



H TECHNICAL PROCEDURE

SOFTEK® NXT Front Axle and Suspension System for Peterbilt Vehicles

SUBJECT: Service Instructions

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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 the Hendrickson SOFTEK® NXT front steer axle and suspension system for applicable Peterbilt Vehicles.

NOTE

Use only Hendrickson Genuine parts for servicing this suspension system.

It is important to read and understand the 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, proper maintenance, service, repair and rebuild instructions for SOFTEK NXT Suspension System.

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 available online at www.hendrickson-intl.com.

SECTION 2

Product Description

Hendrickson's SOFTEK NXT — integrated suspension and steer axle system combines the STEERTEK™ NXT axle and monoleaf spring technology with an advanced integrated clamp group design. This complete system saves up to 84 pounds compared to a traditional two-leaf spring and I-beam axle system.

The SOFTEK NXT system is designed for heavy-duty truck applications rated from 12,500 to 13,200 pound capacities. The advanced design captures characteristics of the traditional mechanical suspension while reducing weight to help increase fuel economy and payload capacity.

Monoleaf spring technology — Reduces weight up to 31 pounds compared to standard 2-leaf springs.

Lightweight clamp group — Weighs up to 53 pounds less than original I-beam and spring clamp group.

STEERTEK NXT axle — The box-shaped cross section resists horizontal, vertical and twisting forces more effectively than traditional I-beam axles which improves handling.

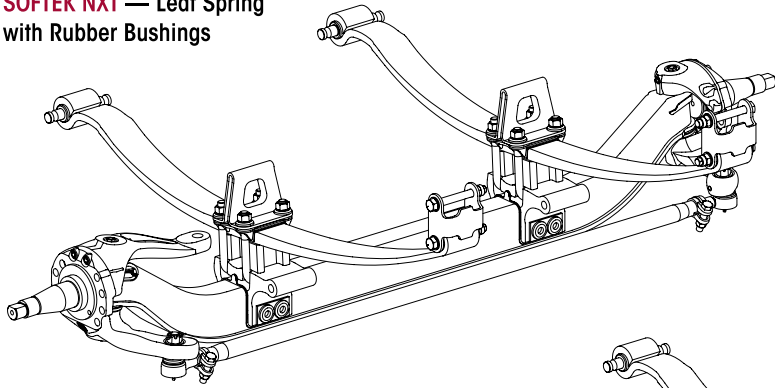
Brake compatibility — Compatible with drum or disc brakes.

Two-piece knuckle assembly — Significantly reduces the time required to service the kingpin bushings.

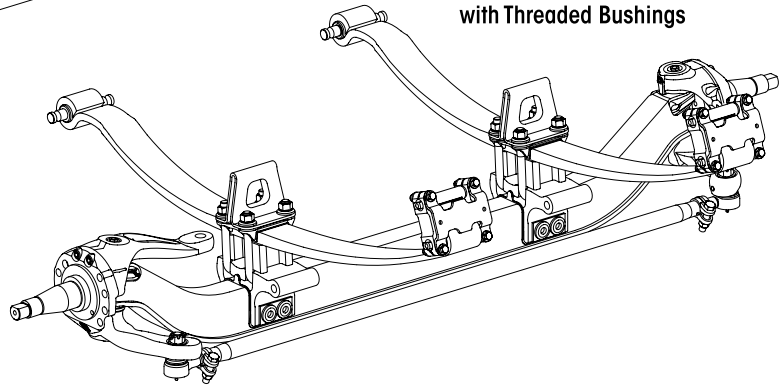


FIGURE 2-1

SOFTEK NXT — Leaf Spring with Rubber Bushings



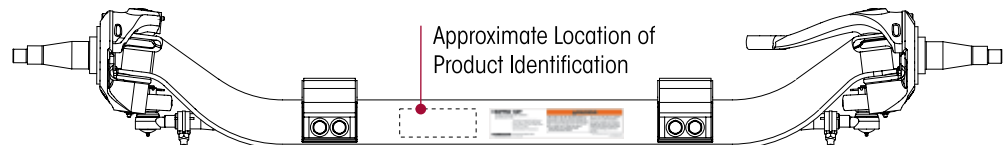
SOFTEK NXT — Leaf Spring with Threaded Bushings



TECHNICAL NOTES

1. SOFTEK NXT system is approved for on-highway usage. Other applications must be pre-approved by both Hendrickson and vehicle manufacturer. This system has a 12,500-13,200 pound capacity. System capacity represents maximum loads on tires at ground level.
2. The SOFTEK NXT system is available with 70.87" Intersections (KPI).
3. The SOFTEK NXT system offers 4.25" and 5.36" axle beam drop height. Axle beam drop is measured from the kingpin intersection to the top of the axle.
4. SOFTEK NXT suspension weight includes rear frame hangers, main springs, bushings, shocks, upper shock brackets and axle attachment hardware.
5. SOFTEK NXT system weight is based on a 4.25" drop height and a 70.87" KPI axle. Weight includes suspension, steer axle, knuckle/steering arm assemblies and tie rod assemblies.
6. This system is anti-lock braking system (ABS) ready. This system is compatible with industry standard wheel ends and brakes.
7. The SOFTEK NXT system product identification is etched on the front of the axle beam providing the following information, see Figure 2-2:
 - Axle part number: Identifies the features of the axle beam
 - Axle assembly number: Identifies the complete assembly, which includes the steering knuckles and bracket assemblies

FIGURE 2-2



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.

This technical publication 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, 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 CAN 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.

WARNING

SHOCK ABSORBERS

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

WARNING

SUPPORT THE VEHICLE PRIOR TO SERVICING

PLACE THE VEHICLE ON A LEVEL FLOOR AND CHOCK THE WHEELS TO HELP PREVENT THE VEHICLE FROM MOVING. NEVER WORK UNDER A RAISED VEHICLE SUPPORTED ONLY BY A FLOOR JACK. ALWAYS SUPPORT A RAISED VEHICLE WITH SAFETY STANDS. CHOCK THE WHEELS AND MAKE SURE THE VEHICLE WILL NOT ROLL PRIOR TO RELEASING BRAKES. A JACK CAN SLIP OR FALL OVER. SERIOUS PERSONAL INJURY CAN RESULT.

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

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 LEAF SPRING ASSEMBLY AND AXLE. DO NOT CONNECT ARC WELDING GROUND LINE TO THE LEAF SPRING ASSEMBLY OR AXLE. DO NOT STRIKE AN ARC WITH THE ELECTRODE ON THE LEAF SPRING ASSEMBLY OR AXLE. DO NOT USE HEAT NEAR THE LEAF SPRING ASSEMBLY OR AXLE. DO NOT NICK OR GOUGE THE LEAF SPRING ASSEMBLY OR AXLE. SUCH IMPROPER ACTIONS CAN DAMAGE THE LEAF SPRING ASSEMBLY OR THE AXLE, AND CAN CAUSE LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

WARNING

REPAIR OR RECONDITIONING

THE REPAIR OR RECONDITIONING OF SUSPENSION OR AXLE COMPONENTS IS NOT ALLOWED AS SHOWN ON LABEL IN FIGURE 3-1. ANY AXLE COMPONENTS FOUND TO BE DAMAGED OR OUT OF SPECIFICATIONS MUST BE REPLACED. ALL MAJOR HENDRICKSON COMPONENTS ARE HEAT TREATED AND TEMPERED. THE 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.

WARNING

AXLE CAMBER

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.

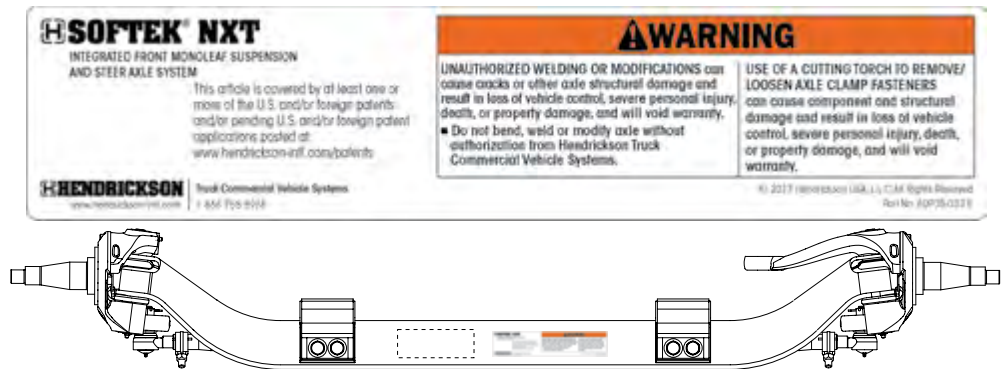
AXLE CAMBER IS NOT ADJUSTABLE. DO NOT CHANGE THE AXLE CAMBER ANGLE OR BEND THE AXLE BEAM, SEE FIGURE 3-1. BENDING THE AXLE BEAM TO CHANGE THE CAMBER ANGLE CAN DAMAGE THE AXLE AND REDUCE AXLE STRENGTH, WILL VOID HENDRICKSON'S WARRANTY AND CAN CAUSE LOSS OF VEHICLE CONTROL, POSSIBLY CAUSING PERSONAL INJURY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

WARNING

IMPROPER JACKING METHOD

IMPROPER JACKING METHOD CAN CAUSE STRUCTURAL DAMAGE AND RESULT IN LOSS OF VEHICLE CONTROL, SEVERE PERSONAL INJURY OR DEATH. DO NOT USE AXLE BEAM OUTBOARD OF AXLE SEATS. REFER TO VEHICLE MANUFACTURER FOR PROPER JACKING INSTRUCTIONS, SEE FIGURE 3-1.

FIGURE 3-1



WARNING

AXLE KINGPINS

SOFTEK 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 SHOWS SIGNS OF MOVEMENT, CONTACT HENDRICKSON TECH SERVICES.

WARNING

DAMAGED AXLE COMPONENTS

IF A VEHICLE EQUIPPED WITH A SOFTEK NXT SYSTEM 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 SUCH ADJACENT PARTS AND THE COMPLETE AXLE ASSEMBLY.

CONTACT HENDRICKSON TECH 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.



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.



OFF-ROADWAY TOWING

WHEN A VEHICLE IS DISABLED AND EQUIPPED WITH A SOFTEK NXT SYSTEM, CARE MUST BE TAKEN TO ENSURE THERE IS NO DAMAGE TO THE SUSPENSION OR AXLE WHEN TOWING THE VEHICLE. THE USE OF TOW STRAP 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 SOFTEK NXT SYSTEM, (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 SOFTEK NXT SYSTEM TO TOW THE VEHICLE, DOING SO WILL DAMAGE THE AXLE AND VOID ANY APPLICABLE WARRANTY, (SEE FIGURE 3-2). FOR DETAILED INSTRUCTIONS FOR ON-HIGHWAY TOWING, SEE TOWING PROCEDURE SECTION OF THIS PUBLICATION.

FIGURE 3-2



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.



PARTS CLEANING

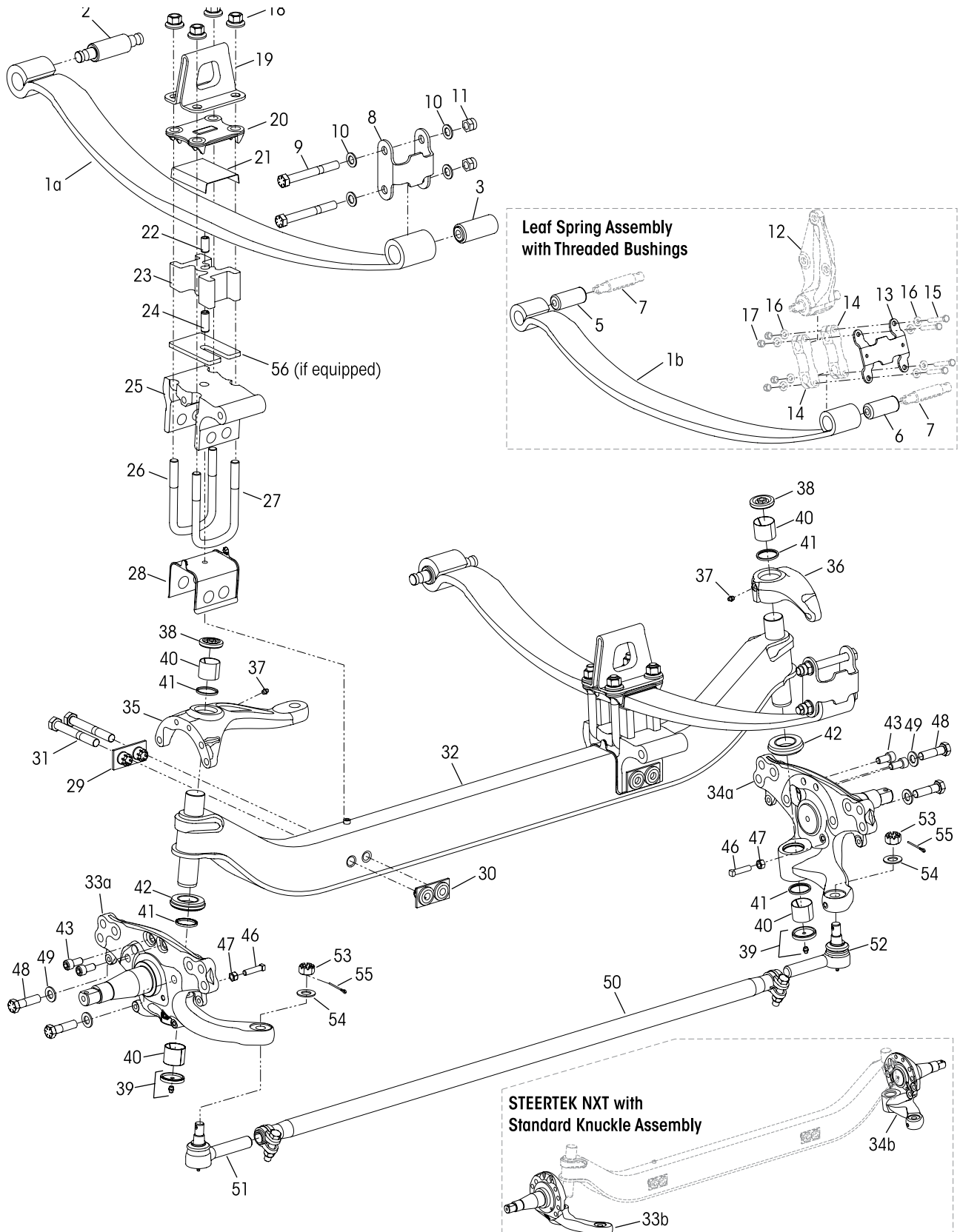
SOLVENT CLEANERS CAN BE FLAMMABLE, POISONOUS AND CAUSE BURNS. TO HELP AVOID SERIOUS PERSONAL INJURY, CAREFULLY FOLLOW THE MANUFACTURER'S PRODUCT INSTRUCTIONS AND GUIDELINES AND THE FOLLOWING PROCEDURE:

1. WEAR PROPER EYE PROTECTION.
2. WEAR CLOTHING THAT PROTECTS YOUR SKIN.
3. WORK IN A WELL VENTILATED AREA.
4. DO NOT USE GASOLINE, OR SOLVENTS THAT CONTAIN GASOLINE. GASOLINE CAN EXPLODE.
5. HOT SOLUTION TANKS OR ALKALINE SOLUTIONS MUST BE USED CORRECTLY. FOLLOW THE MANUFACTURER'S RECOMMENDED INSTRUCTIONS AND GUIDELINES CAREFULLY TO HELP PREVENT PERSONAL ACCIDENT OR INJURY.

