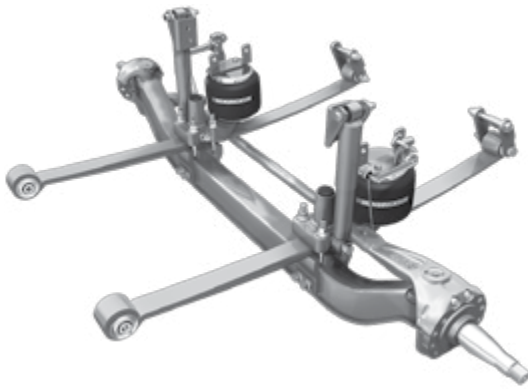




TECHNICAL PROCEDURE

AIRTEK® NXT for Freightliner Cascadia® Vehicles

SUBJECT: Service Instructions

LIT NO: 17730-307

DATE: May 2018 **REVISION:** A

TABLE OF CONTENTS

Section 1	Introduction	2	Section 9	Component Replacement	
Section 2	Product Description	2		Fasteners	35
Section 3	Important Safety Notice	4		Height Control Valve	35
Section 4	Special Tools	9		Air Spring	36
Section 5	Parts List	10		Shock Absorber	37
Section 6	Towing Procedures	12		Rear Shackle	38
Section 7	Preventive Maintenance			Leaf Spring and Clamp Group Assembly	39
	Component Inspection	14		Spring Eye Bushings	41
	Lubrication Intervals	15		Clamp Group Components	46
	Kingpin Lubrication	15		Rubber Bump Stop	48
	Tie Rod End Lubrication	16		STEERTEK NXT Axle	48
	Tie Rod End Inspection	16		Tie Rod Ends and Cross Tube	59
	Clamp Group U-bolt Locknuts Re-torque Interval	19	Section 10	Plumbing Diagram	61
	Steering Knuckle Inspection	19	Section 11	Torque Specifications	62
	Kingpin Bushing Inspection	20	Section 12	Troubleshooting Guide	64
	Axle Wrap Liner Inspection	21	Section 13	Alignment Specifications	66
	Shock Absorber Inspection	21	Section 14	Reference Material	67
	Tire Inspection	23			
Section 8	Alignment & Adjustments				
	Alignment Definitions	25			
	Ride Height Verification	27			
	Inspection Prior to Alignment	29			
	Front Wheel Alignment	30			
	Steering Stop	32			
	Toe Setting	32			
	Spring Eye Re-torque	34			

SECTION 1

Introduction

This publication is intended to acquaint and assist maintenance personnel in the preventive maintenance, service, repair and rebuild of the Hendrickson AIRTEK® NXT front steer axle and suspension system for applicable Freightliner Cascadia® 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 AIRTEK NXT front steer axle and suspension systems.

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 e-mail: techservices@hendrickson-intl.com.

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

SECTION 2

Product Description

Hendrickson's AIRTEK® NXT — combines the STEERTEK NXT axle and air suspension technology with an advanced lightweight integrated clamp group design. The new design is lighter than standard content to improve load capacity and help enhance fuel efficiency.

Improved ride and comfort — advanced air suspension technology assists in protecting drivers from road irregularities and hazards.

Lightweight clamp group — Continuous beam architecture minimizes stress points for added durability. Weighs less than original I-beam and spring clamp group.

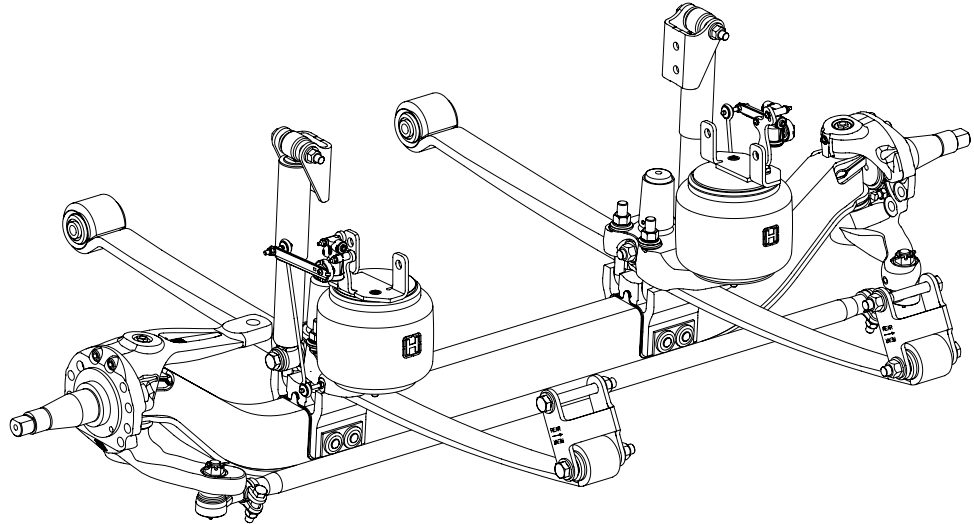
STEERTEK NXT axle — The box-shaped cross section resists horizontal, vertical and twisting forces more effectively than traditional I-beam axles which improves handling.

Brake Compatibility — Compatible with drum or disc brakes.

Two-piece knuckle assembly — eliminates the need to remove the kingpin to service the knuckle.

Air spring — Exclusive air springs support a majority of the load to provide a low spring rate and to improve ride. Conventional bolt-on design provides durability.

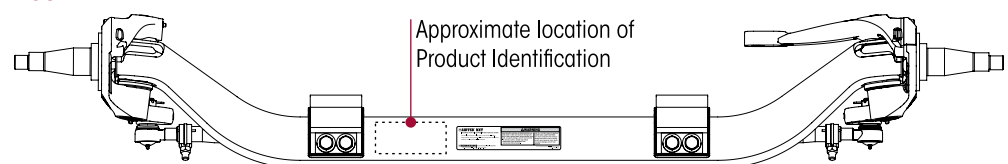
FIGURE 2-1



TECHNICAL NOTES

1. The AIRTEK NXT system is approved for on-highway usage. Other applications must be pre-approved by both Hendrickson and Freightliner. This system has a 12,500-13,300 pound capacity. System capacity represents maximum loads on tires at ground level.
2. The AIRTEK NXT system is available with 70.87" Intersections (KPI).
3. The AIRTEK NXT system offers a 5.36" axle beam drop height. Axle beam drop is measured from the kingpin intersection to the top of the axle.
4. AIRTEK NXT suspension weight includes main springs, bushings, shocks, upper shock brackets and axle attachment hardware.
5. AIRTEK NXT system weight is based on a 5.36" 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 AIRTEK 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.

 **DANGER**

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

 **WARNING**

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

 **CAUTION**

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

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

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

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



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



■ SAFETY PRECAUTIONS

WARNING

FASTENERS

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

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

WARNING

SUPPORT THE VEHICLE PRIOR TO SERVICING

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

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

AIR SPRINGS

AIR SPRING ASSEMBLIES MUST BE DEFLATED PRIOR TO LOOSENING ANY CLAMP GROUP HARDWARE. UNRESTRICTED AIR SPRING ASSEMBLIES CAN VIOLENTLY SHIFT. DO NOT INFLATE AIR SPRING ASSEMBLIES WHEN THEY ARE UNRESTRICTED. AIR SPRING ASSEMBLIES MUST BE RESTRICTED BY SUSPENSION OR OTHER ADEQUATE STRUCTURE. DO NOT INFLATE BEYOND PRESSURES RECOMMENDED BY AIR SPRING MANUFACTURER, CONTACT HENDRICKSON TECHNICAL SERVICES FOR DETAILS. IMPROPER USE OR OVER INFLATION MAY CAUSE AIR SPRING ASSEMBLIES TO BURST, CAUSING PROPERTY DAMAGE AND/OR SEVERE PERSONAL INJURY.

WARNING

WHEN SERVICING THE VEHICLE OR ATTACHING AN AIR SPRING AND THE VEHICLE IS ON THE GROUND, PRIOR TO AIRING THE SUSPENSION SYSTEM MAKE CERTAIN THE AIR SPRING LOCATOR IS INDEXED INTO THE UPPER AIR SPRING BRACKET PROPERLY, AND THE AIR SPRING IS FULLY SEATED ON THE TOP PAD. FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN PREMATURE AIR SPRING FAILURE, CAUSE PERSONAL INJURY, OR PROPERTY DAMAGE.

WARNING

PRIOR TO AND DURING DEFLATION AND INFLATION OF THE FRONT AIR SUSPENSION SYSTEM, ENSURE THAT ALL PERSONNEL AND EQUIPMENT ARE CLEAR FROM UNDER THE VEHICLE AND AROUND THE SERVICE AREA, FAILURE TO DO SO CAN CAUSE SERIOUS PERSONAL INJURY, DEATH, OR PROPERTY DAMAGE.

CAUTION

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.

WARNING

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.

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
REPAIR OR RECONDITIONING

THE REPAIR OR RECONDITIONING OF SUSPENSION OR AXLE COMPONENTS IS NOT ALLOWED. 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 KINGPINS

THE STEERTEK NXT AXLE IS UNIQUE, 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
AXLE CAMBER

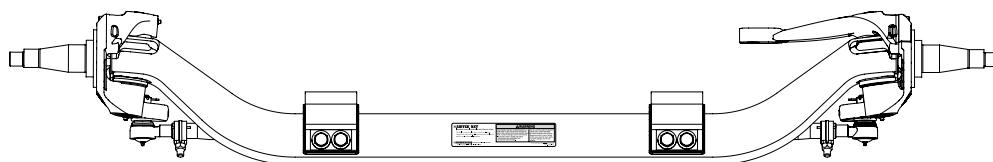
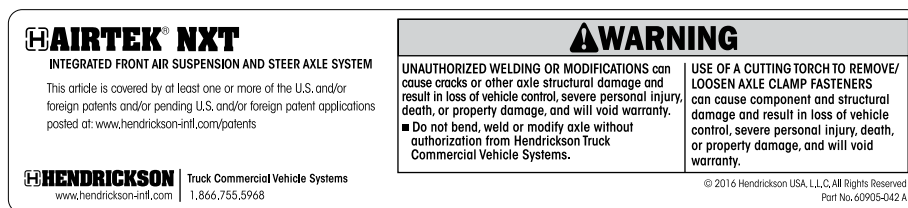
UNAUTHORIZED WELDING OR MODIFICATIONS CAN CAUSE CRACKS OR OTHER AXLE STRUCTURAL DAMAGE AND RESULT IN LOSS OF VEHICLE CONTROL, SEVERE PERSONAL INJURY OR DEATH. DO NOT BEND, WELD OR MODIFY AXLE WITHOUT AUTHORIZATION FROM HENDRICKSON TRUCK COMMERCIAL VEHICLE SYSTEMS.

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
MODIFYING COMPONENTS

DO NOT BEND, WELD, MODIFY OR REWORK PARTS WITHOUT AUTHORIZATION FROM HENDRICKSON AS SHOWN ON LABEL IN FIGURE 3-1. 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.

FIGURE 3-1





WARNING

DAMAGED AXLE COMPONENTS

IF A VEHICLE EQUIPPED WITH AN AIRTEK 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 THE COMPLETE AXLE ASSEMBLY.

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

WARNING

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 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

OFF-ROADWAY TOWING

WHEN A VEHICLE IS DISABLED AND EQUIPPED WITH AN AIRTEK 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 AIRTEK NXT AXLE, (SEE FIGURE 3-2) IN A MANNER THAT IS ACCEPTABLE FOR TOWING THE VEHICLE FROM A REPAIR FACILITY PARKING LOT INTO THE SHOP BAY. DO NOT USE A TOW CHAIN AROUND THE AIRTEK NXT AXLE 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



 WARNING**PARTS CLEANING**

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

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 Special Tools

REAR LEAF SPRING BUSHING TOOLS

Hendrickson Part No. 66086-303

OTC Part No. 4263 Visit otctools.com



Hendrickson Part No. 66086-304

OTC Part No. 4261 Visit otctools.com



Hendrickson Part No. 66086-305 Adapter Set

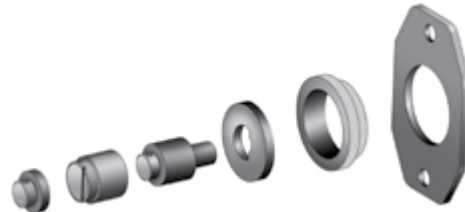
OTC Part No. 4255 Visit otctools.com



Hendrickson Part No. 66086-302

OTC Part No. 4250 Visit otctools.com

NOTE: In conjunction with Hendrickson Part No. 66086-304 (OTC 4261) this additional adapter tool kit is available to purchase to be used on Hendrickson PRIMAAX EX • COMFORT AIR • V-RIDE rear air suspensions (not needed for this front suspension).



ADJUSTABLE STRAIGHT FLUTE REAMER

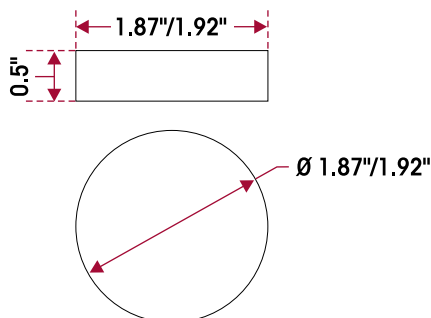
The dimension of cutting diameter must facilitate a range of 1.802"-1.812"



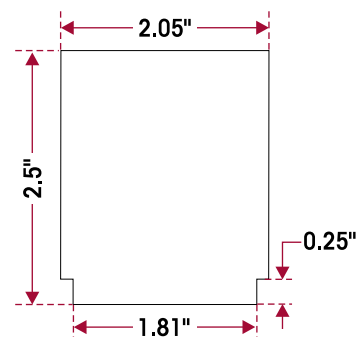
KINGPIN BUSHING AND SEAL SHOP TOOLS

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.

