

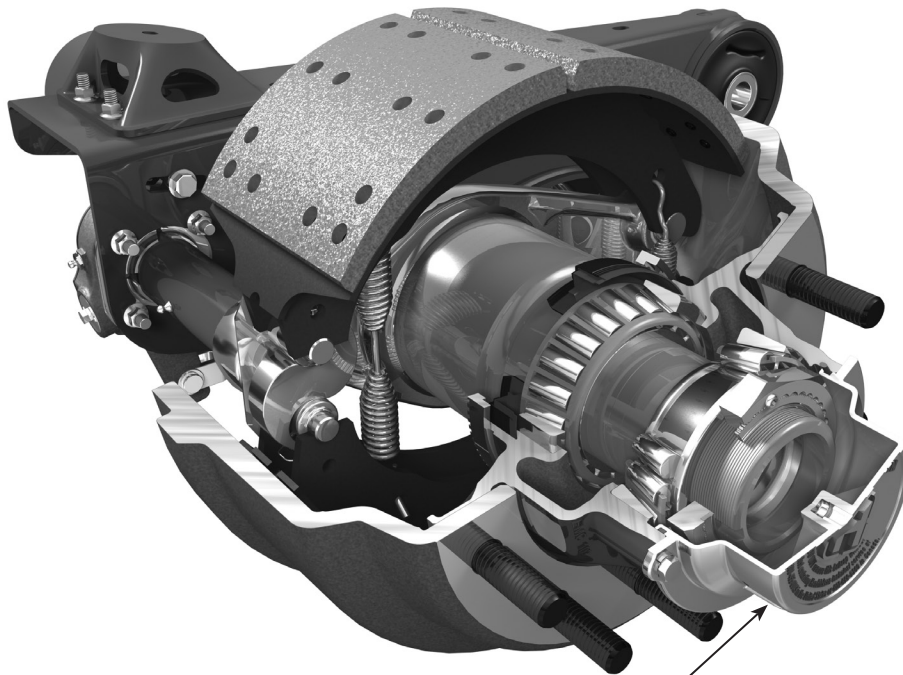
H TECHNICAL PROCEDURE

TRAILER SUSPENSION SYSTEMS

SUBJECT: HNP™ Maintenance Procedures

LIT NO: T72001

DATE: December 2010



H HENDRICKSON

HNP™ Wheel End

DO NOT remove this hubcap without first contacting
Hendrickson technical service at 800-455-0043 in
the United States or 800-668-5360 in Canada.

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H HENDRICKSON
The World Rides On Us®

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CONVENTIONS APPLIED IN THIS DOCUMENT

EXPLANATION OF SIGNAL WORDS

Hazard signal words (such as DANGER, WARNING or CAUTION) appear in various locations throughout this publication. Information accented by one of these signal words must be observed at all times. Additional notes are utilized to emphasize areas of procedural importance and provide suggestions for ease of repair. The following definitions comply with ANSI Z535.4 and indicate the use safety signal words as they appear throughout the publication.


 **DANGER: INDICATES IMMEDIATE HAZARDS WHICH WILL RESULT IN SEVERE PERSONAL INJURY OR DEATH.**

 **WARNING: Indicates hazards or unsafe practices which could result in severe personal injury or death.**

 **CAUTION: Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.**

NOTICE: Indicates hazards or unsafe practices which could result in damage to machines or equipment.

IMPORTANT: An operating procedure, practice or condition that is essential to emphasize.

 Safety alert symbol used to indicate a condition exists that may result in personal injury or harm to individuals. It must be applied to DANGER, WARNING and CAUTION statements.

GENERAL SERVICE NOTES

IMPORTANT: Special attention should be paid to the information included in IMPORTANT SAFETY NOTICES.

BEFORE YOU BEGIN

Read, understand and comply with:

- All instructions and procedures.
- All signal word (CAUTION, WARNING and DANGER) statements to help avoid personal injury or property damage.
- Company's maintenance, service, installation and diagnostic practices.
- Vehicle manufacturer's safety instructions when working on the vehicle.
- Vehicle manufacturer's instructions for recommended practices not described in this manual.
- Local safety regulations.

DURING SERVICE:

- Work must be carried out by trained personnel.
- Sudden release of tensioned springs (e.g. the spring brake part of the brake chamber or the brake return spring) may cause injury.
- Use recommended tools only.
- Before releasing trailer back into service, perform operational checks and test the trailer to make sure brakes are working correctly.

Hendrickson reserves the right to make changes and improvements to its products and publications at any time. Consult the Hendrickson website (www.hendrickson-intl.com) for the latest version of this manual.

