

# INTRODUCTION

## GENERAL

This section has the description and the instructions for disassembly and assembly of the steering axle.

## DESCRIPTION (See FIGURE 1.)

The steering axle assembly includes an axle frame, a steering cylinder, and two spindle and hub assemblies. The axle assembly is connected to the lift truck frame with two stub shafts. The stub shafts permit the axle as-

sembly to move in the frame mounts when the lift truck travels over rough surfaces.

The ends of the piston rod extend from both ends of the steering cylinder shell. A single piston seal is in the center of the rod. Oil pressure on one side of the piston moves the piston in the bore. The piston pushes an equal amount of oil from the opposite side of the cylinder.

A relief valve in the steering system controls the oil pressure when the piston reaches the end of the cylinder. The tie rods that connect the spindle arms to the cylinder rod are not adjustable.

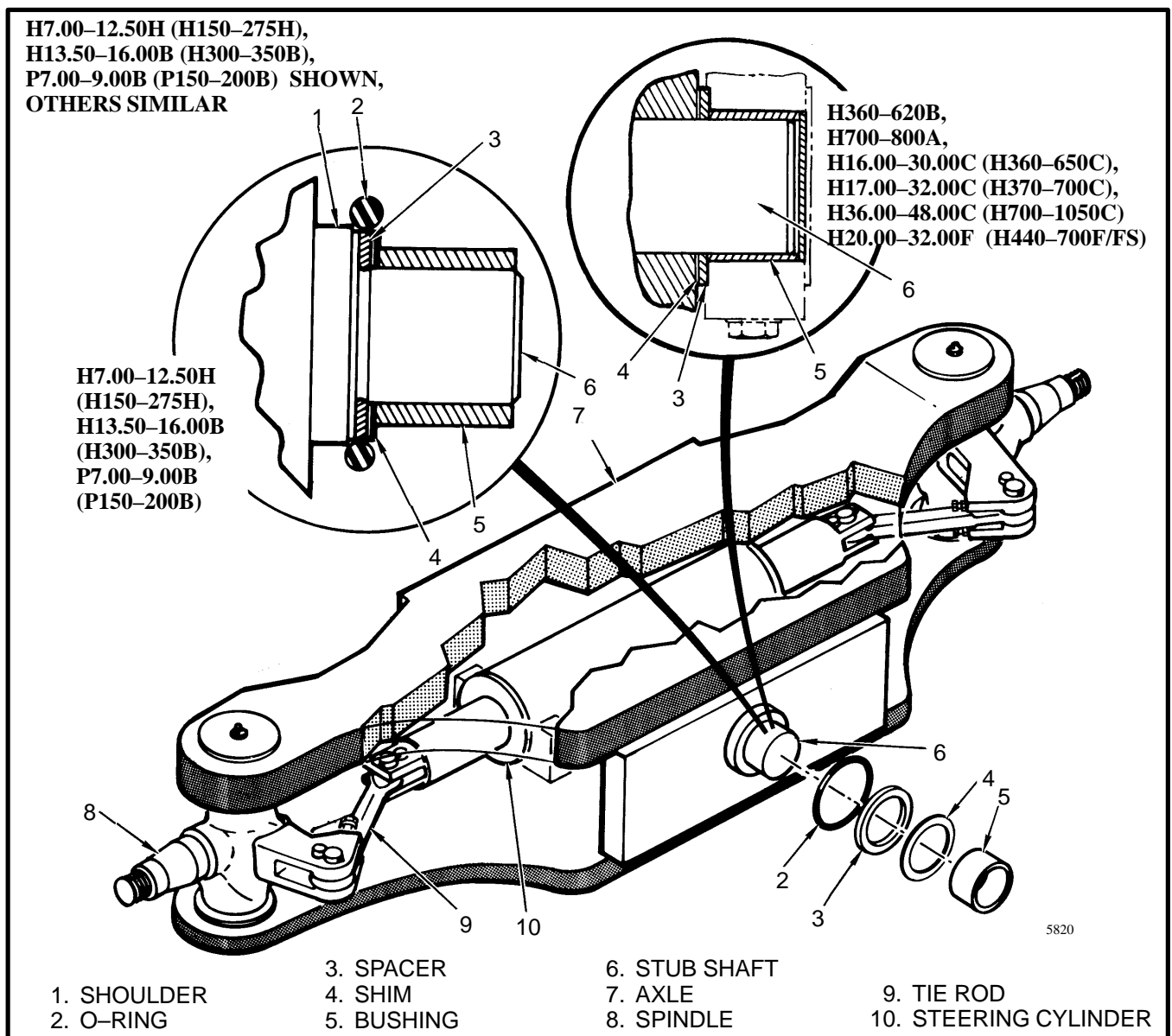


FIGURE 1. STEERING AXLE ASSEMBLY

Each spindle turns on two tapered roller bearings. The bearings are adjusted by shims that are held in position by a bearing cap. Each hub and wheel assembly also turns on two tapered roller bearings. The grease seals protect the bearings from dirt and water. The wear sleeves protect the hub from wear caused by the seals.