**Kingpin Bushing
Installer / Remover Tool**

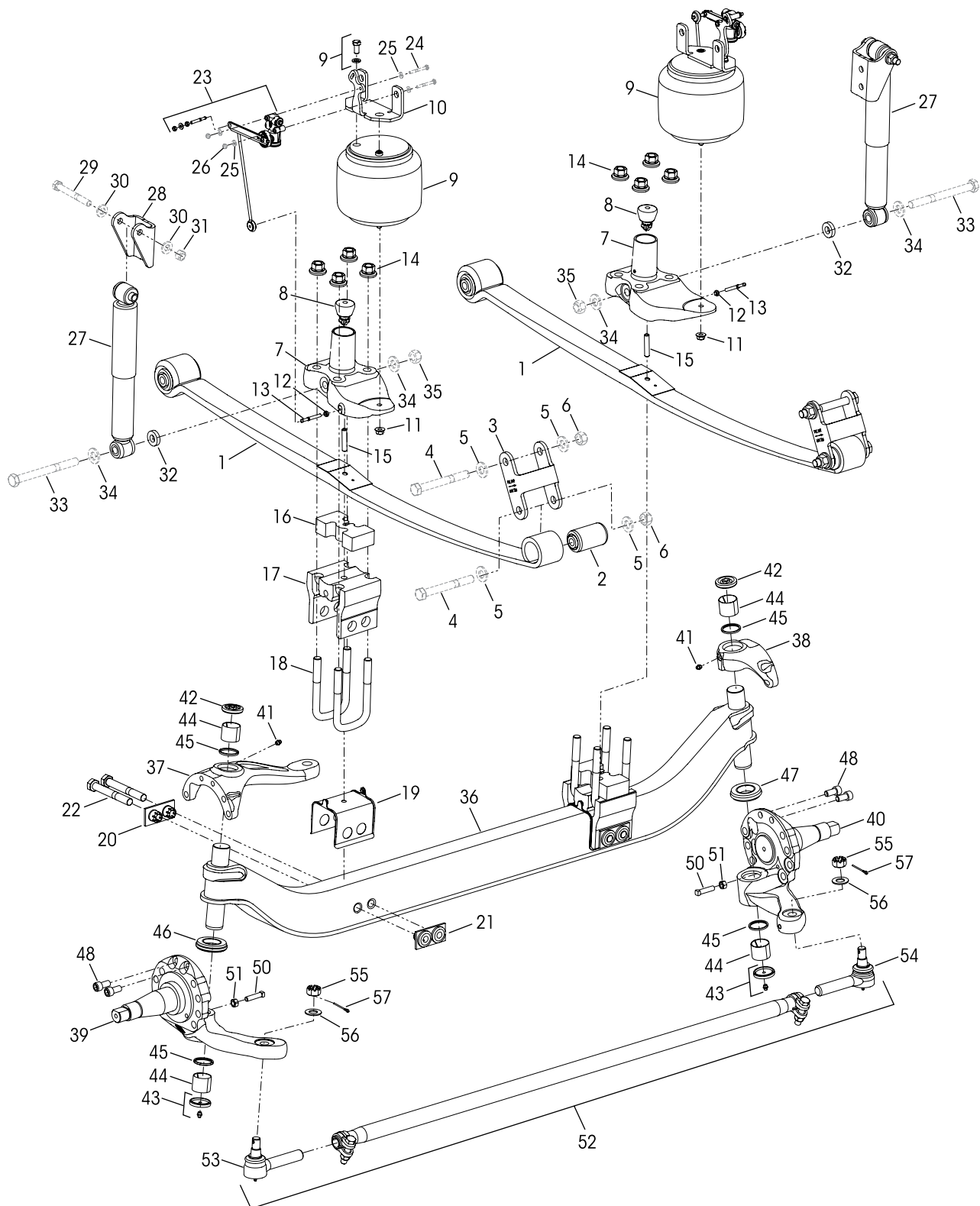


**Kingpin Seal
Installer**



SECTION 5

Parts List





AIRTEK® NXT for Freightliner Cascadia® Vehicles

			VEHICLE				VEHICLE
KEY NO.	PART NO.	DESCRIPTION	QTY.	KEY NO.	PART NO.	DESCRIPTION	QTY.
1	53622-000	Leaf Spring Assembly, Includes Non-serviceable Front Spring Eye Bushing and Key No. 2	2	36	70685-104	Axle and Kingpin Assembly	1
	60961-867	Single Thru-Bolt Bushing Service Kit , Includes Key No. 2 and 58		37		Left Hand Upper Steering Knuckle Assembly, Includes Key Nos. 41-42, 44-45	1
2		**Rear Spring Eye Thru-Bolt Bushing	2		60903-473	390 mm Ride Height	
3	78046-001	Shackle Plate	2		60903-474	430 mm Ride Height	
4		*M20 x 2.50-6G x 170 mm Hex Bolt	4	38	60904-432	Right Hand Upper Steering Knuckle Assembly, Includes Key Nos. 41-42, 44-45	1
5		*M20 Flat Washer - H12	8	39		Left Hand Lower Steering Knuckle Assembly, Includes Key Nos. 43-45, 50-51	1
6		*M20 x 2.5 Locknut	4		58900-405	150 Ackermann	
		Clamp Group & Leaf Spring Assembly Service Kit , Includes Key Nos. 1-2, 7-8, 14-22			58900-403	200 Ackermann	
	34013-238	390 mm Ride Height, Left Hand			58900-401	230-250 Ackermann	
	34013-239	390 mm Ride Height, Right Hand		40		Right Hand Lower Steering Knuckle Assembly, Includes Key Nos. 43-45, 50-51	1
	34013-240	430 mm Ride Height, Left Hand			58900-406	150 Ackermann	
	34013-241	430 mm Ride Height, Right Hand			58900-404	200 Ackermann	
7		Top Pad / Shock Bracket			58900-402	230-250 Ackermann	
	78030-001	Left Hand	1			Kingpin Bushing and Bearing Service Kits, Axle Set , Includes Kit Nos. 60961-629 & -630	
	78030-002	Right Hand	1		60961-628	LH w/Composite Thrust Bearing , Includes Key Nos. 41-46, 48-49	
8	64080-000	Rubber Bump Stop	2		60961-629	RH w/Roller Thrust Bearing , Includes Key Nos. 41-45, 47-49	
9	79115-002L	Air Spring Assembly, Includes Upper Fasteners	2	41	33117-000	Grease Zerk	2
10	78762-101	Air Spring Bracket	2	42	68687-003	Grease Cap Assembly, Upper	2
11	68974-000	M12 x 1.75 Flange Locknut	2	43	68687-002	Grease Cap Assembly, Lower	2
12	17491-011	5/16"-18 UNC Nut	2	44	78320-001	Kingpin Bushing	4
13	59169-003	Link Mount	2			Thrust Bearing Service Kits, Axle Set , Includes Kit Nos. 60961-632 & -633	
14	75989-000	M20 x 1.5-6H Two-piece Nut	8		60961-631	LH Composite Thrust Bearing , Includes Key Nos. 45-46, 48-49	
15		Dowel Pin	2		60961-632	RH Roller Thrust Bearing , Includes Key Nos. 45, 47-49	
	57159-015	1/2" x 2 1/2", 390 mm Ride Height		45	68731-000	Kingpin Seal	4
	57159-014	1/2" x 4 1/8", 430 mm Ride Height		46	77907-000	Composite Thrust Bearing	1
16	77517-040	Spring Spacer, 430 mm Ride Height Only	2	47	64256-000	Roller Thrust Bearing	1
17	78044-101	Axle Wrap	2	48	60236-001	5/8"-11 UNC Socket Head Cap Screw	4
18		M20 x 1.5-6g Semi Round U-bolt	4	49	60937-000	Loctite® (Red) Compound Tube (Not Shown)	1
	78025-175	175 mm, 390 mm Ride Height			60961-069	Stop Bolt Service Kit, One End , Includes Key Nos. 50-51	
	78025-215	215 mm, 430 mm Ride Height		50	60238-001	1/2"-13 UNC Square Head Stop Bolt	2
	60961-802	Axle Clamp Service Kit, One Side , Includes Key Nos. 19-22		51	60240-000	1/2"-13 UNC Hex Jam Stop Nut	2
19		**Axle Wrap Liner	2	52		Tie Rod Assembly, Includes Key Nos. 53-55	1
20		**Axle Clamp, Front - Unthreaded	2		76877-001	150 Ackermann	
21		**Axle Clamp, Rear - Threaded M20 x 2.5	2		76877-002	200 Ackermann	
22		**M20 X 2.5-6G x 160 mm Hex Thru Bolt	4		76877-003	250 Ackermann	
23	59427-101L	LH Height Control Valve and Linkage Assembly	1			Tie Rod End Service Kit	
24	59427-102L	RH Height Control Valve and Linkage Assembly	1		60961-734	Axle Set , Includes Kit Nos. 60961-736 and -741	
25		*1/4"-20 UNC x 2 1/4" Hex Cap Screw	4		60961-736	Left Hand , Includes Key Nos. 53, 55-57	
26		*1/4" Flat Washer	8		60961-741	Right Hand , Includes Key Nos. 54-57	
27	58913-015L	Shock Absorber (538 mm Extended)	2	53	70995-001	Left Hand Tie Rod End	1
28	78047-001	LH Upper Shock Bracket	1	54	70995-002	Right Hand Tie Rod End	1
29	78047-002	RH Upper Shock Bracket	1	55		**7/8" Castle Nut	2
30		*M16 x 2.00-6G x 130 mm Bolt	2	56	22962-007	7/8" Flat Washer	2
31		*M16 Flat Washer	4	57	17800-004	Tie Rod Nut Cotter Pin	2
32		*M16 x 2.00-6H Nut	2	58		**Loctite (Not Shown) (one per bushing)	4
33	59946-012	Lower Shock Spacer (10 mm)	2				
34		*M20 x 2.50-6G x 210 mm Bolt	2				
35		*M20 Flat Washer	4				
		*M20 x 2.5 Locknut	2				
		Front Axle Assembly, Includes Key Nos. 36-57	1				
	77771-001	390 mm Ride Height, 150 Ackermann					
	77771-002	390 mm Ride Height, 200 Ackermann					
	77771-003	390 mm Ride Height, 230-250 Ackermann					
	77771-004	430 mm Ride Height, 150 Ackermann					
	77771-005	430 mm Ride Height, 200 Ackermann					
	77771-006	430 mm Ride Height, 230-250 Ackermann					

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

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

Hendrickson **AIRTEK NXT Ride Height Gauge Lit. No. 45745-436** for Freightliner Vehicles can be obtained on-line at www.hendrickson-intl.com/Litform

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 e-mail to: techservices@hendrickson-intl.com with any questions regarding proper towing procedures for vehicles equipped with an AIRTEK NXT system.

Hendrickson recommends that a vehicle equipped with an AIRTEK 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 THE 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

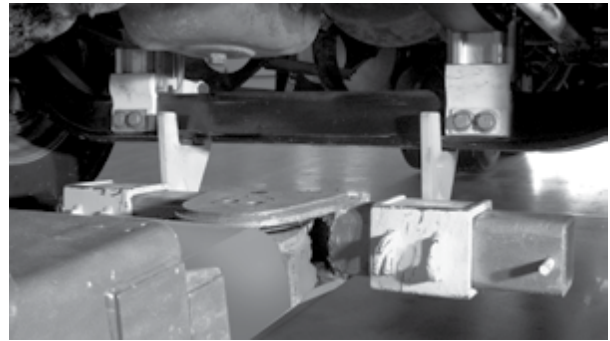
When lifting a vehicle with an under lift boom, care must be taken not to damage the engine's oil pan. Vehicles equipped with a front fairing may require removal of the front fairing prior to towing to prevent component damage.

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

FIGURES 6-2



FIGURE 6-3



OFF-ROADWAY TOWING

WARNING

WHEN A VEHICLE IS DISABLED AND EQUIPPED WITH AN AIRTEK 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 AIRTEK NXT AXLE, (SEE FIGURE 6-4) IN A MANNER THAT IS ACCEPTABLE FOR TOWING THE VEHICLE FROM A REPAIR FACILITY PARKING LOT INTO THE SHOP BAY. DO NOT USE A TOW CHAIN AROUND THE AIRTEK NXT AXLE TO TOW THE VEHICLE, DOING SO WILL DAMAGE THE AXLE AND VOID ANY APPLICABLE WARRANTY, (SEE FIGURE 6-4). FOR DETAILED INSTRUCTIONS FOR ON-HIGHWAY TOWING, SEE TOWING PROCEDURE SECTION OF THIS PUBLICATION.

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

FIGURE 6-4

OFF-ROADWAY TOWING



SECTION 7

Preventive Maintenance

The AIRTEK 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 AIRTEK NXT system and component parts function to their highest efficiency.

HENDRICKSON RECOMMENDED PREVENTIVE MAINTENANCE INTERVALS

- **The first 1,000 miles**
- **On-highway** – every 50,000 miles (80,000 kilometers) or 6 months, whichever comes first

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 plate** — 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 AIRTEK NXT system, regular lubrication intervals should be followed to help prevent premature wear to the kingpin bushings and tie rod ends, see lubrication chart below.

AIRTEK NXT GREASING AND LUBRICATION SPECIFICATIONS				
COMPONENT	LUBRICATION INTERVAL	GREASE	NLGI GRADE	OUTSIDE TEMPERATURE
Kingpin Bushings	Maximum of 25,000 miles (40,225 kilometers) or 90 days, whichever comes first.	Multipurpose Grease	2	Refer to the lubricant manufacturer's specifications for the temperature service limits applicable to your area.
Tie Rod Ends				
Leaf Spring Bushing Threaded	Maximum of 15,000 miles (24,140 kilometers) or 30 days, whichever comes first.	EP Chassis Grease	2	
Drag Link	See Vehicle Manufacturer			

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

KINGPIN LUBRICATION

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

1. Place vehicle on a level floor.
2. Chock the wheels.
3. Raise the vehicle and support the frame with frame stands.
4. Prior to greasing the kingpins on the vehicle, the suspension must be in a loaded condition.
5. Clean off all the grease zerks and grease gun tip with a clean shop towel prior to lubrication.
6. Lubricate the kingpins through the grease zerks on the top and bottom of the steering knuckle, see Lubrication Specification chart above.
7. Force the required lubricant into the upper and lower kingpin grease zerks, until new lubricant flows out from the upper kingpin connection and steering knuckle and the thrust bearing purge location, see Figures 7-2 and 7-3.

FIGURE 7-1



FIGURE 7-2

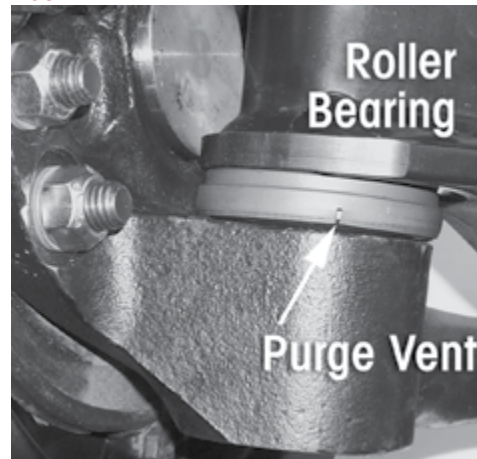


FIGURE 7-3



NOTE

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

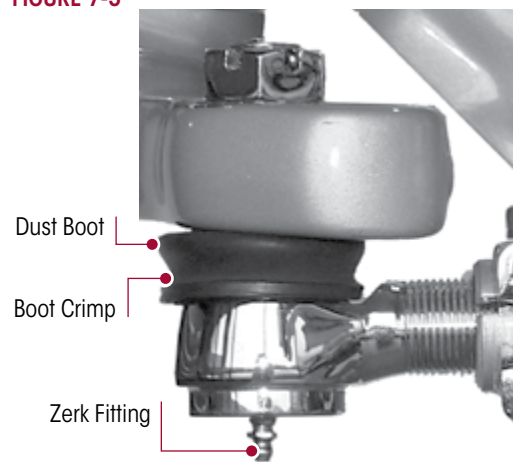
FIGURE 7-4**Top View of Thrust Bearings****TIE ROD END LUBRICATION****LUBRICATION PROCEDURE**

1. Place vehicle on a level floor.
2. Chock the wheels.
3. Raise the vehicle and support the frame with frame stands.
4. Turn the vehicle wheels straight ahead.
5. Wipe the grease zerk and grease gun tip with clean shop towels.
6. Wipe the seal/boot clean with shop towels.
7. Attach a grease gun to the grease zerk. Either a hand or pneumatic grease gun is acceptable. If air operated grease gun is used, system air pressure should not exceed 150 psi (1035 kPa).

CAUTION

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

8. Dirt, water, and discolored old grease should flow from the relief vents or purge holes near the boot crimp or bellows area, see Figure 7-5. Continue to purge grease until fresh grease flows from the purge area.

FIGURE 7-5

9. 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 and Cross Tube in the Component Replacement section of this publication.

10. Apply grease until all the old grease is purged from the boot and fresh grease is coming out.

TIE ROD END INSPECTION**INSPECTION PROCEDURE**

Before beginning this inspection procedure, the entire suspension and axle 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 rigid safety stands.
2. With the engine off, turn the wheels from full left to full right and then return to the straight-ahead position.
3. Check that the boots are in place and completely installed over the tie rod ends.
4. Check for cracking or tears in the boots. Also check the boot seals for damage. Replace the entire tie rod end if the boot is damaged.

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.

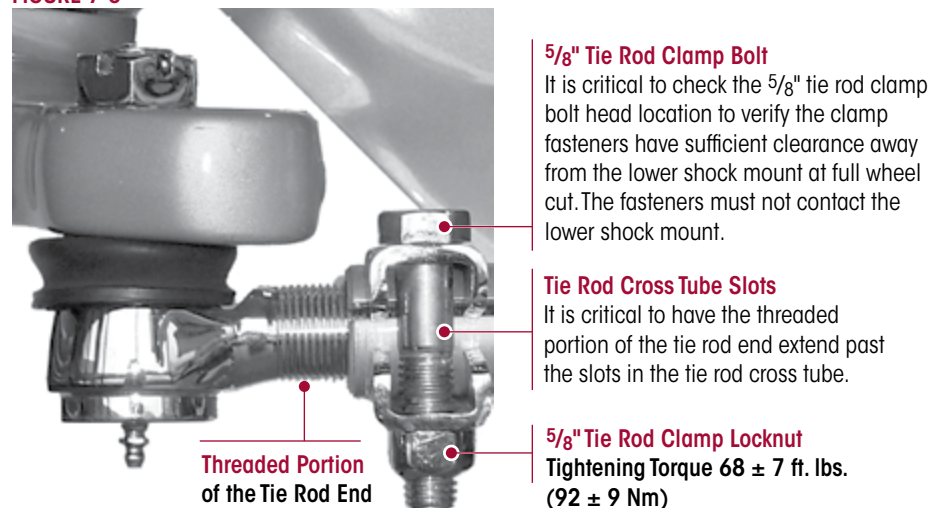
5. Check that the tie rod end nut is installed and secured with a cotter pin. If the cotter pin is missing, check the nut torque specification and then install a new cotter pin. Always tighten the castle nut to specified torque when setting the cotter pin. **DO NOT** back off the nut to insert cotter 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 7-6.

FIGURE 7-6



WARNING

THE THREADED PORTION OF THE TIE ROD END MUST EXTEND PAST THE SLOTS INTO THE TIE ROD CROSS TUBE, SEE FIGURE 7-6. FAILURE TO DO SO CAN CAUSE COMPONENT DAMAGE, LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

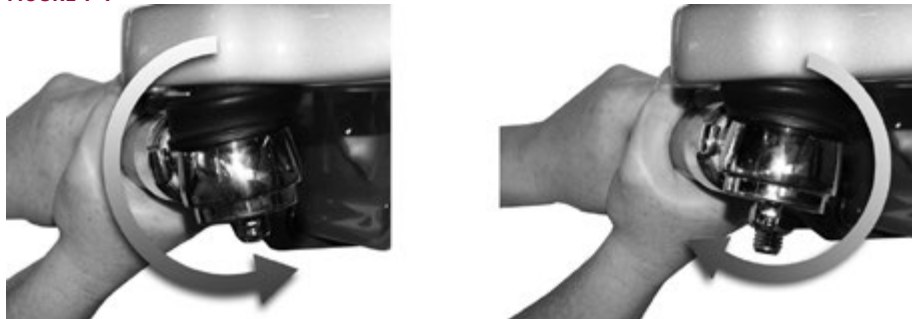
7. Check that the tie rod end is threaded correctly into the cross tube and is engaged deeper than the end of the cross tube slot. The tie rod end must be visible the entire length of the cross tube slot, see Figure 7-6.
8. Check that grease zerks are installed. Replace a damaged grease zerk with a new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

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 $\frac{1}{8}$ " (3 mm) measured with hand pressure only. (393.209(d)), (published in the North American Standard Out-of-Service Criteria Handbook, April 1, 2006.)

FIGURE 7-8

10. Position yourself directly below the tie rod end. Using both hands, grab the assembly end as close to the tie rod end as possible (no more than 6" or 152.4 mm). Apply hand pressure with reasonable human effort vertically up and down in a push-pull motion several times (using approximately 50-100 pounds (68-136 Nm) of force). Check for any movement or looseness at both tie rod end locations, see Figure 7-8.

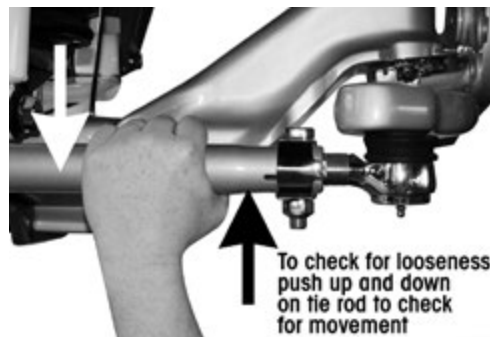


FIGURE 7-9

11. If there is any movement in the tie rod assembly, install a magnetic based dial indicator on the Ackermann arm, see Figure 7-9.
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 (68-136 Nm) 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.



CLAMP GROUP U-BOLT LOCKNUTS RE-TORQUE INTERVAL

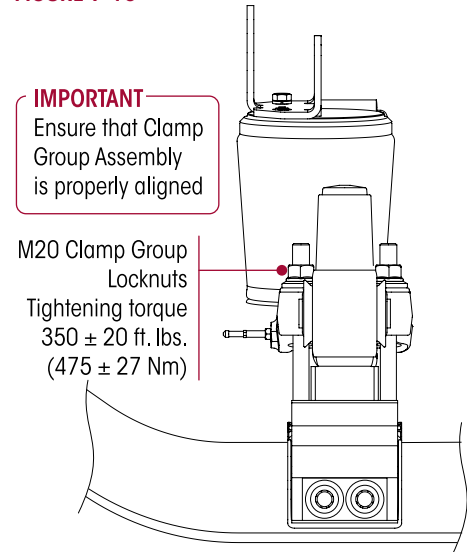
1. Clamp group U-bolt locknuts must be torqued to specification at preparation for delivery and must be re-torqued at 1,000 miles. Thereafter follow the 6 month/50,000 mile visual inspection and annual re-torque interval.

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.

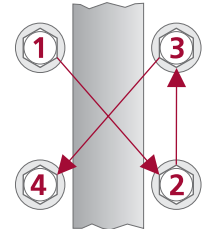
2. Ensure that the clamp group is properly aligned and the U-bolts are seated in the axle wrap, and the top pad is centered on the leaf spring, see Figure 7-10.
3. Check for the signs of component or bolt movement. If signs of movement are present, disassemble the clamp group fasteners, check for component wear or damage and replace components as necessary, then install new clamp group U-bolt fasteners. Follow assembly instructions per Component Replacement section of this publication.

FIGURE 7-10



4. Tighten the M20 clamp group U-bolt locknuts evenly in 100 foot pounds (136 Nm) increments to 350 ± 20 foot pounds (475 ± 27 Nm) torque in the proper pattern to achieve uniform bolt tension, see Figure 7-11.

FIGURE 7-11



STEERING KNUCKLE INSPECTION

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 7-12

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 7-12.
 - 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.



8. ■ If the vertical end play is **greater than 0.030"**, loosen the socket head cap screws and **push down** on the knuckle assembly until the proper vertical end play is achieved.
 - If the vertical end play is **less than 0.008"**, loosen the socket head cap screws and **pull up** on the knuckle assembly until the proper vertical end play is achieved.
9. Retighten the socket head cap screws to $\mathbb{N} 188 \pm 12$ foot pounds (255 ± 16 Nm) torque.