IMPORTANT SAFETY NOTICES

Proper maintenance, service and repair is important to the reliable operation of the suspension system and components. The procedures recommended by Hendrickson and described in this publication are methods of performing inspection, maintenance, service and repair.

All instructions and safety information should be read carefully to help prevent personal injury and to assure that proper methods are used. Improper maintenance, service or repair can cause damage to the vehicle and

other property, personal injury, an unsafe operating condition or void the manufacturer's warranty.

Carefully read, understand and follow all safety related information within this publication.

⚠ WARNING: DO NOT modify or rework parts.
 Use ONLY Hendrickson authorized replacement parts. Use of substitute, modified or replacement parts not authorized by Hendrickson may not meet Hendrickson's specifications. It can also result in failure of the part, loss of vehicle control and possible personal injury or property damage. Do not modify parts without written authorization from Hendrickson.

⚠ WARNING: Always wear proper eye protection and other required PPE (personal protective equipment) when performing vehicle maintenance, repair or service.

⚠ WARNING: Solvent cleaners can be flammable, poisonous and can cause burns. To help avoid serious personal injury, carefully follow the manufacturer's product instructions and guidelines and the following procedures:

- Wear proper eye protection
- Wear clothing that protects your skin
- Work in a well ventilated area
- DO NOT use gasoline, or solvents that contain gasoline. Gasoline can explode.
- Hot solution tanks or alkaline solutions must be used correctly. Follow the manufacturer's recommended instructions and guidelines carefully to help prevent personal accident or injury.

⚠ CAUTION: A mechanic using a service procedure or tool which has not been recommended by Hendrickson must first satisfy himself that neither his safety nor the vehicle's safety will be jeopardized by the method or tool selected. Individuals deviating in any manner from the provided instructions assume all risks of consequential personal injury or damage to equipment.

CONTACTING HENDRICKSON

Contact Hendrickson Trailer Technical Services for technical assistance as needed. To do so, several options are available.

Prior to contacting Technical Services, it may be best to have the following information about your Hendrickson suspension available:

- Vehicle VIN number. Refer to trailer OEM manual for location.
- Suspension ID Tag information (Refer to Hendrickson Lit. No. L977 ID Guide, page 2 for tag location and details):
 - Suspension model number
 - Serial number for the suspension
- Trailer In-service date.
- Vehicle date of manufacture.
- Where applicable, include ID Tag information for:
 - Brake
 - Axle
 - Brake Caliper
 - Any other relative system or components.
- Vehicle configuration. (Type, number of axles, lift axles, etc.)
- System performance symptoms: When do they occur? How often do they occur? Etc...
- What troubleshooting and/or measurements have been performed?
- What service data literature do you have or need?



PHONE

Contact Hendrickson directly at 866-RIDEAIR (743-3247) in United States and 800-668-5360 in Canada. From the menu, select:

- Technical Services/Warranty for technical information.
- Other selections include:
 - Aftermarket Sales for replacement parts information and ordering.
 - Original Equipment Sales for parts inquires and ordering for trailer manufactures.

EMAIL

For Hendrickson Trailer Technical Support, use the following email address:

htfs@hendrickson-intl.com

LITERATURE

If you suspect your version of this or any other Hendrickson manual is not "Up-to-Date", the most current version is free online at:

www.hendrickson-intl.com/literature/

Available Hendrickson documentation can be viewed or downloaded from this site.

All Hendrickson online documentation are PDF files that require Adobe Acrobat Reader to open. This is a free application downloadable from Adobe's home page (<http://get.adobe.com/reader/>).

Relative literature may include:

Name	Description
<u>L977</u>	Hendrickson Trailer Suspension Systems Identification Guide
TMC RMP	<i>Technology & Maintenance Council Recommended Maintenance Practices</i> is produced by the American Trucking Association (ATA) Councils (www.truckline.com). This document defines recommended maintenance practices for transportation equipment.

LINKS

This document includes links, below table, that can be applied when viewed electronically. When the mouse passes over a link, the pointer will change to identify the presence of a hyperlink. Press the mouse select (left) button to activate the link. Hyperlinks include:

Type	How to Identify	Function
Internal Headings	Links to headings are ALL CAPS with grey underline.	Reference to a heading within this document, when selected, will jump to the page with the referenced heading.
Numeric Links	Step number or page number with grey underline.	Identifies the page where the reference is located. When selected, the document will jump to the procedural step or page referenced. This includes TABLE OF CONTENTS, and LIST OF FIGURES at the beginning of this document.