## **WARNING**

**The parts and assemblies handled in this section are very heavy. Make sure that the lifting devices used during the repairs can lift the weight. Make sure the lift truck is in a position of stability before making repairs.**

The following examples are given to help you make an estimate of the weight that will be lifted.

1. Weight of a lift truck at the steering axle:  
H9.00H (H200H) – 12 000 kg (26000 lb)  
H620B – 17 000 kg (35000 lb)  
H800A – 20 400 kg (45000 lb)  
H48.00C (H1050C) – 26 190 kg (57750 lb)  
H32.00F (H700F/F) – 21 700 kg (47850 lb)

2. Weight of a steering axle without wheels:  
H620B – 1 800 kg (3900 lb)  
H48.00C (H1050C) – 1910 kg (4210 lb)  
H32.00F (H700F) – 1910 kg (4210 lb)

3. Weight of a steering cylinder:  
H800A – 210 kg (450 lb)  
H48.00C (H1050C) – 240 kg (475 lb)  
H32.00F (H700F) – 240 kg (475 lb)

**NOTE:** The wheels, hubs, bearings, spindles, cylinders and tie rods can be removed with the axle in the lift truck.

## **REPAIRS**

### **STEERING AXLE**

#### **WARNING**

**Put the lift truck on blocks. Follow the procedures for raising the lift truck in the OPERATING MANUAL or Periodic Maintenance section for this lift truck. The surface must be solid, even, and level. Make sure that any blocks used to support the lift truck are solid, one piece units. Make sure the lifting devices used during repairs can lift the weight of the parts.**

#### **Removal**

When removing the axle, disconnect the hydraulic lines and install caps on the cylinder fittings. The caps will prevent the cylinder rod from moving as the axle is removed from under the lift truck. Put a lifting device under the axle. Remove the caps holding the stub shafts to the frame. Lower the axle from the frame and move the axle from the lift truck.

#### **Installation**

When installing the axle, make sure the spacer, shims and bushing are in the correct position. Lubricate the bushings and stub shafts with multi-purpose grease. Raise the axle into the frame mounts. Install the stub shaft caps. Check the clearance between the shims and

the mounts. Add or subtract shims as necessary to get zero clearance. Tighten the capscrews holding the caps to the frame.

On **H7.00–12.50H (H150–275H)**, **H13.50–16.00B (H300–350B)**, **P7.00–9.00B (P150–200B)** units, tighten the capscrews to 380 Nm (280 lbf ft).

On **H360–620B**, **H700–800A**, **H36.00–44.00B (H700–920B)**, **H17.00–48.00C (H360–1050C)**, **H20.00–32.00F (H440–700F/FS)** units, tighten capscrews to 660 Nm (485 lbf ft).

### **STEERING CYLINDER (See FIGURE 2.)**

#### **Removal**

The steering cylinder can be removed with the axle in the lift truck. Disconnect the hydraulic lines and put caps on the fittings. Disconnect the tie rods at the cylinder rod ends. For models H360–620B, H700–800A, put blocks under the cylinder so that the cylinder does not fall when the capscrews are removed. Remove the capscrews that hold the cylinder to the axle frame. Remove the cylinder from the lift truck.

**NOTE:** Early trucks had cylinders mounted to the top of the axle. Others mount either to the front or bottom of the axle. Blocks are not required under the cylinder.

