

H TECHNICAL PROCEDURE



Bridge Axle for McNeilus Bridgemaster® Mixers

SUBJECT: Service Instructions

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TABLE OF CONTENTS

Section 1	Introduction	2	Section 7	Alignment & Adjustments	22
Section 2	Product Description	3	Section 8	Turn Angle Mechanical Stop	22
Section 3	Important Safety Notice	4	Section 9	Component Replacement	
Section 4	Special Tools	7		Pre-Installation Check List	23
Section 5	Parts List	8		Fasteners	23
Section 6	Preventive Maintenance			Stabilizer	23
	Component Inspection	12		Bridge Axle Installation	24
	Hendrickson Recommended			Steering Knuckle Disassembly	24
	Inspection Intervals	12		Steering Knuckle Assembly	27
	Lubrication Intervals	13		Integrated Brake Replacement	28
	Kingpin Lubrication	13		Tie Rod Replacement	30
	Tie Rod End Lubrication	13	Section 10	Torque Specifications	32
	Tie Rod End Inspection	14	Section 11	Troubleshooting Guide	34
	Kingpin Bushing Inspection	17			
	Steering Knuckle Inspection and				
	Adjustment	17			
	Stabilizer	18			
	Tire Inspection	19			



SECTION 1 Introduction

This publication is intended to acquaint and assist maintenance personnel in the identification, service and preventive maintenance of Hendrickson Bridge Axles equipped on McNeilus Bridgemaster® Mixers.

NOTE

Use only  Hendrickson Genuine parts for servicing this bridge axle system.

It is important to read and understand the entire publication prior to performing any service and maintenance of the product. The information in this publication contains product images, safety information, product specifications, features, proper service and maintenance instructions for Hendrickson Bridge Axles.

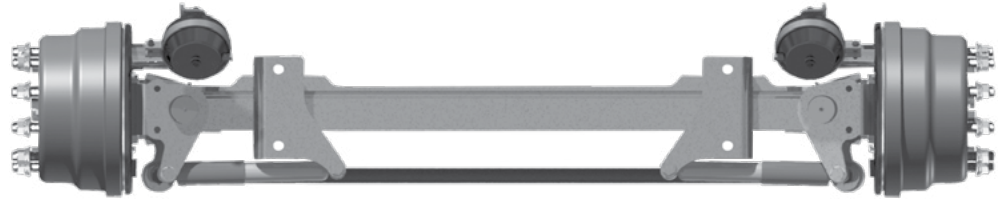
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The latest revision of this publication is also available online at www.hendrickson-intl.com.



SECTION 2 Product Description

FIGURE 2-1



The Hendrickson Bridge Axle is a load-distribution tag axle that allows higher legal payloads on McNeilus Bridgemaster Mixers.

- **Hendrickson integrated brakes** — Hendrickson integrated brakes simplify brake installation and service while optimizing weight savings.
- **Fabricated knuckle design** — Hendrickson’s fabricated knuckle technology with integrated brakes provides optimum steering geometry for the application.


AXLE TAG IDENTIFICATION

NOTE

All Hendrickson Bridge Axles for McNeilus are manufactured with a serial number plate to help in identification, see Figure 2-2.

The serial number tag is an identification label attached to the axle body. It contains a unique serial number and the model identification number for that specific axle. (Label is located on the front center of the axle.)

FIGURE 2-2 Serial Number Label



S/N: _____

Part #: _____

●

WO #: _____

Cust P/N #: _____

This article is covered by at least one or more U.S. and/or foreign patents
and/or pending U.S. and/or foreign patents.
See www.hendrickson-intl.com/patents for a complete listing.

HENDRICKSON SERIAL-TAG CUBB #1001970 210322/1 8/8/12

SECTION 3 Important Safety Notice

Proper maintenance, service, and repair is important for the reliable operation of the axle assembly. The procedures recommended by Hendrickson and described in this technical publication are methods of performing such maintenance, service and repair.

All safety related information should be read carefully to help prevent personal injury and to assure that proper methods are used. Improper maintenance, service or repair may damage the vehicle, cause personal injury, render it unsafe in operation, or void manufacturer's warranty.

Failure to follow the safety precautions in this manual can result in personal injury and/or property damage. Carefully read and understand all safety related information within this publication, on all decals and in all such materials provided by the vehicle manufacturer before conducting any maintenance, service or repair.

■ EXPLANATION OF SIGNAL WORDS

Hazard "Signal Words" (Danger-Warning-Caution) appear in various locations throughout this publication. Information accented by one of these signal words must be observed to help minimize the risk of personal injury to service personnel, or possibility of improper service methods which may damage the vehicle or render it unsafe.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

Additional Notes or Service Hints are utilized to emphasize areas of procedural importance and provide suggestions for ease of repair. The following definitions indicate the use of these signal words as they appear throughout the publication.



INDICATES AN IMMINENTLY HAZARDOUS SITUATION, WHICH IF NOT AVOIDED, WILL RESULT IN SERIOUS INJURY OR DEATH.



INDICATES A POTENTIAL HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, CAN RESULT IN SERIOUS INJURY OR DEATH.



INDICATES A POTENTIAL HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, MAY RESULT IN MINOR OR MODERATE INJURY.

NOTE An operating procedure, practice condition, etc. which is essential to emphasize.

SERVICE HINT A helpful suggestion that will make the servicing being performed a little easier and/or faster.



The torque symbol alerts you to tighten fasteners to a specified torque value. Refer to Torque Specification Section of this publication for torque requirements.



■ SAFETY PRECAUTIONS

WARNING

FASTENERS

DISCARD USED FASTENERS. ALWAYS USE NEW FASTENERS TO COMPLETE A REPAIR. FAILURE TO DO SO COULD RESULT IN FAILURE OF THE PART, OR MATING COMPONENTS, ADVERSE VEHICLE HANDLING, PERSONAL INJURY, OR PROPERTY DAMAGE.

LOOSE OR OVER TORQUED FASTENERS CAN CAUSE COMPONENT DAMAGE, ADVERSE VEHICLE HANDLING, PROPERTY DAMAGE, OR SEVERE PERSONAL INJURY. MAINTAIN CORRECT TORQUE VALUE AT ALL TIMES. CHECK TORQUE VALUES ON A REGULAR BASIS AS SPECIFIED, USING A TORQUE WRENCH THAT IS REGULARLY CALIBRATED. TORQUE VALUES SPECIFIED IN THIS TECHNICAL PUBLICATION ARE FOR HENDRICKSON SUPPLIED FASTENERS ONLY. IF NON HENDRICKSON FASTENERS ARE USED, FOLLOW TORQUE SPECIFICATION LISTED IN THE VEHICLE MANUFACTURER'S SERVICE MANUAL.

WARNING

MODIFYING COMPONENTS

DO NOT MODIFY OR REWORK PARTS WITHOUT AUTHORIZATION FROM HENDRICKSON. DO NOT SUBSTITUTE REPLACEMENT COMPONENTS NOT AUTHORIZED BY HENDRICKSON. USE OF MODIFIED, REWORKED, SUBSTITUTE OR REPLACEMENT PARTS NOT AUTHORIZED BY HENDRICKSON MAY NOT MEET HENDRICKSON'S SPECIFICATIONS, AND CAN RESULT IN FAILURE OF THE PART, ADVERSE VEHICLE HANDLING, POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE, AND WILL VOID THE BRIDGE AXLE WARRANTY. USE ONLY HENDRICKSON AUTHORIZED REPLACEMENT PARTS.

THE VEHICLE MANUFACTURER SHOULD BE CONSULTED BEFORE MAKING ANY CHANGES TO THE VEHICLE'S FRAME. TYPICALLY, CUTTING OR ALTERING THE VEHICLE'S FRAME OR SIDE RAIL IS NOT PERMITTED AND MAY AFFECT THE MANUFACTURER'S WARRANTY COVERAGE.

ANY INSTALLATION DEVIATIONS MUST BE APPROVED IN WRITING BY HENDRICKSON'S PRODUCT ENGINEERING DEPARTMENT. FAILURE TO COMPLY WITH ANY OF THE ABOVE WILL VOID THE BRIDGE AXLE WARRANTY.

WARNING

TORCH / WELDING

DO NOT USE A CUTTING TORCH TO REMOVE ANY FASTENERS. THE USE OF HEAT ON AXLE ASSEMBLY COMPONENTS WILL ADVERSELY AFFECT THE STRENGTH OF THESE PARTS. A COMPONENT DAMAGED IN THIS MANNER CAN RESULT IN THE ADVERSE VEHICLE HANDLING AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

NO WELDING OF ANY OF THE AXLE ASSEMBLY COMPONENTS IS PERMITTED, EXCEPT WHERE

WARNING

PERSONNEL PROTECTIVE EQUIPMENT

ALWAYS WEAR PROPER EYE PROTECTION AND OTHER REQUIRED PERSONAL PROTECTIVE EQUIPMENT TO HELP PREVENT PERSONAL INJURY WHEN YOU PERFORM VEHICLE MAINTENANCE, REPAIR OR SERVICE.

CAUTION

PROCEDURES AND TOOLS

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 INSTRUCTIONS PROVIDED ASSUME ALL RISKS OF POTENTIAL PERSONAL INJURY OR DAMAGE TO EQUIPMENT INVOLVED.



WARNING

SUPPORT THE VEHICLE PRIOR TO SERVICING

PLACE THE VEHICLE ON A LEVEL FLOOR AND CHOCK THE WHEELS TO HELP PREVENT THE VEHICLE FROM MOVING. PRIOR TO SERVICING A VEHICLE IN THE RAISED POSITION, PROPERLY SUPPORT THE VEHICLE WITH SAFETY STANDS. DO NOT WORK AROUND OR UNDER A RAISED VEHICLE SUPPORTED ONLY WITH FLOOR JACKS OR OTHER LIFTING DEVICES. FOLLOW ALL OTHER SAFETY INSTRUCTIONS PROVIDED BY MCNEILUS AND THE CHASSIS MANUFACTURER. FAILURE TO DO SO CAN CAUSE DEATH, PERSONAL INJURY OR DAMAGE TO COMPONENTS.

WARNING

SUPPORT THE BRIDGE AXLE PRIOR TO SERVICING

THE HENDRICKSON BRIDGE AXLE IS A COMPONENT OF THE MCNEILUS BRIDGEMASTER AXLE ASSEMBLY. PLACE THE VEHICLE ON A LEVEL FLOOR AND CHOCK THE WHEELS TO HELP PREVENT THE VEHICLE FROM MOVING. PRIOR TO SERVICING A BRIDGE AXLE, LOWER THE BRIDGEMASTER AXLE ASSEMBLY COMPLETELY TO THE GROUND. IF THE BRIDGE AXLE NEEDS TO BE PARTIALLY RAISED FOR SERVICING, PROPERLY SUPPORT THE BRIDGE AXLE WITH SAFETY STANDS. DO NOT WORK AROUND OR UNDER A RAISED BRIDGE AXLE SUPPORTED ONLY WITH FLOOR JACKS OR OTHER LIFTING DEVICES. FOLLOW ALL OTHER SAFETY INSTRUCTIONS PROVIDED BY MCNEILUS AND THE CHASSIS MANUFACTURER. FAILURE TO DO SO CAN CAUSE DEATH, PERSONAL INJURY OR DAMAGE TO COMPONENTS.