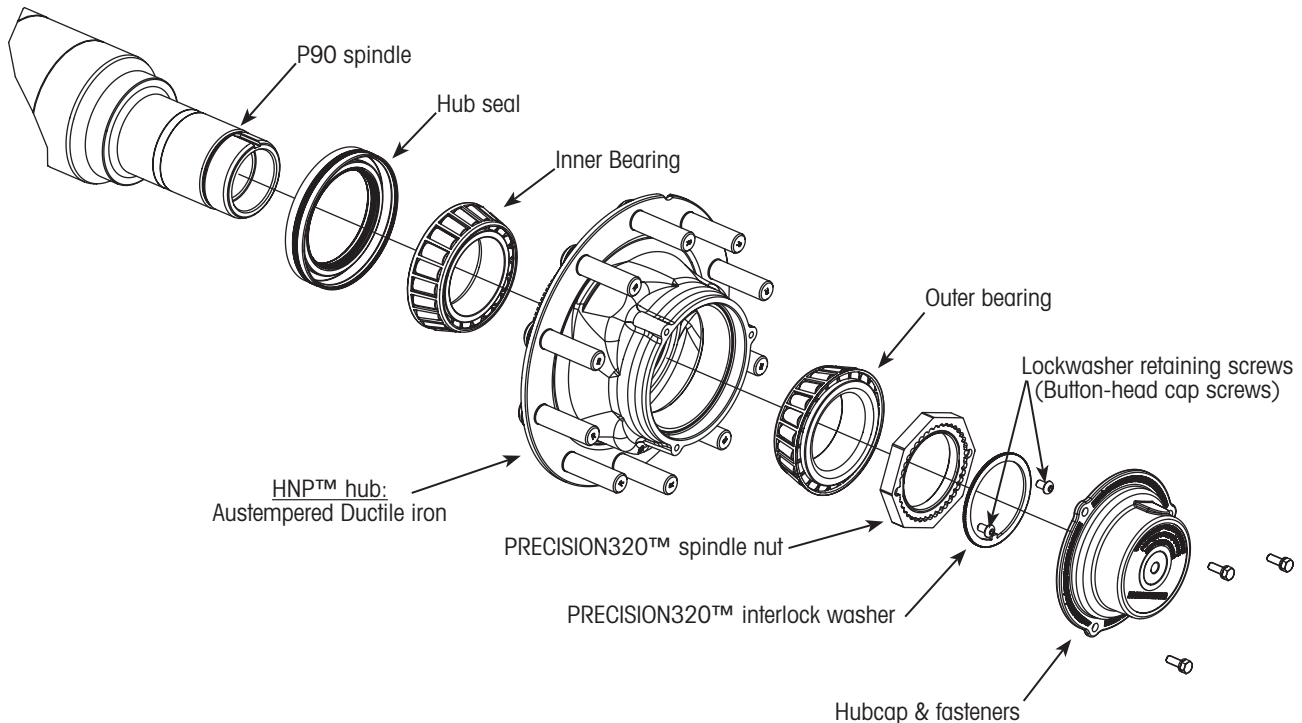


Figure 1 : Hendrickson HNP™ Wheel End parts identification

PREPARING TRAILER FOR SERVICE

NOTE: To ensure continued warranty, **DO NOT** remove the HNP™ hubcap or attempt any kind of field service without first contacting Hendrickson Technical Services. Refer to [CONTACTING HENDRICKSON](#) for details.

⚠ WARNING: To prevent serious eye injury, always wear safety glasses when performing trailer maintenance and service.

Before beginning any work on a trailer suspension system, the following steps help to ensure conditions are safe. Refer to [GENERAL SERVICE NOTES](#) on page 3.

1. Park the trailer on a level, debris-free surface.
2. Set the trailer parking brakes.
3. To prevent the trailer from moving, chock the wheels of an axle not being raised.
4. Exhaust the air from the trailer suspension.
5. Release the trailer parking brakes.

6. Using a jack, raise the axle until the trailer wheels clear the work surface.
7. Support the raised axle with safety stands.

⚠ WARNING: Do not work under a trailer supported by jacks only. Safety stands should be used to provide primary support. Jacks can slip or fall over, resulting in serious personal injury.

HENDRICKSON HNP™ SYSTEM INSPECTION

The Hendrickson HNP System hub assembly, [Figure 1](#) on page 6, comes factory pre-assembled, adjusted, sealed, and lubricated by Hendrickson. At the factory, the assembly, internal cleanliness, bearing adjustment, and seal installation are performed in a controlled environment.