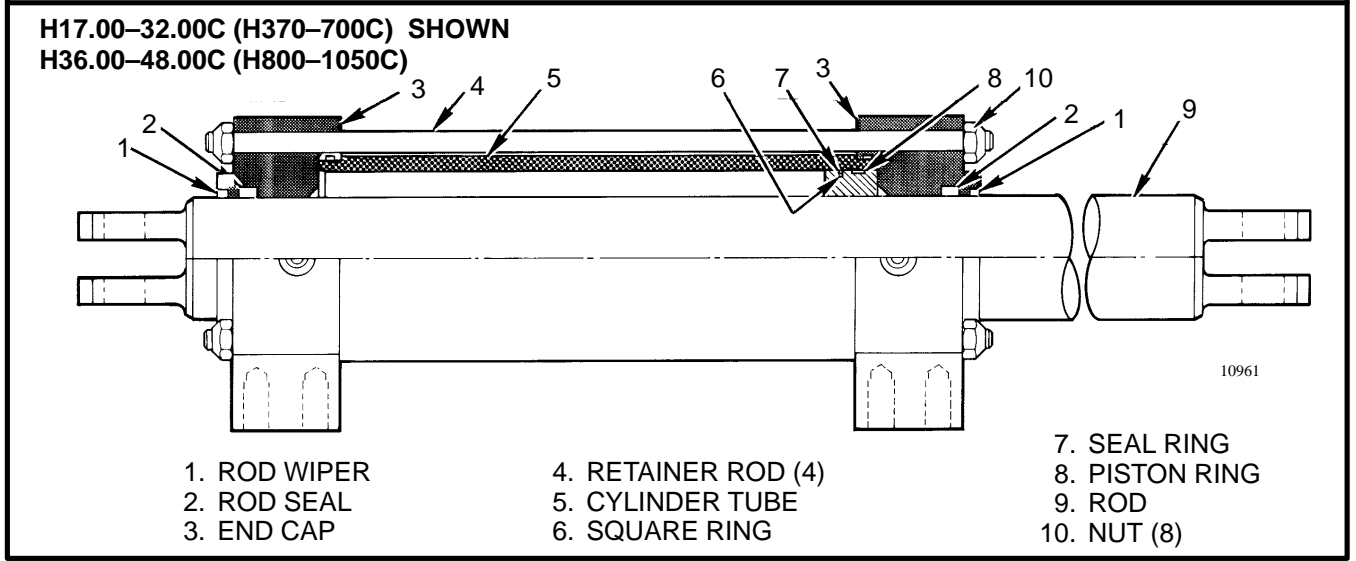
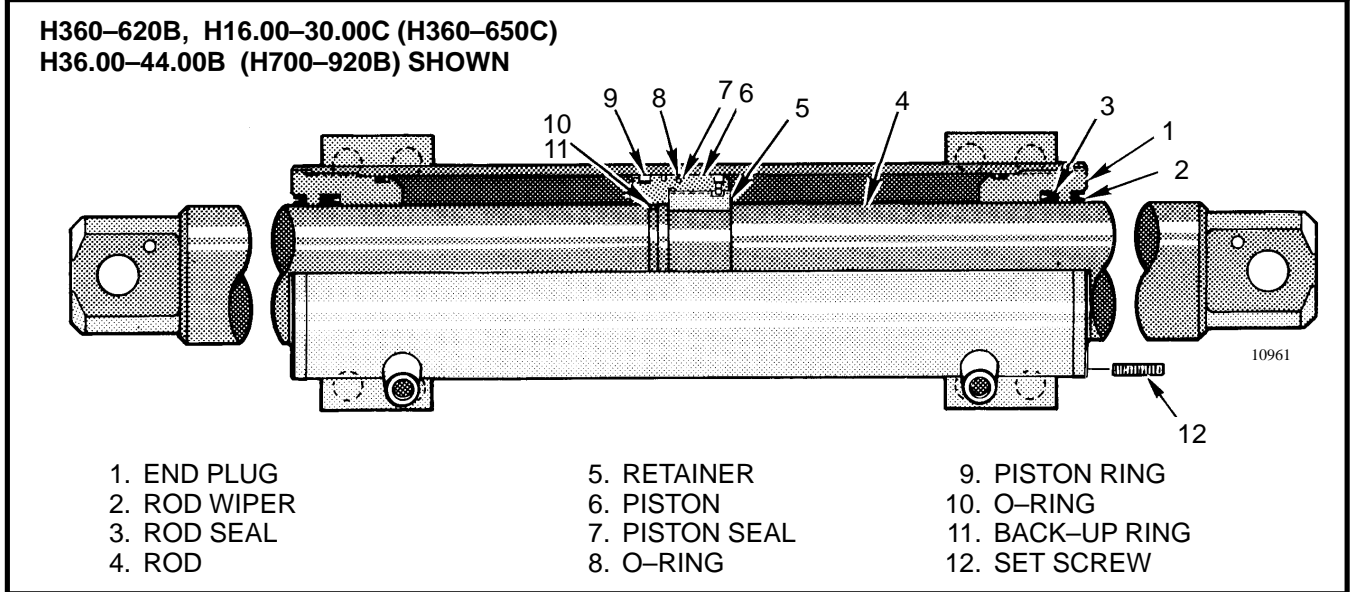
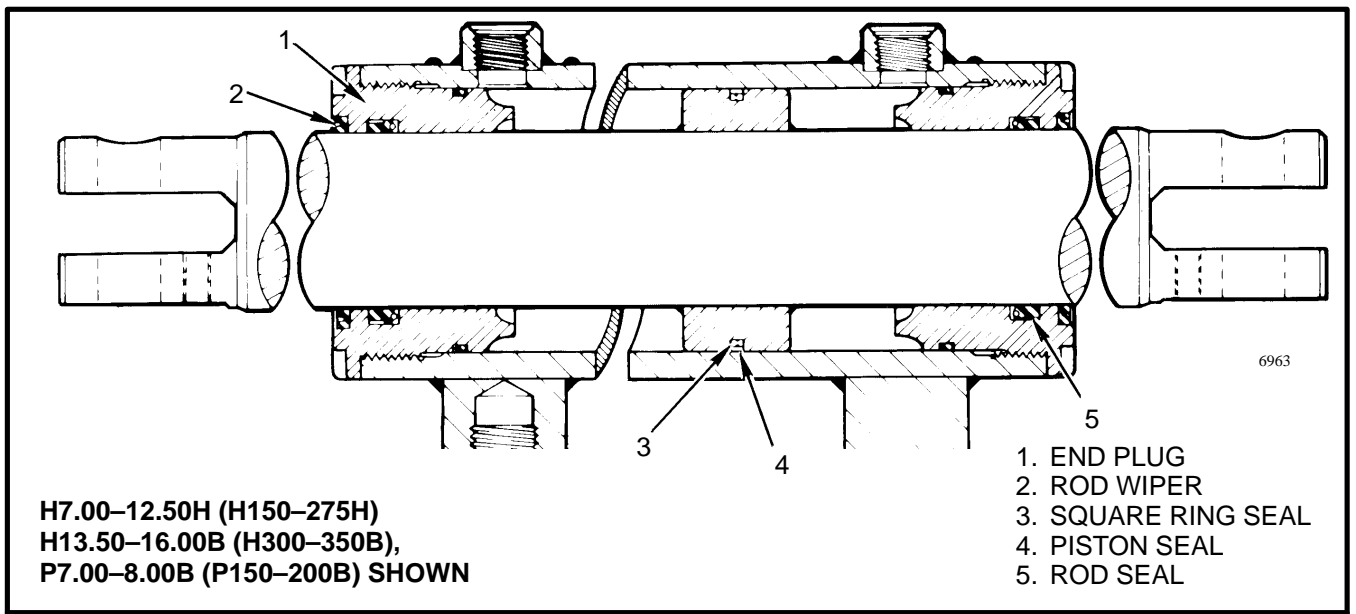


