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H TECHNICAL PROCEDURE

SOFTEK® Front Suspension System for Xos Medium-duty Electric Stepvan Vehicles

SUBJECT: Service Instructions LIT NO: 17730-343 DATE: October 2022 REVISION: A

Section 9 Component Replacement

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SECTION 1 Introduction

This publication is intended to acquaint and assist maintenance personnel in the preventive maintenance, service, repair and rebuild of Hendrickson SOFTEK® integrated front mechanical suspensions with a fabricated STEERTEK NXT axle systems installed on applicable Xos medium-duty electric stepvan vehicles.

NOTE

Use only Hendrickson Genuine parts for servicing this suspension system.

It is important to read and understand this entire Technical Procedure publication prior to performing any maintenance, service, repair, or rebuild of the product. The information in this publication contains parts lists, safety information, product specifications, features, and proper maintenance, service, repair and rebuild instructions for the SOFTEK suspension with the STEERTEK NXT axle.

Hendrickson reserves the right to make changes and improvements to its products and publications at any time. Contact Hendrickson Tech Services for information on the latest version of this manual at 1-866-755-5968 (toll-free U.S. and Canada), 1-630-910-2800 (outside U.S. and Canada) or email: techservices@hendrickson-intl.com.

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

SECTION 2 Product Description

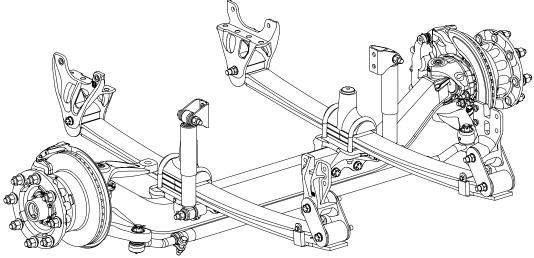
SOFTEK — is a front mechanical suspension and steer axle system (see Figure 2-1) that works to form an integrated torsion system. Utilizing a system approach, Hendrickson has engineered and optimized the following components to form a system delivering ride, stability and handling characteristics with reduced weight and maintenance.

- Leaf spring assembly With its innovative design, the leaf spring provides superior stability, performance and a soft ride. Durable rubber bushings are greaseless and only require periodic inspections.
- Shock absorbers SOFTEK utilizes premium shocks that have been tested and tuned specifically for the suspension system.
- Frame brackets Optimized design delivers weight reduction and proven durability.

STEERTEK NXT — The box-shaped cross section resists horizontal, vertical and twisting forces. Continuous beam architecture minimizes stress points for added durability.

- Axle Clamp Group The Clamp Group consists of the top pad, U-bolts, washers, and nylon locknuts
- Integrated Axle Seats Integrated axle seats to improve ground clearance, reduce part count, and simplify assembly.
- Adjustable Tie Rod To help maximize tire life, the tie rod easily adjusts toe-in/out.
- Steering Knuckles The steering and tie rod arms are integrated for increased strength and reduced weight. The unique steering knuckle packaging delivers up to a maximum of 45° wheel cut. The two piece knuckle design makes replacing the kingpin bushings easier by eliminating the need to remove the kingpins.

FIGURE 2-1



TECHNICAL NOTES

- SOFTEK is approved for on-highway use; other applications must be pre-approved by Hendrickson Sales Engineering. This system has a 10,000 pound capacity. System capacity rating for the suspension represents maximum loads on tires at ground level.
- 2 The STEERTEK NXT axle is available with 69" kingpin intersection (KPI).
- SOFTEK suspension weight (345 pounds) includes frame and shackle bracket assemblies, steel leaf springs, bushings, shocks, upper shock brackets and axle clamp group.
- STEERTEK NXT axle weight (634 pounds) includes the axle beam, knuckle/steering arm assemblies, tie rod assembly and wheel end components.
- SOFTEK is integral to and available exclusively with the STEERTEK NXT axle. This system is anti-lock braking system (ABS) ready. STEERTEK NXT is compatible with most industry standard wheel ends and brakes. Contact vehicle manufacturer for more information.
- 6. The STEERTEK NXT axle product identification is etched on the center front of the axle beam (See Figure 2-2) providing the following information:
 - Axle part number: Identifies the features of the axle beam.
 - Axle assembly number: Identifies the complete assembly, which includes the steering knuckles, bracket assemblies and tie rod assemblies

FIGURE 2-2 Front view of the axle showing approximate location of product identification.



SECTION 3 Important Safety Notice

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

The warnings and cautions 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 the vehicle 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 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, CAN RESULT IN SERIOUS INJURY OR DEATH.

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

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

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

 Also note that particular service operations may require the use of special tools designed for specific purposes. These special tools can be found in the Special Tools section of this publication.



The torque symbol alerts you to tighten fasteners to a specified torque value. Refer to Torque Specifications section of this publication.

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, LOSS OF VEHICLE CONTROL, PERSONAL INJURY, OR PROPERTY DAMAGE.

LOOSE OR OVER TORQUED FASTENERS CAN CAUSE COMPONENT DAMAGE, LOSS OF VEHICLE CONTROL, 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

LOAD CAPACITY

ADHERE TO THE PUBLISHED CAPACITY RATINGS FOR THE SUSPENSIONS. ADD-ON AXLE ATTACHMENTS (I.E. SLIDING FIFTH WHEELS) AND OTHER LOAD TRANSFERRING DEVICES CAN INCREASE THE SUSPENSION LOAD ABOVE THE RATED AND APPROVED CAPACITIES WHICH COULD RESULT IN FAILURE AND LOSS OF VEHICLE CONTROL, POSSIBLY CAUSING PERSONAL INJURY OR PROPERTY DAMAGE.



SUPPORT THE VEHICLE PRIOR TO SERVICING

PLACE THE VEHICLE ON A LEVEL FLOOR AND CHOCK THE WHEELS TO PREVENT THE VEHICLE FROM MOVING OR ROLLING. DO NOT WORK AROUND OR UNDER A RAISED VEHICLE SUPPORTED BY ONLY A FLOOR JACK. ALWAYS SUPPORT A RAISED VEHICLE WITH RIGID SAFETY STANDS. FAILURE TO DO SO CAN CAUSE SERIOUS PERSONAL INJURY OR DAMAGE TO EQUIPMENT.

ACAUTION

A WARNING

PROCEDURES AND TOOLS

A TECHNICIAN 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.

PERSONNEL PROTECTIVE EQUIPMENT

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

A 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, LOSS OF VEHICLE CONTROL, POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE, AND WILL VOID ANY APPLICABLE WARRANTIES. USE ONLY HENDRICKSON AUTHORIZED REPLACEMENT PARTS.

WARNING

UNAUTHORIZED REPAIR AND RECONDITIONING

UNAUTHORIZED REPAIR OR RECONDITIONING OF SUSPENSION OR AXLE COMPONENTS ARE NOT ALLOWED, SEE LABEL IN FIGURE 3-1. ANY SUSPENSION OR AXLE COMPONENTS FOUND TO BE DAMAGED OR OUT OF SPECIFICATIONS MUST BE REPLACED. ALL MAJOR HENDRICKSON COMPONENTS ARE HEAT TREATED AND TEMPERED. AIRTEK•SOFTEK•STEERTEK NXT•STEERTEK COMPONENTS CANNOT BE BENT, WELDED, HEATED, OR REPAIRED WITHOUT REDUCING THE STRENGTH OR LIFE OF THE COMPONENT. FAILURE TO FOLLOW THESE GUIDELINES CAN CAUSE LOSS OF VEHICLE CONTROL, POSSIBLE PERSONAL INJURY, DEATH, OR PROPERTY DAMAGE AND WILL VOID APPLICABLE WARRANTIES.

TORCH/WELDING

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

EXERCISE EXTREME CARE WHEN HANDLING OR PERFORMING MAINTENANCE IN THE AREA OF THE SPRING ASSEMBLY AND AXLE. DO NOT CONNECT ARC WELDING GROUND LINE TO THE SPRING ASSEMBLY OR AXLE. DO NOT STRIKE AN ARC WITH THE ELECTRODE ON THE SPRING ASSEMBLY OR AXLE. DO NOT USE HEAT NEAR THE SPRING ASSEMBLY OR AXLE. DO NOT NICK OR GOUGE THE SPRING ASSEMBLY OR AXLE. SUCH IMPROPER ACTIONS CAN CAUSE DAMAGE TO THE SPRING ASSEMBLY OR THE AXLE COULD FAIL, AND CAN CAUSE LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

WARNING

A 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 PROCEDURE:

- 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.

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 ANY APPLICABLE WARRANTY.

SHOCK ABSORBERS

THE SHOCK ABSORBERS ARE THE REBOUND TRAVEL STOPS FOR THE LEAF SPRINGS. ANYTIME THE FRONT AXLE ON A SOFTEK SUSPENSION IS SUSPENDED IT IS MANDATORY THAT THE SHOCK ABSORBERS REMAIN CONNECTED. FAILURE TO DO SO COULD CAUSE A REVERSE ARCH IN THE STEEL LEAF SPRINGS, POSSIBLY RESULTING IN PREMATURE LEAF SPRING FAILURE.

DAMAGED AXLE COMPONENTS

IF A VEHICLE EQUIPPED WITH A STEERTEK NXT AXLE IS INVOLVED IN A CRASH, THE AXLE STEER KNUCKLES MUST BE DISASSEMBLED AND A THOROUGH INSPECTION OF THE AXLE MUST BE PERFORMED NOTING THE CONDITION OF THE AXLE BEAM, KINGPINS, AND KNUCKLE ASSEMBLIES, INCLUDING THE AREAS OF AXLE TO KINGPIN INTERFACE FOR ANY DAMAGE, GAPS, KINGPIN MOVEMENT OR PLAY. IF ANY COMPONENT APPEARS DAMAGED, OR THE KINGPINS APPEAR TO CONTAIN ANY DAMAGE, GAPS, MOVEMENT OR PLAY, THE COMPLETE AXLE ASSEMBLY MUST BE REPLACED.

IN ADDITION, IN THE EVENT A CRASH RESULTS IN EXCESSIVE SIDE LOAD DAMAGE TO ADJACENT PARTS, SUCH AS A BENT WHEEL, HUB, OR SPINDLE, IT IS STRONGLY RECOMMENDED TO REPLACE THE COMPLETE AXLE ASSEMBLY.

CONTACT HENDRICKSON TECHNICAL SERVICES WITH ANY QUESTIONS. FAILURE TO REPLACE ANY DAMAGED COMPONENTS CAN CAUSE LOSS OF VEHICLE CONTROL, POSSIBLE PERSONAL INJURY, DEATH, OR PROPERTY DAMAGE AND WILL VOID ANY APPLICABLE WARRANTIES.

WARNING

AXLE

UNAUTHORIZED WELDING OR MODIFICATIONS CAN CAUSE CRACKS OR OTHER AXLE STRUCTURAL DAMAGE AND RESULT IN LOSS OF VEHICLE CONTROL, SEVERE PERSONAL INJURY OR DEATH. DO NOT BEND, WELD OR MODIFY AXLE WITHOUT AUTHORIZATION FROM HENDRICKSON TRUCK COMMERCIAL VEHICLE SYSTEMS.

AXLE CAMBER IS NOT ADJUSTABLE

DO NOT CHANGE THE AXLE CAMBER ANGLE OR BEND THE AXLE BEAM, SEE FIGURE 3-1. BENDING THE AXLE BEAM TO CHANGE THE CAMBER ANGLE CAN DAMAGE THE AXLE AND REDUCE AXLE STRENGTH, WILL VOID HENDRICKSON'S WARRANTY AS APPLICABLE, AND CAN CAUSE LOSS OF VEHICLE CONTROL, POSSIBLY CAUSING PERSONAL INJURY OR PROPERTY DAMAGE.

AXLE KINGPINS

STEERTEK NXT IS A UNIQUE AXLE, IN THAT THE KINGPIN IS CRYOGENICALLY INSTALLED IN THE AXLE. THE KINGPIN IS A NON-REPLACEABLE COMPONENT OF THE AXLE ASSEMBLY. DO NOT TRY TO REMOVE THE KINGPIN. IF THE KINGPIN OR ADJACENT MATING SURFACE SHOW SIGNS OF DAMAGE OR MOVEMENT, DO NOT OPERATE THE VEHICLE AND IMMEDIATELY CONTACT THE HENDRICKSON TECH SERVICES DEPARTMENT.

WARNING

STEERTEK NXT AXLE SPRING SEATS

THE INTEGRATED AXLE SPRING SEATS ON THE STEERTEK NXT AXLE ARE NON-SERVICEABLE. UNAUTHORIZED TAMPERING OF INTEGRATED AXLE SPRING SEATS CAN CAUSE COMPONENT AND STRUCTURAL DAMAGE AND RESULT IN LOSS OF VEHICLE CONTROL, SEVERE PERSONAL INJURY OR DEATH, PROPERTY DAMAGE, AND WILL VOID ANY APPLICABLE WARRANTY. DO NOT REMOVE, MODIFY OR REPLACE INTEGRATED AXLE SPRING SEAT OR FASTENERS, SEE FIGURE 3-1.

NOTE: REPLACE ANY SAFETY DECALS THAT ARE FADED, TORN, MISSING, ILLEGIBLE, OR OTHERWISE DAMAGED. CONTACT HENDRICKSON TO ORDER REPLACEMENT LABELS.

FIGURE 3-1



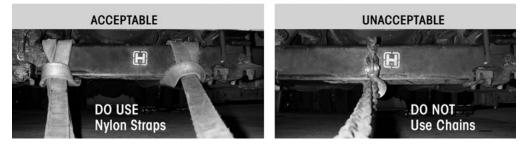
WARNING

OFF-ROADWAY TOWING

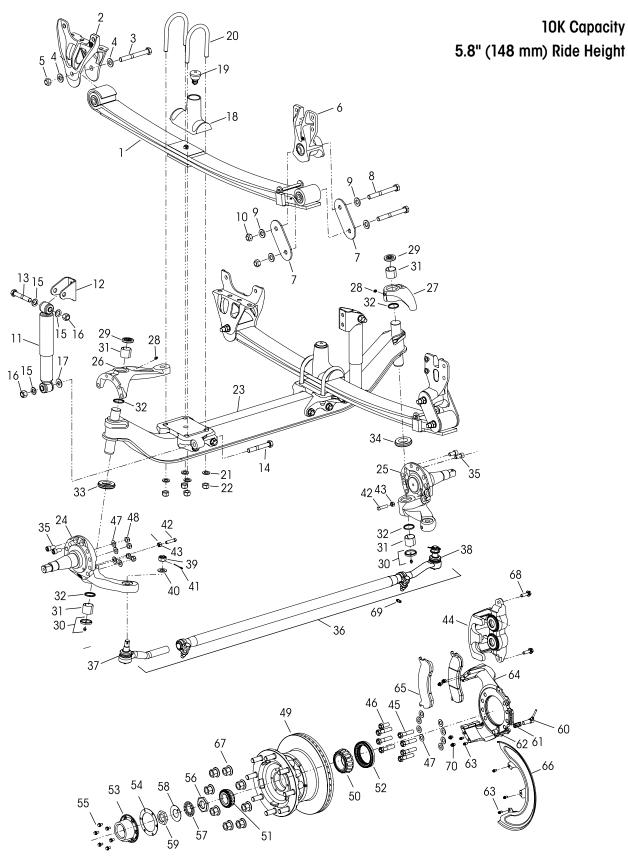
WHEN A VEHICLE IS DISABLED AND EQUIPPED WITH A STEERTEK NXT AXLE, CARE MUST BE TAKEN TO ENSURE THERE IS NO DAMAGE TO THE SUSPENSION OR AXLE WHEN TOWING THE VEHICLE.THE USE OF A TOW STRAP IS NECESSARY TO TOW A DISABLED VEHICLE TO A REPAIR FACILITY PARKING LOT INTO THE SHOP BAY. THE TOW STRAPS SHOULD BE CONNECTED TO THE TOW HOOKS PROVIDED BY THE VEHICLE MANUFACTURER AT THE FRONT OF THE BUMPER. IF THE USE OF TOW HOOKS IS NOT AN OPTION, THEN A TOW STRAP MAY BE WRAPPED AROUND THE FRONT AXLE, (SEE FIGURE 3-2) IN A MANNER THAT IS ACCEPTABLE FOR TOWING THE VEHICLE FROM A REPAIR FACILITY PARKING LOT INTO THE SHOP BAY. DO NOT USE A TOW CHAIN AROUND THE FRONT AXLE OR WITH A SINGLE POINT LOCATION TO TOW THE VEHICLE. DOING SO WILL DAMAGE THE AXLE AND VOID ANY APPLICABLE WARRANTY, SEE FIGURE 3-2. FOR DETAILED TOWING INSTRUCTIONS FOR ON-HIGHWAY TOWING, SEE TOWING PROCEDURES SECTION OF THIS PUBLICATION.