The HNP System features a austempered ductile iron (ADI) hub and is field serviceable with Hendrickson authorized components. However, do not remove the HNP hubcap or attempt any kind of field service without first contacting Hendrickson Technical Services, Refer to [CONTACTING HENDRICKSON](#) for details.

TOOLS REQUIRED

The following tools are required during the performance of these maintenance procedures:

Tool ¹	Where Used
Torque Wrench (10 - 200 ft-lb or 13 - 271 N•m)	To be used with sockets listed in this table.
4-7/8 inch socket	PRECISION320 axle nut
1/2 inch socket	Hubcap fasteners
3/16 inch Allen wrench	Lock washer retaining screws
Dial Indicator, with mounting stand (resolution to 0.0001", 0.002 mm)	End-play measurement. Refer to Figure 3 on page 8.

IMPORTANT: Torque cannot be properly applied with an ordinary wrench. A calibrated torque wrench must be used to tighten fasteners to specified values with even distribution of applied forces.

INSPECTION

At regular intervals, the HNP hub assembly should be checked for seal leaks and smooth rotation.

⚠WARNING: Prior to performing inspection procedures, help ensure conditions are safe by following section **PREPARING TRAILER FOR SERVICE.**

Inspections should be performed:

- Every month:
 - ☐ Visually inspect back of the hub and the hubcap for leakage.
 - ☐ Refer to the section titled CHECKING FOR SEAL LEAKS for complete inspection details.
- Every three to four months:
 - ☐ Perform monthly inspection.
 - ☐ Check for smooth rotation.
 - » Refer to the section titled CHECKING FOR SMOOTH ROTATION for details.
 - » If assistance is required or the hub feels rough, sounds noisy or does not rotate freely, contact the Hendrickson Technical Services department. Refer to [CONTACTING HENDRICKSON](#) for details.
- During brake service and relining.

CHECKING FOR SEAL LEAKS

The HNP™ hub assembly is filled with semi-fluid grease at the factory during the manufacturing process. The grease is contained in the hub by the hub seal, Figure 1 on page 6. A small amount of grease may be visible at the hub seal. This is a normal occurrence and does not necessarily indicate a seal leak.

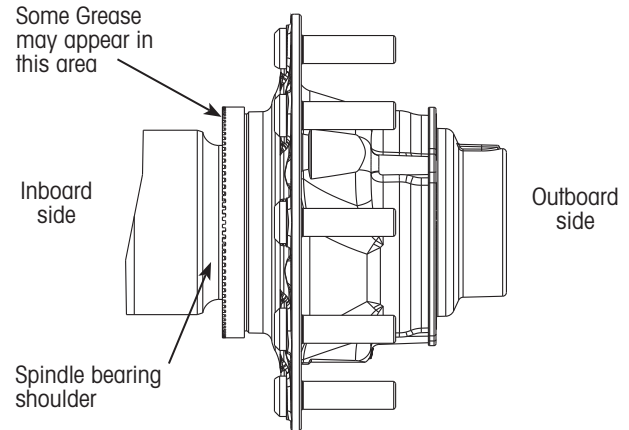


Figure 2: Spindle bearing shoulder

A small amount of grease may also appear at the spindle bearing shoulder to hub joint, Figure 2. This is also normal and does not necessarily indicate a seal leak. It can be wiped clean to minimize any accumulation of dirt.

NOTICE: Pressure or steam washing should be avoided in this area as water could be forced past the seal and degrade lubricant performance and corrode bearings.

To check for leaks, look at the inboard side of the hub, Figure 2. If the hub seal, Figure 1 on page 6, is leaking, a large quantity of grease will be present. If you see this condition, refer to [CONTACTING HENDRICKSON](#) for guidance on how to proceed.

CHECKING FOR SMOOTH ROTATION

There are many factors that can effect smoothness of rotation. Primary causes include:

- Bearing wear
- Damaged hub seal
- Moisture
- Unwanted debris

NOTE: A reasonable assessment can be performed without removing tires and rims. However, this procedure is best performed with hub only as shown in [Figure 4](#) on [page 8](#).

1. While maintaining physical contact, slowly rotate wheel end hub in both directions at least five revolutions.
2. During rotation, ensure smooth and quiet rotation. The bearings should move smoothly. Feel for any resistance in movement. Any debris in bearings should be felt as it moves over rollers in bearings.

IMPORTANT: If bearings feel rough, sound noisy, or do not rotate freely, do not place the suspension back into service. Contact Hendrickson Technical Services for guidance. Refer to [CONTACTING HENDRICKSON](#) for details.