KINGPIN BUSHING INSPECTION

INSPECTION PROCEDURE (STEERING KNUCKLE LATERAL MOVEMENT)

FIGURE 7-13

Checking **UPPER** Kingpin Bushing



FIGURE 7-14

Checking **LOWER** Kingpin Bushing



1. Chock the wheels to help prevent the vehicle from moving. Set the parking brake.
2. Use a jack to raise the vehicle until the wheels are off the ground. Support the vehicle with safety stands.

FIGURE 7-15

3. **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 7-13.
4. Set the dial indicator to "0" zero.
5. Move the top of the tire in and out by applying reasonable constant pressure and then release, see Figure 7-15.
6. Check the reading on the dial indicator. If the dial indicator moves more than 0.015", the upper bushing is worn or damaged. Replace both bushings. Refer to the Kingpin Bushing replacement procedure in the Component Replacement section of this publication.
7. **CHECKING THE LOWER KINGPIN BUSHING.** Install a dial indicator so that the base is on the axle and the indicator tip is against the inside of the bottom of the knuckle, see Figure 7-14.
8. Set the dial indicator to "0" zero.



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

NOTE

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

AXLE WRAP LINER INSPECTION

INSPECTION PROCEDURE

- Axle wrap liners are installed to help prevent any type of abrasion on the axle at the clamp group area. Any time an axle wrap is removed it is mandatory that the axle wrap liner be replaced.
- Liner Crack Criteria:
It is possible for the axle wrap liner to crack during service. If the liner is cracked and all the pieces are intact it is not necessary to replace the liner. If the liner is broken out and there are pieces missing the liner must be replaced immediately, refer to the Leaf Spring and Clamp Group Assembly in the Component Replacement section of this publication.

SHOCK ABSORBER INSPECTION

To help determine component replacement an inspection of the shock absorber can be performed by doing a heat test, and a visual inspection. If replacement is necessary, refer to Shock Absorber in the Component Replacement section of this publication. It is not necessary to replace shock absorbers in pairs if one (1) shock absorber requires replacement.

HEAT TEST

1. Drive the vehicle at moderate speeds on rough road for minimum of fifteen minutes.

WARNING

DO NOT GRAB THE SHOCK AS IT COULD POSSIBLY CAUSE PERSONAL INJURY.

2. Use an infrared thermometer to check the temperature of the shock absorber. This can also be performed by carefully touching the shock body below the dust cover. Touch the frame to get an ambient reference, see Figure 7-16. A warm shock absorber is acceptable, a cold shock absorber should be replaced.
3. To inspect for an internal failure, remove and shake the suspected shock. Listen for the sound of metal parts rattling inside. Rattling of metal parts can indicate that the shock has an internal failure.

VISUAL INSPECTION

Look for these potential problems when doing a visual inspection. Inspect the shock absorbers fully extended. Replace as necessary.

FIGURE 7-16



FIGURE 7-17

SHOCK ABSORBER VISUAL INSPECTION - UNACCEPTABLE CONDITIONS**LEAKING VS. MISTING SHOCK VISUAL INSPECTION**

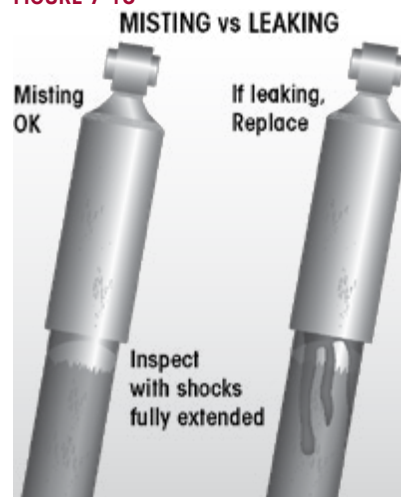
The inspection must not be conducted after driving in wet weather or a vehicle wash. Shock absorbers need to be free from water. Many shocks are often misdiagnosed as failures.

Misting is the process whereby very small amounts of shock absorber fluid evaporate at a high operating temperature through the upper seal of the shock absorber. When the "mist" reaches the cooler outside air, it condenses and forms a film on the outside of the shock body.

Misting is perfectly normal and necessary function of the shock. The fluid which evaporates through the seal area helps to lubricate and prolong the life of the seal.

A shock absorber that is truly leaking and needs to be replaced will show signs of fluid leaking in streams from the upper seal. These streams can easily be seen when the shock absorber is fully extended, underneath the main body (dust cover) of the shock. Look for these potential problems when doing a visual inspection. Inspect the shock absorbers fully extended. Replace as necessary.

FIGURE 7-18

**NOTE**

The AIRTEK NXT system is equipped with a premium seal on the shock absorber, however this seal will allow for misting to appear on the shock body (misting is not a leak and is considered acceptable).

If the shock is damaged install new shock absorber as detailed in the Component Replacement section of this publication.

TIRE INSPECTION

The leading causes of tire wear are the following, in order of importance:

1. Tire Pressure
2. Toe Setting
3. Thrust Angle
4. Camber

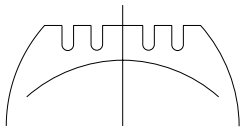
The following tire Inspection guidelines are based upon Technology & Maintenance Council (TMC) recommended practices. Any issues regarding irregular tire wear where Hendrickson is asked for assistance will require tire and alignment maintenance records, reference TMC's literature numbers RP 219A, RP 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:

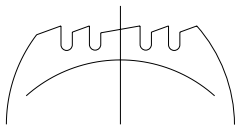
- | | |
|--------------------------------------|---|
| ■ Overall Fast Wear (Miles per 32nd) | ■ Diagonal Wear |
| ■ Feather Wear | ■ Rapid Shoulder Wear (One Shoulder Only) |
| ■ Cupping | ■ One-Sided Wear |

FIGURE 7-19
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 7-20
FEATHER WEAR



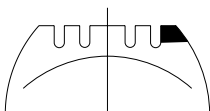
Feather wear — Tread ribs or blocks worn so that one side is higher than the other resulting in step-offs across the tread face. Generally, ribs or blocks exhibit this wear. To spot this problem, do the following:

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 7-21
RAPID SHOULDER WEAR
(One Shoulder Only)



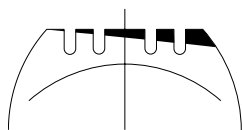
Rapid Shoulder Wear (One Shoulder Only) — Is defined as a tire worn on the edge of one shoulder, sometimes extending to inner ribs. It can progress to diagonal wipeout. For more information, see TMC RP 219A publication, page 22.

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 7-22
ONE-SIDED WEAR



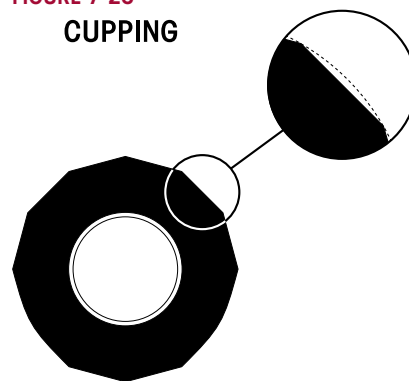
One-sided wear — Is excessive wear on one side of tire extending from the shoulder towards the center of the tread. For more information, see TMC RP 219A, page 26.

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 7-23
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:

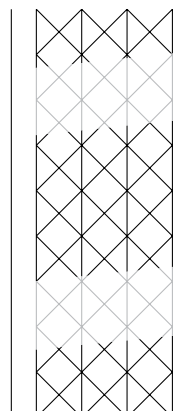
- *Tires* – Correct mismount or balance problem. If ride complaints arise, steer tires may be rotated to drive or trailer axle.
- *Vehicle* – Diagnose component imbalance condition, i.e., wheel, rim, hub, brake, drum. Correct as necessary.

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 219A 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 7-24
DIAGONAL WEAR

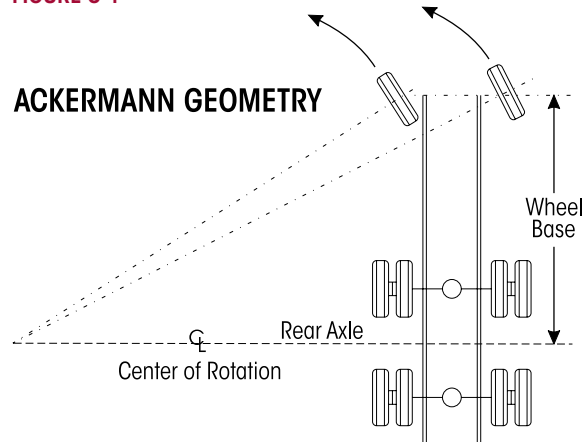


SECTION 8

Alignment & Adjustments

ALIGNMENT DEFINITIONS

FIGURE 8-1

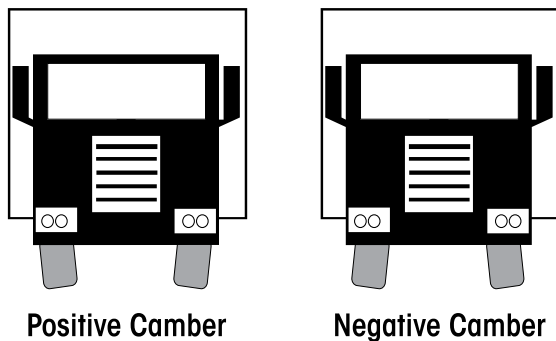


Ackermann steering geometry — The geometry of the four (4) bar linkage consisting of the front axle, two (2) knuckle assemblies, and tie rod assembly is designed to provide free rolling of front tire in a turn. Ackermann geometry is dependent upon the steering axle track-width and wheelbase of the vehicle. Improper geometry results in wheel scrub in turns which generally appears as toe wear on the tire, usually more wear on one side of the vehicle than the other due to the operational route of the vehicle.

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

FIGURE 8-2

CAMBER

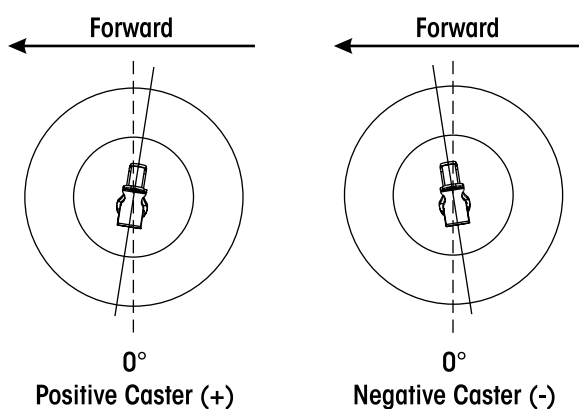


Camber — The angle formed by the inward or outward tilt of the wheel reference to a vertical line. Camber is positive when the wheel is tilted outward at the top and is negative when the wheel is tilted inward at the top.

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.

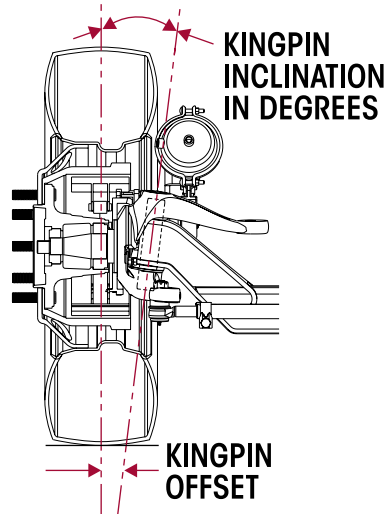
FIGURE 8-3

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

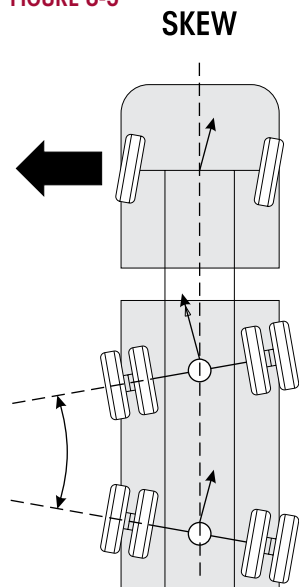
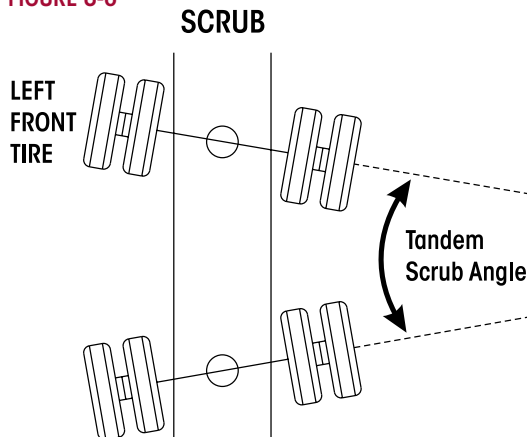


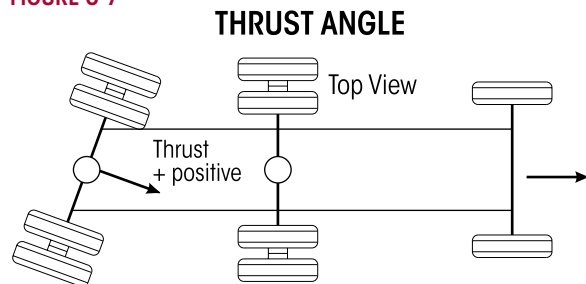
FIGURE 8-6



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.

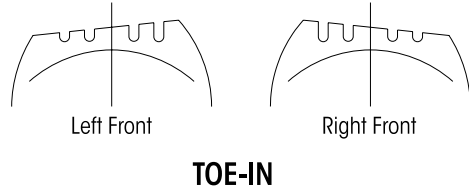
FIGURE 8-7



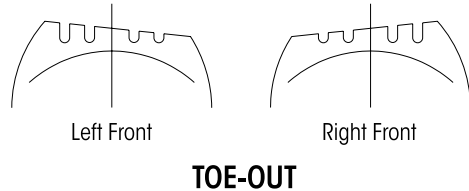
Thrust angle, tracking, or square — The angle formed by the centerline of the vehicle frame (geometric centerline) and the direction that an axle points. As indicated by the term "square", the ideal value for the angle is 0° or when the axle centerline is at 90° or perpendicular to the geometric centerline.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

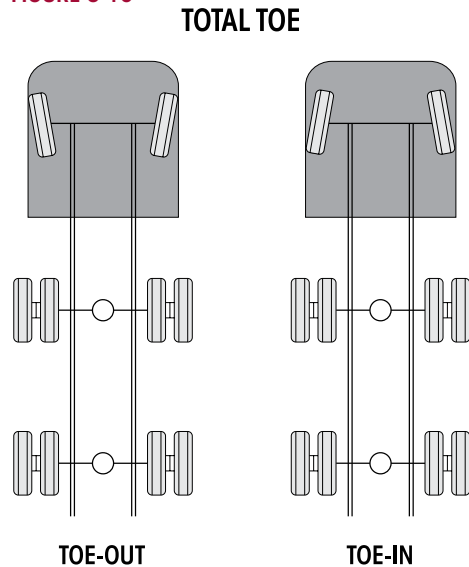
Tie rod arm (ackermann-arm, cross tube arm) — The component that transmits steering forces between left and right axle knuckle assemblies through the cross tube assembly.

FIGURE 8-8


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.

FIGURE 8-9


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.

FIGURE 8-10


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 (2) 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.

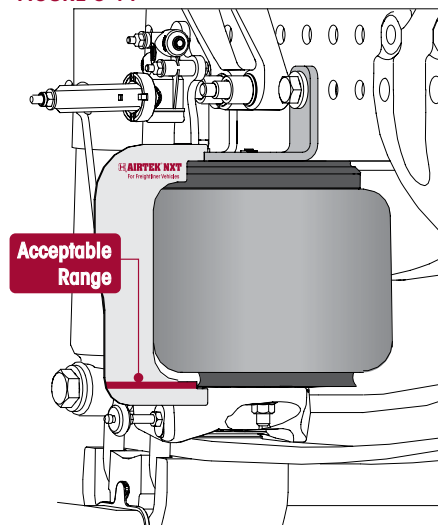
RIDE HEIGHT VERIFICATION

The vehicle manufacturer recommends dual height control valves are only to be installed on the front suspension when the rear suspension is equipped with a single height control valve system. This arrangement is best suited to keep the vehicle level versus having dual height control systems on both the front and rear suspensions.

1. Drive the vehicle onto a level surface.
2. Free and center all suspension joints by slowly moving vehicle back and forth several times without using the brakes. It is **IMPORTANT** when coming to a complete stop to verify the brakes are released.
3. Chock drive wheels.
4. Verify that the air system is at full operating pressure.
5. Detach the lower rubber grommet of the height control valve linkage from the lower stud and exhaust the suspension system air by lowering the height control valve linkage arms.
6. Re-attach the lower grommet of the height control valve linkages onto the lower studs to fill the suspension system with air. Wait until the airflow to the front air springs has stopped.

7. Hold the ride height gauge vertically, see Figure 8-11, and place the Hendrickson AIRTEK NXT ride height gauge (Literature Number 45745-436), so the upper notch is flush against the bottom air spring bracket. The lower air spring piston flange edge should contact the lower region marked "**ACCEPTABLE**" indicated on the gauge. Repeat procedure for the other side of the vehicle.

FIGURE 8-11



8. If the air spring piston flange edge is in contact with the "**BELOW SPEC**" region, the ride is set too low. If the air spring piston flange contacts the "**ABOVE SPEC**" region, the ride height is set too high. If the ride height is out of specification it will be necessary to adjust the ride height.
9. If a ride height gauge is not available, measure the suspension ride height on the front axle:
 - **Referenced ride height** (top front of the air spring to the bottom of the air spring piston flange) is $8" \pm \frac{1}{8}"$.
 - **Actual ride height** (bottom of the frame to the centerline of the axle) is $7.04" \pm \frac{1}{8}"$.

If the ride height is out of specification, it will be necessary to adjust the ride height.

ADJUSTMENT PROCEDURE

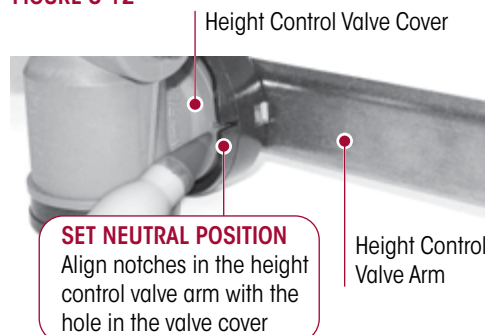
1. Verify that the air system is at full operating pressure.

SERVICE HINT

It is very important that the leveling valve be cycled completely before and after any ride height adjustments. Cycling of the leveling valve will help make the adjustment more accurate.

2. See Air Spring Safety Notice in the Important Safety Notice section of this publication prior to deflating or inflating the suspension system.
3. Cycle the air system. Detach the lower rubber grommet(s) of the height control valve linkage(s) from the lower stud and exhaust the suspension system air by lowering the height control valve linkage arm.
4. Refill the suspension by raising the height control valve arm(s) by hand, so that the air springs are above the proper ride height.
5. Lower the height control valve arm(s) to exhaust the air system until the suspension is at the proper ride height.
6. Rotate lever and set to neutral position (deadband) for the height control valve(s) by aligning the notches in the height control valve arm(s) with the hole in the height control valve cover, as shown in Figure 8-12.
7. With the height control valve at the neutral position (deadband), adjust the height control valves by loosening the mounting locknuts and rotating the valve body in the mounting bracket so the link mount stud inserts directly into the center hole of the rubber grommet at the proper height.