WARNING

PARTS CLEANING

SOLVENT CLEANERS CAN BE FLAMMABLE, POISONOUS, AND CAUSE BURNS. TO HELP AVOID SERIOUS PERSONAL INJURY, CAREFULLY FOLLOW THE MANUFACTURER'S PRODUCT INSTRUCTIONS AND GUIDELINES AND THE FOLLOWING PROCEDURES:

1. WEAR PROPER EYE PROTECTION .
2. WEAR CLOTHING THAT PROTECTS YOUR SKIN.
3. WORK IN A WELL VENTILATED AREA.
4. DO NOT USE GASOLINE OR SOLVENTS THAT CONTAIN GASOLINE. GASOLINE CAN EXPLODE.
5. 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.

DO NOT USE HOT SOLUTION TANKS OR WATER AND ALKALINE SOLUTIONS TO CLEAN GROUND OR POLISHED PARTS. DOING SO WILL CAUSE DAMAGE TO THE PARTS AND VOID WARRANTY.



SECTION 4 Special Tools

The following tools / materials are needed when installing and servicing a Hendrickson Bridge Axle:

BUSHING INSPECTION

- Two jack stands
- Small bottle jack
- Block of wood
- Magnetic base dial indicator

STEERING KNUCKLE DISASSEMBLY

- ½" Impact
- Wrench or socket – 7/16" and 1 5/16"
- 1 5/16" Box wrench
- Deep well socket – 1 5/16" and 1 1/8"
- Brake spring tool or notched screw driver
- Needle nose pliers

KINGPIN INSPECTION AND REPLACEMENT

- Cleaning solvent and emery cloth (220 grit or higher)
- 1"-2" Micrometer measuring device
- 1 1/8" Socket and impact gun
- 3/8" Punch
- Hammer
- Portable hydraulic (5-10 ton) press

BUSHING HOUSING REPLACEMENT

- Hydraulic shop press with a minimum force capacity of 5 tons
- Bushing driver
- Magnetic base dial indicator

STEERING KNUCKLE ASSEMBLY

- 1 5/16" Box wrench and deep well socket
- Brake spring tool or notched screw driver
- Wrench or socket – 7/16", 1 5/16"
- Two 0.010" feeler gauges
- Magnetic base dial indicator
- Needle nose pliers
- Torque wrench capable of 500 foot pounds

KINGPIN LUBRICATION

- Multipurpose NLGI-2 grease
- Grease gun

INTEGRATED BRAKE REPLACEMENT

- Brake spring tool or notched screw driver

STEERING STABILIZER INSPECTION AND REPLACEMENT

- 1 1/8" Wrench and socket
- Torque wrench
- Digital protractor or equivalent device

STEER AHEAD AND TOE SETTING

- 1 5/16" Wrench and socket
- ½" Impact
- Can of white spray paint
- Torque wrench capable of 60 foot pounds and 500 foot pounds
- Straight blade screwdriver for scribing line in tire
- Linear measuring instrument (tape measure or scales)
- Jack stand

LUBRICATION

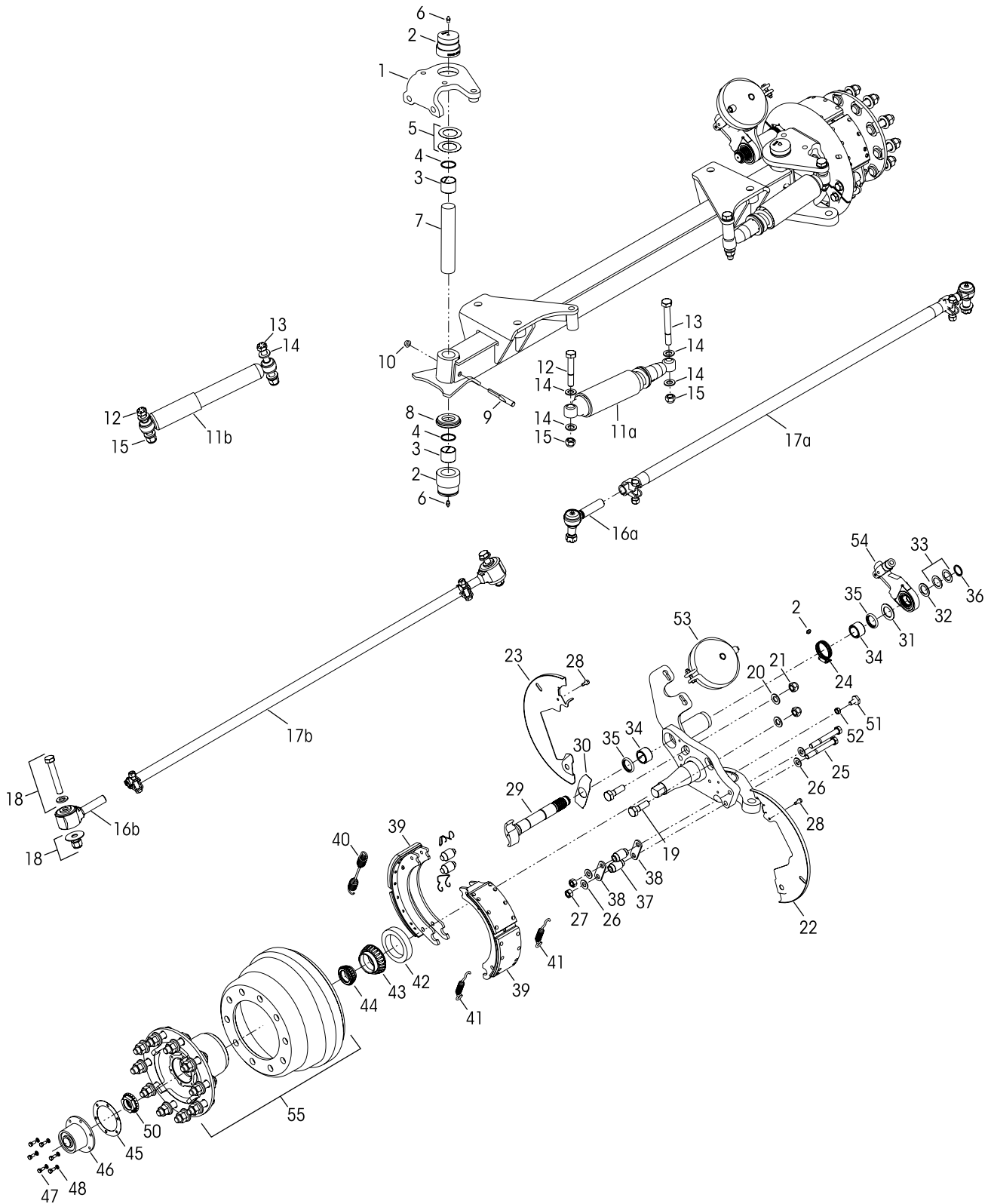
- Hand or pneumatic grease gun
- NLGI-1 or NLGI-2 grease

MISC.

- Wheel chocks



SECTION 5
Parts List





Bridge Axle for McNeilus Bridgemaster® Mixers

ITEM	PART NO.	DESCRIPTION	*NO.REQ.	ITEM	PART NO.	DESCRIPTION	*NO.REQ.
	R-013468-1/2	Upper Kingpin Connection, Includes Item Nos. 1-4	1 EA	25		**5/8"-11 x 5" Phos Hex Bolt Grade 8	4
	R-010551-1/2	Backbone, Includes Item Nos. 2-4, 25-27 28-37, 50-51	1 EA	26		**5/8"-11 Harden Washer Zinc	8
1	R-010545-1/2	Upper Kingpin Plate	1 EA	27		**9/8"-11 Zinc Locknut Grade C	4
2	R-005881	Kingpin Housing	4	28	R-6105C075H2T5	5/16"-18 x 3/4" Zinc Tap Grade 8	4
3	R-004725	Kingpin Bushing	4			S-cam Bushing Kit , Includes Item Nos. 29-36	
4	R-002593	Kingpin Seal	4		R-015783-01	Left Hand	1
	R-015785	Kingpin Kit , Includes Item Nos. 5-10, 19-21	2		R-015783-02	Right Hand	1
5	R-001764-1	Shims	4	29	R-007089-1/2	S-cam	1 EA
6	R-002804	Zerk Fitting	6	30	R-007184	S-cam Washer Shield	2
7	R-006303	Kingpin	2	31	R-007203	S-cam Inner Washer Shield	2
8	R-001620	Thrust Bearing	2	32	R-007121	S-cam Flat Washer (0.106" thickness)	2
9	R-008670	Draw Key	2	33	R-007202	S-cam Flat Washer (0.020" thickness)	4
10	R-6007FH4FC	Draw Key Nut	2	34	R-005216	S-cam bushing	4
		Stabilizer Kit	1	35	R-005217	S-cam Seal	4
a	R-014600	Coil Over, Includes Item Nos. 11a, 12-15		36	R-009304	Lock Ring, 28 Spline (0.050" thickness 1.176" G-diameter)	2
b	011291	Non Coil Over, Includes Item Nos. 11b, 12-15				Brake Shoe Kit	2
11		***Stabilizer	2		R-007442-A	Shoes and Springs only, Includes Item Nos. 39-41	
a	R-A-14496	Coil Over			R-007442-B	Shoes, Springs, Anchor Pins, and Hardware Includes Item Nos. 37-41	
b	R-009600	Non Coil Over		37	R-009694	Anchor Pin	4
12		**3/4"-10 x 4 1/2" Phos Hex Bolt Grade 8	2	38	R-009135	Anchor Pin Spacer	4
13		**3/4"-10 x 6 1/2" Phos Hex Bolt Grade 8	2	39		**Brake Shoe 15 x 4	4
14		**3/4" Zinc Harden Washer	8	40		**Spring - Brake Return	2
15		**3/4"-10 Zinc Locknut Grade C	4	41		**Spring - Coil or Retaining Spring	4
		Tie Rod Assembly	1		R-B-14665	Axle Components Kit , Includes Item Nos. 42-49	1
	R-004062	Standard Taper, Includes Item Nos. 16a-17a		42	R-A-20629	Hub Seal - FF Spindle	2
	012887	Heavy-duty Compliant, Includes Item Nos. 16b-17b		43	R-A-2718	Inner Bearing - Cone	2
16		Tie Rod End	1 EA	44	R-A-20628	Outer Bearing - Cone	2
a	R-002914-1/2	Standard Taper		45	R-001761	Hubcap Gasket 4.50 BC	2
b	R-013472-1/2	Heavy-duty Compliant		46	R-015293-01	Hubcap 4.50 BC; Oil; Sentinel Vent	2
17		Tie Rod Tube	1	47		**9/16"- 8 x 3/4" Phos Hex Bolt Grade 5	12
a	R-002915-25	Standard Taper		48		**5/16" Zinc Lock Washer	12
b	002915	Heavy-duty Compliant		49		**Bushing Lubricant - 2 oz. (not shown)	1
18	010139	Tie Rod Bolt Kit , HD CTR	1	50	R-003269	Spindle Fastener	2
19		**3/4"-10 x 2 1/2" Phos Hex Bolt Grade 8	4	51	R-012550	1/2"-13 Modified Head Stop Bolt	2
20		**3/4" Zinc Harden Washer	4	52	R-6008CH2JC	1/2"-13 Zinc Hex Jam Nut Grade C	2
21		**3/4"-10 Zinc Nylon Locknut Grade C	4	53	R-007353	Brake Chamber	2
	R-015786-00	Dust Shield Kit , Includes Item Nos. 22-27	1	54	R-A-14767	Slack Adjuster	2
22		**Lower Dust Shield	2	55	R-009762 or R-003041	Hub and Drum Assembly	2
23		**Upper Dust Shield	2				
24		**Clamp - Hose	2				

NOTES:

* Quantities specified are shown per axle assembly. Quantities of service kit components may vary from amount shown in list, refer to the following service kit pages to confirm item quantities.