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

SECTION 4 Parts List

12.5K • 13.2K Capacity | 6½", 8½" and 10" Ride Height





KEY NO.	PART NO.	DESCRIPTION	VEHICLE QTY.	KEY NO.	PART NO.	DESCRIPTION	VEHICLE QTY.
		Leaf Spring and Clamp Group Assembly Service Kit, One Side					
		• with Rubber Bushings , Includes Key Nos. 1a, 2-3, 18-31		26		Front U-bolt	2
	60961-813	10" Ride Height, 12.5K			77132-180	10" Ride Height, 12.5K, <i>Replaces 77132-190</i>	
	60961-854	10" Ride Height, 13.2K			77132-190	10" Ride Height, 13.2K	
	60961-814	8½" Ride Height, 12.5K			77132-140	8½" Ride Height, 12.5K, <i>Replaces 77132-150</i>	
	60961-855	8½" Ride Height, 13.2K			77132-150	8½" Ride Height, 13.2K	
	60961-815	6½" Ride Height, 12.5K			77132-120	6½" Ride Height, 12.5K, <i>Replaces 77132-130</i>	
	60961-856	6½" Ride Height, 13.2K			77132-130	6½" Ride Height, 13.2K	
		• with Threaded Bushings , Includes Key Nos. 1b, 5-6, 18-31		27		Rear U-bolt	2
	60961-848	10" Ride Height, 12.5K			77132-190	10" Ride Height, 12.5K	
	60961-849	10" Ride Height, 13.2K			77132-200	10" Ride Height, 13.2K	
	60961-850	8½" Ride Height, 12.5K			77132-150	8½" Ride Height, 12.5K	
	60961-851	8½" Ride Height, 13.2K			77132-160	8½" Ride Height, 13.2K	
	60961-852	6½" Ride Height, 12.5K			77132-130	6½" Ride Height, 12.5K	
	60961-853	6½" Ride Height, 13.2K			77132-140	6½" Ride Height, 13.2K	
		Spring Eye Bushing Service Kit, One Side			60961-802	Axle Clamp Service Kit, One Side , Includes Key Nos. 28-31	
	60961-820	Front, Includes Key Nos. 2, 4		28		*Axle Wrap Liner	2
	60961-821	Rear, Includes Key Nos. 3-4				*Axle Clamp	
2		*Front Bar Pin Spring Eye Bushing	2	29		Front - Unthreaded	2
3		*Rear Thru-bolt Spring Eye Bushing	2	30		Rear - Threaded	2
4	69125-001	Loctite® 680 (Green) Compound Tube (Not Shown)	1	31		*M20 X 2.5-6G x 160 mm Hex Cap Screw	4
5	52700-000	Front Spring Pin Bushing	2	32	70685-XXX	Axle and Kingpin Assembly, <i>See Table 1 on page 10</i>	1
6	53980-000	Rear Threaded Bushing	2	33		Left Hand Lower Steering Knuckle Assembly, <i>See Table 1 on page 10</i>	1
7		***Threaded Bar Pin	2		a	80029-XXX	• with Integrated Brake Knuckle Assembly Includes Key Nos. 39-41, 45-49
	60961-803	Rear Shackle Service Kit, One Side , Includes Key Nos. 8-11			b	58900-XXX	• with Standard Brake Knuckle Assembly Includes Key Nos. 39-41, 45-47
8	70795-001	Shackle	2	34		Right Hand Lower Steering Knuckle Assembly, <i>See Table 1 on page 10</i>	1
9	21867-023	¾"-16 UNF x 6½" Hex Bolt	4		a	80029-XXX	• with Integrated Brake Knuckle Assembly Includes Key Nos. 39-41, 45-49
10	22962-001	¾" Washer	8		b	58900-XXX	• with Standard Brake Knuckle Assembly Includes Key Nos. 39-41, 45-47
11	17700-035	¾"-16 UNF-2B Nylocknut	4	35	60903-472	Left Hand Upper Steering Knuckle Assembly, Includes Key Nos. 37-38, 40-41	1
12		***Rear Hanger	2	36	60904-402	Right Hand Upper Steering Knuckle Assembly, Includes Key Nos. 37-38, 40-41	1
13	79381-001	Shackle	2		60961-630	Kingpin Bushing and Roller Thrust Bearing Service Kit, One Side , Includes Key Nos. 37-44	
14		***Shackle Plate	4	37	33117-000	Grease Zerk	2
15		***M12 Hex Bolt	8	38	68687-003	Grease Cap Assembly, Upper	2
16		***M12 Washer	16	39	68687-002	Grease Cap Assembly, Lower	2
17		***M12 Nylocknut	8	40	58909-001	Kingpin Bushing	4
	60961-804	Clamp Group Service Kit, One Side , Includes Key Nos. 18, 21, 28-31		41	68731-000	Kingpin Seal	4
		• Key No. 26-27 U-bolts to be purchased separately		42	64256-000L	Roller Thrust Bearing	2
18	75989-000	M20 x 1.5-6H Two-piece Nut	8	43	60236-001	⅝"-11 UNC Socket Head Cap Screw	4
19	70690-001	Jounce Stop	2	44	60937-000	Loctite® (Red) Compound Tube (Not Shown)	1
20	70688-001	Top Pad	2	45	64246-000	ABS Sensor Sleeve (Not Shown)	2
21	75990-000	Leaf Spring Liner	2		60961-069	Stop Bolt Service Kit, One End , Includes Key Nos. 46-47	
22		Upper Slotted Spring Pin	2	46	60238-001	½"-13 UNC x 2" Square Head Bolt	2
	76897-013	10" Ride Height, 12.5K / 13.2K		47	60240-000	½"-13 UNC Hex Jam Nut	2
	76897-015	8½" Ride Height, 12.5K		48	58917-023	¾"-10 UNC x 2¾" Hex Head Cap Screw	4
	76897-005	8½" Ride Height, 13.2K		49	22962-047	¾" Flat Washer	4
	76897-016	6½" Ride Height, 12.5K		50		Tie Rod Assembly, Includes Key Nos. 51-53 <i>See Table 2 on page 10</i>	1
	76897-012	6½" Ride Height, 13.2K			60961-XXX	Tie Rod End Service Kits , <i>See Table 2 on page 10</i>	
23		Leaf Spring Spacer	2			Axle Set , Includes Left and Right Hand Kits	
	70694-001	10" Ride Height, 12.5K				Left Hand , Includes Key Nos. 51, 53-55	
	70694-003	10" Ride Height, 13.2K				Right Hand , Includes Key Nos. 52-55	
	70694-002	8½" Ride Height, 12.5K		51		Left Hand Tie Rod End, <i>See Table 2 on page 10</i>	1
	70694-004	8½" Ride Height, 13.2K		52		Right Hand Tie Rod End, <i>See Table 2 on page 10</i>	1
	77808-001	6½" Ride Height, 12.5K		53		*⅞" Castle Nut	2
	70694-005	6½" Ride Height, 13.2K		54	22962-007	⅞" Flat Washer	2
24	76897-001	Lower Slotted Spacer Pin (10" Ride Height Only)	2	55	17800-004	Tie Rod Nut Cotter Pin	2
25	75986-001	Axle Wrap / Shock Bracket	2	56	78578-001	**Chassis Spacer (if equipped)	1



■ Selection Guides

TABLE 1 Brake Knuckle Assembly

		Equipped with Integrated Brake Knuckle				Equipped with Standard Brake Knuckle				
		Part Number				Part Number				
		Wheel Base	STEERTEK NXT Assembly	Axle & Kingpin Assembly	Lower Steering Knuckle Assembly		STEERTEK NXT Assembly	Axle & Kingpin Assembly	Lower Steering Knuckle Assembly	
Left Hand	Right Hand				Left Hand	Right Hand				
4.25" Axle Drop	12.5K	241"-290"	70757-501		80029-099	80029-100	70757-001		58900-499	58900-500
		191"-240"	70757-502	70685-001	80029-097	80029-098	70757-002	70685-001	58900-497	58900-498
		140"-190"	70757-503		80029-095	80029-096	70757-003		58900-495	58900-496
	13.2K	241"-290"	70757-504		80029-099	80029-100	70757-004		58900-499	58900-500
		191"-240"	70757-505	78685-001	80029-097	80029-098	70757-005	78685-001	58900-497	58900-498
		140"-190"	70757-506		80029-095	80029-096	70757-006		58900-495	58900-496
5.36" Axle Drop	12.5K	241"-290"	70757-507		80029-099	80029-100	70757-007		58900-499	58900-500
		191"-240"	70757-508	70685-101	80029-097	80029-098	70757-008	70685-101	58900-497	58900-498
		140"-190"	70757-509		80029-095	80029-096	70757-009		58900-495	58900-496
	13.2K	241"-290"	70757-510		80029-099	80029-100	70757-010		58900-499	58900-500
		191"-240"	70757-511	78685-101	80029-097	80029-098	70757-011	78685-101	58900-497	58900-498
		140"-190"	70757-512		80029-095	80029-096	70757-012		58900-495	58900-496

TABLE 2 Tie Rod Assembly and Tie Rod End Service Kits

Wheel Base	Tie Rod Assembly Part Number		Tie Rod End Part Number		Tie Rod End Service Kit Part Number	
	12.5K	13.2K	12.5K	13.2K	12.5K	13.2K
241"-290"	76877-003	76879-003	70995-001 (LH) 70995-002 (RH)	76876-001 (LH) 76876-002 (RH)	60961-734 (Axle Set) 60961-736 (LH) 60961-741 (RH)	60961-735 (Axle Set) 60961-742 (LH) 60961-743 (RH)
191"-240"	76877-002	76879-002				
140"-190"	76877-005	76879-001				

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

** Chassis spacer (if equipped) can be located on either left or right side of suspension.

*** Not supplied by Hendrickson, used for reference only. Hendrickson is not responsible for components supplied by vehicle manufacturer. For more information and assistance with maintenance and rebuild instructions on these components see vehicle manufacturer.

SECTION 5 Special Tools

LEAF SPRING BUSHING TOOLS

Hendrickson Part No. 66086-300

OTC Part No. 4274 Visit otctools.com



Hendrickson Part No. 66086-301

OTC Part No. 4275 Visit otctools.com



Hendrickson Part No. 66086-302

OTC Part No. 4250 Visit otctools.com

NOTE: In conjunction with Hendrickson Part No. 66086-301 (OTC 4275) this additional adapter tool kit is available to purchase to be used on Hendrickson PRIMAXX EX • COMFORT AIR • V-RIDE rear air suspensions (not needed for this front suspension).



KINGPIN BUSHING TOOL — ADJUSTABLE STRAIGHT FLUTE REAMER

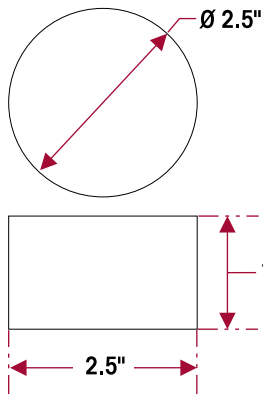
The dimension of cutting diameter must facilitate a range of 1.802"-1.812"



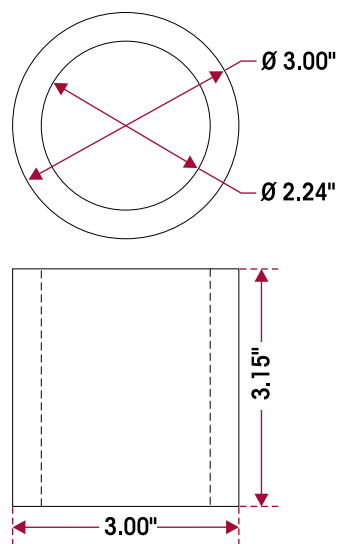
KINGPIN BUSHING AND SEAL SHOP TOOLS

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.

***Bushing Driver**



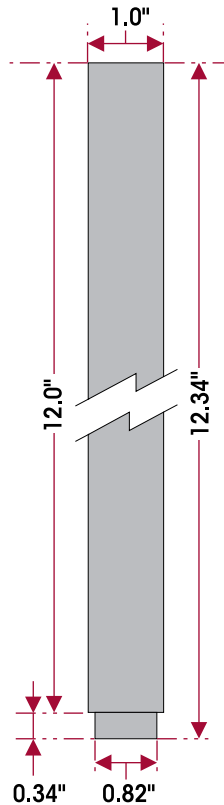
Bushing Receiving Tool
(for press bushing replacement)



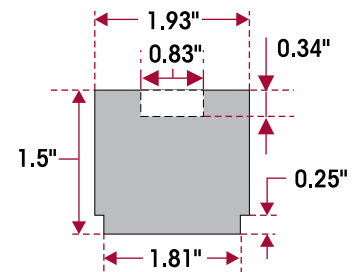
NOTE: *The bushing driver is necessary to sink the kingpin bushing flush into the steering knuckle bore.

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

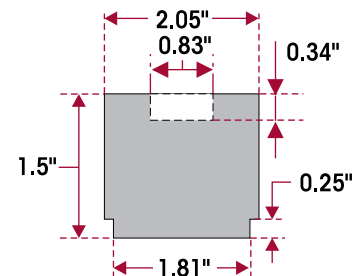
Kingpin Handle



Bushing Installer / Remover Tool
(to seat bushing)



Seal Installer Tool
(to seat seal)



SECTION 6

Towing Procedures

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 at 1-866-755-5968 or send email to: techservices@hendrickson-intl.com with any questions regarding proper towing procedures for vehicles equipped with a SOFTEK NXT system.

Hendrickson recommends that a vehicle equipped with a SOFTEK NXT steer axle and suspension system 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, suspension, and engine 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.

NOTE

When lifting a vehicle with an under lift boom, care must be taken not to damage the engine’s oil pan. Vehicles equipped with a front fairing may require removal of the front fairing prior to towing to prevent component damage.

- Place a spacer on the boom to provide adequate clearance between the oil pan and the boom if necessary. Lift the vehicle in order to place spacer under tires. This will provide sufficient room under the axle to locate forks in the proper position.
 - 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 wraps, see Figure 6-3.

FIGURES 6-2



FIGURE 6-3



OFF-ROADWAY TOWING



WHEN A VEHICLE IS DISABLED AND EQUIPPED WITH A SOFTEK NXT SYSTEM, 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 SOFTEK NXT SYSTEM, (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 SOFTEK NXT SYSTEM 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





SECTION 7 Preventive Maintenance

The SOFTEK NXT suspension and steer axle system is low maintenance system. Following appropriate inspection procedure is important to help ensure the proper maintenance and operation of the SOFTEK NXT system and component parts function to their highest efficiency.

Hendrickson recommends SOFTEK NXT systems be inspected at pre-delivery, the first 1,000 miles of service and at the regular preventive maintenance intervals. Off-highway and severe service operating conditions require more frequent inspections than on-highway service operation.

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:	Within the first 100 miles (500 km)	Within the first 1,000 miles (1,600 km) or 100 hours	ON-HIGHWAY 50,000 miles (80,000 km) every 6 months or whichever comes first
<ul style="list-style-type: none"> • 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:			Inspect all fasteners for proper torque using a calibrated torque wrench
<ul style="list-style-type: none"> • Axle assembly • Front and rear spring eye connection • Leaf spring • Rear shackle brackets and shackle plates • Clamp group 			
Verify the ride height is within specification as per vehicle manufacturer's specifications.			

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

COMPONENT INSPECTION

- **Axle wrap** — Check torque. Inspect axle seats for cracks or damage. Inspect axle seat liners, check for any missing liner material. If liner material is missing disassemble clamp group and replace liners, see Component Replacement Section of this publication.
- **Clamp group** — Check torque on clamp group mounting hardware, refer to the Torque 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 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.
- **Operation** — All steering components must move freely through the full range of motion from axle stop to axle stop.



- **Rear shackle bracket** — Check for proper alignment with spring taper and check for proper torque on rear spring mount fasteners. Refer to the Torque Specifications Section of this publication.
- **Shock absorbers** — Look for any signs of dents or leakage, misting is not considered a leak. See Shock Absorber Inspection in this section.
- **Steel leaf spring** — Look for cracks. Replace if cracked or broken. Check the front bushing for any wear or deterioration. 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.
- **Tire wear** — Inspect tires for wear patterns that may indicate suspension damage or misalignment. See Tire Inspection in this section.
- **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 SOFTEK NXT system, regular lubrication intervals should be followed to help prevent premature wear to the kingpin bushings and tie rod ends, see Lubrication Specifications below.

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

SOFTEK NXT – *Greasing and Lubrication Specifications

Application	Component	Greasing Intervals	Grease	Outside Temperature
GENERAL Does not include line-haul or medium-duty applications	Kingpin Bushings	Maximum of 25,000 miles (40,225 km) or 90 days, whichever comes first	Multipurpose Grease NLGI Grade 2	Refer to the lubricant manufacturer’s specifications for the temperature service limits applicable to your area
	Tie Rod Ends			
	**Leaf Spring Threaded Bushing (if equipped)	Maximum of 30,000 miles (24,140 km) or 30 days, whichever comes first	EP Chassis Grease NLGI Grade 2	
	Drag Link	See Vehicle Manufacturer		
Application Specific Recommendations				
ON-HIGHWAY Line-haul Only, High Mileage Accumulation 95% Highway Surface No off-roadway operation Greater than 50,000 miles per year (80,500 kilometers per year)	Kingpin Bushings	Maximum of 100,000 miles (161,000 km) or 1 year, whichever comes first	Multipurpose Grease NLGI Grade 2	Refer to the lubricant manufacturer’s specifications for the temperature service limits applicable to your area
	Tie Rod Ends			
	**Leaf Spring Threaded Bushing (if equipped)	Maximum of 30,000 miles (24,140 km) or 30 days, whichever comes first	EP Chassis Grease NLGI Grade 2	
	Drag Link	See Vehicle Manufacturer		

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

** Leaf springs equipped with threaded bushings are supplied by the vehicle manufacturer. Consult vehicle manufacturer for greasing intervals and additional information.

*** Leaf springs equipped with rubber bushings require no grease interval.

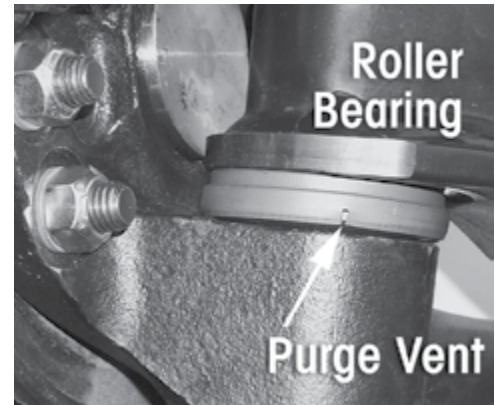
KINGPIN LUBRICATION

SOFTEK NXT – Upper kingpin grease Zerks are located on the inboard side of the steering knuckle and upper kingpin connection, see Figure 7-1.

FIGURE 7-1



FIGURE 7-2



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 chart above.
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 Figure 7-2.

NOTE

Greasing at the lower Zerk should purge grease from the thrust bearing shell. The left and right side of the SOFTEK NXT system have steel roller thrust bearing.

TIE ROD END

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).