CHECKING END PLAY

This procedure should be performed when:

- The rotation check reveals a rough feeling, noisy sounding hub, and the Hendrickson Technical Services department has advised you to perform this check.
- After hub installation as directed by hub installation procedure.

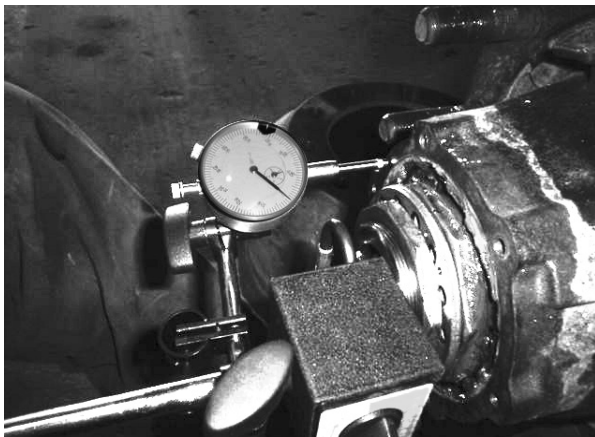


Figure 3: *Checking end play*

NOTE: A reasonable assessment can be performed without removing tires and rims. However, this procedure is best performed with hub only as shown in [Figure 3](#). If being performed after hub installation, do not install drum and wheel until after successfully completing end-play checks.

IMPORTANT: End play can be checked with the brake drum installed or removed. If you are using the following procedure to check end play with the brake drum installed, make sure the brake drum to wheel hub fasteners are tightened to manufacturers specifications before checking end play.

1. Ensure hubcap mounting surface, at end of spindle, is clean and totally free of any debris.

IMPORTANT: Runout or scratches on the machined hubcap mounting surface may cause the indicator to read up to 0.0005 inch (five ten-thousandths of an inch). End play in excess of 0.0005 inch (0.0127 mm) can reduce bearing life, increase spindle wear and cause seal leaks.

2. Rotate the hub at least 5 revolutions to ensure the bearings are fully seated.
3. Referring to [Figure 3](#), attach the magnetic base of a dial indicator to the end of the spindle, as shown.
4. Adjust the dial indicator so that its pointer touches the hub, [Figure 3](#), and line of action is parallel to the spindle axis. Zero the indicator.

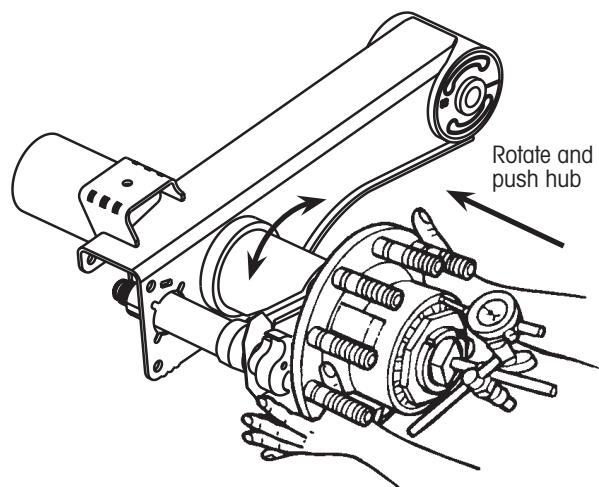


Figure 4: *Checking inward end-play*

5. Grasp hub, as shown in [Figure 4](#), and rotate the hub in both directions while **pushing** the hub inward until the dial indicator reading remains constant. Note the indicator reading.

- While still grasping the hub, as shown in [Figure 4](#), rotate the hub in both directions while **pulling** the hub outward until the dial indicator reading remains constant. Note the indicator reading.

NOTE: To prevent errors in measurement, the indicator must be set to zero prior to pushing or pulling.

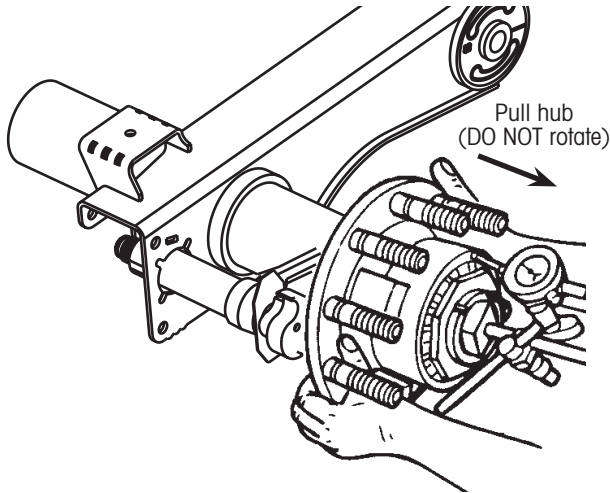


Figure 5: *Checking outward end-play*

- Read and record bearing end play as the total indicator movement.