FIGURE 3-2

OFF-ROADWAY TOWING



SECTION 4 Parts Lists



H

SOFTEK® for Xos Medium-duty Electric Vehicles

KEY I	NO. PART NO.	VE	HICLE QTY.
1	82705-000	Leaf Spring Assembly	2
2	64488-002	Front Hanger	2
	34013-436	Front Spring Eye Fastener Service Kit, One Includes Key Nos. 3-5	
3		*¾"-10 UNC x 7" Hex Bolt	2
4		*¾" Flat Washer	4 2 2 4
5		*¾"-10 UNC Locknut	2
6	66510-001	Rear Shackle Bracket Assembly	2
7	64314-000	Rear Shackle Plate	
	34013-476	Rear Shackle Bracket Fastener Service Kit, One Side, Includes Key Nos. 8-10	
8		*34"-16 UNF x 61/2" Hex Bolt	4
9		*¾" Flat Washer	8
10		*¾"-16 UNF Nylocknut	4
11	58913-009L	Shock Absorber	2
12	59423-002	Upper Shock Absorber Bracket	2
	34013-437	Single Shock Absorber Fastener Service Ki Includes Key Nos. 13-17	t,
13	58917-022	3/4"-10 UNC x 41/2" Upper Shock Bolt	2
14	50764-008	3/4"-10 UNC x 5" Lower Shock Bolt	2
15	22962-001	34" Flat Washer	6
16	49842-000	34"-10 UNC Hex Locknut	4
17	22962-046	Shock Spacer	2
	64506-000	Top Pad / Axle Stop Assembly, Includes Key Nos. 18-19	
18	64519-000	Top Pad	2
19	64080-000	Rubber Axle Stop	2
	91430-074	U-bolt Service Kit, One Side, Includes Key N and Kit No. 48718-515	lo. 20
20		34"-16 UNF x 61/2" U-bolt	4
	48718-515	U-bolt Fastener Service Kit, One Side, Includes Key Nos. 21-22	
21		34" Flat Washer	8
22		34"-16 UNF Hex Locknut	8
	80919-001	STEERTEK NXT Axle Assembly Includes Key Nos. 23-44	1
23	68986-007M	Axle & Kingpin Assembly	1
		Lower Steering Knuckle Assembly, Includes Key Nos. 30-32, 42-43	
24	58900-253	Left Hand	1
25	58900-254	Right Hand	1
20	00700 204	Upper Steering Knuckle Assembly,	
07	(0002.050	Includes Key Nos. 28-29, 31-32	1
26	60903-258	Left Hand	1
27	60904-202	Right Hand Kingpin Bushing and Bearing Service Kits	1
	60961-628	Axle Set, Includes Kit Nos. 60961-629 & -	630
	60961-629	Left Hand with Composite Thrust Bearing Includes Key Nos. 28-33, 35 & Loctite	,
	60961-630	Right Hand with Roller Thrust Bearing, Ind Key Nos. 28-32, 34-35 & Loctite	cludes
28	33117-000	Grease Zerk	2
29	68687-003	Grease Cap Assembly, Upper	2 2 2 4
30	68687-002	Grease Cap Assembly, Lower	2
31	58909-001	Kingpin Bushing	4
-		Thrust Bearing Service Kits	
	60961-631 60961-632	Axle Set, Includes Kit Nos. 60961-632 & Left Hand Composite Thrust Bearing, Incl	
	60961-633	Key Nos. 32-33, 35 & Loctite Right Hand Roller Thrust Bearing, Include Key Nos. 32, 34-35 & Loctite	

		-	
		VEHI	
			QTY.
KET NU	. Part no.	DESCRIPTION	ali.
32	68731-000	Kingpin Seal	4
33	59828-000	Left Hand Composite Thrust Bearing	1
34	64256-000L	Right Hand Roller Thrust Bearing	1
35	60236-001	5/8"-11 UNC Socket Head Cap Screw	4
Not Shown	60937-000	Loctite [®] (Red) Compound Tube	1
36	76878-003	Tie Rod Assembly, Drop, Includes Key Nos. 37-3	91
		Tie Rod End Service Kits	
	60961-737	Axle Set, Includes Kit Nos. 60961-739 & -740	
	60961-739	Left Hand, Includes Key Nos. 37, 39-41	
	60961-740	Right Hand, Includes Key Nos. 38-41	
	00701740	Tie Rod End, Includes Key No. 41	
37	76875-001	Left Hand	1
38	76875-002	Right Hand	1
	70070-002	*7%" Castle Nut	
39	000/0.007		2 2 2
40	22962-007	7%" Flat Washer	2
41	17800-004	Tie Rod Nut Cotter Pin	2
	60961-069	Stop Bolt Service Kit, One Side,	
		Includes Key Nos. 42-43	
42		*½"-13 UNC Square Head Bolt	2 2 2
43		*½"-13 UNC Hex Jam Nut	2
44		**Bosch Brake Caliper Assembly,	2
		Part No. 0204719661	
45		***5%"-11 UNC x 23/4" Hex Bolt (Torque Plate)	14
46		***5%"-11 UNC x 11/2" Hex Bolt (Torque Plate)	2
47	22962-036	5%" Hardened Washer (Torque Plate)	24
48	47764-000	5/8"-11 UNC Locknut (Torque Plate)	8
49		**Webb® Hub and Rotor Assembly,	2
		Part No. 25685XW3	
50		**Timken Inner Bearing One side, Set No. 413	
51		**Timken Outer Bearing One Side, Set No. 406	
52		**Federal-Mogul Wheel Seal, M380001TX0	
53		**Stemco Hubcap Assembly - 6",	2
		Kit No. 343-4024	_
54		**Stemco Hubcap Gasket Part No. 330-3024	2
55	64545-002	5/16"-18 UNC x 3/4" Hex Bolt (Hubcap)	2
00	04040 002	with Retainer Washer	12
56		**Meritor 1½"-12 UNF Inner Wheel	2
50		Bearing Adj. Nut Part No. 1227-U-541	2
57		**Meritor ¾₀" Wheel End Lock Ring	2
57			Z
58		Part No. 1229-G-475 **Meritor 0.05" Wheel End Lock Washer	2
00			Z
<u></u>		Part No. 1229-F-474	
59		**Meritor Wheel End Outer Nut No. 1227-B-106	
60		**Wabco ABS Sensor Hydraulic Brake	2
		Kit 441-030-9102 (Includes Clip Key No 62)	
61		**Wabco ABS Sensor Clip	2
62		**Bosch ABS Sensor Bracket 0 204 793 126	2
63	93398-001	5/16"-18 UNC x 1/2" Lobe Bolt	10
64		**Bosch Torque Plate	2
		Left Hand 0 204 864 363	
		Right Hand 0 204 864 364	
65		**Bosch Brake Pads 0204816587	4
66		**Bosch Dust Shield 0 204 793 130	2
67		***M22 x 1.5 Lug Nut	16
68		**Bosch M12 x 1.25 x 40 mm Hex Bolt	
		0 204 062176	4
69		***7/16" Bleeder Screw 0 204 AJ2 122	2
70	93274-010	M10 x 1.5-6G Lobe Screw	8

- **NOTES:** * Item included in assembly only, part not sold separately.
 - ** Not supplied by Hendrickson for aftermarket service purposes. Description and part number listed for reference only. For more information and assistance with service, maintenance and rebuild instructions on these components see below component manufacturers:
 - Bosch technical and parts support 888.715.3616 or online at www.boschautoparts.com
 - Federal-Mogul technical and parts support 800.325.8886 or online at www.drivparts.com
 - Meritor technical and parts support 888.725.9355 or online, parts (www.meritorpartsexpress.com), technical support (www.meritorbullpen.com)
 - Stemco technical and part support 800.527.8492 or online at www.stemco.com
 - Timken at technical and part support 866.984.6536 or online at www.timken.com/resources or Timken YouTube series, Timken Tricks of the Trade (Installing a Timken Set-Right Bearing)
 - WABCO technical and parts support 855.228.3203 or online at or online at www.wabco-customercentre.com
 - · Webb technical and part support 800.633.3256 or online at www.webbwheel.com

*** Not supplied by Hendrickson, used for reference only. Contact the vehicle manufacturer for more information.

Special Tools

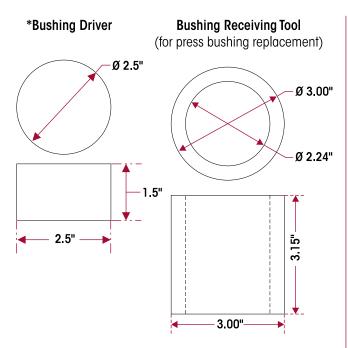
KINGPIN BUSHING TOOL – ADJUSTABLE STRAIGHT FLUTE REAMER

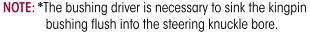
The dimension of cutting diameter must facilitate a **range of 1.802" – 1.812"**



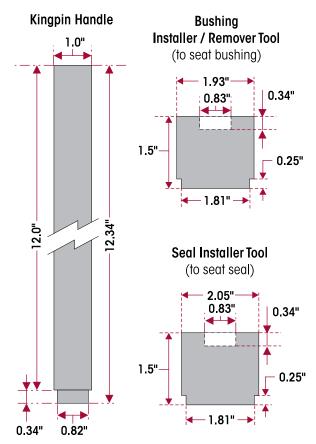
KINGPIN BUSHING AND SEAL SHOP MADE TOOLS

SHOP MADE TOOLS: These shop made tools are designed to install and remove kingpin bushings. Bushing tools are made from cold rolled steel or equivalent. Drawings are for reference only. Hendrickson does not supply these tools.





NOTE: Kingpin Handle is used for both bushing installer / remover and seal installer tools



ON-HIGHWAY AND ON-ROADWAY

Please read, understand and comply with any additional towing instructions and safety precautions that may be provided by the vehicle manufacturer.

Hendrickson will not be responsible for any damage to the axle, suspension or other vehicle components resulting from any towing method or fixture not authorized by Hendrickson.

Please contact Hendrickson Tech Services toll-free at 1-866-755-5968 (U.S. and Canada) or send e-mail to: techservices@hendrickson-intl.com with any questions regarding proper towing procedures for vehicles equipped with a STEERTEK NXT axle.

Hendrickson recommends that a vehicle equipped with a STEERTEK NXT axle be towed by the following methods (listed in order of preference) for ON-HIGHWAY or ON-ROADWAY applications.

- METHOD 1 Wheel lift, the ideal towing procedure
- METHOD 2 Towing the vehicle from the rear
- METHOD 3 Conventional axle fork

Method 1 — Wheel lift

This method provides the greatest ease for towing the vehicle. Lifting at the tires helps reduce the risk of possible damage to the axle, and suspension components during towing operations, see Figure 6-1. **FIGURE 6-1**



Method 2 — Towing vehicle from the rear

This method is preferred when the proper equipment is not available to perform the wheel lift method and is necessary for wreckers not equipped with an under lift system.

Method 3 — Conventional axle fork

This is an alternative method for towing the vehicle, but requires standard tow forks, and designated lift points inside the STEERTEK NXT axle clamp groups.

When lifting a vehicle with an under lift boom, care must be taken not to damage underbody components.

- Ensure there is sufficient clearance between underbody components and the boom
- Release the tractor brakes
- Install safety straps prior to towing the vehicle, it is preferred to use nylon safety straps. Chains have a tendency to bind and may cause damage to the axle.
- 1. Use a tow fork with a minimum of 4.5" Opening, 2" Shank, see Figure 6-2.
- 2. Install the fork in the boom properly.
- 3. The proper tow fork location is centered between the locknuts on the axle spring seats, see Figure 6-3.

FIGURE 6-2



FIGURE 6-3



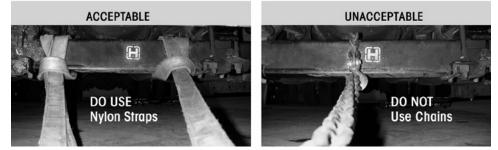
OFF-ROADWAY TOWING METHOD

WHEN A VEHICLE IS DISABLED AND EQUIPPED WITH A STEERTEK NXT AXLE, CARE MUST BE TAKEN TO ENSURE THERE IS NO DAMAGE TO THE SUSPENSION OR AXLE WHEN TOWING THE VEHICLE. THE USE OF TOW STRAPS ARE NECESSARY TO TOW A DISABLED VEHICLE FROM A REPAIR FACILITY PARKING LOT INTO THE SHOP BAY. THE TOW STRAPS SHOULD BE CONNECTED TO THE TOW HOOKS PROVIDED BY THE VEHICLE MANUFACTURER AT THE FRONT OF THE BUMPER. IF THE USE OF TOW HOOKS IS NOT AN OPTION, THEN TOW STRAPS MAY BE WRAPPED AROUND THE FRONT STEERTEK NXT AXLE, (SEE FIGURE 6-4) IN A MANNER THAT IS ACCEPTABLE FOR TOWING THE VEHICLE FROM A REPAIR FACILITY PARKING LOT INTO THE SHOP BAY. DO NOT USE A TOW CHAIN AROUND THE FRONT STEERTEK NXT AXLE TO TOW THE VEHICLE, DOING SO WILL DAMAGE THE AXLE AND VOID ANY APPLICABLE WARRANTY, SEE FIGURE 6-4.

NYLON STRAPS OR CHAINS ARE NOT RECOMMENDED FOR ON-HIGHWAY OR ON-ROADWAY TOWING.

FIGURE 6-4

OFF-ROADWAY TOWING



NOTE

SECTION 7 Preventive Maintenance

Following appropriate inspection procedures is important to help ensure the proper maintenance and operation of the SOFTEK suspension system and components function to their highest efficiency. Hendrickson recommends the SOFTEK equipped with STEERTEK NXT axle front suspension systems be inspected at pre-delivery, the first 1,000 miles of service and at the regular preventive maintenance intervals.

NOTE

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

HENDRICKSON RECOMMENDED INSPECTION INTERVALS	PRE-DELIVERY INSPECTION	FIRST IN-SERVICE INSPECTION	PREVENTIVE MAINTENANCE
 Visual inspection for proper assembly and function. Check for all of the following and replace components as necessary: Signs of unusual movement, loose or missing components Signs of abrasive or adverse contact with other components Damaged, or cracked parts Improper suspension function or alignment Visually inspect the overall condition, torque and for any signs of damage to: Axle assembly Leaf spring assembly Rear shackle brackets and shackle plates Clamp group 	Within the first 100 Miles (500 Km)	Within the first 1,000 Miles (1,600 Km) or 100 Hours	On-Highway 25,000 Miles (40,000 Km) Every 3 Months or Whichever comes first On-Highway 100,000 Miles
Inspect all fasteners for proper torque using a calibrated torque wrench.			(161,000 Km) Every 12 Months or Whichever comes first

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

COMPONENT INSPECTION

- Clamp group Check torque on clamp group mounting hardware. Refer to Storque Specifications section of this publication.
- Fasteners Look for any loose or damaged fasteners on the entire suspension. Make sure all fasteners are tightened to the specified torque. Refer to the Torque Specifications section of this publication if fasteners are supplied by Hendrickson, non-Hendrickson fasteners, refer to the vehicle manufacturer. 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.
- Front hangers and shackle brackets Check for proper fastener torque values using a calibrated torque wrench. Check for cracks or loose mounting hardware. Replace if necessary, see the Component Replacement section of this publication for replacement procedure.
- Operation All steering components must move freely through the full range of motion from axle stop to axle stop.