** Item included in assembly / kit only, part not sold separately.

*** Coil over stabilizers are required for standard tapered tie rods and non coil over stabilizers are required with heavy-duty compliant tie rods.



* SERVICE KITS

Service Kit No.	Kingpin Kit	Service Kit No.	Stabilizer Kit	Service Kit No.	Dust Shield Kit			
R-015785		R-014600 011291	Coil Over Non Coil Over	R-015786-00				
ITEM	CONTENTS	QTY.	ITEM	CONTENTS	QTY.	ITEM	CONTENTS	QTY.
1	Shims	2	1 a	Coil Over Stabilizer	1	1	Lower Dust Shield	2
2	Zerk Fitting	1	b	Non Coil Over Stabilizer	1	2	Upper Dust Shield	2
3	Kingpin	1	2	3/4"-10 x 4 1/2" Phos Hex Bolt Grade 8	1	3	Clamp - Hose	2
4	Thrust Bearing	1	3	3/4"-10 x 6 1/2" Phos Hex Bolt Grade 8	1	4	5/8"-11 x 5" Phos Hex Bolt Grade 8	4
5	Draw Key	1	4	3/4" Zinc Harden Washer	4	5	5/8"-11 Harden Washer Zinc	8
6	Draw Key Nut	1	5	3/4"-10 Zinc Locknut Grade C	2	6	5/8"-11 Zinc Locknut Grade C	4
7	3/4"-10 x 2 1/2" Phos Hex Bolt Grade 8	2						
8	3/4" Zinc Harden Washer	2						
9	3/4"-10 Zinc Nylon Locknut Grade C	2						
Service Kit No.	S-cam Bushing Kit	Service Kit No.	Brake Shoe Kit	Service Kit No.	Brake Shoe Kit			
R-015783-01 (LH)/02 (RH)		R-007442-A	Shoe and Spring Only	R-007442-B	Shoe, Spring, Anchor Pin and Fasteners			
ITEM	CONTENTS	QTY.	ITEM	CONTENTS	QTY.	ITEM	CONTENTS	QTY.
1	S-cam	1	1	Brake Shoe 15 x 4	2	1	Anchor Pin	2
2	S-cam Washer Shield	1	2	Spring - Brake Return	2	2	Anchor Pin Spacer	2
3	S-cam Inner Washer Shield	1	3	Spring - Coil or Retaining Spring	2	3	Brake Shoe 15 x 4	2
4	S-cam Flat Washer (0.106" thickness)	1				4	Spring - Brake Return	2
5	S-cam Flat Washer (0.020" thickness)	2				5	Spring - Coil or Retaining Spring	2
6	S-cam bushing	2						
7	S-cam Seal	2						
8	Lock ring, 28 Spline (0.050" thickness 1.176" G-diameter)	1						

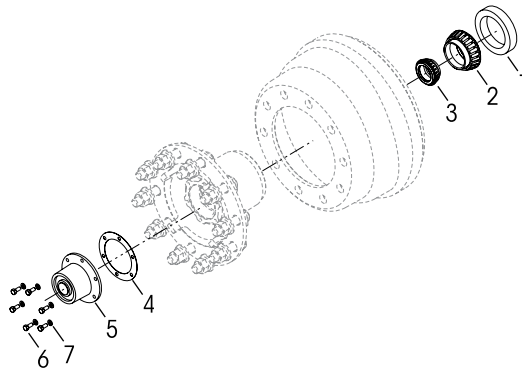
* Quantities specified are shown per service kit. Refer to previous page for quantities of service kits needed per axle assembly.



* SERVICE KITS

Service Kit No.
R-B-14665

Axle Components Kit



ITEM	CONTENTS	QTY.
1	Hub Seal - 'FF' Spindle	2
2	Inner Bearing - Cone	2
3	Outer Bearing - Cone	2
4	Hubcap Gasket 4.50 BC	2
5	Hubcap 4.50 BC; Oil; Sentinel Vent	2
6	5/16" - 8 x 3/4" Phos Hex Bolt Grade 5	12
7	5/16" Zinc Lock Washer	12
8	Bushing Lubricant - 2 oz. (not shown)	1

* Quantities specified are shown per service kit. Refer to previous page for quantities of service kits needed per axle assembly.



SECTION 6 Preventive Maintenance

Following appropriate inspection procedures is important to help ensure the proper maintenance and operation of the Bridge Axle and component parts. Hendrickson recommends the Bridge Axle be inspected at pre-delivery, the first in-service inspection and regular preventive maintenance intervals. Inspection must include the following items and other components referenced in this section.

NOTE Torque values shown in this publication apply only if Hendrickson supplied fasteners are used. If non-Hendrickson fasteners are used, follow the torque specification listed in the vehicle manufacturer’s service manual.

HENDRICKSON RECOMMENDED INSPECTION INTERVALS	FIRST IN-SERVICE INSPECTION	PREVENTIVE MAINTENANCE
Wheel Bearings – Verify end play is between 0.001" and 0.005". Adjust and lubricate as required	Within the first 3,000 Miles	8,000 Miles or every 3 months, whichever comes first
Tie Rod Ends – Inspect for leaking and lubricate		10,000 Miles or every 6 month, whichever comes first
Kingpin Bushings – Check for wear and grease		10,000 Miles or every 6 months, whichever comes first
Stabilizers – Check for all leak and adequate return		5,000 Miles or as needed
Brake Assembly Components – Inspect for leaking and component wear	3,000 Miles	20,000 Miles or every 10 months, whichever comes first

COMPONENT INSPECTION

- **Bridge Axle** — The axle should be free of any nicks or gouges. Inspect for any cracks or dents on axle.
- **Fasteners** — Look for any loose or damaged fasteners on the entire axle assembly. Make sure all fasteners are tightened to the specified torque. 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.
- **Operation** — All steering components must move freely through the full range of motion from axle stop to axle stop.
- **Steering pivot points** — Check for looseness at all pivot points. Inspect and lubricate all pivot points.
- **Tire wear** — Inspect tires for wear patterns that may indicate axle assembly damage or misalignment. See Tire Inspection in this section.
- **Wear and damage** — Inspect all parts of axle for wear and damage. Look for bent or cracked parts. Replace all worn or damaged parts.

See vehicle manufacturer’s applicable publications for other preventive maintenance requirements.



LUBRICATION INTERVALS

For McNeilus Bridgemaster Mixers equipped with Hendrickson Bridge Axle, regular lubrication intervals should be followed to help prevent premature wear to the kingpin, kingpin bushings, and tie rod ends. See lubrication chart below.

NOTE

The recommended service lubrication interval is a guideline, the vehicle may require increased lubrication intervals depending on severity of operation.

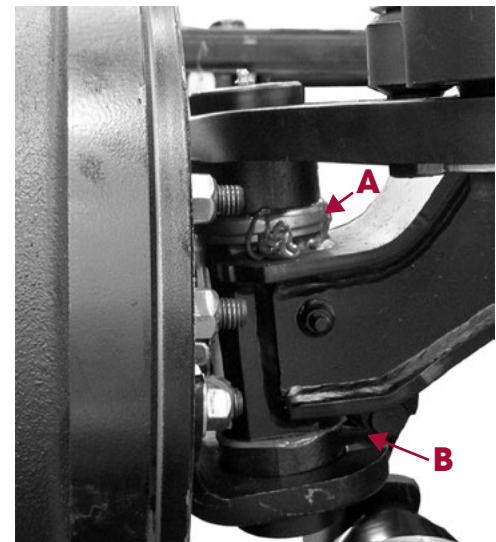
GREASING AND LUBRICATION SPECIFICATIONS

Component	Greasing Interval	Grease
Kingpin Break In	5,000 miles or as needed	NLGI-1 or NLGI-2
Kingpin Bushings	10,000 miles or every 6 months	
Tapered Tie Rod End		

KINGPIN LUBRICATION

On the Hendrickson Bridge Axle, the kingpin grease fittings are located on the top and bottom of the kingpin.

1. Prior to greasing the kingpins, the axle must be on the ground in a loaded condition.
2. Clean off all the grease fittings with a clean shop towel prior to lubrication.
3. Lubricate the kingpins through the grease fittings on the top and bottom of the steering knuckle.
4. Force the required lubricant into the upper and lower kingpin grease fittings until new lubricant flows from locations **A** and **B**, see Figure 6-1.

FIGURE 6-1**NOTE**

Greasing at the lower zerk should purge grease from the thrust bearing shell.

TIE ROD END LUBRICATION

LUBRICATION PROCEDURE

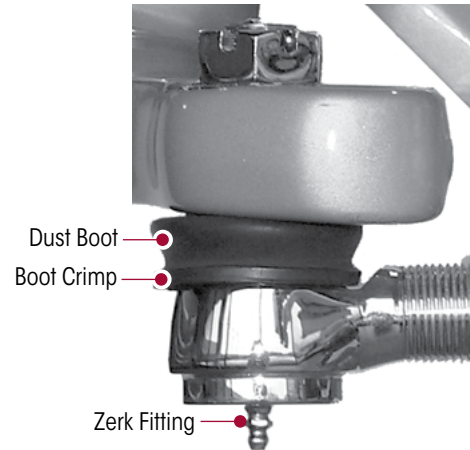
1. Wipe the grease zerk and grease gun tip with clean shop towels.
2. Wipe the seal/boot clean with shop towels.
3. Attach a grease gun to the grease zerk. Either a hand or pneumatic grease gun is acceptable. If air operated grease gun is used, system air pressure should not exceed 150 psi (1035 kPa).

CAUTION

EXCEEDING THE MAXIMUM AIR PRESSURE TO THE GREASE ZERKS CAN CAUSE DAMAGE TO THE DUST BOOT AND COMPONENT FAILURE.

4. Dirt, water, and discolored old grease should flow from the relief vents or purge holes near the boot crimp or bellows area, see Figure 6-2. Continue to purge grease until fresh grease flows from the purge area.

FIGURE 6-2



5. If the tie rod end is designed for lube service and it will not accept grease proceed as follows:
 - a. Remove the grease zerk
 - b. Inspect the threaded grease zerk hole in the tie rod end and remove any obstructions
 - c. Install a new grease zerk
 - 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
6. Apply grease until all the old grease is purged from the boot.

