Installation Instructions

KNORR-BREMSE® IPS90™ AND IPS100™ HYDRAULIC POWER STEERING GEAR INPUT SHAFT SERVICE KIT FOR COMMERCIAL VEHICLES

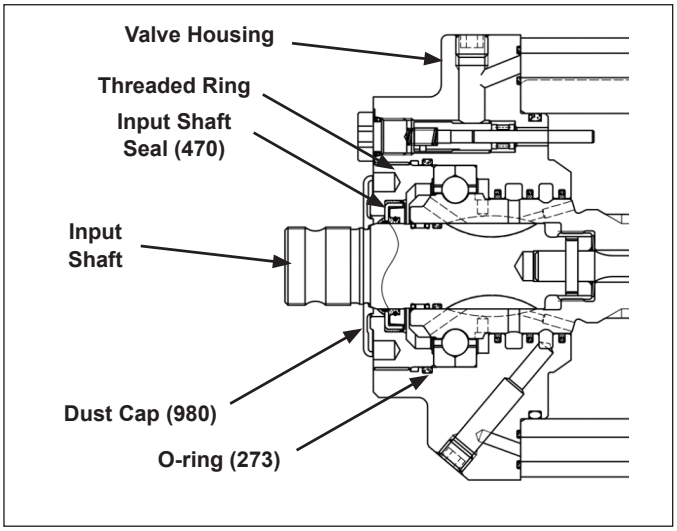

Figure 1 - Steering Gear Cross-Sectional View

⚠ WARNING

Steering gears are heavy. When assembling and disassembling the steering gears, make sure to follow all safety protocols.

Steering fluid can get hot and reach temperatures up to 250° F (121° C). Use the appropriate PPE when servicing.

Comply with OSHA guidelines.

Avoid high-pressure hydraulic wash on steering gears and steering sub-systems.

Unless and otherwise mentioned, use of hammer or heat to disassemble steering components is not permitted.

Use manufacturer-recommended steering fluid only. Mixing of fluids may cause internal damage to rubber or plastic components.

GENERAL SAFETY GUIDELINES

⚠ WARNING! PLEASE READ AND FOLLOW THESE INSTRUCTIONS TO AVOID PERSONAL INJURY OR DEATH:

When working on or around a vehicle, the following guidelines should be observed AT ALL TIMES:

- ▲Park the vehicle on a level surface, apply the parking brakes and always block the wheels. Always wear personal protection equipment.
- ▲Stop the engine and remove the ignition key when working under or around the vehicle. When working in the engine compartment, the engine should be shut off and the ignition key should be removed. Where circumstances require that the engine be in operation, EXTREME CAUTION should be used to prevent personal injury resulting from contact with moving, rotating, leaking, heated or electrically-charged components.
- ▲Do not attempt to install, remove, disassemble or assemble a component until you have read, and thoroughly understand, the recommended procedures. Use only the proper tools and observe all precautions pertaining to use of those tools.
- ▲If the work is being performed on the vehicle's air brake system, or any auxiliary pressurized air systems, make certain to drain the air pressure from all reservoirs before beginning ANY work on the vehicle. If the vehicle is equipped with a Bendix® AD-IS® air dryer system, a Bendix® DRM™ dryer reservoir module, a Bendix® AD-9si®, AD-HF®, or AD-HF®i air dryer, be sure to drain the purge reservoir.
- ▲Following the vehicle manufacturer's recommended procedures, deactivate the electrical system in a manner that safely removes all electrical power from the vehicle.
- ▲Never exceed manufacturer's recommended pressures.
- ▲Never connect or disconnect a hose or line containing pressure; it may whip and/or cause hazardous airborne dust and dirt particles. Wear eye protection. Slowly open connections with care, and verify that no pressure is present. Never remove a component or plug unless you are certain all system pressure has been depleted.
- ▲Use only genuine Bendix® brand replacement parts, components and kits. Replacement hardware, tubing, hose, fittings, wiring, etc. must be of equivalent size, type and strength as original equipment and be designed specifically for such applications and systems.
- ▲Components with stripped threads or damaged parts should be replaced rather than repaired. Do not attempt repairs requiring machining or welding unless specifically stated and approved by the vehicle and component manufacturer.
- ▲Prior to returning the vehicle to service, make certain all components and systems are restored to their proper operating condition.
- ▲For vehicles with Automatic Traction Control (ATC), the ATC function must be disabled (ATC indicator lamp should be ON) prior to performing any vehicle maintenance where one or more wheels on a drive axle are lifted off the ground and moving.
- ▲The power MUST be temporarily disconnected from the radar sensor whenever any tests USING A DYNAMOMETER are conducted on a vehicle equipped with a Bendix® Wingman® system.
- ▲You should consult the vehicle manufacturer's operating and service manuals, and any related literature, in conjunction with the Guidelines above.