- Shock absorber Look for any signs of dents or leakage, misting is not considered a leak. See Shock Absorbers in this section.
- Steel leaf spring Look for cracks. Replace if cracked or broken. Replace if necessary, see the Component Replacement section of this publication for replacement procedure.
- Steering pivot points Check for looseness at all pivot points. Inspect and lubricate all pivot points. Refer to the Troubleshooting Guide section of this publication.
- STEERTEK NXT axle and tie rods Inspect for any cracks or dents on the axle, and also refer to Tie Rod Ends in this section. Replace as necessary.
- Tire wear Inspect tires for wear patterns that may indicate suspension damage or misalignment, see Visual Tire Inspection in this section.
- Top pad and bump stop Check for cracks and/or missing rubber bump stops. Replace if necessary, see the Component Replacement section of this publication for replacement procedure.
- Wear and damage Inspect all parts of suspension for wear and damage. Look for bent or cracked parts. Replace all worn or damaged parts.

Also see vehicle manufacturer's applicable publications for other preventive maintenance requirements.

LUBRICATION INTERVALS

For vehicles equipped with the STEERTEK NXT axle, regular lubrication intervals should be followed to help prevent premature wear to the kingpin bushings and tie rod ends, see Lubrication Specifications in Table 7-1.

NOTE

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

TAB	LE 7-1 SOFTEK v	SOFTEK with STEERTEK NXT Axle Greasing and Lubrication Specifications				
Application		Component	Greasing Interval	Grease	Outside Temperature	
Medium-duty	Low Mileage Accumulation No off-road operation	Kingpin Bushings	Maximum of 40,000 miles (64,000 km) or 6 months, whichever comes first	Multipurpose Grease NLGI Grade 2	Refer to the lubricant manufacturer's specifications for the temperature service limits applicable to your area	
	95% Highway Surface					
	No off-roadway operation	Tie Rod Ends				
	City Delivery, Inner City Coach, Heavy-haul, school bus, motor home, transit coach Less than 50,000 miles per year (80,500 kilometers per year)					
		Drag Link	See the Vehicle Manufacturer			

NOTE: Lubrication greases acceptable for use on the STEERTEK NXT axle will carry a designation of NLGI #2 EP and rated GC-LB or equivalent.

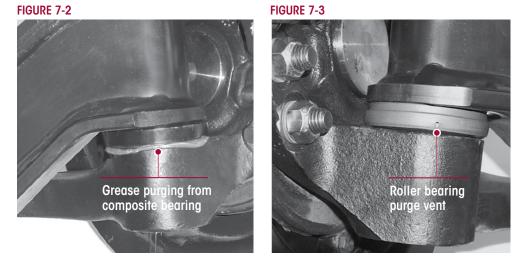
KINGPIN LUBRICATION

STEERTEK NXT upper kingpin grease zerks are located on the inboard side of the steering knuckle and upper kingpin connection, see Figure 7-1.

- 1. Place vehicle on the ground.
- 2. Prior to greasing the kingpins on the vehicle, the suspension must be in a loaded condition.
- 3. Clean off all the grease zerks and grease gun tip with a clean shop towel prior to lubrication.



- 4. Lubricate the kingpins through the grease zerks on the top and bottom of the steering knuckle, see Lubrication Specification Table 7-1.
- 5. Force the required lubricant into the upper and lower kingpin grease zerks, until new lubricant flows out from the upper kingpin connection and steering knuckle and the thrust bearing purge location, see Figures 7-2 and 7-3.



Greasing at the lower fitting should purge grease from the thrust bearing shell. The left side of the axle has a composite style thrust bearing and the right side of the axle has a steel roller thrust bearing, see Figures 7-4 and 7-5. Both purge in the same area.



TIE ROD ENDS

LUBRICATION PROCEDURE

- 1. Turn the vehicle wheels straight ahead.
- 2. Wipe the grease zerk and grease gun tip with clean shop towels.
- 3. Wipe the seal/boot clean with shop towels.
- 4. 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).

ACAUTION

NOTE

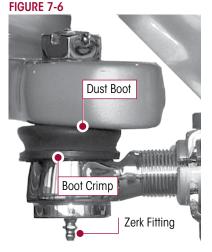
EXCEEDING THE MAXIMUM AIR PRESSURE TO THE GREASE ZERK CAN CAUSE DAMAGE TO THE DUST BOOT AND COMPONENT FAILURE.

- 5. Dirt, water, and discolored old grease should flow from the relief vents or purge holes near the boot crimp or bellows area, see Figure 7-6.
- 6. Continue to purge grease until fresh grease flows from the purge area.
- 7. The tie rod ends are designed for lube service. If a tie rod end 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. If the tie rod end still does not accept grease following this procedure, replace the tie rod end (see Tie Rod End and Cross Tube in the Component Replacement section of this publication).

INSPECTION

Prior to inspection the entire system must be unloaded (i.e., the front end of the vehicle must be raised and supported with safety stands).





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

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



THE COTTER PIN MUST BE INSTALLED CORRECTLY 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 POSSIBLY RESULT IN TOTAL LOSS OF VEHICLE CONTROL.

5. Check that the tie rod end nut is installed and secured with a cotter pin. If the cotter pin is missing, check the nut torque specification and then install a new cotter pin. Always tighten the castle nut to specified torque when setting the cotter pin. DO NOT back off the nut to insert cotter pin.

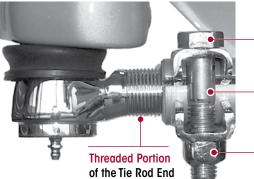
IT IS CRITICAL TO CHECK THE ⁵/8" TIE ROD CLAMP BOLT HEAD LOCATION TO VERIFY THE CLAMP FASTENERS HAVE SUFFICIENT CLEARANCE AWAY FROM THE LOWER SHOCK MOUNT AT FULL WHEEL CUT. THE FASTENERS MUST NOT CONTACT THE LOWER SHOCK MOUNT. FAILURE TO DO SO CAN CAUSE ONE OR MORE COMPONENTS TO FAIL CAUSING LOSS OF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

6. Verify the 5%" tie rod clamp bolt head does not contact the lower shock mount at full wheel cut, see Figure 7-7.

THE THREADED PORTION OF THE TIE ROD END MUST EXTEND PAST THE SLOTS INTO THE TIE ROD CROSS TUBE, SEE FIGURE 7-7. FAILURE TO DO SO CAN CAUSE COMPONENT DAMAGE, LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

7. Check that the tie rod end is threaded correctly into the cross tube and is engaged deeper than the end of the cross tube slot. The tie rod end must be visible the entire length of the cross tube slot, see Figure 7-7.





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 68 ± 7 ft. lbs. (92 ± 9 Nm)

8. Check that grease zerks are installed. Replace a damaged grease zerk with a new one.

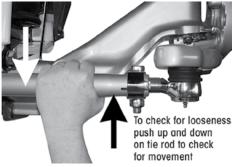
DO NOT USE THE FOLLOWING ITEMS OR METHODS TO CHECK FOR MOVEMENT OF THE TIE ROD ASSEMBLY, WHICH CAN CAUSE DAMAGE TO COMPONENTS:

- A CROW BAR, PICKLE FORK OR 2 x 4
- ANYTHING OTHER THAN HANDS USED TO GRASP AND ROTATE THE CROSS TUBE ASSEMBLY (CAN RESULT IN DAMAGE TO THE CROSS TUBE)
- EXCESSIVE PRESSURE OR FORCE APPLIED TO THE TIE ROD ENDS OR THE JOINTS OF THE ASSEMBLY
- 9. By hand or using a pipe wrench, with jaw protectors to avoid gouging the cross tube, rotate the cross tube toward the front of the vehicle and then toward the rear. After rotating, center the cross tube. If the cross tube will not rotate in either direction, replace both tie rod ends, see Figure 7-8.
- 10. 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 3 75 ± 25 foot pounds of force. Check for any movement or looseness at both tie rod end locations, see Figure 7-9.



A CAUTION





- 11. If there is any movement in the tie rod assembly, install a magnetic based dial indicator on the lower steering knuckle, see Figure 7-10.
- 12. Set the dial indicator to zero.
- 13. Apply hand pressure with reasonable human effort vertically up and down in a push-pull motion several times (using approximately 75 ± 25 foot pounds of force). Observe the reading on the dial indicator.
- 14. If the reading is more than 0.060", replace both tie rod ends at the next service interval.



- 15. 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.
- NOTE According to the Commercial Vehicle Safety Alliance (CVSA), the "out of service" criteria for front steer axle tie rod assemblies on any commercial vehicle is: Any motion other than rotational between any linkage member and its attachment point of more than ¹/₈" (3 mm) measured with hand pressure only. (393.209(d)), (published in the North American Standard Out-of-Service Criteria Handbook, 2022.)

CLAMP GROUP RE-TORQUE INTERVALS

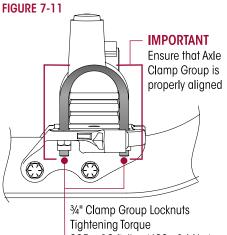
LOOSE OR OVER TORQUED FASTENERS CAN CAUSE COMPONENT DAMAGE, LOSS OF VEHICLE CONTROL, PROPERTY DAMAGE, OR SEVERE PERSONAL INJURY. MAINTAIN CORRECT TORQUE VALUES AT ALL TIMES. CHECK TORQUE VALUES ON A REGULAR BASIS AS SPECIFIED.

- 1. Clamp group locknuts must be torqued to specification at preparation for delivery and re-torqued at 1,000 miles thereafter, follow the 6 month / 50,000 mile visual inspection and annual re-toraue intervals. ENSURE THE CLAMP GROUP IS ALIGNED PROPERLY PRIOR TO TIGHTENING HARDWARE. FAILURE TO DO SO CAN CAUSE LOSS OF VEHICLE CONTROL, PROPERTY DAMAGE OR PERSONAL INJURY.
- 2. Ensure that the clamp group is properly aligned and the U-bolts are seated in the top pad, and the top pad is centered on the axle spring seat, see Figure 7-11.
- 3. Visually inspect for the signs of component or bolt movement. If signs of movement are present:
 - a. Disassemble the clamp group fasteners, check for component wear or damage and replace as necessary, then install new clamp group fasteners.
 - b. Tighten the clamp group locknuts evenly in 50 foot pounds increments to vehicle manufacturer's torque specification in the proper pattern to achieve uniform bolt tension, see Figure 7-12.

KINGPIN BUSHING

INSPECTING STEERING KNUCKLE LATERAL MOVEMENT

- 1. Chock the wheels to help prevent the vehicle from moving. Set the parking brake.
- 2. Use a jack to raise the vehicle until the wheels are off the ground. Support the vehicle with safety stands.
- 3. CHECKING THE UPPER KINGPIN BUSHING. Install the base of a dial indicator onto the axle beam and place the tip against the side of the steering knuckle, see Figure 7-13.
- 4. Set the dial indicator to "O" zero.
- 5. Move the top of the tire in and out by applying reasonable constant pressure and then release, see Figure 7-15.
- 6. Check the reading on the dial indicator. If the dial indicator moves more than 0.015", the upper bushing is worn or damaged. Replace both bushings. Refer to the Kingpin Bushing replacement procedure in the Component Replacement section of this publication.
- 7. CHECKING THE LOWER KINGPIN BUSHING. Install a dial indicator so that the base is on the axle and the indicator tip is against the inside of the bottom of the knuckle, see Figure 7-14.



295 ± 10 ft. lbs. (400 ±14 Nm)

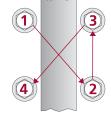


FIGURE 7-13

NOTE

Check the UPPER Kingpin Bushing

FIGURE 7-14

Check the LOWER Kingpin Bushing

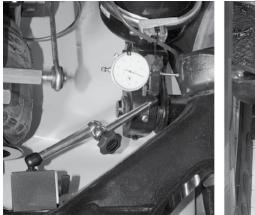




FIGURE 7-15 Move the TOP and BOTTOM of the tire in and out



- 8. Set the dial indicator to "0" zero.
- Move the bottom of the tire in and out. If the dial indicator moves more than 0.015", the lower bushing is worn or damaged. Replace both kingpin bushings. Refer to the Component Replacement section of this publication.

If one (1) bushing is worn or damaged, it is mandatory to replace both the top and bottom bushings on that knuckle assembly.

STEERING KNUCKLE

CHECKING VERTICAL END PLAY (UP AND DOWN MOVEMENT)

The operating specification for vertical end play on the steering knuckle is 0.008" to 0.030".

- 1. Chock the rear tires to help prevent the vehicle from moving.
- 2. Set the parking brakes.
- 3. Use a jack to raise the vehicle until both tires are 1" off the ground.
- 4. Place a dial indicator on each side of the axle as follows:
 - a. Index the wheels slightly (left or right).
 - b. Place the magnetic dial indicator base on the axle, see Figure 7-16.
 - c. Place the tip of the dial indicator on the top of the upper steering knuckle (not on the grease cap).
- 5. Set the dial indicator to "O" (zero).
- 6. Lower the jack.
- 7. If vertical end play is greater than 0.030", or below 0.008" an adjustment of the upper knuckle is necessary.
- 8. Upper knuckle adjustment:
 - If the vertical end play is greater than 0.030", loosen the socket head cap screws and push down on the knuckle assembly until the proper vertical end play is achieved.



- If the vertical end play is less than 0.008", loosen the socket head cap screws and pull up on the knuckle assembly until the proper vertical end play is achieved.
- 9. Retighten the socket head cap screws to \mathbb{R} 188 ± 12 foot pounds torque.

SHOCK ABSORBERS

NOTE

It is not necessary to replace shock absorbers in pairs if only one (1) shock absorber requires replacement.

Hendrickson uses a long service life, premium shock absorber on all SOFTEK suspensions. If shock absorber replacement is necessary, Hendrickson recommends that the shock absorbers be replaced with identical Hendrickson Genuine part for servicing. Failure to do so will affect the suspension performance, durability, and will void any applicable warranty. See vehicle manufacturer's applicable publications for other shock absorber inspection requirements.

Inspection of the shock absorber can be performed by doing a heat test, and a visual inspection. Replace as necessary, refer to the Component Replacement section of this publication.

HEAT TEST AND PHYSICAL INSPECTION

1. **Heat Test:** Drive the vehicle at moderate speeds on a rough road for minimum of fifteen minutes.

DO NOT GRAB THE SHOCK ABSORBER AS IT COULD POSSIBLY BE HOT AND CAUSE PERSONAL INJURY.



- a. Perform heat test by carefully touching or placing a hand near the shock absorber body below the dust cover. Touch the frame to get an ambient reference, see Figure 7-17. A shock absorber that is warm to the touch is acceptable, a cold shock absorber should be replaced.
- 2. **Physical Inspection:** To inspect for an internal failure, remove and shake the suspected shock absorber. Listen for the sound of metal parts rattling inside. Rattling of metal parts can indicate that the shock absorber has an internal failure and the shock absorber should be replaced.

VISUAL INSPECTION

Damaged upper or

lower bushing

Look for these potential problems when doing a visual inspection, see Figure 7-18. Inspect the shock absorbers fully extended. Replace as necessary.

FIGURE 7-18



Damaged upper or lower mount

SHOCK ABSORBER VISUAL INSPECTION - UNACCEPTABLE CONDITIONS



Damaged dust cover and / or shock body



Bent or dented shock absorber

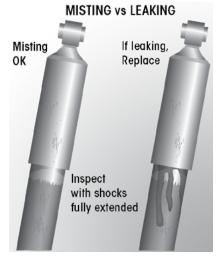


Improper installation Example: washer (if equipped installed backwards

LEAKING VS. MISTING SHOCK ABSORBER VISUAL INSPECTION FIGURE 7-19

The inspection must not be conducted after driving in wet weather or a vehicle wash. The shock absorber needs to be free from water.

Many shock absorbers are often misdiagnosed as failures. Misting is the process whereby very small amounts of shock absorber fluid evaporate at a high operating temperature through the upper seal of the shock absorber. When the "mist" reaches the cooler outside air, it condenses and forms a film on the outside of the shock absorber body. Misting is perfectly normal and necessary function of the shock absorber. The fluid which evaporates through the seal area helps to lubricate and prolong the life of the seal.