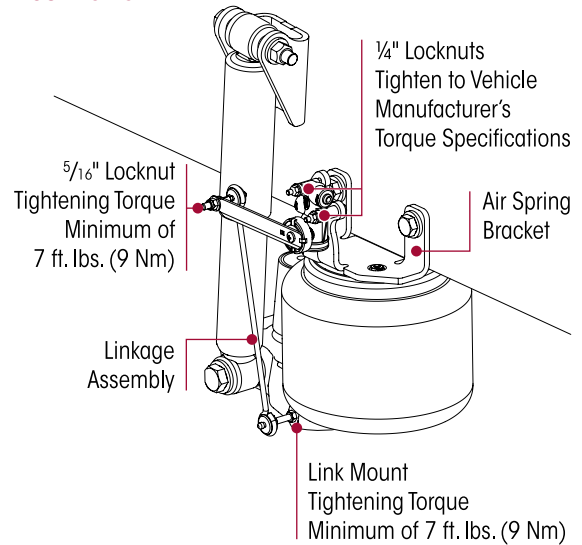
FIGURE 8-12



8. Facing the air spring from the outboard side on the left side of the vehicle, pivot the valve body counter clockwise to increase the ride height and clockwise to decrease the ride height. On the right side of the vehicle, pivot the valve body clockwise to increase the ride height and counter clockwise to decrease the ride height.

FIGURE 8-13

9. Tighten the height control valve mounting locknuts to the vehicle manufacturer's specifications, after the adjustment is made, see Figure 8-13.
10. Cycle the air from the system by lowering the height control valve arm.
11. Reconnect the height control valve linkage rubber grommet to the link mounts. Allow the air suspension system to completely fill with air.
12. Recheck the ride height after adjustment, (if equipped with dual height control valves check both sides of the vehicle).
13. Repeat adjustment if necessary until the ride height is within specification.



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 (1) front tire is worn and the inner edge of the other front tire is worn, check the following:

- Ensure 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's instructions.

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 vehicle 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.



FIGURE 8-14



FIGURE 8-15



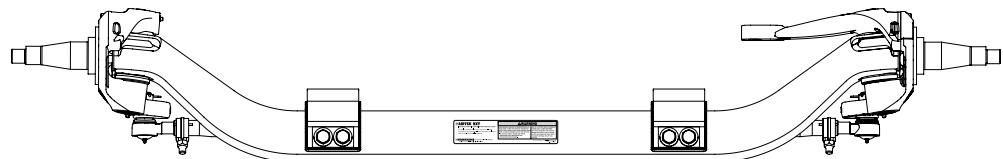
2. Check and adjust the maximum turn angle, refer to the Steering Stop Adjustment Procedure in this section, see Figures 8-14 and 8-15.
3. If the vehicle is equipped with power steering, check the pressure relief in the power steering system and reset if necessary. Refer to the vehicle manufacturer regarding 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 8-16.

FIGURE 8-16

AIRTEK® NXT INTEGRATED FRONT AIR SUSPENSION AND STEER AXLE SYSTEM This article is covered by at least one or more of the U.S. and/or foreign patents and/or pending U.S. and/or foreign patent applications posted at: www.hendrickson-intl.com/patents HENDRICKSON Truck Commercial Vehicle Systems www.hendrickson-intl.com 1.866.755.5968	WARNING UNAUTHORIZED WELDING OR MODIFICATIONS can cause cracks or other axle structural damage and result in loss of vehicle control, severe personal injury, death, or property damage, and will void warranty. ■ Do not bend, weld or modify axle without authorization from Hendrickson Truck Commercial Vehicle Systems. USE OF A CUTTING TORCH TO REMOVE/ LOOSEN AXLE CLAMP FASTENERS can cause component and structural damage and result in loss of vehicle control, severe personal injury, death, or property damage, and will void warranty. © 2016 Hendrickson USA, L.L.C. All Rights Reserved Part No. 60905-042 A
---	--



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.

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 8-17.

FIGURE 8-17



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 (68 ± 14 Nm) 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.

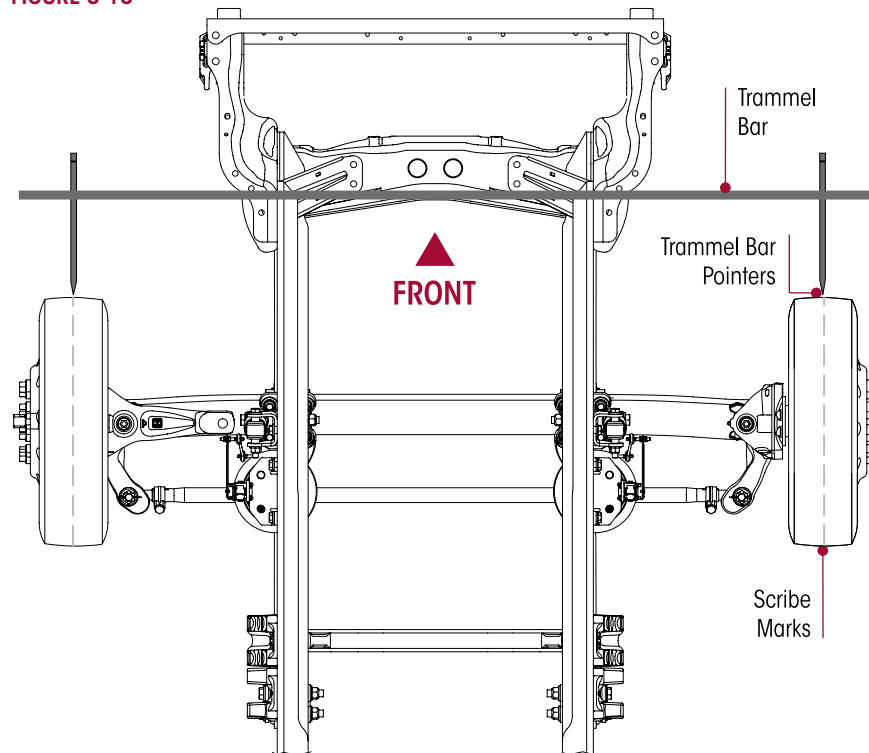
TOE SETTING

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 8-18.

FIGURE 8-18

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.

WARNING

THE THREADED PORTION OF THE TIE ROD END MUST EXTEND PAST THE SLOTS INTO THE TIE ROD CROSS TUBE, SEE FIGURE 8-19. FAILURE TO DO SO CAN CAUSE COMPONENT TO FAIL CAUSING LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

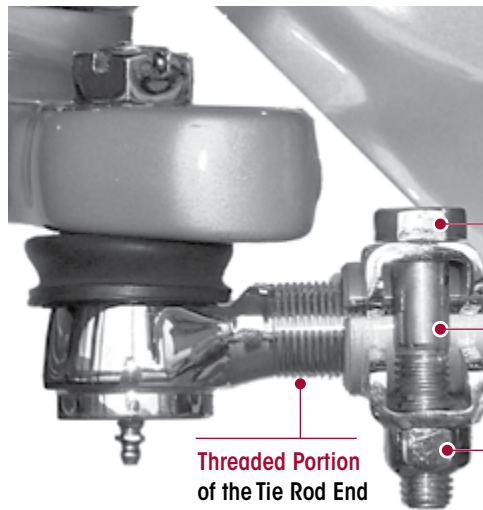
- c. Tighten the bolt and locknut on the tie rod cross tube to 68 ± 7 foot pounds (92 ± 9 Nm) torque.

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 8-19.
12. Repeat Steps 1 through 10 until the correct toe setting is achieved.

FIGURE 8-19

**5/8" Tie Rod Clamp Bolt**

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

Tie Rod Cross Tube Slots

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

5/8" Tie Rod Clamp Locknut

**Tightening Torque 68 ± 7 ft. lbs.
(92 ± 9 Nm)**

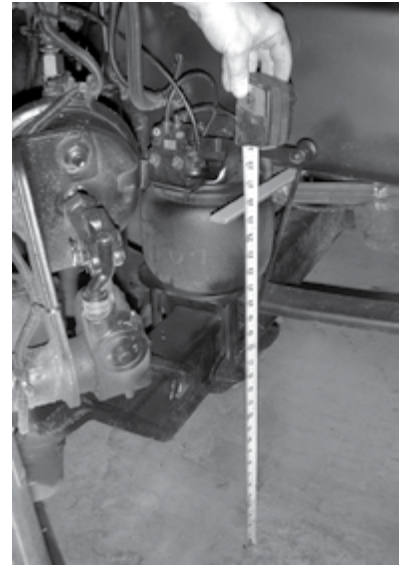
SPRING EYE RE-TORQUE

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

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 with the weight of the vehicle on the suspension
3. Tighten the front and rear spring eye bolt locknuts per the vehicle manufacturer's torque specifications.
4. Affix a straight edge to the bottom of the frame rail behind the frame hanger, see Figure 8-20.
5. 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.
6. Measure the difference from one side to the other.
7. Remove wheel chocks and perform a road test.
8. Chock the rear wheels of the vehicle to prevent movement.
9. Repeat the measurement in Steps 5 through 7.
10. If the difference in measurement from one side to the other is less than 1/2", the vehicle is level. If measurement difference is more than 1/2" contact the vehicle manufacturer.
11. Remove the wheel chocks.

FIGURE 8-20



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.

HEIGHT CONTROL VALVE

The vehicle manufacturer recommends dual height control valves are only to be installed on the front suspension when the rear suspension is equipped with a single height control valve system. This arrangement is best suited to keep the vehicle level versus having dual height control systems on both the front and rear suspensions.

DISASSEMBLY

1. Drain the air from the secondary air tank.

WARNING

PRIOR TO AND DURING DEFLATION AND INFLATION OF THE AIR SUSPENSION SYSTEM, ENSURE THAT ALL PERSONNEL AND EQUIPMENT ARE CLEAR FROM UNDER THE VEHICLE AND AROUND THE SERVICE AREA, FAILURE TO DO SO CAN CAUSE SERIOUS PERSONAL INJURY, DEATH, OR PROPERTY DAMAGE.

2. See additional Air Spring Cautions and Warnings in the Important Safety Notice section of this publication prior to deflating or inflating the air system.
3. Deflate the air springs by removing the height control valve linkage at the rubber grommet and lowering the height control linkage arm. This will exhaust the air pressure in the air springs.

CAUTION

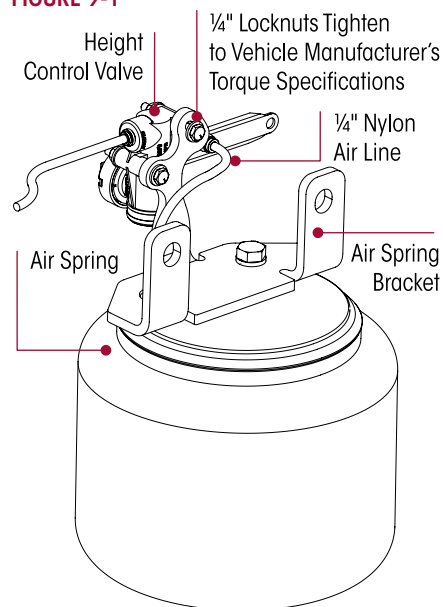
THE PUSH TO CONNECT FITTINGS ON AIRTEK AIR SPRING AND HEIGHT CONTROL VALVES ARE NON SERVICEABLE. IF THE AIR SPRING IS TO BE REINSTALLED; CARE MUST BE TAKEN TO REMOVE DIRT AND DEBRIS FROM THE PUSH-TO-CONNECT FITTING. FAILURE TO DO SO CAN RESULT IN THE PUSH-TO-CONNECT FITTING FAILING TO SEAL PROPERLY WITH THE AIR LINE.

4. Remove the air lines from the height control valve, see Figure 9-1. The air lines are push-to-connect. Push in on the air line to release tension, push down on the collar and pull out the air line.
5. Remove the two (2), 1/4" mounting nuts and washers.
6. Remove the height control valve.

ASSEMBLY

1. Attach the height control valve on the mounting bracket as shown in Figure 9-1.
2. Attach the 1/4" washers and the locknuts. DO NOT tighten the locknuts to specified torque until after the proper ride height is attained. Mount the height control valve parallel to the flange of the upper air spring bracket, see Figure 9-2.

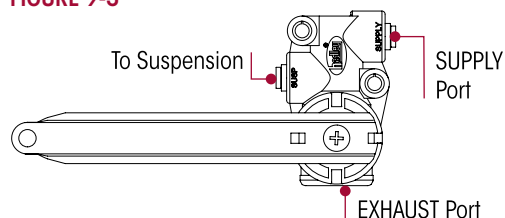
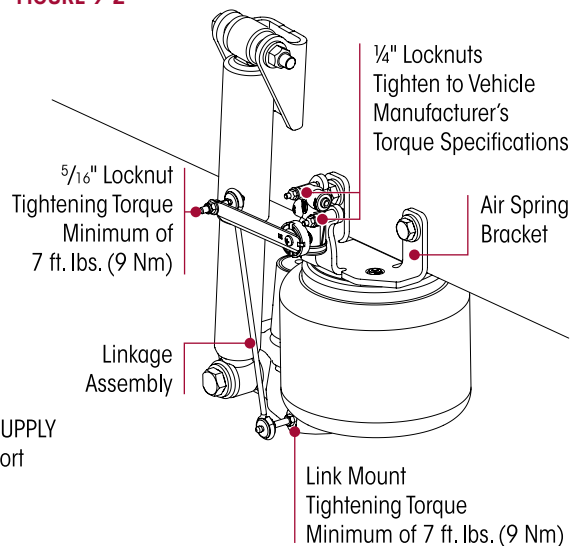
FIGURE 9-1



SERVICE HINT

When replacing or installing nylon air line tubing into quick-connect fittings it is critical that the end of the air line is cut square. Improper cut of the end of the air line tubing can cause the air line to seat improperly in the quick connect fitting causing air leakage.

3. Attach the air lines to the height control valve, see Figure 9-3.

FIGURE 9-3**FIGURE 9-2**

4. Install the height control valve linkage assembly.
5. Adjust the height control valve to the proper specifications. See the Alignment & Adjustments section of this publication for proper ride height adjustment.
6. Tighten the 1/4" Locknuts to Vehicle Manufacturer's Torque Specifications.

AIR SPRING**DISASSEMBLY**

1. Place the vehicle on level floor.
2. Chock the wheels.
3. Raise the truck with floor jack.
4. Support the frame with frame stands.

WARNING

WHEN SERVICING THE VEHICLE OR ATTACHING AN AIR SPRING AND THE VEHICLE IS ON THE GROUND, PRIOR TO AIRING THE SUSPENSION SYSTEM MAKE CERTAIN THE AIR SPRING LOCATOR IS INDEXED INTO THE UPPER AIR SPRING BRACKET PROPERLY, AND THE AIR SPRING IS FULLY SEATED ON THE TOP PAD. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN PREMATURE AIR SPRING FAILURE, CAUSE PERSONAL INJURY, OR PROPERTY DAMAGE.

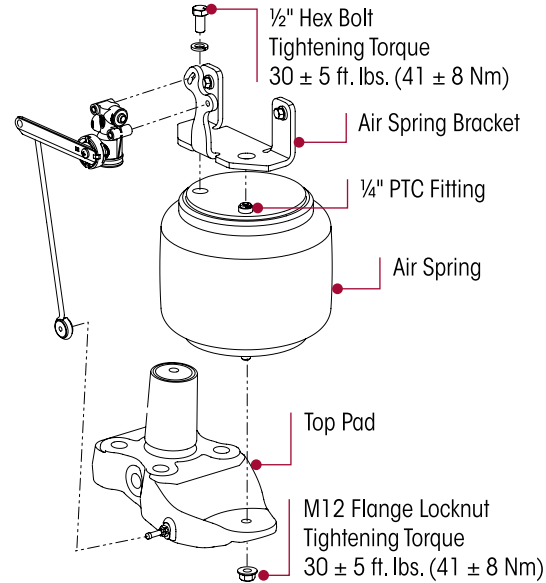
WARNING

PRIOR TO AND DURING DEFLATION AND INFLATION OF THE AIR SUSPENSION SYSTEM, ENSURE THAT ALL PERSONNEL AND EQUIPMENT ARE CLEAR FROM UNDER THE VEHICLE AND AROUND THE SERVICE AREA, FAILURE TO DO SO CAN CAUSE SERIOUS PERSONAL INJURY, DEATH, OR PROPERTY DAMAGE.

5. See additional Air Spring Cautions and Warnings in the Important Safety Notice section of this publication prior to deflating or inflating the air system.
6. Lower the axle.
7. Remove the air from the air system by disconnecting the height control valve linkage at the lower rubber grommet and allowing the lever to drop. This will exhaust air from the system.
8. Disconnect the 1/4" PTC air fitting from the air spring.
9. Remove the lower M12 air spring locknut from the piston stud to remove the air spring from the top pad and discard fasteners, see Figure 9-4.
10. Remove the 1/2" upper air spring bolt and lock washer, see Figure 9-4.
11. Remove the air spring.

FIGURE 9-4
ASSEMBLY

1. Compress the air spring and slide into vertical position.
2. Locate ¼" stud and ½" threaded stud on top of the air spring.
3. Guide the bottom stud and properly seat the lower air spring piston into the top pad. Secure the M12 locknut to the piston, see Figure 9-4.


SERVICE HINT

Prior to tightening the locknut, slightly air up the air spring to approximately 5 psi.

4. Tighten the ½" upper air spring locknut and the M12 lower air spring locknut to 30 ± 5 foot pounds (41 ± 8 Nm) torque.

WARNING

WHEN SERVICING THE VEHICLE OR ATTACHING AN AIR SPRING AND THE VEHICLE IS ON THE GROUND, PRIOR TO AIRING THE SUSPENSION SYSTEM MAKE CERTAIN THE AIR SPRING LOCATOR IS INDEXED INTO THE UPPER AIR SPRING BRACKET PROPERLY, AND THE AIR SPRING IS FULLY SEATED ON THE TOP PAD. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN PREMATURE AIR SPRING FAILURE, CAUSE PERSONAL INJURY, OR PROPERTY DAMAGE.

5. See Air Spring Warnings and instructions in the Important Safety Notice section of this publication prior to deflating or inflating the suspension system.
6. Install the air line into the air spring.
7. Raise the truck with floor jack and remove frame stand supports.
8. Air up the suspension.
9. Check the air spring for leaks.
10. Check the ride height and adjust if necessary, see the Alignment & Adjustments section of this publication for the proper ride height adjustment.
11. Remove the wheel chocks.