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 7-3. Continue to purge grease until fresh grease flows from the purge area.
6. If the tie rod end is designed for lube service and it will not accept grease proceed as follows:
 - a. Remove the grease Zerk
 - b. Inspect the threaded grease Zerk hole in the tie rod end and remove any obstructions
 - c. Install a new grease Zerk
 - d. Continue the lubrication procedure
 - e. If the tie rod end will not accept grease following this procedure it will be necessary to replace the tie rod end (see Tie Rod End replacement in the Component Replacement Section of this publication)
7. Apply grease until all the old grease is purged from the boot and fresh grease is coming out.

INSPECTION

Before beginning this inspection procedure, the entire system must be unloaded (i.e., the front end of the vehicle must be raised and supported with safety stands).

CAUTION

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

CAUTION

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

1. Block rear wheels of vehicle. Using the bottom of the axle beam or the frame rails, raise the front end off the ground and support with 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.

WARNING

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 ADVERSELY AFFECT VEHICLE STEERING AND POSSIBLY RESULT IN TOTAL LOSS OF STEERING 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.

WARNING

IT IS CRITICAL TO CHECK THE $\frac{5}{8}$ " 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 $\frac{5}{8}$ " tie rod clamp bolt head does not contact the lower shock mount at full wheel cut, see Figure 7-4.

WARNING

THE THREADED PORTION OF THE TIE ROD END MUST EXTEND PAST THE SLOTS INTO THE TIE ROD CROSS TUBE, SEE FIGURE 7-4. 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 7-4.
8. Check that grease Zerks are installed. Replace a damaged grease Zerk with a new one.

CAUTION

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

- A CROW BAR, PICKLE FORK OR 2 X 4
 - ANYTHING OTHER THAN HANDS USED TO GRASP AND ROTATE THE 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 7-5.

FIGURE 7-3

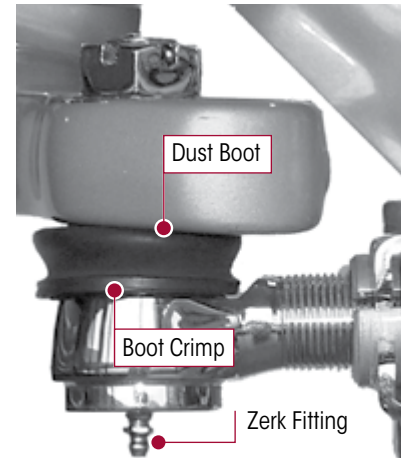
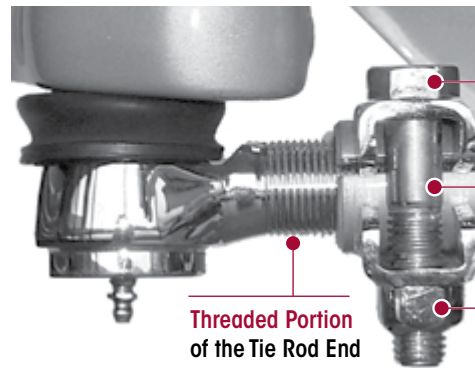


FIGURE 7-4

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.

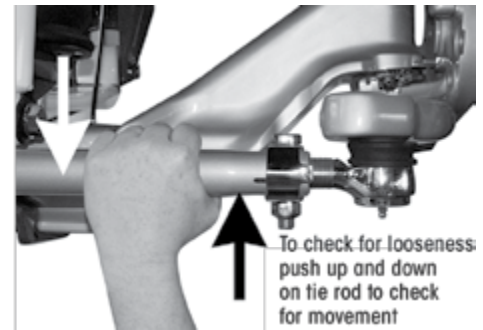
Tie Rod Cross Tube Slots

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)

FIGURE 7-5

FIGURE 7-6


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 50-100 pounds of force). Check for any movement or looseness at both tie rod end locations, see Figure 7-6.

11. If there is any movement in the tie rod assembly, install a magnetic based dial indicator on the Ackermann arm, see Figure 7-7.

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 50-100 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.

FIGURE 7-7

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, April 1, 2006.)

WARNING
CLAMP GROUP ASSEMBLY U-BOLT LOCKNUTS RE-TORQUE INTERVAL

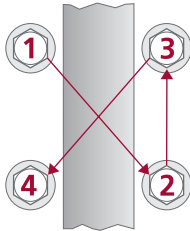
LOOSE OR OVER TORQUED FASTENERS CAN CAUSE COMPONENT DAMAGE, LOSS OF VEHICLE CONTROL, PROPERTY DAMAGE, OR SEVERE PERSONAL INJURY. MAINTAIN CORRECT TORQUE VALUES AT ALL TIMES. CHECK TORQUE VALUES ON A REGULAR BASIS AS SPECIFIED.

- Clamp group U-bolt locknuts must be torqued to specification at preparation for delivery and must be re-torqued at 1,000 miles
- Thereafter follow the 6 month/50,000 mile visual inspection and annual re-torque interval

WARNING

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

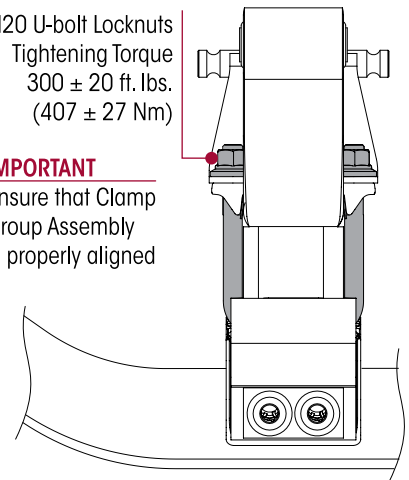
1. Ensure that the clamp group assembly is properly aligned and the U-bolts are seated in the axle wrap, and the top pad is centered on the leaf spring, see Figure 7-8.
2. Check for the signs of component or bolt movement.
3. If signs of movement are present, disassemble the clamp group fasteners, check for component wear or damage and replace as necessary, then install new clamp group fasteners and repeat Steps 3 and 4.
4. Tighten the M20 clamp group assembly U-bolt locknuts evenly in 100 foot pounds increments to 300 ± 20 foot pounds torque in the proper pattern to achieve uniform bolt tension, see Figures 7-8 and 7-9.

FIGURE 7-9

FIGURE 7-8

M20 U-bolt Locknuts
Tightening Torque
 300 ± 20 ft. lbs.
(407 ± 27 Nm)

IMPORTANT

Ensure that Clamp Group Assembly is properly aligned


AXLE CLAMP THROUGH BOLTS
WARNING

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 WILL ASSUME ALL RISKS OF CONSEQUENTIAL PERSONAL INJURY OR DAMAGE TO EQUIPMENT INVOLVED.

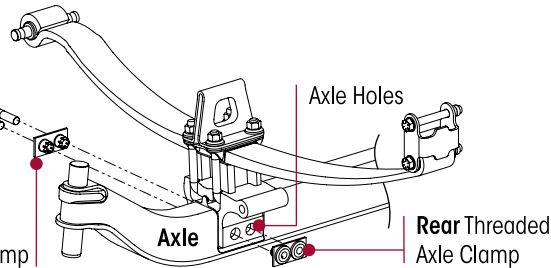
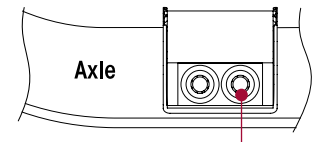
WARNING

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.

NOTE

A popping noise coming from the steer axle area may indicate loose fasteners. Proceed to the next service facility for a torque inspection to ensure fasteners are tightened to specification.

1. Chock the wheels.
2. Tighten the axle clamp fasteners at the bolt head evenly in 140 foot pounds increments to 420 ± 20 foot pounds torque, see Figures 7-10 and 7-11.
3. To identify the torque inspection is completed, apply a mark with a torque seal to both the axle clamp and bolt heads.

TORQUE INSPECTION
FIGURE 7-10
Leaf Spring with Rubber Bushing Shown
**M20 x 160 mm Bolt
Tightening Torque
420 ± 20 ft. lbs.
(569 ± 27 Nm)**
Front Unthreaded Axle Clamp

FIGURE 7-11

**M20 Axle Clamp at the Bolt Head
Tightening Torque
420 ± 20 ft. lbs.
(569 ± 27 Nm)**
KINGPIN BUSHING WEAR
STEERING KNUCKLE LATERAL MOVEMENT INSPECTION

1. Chock the wheels to help prevent the vehicle from moving.
2. Set the parking brake.
3. Use a jack to raise the vehicle until the wheels are off the ground.
4. Support the vehicle with safety stands.
5. **Checking the Upper Kingpin Bushing** — Install the base of a dial indicator onto the axle beam and place the tip against the steering knuckle, see Figure 7-12.

FIGURE 7-12
CHECK UPPER KINGPIN BUSHING

FIGURE 7-13
CHECK LOWER KINGPIN BUSHING

FIGURE 7-14
MOVE BOTTOM OF TIRE IN AND OUT


6. Set the dial indicator to "0" zero.
7. Move the top of the tire in and out by applying reasonable constant pressure and then release, see Figure 7-13.
8. 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.
9. **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 7-13.
10. Set the dial indicator to "0" zero.

NOTE

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


11. Move the bottom of the tire in and out, see Figure 7-14. 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.

STEERING KNUCKLE

CHECKING VERTICAL END PLAY (UP AND DOWN MOVEMENT)

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

FIGURE 7-15

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 7-15.
 - 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 "0" (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.
 - **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.
 - **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.
8. Retighten the socket head cap screws to  188 ± 12 foot pounds torque.



TIRE INSPECTION

The leading causes of tire wear are the following, in order of importance: 1) Tire Pressure, 2) Toe Setting, 3) Thrust Angle and 4) Camber.

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 TMC's literature numbers RP 219A, RP 230, or RP 642.

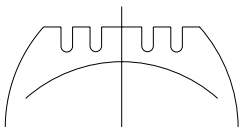
Tire wear is normally the best indicator of vehicle alignment condition. If tires are wearing too rapidly or irregularly, alignment corrections may be needed. The tire wear patterns described below can help isolate specific alignment problems.

The most common conditions of concern are:

- Overall Fast Wear (Miles per 32nd)
- Feather Wear
- Cupping
- Diagonal Wear
- Rapid Shoulder Wear (One Shoulder Only)
- One-Sided Wear

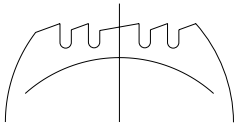
FIGURE 7-16

OVERALL FAST WEAR (Miles per 32nd)



Overall Fast Wear — Fast wear can be described as exhibiting a good, but accelerated wear pattern. It is typically caused by operating conditions, such as mountainous terrain, frequency and severity of turning, abrasive road surfaces in combination with vehicle configurations and their attributes—such as power steering, heavy axle loads, high wheel cuts, setback axles, short wheel base tractors, long wheel base straight trucks. To correct this problem, consult with vehicle and tire manufacturers when specifying equipment or replacing tires. For more information, see TMC RP 219A publication, page 11. For information on how to accurately measure and record tire rates, see TMC RP 230 publication.

FIGURE 7-17
FEATHER WEAR



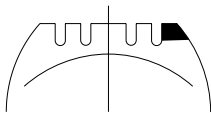
Feather wear — Tread ribs or blocks worn so that one side is higher than the other resulting in step-offs across the tread face. Generally, ribs or blocks exhibit this wear. To spot this problem, do the following:

With one hand flat on the tread of the tire and a firm down pressure, slide your hand across the tread of the tire. In one direction, the tire will feel smooth and in the opposite direction there will be a sharp edge to the tread. Typical causes of feather wear include: excessive side force scrubbing, resulting from conditions of misalignment such as excessive toe, drive axle misalignment, worn, missing or damaged suspension components, bent tie rods or other chassis misalignment.

To correct this problem, tires can be rotated to another axle for maximum utilization of remaining tread. Additionally, diagnose the vehicle itself and correct misalignment condition as required. If steer tire feathers are in opposite directions, an improper toe condition is most likely the cause. For more information, see TMC RP 219A publication, page 5.

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

FIGURE 7-18
RAPID SHOULDER WEAR (One Shoulder Only)



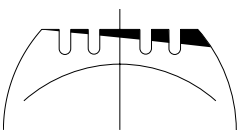
Rapid Shoulder Wear (One Shoulder Only) — Is defined as a tire worn on the edge of one shoulder, sometimes extending to inner ribs. It can progress to diagonal wipeout. For more information, see TMC RP 219A publication, page 22.

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

To correct this type of rapid shoulder wear:

- *Tires* – Change direction of rotation of tire. If shoulder wear is severe, remove and retread
- *Vehicle* – Diagnose misalignment and/or mechanical condition and correct

FIGURE 7-19
ONE-SIDED WEAR



One-sided wear — Is excessive wear on one side of tire extending from the shoulder towards the center of the tread. For more information, see TMC RP 219A, page 26.

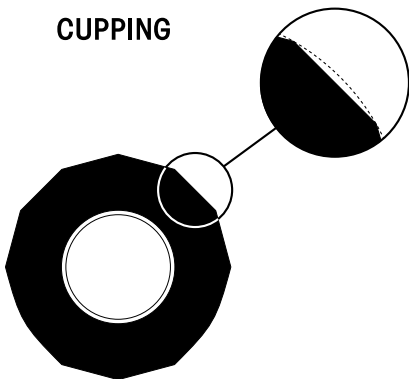
One-sided wear is usually caused by improper alignment, worn kingpins, loose wheel bearings, excessive camber, excessive axle loads, non-parallel axles, or non-uniform tire and wheel assembly caused by improper bead seating or bent wheel.

To correct one-sided wear:

- *Tires* – Depending on severity, rotate tires to another axle position or, if worn to minimum tread depths, submit for possible retreading
- *Vehicle* – Diagnose mechanical problem and correct

FIGURE 7-20

CUPPING



Cupping — Localized, dished out areas of fast wear creating a scalloped appearance around the tire. Cupping, which appears around the tire on the shoulder ribs, may also progress to adjoining ribs, see TMC RP 219A publication, page 7.

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

To solve cupping problems:

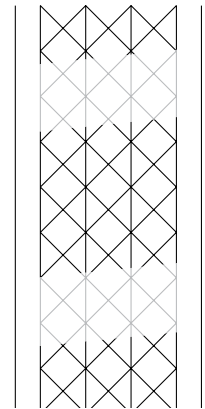
- *Tires* – Correct mismount or balance problem. If ride complaints arise, steer tires may be rotated to drive or trailer axle
- *Vehicle* – Diagnose component imbalance condition, i.e., wheel, rim, hub, brake, drum. Correct as necessary

Diagonal Wear — Can be described as localized flat spots worn diagonally across the tread at approximately 25-35° angles, often repeating around the tread circumference. For more information, see TMC RP 19A publication, page 20.

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.

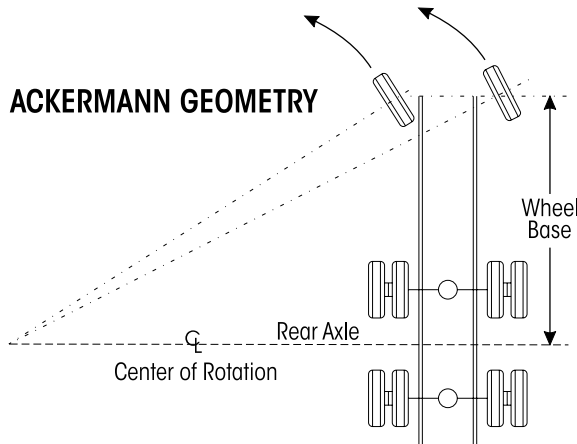
To correct diagonal wear, reverse direction of rotation of the tire. If wear is excessive, true tire. If the source of trouble is the vehicle, diagnose cause and correct as needed.

FIGURE 7-21
DIAGONAL WEAR



SECTION 8 Alignment & Adjustments

ALIGNMENT DEFINITIONS

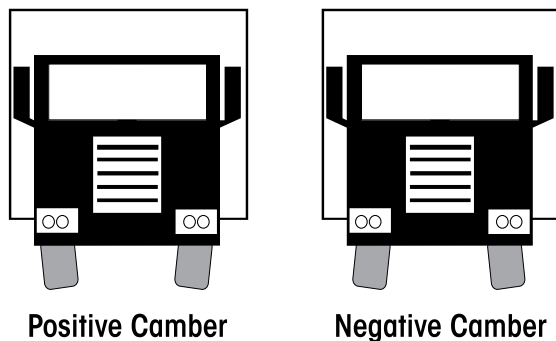
FIGURE 8-1


Ackermann steering geometry — The geometry of the four bar linkage consisting of the front axle, two knuckle assemblies, and tie rod assembly is designed to provide free rolling of front tire in a turn. Ackermann geometry is dependent upon the steering axle track-width and wheel-base 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.

FIGURE 8-2

CAMBER

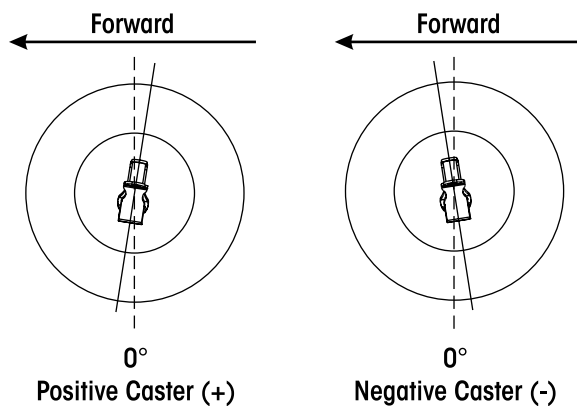


Camber — The angle formed by the inward or outward tilt of the wheel reference to a vertical line. Camber is positive when the wheel is tilted outward at the top and is negative when the wheel is tilted inward at the top.