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

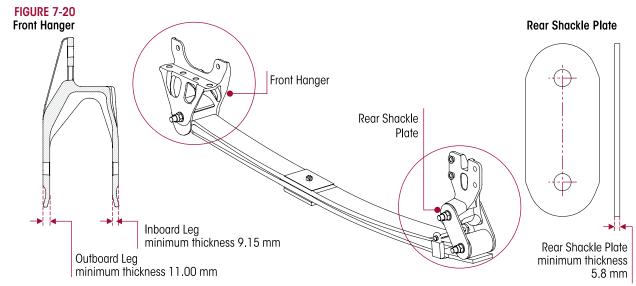
Inspect the shock absorber fully extended. **A shock absorber that is truly leaking** will show signs of fluid **leaking in streams from the upper seal**. These streams can easily be seen, see Figure 7-19, underneath the main body (dust cover) of the shock absorber. Replace as necessary.

SURFACE PAINT WEAR

INSPECTION

Front Hanger • Rear Shackle Bracket — Hendrickson SOFTEK suspension systems equipped on Xos vehicles utilize rubber bushings in the leaf springs. These rubber bushings allow the leaf spring to deflect and may contact the front hanger and shackle plates when the truck encounters high lateral acceleration (e.g. a highway clover leaf). The rubber bushing will center the leaf spring between the legs of the hanger/shackle plates once the vehicle is driven straight.

This function of the rubber bushing may allow the leaf spring to contact the front hanger/rear shackle plate and possibly remove surface paint from the contact area. Surface paint wear does not cause damage that will affect the function or durability of the front hanger/rear shackle plate or their mating components provided a minimum wall thickness is maintained.



NOTE

An indication that the front hanger/ rear shackle plates are worn and require replacement is when the components no longer meet the following minimum requirements:

- Front hanger inboard leg minimum thickness of 9.15 mm and the outboard leg thickness minimum thickness 11.00 mm, see Figure 7-20.
- Rear shackle plate minimum thickness of 5.8 mm, see Figure 7-20.

WHEEL BEARING END PLAY

This procedure follows the guidelines of TMC RP 618.

 Lubricate the bearings with clean axle lubricant, see Lubrication Intervals in the Preventive Maintenance section of this publication.

Never use an impact wrench when tightening or loosening axle/spindle nuts or bolts during the procedure.

 After the wheel hub and bearings are assembled on the spindle, tighten the inner wheel bearing adjusting nut to 200 foot pounds torque while rotating the wheel hub assembly. FIGURE 7-21

be taken not to rotate the hub assembly.

- 3. Back off the inner wheel bearing (adjusting) nut one full turn. **DO NOT** rotate the hub and proceed to Step 4.
- 4. Re-torque the inner (adjusting) nut adjusting nut to S 50 foot pounds torque while rotating the wheel hub assembly.
- 5. Back off the inner (adjusting) nut one third turn.
- Install the locking washer. If dowel pin and washer (or washer tang and nut flat) are not aligned, remove the washer, turn it over and reinstall. If required, loosen the inner (adjusting) nut just enough for alignment.

NEVER TIGHTEN THE INNER (ADJUSTING) NUT FOR ALIGNMENT AT THIS POINT OF THE PROCEDURE. THIS MAY PRE-LOAD THE BEARING AND CAUSE PREMATURE FAILURE. HOWEVER, WHEN USING A SINGLE-NUT SYSTEM FOR WHEEL END FASTENERS, TIGHTEN THE NUT TO INSERT THE LOCKING DEVISE. NOTE THAT THERE ARE VARYING SINGLE-PIECE NUT SYSTEMS COMMERCIALLY AVAILABLE, MANY WITH INTEGRAL LOCKING SYSTEMS. REFER TO THE MANUFACTURER'S SERVICE INFORMATION FOR THESE NUT SYSTEMS, BEAR IN MIND THAT 0.001" TO 0.005" END PLAY READING ARE THE ONLY ACCEPTABLE VALUES FOR MANUALLY ADJUSTED WHEEL ENDS.

7. Install and tighten the outer (jam) nut to vehicle manufacturer's specified torque.

This adjustment allows the wheel to rotate freely with 0.001" to 0.005" (0.025 mm to 0.0127 mm) end play.

- 8. Verify end play with a dial indicator, see Figure 8-17. Wheel end play is the free movement of the tire and wheel assembly along the spindle axis.
 - Ensure the brake drum-to-hub fasteners are tightened to the vehicle manufacturer's specifications.
 - b. Attach a dial indicator with its magnetic base to the hub, brake drum or spindle, depending on preference. The dial indicator pointer must be positioned on a smooth machined surface which is free of gasket sealant material to achieve an accurate reading when the hub is oscillated during the adjustment reading procedure.
 - c. Adjust the dial indicator so that its pointer is against the end of the spindle with its line of action parallel to the axis of the spindle, see Figure 8-17.

NOTE

NOTE

d. Grasp the hub assembly at the three o'clock and nine o'clock positions. Oscillate the hub a maximum of five degrees several times while pushing inward on the hub. Zero the dial indicator. Oscillate the hub a maximum of five degrees several times while pulling outward on the hub. Note the dial indicator reading, this will indicate the bearing end play.

If end play is not within specification of 0.001" to 0.005" (0.025 mm to 0.0127 mm), a readjustment is required.

- 9. Readjustment Procedure:
 - Excessive End Play If end play is greater than 0.005", remove the outer (jam) nut and pull the washer away from the inner (adjusting) nut, but not off the spindle. Tighten the inner (adjusting) nut to the next alignment hole of the washer. Reassemble the washer and retorque the outer (jam) nut to vehicle manufacturer's specified torque. Verify end play with a dial indicator.
 - Insufficient End Play If end play is not present, remove the outer (jam) nut and pull the washer away from the inner (adjusting) nut, but not off the spindle. Loosen the inner (adjusting) nut to the next alignment hole of the locking washer. Reassemble the washer and retorque the outer (jam) nut to the vehicle manufacturer's specifications. Verify end play with a dial indicator.

FINE TUNING ADJUSTMENT

Maximum wheel bearing life is achieved with end play on the lower end (less end play) of the allowable limit. Technician should utilize a fine tuning process, when possible, to arrive at wheel end play that is on the lower end of the 0.001"-0.005" (0.025 mm to 0.0127 mm) allowable range. In many cases, end play in the 0.001"-0.002" range can be achieved if the initial end play reading are in the 0.003"-0.005" range.

If after performing the readjustment procedures, and a slight adjustment is required, repeat the appropriate procedures, remove the washer from the spindle, tighten or loosen the inner (adjusting) nut the equivalent of ½ of an alignment hole of the washer, or reversing the alignment washer, and reinstalling it on the spindle. Reassemble and re-torque the outer (jam) nut to the vehicle manufacturer's specifications. Verify end play with a dial indicator.

Bendable type washer lock only: Secure nuts by bending one wheel nut washer tang over the inner and outer nut. Bend the tangs over the closest flap perpendicular to the tang.

ACAUTION

NOTE

NOTE

BEFORE OPERATING THE VEHICLE, THE WHEEL HUB CAVITIES AND BEARINGS MUST BE LUBRICATED TO HELP PREVENT FAILURE. REFER TO LUBRICATION INTERVALS IN THE PREVENTIVE MAINTENANCE SECTION OF THIS PUBLICATION.

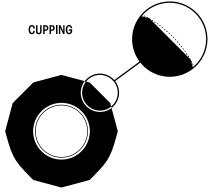
VISUAL TIRE INSPECTION

The following tire Inspection guidelines are based upon Technology & Maintenance Council (TMC) recommended practices. Any issues regarding irregular tire wear where Hendrickson is asked for assistance, will require tire and alignment maintenance records, reference RP 642 in TMC Recommended Practices Manual.

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 for steer tires are: cupping, diagonal wear, feather wear, one-sided wear, overall fast wear (Miles per 32nd), and rapid shoulder wear (one shoulder only).

FIGURE 7-22



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.

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 shock absorber control on some suspension types as well as loose kingpins.

To solve cupping problems:

Tires – Correct mismount or balance problem. If ride complaints arise, steer tires may be rotated to drive or trailer axle.

Vehicle – Diagnose component imbalance condition, i.e., wheel, rim, hub, brake, drum. Correct as necessary.

Diagonal Wear — Is localized flat spots worn diagonally across the tread at approximately 25-35° angles, often repeating around the tread circumference. For more information.

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

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

FIGURE 7-24



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, all 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.

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.

One-sided wear — Is excessive wear on one side of tire extending from the shoulder towards the center of the tread.

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

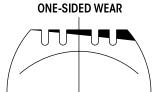
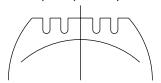


FIGURE 7-25

FIGURE 7-23 DIAGONAL WEAR



FIGURE 7-26 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.

Rapid Shoulder Wear (one shoulder only) — Is a tire worn on the edge of one shoulder, sometimes extending to inner ribs. It can progress to diagonal wipeout.

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.



SECTION 8 Alignment & Adjustments

ALIGNMENT DEFINITIONS

FIGURE 8-1

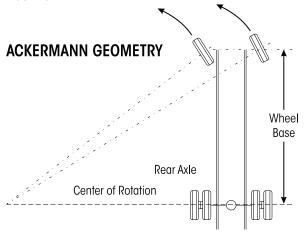
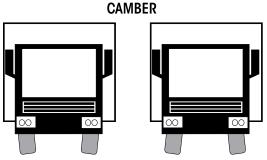
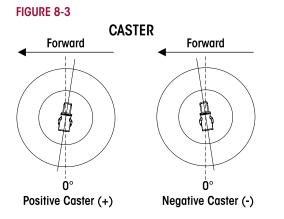


FIGURE 8-2



Positive Camber

Negative Camber



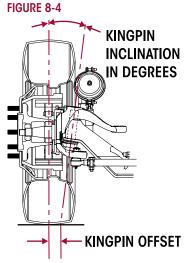
Lower Steering Knuckle (Ackermann Arm) Geometry — The geometry of the four bar linkage consisting of the front axle beam pivot points, tie rod arms, and cross tube and attempts to provide free rolling of front tires in a turn. Ackermann geometry is dependent upon the steering axle track-width and wheelbase of the vehicle. Improper geometry results in wheel scrub in turns which generally appears as toe wear on the tire, usually more wear on one side of the vehicle than the other due to the operational route of the vehicle.

Bump Steer (Feedback) — The feedback felt through the steering linkage to the steering wheel when a steer axle tire hits a bump in the road. This occurs because the axle-end of the drag link and the axle attachment point of the spring do not travel in parallel circular arcs as the suspension moves up and down. This condition can also be caused by trapped air in the power steering system.

Camber — The angle formed by the inward or outward tilt of the wheel reference to a vertical line. Camber is positive when the wheel is tilted outward at the top and is negative when the wheel is tilted inward at the top.

Excessive positive camber may cause smooth wear on the outer half of the tire tread. Excessive negative camber may cause wear on the inner half of the tread. Static-unloaded camber angles are built into the axle to put the loaded tire perpendicular to the road.

Caster — The forward or rearward tilt of the steering axle kingpin in reference to a vertical line. The angle is measured in degrees. Caster is positive when the top of the steering axis is tilted rearward and is negative when the tilt is forward. Proper caster is important for directional stability and returnability. Too much positive caster can cause shimmy, excessive steering effort and is normally a vehicle performance and handling consideration. Uneven positive caster may create a steering pull toward the side with the lower caster. This attribute may be used to compensate for crowned roads.

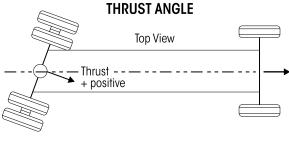


Kingpin Inclination — The inward tilt of the kingpin from the vertical. This front suspension parameter has a pronounced effect on steering effort and returnability. As the front wheels are turned around an inclined kingpin, the front of the truck is lifted. This lifting of the vehicle is experienced as steering effort when the turn is executed and exhibits itself as recovery force when the steering wheel is released.

Kingpin Offset — The distance between the center of the tire patch and intersection of the kingpin axis with the ground. This parameter of front end geometry is important in vehicles without power steering and has a major effect on static steering. If there is no kingpin offset, the tires must scrub around the center of the pin patch when turned in a static condition, resulting in higher static steering efforts.

Steering Arm — The component that connects the drag link to the axle knuckle assembly.

FIGURE 8-5

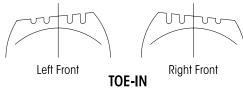


Thrust Angle, Tracking, or Square — The angle formed by the centerline of the vehicle frame (geometric centerline) and the direction that an axle points. As indicated by the term "square", the ideal value for the angle is 0° or when the axle centerline is at 90° or perpendicular to the geometric centerline. Thrust or tracking to the right is positive, and to the left is negative.

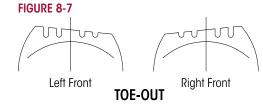
A steering correction is required to offset the effect of the thrust angles and keeps the vehicle traveling in a straight line. It results in a lateral offset between the steer and drive axle tires commonly referred to as "dog tracking."

Tie Rod Arm (lower steering knuckle, cross tube arm) — The component that transmits steering forces between left and right axle knuckle assemblies through the cross tube assembly.

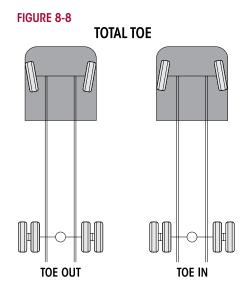
FIGURE 8-6



Toe-in — is when the horizontal line intersects in front of the wheels, or the wheels are closer together in front than in the back. Toe-in is commonly designated as positive, toe-out as negative. Excessive toe-in wears the outside edge of the tires. Steer axle toe is adjustable to reduce wear to the leading edge of the tire and also to avoid road wander. Toe is adjusted in a static, unloaded condition so that the tires will run in a straight line under a dynamic, loaded condition.



Toe-out — Is when the horizontal lines intersect behind the wheels, or the wheels are closer together in back than in front. Toe-in is commonly designated as positive, toe-out as negative. Excessive toe-out wears the inside edge of the tires. Steer axle toe is adjustable to reduce wear to the leading edge of the tire and also to avoid road wander. Toe is adjusted in a static, unloaded condition so that the tires will run in a straight line under a dynamic, loaded condition.



Toe-Out on Turns — (See Ackermann Geometry). Excessive turning angles such as those encountered in pickup and delivery operations may contribute to premature tire wear. Be advised that the greater turning angles, the more that toe and camber change. If you have any doubt regarding the optimum turning angles for your operation, contact the vehicle's manufacturer, axle manufacturer, tire manufacturer and alignment equipment manufacturer for advice.

Total Toe — The angle formed by two horizontal lines through the planes of two wheels. Steer axle toe Is adjustable to reduce wear to the leading edge of the tire and also to avoid road wander. Toe is adjusted in a static, unloaded condition so that the tires will run in a straight line under a dynamic, loaded condition.

INSPECTION PRIOR TO ALIGNMENT

WHEELS AND TIRES

Examine the following items:

- The tires are inflated to the manufacturer's specified tire pressure.
- The steer axle tires are the same size and type.
- The lug nuts are tightened to manufacturer's specified torque.
- The wheels are balanced and check for tire to rim runout.
- The wheels and tires are free of excessive wear and damage.
- Wheel bearing end play is within vehicle manufacturer's specification.

FRONT SUSPENSION

Inspect the following:

- All fasteners are installed and tightened to the specified torque, refer to the Torque Specifications section of this publication.
- Leaf springs are free of wear or damage.
- Shock absorbers are free of wear and damage.
- Verify the rear suspension ride height is within specification if equipped with an air suspension. Follow manufacturer's guidelines (if equipped).
- Front and rear spring mounts for wear or damage.

TIE ROD ENDS

Perform the Tie Rod Inspection procedure, refer to the Preventive Maintenance section of this publication.

REAR AXLE AND REAR SUSPENSION

Rear axle misalignment can cause front tire wear. If the outer edge of one front tire is worn and the inner edge of the other front tire is worn, check the following:

- Ensure the rear axle is correctly aligned. Refer to the procedure from the vehicle or suspension manufacturer.
- All fasteners, including U-bolts (if applicable) are installed and tightened to the specified torque.
- Ensure the leaf springs are not worn or damaged.