FIGURE 2. STEERING CYLINDER

## Inspection

1. Inspect the piston rod for grooves or damage. Remove small scratches with emery cloth.
2. Inspect the brackets on the cylinder for cracks.

## Assembly

1. Repair the cylinder as necessary using new seals and O-rings. Lubricate the parts with hydraulic oil during assembly. Make sure that the square ring seal is under the piston seal ring.

2. Tighten each cylinder end plug to the following torque values:

H7.00–12.50H(H150–275H), H13.50–16.00B  
(H300–350B), P7.00–9.00B (P150–200B)  
410–475 Nm (300–350 lbf ft)

H360–620B , H16.00–30.00C (H360–650C),  
H17.00–32.00C (H370–700C)  
815–950 Nm (600–700 lbf ft)

H700–800A, H36.00–44.00B (H700–920B)  
1220–1360 Nm (900–1000 lbf ft)

3. On H36.00–48.00C (H800–1050C), H20.00–32.00F (H440–700F/FS), H360–650C and on later model H17.00–32.00C (H370–700C) lift trucks, the steering cylinders have end caps that are fastened at each end of the cylinder by four retainer rods and nuts. Tighten the nuts evenly to 320 Nm (236 lbf ft)

## Installation

**H7.00–12.50H (H150–275H), H13.50–16.00B (H300–350B), P7.00–9.00B (P150–200B) and H700–800A:**

Install the steering cylinder as follows:

1. Install the hydraulic fittings on the cylinder. Install the cylinder in the axle frame. Tighten the cap-screws that hold the cylinder to the axle frame as follows:

H7.00–12.50H (H150–275H), H13.50–16.00B  
(H300–350B), P7.00–9.00B (P150–200B)  
625 Nm (460 lbf ft),  
H700–800A  
1900–2035 Nm (1400 to 1500 lbf ft).

2. Install the seals on the tie rod bearings (if required). Install the pivot pins and anchor pins. If the tie rods have grease fittings, make sure the grease fittings are toward the counterweight. Do not damage the bearing seals when installing tie rods.