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.

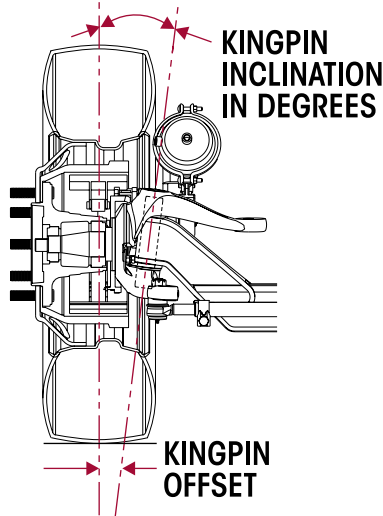
FIGURE 8-3

CASTER



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.

FIGURE 8-4



Kingpin inclination (KPI) — 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

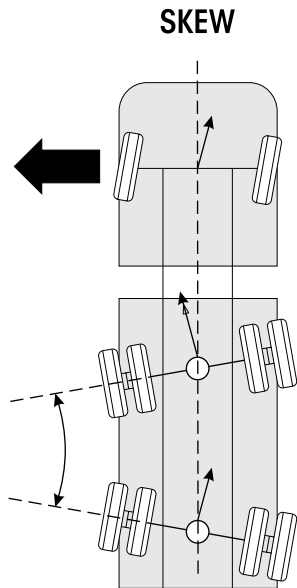
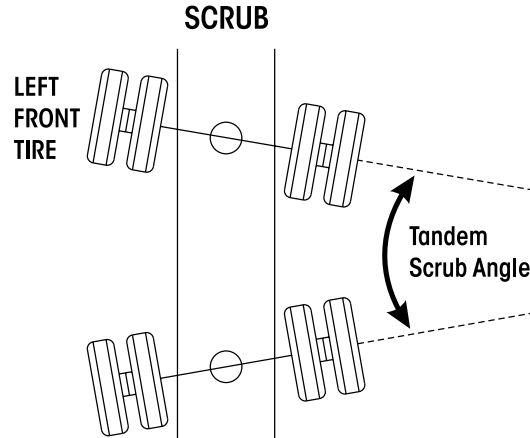


FIGURE 8-6



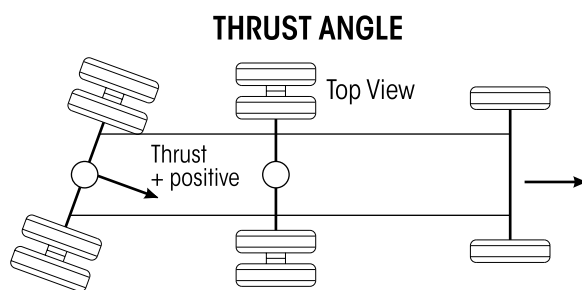
Scrub, skew, tram angle or parallelism —

The angle formed by two thrust or tracking lines of a tandem (or multiple) axle vehicle. As indicated by the term "parallelism", the ideal condition is when the two thrust lines form a 0° angle, or are parallel to each other. Positive skew or tram is when the distance between the right axle ends is less than the distance between the left.

Any scrub angle other than 0° will cause the tandem axles to work against each other. The steer axle must be turned to offset the "push" of the tandem axles to keep the vehicle moving straight ahead. This causes every tire on

the vehicle to "scrub". Tire wear from tandem scrubbing occurs at the leading edge of the steer tires in a pattern called "inside/outside" wear, that is, the inside edge of the left steer tire and the outside edge of the right steer tire will exhibit irregular wear for example. Additional tire wear may occur on all tandem axle tires.

FIGURE 8-7

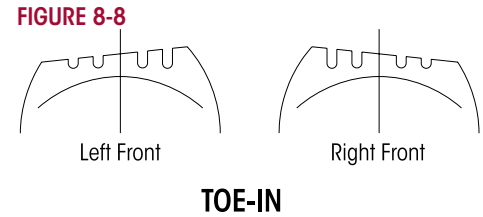


Thrust angle, tracking, or square — The angle formed by the centerline of the vehicle frame (geometric centerline) and the direction that an axle points. As indicated by the term "square", the ideal value for the angle is 0° or when the axle centerline is at 90° or perpendicular to the geometric centerline.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

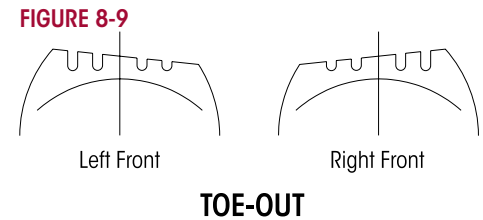
A steering correction is required to offset the effect of the thrust angles and keeps the vehicle traveling in a straight line. It results in a lateral offset between the steer and drive axle tires commonly referred to as "dog tracking."

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

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.

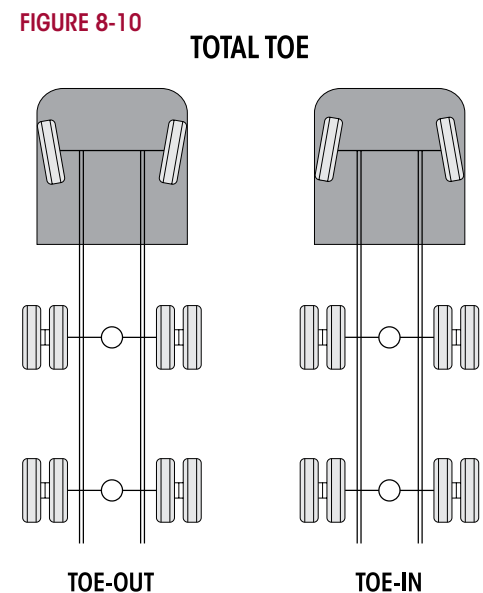


Toe-out — Is when the horizontal lines intersect behind the wheels, or the wheels are closer together in back than in front. Toe-in is commonly designated as positive, toe-out as negative. Excessive toe-out wears the inside edge of the tires. Steer axle toe is adjustable to reduce wear to the leading 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 OEM, tire OEM 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
- The wheels and tires are free of excessive wear and damage
- Wheel bearing end play is within OEM specification

FRONT SUSPENSION

Inspect the following:

- All fasteners are installed and tightened to the specified torque. See Torque Specification Section of this publication.
- Leaf springs are free of wear or damage
- Shock absorbers are free of wear and damage
- Vehicle ride height for both the front and rear are within specification. Follow manufacturer's guidelines (if equipped).
- Front and rear spring mounts are free of wear or damage

INSPECT TIE ROD ENDS

Perform Tie Rod Inspection procedure; refer to the Preventive Maintenance Section of this publication.

REAR AXLE AND REAR SUSPENSION

The rear axle 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:

- Make sure the rear axle (especially a tandem axle) is correctly aligned. Refer to the procedure dictated by the vehicle or suspension manufacturer.
- All fasteners including U-bolts (if applicable) are installed and tightened to the specified torque
- The leaf springs are not worn or damaged
- The bushings in the leaf springs are not worn or damaged
- The torque rods (if used) are correctly adjusted (if adjustable)
- The frame is not bent or twisted
- Refer to any additional recommendations and specifications from the manufacturer of vehicle on rear axles and suspensions. Reference The Technology & Maintenance Council (TMC) Guidelines for Total Vehicle Alignment.

FRONT WHEEL ALIGNMENT

Hendrickson recommends technicians review The Technology & Maintenance Council's publication (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, or 12-18 months (normal maintenance).
- When the vehicle does not steer correctly.
- To correct a tire wear condition.

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

The front wheel alignment specifications can be found in the Alignment Specifications 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.
2. *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 the Inspection Prior to Alignment in this section.

2. Check the wheel bearing end play.
3. Check and adjust toe.
4. Check and adjust the vehicle ride height as specified in the Preventive Maintenance Section of this publication.

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 8-11 and 8-12.

FIGURE 8-11



FIGURE 8-12



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.
4. Check the turning angle. Refer to the original equipment manufacturer specifications.
5. Check the kingpin (or steering axis) inclination. Refer to Kingpin Inclination under Alignment Definitions in this section.

WARNING

AXLE CAMBER IS NOT ADJUSTABLE. DO NOT CHANGE THE AXLE CAMBER ANGLE OR BEND THE AXLE BEAM. BENDING THE AXLE BEAM TO CHANGE THE CAMBER ANGLE CAN DAMAGE THE AXLE AND REDUCE AXLE STRENGTH, AND WILL VOID HENDRICKSON'S WARRANTY. A BENT AXLE BEAM CAN CAUSE LOSS OF VEHICLE CONTROL, POSSIBLY CAUSING PERSONAL INJURY OR PROPERTY DAMAGE, SEE FIGURE 8-13.

FIGURE 8-13



6. Check camber angle. **DO NOT** attempt to adjust camber. Refer to "Camber" under the Alignment Definitions in this section.
7. It is necessary to verify that all ride heights (front and rear) are within specifications prior to checking caster to get an accurate caster reading.

8. Check and adjust caster angle. Refer to Caster Angle under Alignment Definitions in this section.

NOTE

The use of two different angle caster shims will not change cross caster. Cross caster is the difference between the caster readings for left and right side of the vehicle.

9. 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.


The steering stop adjustment procedure is as follows:

1. Drive truck onto 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.

FIGURE 8-14

**NOTE**

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 8-14.

5. Decrease the wheel cut by loosening the jam nuts and screw the axle stops out counter-clockwise.
6. Tighten the jam nuts to  50 ± 10 foot pounds torque.
7. Measure the wheel cut and check for any interference with related steering components.

 **WARNING**

ALWAYS CHECK / RESET THE STEERING GEAR BOX POPPETS 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, 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 jack stands.
3. Use paint and mark the center area of tread on both steer axle tires around the complete outer diameter of the tires.
4. 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 jack stands.
6. Set the vehicle on the ground.

NOTE

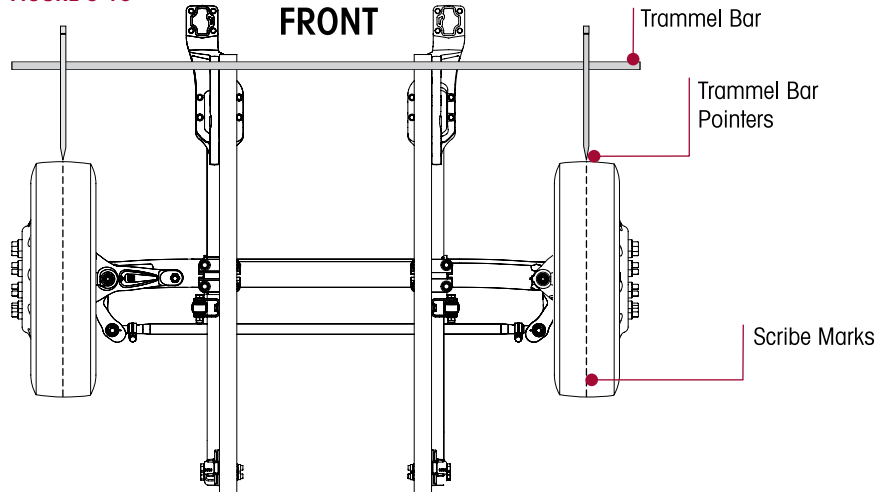
DO NOT measure toe-in with the front axle off the ground. The weight of the vehicle must be on the front axle when toe-in is measured.

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 8-15.

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 $\frac{1}{16}'' \pm \frac{1}{32}''$ ($0.060'' \pm 0.030''$), 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.

FIGURE 8-15

WARNING

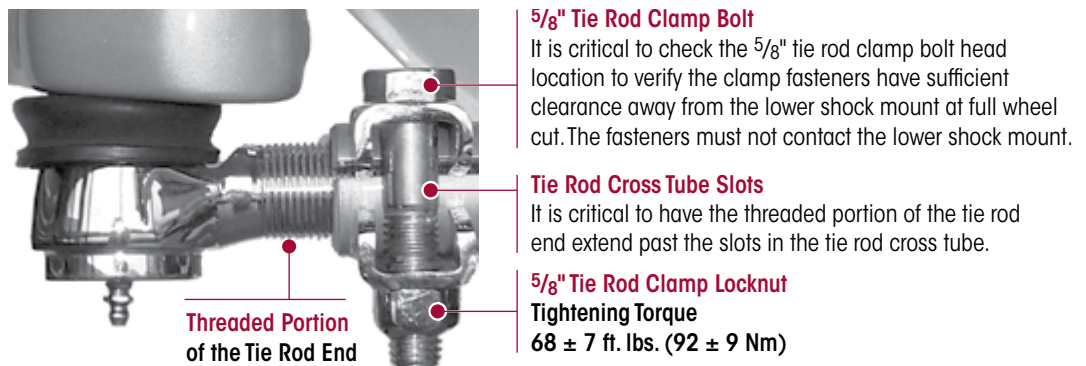
THE THREADED PORTION OF THE TIE ROD END MUST EXTEND PAST THE SLOTS INTO THE TIE ROD CROSS TUBE, SEE FIGURE 8-16. FAILURE TO DO SO CAN CAUSE COMPONENT TO FAIL CAUSING LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

- c. Tighten the bolt and locknut on the tie rod cross tube to 68 ± 7 foot pounds torque.


WARNING

IT IS CRITICAL TO CHECK THE $\frac{5}{8}''$ 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.

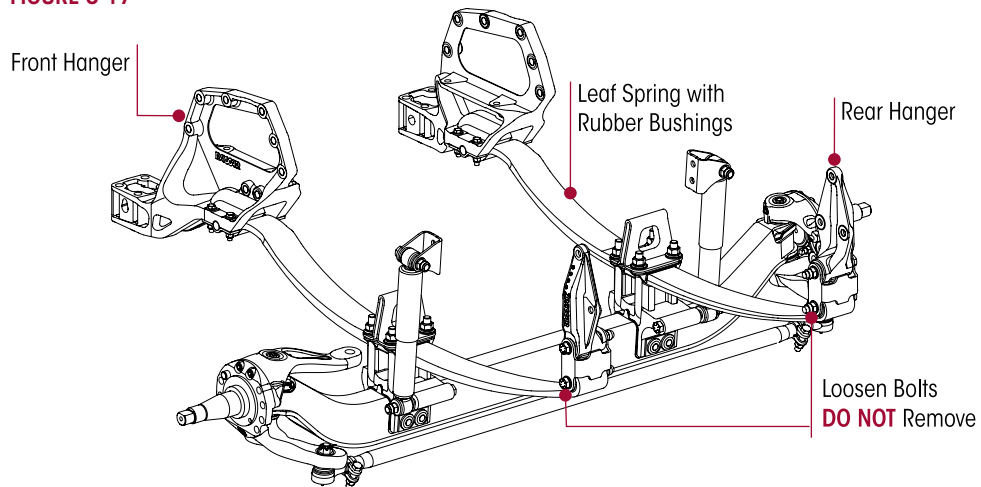
11. Verify the $\frac{5}{8}''$ tie rod clamp bolt head does not contact the lower shock mount at full wheel cut, see Figure 8-16.
12. Repeat Steps 1-10 until the correct toe setting is achieved.

FIGURE 8-16


SPRING EYE RE-TORQUE

This procedure to re-torque is necessary when replacing the: front hanger, shackle bracket and/or the leaf spring assembly.

FIGURE 8-17



RE-TORQUE PROCEDURE

1. Chock the rear wheels of the vehicle to prevent movement.
2. Loosen, **DO NOT REMOVE** front and rear spring eye bolts, see Figure 8-17, with the weight of the vehicle on the suspension.
3. Tighten the front M12 spring eye bolt locknuts per the vehicle manufacturer's torque specifications.
4. Tighten the rear spring eye bolt and shackle bolt locknuts –
 - **Equipped with Rubber bushing:** Tighten $\frac{3}{4}$ " fasteners to $\boxed{400} \pm 20$ foot pounds torque
 - **Equipped with Threaded bushing:** Tighten M12 fasteners to vehicle manufacturer's torque specifications
5. Affix a straight edge to the bottom of the frame rail behind the frame hanger, see Figure 8-18.
6. With the vehicle on a level surface, measure the distance from the top of the straight edge to the ground on both sides of the vehicle and record the measurements.
7. Measure the difference from one side to the other.
8. Remove wheel chocks and perform a road test.
9. Chock the rear wheels of the vehicle to prevent movement.
10. Repeat the measurement in Steps 5 through 7.
11. If the difference in measurement from one side to the other is less than $\frac{1}{2}$ ", the vehicle is level. If measurement difference is more than $\frac{1}{2}$ " contact the vehicle manufacturer.
12. Remove the wheel chocks.

FIGURE 8-18



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.

SHACKLE

DISASSEMBLY

1. Place the vehicle on a level floor.
2. Chock the wheels.
3. Raise the vehicle and support the frame.
4. Suspend the front axle to remove the load from the shackle.

SERVICE HINT

It may be necessary to raise the axle slightly to remove shackle bolts.