TIE ROD END INSPECTION

■ STANDARD TAPER TIE ROD

INSPECTION PROCEDURE

Before beginning this inspection procedure, the entire system must be unloaded.

CAUTION

DO NOT GREASE THE TIE ROD ASSEMBLY BEFORE PERFORMING THE INSPECTION. DOING SO CAN INHIBIT EFFORTS TO DETERMINE ACTUAL WEAR.

CAUTION

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

1. Block rear wheels of vehicle. Raise the axle off the ground and support with jack stands.
2. Check that the boots are in place and completely installed over the tie rod ends.
3. 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

THE CORRECT COTTER PIN MUST BE INSTALLED THROUGH THE TIE ROD END WITH THE CASTLE NUT TIGHTENED TO THE PROPER TORQUE SPECIFICATION IN ORDER TO SECURELY ATTACH THE TIE ROD. LOSS OF THE COTTER PIN CAN CAUSE THE TIE ROD END NUT TO BECOME LOOSE AND ADVERSELY AFFECT BRIDGE AXLE PERFORMANCE.

4. 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.

WARNING

IT IS CRITICAL TO CHECK THE 5/8" TIE ROD CLAMP BOLT HEAD LOCATION TO VERIFY THE CLAMP FASTENERS HAVE SUFFICIENT CLEARANCE AWAY FROM THE LOWER STABILIZER MOUNT AT FULL WHEEL CUT. THE FASTENERS MUST NOT CONTACT THE LOWER STABILIZER MOUNT. FAILURE TO DO SO CAN CAUSE ONE OR MORE COMPONENTS TO FAIL CAUSING ADVERSE VEHICLE HANDLING AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

5. Verify the 5/8" tie rod clamp bolt head does not contact the lower shock mount at full wheel cut, see Figure 6-3.

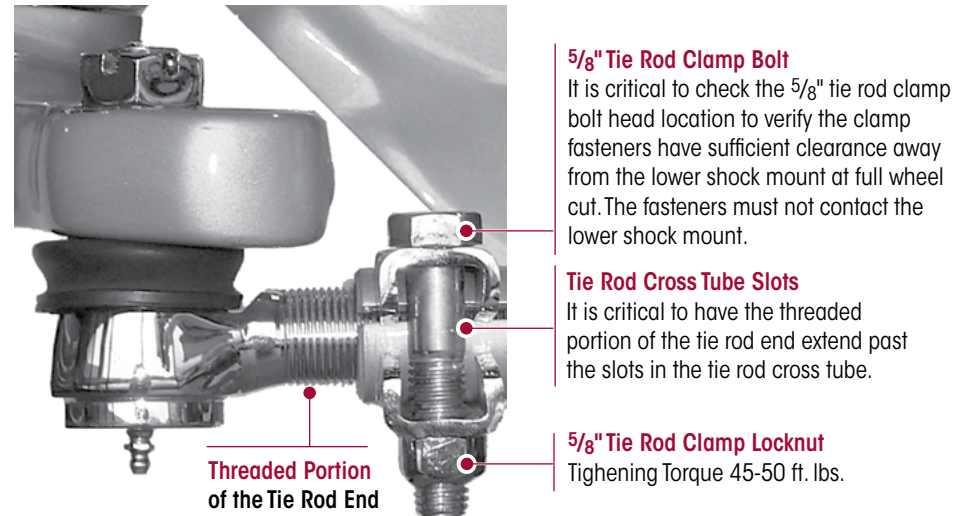


WARNING

THE THREADED PORTION OF THE TIE ROD END MUST EXTEND PAST THE SLOTS INTO THE TIE ROD CROSS TUBE, SEE FIGURE 6-3. FAILURE TO DO SO CAN CAUSE COMPONENT DAMAGE, ADVERSE VEHICLE HANDLING AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

6. Check that the tie rod end is threaded correctly into the tie rod cross tube and is engaged deeper than the end of the tie rod cross tube slot. The tie rod end must be visible the entire length of the tie rod cross tube slot, see Figure 6-3.
7. Check that grease zerks are installed. Replace a damaged grease zerk with a new one.

FIGURE 6-3

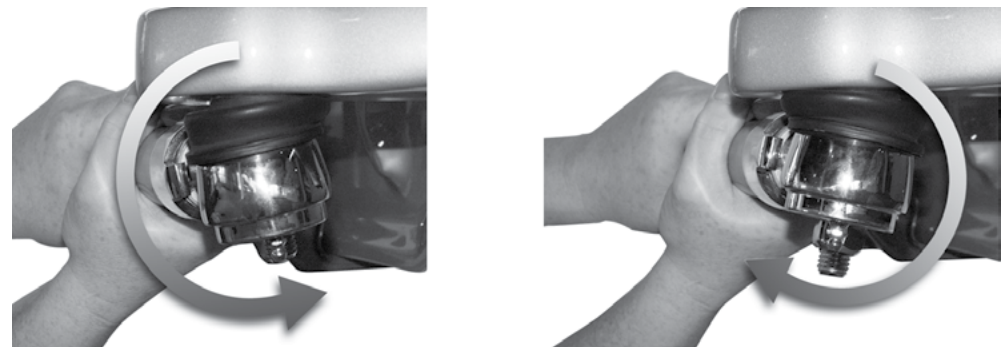


CAUTION

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

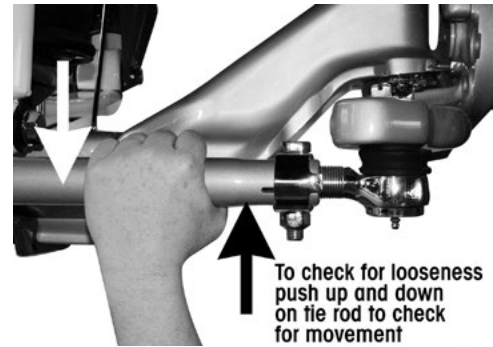
- A CROW BAR, PICKLE FORK, OR 2 x 4.
 - ANYTHING OTHER THAN HANDS USED TO GRASP AND ROTATE THE TIE ROD CROSS TUBE ASSEMBLY (CAN RESULT IN DAMAGE TO THE TIE ROD CROSS TUBE).
 - EXCESSIVE PRESSURE OR FORCE APPLIED TO THE TIE ROD ENDS OR THE JOINTS OF THE ASSEMBLY.
8. By hand rotate the tie rod cross tube toward the front of the vehicle and then toward the rear. After rotating, center the tie rod cross tube. If the tie rod cross tube will not rotate in either direction, replace both tie rod ends, see Figure 6-4.

FIGURE 6-4



9. Position yourself directly below the tie rod end. Using both hands, grab the assembly end as close to the tie rod end as possible (no more than 6" or 152.4 mm). Apply hand pressure with reasonable human effort vertically up and down in a push-pull motion several times (using approximately 50-100 pounds of force). Check for any movement or looseness at both tie rod end locations, see Figure 6-5.

FIGURE 6-5



10. If there is any movement in the tie rod assembly, install a magnetic based dial indicator on the Ackermann arm, see Figure 6-6.
11. Set the dial indicator to zero.
12. Apply hand pressure with reasonable human effort vertically up and down in a push-pull motion several times (using approximately 50-100 pounds of force). Observe the reading on the dial indicator.
13. If the reading is more than 0.060", replace both tie rod ends at the next service interval.
14. If a tie rod end exhibits 0.125" of movement by hand, the vehicle should be removed immediately from use and the tie rod end be replaced.

FIGURE 6-6



■ HEAVY-DUTY COMPLIANT TIE ROD (HD CTR)

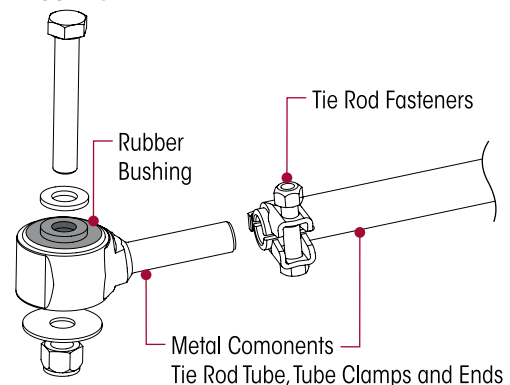
INSPECTION PROCEDURE

1. Inspect rubber bushing for wear or damage, see Figure 6-7.
2. Inspect all metal components for a bent or cracked condition, see Figure 6-7.
3. Inspect and verify torque values for all fasteners. Refer to Torque Specification Section of this publication for torque requirements.

NOTE

Contact Hendrickson Auxiliary Axle Customer Service with any questions or concerns.

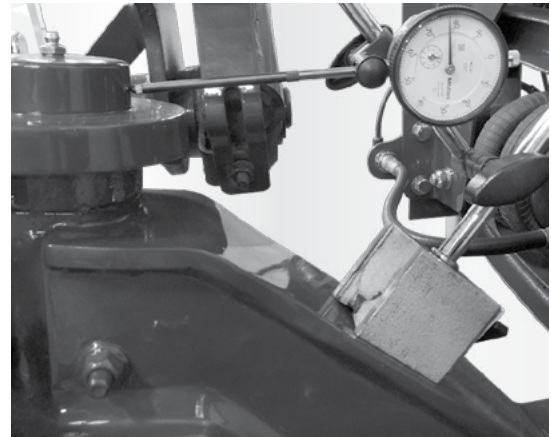
FIGURE 6-7



KINGPIN BUSHING INSPECTION

1. Chock the wheels and the parking brake to prevent the vehicle from moving.
2. Raise the axle off the ground until both the tires are 1" off the ground and allow it to rest on the jack stands.
3. **CHECKING UPPER KINGPIN BUSHING.** Affix a magnetic base dial indicator to the top side of the axle and place the tip of the dial indicator on the inside of the upper kingpin connection, see Figure 6-8.
4. Set the dial indicator to '0' zero.
5. Move the top of the tire in and out by applying reasonable, constant pressure. Maintain pressure against the tire in both directions in order to check the readings with a dial indicator.
6. Check and record reading on the dial indicator. If the dial indicator moves more than 0.015", the upper bushing is worn or damaged.
7. **CHECKING LOWER KINGPIN BUSHING.** Install the dial indicator so that the base is on the bottom side of the axle and the indicator tip is against the inside of the bottom knuckle.
8. Set the dial indicator to '0' zero and repeat the steps 5 and 6.

FIGURE 6-8



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 AND ADJUSTMENT

VERTICAL END PLAY INSPECTIONS

Vertical end play inspection determines the range of vertical movement along the kingpin and will indicate if the thrust bearing is worn or damaged.