NOTE: Correct end play is between 0.0000 and 0.0005 inch (five ten-thousandths of an inch or 0.0127 mm).

IMPORTANT: If excess end play is recorded (more than 0.0005 inch or 0.0127 mm), contact Hendrickson Technical Services for guidance. Refer to [CONTACTING HENDRICKSON on page 4](#) for details.

DO not place the suspension back into service without correcting the problem.

REMOVING AND INSTALLING HUB

IMPORTANT: To ensure continued warranty, **DO NOT** perform the following procedures without obtaining prior authorization from Hendrickson Trailer Technical Services. Refer to [CONTACTING HENDRICKSON](#) for details.

⚠ WARNING: Prior to performing maintenance procedures, help ensure conditions are safe by following section [PREPARING TRAILER FOR SERVICE](#).

HUB REMOVAL

Only after receiving proper authorization from Hendrickson to proceed, use the following procedure to remove the HNP™ hub assembly:

- Remove the tire / wheel assembly.
- Disengage the brakes and remove the brake drum.
- Remove the hubcap bolts and remove the hubcap.

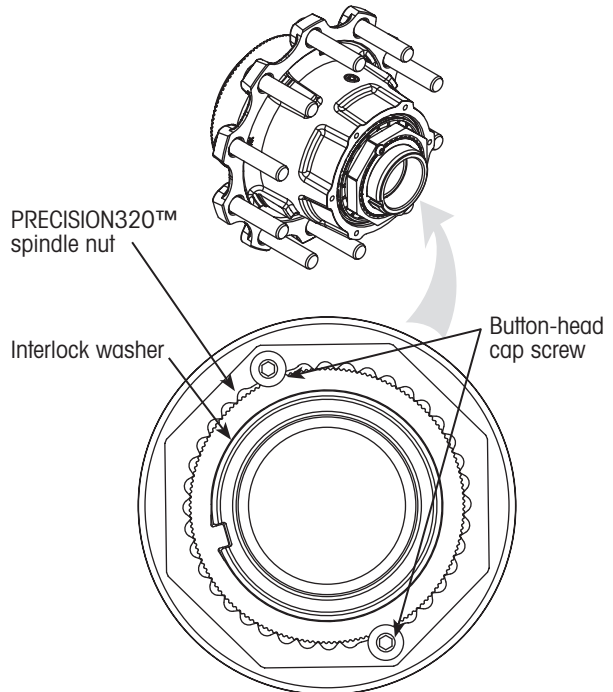


Figure 6: *Button-head cap screw on PRECISION320™ nut system*

- Using a 3/16-in. hex key, remove the button-head cap screws from the interlock washer [Figure 6](#).



5. Remove the interlock washer and spindle nut, [Figure 1 on page 6](#).

NOTE: Pushing on the edge of the interlock washer near one of the screw holes will cause the opposite edge to tip away from the nut, allowing easy removal of the interlock washer.

6. Carefully pull the HNP hub assembly slightly toward the spindle end. A short quick motion should allow outer bearing to exit the hub. Be prepared to catch outer bearing if it slides off the end of the spindle. Otherwise, simply remove it.
7. Remove hub from spindle. The inner bearing is held in the hub by the hub seal and should come off with the hub.
8. Remove and discard the hub seal:
 - A. **If the seal is in the hub** - a pry bar can be used to carefully remove the seal from the hub bore. Damage to hub and hub surfaces must be avoided.
 - B. **If the seal is on the spindle** - Using a brass, leather or other soft-faced mallet, drive the seal off the spindle by carefully striking the seal from the back side.

NOTICE: Any damage to the spindle's machined surfaces can effect wheel end performance.

HUB/SPINDLE PREPARATION

Before installing or re-installing the hub, follow this procedure to ensure hub and spindle machined surfaces are clean and undamaged.

1. Make sure all sharp edges, nicks and burrs are removed from the seal bore, hubcap bore and hubcap mounting surface of the hub.
2. Thoroughly clean the hub bore of any dirt, grease, rust or any other substance that may be present.
3. Inspect the machined spindle seal surface for nicks, scratches, burrs or marks. If needed, use crocus cloth or emery cloth to repair any damaged areas.

4. Clean the spindle threads and keyway thoroughly with a wire brush to avoid false bearing adjustments and to avoid introduction of contaminants into the lubricant cavity.
5. Thoroughly clean the spindle and spindle threads of rust, dirt, grease or any other contaminants that could damage the hub seal and cause it to leak.
6. Lubricate spindle with clean lubricant. Use the same synthetic semi-fluid grease used in the hub cavity.