5. Remove rear shackle fasteners, see Figures 9-1 and 9-2.
6. Remove the shackle and shackle plate (if equipped).

FIGURE 9-1

Leaf Spring with Rubber Bushing

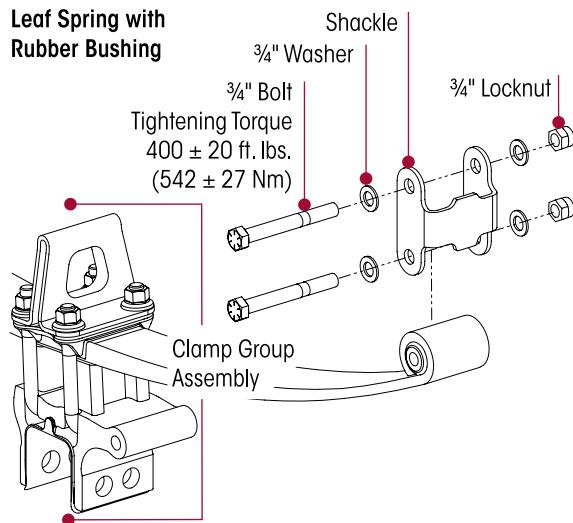
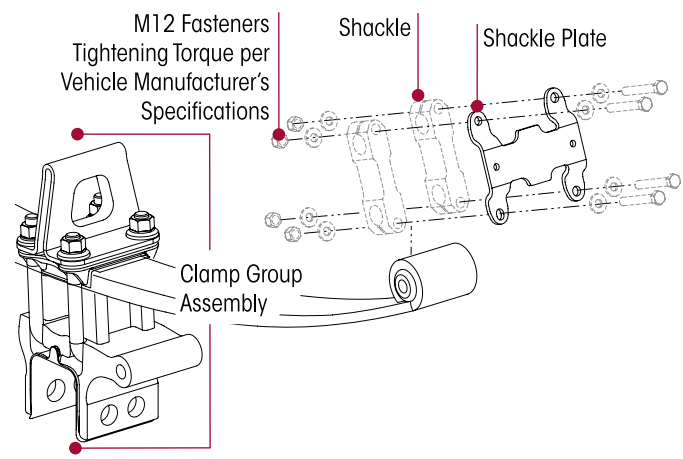


FIGURE 9-2

Leaf Spring with Threaded Bushing



ASSEMBLY

1. Install the shackle, shackle plate (if equipped) and fasteners, see Figures 9-1 and 9-2.
2. Snug the fasteners.
3. Raise the vehicle and remove the frame stands.
4. Lower the vehicle.
5. Tighten the shackle fasteners:
 - **Equipped with Rubber bushing:** $\frac{3}{4}$ " fasteners to 400 ± 20 foot pounds torque
 - **Equipped with Threaded bushing:** M12 fasteners to vehicle manufacturer's torque specifications
6. Remove the wheel chocks.

LEAF SPRING AND CLAMP GROUP ASSEMBLY

DISASSEMBLY

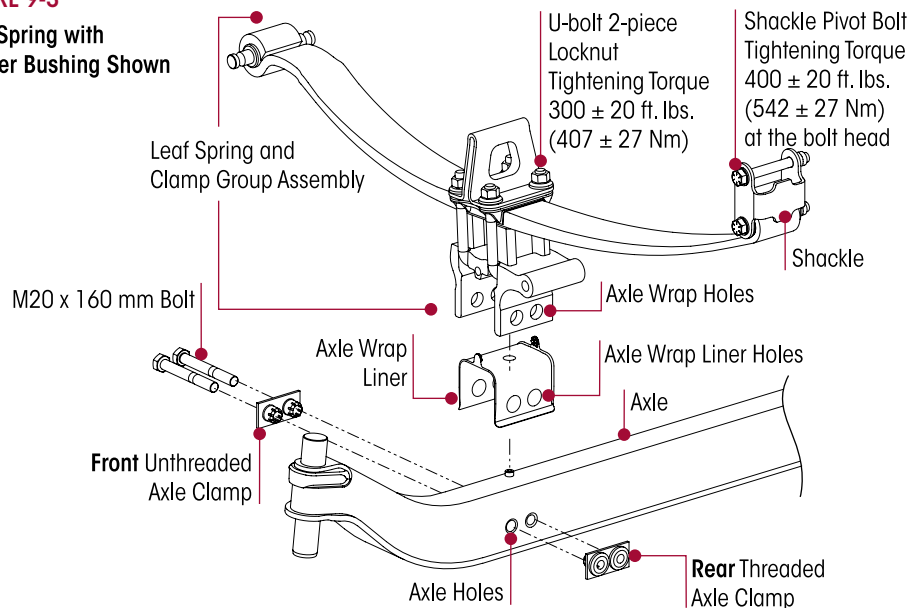
1. Place the vehicle on a level floor.
2. Chock the wheels.
3. Raise the vehicle high enough to lower the spring eye bushing being replaced out of the hangers or shackles. If necessary remove the tires for greater access.
4. Support the vehicle with frame stands.
5. Suspend the front axle to remove the load from leaf spring assembly.
6. Support the axle with a floor jack.
7. Remove the lower shock absorber mounting bolts.
8. Loosen the four (4) front spring eye clamp bolts and remove the rear spring eye bolt fasteners.
9. Lower the axle and spring assembly to gain access to replace the rear spring eye bushings.

SERVICE HINT

To ease in the removal of the spring eye bolts, it may be necessary to raise the axle slightly.

FIGURE 9-3

Leaf Spring with Rubber Bushing Shown



10. Remove the two (2) M20 axle clamp bolts, see Figure 9-3.
11. Remove the front and rear axle clamps from the axle wrap liner.
12. Remove the leaf spring and clamp group assembly from the axle.

ASSEMBLY



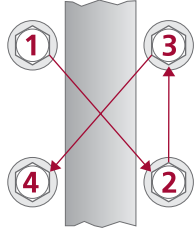
WARNING

WHEN PLACING THE LEAF SPRING AND CLAMP GROUP ASSEMBLY IN A VISE IT IS NECESSARY TO PROTECT THE MACHINED SURFACES FROM GOUGES OR MARRING BY USING BRASS JAWS (SOFT JAWS) SEE FIGURE 9-4. FAILURE TO DO SO CAN CAUSE PREMATURE PART DAMAGE, DAMAGE TO THE LEAF SPRING AND CLAMP GROUP ASSEMBLY, LOSS OF WARRANTY, LOSS OF VEHICLE CONTROL, CAUSING PERSONAL INJURY OR PROPERTY DAMAGE.

SERVICE HINT

It is acceptable to mount the leaf spring and clamp group components in a brass jaws (soft jaws) vise when performing the tightening procedure.

1. Secure the leaf spring and clamp group assembly in a suitable holding device, such as a brass jaws (soft jaws) vice, see Figure 9-4.

FIGURE 9-5

WARNING

2. Ensure the clamp group U-bolt locknuts are tightened to 300 ± 20 foot pounds torque in the proper pattern to achieve uniform bolt tension, see Figures 9-4 and 9-5.
3. Install the new axle wrap liner under the axle wrap/shock bracket (liner tabs snap to sides of axle wrap), see Figure 9-6.

THE WEIGHT OF THE LEAF SPRING AND CLAMP GROUP ASSEMBLY IS APPROXIMATELY 90 POUNDS. CARE SHOULD BE TAKEN AT REMOVAL AND INSTALLATION TO PREVENT PERSONAL INJURY OR DAMAGE TO COMPONENTS.

4. Install the new leaf spring and clamp group assembly (approximate weight 90 pounds) on the axle. Ensure the axle wrap liner holes are lined up with the axle wrap and axle holes, see Figures 9-3.
5. Install the front and rear axle clamps into the axle wrap, axle wrap liner, and axle.
6. Install the M20 bolts into the axle clamp. Snug bolts. **DO NOT** tighten at this time.
7. Raise the axle and the leaf spring assembly into the front hanger and rear shackle assembly.
8. Install the spring hanger clamps, spring eye bolts and fasteners. Snug bolts. **DO NOT** tighten at this time.
9. Install the lower shock bolt, refer to Shock Absorber installation instructions in this publication.
10. Remove the frame supports and load the front axle with the vehicle weight.

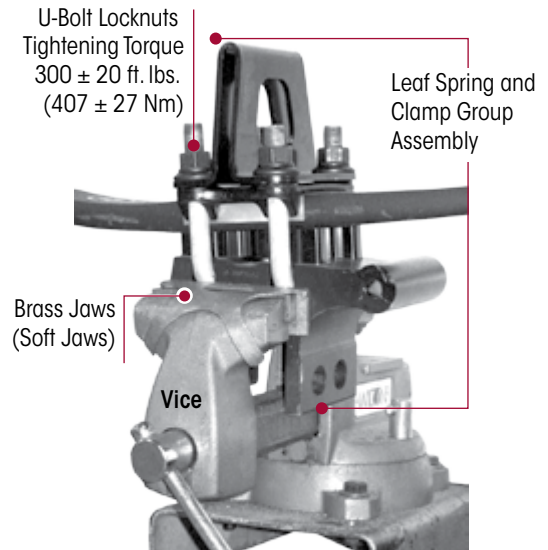
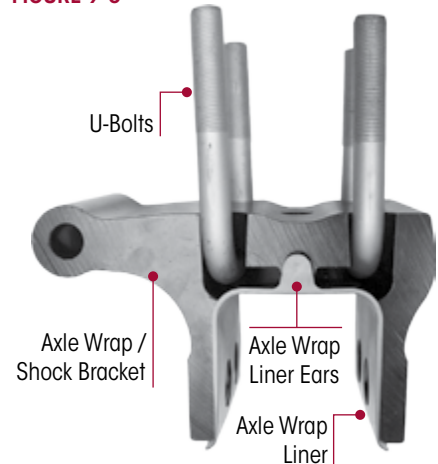
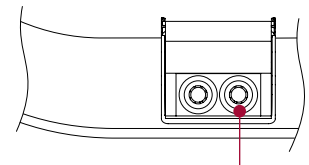
11. Tighten the axle clamp fasteners at the bolt head evenly in 140 foot pounds increments to 420 ± 20 foot pounds torque, see Figure 9-7.

12. Tighten the front spring eye hanger clamp locknuts to the vehicle manufacturer's torque specifications.

13. Tighten the rear shackle fasteners:

- **Equipped with Rubber bushing:** $\frac{3}{4}$ " fasteners to 400 ± 20 foot pounds torque
- **Equipped with Threaded bushing:** M12 fasteners to vehicle manufacturer's torque specifications

14. Remove the wheel chocks.

FIGURE 9-4

FIGURE 9-6

FIGURE 9-7


M20 Axle Clamp at the Bolt Head
Tightening Torque 420 ± 20 ft. lbs.
(569 ± 27 Nm)

FRONT AND REAR SPRING EYE BUSHINGS



WARNING

DO NOT USE HEAT OR A CUTTING TORCH TO REMOVE THE SPRING EYE BUSHINGS FROM THE STEEL SPRING. THE USE OF SUCH HEAT CAN ADVERSELY AFFECT THE STRENGTH OF THE SPRING. A COMPONENT DAMAGED IN THIS MANNER CAN RESULT IN THE LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

The spring eye bushings for the SOFTEK NXT leaf spring assembly are designed for extended service life. In the event of premature wear or damage, consideration must be given to the contributing factors. This must be corrected to help prevent the new spring eye bushings from sustaining wear or damage in the same manner. Hendrickson recommends that in the event of a high mileage spring eye bushing wear that the leaf spring assembly also be replaced.

You will need:

Spring Eye Bushing Tools

- Hendrickson Tool Nos. 66086-300 and 66086-301 (OTC Nos. 4274 and 4275), refer to the Special Tools Section in this publication.

	577542 Cylinder Adapter	577544 Alignment Tool	577546 Alignment Pin	577560 Bushing Support	577706 Extension	578286 Spacer A Thru-bolt	578288 Spacer B Bar Pin
REMOVAL	✓	✓	✓	✓	✓		✓
INSTALLATION	✓	✓	✓	✓		✓	

DISASSEMBLY

Prior to removal, note the front and rear leaf spring eye bushings are different and require different bushing tools for component replacement, see Figures 9-8 and 9-9.

There are two options to prepare for spring eye bushing replacement:

- **OPTION ONE** — Replace spring eye bushings in-chassis. To select this option proceed to **Spring Eye Bushing Replacement In-Chassis**
- **OPTION TWO** — Remove the leaf spring and clamp group assembly as detailed in this section then proceed to **Spring Eye Bushing**

FIGURE 9-8

Leaf Spring with Rubber Bushing

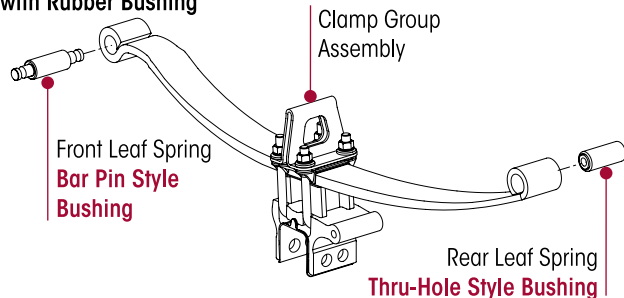
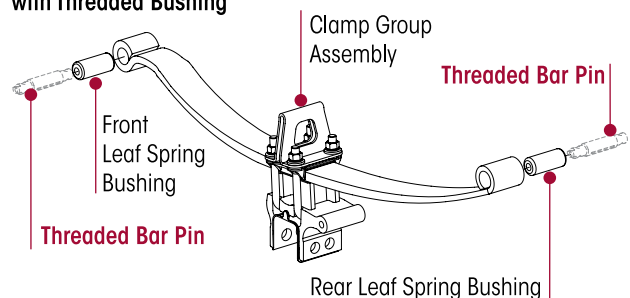


FIGURE 9-9

Leaf Spring with Threaded Bushing



SPRING EYE BUSHING REPLACEMENT IN-CHASSIS

DISASSEMBLY

1. Place the vehicle on a level floor.
2. Chock the wheels.
3. Raise the vehicle high enough to lower the spring eye bushing being replaced out of the hangers or shackles. If necessary remove the tires for greater access.
4. Support the vehicle with frame stands.
5. Suspend the front axle to remove the load from leaf spring assembly.
6. Support the axle with a floor jack.
7. Remove the lower shock absorber mounting fasteners.
8. If replacing only the front bushings, see **A**, if replacing only the rear see **B**, if replacing both front and rear see **C**, see Figures 9-8 and 9-9.

A FRONT SPRING EYE BUSHINGS

- a. Remove the eight (8) **FRONT** spring eye clamp bolts (both sides).
 - **Rubber bushing** – loosen the rear 3/4" spring eye bolt fasteners
 - **Threaded bushing** – loosen the rear M12 spring eye bolt fasteners
- b. Lower the axle and spring assembly to gain access to replace the **FRONT** spring eye bushings.

B REAR SPRING EYE BUSHINGS

SERVICE HINT: To ease in the removal of the **REAR** spring eye clamp bolts, it may be necessary to raise the axle slightly.

- a. Loosen the eight (8) **FRONT** spring eye clamp bolts (both sides).
 - **Rubber bushing** – remove the rear 3/4" spring eye bolt fasteners
 - **Threaded bushing** – remove the rear M12 spring eye bolt fasteners
- b. Lower the axle and spring assembly to gain access to replace the **REAR** spring eye bushings.

C FRONT AND REAR SPRING EYE BUSHINGS

- a. To replace both **FRONT** and **REAR** spring eye bushings, is either done by doing the front bushings first, then rear or rear bushings first then front. Begin with either procedure.
9. Proceed to Spring Eye Bushing instructions below.

SPRING EYE BUSHING

REMOVAL

1. For the **threaded bushing**, prior to inserting the alignment tools, it will be necessary to remove the grease Zerk from the threaded pin. Retain Zerk for reuse after bushing installation.
2. Insert the **two (2) alignment tools** into the spring eye bushing as shown in Figure 9-10.
3. Place the bushing support over an alignment tool.
4. Place the head plate over the bushing support.
5. Place the clamping plate over the other alignment tool with the cutouts in the plate facing away from the bushing.

6. Assemble the clamping nuts to the threaded rods, see Figure 9-10.
7. Insert a threaded rod through the **lower** holes in the clamping plate and the head plate. Install a hex nut on the end of the threaded rod, fully seated and hand tighten.
8. Insert a threaded rod through the **upper** holes in the clamping plate and the head plate. Install a hex nut on end of the threaded rod, fully seated and hand tighten.
9. Tighten the clamping nuts to the clamping plate ¼" to ½" turn past hand tight, see Figures 9-10 and 9-11.



WARNING

TO PREVENT PERSONAL INJURY, THE CYLINDER MUST BE FULLY THREADED INTO THE CYLINDER MOUNTING PLATE, SEE FIGURE 9-12.

10. Thread the cylinder into the cylinder mounting plate, see Figure 9-12.
11. Install the **cylinder mounting plate** onto the end of the threaded rods. Assemble the hex nuts on the threaded rods until they are fully seated and hand tighten.
12. Carefully remove the **two (2) alignment tools**, see Figure 9-10.