### **H360–620B:**

Install the steering cylinder as follows:

1. Install the hydraulic fittings on the cylinder. Put the cylinder in the correct position on the axle frame. Install the capscrews for the bracket on one end of the cylinder. Tighten the capscrews to 1085 Nm (800 lbf ft). Install the capscrews for the bracket on the other end of the cylinder. Do not tighten these capscrews.

2. Measure the clearance between the axle frame and the bracket that is not tight. Install shims between the axle frame and bracket so that there is zero clearance. Tighten the capscrews to 1085 Nm (800 lbf ft).

**H16.00–30.00C (H360–650C),  
H20.00–32.00F (H440–700F/FS),  
H36.00–44.00B (H700–920B):**

Install the steering cylinder as follows:

1. Install the hydraulic fittings on the cylinder. Put the cylinder in the correct position on the axle frame. Check for clearance between any of the brackets on the cylinder and the axle frame. If a bracket has clearance, install the capscrews in the opposite bracket. Tighten the capscrews to approximately 270 Nm (200 lbf ft).

2. Install shims between the axle frame and bracket so that there is zero clearance. Install the capscrews. Tighten all capscrews to 1085–1220 Nm (800–900 lbf ft).

**H36.00–48.00C (H800–1050C),  
H20.00–32.00F (H440–700F/FS),  
H17.00–32.00C (H370–700C)  
and on later H16.00–30.00C (H360–650C) models:**

Install the steering cylinder as follows:

1. Install the hydraulic fittings on the cylinder. Loosen the nuts at one end of the retainer rods one turn. Put the cylinder in the correct position on the axle frame.

2. Add shims between the end caps and the axle frame as required to allow the cylinder to have a flat mounting surface. Install the capscrews for the end caps and tighten by hand. Tighten the nuts on the retainer rods to 320 Nm (235 lbf ft).

3. Tighten the capscrews for the end caps evenly to 1085 to 1220 Nm (800 to 900 lbf ft).

**HUBS,  
H7.00–12.50H (H150–275H),  
H13.50–16.00B (H300–350B), P7.00–9.00B  
(P150–200B) (See FIGURE 3.)**

**Removal**

Remove the wheels to service the hubs. Remove the grease cap in the hub for access to the bearings. Remove the outer bearing assembly. Remove the hub. If the bearings or the seals are replaced, use a brass drift to remove the inner bearing assembly from the hub. Check for damage or wear on the bearings.

**⚠ WARNING**

**Cleaning solvents can be flammable and toxic and can cause skin irritation. When using cleaning solvents, always follow the solvent manufacturer's recommended safety procedures.**

Clean all parts with petroleum solvent. Make sure the bearings are clean. Make sure all solvent has evaporated from inside the bearing cones before filling them with grease.

**Installation**

Lubricate the two hub bearings with multi-purpose grease. Install the seal and the inner bearing. Install the outer hub bearing, washer and nut. Tighten the nut to 200 Nm (150 lbf ft) while rotating the hub. Loosen the nut until the hub rotates freely. Tighten the nut to 35 Nm (25 lbf ft). Lock the nut in position with a cotter pin at the first alignment slot that occurs at approximately or above 35 Nm (25 lbf ft).