PREPARING HUB FOR RE-INSTALLATION

1. Remove old lubricant and thoroughly clean the hub cavity and hub bore.
2. Inspect the hub seal bore for roughness. If needed, use emery cloth to remove any burrs or old bore sealant, and wipe the hub clean.
3. Ensure hubcap mounting surface is smooth and free of debris.

HUB LUBRICATION AND INSTALLATION

Refer to [TMC RP 631](#) for complete lubrication details.

1. Lubricate the inner bearing and install into the hub.

NOTE: A hub seal driver is recommended and can be obtained from the seal manufacturer.

2. Lubricate the seal according to the seal manufacturer's recommendations, then place it on an installation tool.
 - A. Align the tool with the hub seal bore.
 - B. Drive the seal until it bottoms out in the hub seal bore.
 - C. Rotate the installation tool and apply several light blows to ensure the seal is properly seated.
 - D. Check the inner bearing to make sure it rotates freely.
3. Gently slide the hub onto the spindle, taking care not to damage the seal.

NOTICE: The HUB SEAL CAN BE DAMAGED if:

- Hub seal is improperly installed.
- Hub seal is rammed into the spindle bearing shoulder.
- Hub is not kept supported and aligned with spindle until the outer bearing and axle nut are installed.

4. Fill the hub with semi-fluid grease per TMC RP 631.
5. Lubricate the outer bearing and install into the hub.

INSTALLING PRECISION320™ NUT SYSTEM

This procedure is designed to set the bearings in slight preload. After completion, no end play should be detected.

NOTICE: Failure to exactly follow the steps of this procedure could cause improper bearing seating, resulting in reduced bearing life.

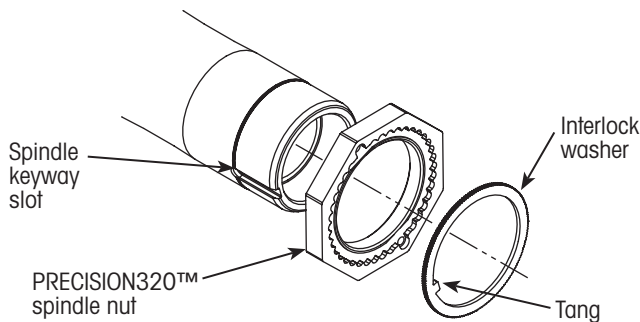


Figure 7: Interlock washer and spindle nut

1. Install the PRECISION320™ spindle nut, Figure 7 onto the spindle, toothed side out, and hand tighten.
2. Simultaneously rotate hub clockwise at least three revolutions, while using a torque wrench to tighten the PRECISION320 spindle nut to 200 ft. lbs. (271 N•m) of torque.
3. Back off the PRECISION320 spindle nut ½ revolution.
4. Rotate the hub clockwise at least one full revolution.

NOTICE: DO NOT use a wrench of any kind to complete steps 5 to 7. However, use of the 4 7/8 inch socket (without wrench) is allowed.

USING a wrench during these steps may cause excessive preload, resulting in reduced bearing life.

5. Hand-tighten the PRECISION320™ spindle nut.
6. Rotate the hub clockwise three full revolutions.
7. Repeat steps 5 and 6 two more times.

NOTE: These repeated cycles ensure the hub and bearings are fully seated on the spindle while tightening the nut.

8. Hand-tighten the PRECISION320 spindle nut.

IMPORTANT: DO NOT rotate the hub at this point. Rotating the hub before installing the interlock washer can dislodge the PRECISION320 spindle nut and cause improper bearing seating.