FIGURE 9-10

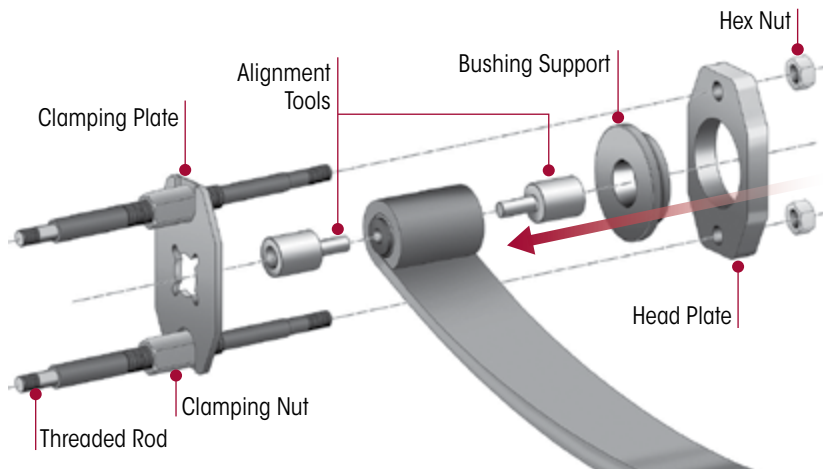
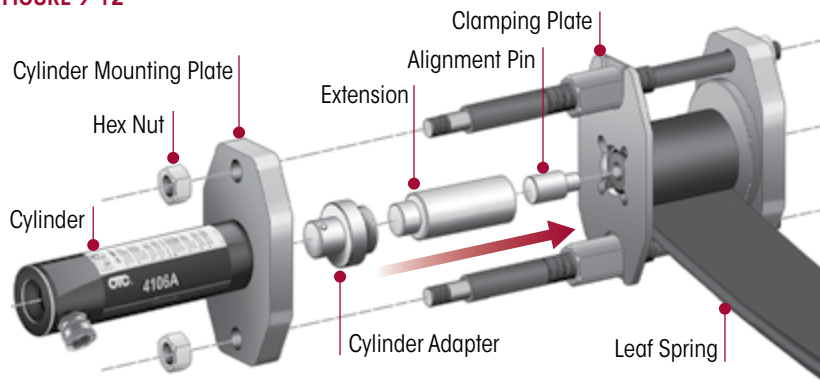


FIGURE 9-11



FIGURE 9-12



13. Insert the cylinder adapter into the head of the cylinder.
14. Follow below per the type of bushing, front or rear:
 - **Rear** Spring Eye Thru-bolt Bushing — Insert the extension into the cylinder adapter. Place the alignment pin into the extension
 - **Front** Spring Eye Bar Pin Bushing — Insert the extension into the cylinder adapter
15. Prepare the hydraulic pump for use by following the instructions provided with the pump regarding hookup, venting, priming, and operation.



WARNING

TO PREVENT PERSONAL INJURY, PUMP CAPACITY MUST NOT EXCEED 10,000 PSI.

WARNING

16. Connect the hydraulic hose from the hydraulic pump to the cylinder.

TO PREVENT PERSONAL INJURY FROM POSSIBLE BREAKAGE UNDER PRESSURE, DO NOT STAND IN THE VICINITY OF THE TOOL WHILE THE PIVOT BUSHING IS BEING EXTRACTED. IT IS ESPECIALLY IMPORTANT TO NOT STAND IN THE DIRECTION OF THE HYDRAULIC FORCE.

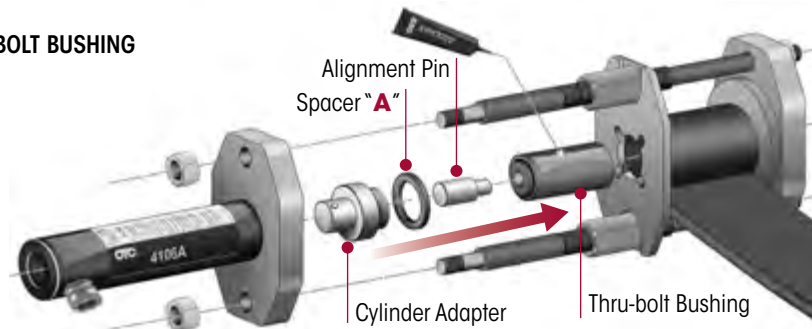
17. Verify all components are aligned. Slowly and carefully operate the pump to extend the cylinder piston rod. Guide the assembly until the alignment pin enters the bushing. Operate the pump until the bushing is driven out of the spring.

18. **DO NOT** remove tool components to preserve alignment for installation.

INSTALLATION
■ REAR SPRING EYE – THRU-BOLT BUSHING

1. Remove residual adhesive from the inside diameter of the beam using Hendrickson-approved methods.
2. Insert the cylinder adapter into the head of the cylinder as shown in Figure 9-13.
3. Place spacer "A" over the cylinder adapter.

FIGURE 9-13
REAR
THRU-BOLT BUSHING



4. Insert the alignment pin into the cylinder adapter.
5. Clean the outer diameter of the new bushing and apply Loctite® 680 adhesive, being careful to apply the adhesive to metal only. **DO NOT** apply adhesive to the rubber part of the bushing.
6. Insert the alignment pin into the spring eye bushing.
7. Operate the pump to extend the cylinder piston rod. Guide the assembly until the bushing contacts the bore of the spring. Check the alignment of the pivot bushing.

WARNING

TO PREVENT PERSONAL INJURY, PUMP CAPACITY MUST NOT EXCEED 10,000 PSI.

8. Operate the pump to drive the bushing into the spring. When the spacer contacts the clamping plate, bushing installation is complete.

WARNING

TO PREVENT PERSONAL INJURY FROM POSSIBLE BREAKAGE UNDER PRESSURE, DO NOT STAND IN THE VICINITY OF THE TOOL WHILE THE PIVOT BUSHING IS BEING INSTALLED. IT IS ESPECIALLY IMPORTANT TO NOT STAND IN THE DIRECTION OF THE HYDRAULIC FORCE.

9. Wipe away any residual Loctite® 680 adhesive from exposed faces of the bushing, spring, and tools.
10. If the front spring eye does not require replacement, proceed to installation.

■ FRONT AND REAR SPRING EYE – BAR PIN/THREADED BUSHING

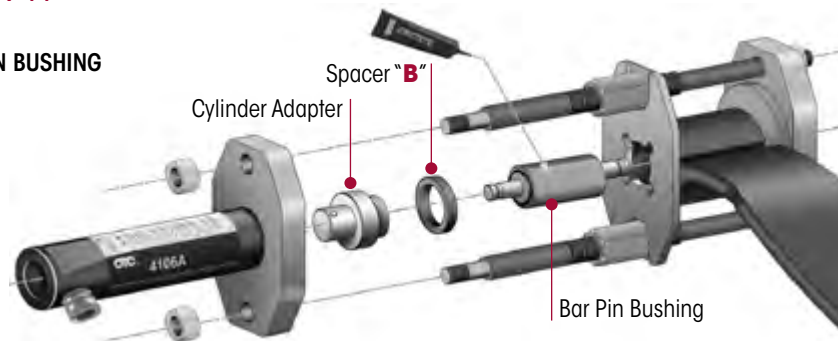
1. Remove residual adhesive from the inside diameter of the beam using Hendrickson approved methods.
2. Insert the cylinder adapter into the head of the cylinder as shown in Figure 9-14.
3. Place spacer **B** over the cylinder adapter.

WARNING

TO HELP PREVENT PERSONAL INJURY, PUMP CAPACITY MUST NOT EXCEED 10,000 PSI.

FIGURE 9-14

FRONT BAR PIN BUSHING



4. Clean the outer diameter of the new bushing and apply Loctite® 680 adhesive, being careful to apply the adhesive to metal only. **DO NOT** apply adhesive to the rubber part of the bushing.
5. Insert the bar pin/threaded bushing into the cylinder adapter. It may be necessary to adjust the threaded pin to facilitate the correct driver installation on bushing.
6. Operate the pump to extend the cylinder piston rod. Guide the assembly until the bushing contacts the bore of the spring. Check the alignment of the pivot bushing.
7. Operate the pump to drive the bushing into the spring. When the spacer contacts the clamping plate, bushing installation is complete.

WARNING

TO PREVENT PERSONAL INJURY FROM POSSIBLE BREAKAGE UNDER PRESSURE, DO NOT STAND IN THE VICINITY OF THE TOOL WHILE THE PIVOT BUSHING IS BEING INSTALLED. IT IS ESPECIALLY IMPORTANT TO NOT STAND IN THE DIRECTION OF THE HYDRAULIC FORCE.

8. Wipe away any residual Loctite® 680 adhesive from exposed faces of the bushing, spring, and tools.
9. If the other spring eye replacement is complete or does not require replacement, proceed to leaf spring installation.
10. If removed, re-install the grease Zerk into the threaded pin.

LEAF SPRING INSTALLATION

If the choice of the two options during spring eye bushing preparation replacement was:

■ **OPTION ONE** — Replace spring eye bushings in-chassis, proceed to Step 1

■ **OPTION TWO** — Install the leaf spring and clamp group assembly as detailed in this section

1. If replacing only the front bushings, see **A**, if replacing only the rear bushing, see **B**, if replacing both front and rear bushings, see **C**.

A FRONT SPRING EYE BUSHINGS

- a. Raise the axle and spring assembly to engage the **FRONT** spring eye bushings in the hangers.
- b. Install the new eight (8) **FRONT** spring eye clamp bolts (both sides). Snug the front and rear spring eye fasteners to 50 foot pounds. Proceed to Step 2.

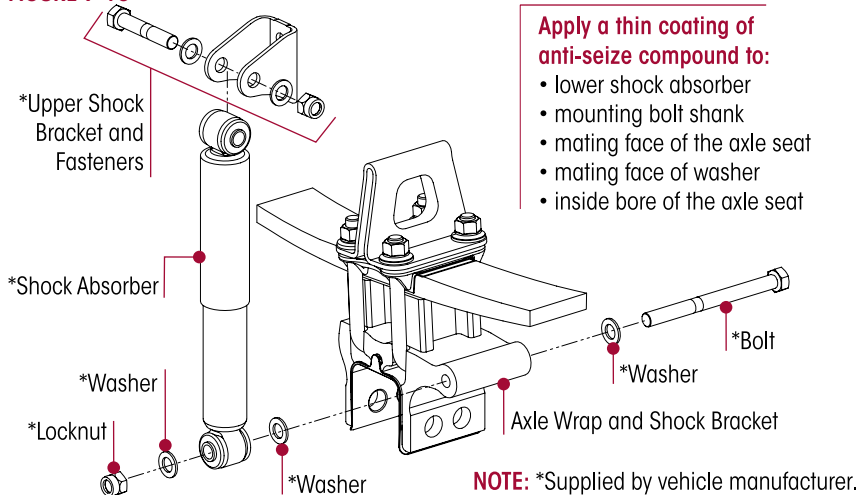
B REAR SPRING EYE BUSHINGS

- a. Raise the axle and spring assembly to engage the **REAR** spring eye bushings into the shackle brackets. Install the spring eye bolt fasteners into the shackle.
- b. Snug the front and rear spring eye fasteners to 50 foot pounds. Proceed to Step 2.

C FRONT AND REAR SPRING EYE BUSHINGS

- a. Follow **A** or **B** whichever was done last.
- b. Snug the front and rear spring eye fasteners to 50 foot pounds. Proceed to Step 2.

2. **Apply a thin coating of anti-seize compound** to the shock absorber lower mounting bolt shank, to the mating face of the axle wrap, washer, and to the inside bore of the aluminum axle wrap. **This is necessary to help prevent seizing of the bolt to the aluminum axle wrap**, see Figure 9-15.

FIGURE 9-15


3. Install the lower bolt from the inboard side to the outboard side of the axle wrap and attach the washer and locknut, see Figure 9-15.
4. Tighten the lower shock eye fasteners per vehicle manufacturer's torque specifications.
5. Install tires if removed.
6. Raise the vehicle and remove frame stands.
7. Lower the vehicle.
8. Tighten both front and rear spring eye fasteners to the required torque.
9. Remove wheel chocks.

CLAMP GROUP COMPONENTS

The clamp group instructions can be used to replace the different components in the clamp group, such as the top axle wrap/shock absorber bracket or the jounce stop.

DISASSEMBLY

1. Remove the Leaf Spring and Clamp Group Assembly per instructions in this Section.
2. Remove and discard the four (4) M20 U-bolt locknuts.
3. Remove the jounce stop and top pad.
4. Remove and discard all plastic leaf spring liners.
5. Remove the leaf spring assembly and leaf spring spacer.
6. Remove the upper slotted spring pin from the leaf spring.

NOTE

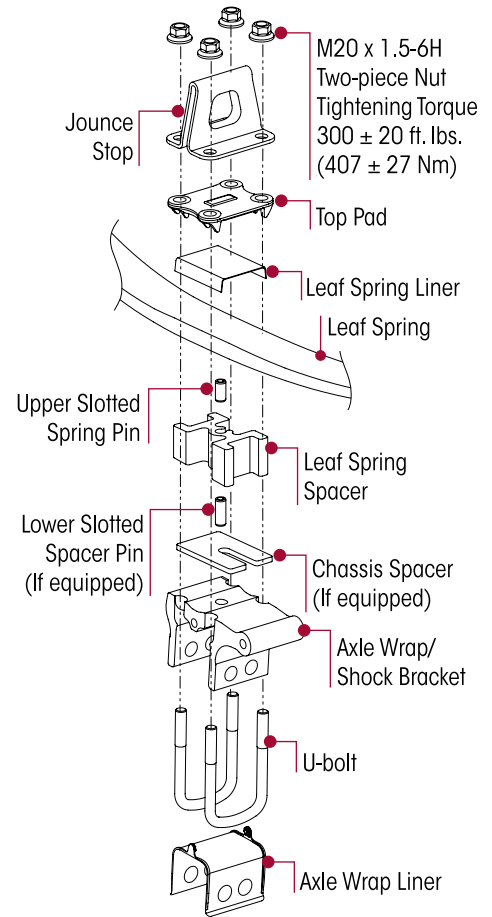
Replace spring pin if damaged during removal.

7. Remove chassis spacer (if equipped) and note the location, see Figure 9-16.
8. Remove the lower slotted spring spacer pin from leaf spring spacer.
9. Inspect all clamp group components for any damage, replace as necessary.

ASSEMBLY

1. Install the new U-bolts under and around axle wrap, see Figure 9-16.
2. Install the upper slotted spring pin into the leaf spring and seat with a rubber mallet.
3. Install the lower slotted leaf spring spacer pin into the top wrap.
4. Install chassis spacer (if equipped) from same location as removed, see Figure 9-16.
5. Install the leaf spring spacer onto the top wrap.
6. Install the leaf spring onto the leaf spring spacer.
7. Install new leaf spring liner onto leaf spring assembly.
8. Install the top pad and jounce stop on top of leaf spring liner.
9. Further install the U-bolts into the holes on the top pad and jounce stop, see Figure 9-16. Loosely install U-bolt locknuts and hand tighten. **DO NOT** tighten to torque at this time.

FIGURE 9-16



WARNING

WHEN PLACING THE LEAF SPRING AND CLAMP GROUP ASSEMBLY IN A VISE IT IS NECESSARY TO PROTECT THE MACHINED SURFACES FROM GOUGES OR MARRING BY USING BRASS JAWS (SOFT JAWS) SEE FIGURE 9-17. FAILURE TO DO SO CAN CAUSE PREMATURE PART DAMAGE, DAMAGE TO THE LEAF SPRING AND CLAMP GROUP ASSEMBLY, LOSS OF WARRANTY, LOSS OF VEHICLE CONTROL, CAUSING PERSONAL INJURY OR PROPERTY DAMAGE.

SERVICE HINT

It is acceptable to mount the leaf spring and clamp group components in a brass jaws (soft jaws) vise when performing the tightening procedure.

10. Secure the leaf spring assembly in a suitable holding device, such as a brass jaws (soft jaws) vise, see Figure 9-17.
11. Ensure that the clamp group is properly aligned and the U-bolts are seated in the axle wrap, and the top pad is centered on the leaf spring.
12. Tighten the clamp assembly U-bolt fasteners evenly in 100 foot pounds increments to 300 ± 20 foot pounds torque in the proper pattern to achieve uniform bolt tension, see Figures 9-17 and 9-18.
13. Install the new axle wrap liner under the axle wrap/shock bracket (liner tabs snap to the sides of axle wrap), see Figure 9-19.

FIGURE 9-18

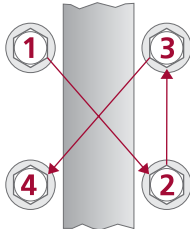
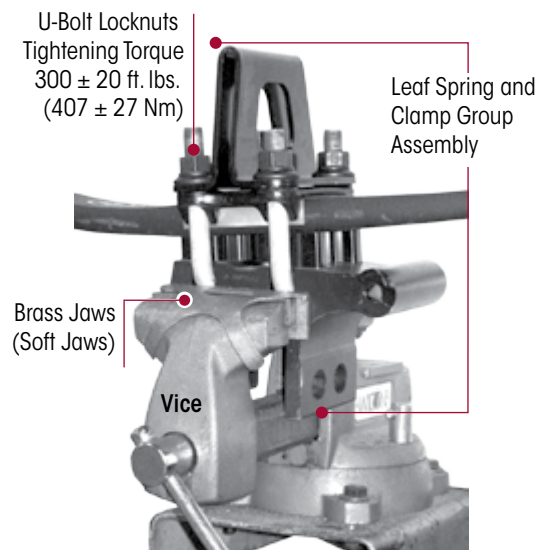


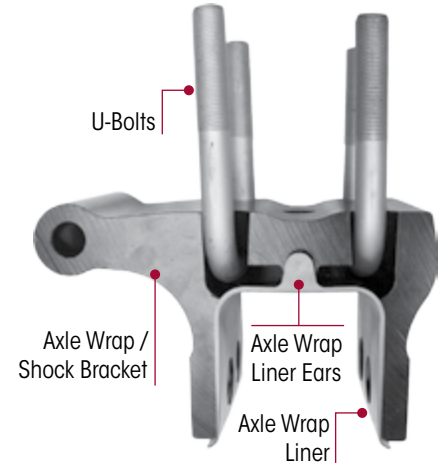
FIGURE 9-17



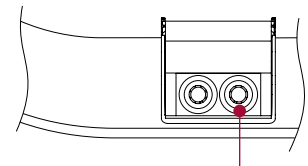
WARNING

THE WEIGHT OF THE LEAF SPRING AND CLAMP GROUP ASSEMBLY IS APPROXIMATELY 90 POUNDS. CARE SHOULD BE TAKEN AT REMOVAL AND INSTALLATION TO PREVENT PERSONAL INJURY OR DAMAGE TO COMPONENTS.