FIGURE 6-9

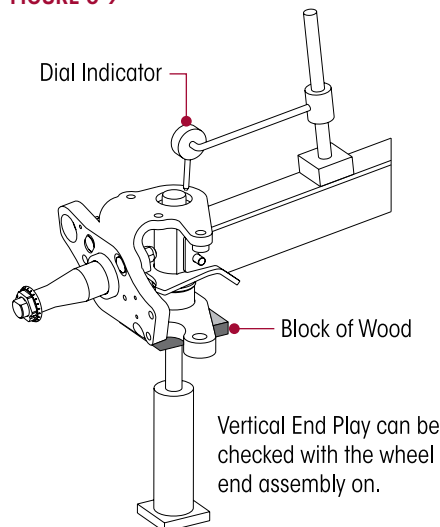


FIGURE 6-10





1. Place a jack and a wood block under the lower kingpin grease cap area, as shown in Figure 6-9. The wood block requires a hole that allows for clearance for the lower kingpin grease fitting.
2. Place a dial indicator on the top side of the axle while ensuring that the wheels are positioned straight ahead, see Figure 6-10.
3. Place the tip of the dial indicator on top of the upper kingpin connection. If necessary remove the wheels.
4. Set the dial indicator to '0'.
5. Raise the jack until the dial indicator shows the overall vertical travel, and record the dial indicator reading. Vertical clearance, or up and down movement, must be between 0.008" and 0.030". If vertical clearance is greater than 0.030" it is required to replace the thrust bearing.

VERTICAL END PLAY ADJUSTMENT

1. If vertical clearance is **greater than 0.030"**, replace the thrust bearing.
2. After replacing the thrust bearing, if vertical clearance is greater than 0.018", install shims (Hendrickson Part No. R-001764-1) between the top of the axle and the bottom of the upper kingpin connection to obtain the proper clearance specification. See the Steering Knuckle Disassembly section.
3. If vertical clearance is **less than 0.008"**, remove the shims from between the top of the axle and the bottom of the upper kingpin connection to obtain the proper clearance specification.
4. Repeat steps 2 or 3 until proper clearance is achieved.
5. Lower the jack.
6. Remove wheel chocks.

STABILIZER

INSPECTION

Inspection of the stabilizer can be performed by conducting a visual inspection for leaking or damage.

1. Lower the axle to the ground and chock the wheels of the vehicle.

NOTE

It is important to inspect the stabilizer fully extended.

2. Evidence of the following potential problems indicates replacement of your stabilizer is necessary:
 - Damaged inner or outer mounts
 - Damaged inner or outer bushings
 - Damaged dust cover
 - Bent or dented stabilizer
 - Evidence of improper installation. For instance, washers installed incorrectly.
 - Fluid leaking in streams from the upper seal

ALTERNATE INSPECTION PROCEDURE

1. Remove the stabilizer.
2. Once removed, shake the suspected stabilizer and listen for the sound of metal parts rattling inside. Rattling of internal parts can indicate a failure.
3. Replace if needed.



FIGURE 6-11

STABILIZER VISUAL INSPECTION - UNACCEPTABLE CONDITIONS

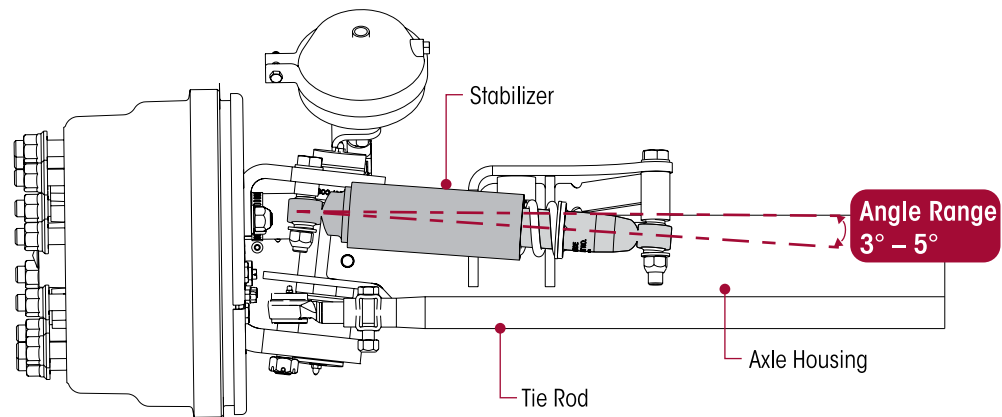


STABILIZER ANGLE INSPECTION

Hendrickson recommends verifying the stabilizer angle to ensure it is within the recommended 3-5 degree angle, see Figure 6-12.

This can be done by use of a digital protractor or equivalent device. If the angle of your stabilizer does not meet 3-5 degrees, contact Hendrickson Customer Service for the necessary spacers.

FIGURE 6-12



TIRE INSPECTION

The leading potential causes of tire wear on commercial vehicles according to TMC (The Technology & Maintenance Council) 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 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 RP 642 (Guidelines for Total Vehicle Alignment).

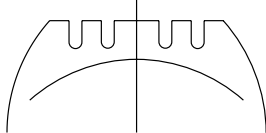
Tire wear is normally the best indicator of vehicle alignment condition. If tires are wearing too rapidly or irregularly, alignment corrections may be needed. The tire wear patterns described below can help isolate specific alignment problems.

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 6-13

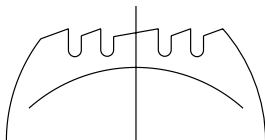
**OVERALL FAST WEAR
(Miles per 32nd)**



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 literature number RP 219 (“Radial Tire Wear Conditions and Causes”), page 11. For information on how to accurately measure and record tire rates, see TMC literature number RP 230 (“Tire Test Procedures for Tread Wear, Serviceability, and Fuel Economy”).

FIGURE 6-14

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 literature number RP 219 (“Radial Tire Wear Conditions and Causes”), page 5.

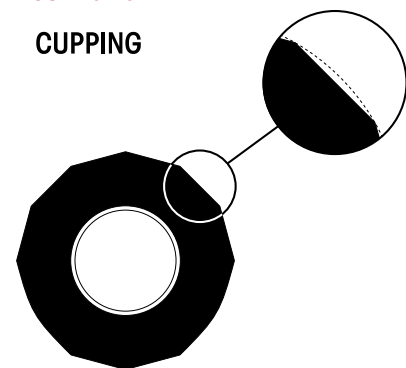
If feather wear on both steer tires is in the same direction, drive axle or other chassis misalignment is indicated. If one steer tire shows feather wear and the other steer tire has normal wear, a combination of toe and drive axle or chassis misalignment is indicated.

FIGURE 6-15

CUPPING

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 literature number RP 219 (“Radial Tire Wear Conditions and Causes”), page 7.

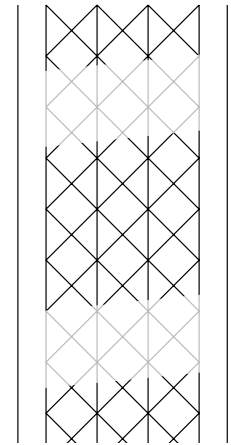
Cupping is usually a result of moderate-to-severe imbalance, improper rim/wheel mounting, excessive wheel end play or other assembly non-uniformity. It can also be due to lack of stabilizer control on some suspension types.



To solve cupping problems:

- *Tires* – Correct mismatch 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 6-16
DIAGONAL
WEAR



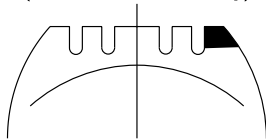
Diagonal Wear — Can be described as localized flat spots worn diagonally across the tread at approximately 25-35° angles, often repeating around the tread circumference. For more information, see TMC literature number RP 219 (“Radial Tire Wear Conditions and Causes”), page 20.

Diagonal wear is usually caused by bad wheel bearings, toe-out, mounting 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 6-17

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 wipeout. For more information, see TMC literature number RP 219 (“Radial Tire Wear Conditions and Causes”), page 22.

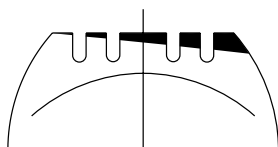
This wear condition is usually caused by excessive toe or excessive camber. These conditions can be created by a misaligned or bent axle and can also be caused by loose or worn wheel bearings.

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 6-18

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 literature number RP 219 (“Radial Tire Wear Conditions and Causes”), 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.

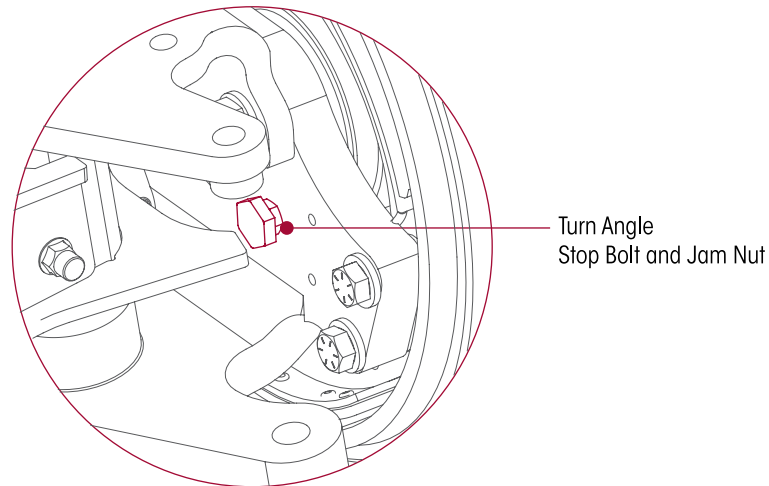
SECTION 7 Alignment & Adjustments

For Toe Inspection and Setting Procedure, refer to Hendrickson Literature TP-H785 (available online at www.hendrickson-intl.com).

SECTION 8 Turn Angle Mechanical Stop

A mechanical turn angle stop (bolt) is an adjustable fastener that limits the axle's turn radius angle and allows users to avoid tire contact with the vehicle accessories.

FIGURE 8-1



1. Adjust the axle turn angle stop bolt, see Figure 8-1, for maximum turn angle while providing adequate chassis clearance.
2. Tighten the jam nut. Refer to Torque Specification Section of this publication for torque requirements.

NOTE

Factory settings of turn angle stop bolts varies.

SECTION 9 Component Replacement

PRE-INSTALLATION CHECK LIST

1. Check that the axle about to be installed matches the specifications required for the vehicle.
2. Confirm that the components listed on the axle assembly drawing have been provided in the proper quantities. Contact Hendrickson Customer Service Department if any missing or damaged components are found.

FASTENERS

Hendrickson recommends that when servicing the vehicle replace the removed fasteners with new equivalent fasteners. Maintain correct torque values at all times. Check torque values as specified, refer to Torque Specification Section of this publication. If non-Hendrickson fasteners are used follow torque specifications listed in the vehicle manufacturer's service manual.

STABILIZER

NOTE

It is not necessary to replace the stabilizer in pairs if only one stabilizer requires replacement.

DISASSEMBLY

1. Place the vehicle on a level floor.
2. Chock the wheels.

WARNING

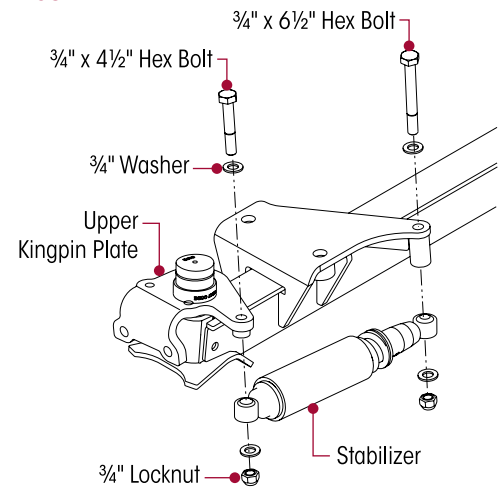
THE STABILIZER IS EQUIPPED WITH A COIL SPRING THAT CONTAINS STORED ENERGY ONCE INSTALLED ON THE AXLE. PRIOR TO AND DURING STABILIZER REMOVAL AND INSTALLATION, THE STABILIZER MUST BE PROPERLY COMPRESSED AND RESTRAINED. FAILURE TO DO SO MAY ALLOW THE STABILIZER TO RELEASE THE STORED ENERGY, RESULTING IN POSSIBLE DAMAGE TO COMPONENTS AND/OR PERSONAL INJURY.