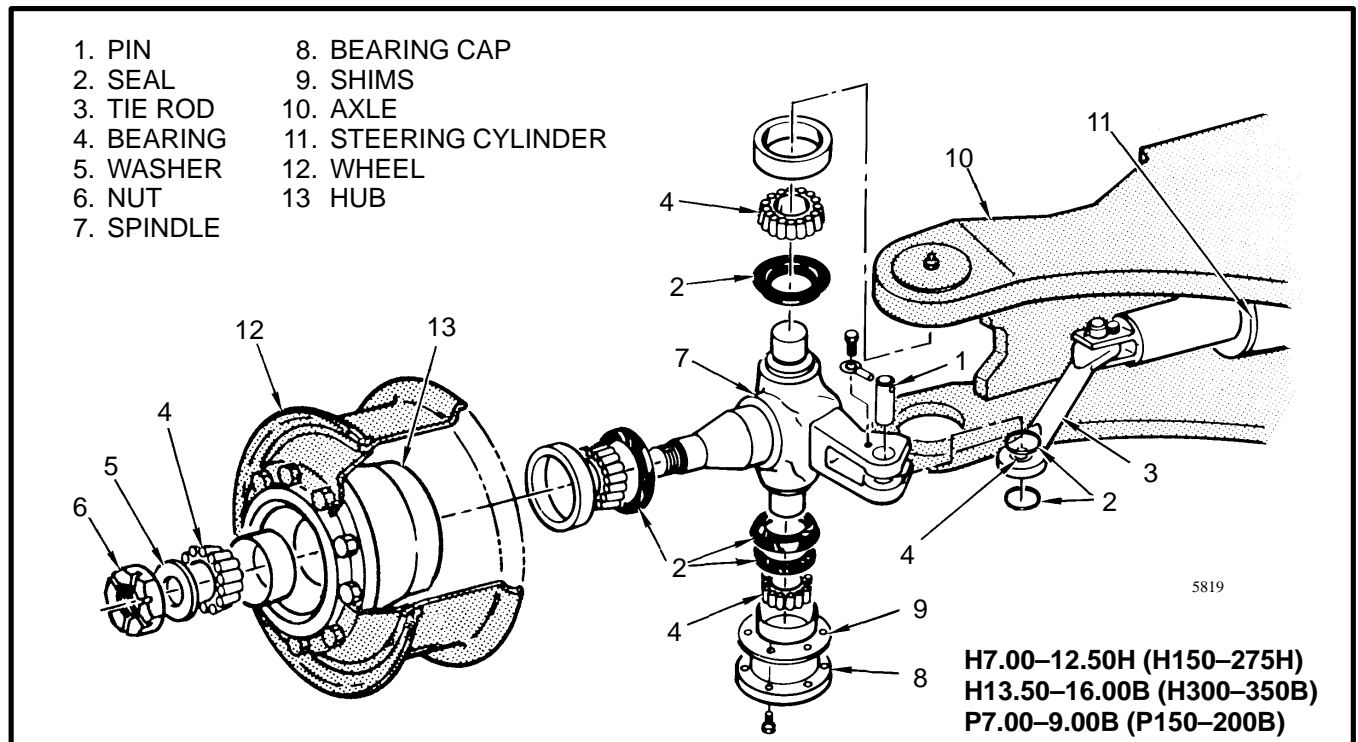


FIGURE 3. SPINDLE AND HUB

(More Content includes: Brake system, Capacities, and specifications, Frame, Hydraulic, System, Industrial battery, Main control, Valve, Mast repair, Fasteners, Schematics diagrams, Steering axle, Steering system, Wire harness repair And more)

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much.**

**HUBS,**  
**H360–620B, H16.00–30.00C (H360–650C),**  
**H17.00–32.00C (H370–700C), H700–800A,**  
**H36.00–44.00B (H700–920B),**  
**H36.00–48.00C (H800–1050C),**  
**H20.00–32.00F (H440–700F/FS)**  
**(See FIGURE 4.)**

### Removal

Remove the wheels to service the hubs. Remove the hub cover. Remove the lubricant from the hub. Remove the outer bearing assembly.

Remove the hub. If the bearings or the seals are replaced, use a brass drift to remove the inner bearing assembly from the hub. Check for damage or wear on the bearings.

### **WARNING**

**Cleaning solvents can be flammable and toxic and can cause skin irritation. When using cleaning solvents, always follow the solvent manufacturer's recommended safety procedures.**

Clean all parts with petroleum solvent. Make sure the bearings are clean. Make sure all solvent has evaporated from inside the bearing cones before filling them with grease.

### Installation

1. Lubricate the bearings with multi-purpose grease. Install the inner bearing and seal. Install the hub, outer bearing, washer and adjusting nut on the spindle. Tighten the adjusting nut to 200 Nm (150 lbf ft) while rotating the hub. Loosen the adjusting nut, then tighten the nut with your fingers.

2. Install the lock washer against the adjusting nut. Tighten the adjusting nut a small amount until a tab on the lock washer aligns with a notch in the adjusting nut. Bend the tab on the lock washer to lock the adjusting nut.

3. Install the lock nut and tighten it to 135–270 Nm (100–200 lbf ft). Bend the tab on the lock washer to lock the lock nut.

4. Install the gasket and hub cover. Fill the hub with multi-purpose grease to the bottom of the hole in the center of the hub cover. Install the plug in the hole.

## SPINDLES

### Removal

Remove the wheels from the steering axle to service the spindles. Remove the hubs. Disconnect the tie rod from the spindle. Remove the bearing cap for the spindle bearing as follow:

1. Remove the six capscrews.
2. Install a capscrew in each of the two puller holes that have threads.
3. Tighten the two capscrews to pull the bearing cap from the axle. Remove the spindle assembly from the axle.