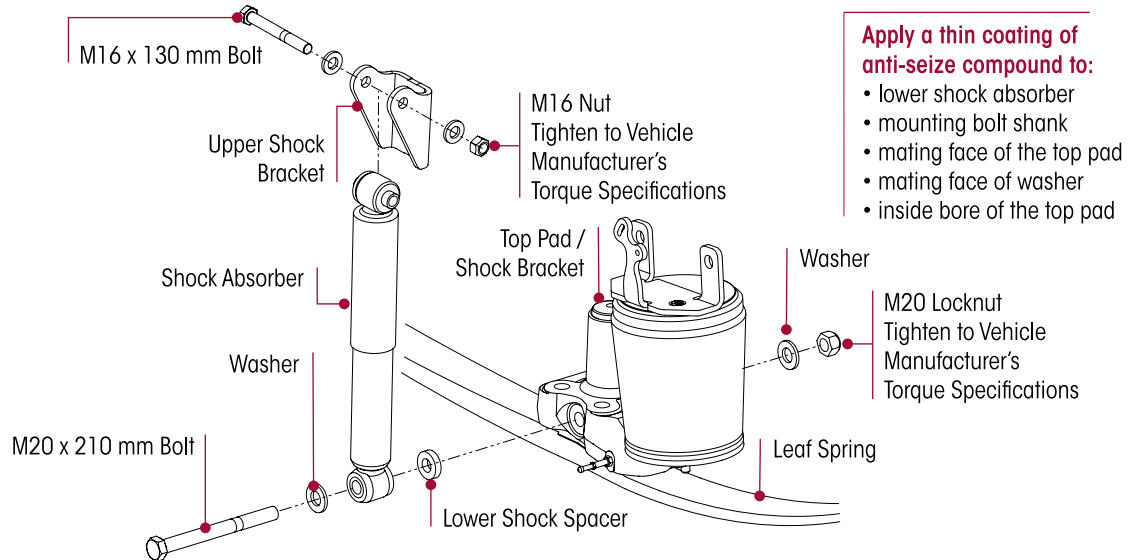
SHOCK ABSORBER
NOTE

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

DISASSEMBLY

1. Remove the lower shock absorber mounting fasteners from top pad, see Figure 9-5.
2. Remove the upper shock absorber mounting fasteners.
3. Slide out the shock absorber.
4. Inspect the shock absorber mounting brackets and hardware for damage or wear, replace as necessary.

FIGURE 9-5



ASSEMBLY

1. Install the shock absorber into the **upper** shock bracket.
2. Install the **upper** shock absorber mounting fasteners.
3. **Apply a thin coating of anti-seize compound** to the shock absorber **lower** mounting bolt shank, to the mating face of the top pad, washers, and to the inside bore of the aluminum top pad. **This is necessary to help prevent seizing of the bolt to the aluminum top pad**, see Figure 9-5.
4. Install the lower bolt from the outboard side to the inboard side of the top pad and attach the spacer, washer and locknut, see Figure 9-5.
5. Tighten the upper and lower shock absorber fasteners to the vehicle manufacturer's torque specifications.

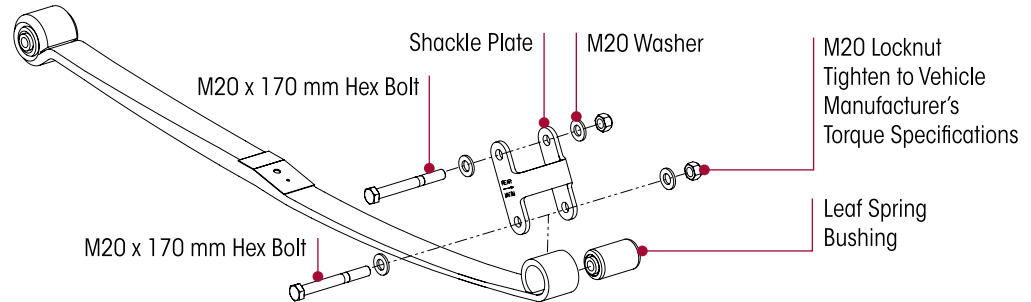
REAR SHACKLE

DISASSEMBLY

1. Place the vehicle on a level floor.
2. Chock the wheels.
3. Raise the vehicle and support the frame with frame stands.
4. Suspend the front axle to remove the load from the shackle.
5. Remove rear shackle fasteners, see Figure 9-6.
6. Remove the shackle plate.

ASSEMBLY

1. Install the shackle plate and fasteners, see Figure 9-6.
2. Snug the fasteners.
3. Raise the vehicle and remove the frame stands.
4. Lower the vehicle.
5. Inflate the suspension to ride height.
6. Tighten the shackle fasteners to vehicle manufacturer's torque specifications.
7. Remove the wheel chocks.

FIGURE 9-6


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 front spring eye bolts and remove the rear spring eye bolt fasteners.
9. Lower the axle and leaf spring assembly.

SERVICE HINT

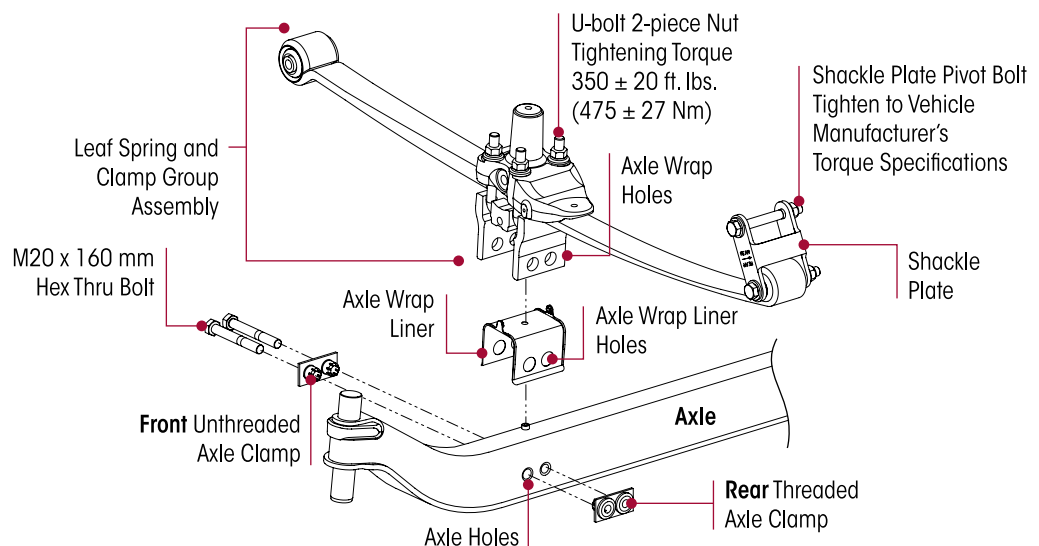
To ease in the removal of the spring eye bolts, it may be necessary to raise the axle slightly.

10. Remove the two (2) M20 axle clamp hex thru bolts, see Figure 9-7.
11. Remove the front and rear axle clamps from the axle wrap liner.
12. Remove the front spring eye bolt.

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.

13. Remove the leaf spring and clamp group assembly from the axle.

FIGURE 9-7


ASSEMBLY

⚠ WARNING

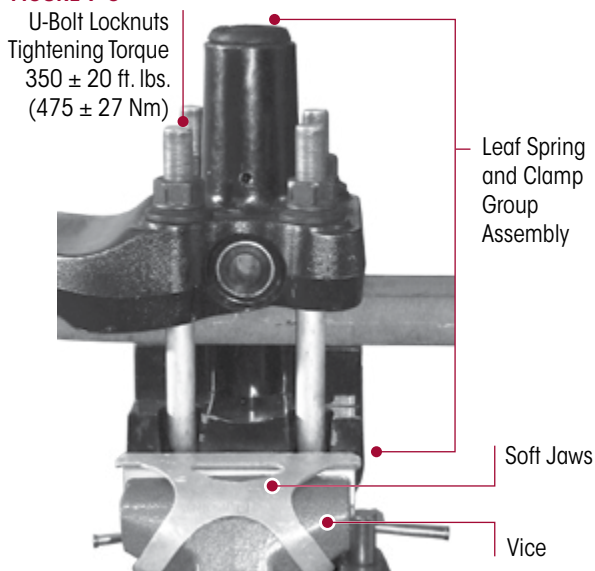
WHEN PLACING THE LEAF SPRING AND CLAMP GROUP ASSEMBLY IN A VISE IT IS NECESSARY TO PROTECT THE MACHINED SURFACES FROM GOUGES OR MARRING BY USING BRASS JAWS (SOFT JAWS) SEE FIGURE 9-8. FAILURE TO DO SO CAN CAUSE PREMATURE PART DAMAGE, DAMAGE TO THE LEAF SPRING AND CLAMP GROUP ASSEMBLY, LOSS OF WARRANTY, 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 soft jaw vise when performing the tightening procedure.

1. Secure the clamp group assembly in a suitable holding device, such as a soft jaw vise, see Figure 9-8.
2. Ensure the clamp group U-bolt locknuts are tightened evenly in 100 foot pounds (136 Nm) increments to 350 ± 20 foot pounds (475 ± 27 Nm) torque in the proper pattern to achieve uniform bolt tension, see Figure 9-9.
3. Install the new axle wrap liner under the axle wrap (liner tabs snap to sides of axle wrap), see Figure 9-10.

FIGURE 9-8


⚠ 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.

FIGURE 9-9

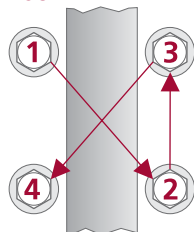
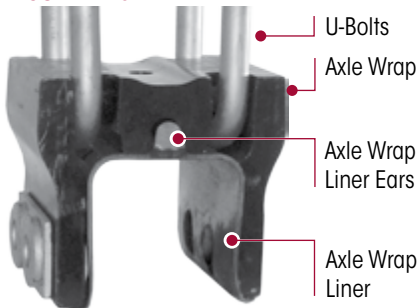


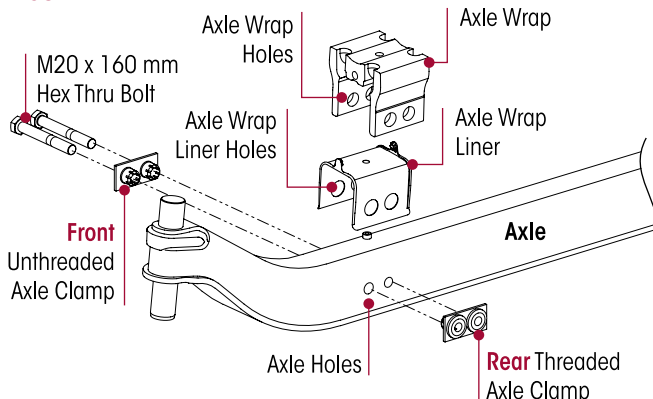
FIGURE 9-10



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 9-7.
5. Install the front and rear axle clamps through the axle wrap, axle wrap liner and axle, see Figure 9-11.

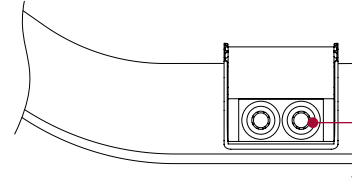
FIGURE 9-11

6. Install the M20 hex thru 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 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. Inflate suspension to ride height.
12. Tighten the axle clamp fasteners at the bolt head evenly in 140 foot pounds (190 Nm) increments to 420 ± 20 foot pounds (569 ± 27 Nm) torque, see Figure 9-12.
13. Tighten the front and rear spring eye hanger clamp locknuts to the vehicle manufacturer's torque specifications.
14. Remove the wheel chocks.

FIGURE 9-12



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

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 LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

NOTE

Front spring eye bushings **ARE NOT** replaceable. It is necessary to replace the entire leaf spring assembly if the front spring eye bushing requires replacement

The spring eye bushings for the AIRTEK 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 — REAR SPRING EYE BUSHING TOOLS

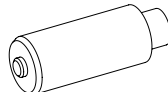
- Hendrickson Tool Nos. 581730 and 581731 or 581734 (OTC Nos. 4263 and 4255 or 4261), refer to the Special Tools section in this publication.



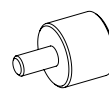
581730
Cylinder Adapter



581731
Spacer



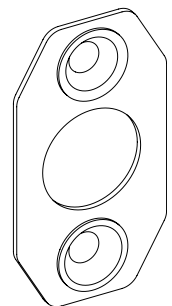
581734
Extractor



581678
Alignment Tool



581683
Bushing Support
Small Adapter



581682
Clamping Plate

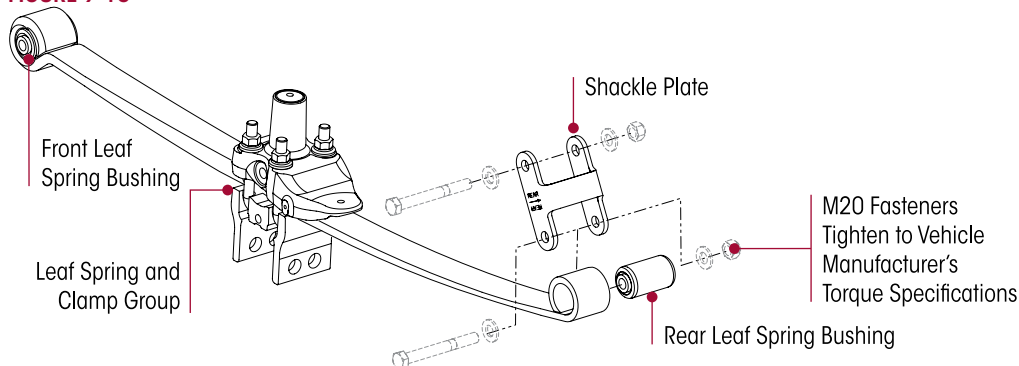
REMOVAL			✓	✓	✓	✓
INSTALLATION	✓	✓			✓	✓

REAR SPRING EYE BUSHING DISASSEMBLY

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

- **OPTION 1 Leaf Spring and Clamp Group Assembly In-Chassis** — Replace rear spring eye bushings in-chassis, proceed to **In-Chassis Preparation**.
- **OPTION 2 Leaf Spring and Clamp Group Assembly Removed from Chassis** — Remove the entire leaf spring and clamp group assembly per Leaf Spring and Clamp Group Assembly instructions in this section then proceed to **Tool Setup**.

FIGURE 9-13



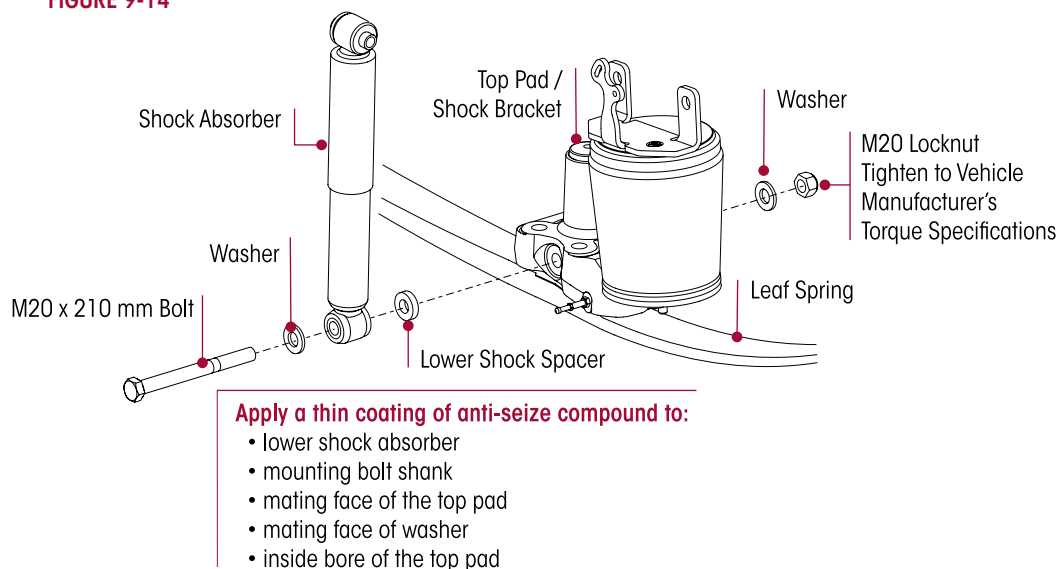
OPTION 1 – In-chassis Preparation

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 and discard the lower shock absorber mounting fasteners, see Figure 9-14.

SERVICE HINT

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

FIGURE 9-14



8. Rear spring eye bushings.
 - a. Loosen the front spring eye bolts from both sides.
 - b. Remove rear shackle bolts from both sides.
 - c. Lower the axle and spring assembly to gain access to replace the rear spring eye bushings.

OPTION 1 & 2 – TOOL SETUP

1. Insert the **two (2) alignment tools** into the spring eye bushing as shown in Figure 9-15.
2. Place the **two (2) bushing support adapters** over the alignment tools with the wider diameter facing the spring eye, see Figure 9-15.
3. Place the **head plate** over the bushing support adapter on far side of spring and **clamping plate** over the other bushing support adapter, see Figure 9-15.
4. Insert threaded rod assemblies through the holes in the clamping plate and the head plate, see Figure 9-15.
5. Install hex nuts on the end of the threaded rod, fully seated and hand tighten.
6. Tighten the clamping nuts against the clamping plate $\frac{1}{4}$ to $\frac{1}{2}$ turn past hand tightening.
7. Carefully remove the **two (2) alignment tools**.

FIGURE 9-15

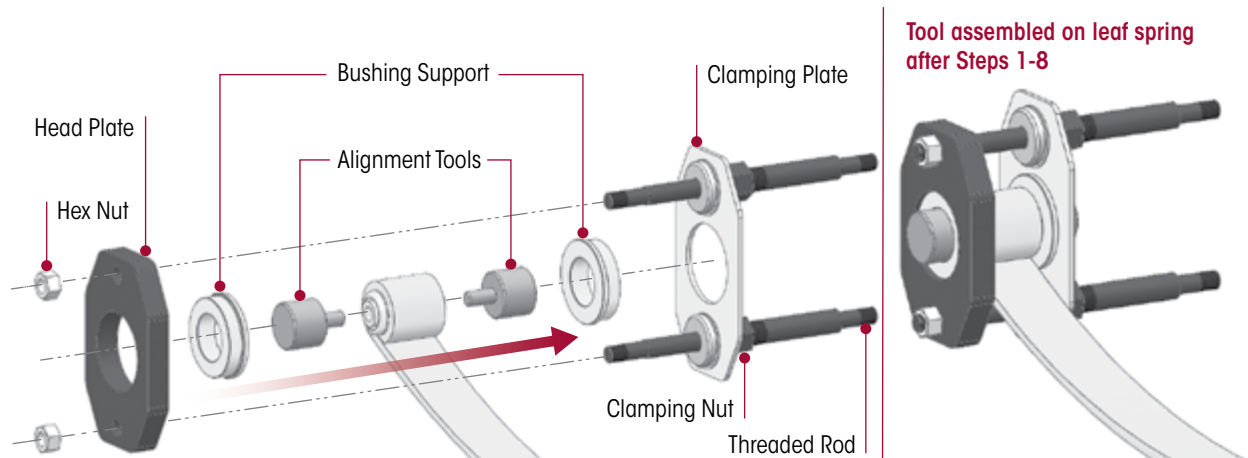


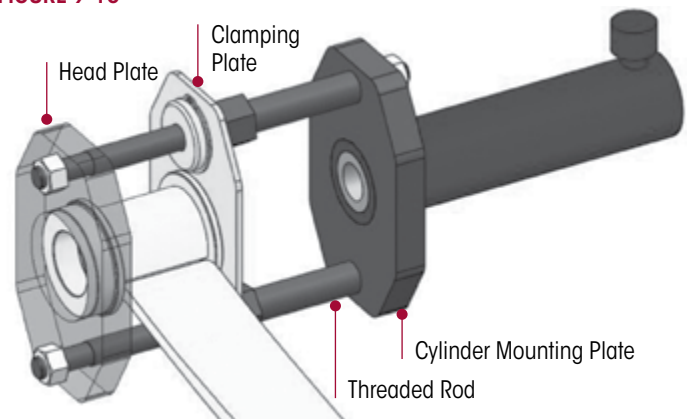
FIGURE 9-16

8. Place cylinder mounting plate over the rods and secure with nuts.

WARNING

TO PREVENT PERSONAL INJURY, THE CYLINDER MUST BE FULLY THREADED INTO THE CYLINDER MOUNTING PLATE, SEE FIGURE 9-16.