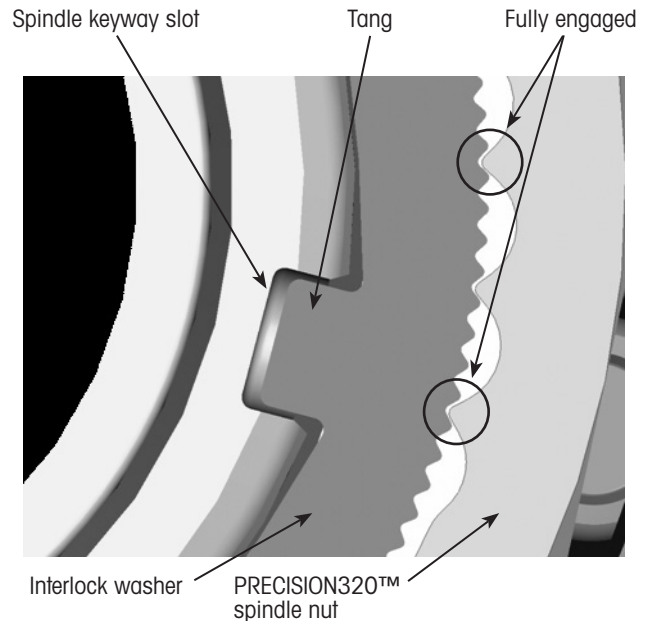


Figure 8: Interlock washer and spindle nut fully engaged

9. Install the interlock washer into the PRECISION320 spindle nut with the tang aligned and inserted in the spindle keyway as shown in Figure 7 and Figure 8.

IMPORTANT: Teeth between the interlock washer and PRECISION320 spindle nut must fully engaged as shown in [Figure 8](#). If not, remove the interlock washer, turn it over, and reinstall. DO NOT ADJUST THE NUT TO ALIGN THE INTERLOCK WASHER.

NOTE: The PRECISION320 interlock washer and nut are designed so that one side of the washer will always engage the PRECISION320 spindle nut teeth without readjusting the nut.

10. Screw the two button-head cap screws into the PRECISION320 spindle nut until the heads of the screws just contact the face of the nut.
11. Tighten the cap screws to 15 ft. lbs. (20 N•m) of torque.

INSPECTING INSTALLATION

To ensure correct installation, follow these procedures:

1. Make sure the interlock washer is fully seated in the PRECISION320 spindle nut.
2. Ensure heads of both cap screws contact the face of the nut.
3. Check end-play using the [CHECKING END PLAY](#) procedure on [page 8](#).

If end play is less than 0.0005 inch or 0.0127 mm, continue with [INSTALLING HUBCAP](#). If not:

- A. Remove the two cap screws and interlock washer.
- B. Remove the PRECISION320 spindle nut.
- C. Inspect for debris and damage to threads on the nut and spindle. Repair as needed.
- D. Reinstall nut and return to Step 5 of the [INSTALLING PRECISION320™ NUT SYSTEM](#) on [page 11](#).
- E. Perform the [CHECKING FOR SMOOTH ROTATION](#) on [page 7](#).

NOTE: If the above steps have already been performed and end play is still out of tolerance, return to [HUB REMOVAL](#) on [page 9](#). If difficulty continues, Refer to [CONTACTING HENDRICKSON](#) on [page 4](#).

INSTALLING HUBCAP

After the hub installation and inspection is complete, the hubcap can be installed. Installation begins with inspection of the O-ring and hubcap. If damaged, a new O-ring and/or hubcap should be installed.

INSPECTING HUBCAP AND O-RING

Any time the hubcap is removed and reinstalled after extended use, Hendrickson recommends replacing the O-ring. Even for a new O-ring, an inspection should be performed. To do so:

1. Visually check the O-ring for:
 - A. Cracks or tears.
 - B. Flat spots.
 - C. Presence of dirt and debris in O-ring groove.

NOTE: The hubcap O-ring helps prevent moisture from entering the hub. A cracked or torn O-ring will allow moisture to pass through to the internal part of the hub, which can shorten the life of the hub. Therefore, the hubcap O-ring should be replaced if flat spots, cuts, tears or surface breakdown are observed.

IF damaged, replace the hubcap O-ring.

2. Visually inspect hubcap integrity for points what could allow moisture or debris to enter wheel end and lubricant to leak out:
 - A. Cracks or other openings.
 - B. Scratches or dents.
 - C. If suspension includes TIREMAAX® system, Check the integrity of TIREMAAX components. Replace as needed.



PLACING HUBCAP ON HUB

The HNP wheel end uses the Hendrickson 3-bolt hubcap, [Figure 1 on page 6](#).

1. For three-bolt, bolt-on type hubcaps, ensure that:
 - A. All surfaces are clean and free of dirt, etc.
 - B. A new O-ring is properly placed in the groove on the hubcap.

NOTE: If necessary, a thin film of oil on the O-ring can help O-ring seating while installing hubcap.

2. Place the hubcap on the hub and install only the first two threads of the bolts into the hub.
3. Position the hubcap against the hub so the entire O-ring is in contact with the hub.
4. Apply firm pressure against the face of the hubcap to seat the hubcap mating flange completely against the hub.
5. Check to make sure no gap exists between the hubcap mating flange and hub.
6. Tighten the three hubcap bolts to 15 ±3 ft. lb. (20 ±4 N•m) of torque.

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