### Installation

1. Lubricate the upper bearing and install it and the seal in the axle frame. Lubricate the lower bearing and install it and the seal in the bearing cap. Install the dust seal on the lower spindle pivot and put the spindle in the axle frame. Install the bearing cap and bearing without the shims.

2. Adjust the spindle bearing clearance as follows:
  - a. Tighten the six capscrews for the bearing cap to 50 Nm (35 lbf ft) while rotating the spindle.
  - b. Loosen the six capscrews. Tighten the six capscrews until the spindle has zero clearance.
  - c. Measure the clearance between the bearing cap and the axle frame. Install enough shims to fill the clearance. When the adjustments are correct, there is no clearance on the spindle bearings.
  - d. Install the bearing cap and capscrews. Tighten the capscrews as follows:

H7.00–12.50H (H150–275H), H13.50–16.00B (H300–350B), P7.00–9.00B (P150–200B)  
75 Nm (55 lbf ft)

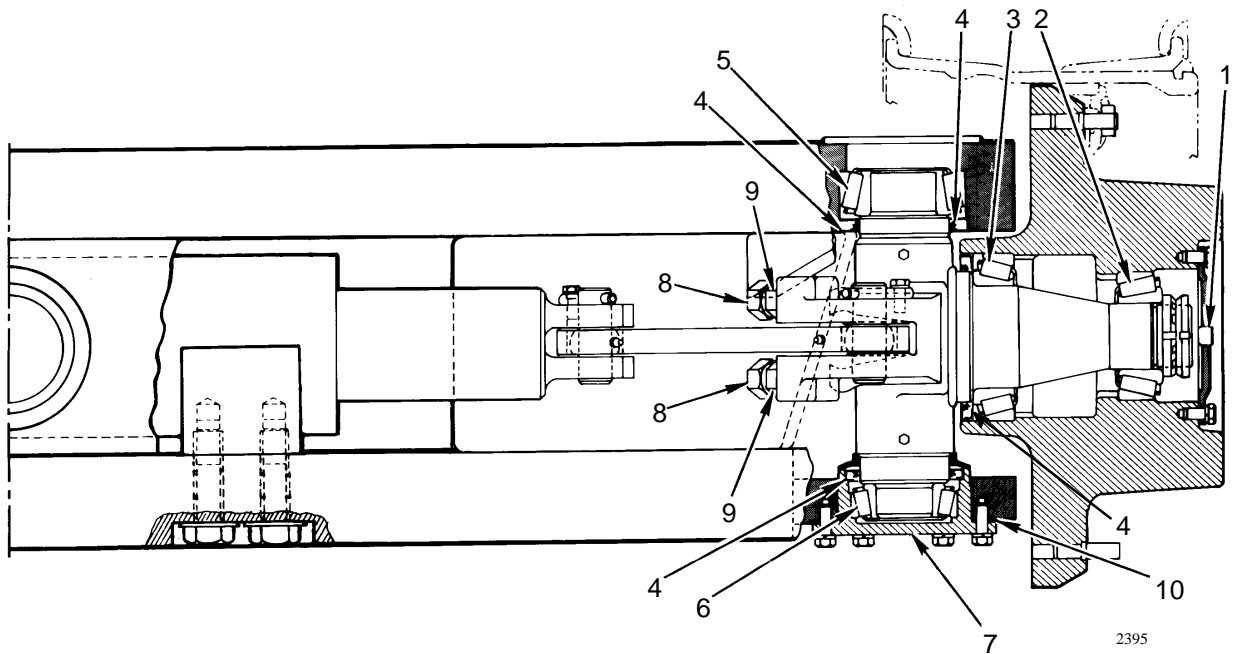
H360–620B – 35–50 Nm (25–35 lbf ft)

H16.00–30.00C (H360–650C), H17.00–32.00C (H370–700C), H700–800A, H36.00–44.00B (H700–920B), H20.00–32.00F (H440–700F/FS)– 50 Nm (35 lbf ft)