9. Thread the cylinder into the cylinder mounting plate, see Figure 9-16. Ensure threads are fully engaged. Connect Cylinder to the hydraulic pump.



WARNING

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

BUSHING REMOVAL

1. Insert the extractor into hydraulic cylinder rod, see Figure 9-17.

WARNING

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

2. Activate hydraulic pump to extend cylinder and drive out spring eye bushing, see Figure 9-18.
3. Retract cylinder and remove the extractor from cylinder rod.
4. Clean spring eye bore.

FIGURE 9-17

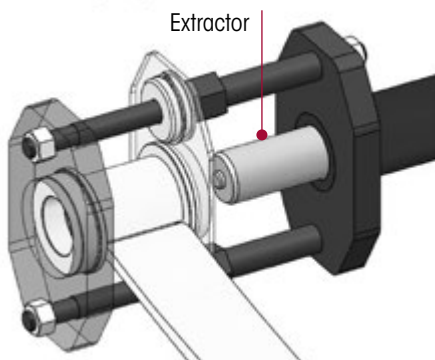
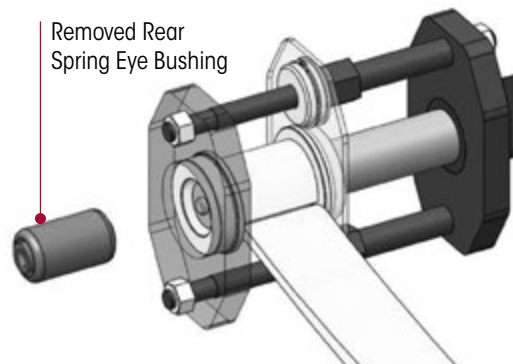


FIGURE 9-18



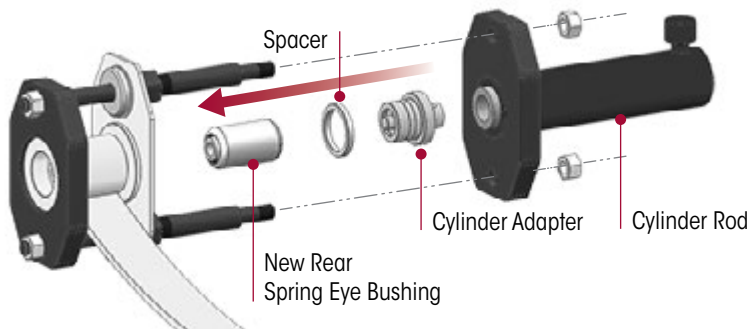
BUSHING INSTALLATION

1. Insert **cylinder adapter** into cylinder rod, see Figure 9-19.
2. Place one (1) **spacer** over the cylinder adapter.
3. Apply Loctite® 680 adhesive to new bushing, being careful to apply the adhesive to metal only. **DO NOT** apply adhesive to the rubber part of the bushing.
4. Hold replacement spring eye bushing against face of cylinder adapter, see Figure 9-19.

WARNING

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

FIGURE 9-19



WARNING

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

5. Activate pump to extend cylinder.
6. Guide spring eye bushing into spring eye, and remove hand after partially inserted.
7. Continue to extend cylinder until the spacer is pressed against bushing support adapter. This will set the proper depth of the replacement spring eye bushing.

SERVICE HINT

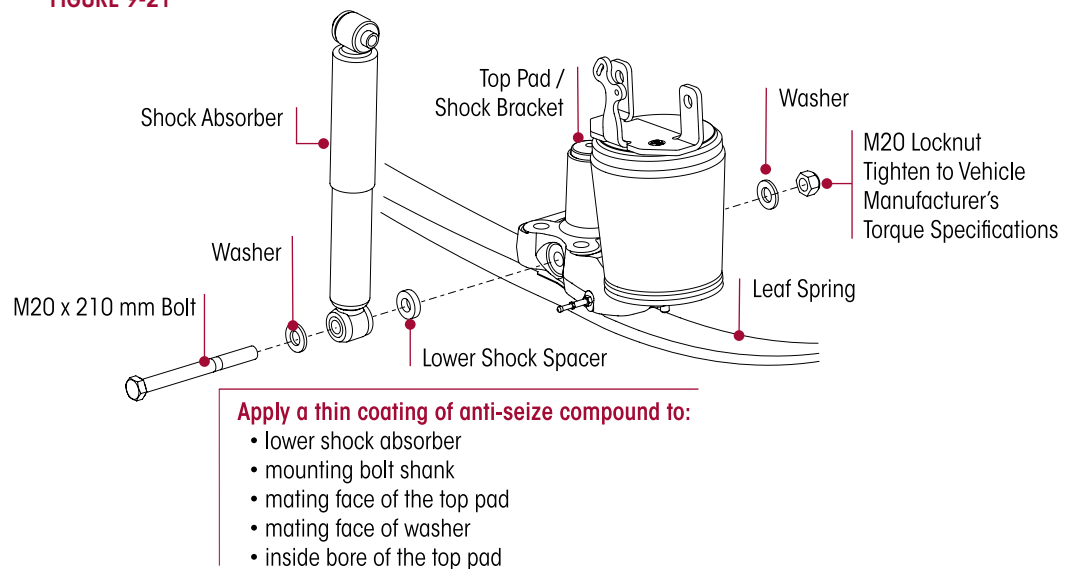
If a different bushing depth is required (up to 10 mm deeper than nominal), operator can reference the lines machined into the diameter of cylinder adapter. When line shown below is flush with the face of bushing support adapter, the proper nominal depth has been achieved, see Figure 9-20.

8. Wipe away any residual Loctite® 680 adhesive from exposed faces of the bushing, spring, and tools.
9. Verify all components are aligned.
10. If **OPTION 1** (In-chassis) proceed to Leaf Spring Installation, if **OPTION 2** (leaf spring and clamp group assembly removed from chassis), proceed to the Leaf Spring and Clamp Group Assembly installation instructions in this section.

OPTION 1 – Leaf Spring Installation

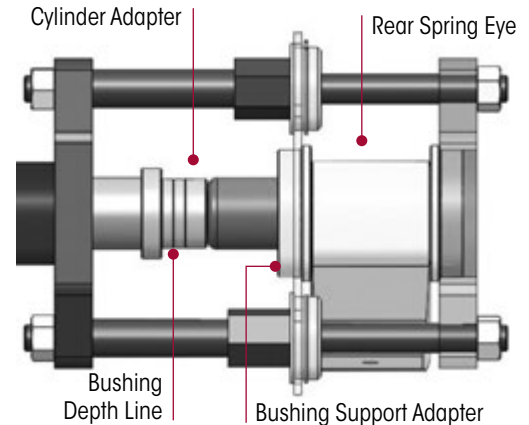
1. **After bushing installation**, raise the axle and spring assembly to engage the rear spring eye bushings into the shackle brackets.
2. Install the spring eye bolt fasteners into the shackle.
3. Snug the front and rear spring eye fasteners to 50 foot pounds (68 Nm).
4. **Apply a thin coating of anti-seize compound** to the shock absorber **lower** mounting bolt shank, to the mating face of the top pad, washers, and to the inside bore of the aluminum top pad. **This is necessary to help prevent seizing of the bolt to the aluminum top pad**, see Figure 9-21.

FIGURE 9-21



5. Install the lower bolt from the outboard side to the inboard side of the top pad and attach the washer and locknut, see Figure 9-21.
6. Tighten the lower shock eye fasteners per vehicle manufacturer's torque specifications.
7. Install tires if removed.
8. Raise the vehicle and remove frame stands.
9. Lower the vehicle.
10. Inflate suspension to ride height.
11. Tighten the both front and rear spring eye fasteners to the required torque.
12. Remove wheel chocks.

FIGURE 9-20



CLAMP GROUP COMPONENTS

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

DISASSEMBLY

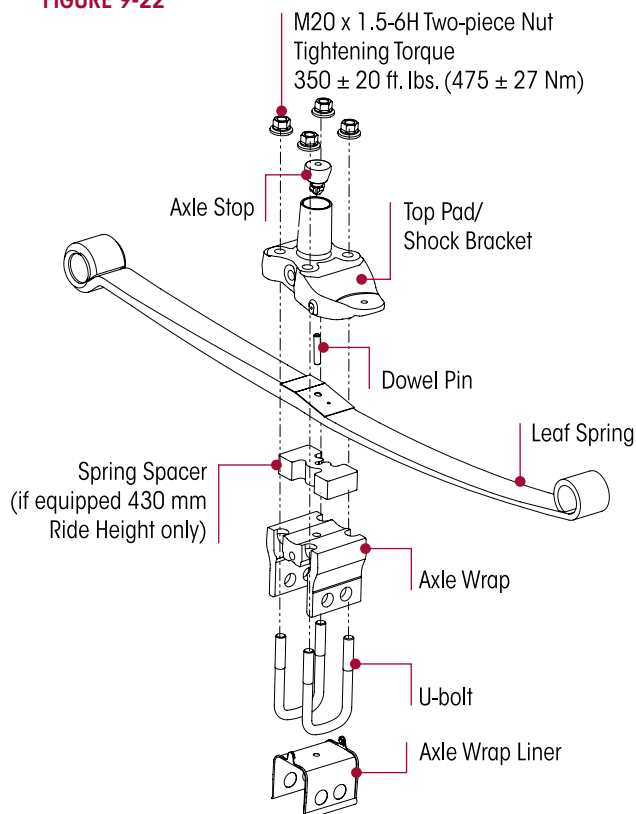
1. Remove the Leaf Spring and Clamp Group Assembly per instructions in this section.
2. Remove and discard the four (4) M20 U-bolt locknuts.
3. Remove the jounce stop and top pad.
4. Remove and discard all plastic leaf spring liners.
5. Remove the leaf spring assembly and leaf spring spacer (if equipped 430 mm ride height only).
6. Remove the dowel pin from the leaf spring.

NOTE

Replace dowel pin if damaged during removal.

7. Remove chassis spacer (if equipped) and note the location.
8. Inspect all clamp group components for any damage, replace as necessary.

FIGURE 9-22



ASSEMBLY

1. Install the new U-bolts under and around axle wrap, see Figure 9-22.
2. Install the dowel pin.
3. Install chassis spacer (if equipped) from same location as removed.
4. Install the leaf spring onto the leaf spring spacer.
5. Install new leaf spring liner onto leaf spring assembly.
6. Install the top pad on top of leaf spring liner.
7. Further install the U-bolts into the holes on the top pad, see Figure 9-22. Loosely install U-bolt locknuts and hand tighten. **DO NOT** tighten to torque at this time.

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 9-23. 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 soft jaw vise when performing the tightening procedure.

8. Secure the clamp group assembly in a suitable holding device, such as a soft jaw vice, see Figure 9-23.

9. Ensure the clamp group U-bolt locknuts are tightened evenly in 100 foot pounds (136 Nm) increments to 350 ± 20 foot pounds (475 ± 27 Nm) torque in the proper pattern to achieve uniform bolt tension, see Figure 9-24.
10. Install the new axle wrap liner under the axle wrap (liner tabs snap to sides of axle wrap), see Figure 9-25.

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.

FIGURE 9-23

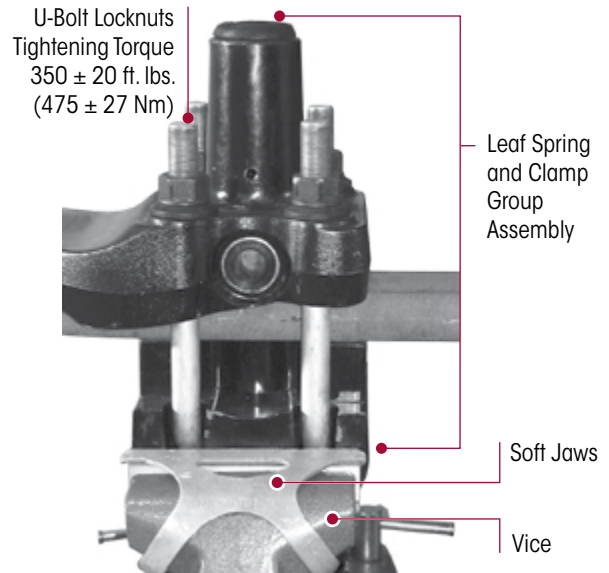


FIGURE 9-24

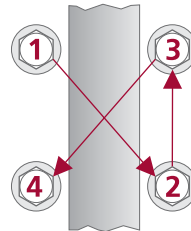
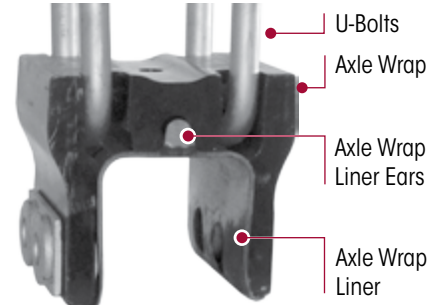
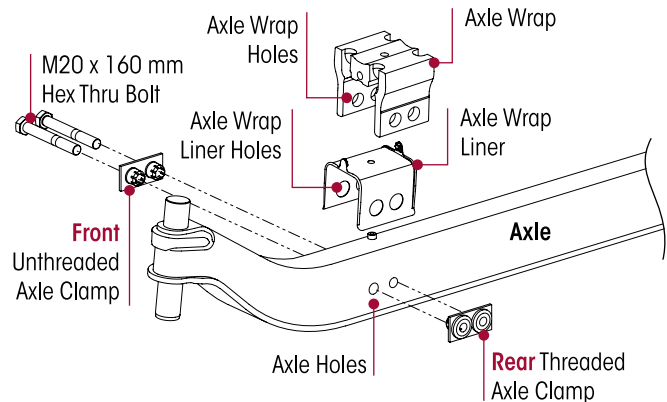


FIGURE 9-25



11. 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, see Figure 9-26.
12. Install the front and rear axle clamps through the axle wrap, axle wrap liner and axle, see Figure 9-26.

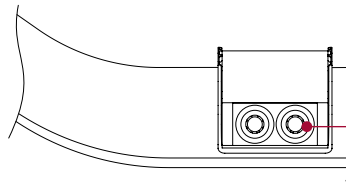
FIGURE 9-26



13. Install the M20 hex thru bolts into the front and rear axle clamps. Snug bolts. **DO NOT** tighten at this time.
14. Raise the axle and the leaf spring assembly into the front hanger and rear shackle assembly.
15. Install the spring eye bolts and fasteners. Snug bolts. **DO NOT** tighten at this time.
16. Install the lower shock bolt, refer to Shock Absorber installation instructions in this publication.
17. Remove the frame supports and load the front axle with the vehicle weight.
18. Inflate the suspension to ride height.

FIGURE 9-27

19. Tighten the axle clamp fasteners at the bolt head evenly in 140 foot pounds (190 Nm) increments to 420 ± 20 foot pounds (569 ± 27 Nm) torque, see Figure 9-27.



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

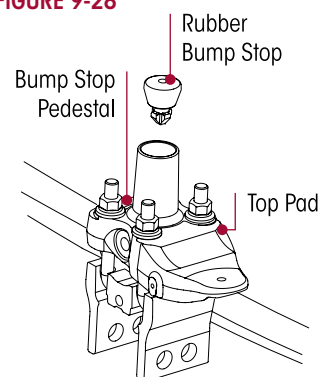
20. Tighten the front and rear spring eye fasteners to the vehicle manufacturer's torque specifications.
21. Remove the wheel chocks.

RUBBER BUMP STOP

REMOVAL

1. Insert a small pry bar between the rubber bump stop and the inside of the bump stop pedestal.
2. Apply downward force on the pry bar and pull the rubber axle stop out of the bump stop pedestal, see Figure 9-28.
3. Inspect the bump stop pedestal and frame rail flange for any contact damage.
4. Clean any debris from inside the bump stop pedestal.

FIGURE 9-28



INSTALLATION

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

STEERTEK NXT AXLE

AXLE DISASSEMBLY FROM CHASSIS

Refer to Parts List section of this publication when replacing the AIRTEK 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 AIRTEK NXT SUSPENSION. THE USE OF A TORCH CAN CAUSE DAMAGE TO CERTAIN AIRTEK NXT COMPONENTS THAT CAN RESULT IN LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

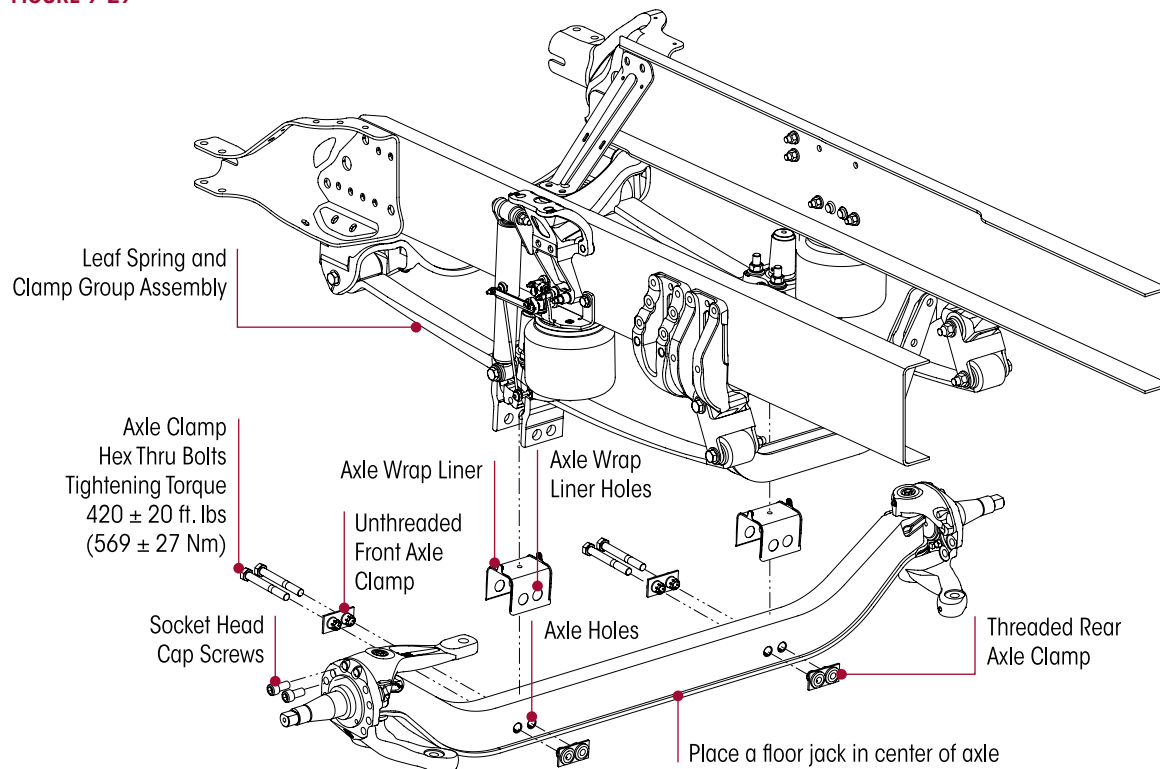
3. Raise the frame.
4. Support the vehicle with frame stands and suspend the front axle with the shocks attached.