KIT COMPONENTS

The Knorr-Bremse® IPS90™ and IPS100™ Hydraulic Power Steering Gear Input Shaft Service Kit contains the following parts:

Item No.	Description	Qty.
470	Oil Seal	1
980	Dust Cap	1
273	O-ring	1

Required Tools

- ¼-in. Flathead Screwdriver
- Drain Pan
- Grease: DYNAMAX® (or equivalent)
- Liquid Gasket: Herme Seal 101Y or ThreeBond® 1102
- Non-metallic Brush
- Plugs for Inlet and Outlet Ports
- Tape
- Threaded Ring Socket (K218648)
- Seal Press-In Tool (K218642)
- Seal Removal Tool (K218647)
- Wrench

PROCEDURE

1. Remove the steering column lower u-joint from the steering gear input shaft by following the vehicle manufacturer's instructions. Place the drain pan below the steering gear. Depending on how the steering gear is mounted, some fluid may be lost.
2. Clean the splines of the input shaft with a non-metallic bristle brush to prevent damage to the splines.
3. Tape the splines of the input shaft to prevent damage to the threaded ring or the new input shaft seal during reassembly.
4. Remove the dust cap from the input shaft by using a 1/4-in. flathead screwdriver.

⚠ CAUTION

Do not scratch the input shaft during removal.

5. Loosen the threaded ring using a threaded-ring socket (K218648) with a wrench and carefully take out the threaded ring from the valve housing.

See Figure 2.

Figure 2 - Removing the Threaded Ring from the Steering Gear

NOTE: *See Figure 3.* To prevent the upper ball race from moving outwards after removing the o-ring, the steering assembly shall be in a vertical position with the input shaft oriented upward. In order to easily remove the o-ring, slightly push the upper ball race by finger from the top after removing the threaded ring.

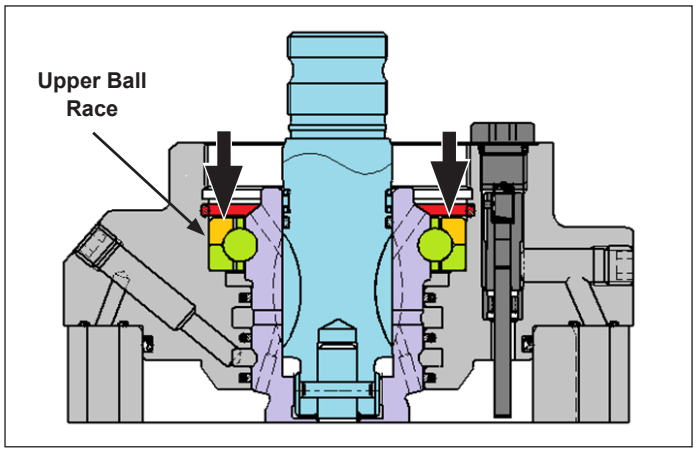

Figure 3 - Upper Ball Race Cross-Sectional View

NOTE: If the input shaft is rust-pitted or badly worn, the steering gear will have to be replaced. The input shaft itself is not serviceable.

6. *See Figure 4A*. Remove the input shaft seal by pushing it out using the seal removal tool K218647 and discard it.

Figure 4A - Input Shaft Seal Disassembly

⚠ CAUTION

It is recommended that you use your hand to press the input shaft seal into the threaded ring slot. If using your hand is not sufficient, use a rubber mallet to ensure the input shaft seal is secured in the threaded ring slot.

⚠ CAUTION

Do not damage the seal seat when removing the seal. If the seal seat gets damaged, external leakage can happen and the steering gear would need to be replaced.

7. Inspect the seal seat for any contamination. If needed, clean the seal seat.
8. Apply a very small amount of grease to the outer diameter of the new input shaft seal.
9. *See Figure 4B*. Press in the new input shaft seal using the seal press-in tool K218642. Press in the new input shaft seal until it is fully seated. Ensure the input shaft seal lip is directed to the outside, pointing toward the press-in tool.