- Ensure the bushings in the leaf springs are not worn or damaged.
- Ensure the torque rods (if used) are correctly adjusted (if adjustable).
- Verify the frame is not bent or twisted.
- Refer to any additional recommendations and specifications from the manufacturer of vehicle on rear axles and suspensions.

FRONT WHEEL ALIGNMENT

Hendrickson recommends technicians review the TMC Guidelines for Total Vehicle Alignment (TMC RP 642).

Check total (front and rear) vehicle wheel alignment when any of the following occurs:

- Every 80,000 to 100,000 miles (128,700 to 160,900 kms), or 12-18 months (normal maintenance), whichever comes first.
- When the vehicle does not steer correctly.
- To correct a tire wear condition.

For rear wheel alignment specifications and adjustment refer to the vehicle manufacturer.

The **front** wheel alignment specifications can be found in the Alignment section of this publication. There are two types of front wheel alignment:

- 1. *Minor alignment* a minor front wheel alignment is done for all normal maintenance conditions, see below.
- Major alignment a major alignment is done when uneven or excessive tire wear is evident, or response at the steering wheel is sluggish, or the need for major wheel alignment check and adjustment is required, see below.

MINOR FRONT WHEEL ALIGNMENT

Perform the minor front wheel alignment in the following sequence:

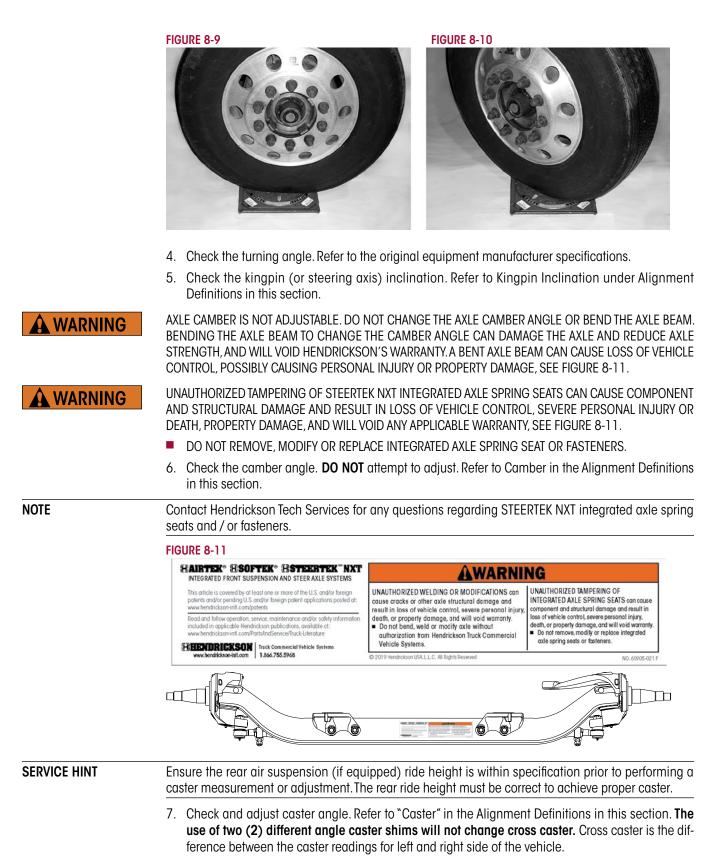
- 1. Inspect all systems that affect wheel alignment. Refer to Inspection Prior to Alignment in this section.
- 2. Check the wheel bearing end play.
- 3. Check and adjust toe if necessary.
- 4. Check and adjust the vehicle rear air suspension ride height as per vehicle manufacturer.

MAJOR FRONT WHEEL ALIGNMENT

Be certain to follow wheel alignment inspection intervals as specified by the original equipment manufacturer. Before performing a major front wheel alignment it is recommended that alignment equipment calibration be checked to ensure proper vehicle alignment.

Major wheel alignment is accomplished in the following sequence of operation:

- 1. Inspect all the systems that influence the wheel alignment. Refer to the Inspection Prior to Alignment in this section.
- 2. Check and adjust the maximum turn angle, refer to the Steering Stop Adjustment Procedure in this section, see Figures 8-9 and 8-10.
- 3. If the vehicle is equipped with power steering, check the pressure relief in the power steering system and reset if necessary. Refer to the vehicle manufacturer regarding the subject: Adjusting the Pressure Relief in the Power Steering System.



8. Check and adjust toe-in, refer to Toe Setting in this section.

STEERING STOP

ADJUSTMENT PROCEDURE

When the axle or lower steering knuckle is replaced, the steering stop adjustment must be checked.

- 1. Drive the vehicle on turntables and chock the rear wheels.
- 2. Measure the wheel cut. The wheel cut is determined by steering the tires. Wheel cut is measured at the inside wheel only, therefore the tires must be turned to the full lock position for each right hand and left hand direction. Refer to the vehicle manufacturer for exact specifications.
- 3. Increase the wheel cut by loosening the jam nuts and screw the axle stops in clockwise.

4. Tighten the jam nuts.

It is very important that the sides of the square head axle stops are set parallel to the axle beam to ensure a good contact point on the axle, see Figure 8-12.

- 5. Decrease the wheel cut by loosening the jam nuts and screw the axle stops out counter-clock-wise.
- 6. Tighten the jam nuts to 350 ± 10 foot pounds torque.



7. Measure the wheel cut and check for any interference with related steering components.

WARNING

NOTE

ALWAYS CHECK/RESET THE STEERING GEAR BOX POPPET WHEN THE WHEEL CUT IS DECREASED. FOLLOW MANUFACTURER'S GUIDELINES FOR THE GEAR BOX POPPET RESETTING PROCEDURE. FAILURE TO DO SO CAN RESULT IN PREMATURE FAILURE OF THE AXLE OR STEERING KNUCKLE. THIS CONDITION CAN CAUSE LOSS OF VEHICLE CONTROL, POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE AND VOID ANY APPLICABLE WARRANTY.

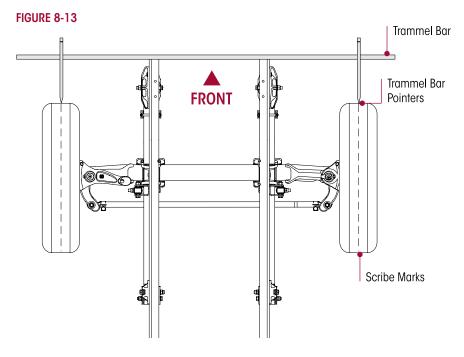
TOE SETTING

- 1. Place the vehicle on a level floor with the wheels in a straight ahead position.
- 2. Raise the vehicle and support the front axle with safety stands.
- 3. Use paint and mark the center area of tread on both steer axle tires around the complete outer diameter of the tires.
- Scribe a line through both steer axle tires in the painted area around the complete outer diameter of the tires.
- 5. Raise the vehicle and remove the safety stands.
- 6. Set the vehicle on the ground.

NOTE DO NOT measure toe-in with the front axle off the ground. The weight of the vehicle must be on the front axle when toe-in is measured.

- 7. Use a trammel bar and measure the distance between the scribe marks at the rear of the steer axle tires. Record the measurement.
- 8. Install the trammel bar and measure the distance between the scribe marks at the front of the steer axle tires. Record the measurement, see Figure 8-13.

NOTE When setting up the trammel bar the pointers should be level with the spindles at the front and rear of the steer axle tires.



- 9. To calculate the toe setting subtract the front measurement from the rear measurement, the difference between the two will equal the toe-in/toe-out measurement.
- 10. If the toe measurement is not within the specifications of $\frac{1}{6} \pm \frac{1}{32}$ (0.060" ± 0.030"), it will be necessary to adjust the toe setting. Refer to the following procedure.
 - a. Loosen the tie rod cross tube clamp bolts and locknuts.
 - b. Turn the tie rod cross tube until the specified toe-in distance is achieved.
 - c. Tighten the bolt and locknut on the tie rod cross tube to 368 ± 7 foot pounds torque.

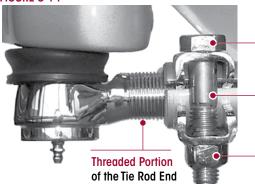
WARNING

THE THREADED PORTION OF THE TIE ROD END MUST EXTEND PAST THE SLOTS INTO THE TIE ROD (SEE FIGURE 8-14) IT IS CRITICAL TO CHECK THE 5%" 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 LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

11. Verify the 5%" tie rod clamp bolt head does not contact the lower shock mount at full wheel cut, see Figure 8-14.

12. Repeat Steps 1-10 until the correct toe setting is achieved.

FIGURE 8-14



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.

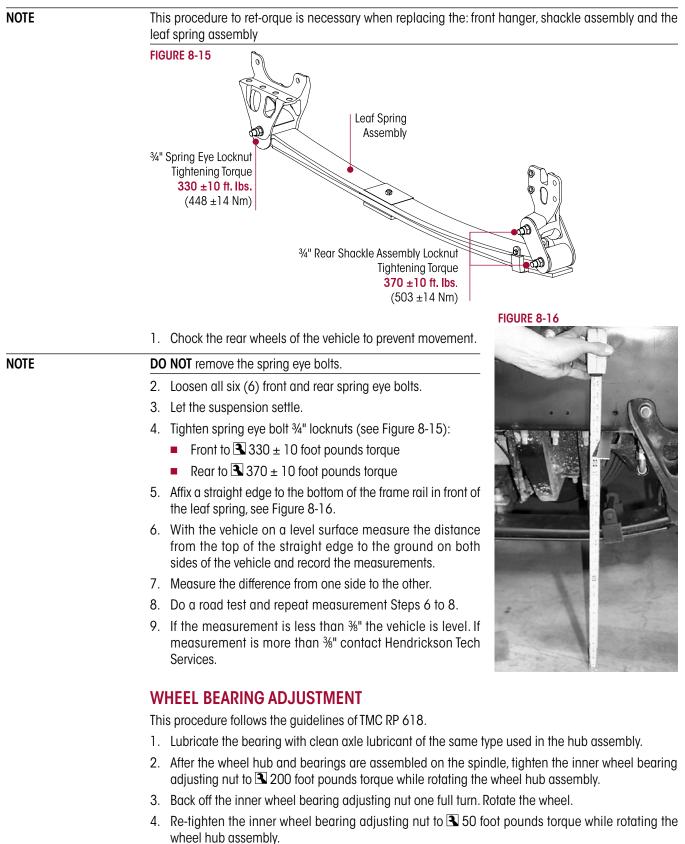
Tie Rod Cross Tube Slots

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 68 ± 7 ft. lbs. (92 ± 9 Nm)

SPRING EYE RE-TORQUE

RE-TORQUE PROCEDURE



- 5. Back off the inner wheel bearing adjusting nut one third turn.
- 6. Install the locking washer. If dowel pin and washer are not aligned, remove the washer and turn it over and reinstall. If required, loosen the inner wheel bearing adjusting nut just enough for alignment.

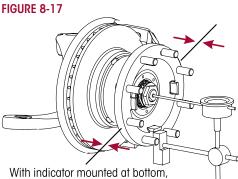
ACAUTION

NEVER TIGHTEN THE INNER WHEEL BEARING ADJUSTING NUT FOR ALIGNMENT AT THIS POINT OF THE PROCEDURE. THIS CAN PRE-LOAD THE BEARING AND CAUSE PREMATURE FAILURE.

- 7. Install and tighten the outer (jam) nut to 3250 ± 10 foot pounds torque.
- 8. Verify end play with a dial indicator, see Figure 8-17. Wheel end play is the free movement of the wheel assembly along the spindle axis.
 - a. Attach a dial indicator with its magnetic base to the hub.
 - b. Adjust the dial indicator so that its plunger or pointer is against the end of the spindle with its line of action parallel to the axis of the spindle.
 - c. Grasp the hub assembly at the 3 o'clock and 9 o'clock positions. Push the hub in and pull out while oscillating it to seat the bearings. Care must be taken not to rotate the hub assembly. Read bearing end play as the total indicator movement.

If end play is not within specification of 0.001" to 0.005", a readjustment is required.

- 9. Readjustment Procedure
 - Excessive End Play If the end play is too loose, remove the outer (jam) nut and pull the washer away from the inner wheel bearing adjusting nut, but not off the spindle. Tighten the inner wheel bearing adjusting nut to the next alignment hole of the washer. Reassemble the washer and re-tighten the outer (jam) nut to 20 ± 10 foot pounds torque. Verify end play with a dial indicator.



 Insufficient End Play – If end play is not present, remove the outer (jam) nut and pull the With indicator mounted at bottom, push/pull at sides of hub flange. Care must be taken not to rotate the hub assembly.

washer away from the inner wheel bearing adjusting nut, but not off the spindle. Loosen the inner wheel bearing adjusting nut to the next alignment hole of the washer. Reassemble the washer and retighten the outer (jam) nut to 3250 ± 10 foot pounds torque. Verify end play with a dial indicator.

Fine Tuning Adjustment – If after performing the readjustment procedures, end play is 0.001"-0.005" range, if less play is desired, repeat the appropriate procedures, removing the washer from the spindle, tighten or loosen the inner wheel bearing adjusting nut the equivalent of on half of an alignment hole, or reversing the alignment washer, and re-installing it onto the spindle. Reassemble and retighten the outer (jam) nut to 3 250 ± 10 foot pounds torque. Verify end play with a dial indicator.

10. Secure outer nut by bending one (1) washer tang over the outer nut.



BEFORE OPERATING THE VEHICLE, THE WHEEL HUB CAVITIES AND BEARINGS MUST BE LUBRICATED TO HELP PREVENT FAILURE.

NOTE

SECTION 9 Component Replacement

FASTENERS

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

HYDRAULIC DISC BRAKES

Brake components are not supplied by Hendrickson for aftermarket service purposes. For more information and assistance with service, maintenance and rebuild instructions on these components, refer to component manufacturers.

FRONT LEAF SPRING EYE BUSHINGS

The spring eye bushings for the SOFTEK leaf spring is designed to provide extended service life. If premature wear occurs careful consideration must be given to the contributing factor that caused the wear. This must be corrected in order to prevent the new bushing from wearing in the same manner. The front and rear bushings are permanently installed in the spring leaf and are not serviceable. If a bushing wears prematurely, the leaf spring assembly must be replaced. Follow the procedure for the Leaf Spring Assembly in this section.

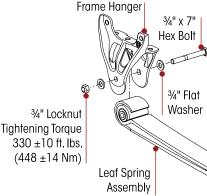
FRAME HANGER

DISASSEMBLY

1.	Place the vehicle on level floor.	
2.	Chock the wheels.	
3.	Raise the frame.	
4.	Support the vehicle with safety stands.	
5.	Suspend the front axle from the shock absorbers.	
6.	Remove and discard the $\frac{3}{4}$ " spring eye fasteners.	
Ab	ottle jack may be required to raise the axle slightly to fac	ilitate removal of the spring eye bolt.
7.	Remove the frame mounting fasteners from the hanger	per manufacturer's guidelines.
8.	Remove the hanger from the vehicle, see Figure 9-1.	
		FIGURE 9-1
• •	CEMPLY	Frame Hanger 34" x 7
-	SEMBLY	Hex Bo
1.	Install the new hanger on the frame.	
2.	Install new frame fasteners per manufacturer's instructions.	
3.	Install the new ³ / ₄ " spring eye fasteners, see Figure 9-1.	34" F 34" Lockout

- 4. Remove the safety stands and lower frame.
- 5. Tighten the $\frac{3}{4}$ " locknut to 330 ± 10 foot pounds torque.
- 6. Remove the wheel chocks.

GURE 9-1



SERVICE HINT

REAR SHACKLE BRACKET

DISASSEMBLY

- 1. Place the vehicle on level floor.
- 2. Chock the wheels.
- 3. Raise the frame.
- 4. Support the vehicle with safety stands.
- 5. Suspend the front axle from the shock absorbers.
- 6. Remove and discard the rear ³/₄" spring eye and shackle fasteners.

SERVICE HINT

A bottle jack may be required to raise the axle slightly to facilitate removal of the spring eye bolt.

- 7. Remove the frame fasteners from the shackle bracket per manufacturer's guidelines.
- 8. Remove the shackle bracket from the vehicle, see Figure 9-2.
- 9. Inspect the shackle bracket and shackle plate for excessive wear or damage.

