ANYTHING OTHER THAN HANDS ARE USED TO GRASP THE CROSS TUBE ASSEMBLY (CAN RESULT IN DAMAGE TO THE CROSS TUBE).
- EXCESSIVE PRESSURE OR FORCE IS APPLIED TO THE TIE ROD ENDS OR THE JOINTS OF THE ASSEMBLY.

8. By hand or using a pipe wrench, with jaw protectors to avoid gouging the cross tube, rotate the cross tube toward the front of the vehicle and then toward the rear. After rotating, center the cross tube. If the cross tube will not rotate in either direction, replace both tie rod ends.
9. Position yourself directly below the ball stud socket. Using both hands, grab the assembly end as close to the socket as possible (no more than six inches or 152.4mm). Apply hand pressure with reasonable human effort vertically up and down in a push-pull motion several times. Check for any movement or looseness at both tie rod end locations.
10. If there is any movement in the tie rod assembly, replace both tie rod ends.

Reference the TMC RP 645 Tie Rod End Inspection and Maintenance Procedure for additional information.