3. Using the appropriate tools, restrain stabilizers to restrain the stabilizer coil springs.
4. Remove the fasteners from the upper kingpin plate and axle seat, see Figure 9-1.
5. Slide out the stabilizer.
6. Inspect the stabilizer mounting brackets and hardware for damage or wear, replace as necessary.

ASSEMBLY

1. Install the stabilizer into the upper kingpin plate and axle seat.
2. Install the upper and lower stabilizer mounting fasteners.
3. Tighten the upper and lower stabilizer fasteners. Refer to Torque Specification Section of this publication for torque requirements.

FIGURE 9-1



BRIDGE AXLE INSTALLATION

BRIDGE AXLE MOUNTING — If mounting of the Bridge Axle to the rear Bridge Axle arms is required, install per the vehicle manufacturer's instructions.

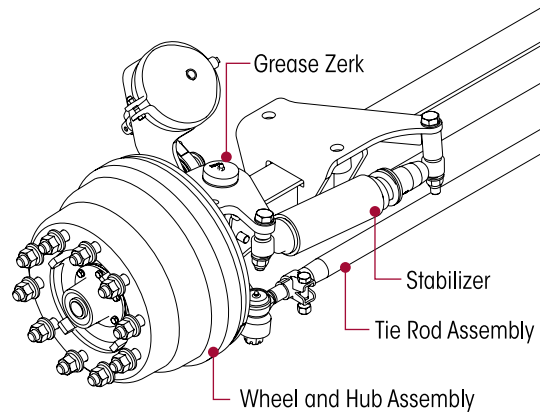
STEERING KNUCKLE DISASSEMBLY

See tools needed to remove and install kingpin bushing under the Special Tools Section of this publication.

The steering knuckle disassembly and assembly includes the Kingpin Preparation and Measurement and Kingpin Bushing Removal process.

FIGURE 9-2

1. Remove the wheel and hub assembly, see Figure 9-2.
2. Remove the grease zerks from the knuckle assemblies. This will allow the knuckle assemblies to freely slide up and down the kingpins without creating back pressure.
3. Remove the brake components from the steering knuckle.
4. Remove the tie rod assembly, see Figure 9-2.



WARNING

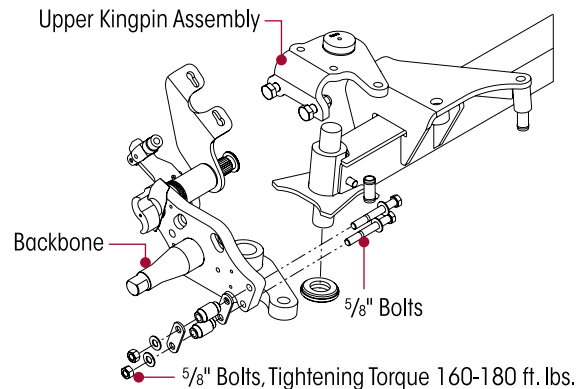
REMOVAL OF TIE ROD BOLTS ALLOWS SHOCKS TO FULLY EXTEND.

5. Remove the stabilizer bolts.
6. Ensure that the backbone is properly supported and remove the bolts that connect upper kingpin assembly to the backbone, see Figure 9-3.

WARNING

REMOVAL OF THE BOLTS WILL ALLOW THE BACKBONE TO SEPARATE FROM THE AXLE WHICH CAN RESULT IN COMPONENT DAMAGE AND/OR PERSONAL INJURY. BACKBONE MUST BE SUPPORTED BEFORE REMOVAL OF THE TWO BOLTS.

FIGURE 9-3



7. Remove the backbone from the kingpin by removing the support and allowing it to slide down the kingpin.
8. Remove the upper kingpin assembly from the axle by sliding it up and off the kingpin.

■ KINGPIN PREPARATION AND MEASUREMENT

CLEANING THE GROUND OR POLISHED PARTS

- Use a cleaning solvent to clean ground or polished parts and surfaces. **DO NOT use GASOLINE.**

CAUTION

DO NOT USE HOT SOLUTION TANKS OR WATER AND ALKALINE SOLUTIONS TO CLEAN GROUND OR POLISHED PARTS. DAMAGE TO THE PARTS WILL RESULT.



CLEANING THE ROUGH PARTS

- Rough parts can be cleaned with the ground or polished parts. Rough parts can also be cleaned in hot solution tanks with a weak alkaline solution. The parts must remain in the hot solution tanks until they are completely cleaned and heated.

DRYING THE CLEANED PARTS

- Parts must be dried immediately after cleaning. Dry the parts with clean paper towels, clean rags, or compressed air. **DO NOT** dry bearings by spinning with compressed air. Damage to the bearings will result.

PREVENTING CORROSION ON CLEANED PARTS

- Apply a light coating of oil to all cleaned and dried parts that are going to be reused. **DO NOT** apply oil to the brake lining or the brake drums. If parts are to be stored, apply an effective rust inhibitor to all surfaces.

WARNING

TO HELP PREVENT SERIOUS EYE INJURY, ALWAYS WEAR PROPER EYE PROTECTION WHEN YOU PERFORM VEHICLE MAINTENANCE OR SERVICE.

WARNING

SOLVENT CLEANERS CAN BE FLAMMABLE, POISONOUS AND CAUSE BURNS. TO HELP AVOID SERIOUS PERSONAL INJURY, CAREFULLY FOLLOW THE VEHICLE MANUFACTURER'S PRODUCT INSTRUCTIONS AND GUIDELINES AND THE FOLLOWING PROCEDURES:

1. WEAR PROPER EYE PROTECTION.
2. WEAR CLOTHING THAT PROTECTS YOUR SKIN.
3. WORK IN A WELL VENTILATED AREA.
4. **DO NOT** USE GASOLINE, SOLVENTS OR OTHER MATERIALS THAT CONTAIN GASOLINE THAT CAN EXPLODE.

HOT SOLUTION TANKS OR ALKALINE SOLUTIONS MUST BE USED CORRECTLY. FOLLOW THE VEHICLE MANUFACTURER'S RECOMMENDED INSTRUCTIONS AND GUIDELINES CAREFULLY TO HELP PREVENT PERSONAL ACCIDENT OR INJURY.

1. Prepare and polish the kingpin by removing all grease and excess debris using a fine grit (220 grit or higher) emery cloth and parts solvent, see Figures 9-4 through 9-7.

FIGURE 9-4



FIGURE 9-5



FIGURE 9-6



FIGURE 9-7



2. Inspect the kingpin for wear or damage. Using a micrometer, measure the upper and lower kingpin in two locations each, see Figures 9-8 through 9-11. Ensure that the positions of the micrometer are 90 degrees from each other. A total of 8 measurements are required.
3. If the kingpin diameter is less than 1.802" it is necessary to replace the kingpin.

FIGURE 9-8

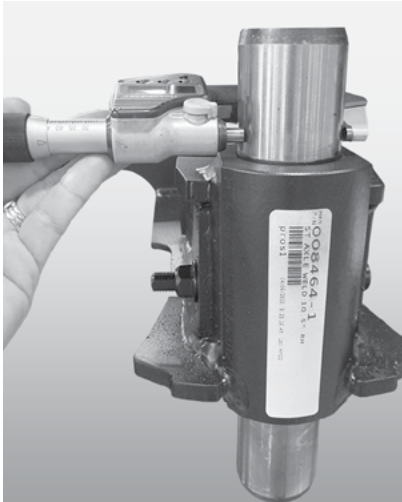


FIGURE 9-9

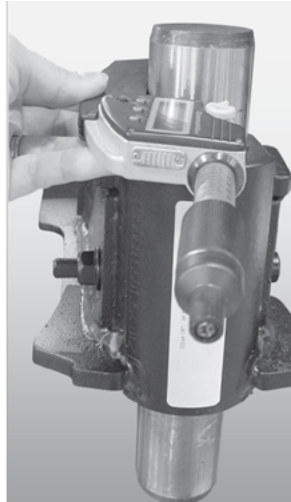
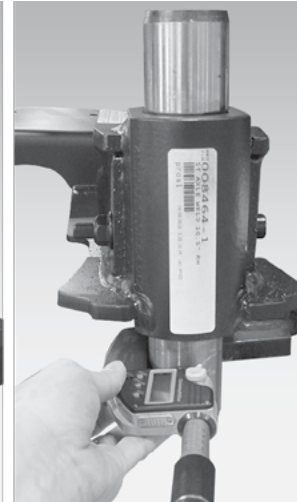


FIGURE 9-10



FIGURE 9-11



■ KINGPIN BUSHING INSTALLATION

The kingpin bushing housing on a fabricated knuckle includes pre-reamed bushings and seals.

1. Install the backbone assembly or upper kingpin connection in the press.

WARNING

BEFORE APPLYING HYDRAULIC PRESSURE TO ANY TOOLING SET-UP, ALWAYS CHECK TO BE SURE THE PRESS PLATE, ADAPTERS AND COMPONENTS BEING WORKED ON ARE POSITIONED PROPERLY, I.E. "IN LINE" WITH THE RAM. IMPROPER POSITIONING CAN CAUSE PERSONAL INJURY AND/OR COMPONENT DAMAGE.

2. Remove worn kingpin bushing housings.
3. Install the kingpin bushing housing from the machined side (axle side) of the backbone and upper kingpin connection. Ensure that the kingpin bushing housing is tight against the machined surface, see Figures 9-13 through 9-15.

FIGURE 9-12



FIGURE 9-13

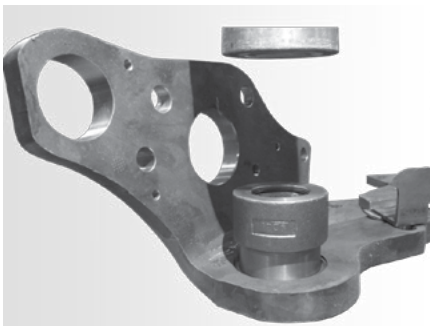


FIGURE 9-14

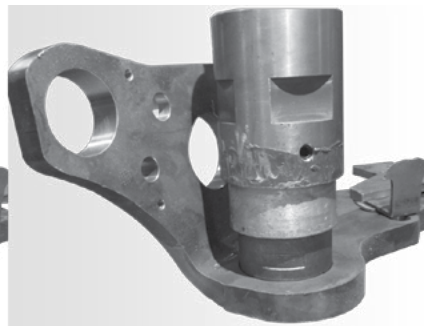


FIGURE 9-15



■ KINGPIN REPLACEMENT

1. Remove the nut and washer from the draw key, see Figure 9-16.
2. Using a $\frac{3}{8}$ " punch and hammer, remove the draw key from the axle beam.