14. Install the new leaf spring and clamp group assembly (approximate weight 90 pounds) on the axle. Ensure that the axle wrap liner holes are lined up with the axle wrap and axle holes.
15. Install the front and rear axle clamps into the axle wrap, axle wrap liner, and axle.
16. Install the M20 bolts into the axle clamp. Snug bolts. **DO NOT** tighten at this time.
17. Raise the axle and the leaf spring assembly into the front hanger and rear shackle assembly.
18. Install the spring hanger clamps, spring eye bolts and fasteners. Snug bolts. Do not tighten at this time.
19. Install the lower shock bolt, refer to Shock Absorber installation instructions in this publication.

FIGURE 9-19


20. Remove the frame supports and load the front axle with the vehicle weight.
21. Tighten the axle clamp fasteners evenly in 100 foot pounds increments to \mathbb{N} 420 \pm 20 foot pounds torque in the proper pattern to achieve uniform bolt tension, see Figure 9-20.
22. Tighten the front spring eye hanger clamp locknuts to the vehicle manufacturer's torque specifications.
23. Tighten the rear shackle fasteners, equipped with:
 - **Rubber bushing:** $\frac{3}{4}$ " fasteners to \mathbb{N} 400 \pm 20 foot pounds torque
 - **Threaded bushing:** M12 fasteners to vehicle manufacturer's torque specifications
24. Remove the wheel chocks.

FIGURE 9-20


M20 Axle Clamp at the Bolt Head
Tightening Torque 420 \pm 20 ft. lbs.
(569 \pm 27 Nm)

STEERTEK NXT AXLE

AXLE REMOVAL

Refer to Figure 9-21 when replacing the SOFTEK NXT components.

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

WARNING

DO NOT USE A TORCH ON AXLE CLAMP BOLTS OR ANY OTHER PART OF THE SOFTEK NXT SUSPENSION. THE USE OF A TORCH CAN CAUSE DAMAGE TO CERTAIN SOFTEK NXT 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 frame stands
5. Suspend the front axle with the shocks attached.
6. Remove the front wheels, hubs, brake shoes, ABS sensors, and backing plate assembly.
7. Disconnect the drag link from the steering arm.
8. Support the axle with a suitable jack.

WARNING

DO NOT REPAIR OR RECONDITION SUSPENSION OR AXLE COMPONENTS FOUND TO BE DAMAGED OR OUT OF SPECIFICATIONS. ALL SUCH DAMAGED OR OUT OF SPECIFICATION COMPONENTS MUST BE REPLACED. ALL MAJOR HENDRICKSON COMPONENTS ARE HEAT TREATED AND TEMPERED. SOFTEK NXT 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, AND POSSIBLE PERSONAL INJURY OR DEATH OR PROPERTY DAMAGE AND WILL VOID APPLICABLE WARRANTIES.

9. Remove the M20 axle clamp bolts and clamps, see Figure 9-21.
10. Lower the axle and remove from the vehicle.

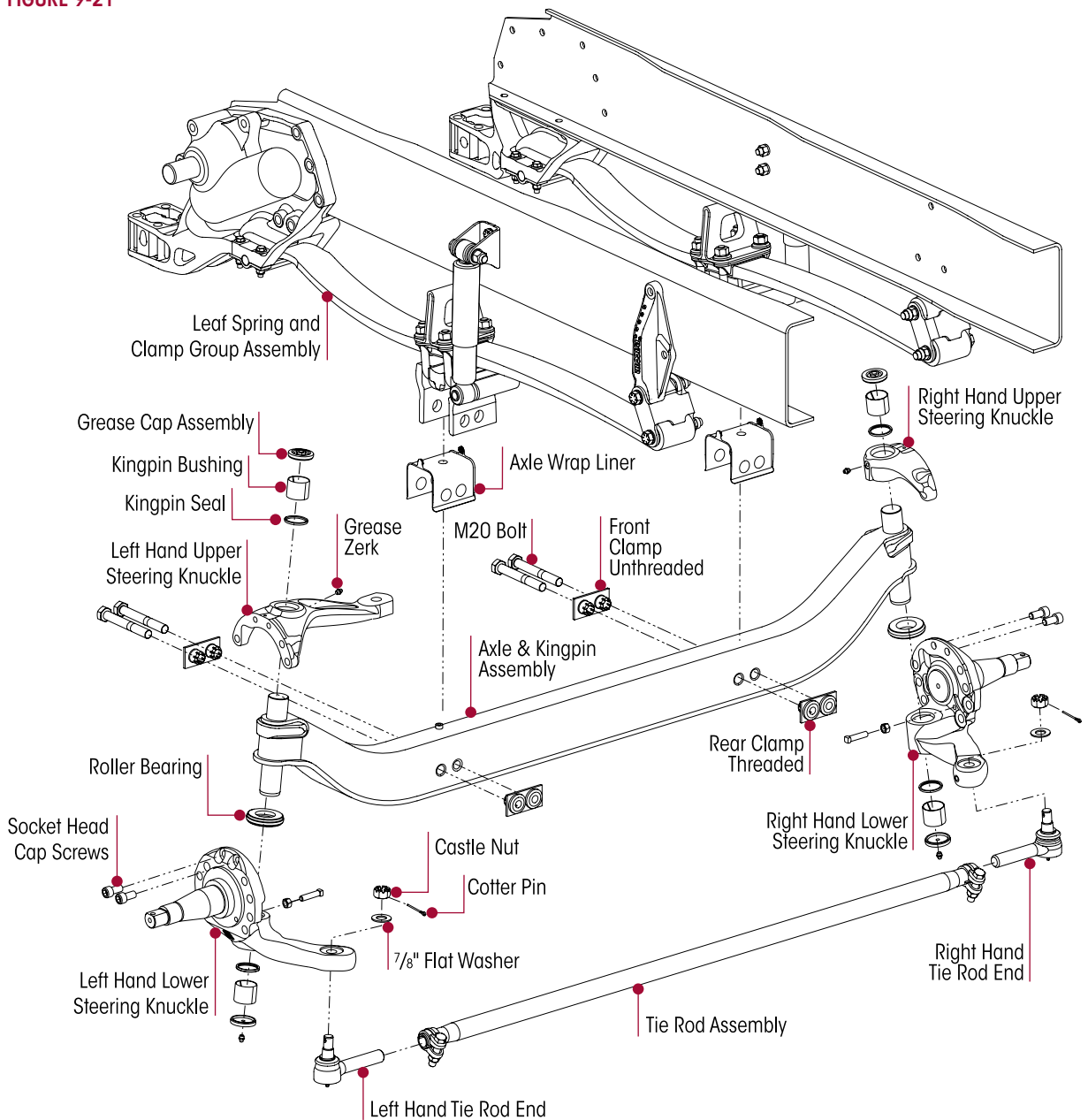
AXLE DISASSEMBLY (REMOVED FROM CHASSIS)

1. Remove the tie rod assembly, refer to 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.

FIGURE 9-21

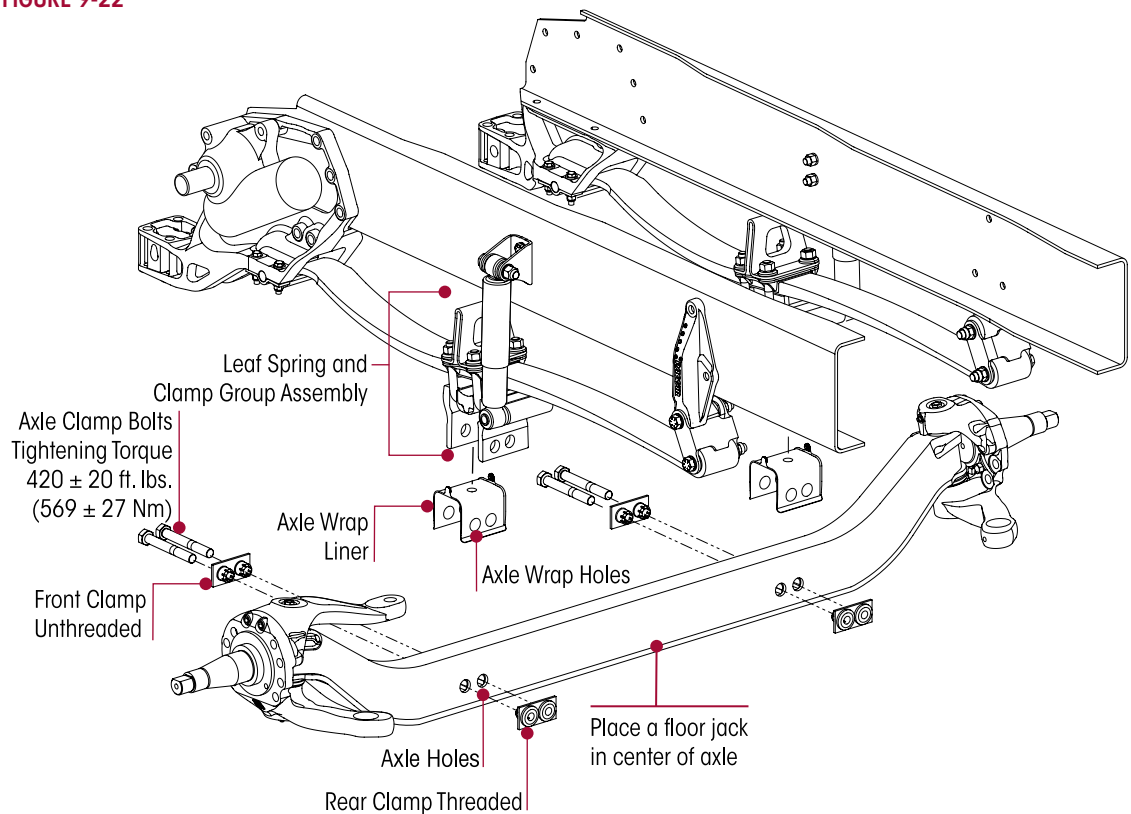


2. Remove the two (2) $\frac{5}{8}$ " socket head cap screws from the steering knuckle assembly, see Figure 9-21.
3. Remove the steering knuckle, thrust bearing, and shims (if equipped).
4. After complete removal of the one side, repeat Steps 2-3 for the opposite side of the axle.
5. Inspect the steering kingpin bushings for excessive wear. If worn, replace the kingpin bushings and seals, refer to the Kingpin Bushing Component Replacement Section in this publication.

SOFTEK NXT AXLE INSTALLATION

1. Place the new axle on the floor jack and position the axle under the vehicle, see Figure 9-22.
2. Install the new axle wrap liner under the axle wrap/shock bracket (liner taps snap to the side of the axle wrap), see Figure 9-22.
3. Raise the axle into position.
4. Ensure the axle wrap liner holes are lined up with the axle wrap and axle holes, see Figure 9-22.

FIGURE 9-22



5. Install the new axle clamp fasteners. **DO NOT** tighten to torque at this time.
6. Snug the axle clamp bolts to $\frac{1}{2}$ 100 foot pounds pre-torque.
7. Install the steering knuckles, refer to the Steering Knuckle Assembly instructions in this section.
8. Install the tie rod assembly in the Ackermann arms.
9. Install the $\frac{7}{8}$ " hardened washers on the Ackermann arm and the castle nuts. Tighten the castle nuts to $\frac{1}{2}$ 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.
10. Install the tie rod end cotter pin.
11. Connect the drag link in the steering arm.



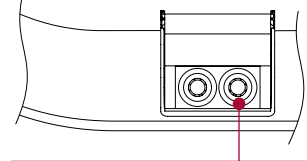
12. Install the castle nut on the drag link taper stud. Tighten the castle nut to  185 foot pounds, then rotate until the first castle slot lines up with the cotter pin bore in the drag link. **DO NOT** back off nut for cotter pin installation.
13. Install the drag link cotter pin.
14. Install the brake backing plate assemblies and ABS sensor and torque all fasteners per manufacturer's specifications.
15. Install the brakes, hubs, and wheels per the vehicle manufacturer's guidelines.
16. Raise the vehicle and remove the frame supports.
17. Lower the vehicle and load the front axle with the truck's weight. Remove the floor jack.
18. Tighten the M20 axle clamp bolts to  420 ± 20 foot pounds torque, see Figure 9-23.
19. Remove the wheel chocks.
20. Fill the hubs with the proper lubricant, (see manufacturer's guidelines for recommended lubrication), if required.
21. Grease the front steering components as per lubrication guidelines in the Preventive Maintenance Section of this publication.

FIGURE 9-23



M20 Axle Clamp at the Bolt Head
Tightening Torque 420 ± 20 ft. lbs.
(569 ± 27 Nm)

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
- A hydraulic shop press with a minimum forcing capacity of 2.5 tons

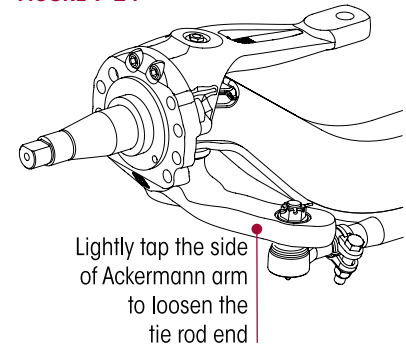
NOTE

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 jack stands on the axle.
4. Remove the wheel and hub assembly.
5. Remove the brake components from steering knuckle.
6. Remove the tie rod assembly.

FIGURE 9-24



Lightly tap the side of Ackermann arm to loosen the tie rod end

SERVICE HINT

Lightly tap the side of the Ackermann arm with a mallet to separate the tie rod end from the Ackermann arm, see Figure 9-24.

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 (2) socket head cap screws that connect upper kingpin connection to the steering knuckle, see Figure 9-25.

9. Remove the two (2) socket head cap screws that connect upper kingpin connection to the steering knuckle, see Figure 9-25.
10. Remove the lower steering knuckle from the kingpin by sliding it down the kingpin.
11. Remove the upper steering knuckle by sliding it up off the kingpin.

FIGURE 9-25


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 or the brake drums. If parts are to be stored, apply an effective rust inhibitor to all surfaces.


WARNING

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


WARNING

SOLVENT CLEANERS CAN BE FLAMMABLE, POISONOUS AND CAUSE BURNS. TO HELP AVOID SERIOUS PERSONAL INJURY, CAREFULLY FOLLOW THE 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.


CAUTION

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


WARNING

THE SOFTEK NXT SYSTEM 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 9-26 through 9-29.

FIGURE 9-26



FIGURE 9-27



FIGURE 9-28



FIGURE 9-29



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 9-30 through 9-33. **Kingpin minimum dimension is 1.802".**

FIGURE 9-30



FIGURE 9-31



FIGURE 9-32



FIGURE 9-33



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 9-34. IMPROPER SUPPORT TO THE STEERING KNUCKLE CAN CAUSE COMPONENT DAMAGE.

KINGPIN BUSHING 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, and bushing receiving tool

NOTE

If a shop press is not available to remove and install the kingpin bushings, an acceptable optional method is to use a hammer along with the shop made tools (kingpin bushing driver, bushing handle, bushing installer/remover, bushing receiving 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 9-34 and 9-35.

FIGURE 9-34



FIGURE 9-35



FIGURE 9-36



FIGURE 9-37

3. From the non-machined side of the steering knuckle, use the kingpin bushing installer / remover tool (see Special Tools in this publication) to drive the kingpin bushing and kingpin seal out of the steering knuckle, see Figure 9-36.
4. Clean the parts and inspect for reassembly, see Figure 9-37.



STEERING KNUCKLE BORE MEASUREMENT

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

1. 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" \pm 0.003".
2. 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 9-38 through 9-40. If the average measurement is more than the knuckle bore maximum diameter specification, replace the knuckle.

FIGURE 9-38



FIGURE 9-39



FIGURE 9-40



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

WARNING

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

NOTE

If a shop press is not available to remove and install the kingpin bushings, an acceptable optional method is to use a hammer along with the shop made tools (kingpin bushing driver, bushing handle, bushing installer/remover, bushing receiving 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 9-41.

NOTE

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

FIGURE 9-41



FIGURE 9-42



FIGURE 9-43



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 9-42.
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 9-43.
4. Following this procedure it is necessary to ream the kingpin bushings to fit the kingpins, see Kingpin Bushing Reaming Instructions in this section.

KINGPIN BUSHING REAMING

You will need:

Refer to the Special Tools Section of this publication.

- Vise with brass jaws (soft jaws)
- Adjustable Straight Flute Reamer



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.



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 performing the reaming procedure.

2. Install the reamer into the lower steering knuckle until the blades touch the kingpin bushing.
3. Rotate the reamer with light downward pressure. Rotate the reamer smoothly. **DO NOT** apply too much pressure, see Figures 9-44 and 9-45.
4. 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.