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. AIRTEK 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.

5. Remove the front wheels, hubs, brake shoes, ABS sensors, and backing plate assembly per the vehicle manufacturer's guidelines.
6. Disconnect the drag link from the steering arm.

7. Support the axle with a suitable jack.
8. Remove the M20 axle clamp hex thru bolts and clamps, see Figure 9-29.
9. Lower the axle and remove from the vehicle.

FIGURE 9-29


■ STEERTEK NXT AXLE (Removed from Chassis)

DISASSEMBLY

1. Remove the tie rod assembly, refer to Tie Rod Ends and Cross Tube in this section.

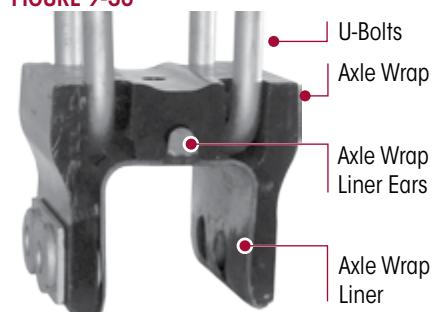
WARNING

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

2. Remove the two (2), $\frac{5}{8}$ " socket head cap screws from the steering knuckle assembly, see Figure 9-29.
3. Remove the steering knuckle, thrust bearing, and shims (if equipped).
4. After complete removal of the one side, repeat Steps 2 and 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.

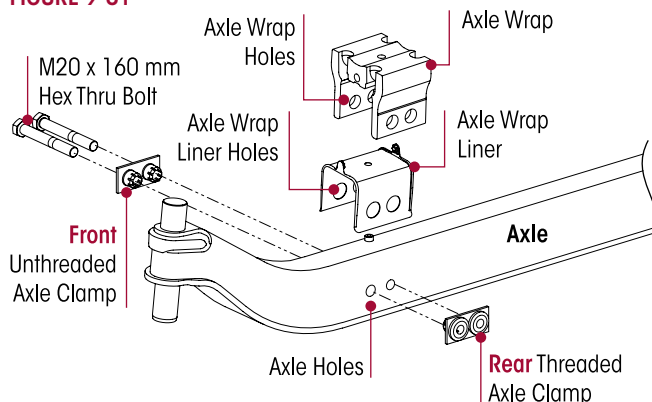
INSTALLATION

1. Place the new axle on the floor jack and position the axle under the vehicle.
2. Install the new axle wrap liner under the axle wrap (liner taps snap to the side of the axle wrap), see Figure 9-30.
3. Raise the axle into position.

FIGURE 9-30


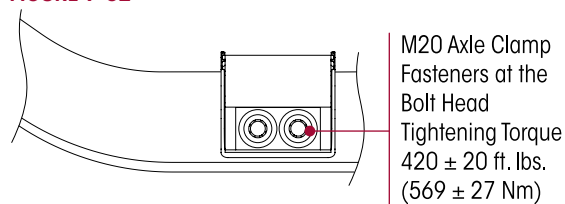
4. Ensure the axle wrap liner holes are lined up with the axle wrap and axle holes, see Figure 9-31.
5. Install the front unthreaded and rear threaded axle clamps through the axle wrap, axle wrap liner and axle, see Figure 9-31.

FIGURE 9-31



6. Install the new M20 hex thru bolts. **DO NOT** tighten to torque at this time, see Figure 9-31.
7. Snug the axle clamp fasteners to 100 foot pounds (136 Nm).
8. Install the steering knuckles, refer to the Steering Knuckle Assembly instructions in this section.
9. Install the tie rod assembly in the Ackermann arms.
10. Install the $\frac{7}{8}$ " hardened washers on the Ackermann arm and the castle nuts. Tighten the castle nuts to 185 foot pounds (251 Nm), then rotate until the first castle slot lines up with the cotter pin bore in the tie rod end. **DO NOT** back off nut for cotter pin installation.
11. Install the tie rod end cotter pin.
12. Connect the drag link in the steering arm.
13. Install the castle nut on the drag link taper stud. Tighten the castle nut to 185 foot pounds (251 Nm), then rotate until the first castle slot lines up with the cotter pin bore in the drag link. **DO NOT** back off nut for cotter pin installation.
14. Install the drag link cotter pin.
15. Install the brake backing plate assemblies and ABS sensor and torque all fasteners per manufacturer's specifications.
16. Install the brakes, hubs, and wheels per the vehicle manufacturer's guidelines.
17. Raise the vehicle and remove the frame supports.
18. Lower the vehicle and load the front axle with the truck's weight. Remove the floor jack.

FIGURE 9-32



19. Tighten the axle clamp fasteners at the bolt head evenly in 140 foot pounds (190 Nm) increments to 420 ± 20 foot pounds (569 ± 27 Nm) torque, see Figure 9-32.
20. Remove the wheel chocks.
21. Fill the hubs with the proper lubricant, (see manufacturer's guidelines for recommended lubrication), if required.
22. Grease the front steering components as per lubrication guidelines in the Preventive Maintenance section of this publication.

■ STEERING KNUCKLE DISASSEMBLY

YOU WILL NEED:

Refer to the Special Tools section of this publication.

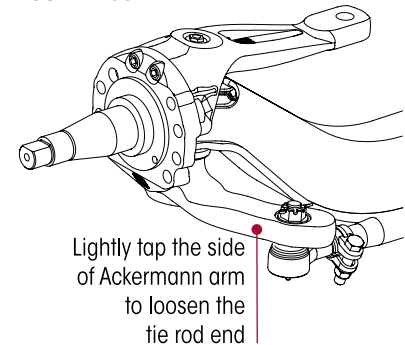
- Kingpin Bushing Installer / Remover Tool
- Adjustable Straight Flute Reamer
- A hydraulic shop press with a minimum forcing capacity of 2.5 tons

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.

1. Place the vehicle on level floor.
2. Chock the wheels.
3. Support the vehicle with jack stands under the axle.
4. Remove the wheel and hub assembly.
5. Remove the brake components from steering knuckle.
6. Remove the tie rod assembly.

FIGURE 9-33



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 9-33.

7. Remove the drag link from the knuckle if necessary.

FIGURE 9-34



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 9-34.
9. Remove the lower steering knuckle from the kingpin by sliding it down the kingpin.
10. Remove the upper steering knuckle by sliding it up off the kingpin.

■ KINGPIN PREPARATION AND MEASUREMENT

CLEANING 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.

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 AIRTEK 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 9-35 through 9-38.
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 9-39 through 9-42. **Kingpin minimum dimension is 1.802".**

FIGURE 9-35



FIGURE 9-36



FIGURE 9-37

FIGURE 9-38

FIGURE 9-39

FIGURE 9-40

FIGURE 9-41

FIGURE 9-42


■ KINGPIN BUSHING REMOVAL

WARNING

BEFORE APPLYING HYDRAULIC PRESSURE TO ANY TOOLING SET-UP, ALWAYS CHECK TO ENSURE THE PRESS PLATE, ADAPTERS, 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.

CAUTION

PRIOR TO APPLYING HYDRAULIC PRESSURE TO REMOVE OR INSTALL THE KINGPIN BUSHING, SUPPORT THE LOWER STEERING KNUCKLE AS SHOWN IN FIGURES 9-43 AND 9-44. IMPROPER SUPPORT TO THE STEERING KNUCKLES CAN CAUSE COMPONENT DAMAGE.

1. Remove the threaded grease cap and grease zerk.
2. Ensure that each part of the steering knuckle assembly is squarely supported on the receiving tool before applying hydraulic pressure to press out the kingpin bushings, see Figures 9-43 through 9-45.
3. Place the AIRTEK NXT kingpin bushing Installer/Remover tool in the steering knuckle/kingpin bore.
4. Press out the kingpin bushing.
5. Clean the parts and inspect for reassembly, see Figure 9-46.

FIGURE 9-43

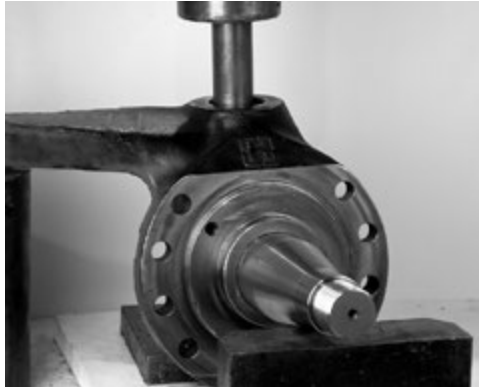


FIGURE 9-44



FIGURE 9-45



FIGURE 9-46



■ 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 9-47 through 9-49. If the average measurement is more than the knuckle bore maximum diameter specification, replace the knuckle.

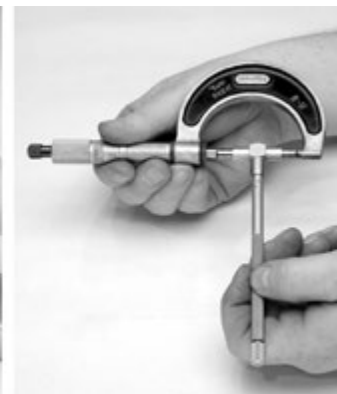
FIGURE 9-47



FIGURE 9-48



FIGURE 9-49



■ KINGPIN BUSHING INSTALLATION

⚠ WARNING

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

1. Install the lower or upper steering knuckle in the press. Ensure that each part of the steering knuckle assembly is squarely supported on the receiving tool before applying hydraulic pressure to press in the kingpin bushings.
2. Always install the kingpin bushing from the machined side (axle side) of the lower steering knuckle using a bushing installer / removal tool, (see specifications in the Special Tools section of this publication). Press in bushing to a depth of no less than $\frac{15}{64}$ " (0.236") or 6 millimeters and no more than $\frac{5}{16}$ " (0.32") or 8 millimeters, see Figures 9-50 through 9-52.
3. Following this procedure it is necessary to ream the kingpin bushings to fit the kingpins, see Kingpin Bushing Reaming Instructions in this section.

FIGURE 9-50



FIGURE 9-51



FIGURE 9-52



■ KINGPIN BUSHING REAMING

⚠ CAUTION

REAM THE KINGPIN BUSHINGS WITH AN ADJUSTABLE STRAIGHT FLUTE REAMER. (SEE SPECIAL TOOLS SECTION OF THIS PUBLICATION) DO NOT HONE OR BURNISH THE KINGPIN BUSHINGS. HONING OR BURNISHING WILL DAMAGE THE BUSHINGS AND VOID ANY APPLICABLE WARRANTY.

⚠ WARNING

WHEN INSTALLING STEERING KNUCKLE COMPONENTS IN A VISE IT IS NECESSARY TO PROTECT THE MACHINED SURFACES FROM GOUGES OR MARRING BY USING BRASS JAWS. 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.

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 9-53 and 9-54.
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.
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.

⚠ WARNING

PRIOR TO INSTALLATION ENSURE THAT ALL RESIDUAL LOCTITE® MATERIAL IS REMOVED FROM THE MOUNTING BOLTS AND THE THREAD BORES IN THE UPPER STEERING KNUCKLES, AND NEW LOCTITE 277 OR EQUIVALENT IS APPLIED TO HELP ENSURE THAT THE BOLTS SUSTAIN THE PROPER TORQUE REQUIREMENT. FAILURE TO DO SO CAN CAUSE LOSS OF VEHICLE CONTROL RESULTING IN PERSONAL INJURY OR PROPERTY DAMAGE.

FIGURE 9-53

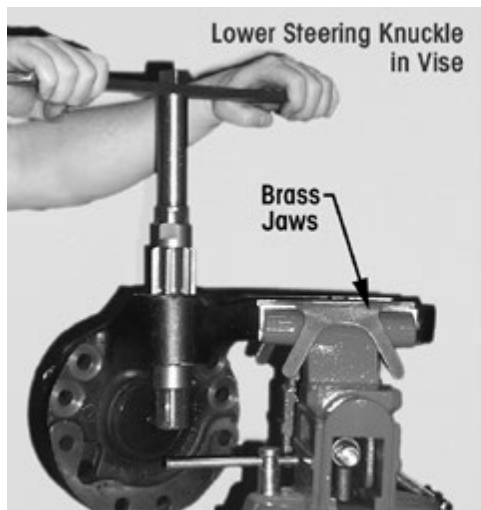


FIGURE 9-54



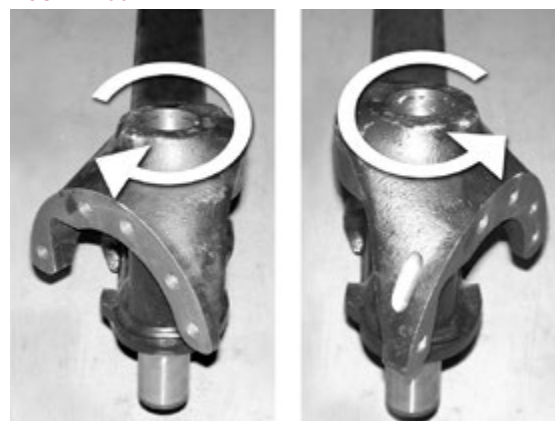
6. Clean the $\frac{5}{8}$ " brake backing plate bolts with a wire wheel and run a tap through the threads of the lower steering knuckle assembly and then flush out with brake cleaner and dry with compressed air.

NOTE

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

7. Install the upper and lower steering knuckle on the kingpin.
8. Check for the proper fit by rotating the knuckle assembly back and forth to verify there is no binding on the kingpin, see Figure 9-55.
9. If the bushing is too tight repeat Steps 1 through 8 until the proper clearance is achieved.

FIGURE 9-55

**NOTE**

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

■ KINGPIN SEAL INSTALLATION

1. Place the steering knuckle assembly in a vise with brass 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 a kingpin bushing Installer/Remover tool (see Special Tool section) and press seal firmly into the steering knuckle assembly.
4. Double Lip design, see Figure 9-56. Install the kingpin seal until it bottoms out in the kingpin bore.

FIGURE 9-56

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



■ STEERING KNUCKLE ASSEMBLY

1. After replacement of the kingpin bushings it is necessary to re-assemble the steering knuckle assemblies.

NOTE

DO NOT substitute aftermarket components when servicing. The left and right side of the AIRTEK NXT system have steel roller thrust bearings, see Figure 9-57.

FIGURE 9-57

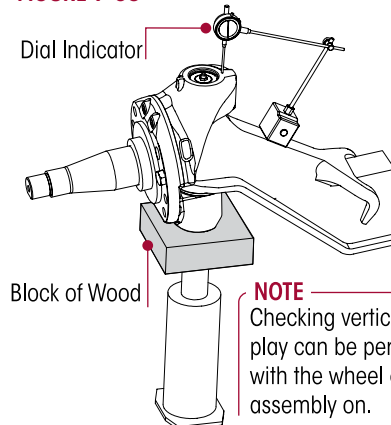
Top View of Thrust Bearings



2. Install the thrust bearing on the lower kingpin with the seal facing up toward axle (the black seal will designate the top side), see Figure 9-57.
3. Install the shim, if equipped, on the upper kingpin.
4. Pack the bushing dimples on the upper and lower steering knuckles with multi purpose Lithium based grease (NLGI Grade 2) before installation.
5. Install the upper steering knuckle on the upper arm kingpin.
6. Install the lower steering knuckle on the lower kingpin and install the old socket head cap screws loose into the top two (2) threaded holes.

7. 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 9-58. These are for guide purposes only.
8. Snug the two (2) socket head cap screws.
9. Lower the bottle jack so that all the vertical end play is on the underside of the axle.
10. 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 9-58.
11. Zero the dial indicator.

FIGURE 9-58



NOTE

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

12. Raise the bottle jack until there is **NO CLEARANCE** between the knuckle assembly and the bottom of the axle, slightly lifting the axle.
13. Check the reading on the dial indicator. The specification for vertical travel on the steering knuckle during assembly is 0.008" to 0.011".
14. If the clearance is **above 0.011"**, loosen the socket head cap screws and **push down** on the knuckle assembly until the proper vertical end play is achieved.
If the clearance is **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.

WARNING

PRIOR TO INSTALLATION ENSURE THAT ALL RESIDUAL LOCTITE MATERIAL IS REMOVED FROM THE MOUNTING BOLTS AND THE THREAD BORES IN THE UPPER STEERING KNUCKLE, AND NEW LOCTITE 277 OR EQUIVALENT IS APPLIED TO HELP ENSURE THAT THE BOLTS SUSTAIN THE PROPER TORQUE REQUIREMENT. FAILURE TO DO SO CAN CAUSE LOSS OF VEHICLE CONTROL RESULTING IN PERSONAL INJURY OR PROPERTY DAMAGE.

15. Remove one (1) old socket head cap screw and replace with new socket head cap screw.

16. Remove second socket head cap screw and replace with new socket head cap screw. Tighten both socket head cap screws to 188 ± 12 foot pounds (255 ± 16 Nm) torque.
17. Recheck the vertical end play with the dial indicator, see Figure 9-58, or a 0.010" feeler gauge.
18. Remove the brake spider bolts, they should thread out freely.
19. Remove the bottle jack and continue assembling the wheel ends.

IMPORTANT NOTE

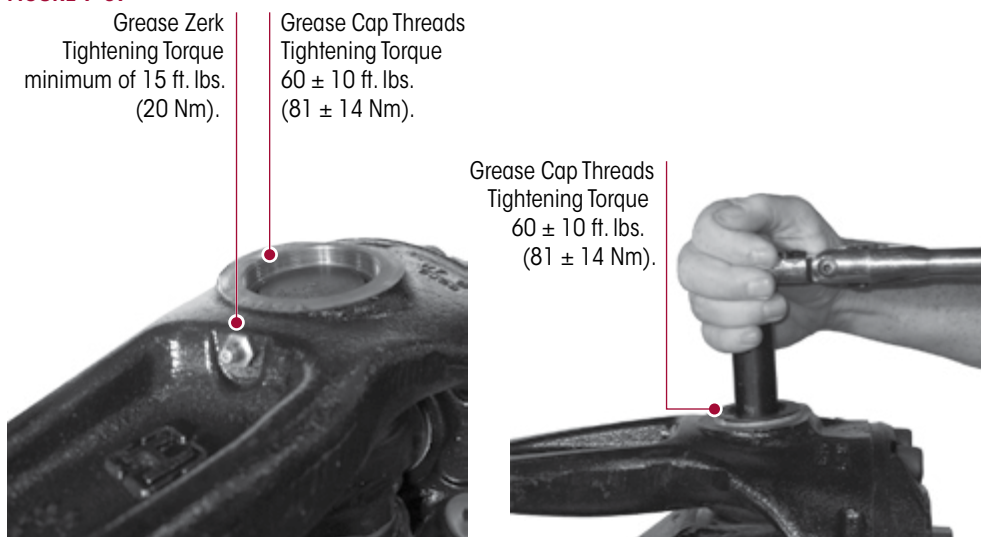
It is critical to apply Loctite to the three (3) brake spider bolts to ensure that these bolts sustain the proper torque requirement of steering knuckle assembly.