NOTE

If the kingpin does not have a draw key the kingpin is not serviceable and requires the replacement of the axle beam assembly.

3. Remove the kingpin. This may require some force; utilize a hammer or portable hydraulic (5-10 ton) press to remove the kingpin.
4. Inspect and clean kingpin bore using emery cloth (220 grit or higher) and cleaning solvent.
5. Replace the new kingpin into the axle ensuring that the stamped end is positioned at the top.

FIGURE 9-16

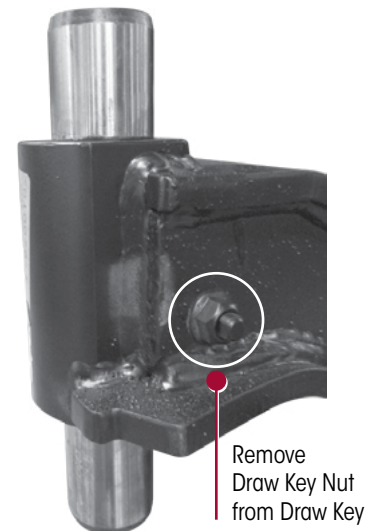
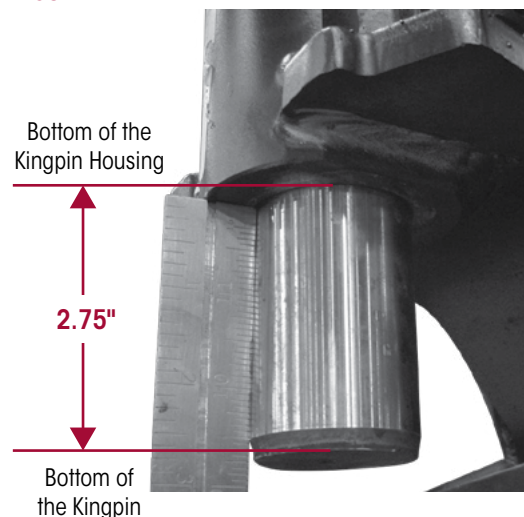


FIGURE 9-17

SERVICE HINT

When placed, the measurement from the bottom of the kingpin housing to the bottom of the kingpin should be 2.75", see Figure 9-17. If your measurement does not meet 2.75" that may be an indication that the kingpin has been placed in the wrong direction. If so, ensure that the kingpin end with the stamping is positioned at the top. Repeat measurement.

6. Insert the draw key. Using an $1\frac{1}{16}$ " socket and torque wrench tighten the nut to 50 foot pounds.



STEERING KNUCKLE ASSEMBLY

After replacing the kingpin housings, it is necessary to reassemble the steering knuckle assemblies.

1. Install the thrust bearing on the lower kingpin so the top side is up when the axle is in the operating position. The thrust bearing may be stamped 'top' or the black seal will designate the top side.
2. Apply a thin film of grease, typically NLGI Grade 2, to the bushing dimples and the OD of the kingpin.
3. Install the backbone assembly on the kingpin. It will be necessary to support the backbone assembly with a bottle jack and a block of wood under the backbone assembly.
4. The easiest way to install the knuckle is with the zerk fitting not installed. In this manner, it does not create back pressure. The assembly can then freely slide up and down on the kingpin.
5. Raise the bottle jack so that there is no free play between the backbone, thrust bearing and the bottom of the axle.
6. Install two shims on the upper kingpin.

7. Install the upper kingpin connection on the upper kingpin, see Figure 9-18.
8. Slide two 0.010" feeler gauges on each side of the kingpin between the top shim and the upper kingpin connection. Check the clearance between the upper kingpin connection and the top of the axle.
9. Install the bolts that connect the upper kingpin assembly to the backbone. Refer to Torque Specification Section of this publication for torque requirements.
10. Once the final torque of the bolts has been obtained, remove the two 0.010" feeler gauges and lower the bottle jack.
11. Affix a magnetic base dial indicator on the axle and place the tip of the dial indicator on top of the upper kingpin connection, see Figure 9-19.

FIGURE 9-18

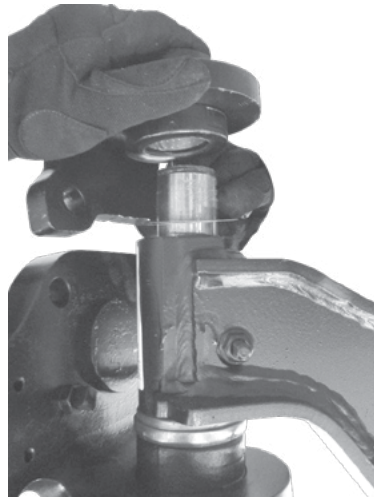
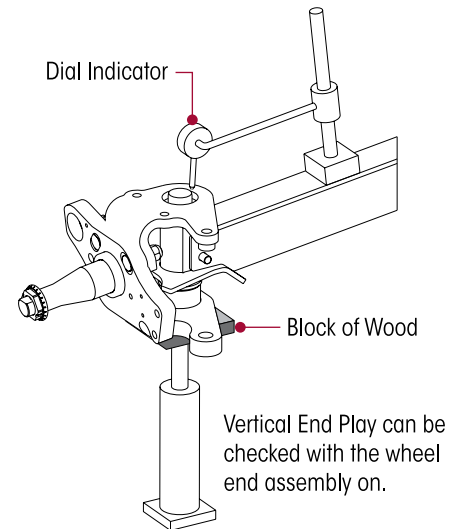


FIGURE 9-19



12. Zero the dial indicator.
13. Raise the bottle jack until there is no clearance between the backbone and the bottom of the axle.
14. Check the reading on the dial indicator. The specification for vertical travel on the steering knuckle assemblies is 0.008" to 0.011".
15. If the clearance is not within the required specification add or remove shims to obtain the proper clearance.
16. Remove the bottle jack to remove the load off the knuckle assembly and install zerk fittings to the backbone and upper kingpin connections.
17. Install the brakes and tie rod assembly.

INTEGRATED BRAKE REPLACEMENT

WARNING

ADEQUATE AXLE ASSEMBLY SUPPORT MUST BE PROVIDED. FAILURE TO PROVIDE ADEQUATE AXLE ASSEMBLY SUPPORT COULD RESULT IN SERIOUS BODILY HARM OR FATAL INJURY. EYE PROTECTION STRONGLY RECOMMENDED.

1. Raise and support the axle assembly in which the brakes are to be replaced. Remove the wheel and brake drum to expose the brake shoes.
2. Remove the outer retaining spring and inner retaining spring, see Figure 9-20.
3. While supporting the lower brake shoe assembly, remove the return spring, see Figure 9-20, set parts aside, and remove the upper brake shoe.



FIGURE 9-20

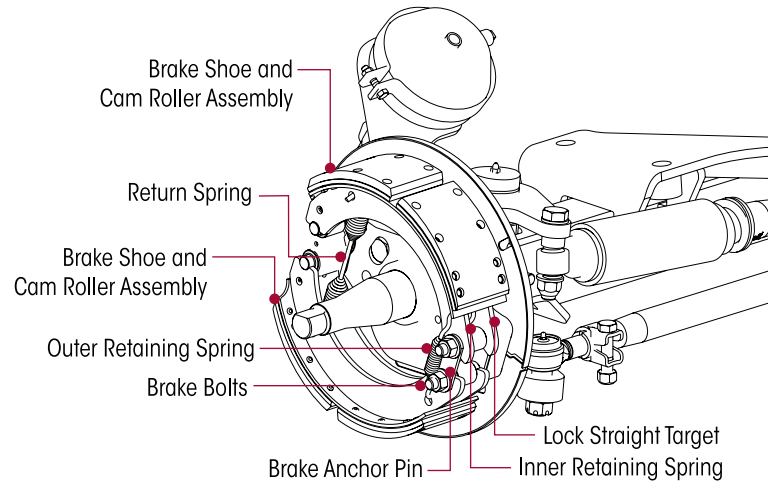


FIGURE 9-21



FIGURE 9-22

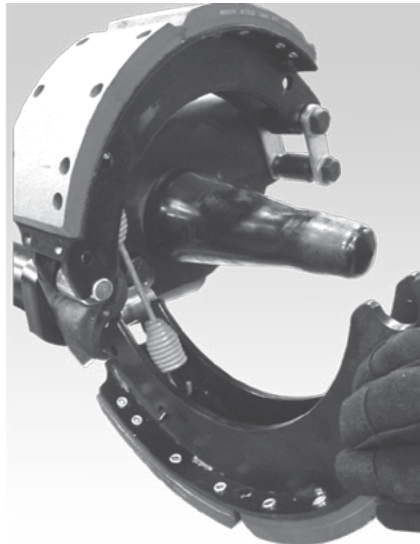


FIGURE 9-23



4. If the anchor pin is worn and requires replacement remove the brake bolts and brake anchor pin. If replacing **ONLY** the brake shoes, removal of the brake bolts and brake anchor pin is not necessary.

SERVICE HINT

If the lock straight target is present, note the position for proper reassembly location.

5. All of the necessary parts will be included in the replacement brake kit provided by Hendrickson. Contact Hendrickson Customer service to determine the proper brake kit for your axle assembly.
6. Discard worn or damaged parts.
7. Place the upper and lower brake shoe assemblies and install the return spring, see Figures 9-21 through 9-23.

WARNING

ENSURE PROPER SUPPORT OF THE BRAKE SHOES TO AVOID COMPONENT DAMAGE OR PERSONAL INJURY. BE SURE THE SPRING IS COMPLETELY INSTALLED IN THE MOUNTING HOLE. FAILURE TO DO SO COULD RESULT IN BRAKE FAILURE.

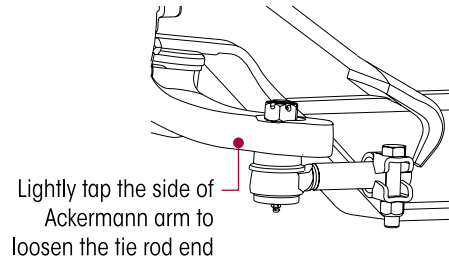
8. Install the outer and inner retaining springs.
9. Reassemble the wheel end components.

TIE ROD REPLACEMENT

DISASSEMBLY

1. Chock the wheels.
2. Position the steer axle tires straight ahead.
3. **Standard Taper Tie Rod –**
 - a. Remove the cotter pin and castle nut.
 - b. Lightly tap the side of the Ackermann arm to loosen the tie rod end from the Ackermann arm, see Figure 9-24.

FIGURE 9-24



- Heavy-duty CTR –**
 - a. Loosen nut and bolt that attaches tie rod to knuckle.
 - b. Remove nut, bolt, tie rod catch and washer.
4. Repeat Steps 3 and 4 to remove the other tie rod end.
5. Remove the tie rod cross tube and tie rod ends from the vehicle.
6. Mount the tie rod cross tube in a soft jaw vice.
7. Remove the hardware from the clamp on the tie rod cross tube.
8. Count the exposed threads on the tie rod end being replaced.
9. Remove the tie rod end from the tie rod cross tube.