Figure 4B - Input Shaft Seal Assembly

10. If needed, grease the inner diameter of the new input shaft seal.
11. Clean the thread in the valve housing and on the threaded ring from liquid gasket remnants.
12. Replace the o-ring inside the valve housing with a new o-ring. *See Figure 5.*

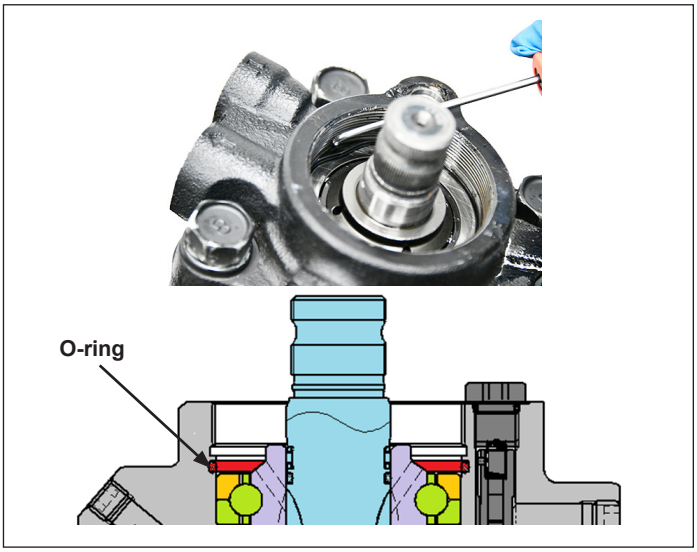

Figure 5 - O-ring Position

NOTE: *See Figure 5.* Ensure the o-ring is positioned on the correct groove and inserted into the groove at the bottom of the input shaft. Ensure there are no o-ring remnants inside the thread pitch of the threaded ring.

13. *See Figure 6.* Apply new liquid gasket to the area of the threaded ring shown. Only one thin coat of liquid gasket is needed to only one or two threads.

Figure 6 - Liquid Gasket Application

14. *See Figure 7.* Carefully push the threaded ring over the input shaft and, with the threaded-ring socket and a wrench, torque the threaded ring to 226-245 N•m.

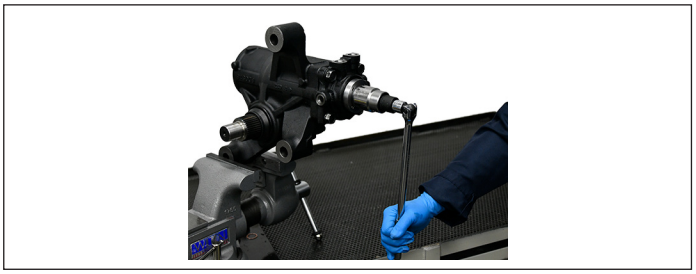

Figure 7 - Torquing the O-ring

15. *See Figure 8.* Grease the inner diameter of the new dust cap and install the dust cap over the input shaft. Ensure the dust cap is pushed down below the bottom of the splines and makes good contact with the cover.

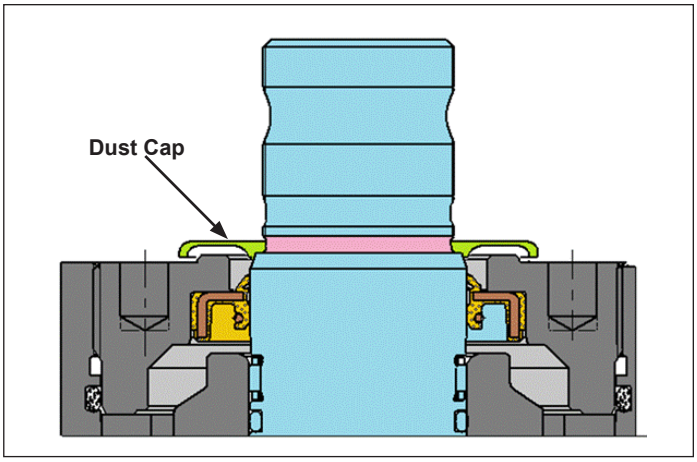

Figure 8 - Dust Cap Installation

16. Remove the tape from the input shaft and reinstall the steering column lower yoke. Torque the pinch bolt to the manufacturer's specification. Fill the power steering reservoir to the proper level, start the vehicle, and check for leaks.

For direct telephone technical support, contact the Bendix Tech Team at 1-800-AIR-BRAKE (1-800-247-2725), option 2, Monday through Thursday, 8:00 a.m. to 6:00 p.m., and Friday, 8:00 a.m. to 5:00 p.m., E.T. The Bendix Tech Team can also be reached by email at: techteam@bendix.com. Please have the following information ready when you contact the Bendix Tech Team:

- Bendix product model number
- Part number and configuration
- Vehicle make and model

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