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 9-44

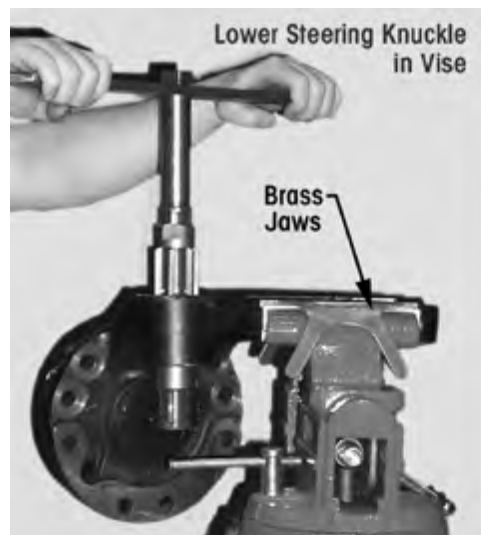


FIGURE 9-45



5. Clean and remove all kingpin bushing material from the steering knuckle assembly. Take special attention to remove material from the grease channels and dimples.
6. Clean the 5/8" brake backing plate bolts with a wire wheel and run a tap through the threads of the lower steering knuckle assembly and then flush out with brake cleaner and dry with compressed air.

NOTE

The Hendrickson Genuine part socket head cap screw, comes with a pre-applied Loctite compound.

7. Temporarily install the upper/lower knuckle on the kingpin to check for fit.
8. Rotate the upper/lower knuckle back and forth to verify there is no binding on the kingpin, see Figure 9-46.
9. If the bushing is too tight repeat Steps 1 through 8 until the proper clearance is achieved.

FIGURE 9-46



NOTE

Bushing size is to be 0.001" larger than the kingpin size.

KINGPIN SEAL INSTALLATION

You will need:

- Vise with brass jaws (soft jaws)
- Kingpin handle and seal installer tool, Refer to the Special Tools Section of this publication.



WHEN INSTALLING THE UPPER OR LOWER 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. 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.
3. Use the seal installer tool (see tools specifications in 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 9-47.

FIGURE 9-47

STEERTEK NXT
Magnification of the kingpin bushing and a **DOUBLE** lip seal installed in the steering knuckle.



STEERING KNUCKLE

ASSEMBLY

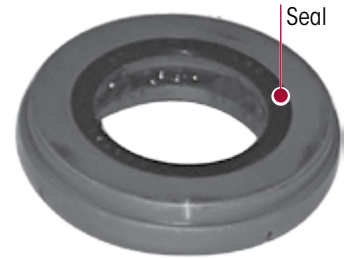
After replacement of the kingpin bushings it is necessary to re-assemble the steering knuckle assemblies. **DO NOT** substitute aftermarket components when servicing.

NOTE

Hendrickson SOFTEK NXT axle is installed with steel roller thrust bearings on both the left and right hand sides, see Figure 9-48.

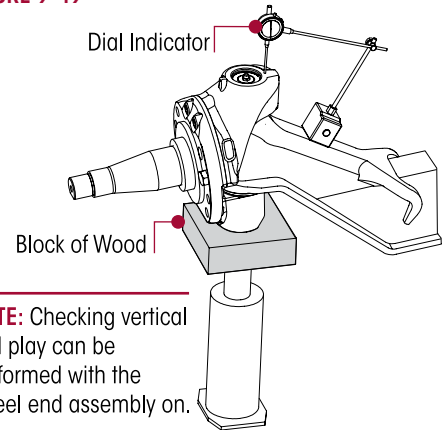
1. Install the roller thrust bearing on the lower kingpin with the seal facing up toward axle (the black seal will designate the top side), see Figure 9-48.
2. Pack the bushing dimples on the upper and lower steering knuckles with multi purpose Lithium based grease (NLGI Grade 2) before installation.
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 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, see Figure 9-49. These are for guide purposes only.
6. Snug the two (2) socket head cap screws.
7. Lower the bottle jack so that all the vertical end play is on the underside of the axle.

FIGURE 9-48
Top View of Roller Bearing



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 9-49.
9. Zero the dial indicator.
10. Raise the bottle jack until there is **NO CLEARANCE** between the knuckle assembly and the bottom of the axle, slightly lifting the axle.
11. 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:

FIGURE 9-49



NOTE: Checking vertical end play can be performed with the wheel end assembly on.

- **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 parts, socket head cap screw comes with a pre-applied Loctite compound.

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 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 $\boxed{188 \pm 12}$ foot pounds torque.
15. Recheck the vertical end play with the dial indicator, see Figure 9-49, 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 $\boxed{188 \pm 12}$ foot pounds torque.

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 SOFTEK NXT system are threaded, tighten to 60 ± 10 foot pounds torque.
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 9-50.
24. Install brakes, drums, wheels and tires.
25. Remove jack and safety stands.
26. Grease steering knuckles with the vehicle on the floor.
27. Remove the wheel chocks.

FIGURE 9-50

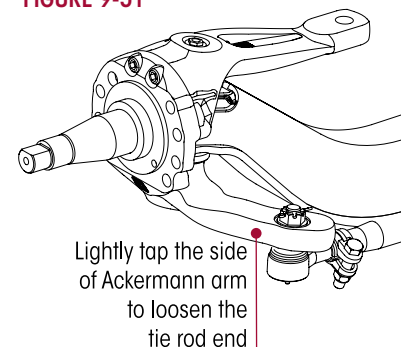

TIE ROD ENDS AND CROSS TUBE

NOTE:

Hendrickson supplies different tie rod configurations. Prior to ordering find the part number on the tie rod tube. See Hendrickson Technical Bulletin Literature No. SEU-0223 for additional information or contact Hendrickson Truck Parts (e-mail: truckparts@hendrickson-intl.com).

DISASSEMBLY

1. Chock the wheels.
2. Position the steer axle tires straight ahead.
3. Remove the cotter pin and castle nut.
4. Lightly tap the side of the Ackermann arm to loosen the tie rod end from the Ackermann arm, see Figure 9-51.
5. Repeat Steps 3 and 4 to remove the other tie rod end.
6. Remove the cross tube and tie rod ends from the vehicle.
7. Mount the cross tube in a brass jaws (soft jaws) vice.
8. Remove the hardware from the clamp on the cross tube.
9. Count the exposed threads on the tie rod end being replaced.
10. Remove the tie rod end from the cross tube.

FIGURE 9-51


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.

11. If the opposing tie rod end is being replaced repeat Steps 8 through 10.

12. Inspect the cross tube for dents, cracks, or thread damage. Replace the cross tube if needed.

ASSEMBLY

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

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

WARNING

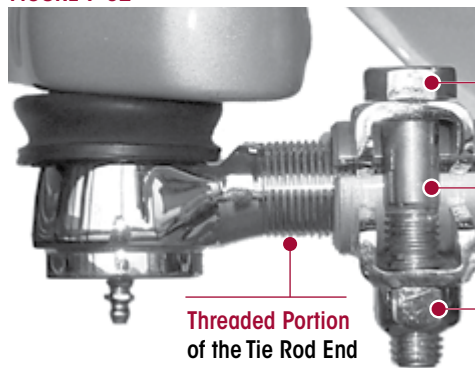
THE THREADED PORTION OF THE TIE ROD END MUST EXTEND PAST THE SLOTS INTO THE TIE ROD CROSS TUBE, SEE FIGURE 9-52. FAILURE TO DO SO CAN CAUSE COMPONENT DAMAGE, LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

WARNING

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

3. Replace the opposing tie rod end if necessary by repeating Steps 1 and 2.

FIGURE 9-52


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)

Threaded Portion of the Tie Rod End

WARNING

DO NOT HEAT THE CROSS TUBE WITH A TORCH TO ROTATE THE CROSS TUBE IN 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 LOSS OF VEHICLE CONTROL, AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

4. It is critical that the cross tube rotate in the opposing tie rod end, even if it is not replaced.

5. Install the tie rod end into the lower steering knuckle.

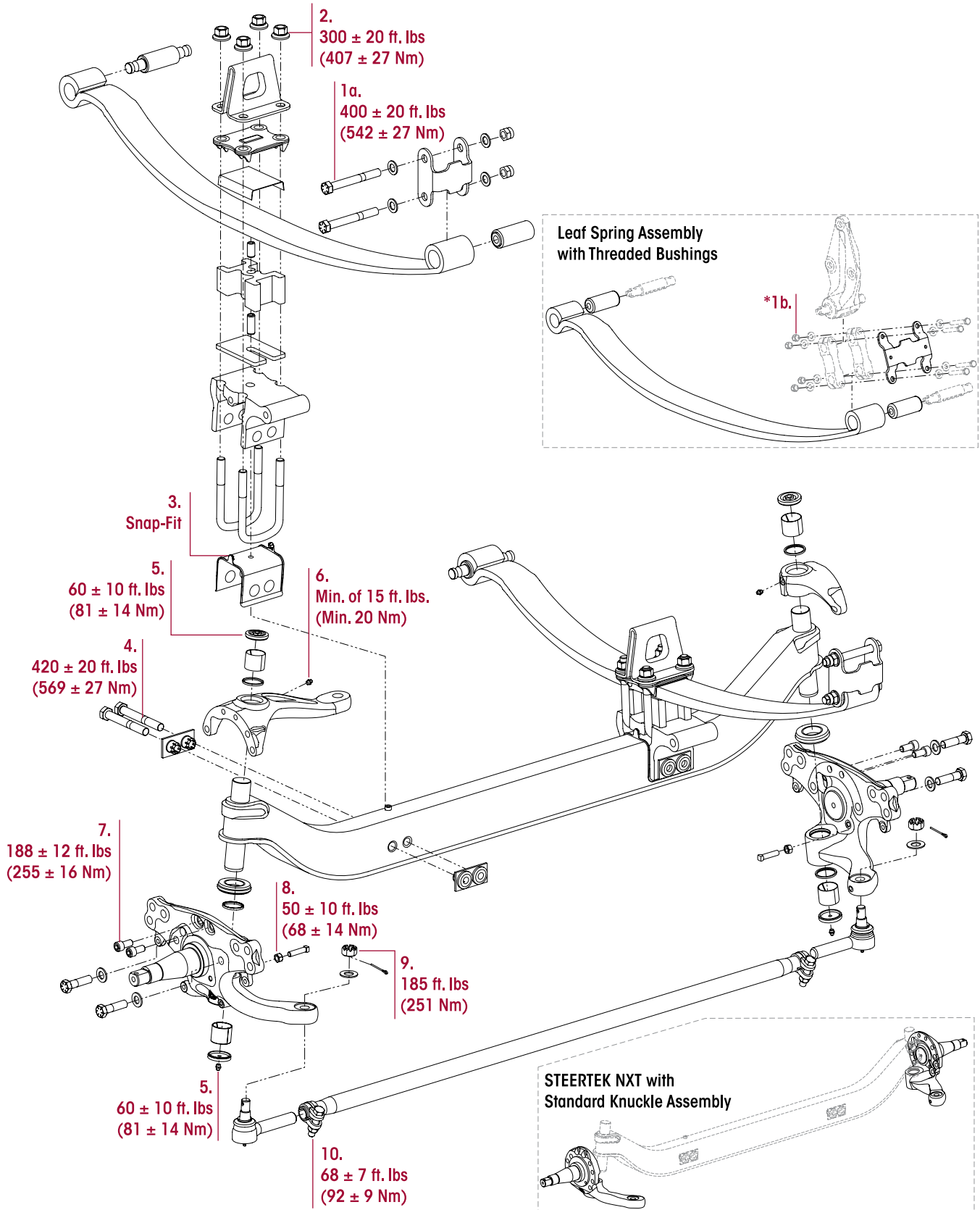
6. Tighten the castle nuts to 185 foot pounds torque then rotate the castle nut to the next castle slot and install cotter pin.

7. Grease the tie rod ends. Refer to the Lubrication Chart for required lubricant in the Preventive Maintenance Section of this publication.

8. Set the toe, refer to the Toe Adjustment Procedure in the Alignment & Adjustments Section of this publication.

SECTION 10 Torque Specifications


Hendrickson recommended torque values provided
in FOOT POUNDS and in NEWTON METERS





SOFTEK NXT

HENDRICKSON RECOMMENDED TORQUE SPECIFICATIONS

NO.	COMPONENT	FASTENER		TORQUE VALUE	
		Quantity	Size	Foot Pounds	Newton Meters
	Frame fasteners are furnished and installed by the vehicle manufacturer. Vehicle manufacturer may use an equivalent HUCK fastener at frame mount.				
1.	Rear Shackle to Clamp Group Assembly, on the Bolt Head	4	¾"	400 ± 20	542 ± 27
2.	Clamp Group U-bolt	4	M20	300 ± 20	407 ± 27
3.	Axle Wrap Liner	2		Snap Fit	Snap Fit
	 WARNING ENSURE CLAMP GROUP IS ALIGNED PROPERLY PRIOR TO TIGHTENING HARDWARE. FAILURE TO DO SO CAN CAUSE LOSS OF VEHICLE CONTROL, PROPERTY DAMAGE OR PERSONAL INJURY.				
4.	Axle Clamp at the Bolt Head	4	M20	420 ± 20	569 ± 27
5.	Grease Cap Assembly - Upper and Lower	4	½"	60 ± 10	81 ± 14
6.	Grease Zerk	2		Minimum of 15	Minimum of 20
7.	Knuckle Attachment Bolt (Socket Head Cap Screw)	4	⅝"	188 ± 12	255 ± 16
8.	Knuckle / Axle Wheel Stop Bolt	2	⅝" Jam Nut	50 ± 10	68 ± 14
9.	Tie Rod Ends / Drag Link to Steering Knuckle	2	⅞" Castle Nut	*185	*251
10.	Tie Rod Tube to Tie Rod Ends	2	⅝"	68 ± 7	92 ± 9
• All hardware ¼" and greater is Grade 8 with no additional lubrication.					
NOTE:* Torque to 185 foot pounds, advance nut to next hex face to install cotter pin. DO NOT back off nut for cotter pin installation.					

SECTION 11

Alignment Specifications

SOFTEK NXT

FRONT SUSPENSION ALIGNMENT SPECIFICATIONS

CAMBER ¹	DESIGN SPECIFICATION	RANGE	
		Minimum	Maximum
LEFT	0.0° ± 1.0°	-1.0°	+1.0°
RIGHT	-0.25° ± 1.0°	-1.25°	+0.75°
CROSS	0.0°	—	+2.0°

CAMBER NOTES:

- 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 ^{2,3,5}	DESIGN SPECIFICATION	RANGE	
		Minimum	Maximum
LEFT	3.50° ± 1.0°	+2.5°	+4.5°
RIGHT	3.50° ± 1.0°	+2.5°	+4.5°
CROSS ⁴	0.0°	—	+1.5°

CASTER NOTES:

- Caster is determined with the vehicle at specified ride height for air suspension or at rated load for mechanical suspension systems. It is critical that the vehicle front and rear ride height is within specifications prior to performing a caster measurement or adjustment. See Hendrickson ride height specifications and procedure.
- 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.
- The Cross caster angle is not adjustable – DO NOT** bend axle or otherwise try to adjust cross caster. If found out of specifications notify Hendrickson Tech Services for further information. Changes to caster can be attained by using caster shims as provided by the vehicle manufacturer or chassis and 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:** 4.5° Right Hand / 5° Left Hand would require one (1), 1.0 shim on each side to increase caster and achieve 5.50° Right Hand / 6.00° Left Hand, which is in specification. **DO NOT** attempt to use uneven shims.

Hendrickson recommends the following TMC⁷ practices:

	DESIGN SPECIFICATION ⁶	RANGE	
		Minimum	Maximum
TOTAL TOE⁷	1/16" ± 1/32" (0.06" ± 0.03")	1/32" (0.03")	3/32" (0.09")

TOE-IN NOTES:

- 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.
- In most instances total toe is set by the vehicle manufacturer or body builder. Consult the vehicle manufacturer for specifications.



SECTION 12

Troubleshooting Guide

SOFTEK NXT

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

SECTION 13

Reference Material

This technical publication covers Hendrickson Truck 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 The Technology & Maintenance Council (TMC) and Hendrickson supports these recommendations. We have compiled a list of these below.

TMC

To obtain copies of the following RP's, video's, or charts, contact TMC at:

TMC/ATA	Phone: 703-838-1763
2200 Mill Road	website: tmc.truckline.com
Alexandria, VA 22314	online ordering: www.truckline.com/store

Important References

TMC RP 214B	Tire/Wheel End Balance and Runout
TMC RP 216	Radial Tire Conditions Analysis Guide
TMC RP 219A	Radial Tire Wear Conditions and Causes
TMC RP 222A	User's Guide To Wheels and Rims
TMC RP 230	Tire Test Procedures for Tread wear, Serviceability, and Fuel Economy
TMC RP 514	Pre-Alignment Inspection
TMC RP 618	Wheel Bearing Adjustment Procedure
TMC RP 620B	Front End Alignment Steering Geometry
TMC RP 708A	Trailer Axle Alignment
TMC RP 642	Guidelines For Total Vehicle Alignment
TMC RP 644	Wheel End Conditions Analysis Guide
TMC RP 645	Tie Rod End Inspection and Maintenance Procedure

Video's

TMC T0326	Wheel End Maintenance
TMC T0372	Tire Pre-Trip Inspection Guidelines

Other

TMC T0400	Wheel bearing Adjustment Procedure Wall Chart
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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.



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