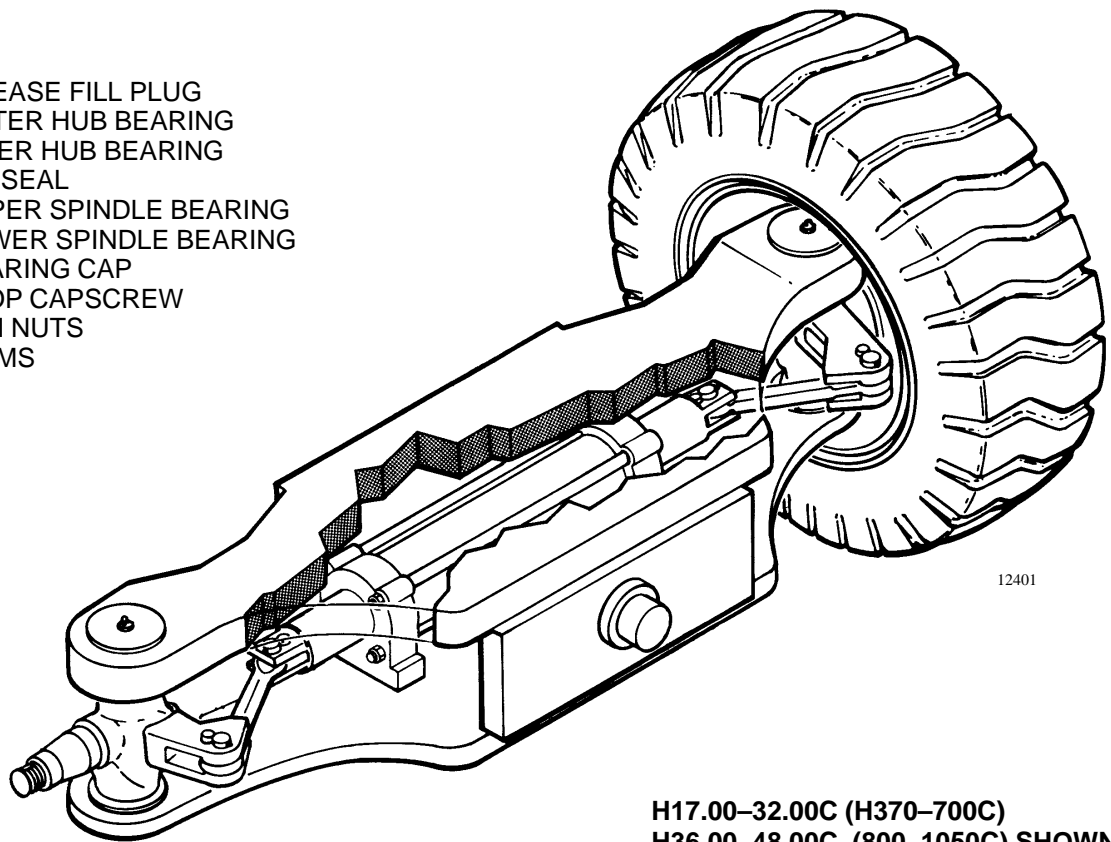
3. Remove the plugs in the spindle and lubricate the bearings with a grease gun. To prevent damage to the seals, pull the seal away from the shaft while greasing and do not use a power grease gun.

4. Connect the tie rod to the spindle. The tie rods are not adjustable.

H16.00-30.00C (H360-650C),  
H36.00-44.00B (H700-920B) SHOWN



1. GREASE FILL PLUG
2. OUTER HUB BEARING
3. INNER HUB BEARING
4. OIL SEAL
5. UPPER SPINDLE BEARING
6. LOWER SPINDLE BEARING
7. BEARING CAP
8. STOP CAPSCREW
9. JAM NUTS
10. SHIMS



H17.00-32.00C (H370-700C)  
H36.00-48.00C (800-1050C) SHOWN

FIGURE 4. AXLE ASSEMBLY



## CHECKS AND ADJUSTMENTS

### REMOVE THE AIR FROM THE STEERING SYSTEM

Remove the air from the system after installation. If air is in the system, the steering wheel will not turn smoothly. To remove the air start the engine and turn the steering wheel several times from one stop to the other.

### ADJUST THE CYLINDER STOPS (See FIGURE 4.)

The H360–620B, H16.00–30.00C (H360–650C), H17.00–32.00C (H370–700C), H700–800A, H32.00–44.00B (H700–920B), H36.00–48.00C (H800–1050C), and H20.00–32.00F (H440–700F/FS) units have cylinder stops. Adjustable stops are part of the spindles. Adjust these stops as described in the following procedure:

1. Turn all the stop capscrews clockwise so that the jam nuts touch both the capscrew heads and the axle frame.
2. Operate the steering cylinder for a maximum turn. Make a mark on the shortest cylinder rod at the end plug. Use a pen that has a felt tip or an equivalent. Do not put a scratch mark on the rod.
3. Turn the capscrews touching the axle frame to move the cylinder rod 6.4 mm (0.25 in) out of the cylinder. Measure the distance from the mark to the end plug. Make sure both capscrews move the same amount.
4. Use a wrench to hold each capscrew and tighten each jam nut against the spindle.
5. Move the steering wheel for a maximum turn in the opposite direction. Repeat steps 2, 3 and 4.