ASSEMBLY

- 1. Install the shackle bracket on the frame.
- 2. Install new frame fasteners per manufacturer's guidelines.
- 3. Install the shackle plate with the new ³/₄" fasteners. Snug the shackle bolts. **DO NOT** tighten at this time.
- 4. Remove the safety stands and lower frame.
- 5. Tighten the $\frac{3}{4}$ " shackle locknuts to 370 ± 10 foot pounds torgue, see Figure 9-2.
- 6. Remove the wheel chocks.

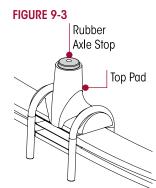
RUBBER AXLE STOP

REMOVAL

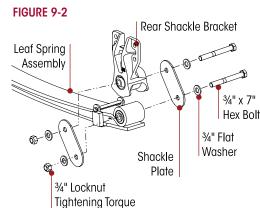
- 1. Insert a small pry bar between the rubber stop and the inside of the top pad.
- 2. Apply downward force on the pry bar and pull the rubber stop out of the top pad, see Figure 9-3.
- 3. Inspect the top pad and frame rail flange for any contact damage.
- 4. Clean any debris from inside the top pad.

INSTALLATION

- 1. Lubricate the new rubber axle stop with soapy water.
- 2. Install the rubber axle stop in the top pad.
- 3. Apply downward force on the rubber axle stop until it is seated firmly in the top pad.







370 ±10 ft. lbs. (503 ±14 Nm)

SHOCK ABSORBER

NOTE

WARNING

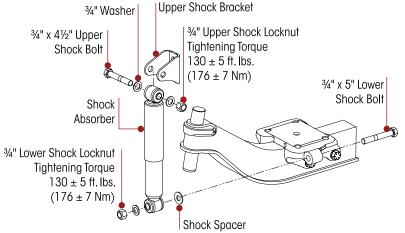
It is not necessary to replace the shock absorber in pairs if only one (1) shock absorber requires replacement.

THE SHOCK ABSORBERS ARE THE REBOUND TRAVEL STOPS FOR THE SPRINGS. ANYTIME THE FRONT AXLE ON SOFTEK SUSPENSION IS SUSPENDED IT IS MANDATORY THAT THE SHOCK ABSORBERS REMAIN CONNECTED. FAILURE TO DO SO COULD CAUSE THE LEAF SPRINGS TO EXCEED THEIR MAXIMUM LENGTH, OR CAUSE A REVERSE ARCH IN THE STEEL LEAF SPRINGS, POSSIBLY RESULTING IN PREMATURE STEEL LEAF SPRING FAILURE.

DISASSEMBLY

- 1. Remove the ³/₄" lower mounting bolt, fasteners, and spacer.
- 2. Remove the ³/₄" upper mounting bolt and fasteners.
- 3. Slide the shock absorber out of the top pad and off of the lower mounting bolt.
- 4. Inspect the shock absorber mounting brackets and hardware for damage or wear, replace as necessary.

FIGURE 9-4



ASSEMBLY

- 1. Install the shock absorber into the upper mounting bracket.
- 2. Install the upper ³/₄" shock mounting fasteners.
- 3. Install the lower bolt from the inboard side to the outboard side of the top pad and attach the shock spacer and fasteners, see Figure 9-4.
- 4. Tighten both upper and lower $\frac{3}{4}$ " locknuts to $3 \times 130 \pm 5$ foot pounds torque, see Figure 9-4.

LEAF SPRING ASSEMBLY

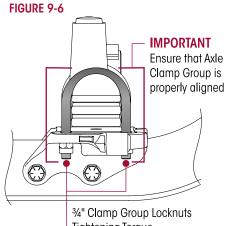
DISASSEMBLY

- 1. Place the vehicle on a level floor.
- 2. Chock the wheels.
- 3. Raise the vehicle and support with safety stands. It may be necessary to remove the peripheral components for installation of the safety stands.
- 4. Remove the tires and allow the axle to hang.
- 5. Install a floor jack with a 4 inch lifting plate below the axle.
- 6. Remove and discard the lower shock absorber mounting fasteners on both sides of the suspension.
- 7. Loosen, DO NOT remove, the clamp group locknuts for the leaf spring that IS NOT being replaced.

WARNING	DO NOT USE A CUTTING TORCH TO REMOVE CLAMP GROUP BOLTS OR ATTACHING FASTENERS. THE USE OF SUCH HEAT ON SUSPENSION COMPONENTS CAN ADVERSELY AFFECT THE STRENGTH OF THESE PARTS. A COMPONENT DAMAGED IN THIS MANNER CAN RESULT IN THE LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.
SERVICE HINT	If a clamp group locknut fails to come off the bolt, cut half way through the bolt with an abrasive cut off wheel, taking care not to contact axle beam or other components. Using an impact wrench, spin the locknut to fracture the bolt and remove.
	8. Remove and discard the clamp group U-bolts and fasteners on the leaf spring assembly being replaced.
SERVICE HINT	To ease in the removal of the spring eye bolts, it may be necessary to raise or lower the axle slightly.
	9. Remove and discard both front and rear $\frac{3}{4}$ " spring eye bolts on the side being serviced.
	Frame Hanger 3/4" Washer 4/4" Locknut ghtening Torque 330 ±10 ft. lbs. (448 ±14 Nm)
	Axle & Kingpin Assembly 4." Washer 4." Washer 4." Washer 4." Washer 4." Washer 4." Washer 4." Washer 4." Washer 4." Washer 4." Cocknut Tightening Torque 25 ± 10 ft. lbs. (400±14 Nm)
WARNING	UNAUTHORIZED TAMPERING OF INTEGRATED AXLE SPRING SEATS CAN CAUSE COMPONENT AND STRUCTURAL DAMAGE AND RESULT IN LOSS OF VEHICLE CONTROL, SEVERE PERSONAL INJURY OR DEATH, PROPERTY DAMAGE, AND WILL VOID ANY APPLICABLE WARRANTY. DO NOT REMOVE, MODIFY OR REPLACE INTEGRATED AXLE SPRING SEAT OR FASTENERS.
NOTE	Contact Hendrickson Tech Services for any questions regarding STEERTEK NXT axle spring seats and / or fasteners.
	 10. Remove the top pad, galvanized liner and front axle spacer from the leaf spring assembly that is going to be removed, see Figure 9-5. 11. Remove the leaf spring assembly.

ASSEMBLY

- 1. Install the new leaf spring assembly with the galvanized liner on the axle.
- 2. Verify that the center bolt is engaged properly in the axle spring seat
- 3. Install the top pad and verify the center bolt is engaged in the top pad, see Figure 9-5.
- 4. Install the new clamp group fasteners. New clamp group fasteners must be used when the clamp group is removed, to prevent premature bolt fatigue.
- 5. Snug the clamp group, DO NOT tighten to torque at this time.
- 6. Install the FRONT spring eye bolt and fastener, snug but DO NOT tighten at this time.
- 7. Raise the axle and the REAR spring eye into the rear shackle bracket.
- 8. Install the **REAR** spring eye bolts in the rear shackle bracket, snug but **DO NOT** tighten at this time, see Figure 9-5.
- Install the lower bolt from the inboard side to the outboard side of the top pad and attach the shock spacer and fasteners and snug, see Figure 9-4. DO NOT tighten to torgue at this time.
- 10. Install tires.
- 11. Raise vehicle and remove frame stands.
- 12. Lower the floor jack and set truck on ground.
- 13. Tighten the lower shock mounting fasteners to \bigcirc 130 ± 5 foot pounds torque.
- 14. Tighten the:
 - Front spring eye fasteners to 330 ± 10 foot pounds torque.
 - Rear spring eye fasteners to 370 ± 10 foot pounds torque.



Tightening Torque 295 ± 10 ft. lbs. (400 ± 14 Nm)

- 15. Ensure that the clamp group is properly aligned, and the U-bolts are seated in top pad, see Figure 9-6.
- 16. Tighten the clamp group locknuts evenly in 50 foot pounds increments to 295 ± 10 foot pounds torque in the proper pattern to achieve uniform bolt tension, see Figure 9-7.
- 17. Remove the wheel chocks.

STEERTEK NXT AXLE

STEERTEK NXT AXLE REMOVAL

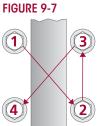
Refer to Figure 9-8 when replacing the components of the STEERTEK NXT axle.

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

WARNING

DO NOT USE A TORCH ON CLAMP GROUP BOLTS OR ANY OTHER PART OF THE SOFTEK SUSPENSION. IF THE CLAMP GROUP BOLTS WILL NOT COME LOOSE WITH AN IMPACT WRENCH, USE A CUT OFF WHEEL AND CUT THE SHANK OF THE BOLT. THE USE OF A TORCH CAN CAUSE DAMAGE TO CERTAIN SOFTEK COMPONENTS THAT CAN RESULT IN THE LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

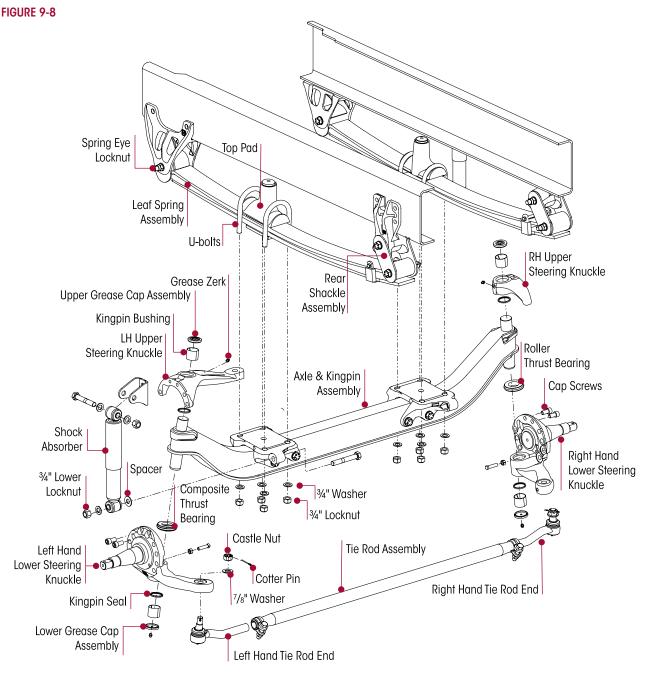
- 3. Raise the frame.
- 4. Support the vehicle with safety stands and suspend the front axle with the shocks attached.



WARNING

THE INTEGRATED AXLE SPRING SEATS ON THE STEERTEK NXT AXLE ARE NON-SERVICEABLE. UNAUTHORIZED TAMPERING OF INTEGRATED AXLE SPRING SEATS CAN CAUSE COMPONENT AND STRUCTURAL DAMAGE AND RESULT IN LOSS OF VEHICLE CONTROL, SEVERE PERSONAL INJURY OR DEATH, PROPERTY DAMAGE, AND WILL VOID ANY APPLICABLE WARRANTY. DO NOT REMOVE, MODIFY OR REPLACE INTEGRATED AXLE SPRING SEAT OR FASTENERS, SEE FIGURE 3-1.

- 5. Remove the front wheels, hubs, brake shoes, ABS sensors, and backing plate assembly.
- 6. Disconnect the drag link from the steering arm.
- 7. Support the axle with a floor jack.
- 8. Disconnect and remove the lower shock mounting bolts and shock spacer.
- 9. Remove the ³/₄" clamp group bolts and fasteners.
- 10. Lower the axle and remove from the vehicle.



AXLE DISASSEMBLY (REMOVED FROM CHASSIS)

1. Remove the tie rod assembly. See Tie Rod Disassembly in this section.

WARNING

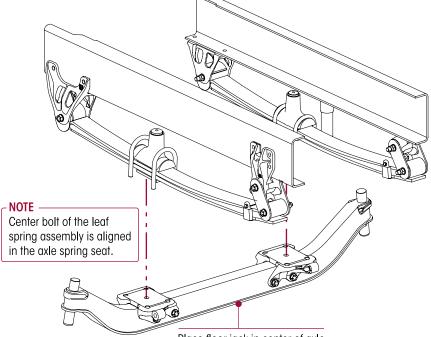
REMOVAL OF THE CAP SCREWS WILL ALLOW THE STEERING KNUCKLE TO SEPARATE FROM THE AXLE. THE STEERING KNUCKLE MUST BE SUPPORTED BEFORE REMOVAL OF THESE TWO (2) CAP SCREWS. FAILURE TO DO SO CAN CAUSE COMPONENT DAMAGE OR PERSONAL INJURY.

- 2. Remove the two (2) %" socket head cap screws from the steering knuckle assembly, see Figure 9-8.
- 3. Remove the steering knuckle and thrust bearing.
- 4. After complete removal of the one side, repeat steps 1-3 for the opposite side of the axle.
- 5. Inspect the steering kingpin bushings for excessive wear. If worn, replace the kingpin bushings and seals. See the Kingpin Bushing replacement instructions in this section.

STEERTEK NXT AXLE INSTALLATION

- 1. Place the new axle on the floor jack and position the axle under the vehicle, see Figure 9-9.
- 2. Raise the axle into position.
- 3. Ensure the front leaf spring assembly's center bolt is aligned correctly in the axle spring seat, see Figure 9-9.
- 4. Install the galvanized liner between the leaf spring assembly and the top pad.

FIGURE 9-9



Place floor jack in center of axle

5. Install the new clamp group fasteners. **DO NOT** tighten to torque at this time.

ENSURE THE CLAMP GROUP IS ALIGNED PROPERLY PRIOR TO TIGHTENING HARDWARE. FAILURE TO DO SO CAN CAUSE LOSS OF VEHICLE CONTROL, PROPERTY DAMAGE OR PERSONAL INJURY.

- 6. Ensure the clamp group is properly aligned and the U-bolts are seated in the top pad, and the top pad is centered on the axle spring seat, see Figure 9-10.
- 7. Snug the clamp group fasteners to **1**00 foot pounds pre-torque.
- 8. Install the steering knuckles as per the Steering Knuckle Assembly instructions in this section.
- 9. Install the tie rod assembly in the lower steering knuckle.

FIGURE 9-10

- 10. Install the ⁷/₈" hardened washers on the lower steering knuckle and the castle nuts. Tighten the castle nuts to **185** foot pounds, then rotate until the first castle slot lines up with the cotter pin bore in the tie rod end. **DO NOT** back off nut for cotter pin installation.
- 11. Install the tie rod end cotter pin.
- 12. Connect the drag link in the steering arm.
- 13. Install the castle nut on the drag link taper stud. Tighten the castle nut to 185 foot pounds, then rotate until the first castle slot lines up with the cotter pin bore in the drag link. DO NOT back off nut for cotter pin installation.
- 14. Install the drag link cotter pin.
- 15. Install the lower shock absorber connection. Install the lower shock fasteners to the integrated axle spring seat and tighten to $\boxed{130 \pm 5}$ foot pounds.
- Install the brake backing plate assemblies and ABS sensor and torque all fasteners per manufacturer's specifications.
- 17. Install the brakes, hubs, and wheels per the manufacturer's guidelines.
- 18. Raise the vehicle and remove the frame supports.
- 19. Lower the floor jack and load the front axle with the truck's weight. Remove the floor jack.
- 20. Tighten the clamp group locknuts evenly in 50 foot pounds increments to 295 ± 10 foot pounds torque in the proper pattern to achieve uniform bolt tension, see Figure 9-11.
- 21. Remove the wheel chocks.
- 22. Fill the hubs with the proper lubricant, (see manufacturer's guidelines for recommended lubrication), if required.
- 23. Grease the front steering components as per lubrication guidelines in the Preventive Maintenance section of this publication.

STEERING KNUCKLE

You will need:

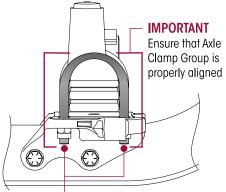
Refer to the Special Tools section of this publication.

- Kingpin Bushing and Seal Installer/Remover, Driver and Receiver Tool
- Adjustable Straight Flute Reamer

Steering knuckle component replacement includes kingpin preparation and measurement, kingpin bushing removal, steering knuckle bore measurement, kingpin bushing installation, reaming, and kingpin seal installation.