WARNING

DO NOT HEAT THE TIE ROD CROSS TUBE WITH A TORCH TO FACILITATE THE REMOVAL OF THE TIE ROD END. THE USE OF SUCH HEAT CAN ADVERSELY AFFECT THE STRENGTH OF THE TIE ROD CROSS TUBE. A COMPONENT DAMAGED IN THIS MANNER WILL RESULT IN LOSS OF WARRANTY, AND CAN RESULT IN THE AND ADVERSE VEHICLE HANDLING, AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

10. If the opposing tie rod end is being replaced repeat Steps 8 through 10.
11. Inspect the tie rod cross tube for dents, cracks, or thread damage. Replace if needed.

ASSEMBLY

1. Lubricate the new tie rod end threads with Anti-Seize.

NOTE

When installing the tie rod cross tube the thread direction of the tie rod ends are as follows:

- A right hand threaded tie rod end will be installed into the right side Ackermann arm.
- A left hand threaded tie rod end will be installed into the left side Ackermann arm.

2. Install the new tie rod end into the tie rod cross tube, leaving the same amount of threads exposed that were counted on the failed tie rod end prior to removal.

WARNING

THE THREADED PORTION OF THE TIE ROD END MUST EXTEND PAST THE SLOTS INTO THE TIE ROD CROSS TUBE, SEE FIGURE 9-25. FAILURE TO DO SO CAN CAUSE COMPONENT DAMAGE, ADVERSE VEHICLE HANDLING AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

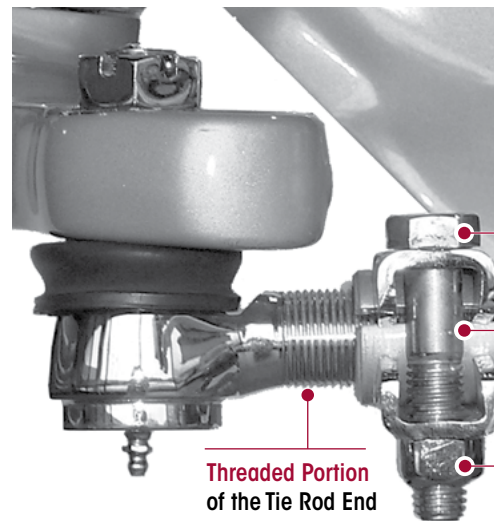
WARNING

IT IS CRITICAL TO CHECK THE 5/8" TIE ROD CLAMP BOLT HEAD LOCATION TO VERIFY THE CLAMP FASTENERS HAVE SUFFICIENT CLEARANCE AWAY FROM THE LOWER SHOCK MOUNT AT FULL WHEEL CUT. THE FASTENERS MUST NOT CONTACT THE LOWER SHOCK MOUNT. FAILURE TO DO SO CAN CAUSE ONE OR MORE COMPONENTS TO FAIL CAUSING ADVERSE VEHICLE HANDLING AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

3. Replace the opposing tie rod end if necessary by repeating Steps 2 and 3.



FIGURE 9-25 STANDARD TAPER TIE ROD SHOWN



5/8" Tie Rod Clamp Bolt

It is critical to check the 5/8" tie rod clamp bolt head location to verify the clamp fasteners have sufficient clearance away from the lower shock mount at full wheel cut. The fasteners must not contact the lower shock mount.

Tie Rod Cross Tube Slots

It is critical to have the threaded portion of the tie rod end extend past the slots in the tie rod cross tube.

5/8" Tie Rod Clamp Locknut

Tightening Torque 45-50 ft. lbs.

Threaded Portion of the Tie Rod End

⚠ WARNING

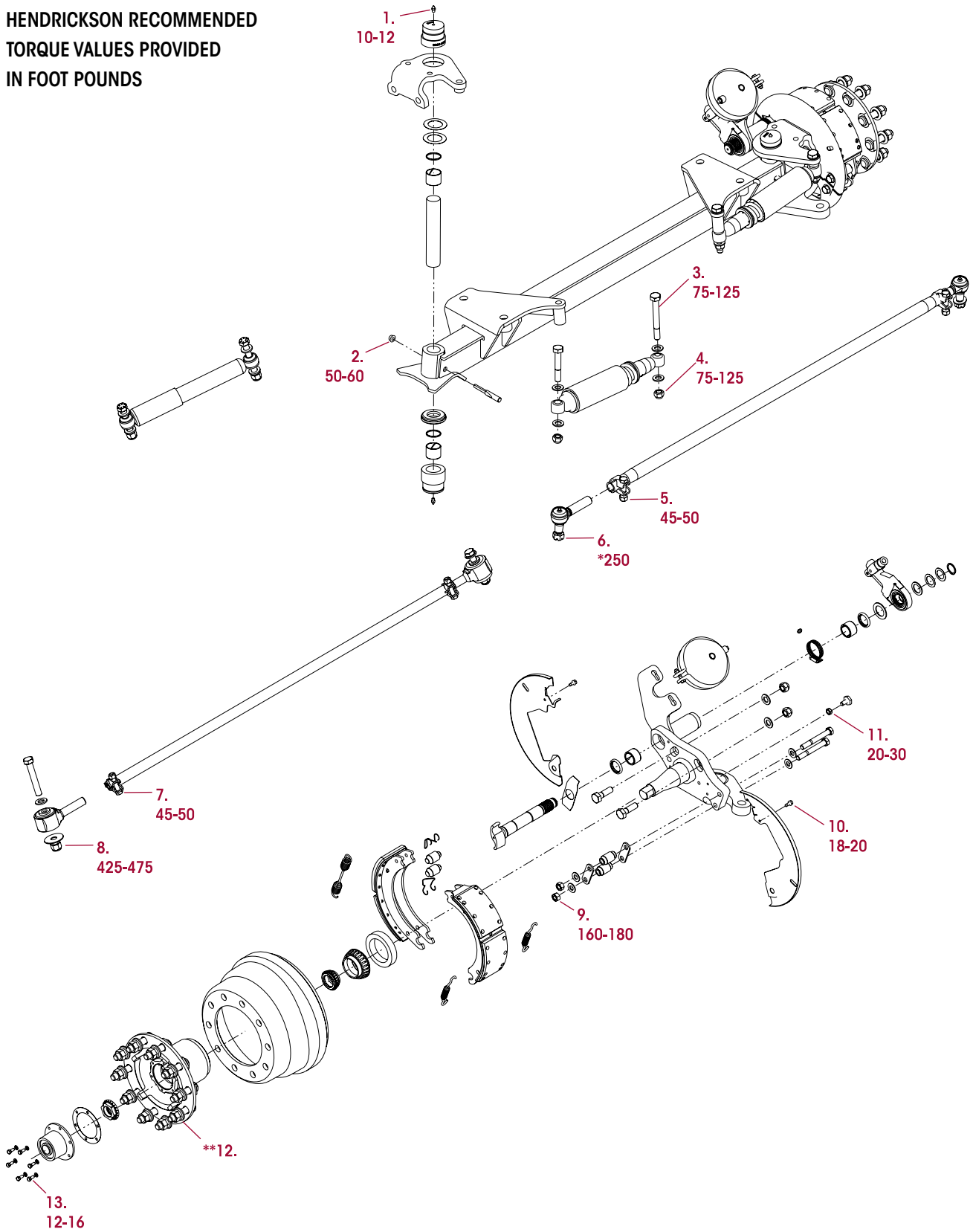
DO NOT HEAT THE TIE ROD CROSS TUBE WITH A TORCH TO ROTATE THE TIE ROD CROSS TUBE IN THE TIE ROD END. THE USE OF SUCH HEAT CAN ADVERSELY AFFECT THE STRENGTH OF THE TIE ROD CROSS TUBE. A COMPONENT DAMAGED IN THIS MANNER WILL RESULT IN LOSS OF WARRANTY, AND CAN RESULT IN THE ADVERSE VEHICLE HANDLING, AND POSSIBLE LOWER STEERING KNUCKLE PERSONAL INJURY OR PROPERTY DAMAGE.

4. If replacing opposing tie rod end is not necessary, it is critical that the tie rod cross tube rotate in the opposing tie rod end.
5. Install the tie rod cross tube into the Ackermann arms.
6. **Standard Taper Tie Rod** – Tighten the castle nuts to 250 foot pounds torque then rotate the castle nut to the next castle slot and install cotter pin.
Heavy-duty CTR – Install washer, bolt, tie rod catch and nut. Refer to Torque Specification Section of this publication for torque requirements.
7. Grease tie rod ends. See Lubrication Chart for required lubricant in the Preventive Maintenance Section of this publication.
8. Set the toe, see Toe Adjustment Procedure in Hendrickson Literature No. TP-H785, available online at www.hendrickson-intl.com.



SECTION 10 Torque Specifications

HENDRICKSON RECOMMENDED
TORQUE VALUES PROVIDED
IN FOOT POUNDS





Bridge Axle for McNeilus Bridgemaster Mixers

HENDRICKSON RECOMMENDED TORQUE SPECIFICATIONS				
NO.	DESCRIPTION	QUANTITY	SIZE	TORQUE VALUE (FOOT POUNDS)
1	Zerk Fitting	6	1/8"	10-12
2	Draw Key Nut	2	7/16"	50-60
3	Stabilizer Shock Bolt	4	3/4"	75-125
4.	Stabilizer Shock Locknut	4	3/4"	75-125
5	Round Tube Tie Rod Adjustment	2	5/8"	45-50
6.	Tie Rod End Castle Nut	2	7/8"	*250
7.	Heavy-duty (HD) Tie Rod Adjustment	2	5/8"	45-50
8.	Heavy-duty (HD) Tie Rod Attachment	4	7/8"	425-475
9.	Bolt-on Brake Attachments	4	5/8"	160-180
10.	Dust Shield	4	5/16"	18-20
11.	Steering Stop Jam Nut	2	1/2"	20-30
12.	Wheel Flange Nut	20	M22 x 1.5	**
13.	Hubcap	6	5/16"	12-16
14.	Shift Chamber Attachment (Not Shown in Graphic)	4	7/16"	40-50
15.	Shift Chamber Yoke Attachment (Not Shown in Graphic)	2	7/16"	70-90
<p>NOTE: Torque values shown apply only if Hendrickson supplied fasteners are used. If non Hendrickson fasteners are used, follow the torque specification listed in vehicle manufacturer's service manual.</p> <p>* Refer to Tie Rod Replacement in the Component Replacement Section of this publication.</p> <p>** Contact the wheel manufacturer for torque specifications.</p>				



SECTION 11 Troubleshooting Guide

BRIDGE AXLE		
TROUBLESHOOTING GUIDE		
PROBLEM	POSSIBLE CAUSE	CORRECTION
Axle shimmy	Improper Caster	Readjust caster if possible
	Toe Setting is incorrect	Readjust toe setting
	Axle bolt connection loose	Re-torque mounting bolts to manufacturer recommended torque value
	Axle out of alignment	Re-align axle
	Tires different size on each side	Use same size tires
	Tires unbalanced	Balance tires
	Air pressure in tires different from side to side	Equalize air pressure
Axle unit has vertical hop	Stabilizers worn	Verify stabilizer resistance and replace as necessary
	Stabilizers worn	Verify stabilizer resistance and replace as necessary



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