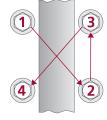
DISASSEMBLY

- 1. Place the vehicle on level floor.
- 2. Chock the wheels.
- 3. Support the vehicle with safety stands on the axle.
- 4. Remove the wheel and hub assembly.



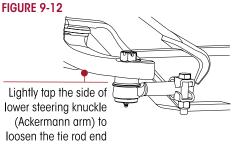
³⁄4" Clamp Group Locknuts Tightening Torque 295 ± 10 ft. lbs. (400 ±14 Nm)

FIGURE 9-11



NOTE

- 5. Remove the brake components from steering knuckle.
- 6. Remove the tie rod assembly.
- **SERVICE HINT** Lightly tap the side of the lower steering knuckle (Ackermann arm) with a mallet to separate the tie rod end from the lower steering knuckle, see Figure 9-12.
 - 7. Remove the drag link from the knuckle if necessary.



WARNING REMOVAL OF THE CAP SCREWS WILL ALLOW THE STEERING KNUCKLE TO SEPARATE FROM THE AXLE. THE STEERING KNUCKLE MUST BE SUPPORTED BEFORE REMOVAL OF THESE TWO (2) CAP SCREWS. FAILURE TO DO SO CAN CAUSE COMPONENT DAMAGE OR PERSONAL INJURY.

8. Remove the two socket head cap screws that connect upper kingpin connection to the steering knuckle, see Figure 9-13.

SERVICE HINT 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.

- 9. Remove the lower steering knuckle from the kingpin by sliding it down the kingpin.
- Remove the upper steering knuckle by sliding it up off the kingpin.

FIGURE 9-13



KINGPIN

PREPARATION AND MEASUREMENT

Cleaning the Ground and Polished Parts

- Use a cleaning solvent to clean ground or polished parts and surfaces. DO NOT USE GASOLINE.
- DO NOT clean ground or polished parts in a hot solution tank or with water, steam, or alkaline solutions. These solutions will cause corrosion of the parts.

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. If parts are to be stored, apply an effective rust inhibitor to all surfaces.



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

A WARNING

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:

- WEAR PROPER EYE PROTECTION
- WEAR CLOTHING THAT PROTECTS YOUR SKIN
- WORK IN A WELL VENTILATED AREA
- 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 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, DAMAGE TO THE PARTS WILL RESULT.

THE STEERTEK NXT HAS A UNIQUE AXLE. THE KINGPIN IS CRYOGENICALLY INSTALLED IN THE AXLE. THE KINGPIN IS A NON-REPLACEABLE COMPONENT OF THE AXLE ASSEMBLY. DO NOT TRY TO REMOVE THE KINGPIN. DOING SO WILL DAMAGE THE AXLE AND MAY CAUSE LOSS OF VEHICLE CONTROL, PERSONAL INJURY OR PROPERTY DAMAGE. IF THE KINGPIN SHOWS SIGNS OF MOVEMENT, CONTACT HENDRICKSON TECH SERVICES.

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 9-14 through 9-17.

FIGURE 9-14



FIGURE 9-15



FIGURE 9-16



2. Inspect the kingpin for wear or damage. Use a micrometer and measure the upper and lower kingpin in two locations. Positions must be 90° opposed from each other. If the kingpin has less than 1.802" diameter, replacement of the axle is necessary, see Figures 9-18 through 9-21. Kinapin minimum dimension is 1.802".

FIGURE 9-18

FIGURE 9-19

FIGURE 9-20

FIGURE 9-21









KINGPIN BUSHING



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



PRIOR TO APPLYING HYDRAULIC PRESSURE TO REMOVE OR INSTALL THE KINGPIN BUSHING, SUPPORT THE LOWER STEERING KNUCKLE AS SHOWN IN FIGURE 9-22. IMPROPER SUPPORT TO THE STEERING KNUCKLE CAN CAUSE COMPONENT DAMAGE.

REMOVAL

You will need:

Refer to the Special Tools section of this publication.

- A hydraulic shop press with a minimum forcing capacity of 2.5 tons (or an arbor press) or optional method use hand tools
- Kingpin handle, bushing installer/remover, driver and receiving tool

NOTE If a shop press is not available to remove / install the kingpin bushings, an acceptable optional method is to use a hammer along with the shop made tools (kingpin bushing driver, receiving tool, kingpin handle, bushing installer / remover and seal installer tools) on a work bench.

NOTE To remove the kingpin bushing, always drive the bushing from the non-machined side of the steering knuckle.



- 1. Remove the threaded grease cap and grease zerk.
- 2. With the machined side of the steering knuckle face down (axle side down), ensure that each part of the steering knuckle assembly is squarely supported on the bushing receiving tool before applying hydraulic pressure to press out the kingpin bushings, see Figures 9-22 and 9-23.
- 3. From the non-machined side of the steering knuckle, use the kingpin bushing installer/remover tool (see

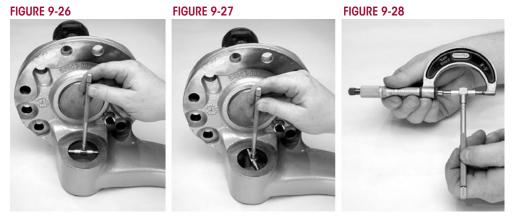


- Special Tools section of this publication) to drive the kingpin bushing and kingpin seal out of the steering knuckle, see Figure 9-24.
- 4. Clean the parts and inspect for reassembly, see Figure 9-25.

STEERING KNUCKLE BORE MEASUREMENT

Complete the following steering knuckle bore inspection and the measurement instructions prior to installing the kingpin bushing.

- Measure the upper knuckle bore inside diameter at two locations. Always use an inside micrometer or a telescoping gauge when taking a knuckle bore measurement. Some out-of-roundness at the top and bottom of the bore edges is acceptable. Steering knuckle bore diameter is 1.938" ± 0.003".
- Measure the upper and lower bore in two positions and at two locations. The two positions must be 90° opposed from each other, see Figures 9-26 through 9-28. If the average measurement is more than the knuckle bore maximum diameter specification, replace the knuckle.



KINGPIN BUSHING INSTALLATION

You will need:

Refer to the Special Tools section of this publication.

- Kingpin Bushing and Seal Installer/Remover, Driver and Receiver Tool
- Adjustable Straight Flute Reamer
- A hydraulic shop press with a minimum forcing capacity of 2.5 tons

A WARNING

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

NOTE If a shop press is not available to remove / install the kingpin bushings, an acceptable optional method is to use a hammer along with the shop made tools (kingpin bushing driver, receiving tool, kingpin handle, bushing installer / remover and seal installer tools) on a work bench.

1. With the machined side of the steering knuckle face up (axle side up), ensure that each part of the steering knuckle assembly is squarely supported before applying hydraulic pressure to press in the kingpin bushing, see Figure 9-29.

NOTE

To install the kingpin bushing, always drive the bushing from the machined side of the steering knuckle.

- 2. From the machined side of the steering knuckle, use the kingpin bushing driver tool to drive the kingpin bushing flush into steering knuckle, see Figure 30.
- 3. Next, use the kingpin bushing installer/remover tool to sink the kingpin bushing into the steering knuckle bore to just below the seal bore, see Figure 31.
- 4. Following this procedure it is necessary to ream the kingpin bushings to fit the kingpins, see Kingpin Bushing Reaming instructions.



KINGPIN BUSHING REAMING

You will need:

- Vise with brass jaws (soft jaws)
 - Adjustable Straight Flute Reamer, see Special Tools section of this publication.

A CAUTION	REAM THE KINGPIN BUSHINGS WITH AN ADJUSTABLE STRAIGHT FLUTE REAMER, SEE SPECIAL TOOLS SECTION OF THIS PUBLICATION. DO NOT HONE OR BURNISH THE KINGPIN BUSHINGS. HONING OR BURNISHING WILL DAMAGE THE BUSHINGS AND VOID ANY APPLICABLE WARRANTY.
WARNING	 WHEN INSTALLING STEERING KNUCKLE COMPONENTS IN A VISE IT IS NECESSARY TO PROTECT THE MACHINED SURFACES FROM GOUGES OR MARRING BY USING BRASS JAWS (SOFT JAWS). FAILURE TO DO SO CAN CAUSE PREMATURE PART DAMAGE, DAMAGE TO THE STEERING KNUCKLE COMPONENTS, LOSS OF WARRANTY, LOSS OF VEHICLE CONTROL, CAUSING PERSONAL INJURY OR PROPERTY DAMAGE. 1. Install the lower steering knuckle assembly in a vise with brass jaws (soft jaws).
SERVICE HINT	It is acceptable to mount the knuckle components in a vise either vertically or horizontally when per- forming the reaming procedure.
	 Install the reamer into the lower steering knuckle until the blades touch the kingpin bushing. Rotate the reamer with light downward pressure. Rotate the reamer smoothly. DO NOT apply too much pressure, see Figures 9-32 and 9-33. Slide the reamer out of the bottom of the steering knuckle assembly. If it is necessary to remove the reamer from the top, rotate the reamer opposite of cutting rotation.
WARNING	PRIOR TO INSTALLATION ENSURE THAT ALL RESIDUAL LOCTITE MATERIAL IS REMOVED FROM THE MOUNTING BOLTS AND THE THREAD BORES IN THE UPPER STEERING KNUCKLES, AND NEW LOCTITE 277 OR EQUIVALENT IS APPLIED TO HELP ENSURE THAT THE BOLTS SUSTAIN THE PROPER TORQUE REQUIREMENT. FAILURE TO DO SO CAN CAUSE LOSS OF VEHICLE CONTROL RESULTING IN PERSONAL INJURY OR PROPERTY DAMAGE.

	FIGURE 9-32	FIGURE 9-33
	Lower Steering Knu	
	attention to remove material from th 6. Clean the %" brake backing plate bo	ng material from the steering knuckle assembly. Take special te grease channels and dimples. Its with a wire wheel and run a tap through the threads of the I then flush out with brake cleaner and dry with compressed air.
NOTE		ead cap screw comes with a pre-applied Loctite compound.
	 Temporarily install the upper/lower k Rotate the upper/lower knuckle back and forth to verify there is no bind- ing on the kingpin, see Figure 9-34. If the bushing is too tight repeat 	FIGURE 9-34
	Steps 1 through 8 until the proper clearance is achieved.	
NOTE	Bushing size is to be 0.001" larger than the kingpin size.	
	10. Proceed to Kingpin Seal installation	
	KINGPIN SEAL INSTALLATION	
	You will need:	UU
	 Vise with brass jaws (soft jaws) Kingpin bandle and seal installer to: 	ol, see Special Tools section of this publication.
WARNING	WHEN INSTALLING STEERING KNUCKLE MACHINED SURFACES FROM GOUGES OR SO CAN CAUSE PREMATURE PART DAMAG WARRANTY, LOSS OF VEHICLE CONTROL, (E COMPONENTS IN A VISE IT IS NECESSARY TO PROTECT THE MARRING BY USING BRASS JAWS (SOFT JAWS). FAILURE TO DO E, DAMAGE TO THE STEERING KNUCKLE COMPONENTS, LOSS OF CAUSING PERSONAL INJURY OR PROPERTY DAMAGE.

1. Place the steering knuckle assembly in a vise with brass jaws (soft jaws) or place on a suitable workbench. The steering knuckle will have the machined surface facing up (axle side up).



- 2. Lay the kingpin seal into the bore of the steering knuckle. The seal lip should face outward or toward the axle, see Figure 9-35.
- 3. Use the seal installer tool (see Special Tools section of this publication) and press seal firmly into the steering knuckle assembly.
- 4. Install the double lip kingpin seal until it bottoms out in the kingpin bore, see Figure 9-36.

STEERING KNUCKLE

ASSEMBLY

After replacement of the kingpin bushings it is necessary to re-assemble the steering knuckle assemblies. DO NOT substitute aftermarket components when servicing.

Hendrickson STEERTEK NXT axle is installed with a left hand composite bearing and a right hand roller bearing configuration.

1. Install the composite thrust bearing on the lower kingpin on the left side and the roller thrust bearing on the right

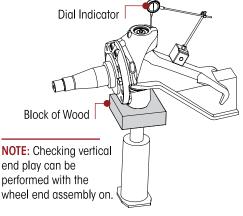
FIGURE 9-37



side with the seal facing up toward axle (the black seal will designate the top side), see Figure 9-37.

- 2. Pack the bushing dimples on the upper and lower steering knuckles with multi purpose Lithium based grease (NLGI Grade 2) before installation.
- 3. Install the upper steering knuckle on the upper arm kingpin.
- 4. Install the lower steering knuckle on the lower kingpin and install the old socket head cap screws loose into the top two (2) threaded holes.
- 5. Install a bottle jack under the lower knuckle and slightly raise the knuckle until it is possible to thread in the three (3) brake backing plate bolts by hand. These are for quide purposes only.





NOTE

	7. Lower the bottle jack so that all the vertical end play is on the underside of the axle.
	8. Affix a magnetic base dial indicator on the axle and place the tip of the dial indicator on top of the knuckle assembly, see Figure 9-38.
	9. Zero the dial indicator.
	 Raise the bottle jack until there is NO CLEARANCE between the knuckle assembly and the bottom of the axle, slightly lifting the axle.
	 Check the reading on the dial indicator. The specification for vertical travel on the steering knuckle during assembly is 0.008" to 0.011".
	12. If the clearance is:
	Above 0.011", loosen the socket head cap screws and push down on the knuckle assembly until the proper vertical end play is achieved.
	Below 0.008", loosen the socket head cap screws and pull up on the knuckle assembly until the proper vertical end play is achieved.
NOTE	The Hendrickson Genuine part, socket head cap screw comes with a pre-applied Loctite compound.
WARNING	PRIOR TO INSTALLATION ENSURE THAT ALL RESIDUAL LOCTITE MATERIAL IS REMOVED FROM THE MOUNTING BOLTS AND THE THREAD BORES IN THE UPPER STEERING KNUCKLE, AND NEW LOCTITE 277 OR EQUIVALENT IS APPLIED TO HELP ENSURE THAT THE BOLTS SUSTAIN THE PROPER TORQUE REQUIREMENT. FAILURE TO DO SO CAN CAUSE LOSS OF VEHICLE CONTROL RESULTING IN PERSONAL INJURY OR PROPERTY DAMAGE.
	13. Remove one (1) old socket head cap screw and replace with new socket head cap screw.
	14. Remove second socket head cap screw and replace with new socket head cap screw. Tighten both socket head cap screws to 3 188 ± 12 foot pounds torque.
	15. Recheck the vertical end play with the dial indicator, see Figure 9-38 or a 0.010" feeler gauge.
	16. Remove the brake spider bolts, they should thread out freely.
	17. Remove the bottle jack and continue assembling the wheel ends.
IMPORTANT NOTE	It is critical to apply Loctite to the three (3) brake spider bolts to ensure that these bolts sustain the proper torque requirement of steering knuckle assembly.
	18. Apply Loctite to the three (3) brake spider bolts prior to installation into the brake spider. Tighten bolts to 188 ± 12 foot pounds torque.
A WARNING	DO NOT GREASE KNUCKLES WITHOUT THE BRAKE SPIDER INSTALLED AND TIGHTENED TO PROPER TORQUE. FAILURE TO DO SO CAN CAUSE COMPONENT DAMAGE RESULTING IN FAILURE AND LOSS OF VEHICLE CONTROL, POSSIBLY CAUSING PERSONAL INJURY OR PROPERTY DAMAGE.
	19. Install the tie rod end into the lower steering knuckle arm.
	20. Tighten the castle nuts to 🖪 185 foot pounds torque then rotate the castle nut to the next castle slot and install cotter pin.
	21. Install the drag link into the steering arm and tighten to the vehicle manufacturer's specifications.
	22. Install new grease caps. Note the grease caps on the STEERTEK NXT axle are threaded, tighten to $\textcircled{3}$ 60 \pm 10 foot pounds torque, see Figure 9-39.
	23. Allow 30 minutes for thread sealant to cure before greasing. Install new grease zerk and tighten to a minimum of 💽 15 foot pounds, see Figure 9-39.
	24. Install the brakes, drums, wheels, and tires.

6. Snug the two socket head cap screws.

FIGURE 9-39



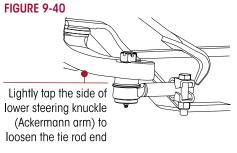
- 25. Remove jack and safety stands.
- 26. Grease steering knuckles with the vehicle on the floor.
- 27. Remove the wheel chocks.

TIE ROD END AND CROSS TUBE

DISASSEMBLY

- 1. Chock the wheels.
- 2. Position the steer axle tires straight ahead.
- 3. Remove the cotter pin and castle nut from the tie rod end.
- 4. Lightly tap the side of the lower steering knuckle to loosen the tie rod end from the lower steering knuckle, see Figure 9-40.
- 5. Repeat Steps 3 and 4 to remove the other tie rod end to remove the tie rod assembly.
- 6. Remove the tie rod assembly from the vehicle.
- 7. Mount the cross tube in a soft jaw vice.
- 8. Remove the tie rod clamp hardware from the cross tube.
- 9. Count the exposed threads on the tie rod end being replaced.

WARNING	 DO NOT HEAT THE 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 CROSS TUBE. A COMPONENT DAMAGED IN THIS MANNER WILL RESULT IN LOSS OF WARRANTY, AND CAN RESULT IN THE AND LOSS OF VEHICLE CONTROL, AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE. 10. Remove the tie rod end from the cross tube. 11. If the opposing tie rod end is also being replaced, repeat Steps 8 through 10. 12. Inspect the cross tube for dents, cracks, or thread damage, replace as necessary.
	ASSEMBLY Lubricate the new tie rod end threads with Anti-Seize.
NOTE	 When installing the 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 lower steering knuckle. A left hand threaded tie rod end will be installed into the left side lower steering knuckle.
	 Install the new tie rod end(s) into the cross tube, leaving the same amount of threads exposed that were counted on the removed tie rod end.

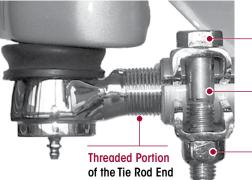


3. If the opposing tie rod end replacement is not necessary, it is critical that the ball and socket are free to rotate in the opposing tie rod end.

WARNING

THE THREADED PORTION OF THE TIE ROD END MUST EXTEND PAST THE SLOTS INTO THE TIE ROD CROSS TUBE, SEE FIGURE 9-41. FAILURE TO DO SO CAN CAUSE COMPONENT DAMAGE, LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

FIGURE 9-41



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.

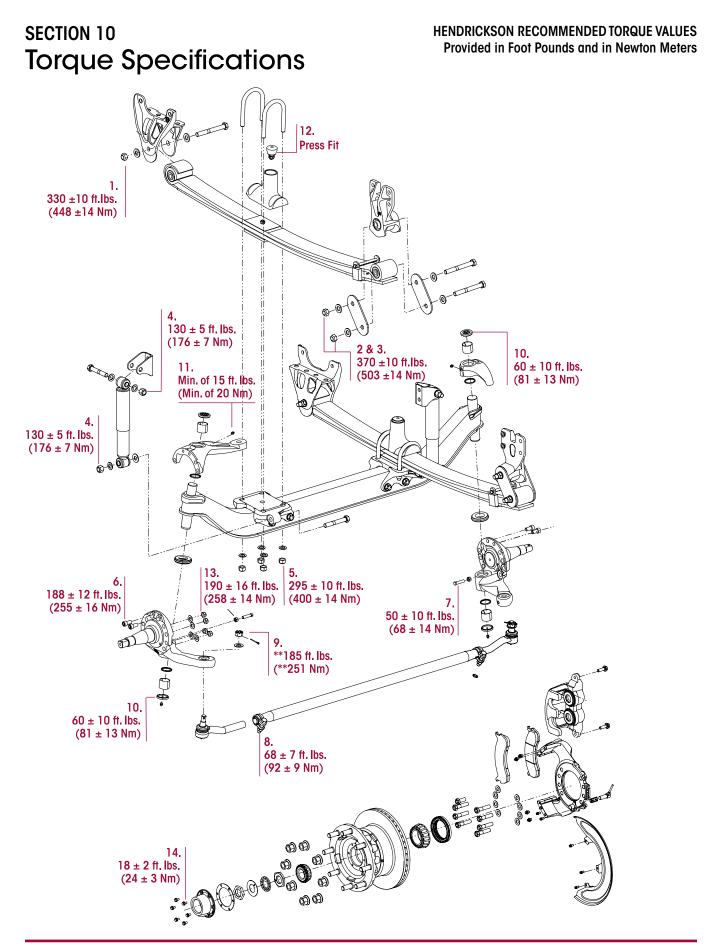
5/8" Tie Rod Clamp Locknut Tightening Torque 68 ± 7 ft. lbs. (92 ± 9 Nm)

- 4. Replace the opposing tie rod end if necessary, by repeating Steps 1 and 2.
- 5. Install the tie rod end(s) into the tie rod arm.

WARNING

IT IS CRITICAL TO CHECK THE 5%" 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 LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

- 6. Install the tie rod assembly by placing both tie rod ends into the lower steering knuckles.
- 7. Tighten the castle nuts to 185 foot pounds (251 Nm) torque, then rotate the castle nut to the next castle slot and install the cotter pin.
- 8. Grease the tie rod ends with the specified lubricant, see lubrication specifications and procedure in the Preventive Maintenance section of this publication.
- 9. Set the toe, refer to the Toe Adjustment procedure in the Alignment & Adjustments section of this publication.
- 10. Remove the wheel chocks.



NO	COMPONENT	FASTENERS		*TORQUE VALUE	
NO.		QTY.	SIZE	FOOT POUNDS	Nm
1	Front Frame Hanger to Front Leaf Spring Eye	2	3⁄4"	330 ± 10	448 ± 14
2	Rear Shackle Bracket to Shackle Plate	2	2/11	270 10	
3	Rear Shackle Bracket to Spring Eye	2	- 3⁄4"	370 ± 10	503 ± 14
4	Upper and Lower Shock Eye	2	3⁄4"	130 ± 5	176 ± 7
5	Clamp Group Hardware	8	3⁄4"	295 ± 10	400 ± 14
	A WARNING ENSURE CLAMP GROUP IS ALIGNED CAN CAUSE LOSS OF VEHICLE CONT				
6	Knuckle Attachment Bolt (Socket Head Cap Screw)	4	5⁄8"	188 ± 12	255 ± 16
7	Knuckle / Axle Wheel Stop Bolt	2	½" Jam Nut	50 ± 10	68 ± 14
8	Tie Rod Tube to Tie Rod Ends	2	5/8"	68 ± 7	92 ± 9
9	Tie Rod Ends to Lower Steering Knuckle	2	⅔" Castle Nut	**185	**251
10	Grease Cap Assembly, Upper and Lower	4	½"	60 ± 10	81 ± 13
11	Grease Zerk	2		Minimum of 15	Minimum of 20
12	Rubber Axle Stop	2	_	Press Fit	
13	Torque Plate to Knuckle Assembly	8	5%"	190 ± 16	258 ± 14
14	Hub Cap Fasteners	12	5⁄16"	18 ± 2	24 ± 3
	hardware ¼" and greater is Grade 8 with no additional ne mount hardware in most cases are Huck style faster			manufacturer.	

SOFTEK with STEERTEK NXT Axle for Xos Vehicles

by Hendrickson. If non Hendrickson fasteners are used, follow torque specifications listed in the vehicle manufacturer's service manual. Hendrickson is not responsible for maintaining vehicle manufacturer's torque values.

** Torque to 185 foot pounds (251 Nm), advance nut to next hex face to install cotter pin. **DO NOT** back off nut for cotter pin installation.

SECTION 11 Troubleshooting Guide

SOFTEK for Xos Vehicles

TROUBLESHOOTING GUIDE				
CONDITION	POSSIBLE CAUSE	CORRECTION		
	Dirt in system- contaminated lubricant	Polish and inspect the kingpin, replace bushing and seals, then follow specified lubrication procedures.		
	Incorrect lubricant	Lubricate the axle with specified lubricant.		
Worn or damaged kingpins and kingpin	Axle not lubricated at scheduled frequency	Lubricant the axle at scheduled frequency.		
bushings	Incorrect lubrication procedures	Use the correct lubrication procedures.		
	Lubrication interval not compatible with operating conditions	Change the lubrication interval to match operating conditions.		
	Worn or missing seals	Replace the worn or missing seals		
	Caster out of specification	Verify the rear air suspension(if equipped) is at the proper ride height if equipped, then adjust caster to specification.		
	Wheels and/or tires out of balance	Balance or replace the wheels and/or tires.		
Vibration or shimmy	Worn shock absorbers	Replace the shock absorbers.		
of front axle during operation	Worn thrust washers (if equipped) and rear hanger clamps	Replace the thrust washers (if equipped) and rear hanger clamps.		
	Broken engine mount	Replace the engine mount.		
	Wheel bearing adjustment	Adjust the wheel bearing to the vehicle manufacturer's specifications.		
	Tires have incorrect air pressure	Adjust the tire pressure to manufacturer's specification.		
	Tires out of balance	Balance or replace the tires.		
	Incorrect tandem axle alignment	Align the tandem axles.		
Excessive wear on tires	Incorrect toe setting	Adjust the toe-in to manufacturer's specification.		
or uneven tire tread	Incorrect steering arm geometry	Repair the steering system as necessary.		
wear	Worn kingpin bushings	Replace the kingpin bushings.		
	Excessive wheel bearing end play	Check the specified wheel nut torque, replace worn or damaged wheel bearings.		
	Wheel bearing adjustment	Adjust the wheel bearing to the vehicle manufacturers specifications.		
	Low pressure in the power steering system	Repair the power steering system.		
	Steering linkage needs lubrication	Lubricate the steering linkage.		
	Steering knuckles are binding	Check the vertical clearance.		
Vehicle is hard to steer	Incorrect steering arm geometry	Repair the steering system as necessary.		
	Caster out of specification	Adjust the caster to specification applicable.		
	Tie rod ends hard to move	Replace the tie rod ends.		
	Worn thrust bearing	Replace the thrust bearing.		
	Steering gear box internal problem	Perform the steering gear troubleshooting procedures per steering gear manufacturer's guidelines.		

SOFTEK for Xos Vehicles (continued)

TROUBLESHOOTING GUIDE				
CONDITION	POSSIBLE CAUSE	CORRECTION		
	Tie rod ends need lubrication	Lubricate the tie rod end. Make sure lubrication schedule is followed.		
Tie rod ends are worn and require replacement	Severe operating conditions	Increase the frequency of inspection and lubrication intervals.		
	Damaged boot on tie rod end	Replace the tie rod end.		
Bent or broken cross tube,	Pump/gear relief valve pressure setting exceeds system specifications	Adjust the power steering system to manufacturer's specified pressure.		
tie rod end ball stud or tie rod end	Steering gear poppets improperly set or malfunctioning	Check for proper operation or adjust poppets to vehicle manufacturer's specifications.		
NOTE: Damaged components	Axle stops improperly set	Set the axle stops to vehicle manufacturer's specifications.		
require replacement	Severe duty cycle service	Increase the frequency of inspection and lubrication intervals.		
	Drag link fasteners lightened past specified torque	Tighten the drag link fasteners to the specified torque.		
Worn or broken steering ball stud	Lack of lubrication or incorrect lubricant	Lubricate the linkage with specified lubricant.		
	Power steering stops out of adjustment	Adjust the steering stops to vehicle manufacturer's specifications.		
Suspension has harsh or	Broken or worn leaf spring	Replace the leaf spring assembly.		
bumpy ride	Front suspension overloaded	Redistribute the steer axle load.		
Restricted steering radius	Steering stops not adjusted correctly	Adjust the steering stops to achieve correct wheel cut.		
	Suspension is not torqued correctly at installation	Perform a spring eye re-torque procedure, refer to the Alignment & Adjustment section of this publication.		
Vehicle leans	Leaf spring broken	Replace the leaf spring assembly.		
	Excessive weight bias	Contact the vehicle manufacturer or Hendrickson Tech Services.		
	Caster out of specifications	Adjust the caster to specification applicable.		
	Incorrect toe setting	Adjust the toe to specification.		
Vehicle wanders	Air in the power steering system	Remove the air form the power steering systems.		
	Rear air suspension ride height is out of adjustment	Adjust the rear air suspension to the proper ride height.		

SECTION 12 Front Wheel Alignment Specifications

SOFTEK for Xos Vehicles

FRONT SYSTEM SUSPENSION ALIGNMENT SPECIFICATION				
	DESIGN SPECIFICATION	RANGE		
CAWDER		MINIMUM	MAXIMUM	
LEFT	$0.00^{\circ} \pm 1.0^{\circ}$	-1.0°	+1.0°	
RIGHT	- 0.25° ± 1.0°	-1.25°	+0.75°	
CROSS	Max 2.0°		—	

CAMBER NOTES:

¹ The camber angle is not adjustable. Do not bend axle or otherwise try to adjust camber. If found out of specification, notify Hendrickson Tech Services for further information.

CASTER ^{1,2}	DESIGN SPECIFICATION	RANGE	
CASTER		MINIMUM	MAXIMUM
LEFT	3.12° ± 1°	+2.12°	+4.12°
RIGHT	3.12° ± 1°	+2.12°	+4.12°
CROSS ³	Max 1.0°	—	—

CASTER NOTES:

¹ Caster is to be measured with the vehicle at the rated load for mechanical suspension systems. Ensure the rear air suspension (if equipped) ride height is within specification prior to performing a caster measurement or adjustment.

² In most cases actual vehicle caster is defined with the frame rails at zero slope. Refer to the vehicle manufacturer's specifications for correct frame rail slope. (Both the alignment surface and the vehicle's frame rails should be level during execution of alignment procedures). For vehicles with a positive frame rake (higher in rear) add the frame slope (in degrees) to the caster reading to determine true vehicle caster.

³ The cross caster angle is not adjustable – DO NOT bend axle or otherwise try to adjust cross caster. If caster measurement falls outside of the specification, notify Hendrickson Tech Services for further information. Changes to caster can be attained by using caster shims provided by the chassis or body manufacturer. Caster shims must match, side to side to reduce uneven loading to the suspension components. The use of two (2) different angle caster shims will not correct cross caster.

Example of caster adjustment: 2.5° Right Hand / 3° Left Hand, would require one, 1.0 shim on each side to increase caster and achieve 3.50° Right Hand / 4.00° Left Hand, which is in specification. **DO NOT** attempt to use uneven shims.

Hendrickson recommends following practices:

	DESIGN SPECIFICATION	RAM	IGE
	DESIGN SPECIFICATION	MINIMUM	MAXIMUM
TOTAL TOE	¹ /16" ± ¹ /32" (0.06" ± 0.03")	1/32" (0.03")	³ / ₃₂ " (0.09")

TOE-IN NOTES:

¹ Toe-in is to be set and adjusted in the normal vehicle unladed configuration. Actual vehicle curb weight on the ground. Toe should be checked at the tires front and rear tread center, at a distance above ground equal to the tire's rolling radius.

SECTION 13 Reference Material

This technical publication covers Hendrickson Truck Commercial Vehicle suspension's recommended procedures for our parts/products. Other components play a major role in overall performance and Hendrickson recommends you follow the specific vehicle manufacturer's recommendation for care and maintenance. Some recommended procedures have been developed by TMC and Hendrickson supports these recommendations.

To obtain copies of TMC's Recommended Practices Manual at:

TMC / ATA Headquarters 950 North Glebe Road, Suite 210 Arlington, VA 22203-4181 Phone: 703-838-1763 website: tmc.trucking.org online ordering: atabusinessolutions.com/Shopping

Actual product performance may vary depending upon vehicle configuration, operation, service and other factors. All applications must comply with applicable Hendrickson specifications and must be approved by the respective vehicle manufacturer with the vehicle in its original, as-built configuration. Contact Hendrickson for additional details regarding specifications, applications, capacities, and operation, service and maintenance instructions.

Call Hendrickson at 1.866.755.5968 (toll-free) or 1.630.910.2800 for additional information.

800 South Frontage Road Woodridge, IL 60517-4904 USA 1.866.755.5968 (Toll-free U.S. and Canada)

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TRUCK COMMERCIAL VEHICLE SYSTEMS

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