20. Apply Loctite to the three (3) brake spider bolts prior to installation into the brake spider. Tighten bolts to 188 ± 12 foot pounds (255 ± 16 Nm) 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.

21. Install the tie rod end into the lower steering knuckle arm.
22. Tighten the castle nuts to 185 foot pounds (251 Nm) torque then rotate the castle nut to the next castle slot and install cotter pin.
23. Install the drag link into the steering arm and tighten to the vehicle manufacturer's specifications.
24. Install new O-rings on the grease caps and lubricate O-rings with grease.
25. Install new grease caps. Note the grease caps on the AIRTEK NXT system are threaded, tighten to 60 ± 10 foot pounds (81 ± 14 Nm) torque. Allow 30 minutes for thread sealant to cure before greasing. Install new grease zerk and tighten to a minimum of 15 foot pounds (20 Nm), see Figure 9-59.

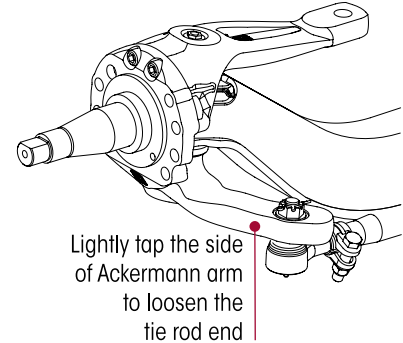
FIGURE 9-59

26. Install brakes, drums, wheels and tires.
27. Remove jack and safety stands.
28. Grease steering knuckles with the vehicle on the floor.
29. Remove the wheel chocks.

TIE ROD ENDS AND CROSS TUBE

NOTE:

Hendrickson supplies different tie rod configurations. Prior to ordering, locate the part number on the tie rod tube, for additional information see Hendrickson Technical Bulletin SEU-0223 or contact Hendrickson Tech Services.

FIGURE 9-60

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 9-60.
5. Repeat to 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 soft jaw 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.

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 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

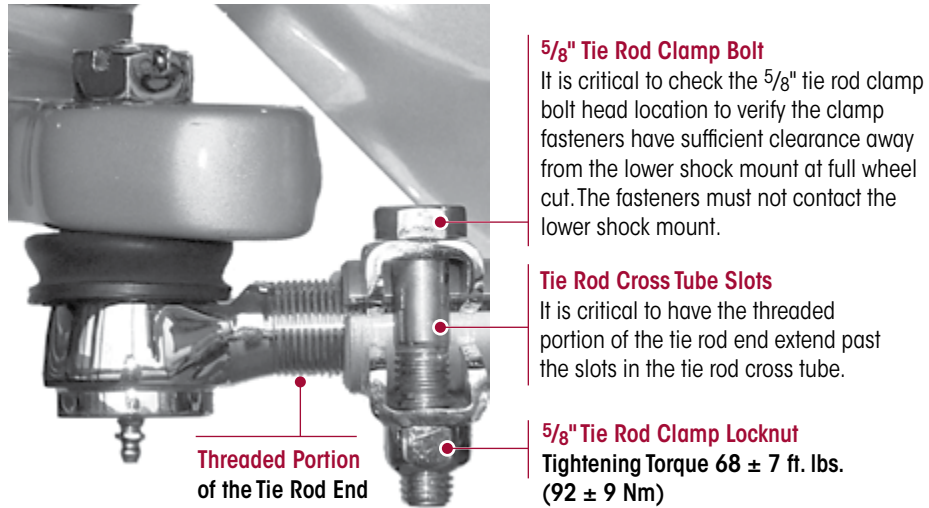
THE THREADED PORTION OF THE TIE ROD END MUST EXTEND PAST THE SLOTS INTO THE TIE ROD CROSS TUBE, SEE FIGURE 9-61. FAILURE TO DO SO CAN CAUSE COMPONENT DAMAGE, LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

WARNING

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

3. Replace the opposing tie rod end if necessary by repeating Steps 1 and 2.
4. It is critical that the cross tube rotate in the opposing tie rod end, even if it is not replaced.

FIGURE 9-61

 **WARNING**

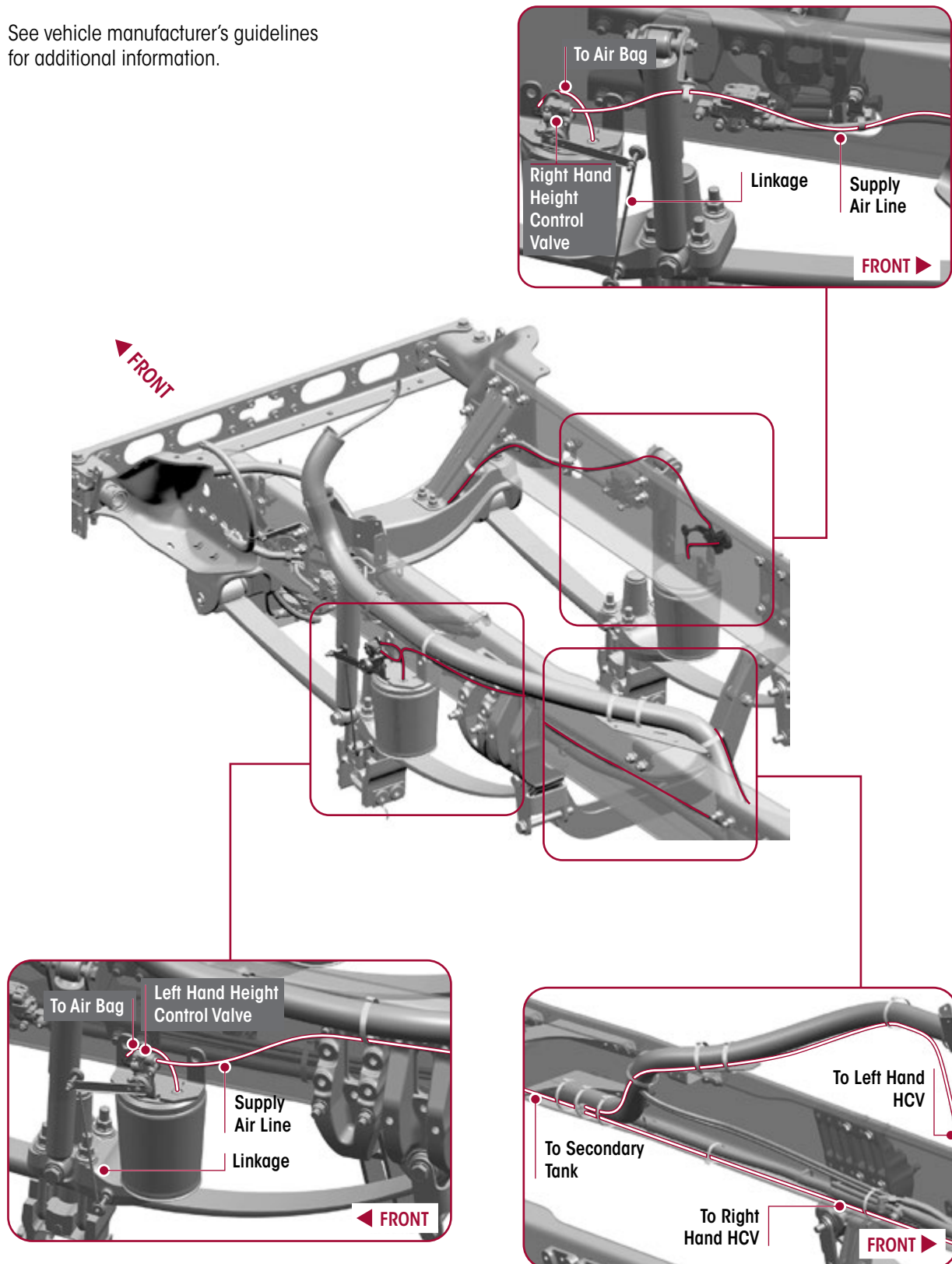
DO NOT HEAT THE CROSS TUBE WITH A TORCH TO ROTATE THE CROSS TUBE IN THE TIE ROD END. THE USE OF SUCH HEAT CAN ADVERSELY AFFECT THE STRENGTH OF THE CROSS TUBE. A COMPONENT DAMAGED IN THIS MANNER WILL RESULT IN LOSS OF WARRANTY, AND CAN RESULT IN LOSS OF VEHICLE CONTROL, AND POSSIBLE PERSONAL INJURY OR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

5. Install the tie rod end into the lower steering knuckle.
6. Tighten the castle nut to 185 foot pounds (251 Nm) torque then rotate the castle nut to the next castle slot and install cotter pin. **DO NOT** back off nut for cotter pin installation
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 Plumbing Diagram

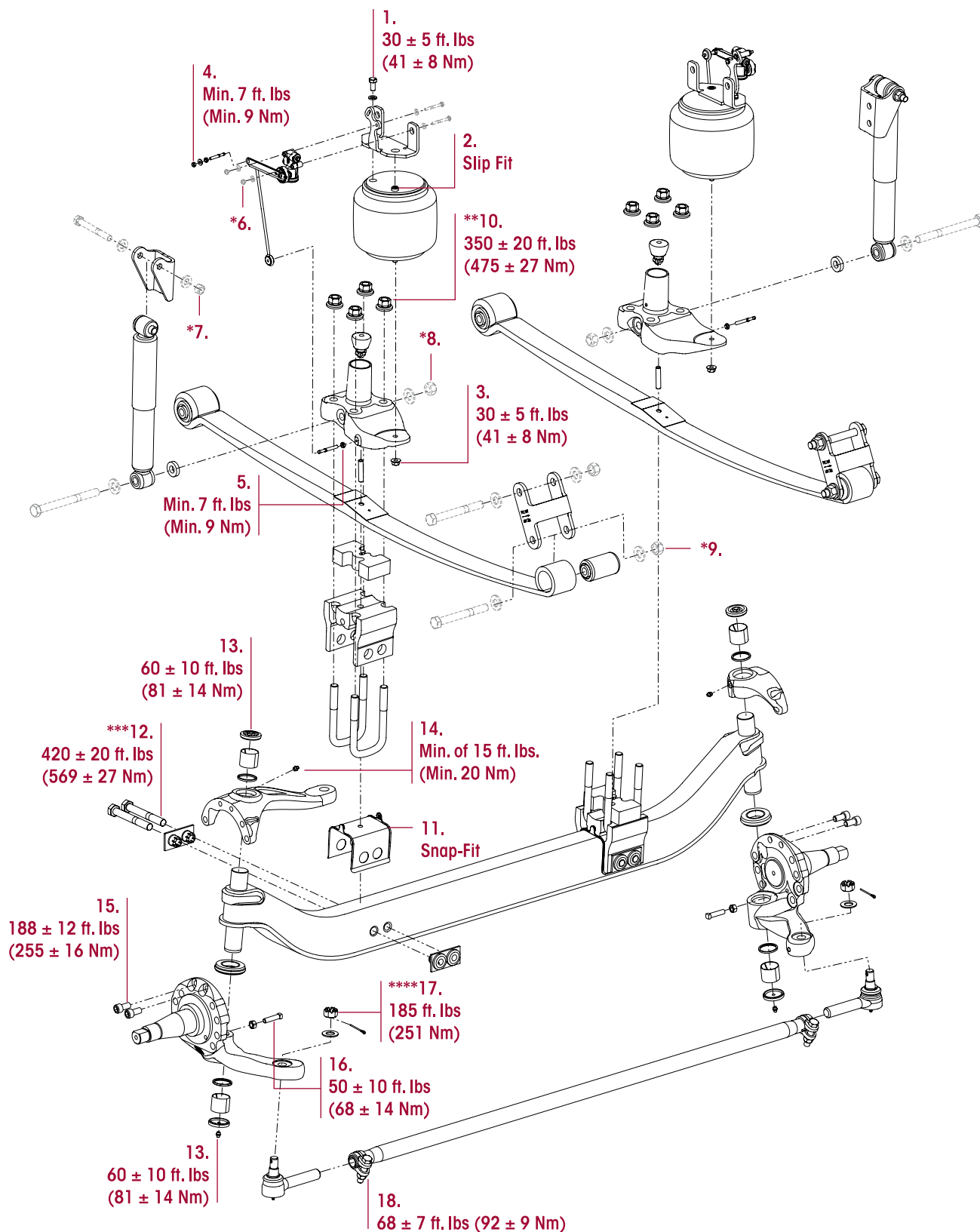
See vehicle manufacturer's guidelines for additional information.



SECTION 11

Torque Specifications

Hendrickson recommended torque values
provided in Foot Pounds and in Newton Meters





AIRTEK NXT

HENDRICKSON RECOMMENDED TORQUE SPECIFICATIONS

NO.	COMPONENT	FASTENER		TORQUE VALUE	
		QTY.	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	Air Spring Threaded Stud	2	½"	30 ± 5	41 ± 8
2	Air Spring PTC Fitting		¼"	Slip Fit	
3	Air Spring to Top Pad	2	M12	30 ± 5	41 ± 8
4	Height Control Valve to Linkage Rod	2	5/16"	Minimum of 7	Minimum of 9
5	Link Mount to Top Pad	2	5/16"	Minimum of 7	Minimum of 9
6	Height Control Valve to Air Spring Bracket	4	¼"	*	*
7	Upper Shock Absorber	2	M16	*	*
8	Lower Shock Absorber to Top Pad/Shock Bracket	2	M20	*	*
9	Rear Shackle to Clamp Group Assembly	4	M20	*	*
10	Clamp Group U-bolt Fastener	4	M20	**350 ± 20	**475 ± 27
11	Axle Wrap Liner	2		Snap Fit	
	WARNING: ENSURE CLAMP GROUP IS ALIGNED PROPERLY PRIOR TO TIGHTENING HARDWARE. FAILURE TO DO SO CAN CAUSE ADVERSE VEHICLE HANDLING, PROPERTY DAMAGE OR PERSONAL INJURY.				
12	Axle Clamp to Axle at the Bolt Head	4	M20	***420 ± 20	***569 ± 27
13	Grease Cap Assembly - Upper and Lower	4	½"	60 ± 10	81 ± 14
14	Grease Zerk	2		Minimum of 15	Minimum of 20
15	Knuckle Attachment Bolt (Socket Head Cap Screw)	4	5/8"	188 ± 12	255 ± 16
16	Knuckle / Axle Wheel Stop Bolt	2	½"	50 ± 10	68 ± 14
17	Tie Rod Ends / Drag Link to Steering Knuckle	2	7/8" Castle Nut	****185	****251
18	Tie Rod Tube to Tie Rod Ends	2	5/8"	68 ± 7	92 ± 9
• All hardware ¼" and greater is Grade 8 with no additional lubrication.					
NOTES: * Not supplied by Hendrickson, used for reference only. Follow the torque specification listed in the vehicle manufacturer's service manual. ** Tighten the M20 clamp group U-bolt locknuts evenly in 100 foot pounds (136 Nm) increments in the proper pattern to achieve uniform bolt tension. *** Tighten the axle clamp fasteners at the bolt head evenly in 140 foot pounds (190 Nm) increments. **** Tighten to 185 foot pounds (251 Nm) torque, advance nut to next hex face to install cotter pin. DO NOT back off nut for cotter pin installation.					

SECTION 12

Troubleshooting Guide

AIRTEK 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	Lubricate 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	Check ride height prior and adjust caster to specification
	Wheels and/or tires out of balance	Balance or replace wheels and/or tires
	Worn shock absorbers	Replace shock absorbers
	Worn thrust washers and rear hanger clamps	Replace thrust washers and rear hanger clamps
	Broken engine mount	Replace engine mount
	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 the vehicle manufacturer's specification.
	Tires out of balance	Balance or replace tires
	Incorrect tandem axle alignment	Align tandem axles
	Incorrect toe setting	Adjust toe-in to the vehicle manufacturer's specification
	Incorrect steering arm geometry	Repair steering system as necessary
	Worn kingpin bushings	Replace kingpin bushings
	Excessive wheel bearing end play	Adjust wheel nut torque to the vehicle manufacturer's specification, replace worn or damaged wheel bearings
	Wheel bearing adjustment	Adjust wheel bearing to the vehicle manufacturer's specifications.
Vehicle is hard to steer	Low pressure in the power steering system	Repair power steering system
	Steering linkage needs lubrication	Lubricate steering linkage
	Steering knuckles are binding	Check vertical clearance
	Incorrect steering arm geometry	Repair steering system as necessary
	Caster out of specification	Check ride height prior and adjust caster to specification
	Tie rod ends hard to move	Replace tie rod ends
	Worn thrust bearing	Replace thrust bearing
	Steering gear box internal problem	Perform steering gear trouble shooting procedures per steering gear box manufacturer's guidelines.

**AIRTEK NXT****TROUBLESHOOTING GUIDE**

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

SECTION 13

Alignment Specifications

AIRTEK NXT

FRONT SUSPENSION ALIGNMENT SPECIFICATIONS			
CAMBER ¹	DESIGN SPECIFICATION	RANGE	
		MINIMUM	MAXIMUM
LEFT	0°±1°	-1°	+1°
RIGHT	-0.25°±1°	-1.25°	+0.75°
CROSS	0°	—	+2°
CAMBER NOTES: ¹ The camber angle is not adjustable. DO NOT bend axle or otherwise try to adjust camber. If found out of specification, notify Hendrickson Tech Services for further information.			
CASTER ^{1,2}	DESIGN SPECIFICATION	RANGE	
		MINIMUM	MAXIMUM
LEFT	4°+1° / 4°-0.5°	+3.5°	+5°
RIGHT	4°+1° / 4°-0.5°	+3.5°	+5°
CROSS ³	0°	—	+1.5°
CASTER NOTES: ¹ 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. ² In most cases actual vehicle caster is defined with the frame rails at zero slope. Refer to the vehicle manufacturer's specifications for correct frame rail slope. (Both the alignment surface and the vehicle's frame rails should be level during execution of alignment procedures). For vehicles with a positive frame rake (higher in rear) add the frame slope (in degrees) to the caster reading to determine true vehicle caster. ³ The Cross caster angle is not adjustable – DO NOT bend axle or otherwise try to adjust cross caster. If 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 different angle caster shims will not correct cross caster. ⁴ Example of caster adjustment: 3° RH / 2.5° Left Hand would require one (1), 1° shim on each side to increase caster and achieve 4.0° Right Hand and / 3.5° Left Hand. DO NOT attempt to use uneven shims.			
Hendrickson recommends the following TMC ² practices:			
	DESIGN SPECIFICATION ¹	RANGE	
		MINIMUM	MAXIMUM
TOTAL TOE²	1/16" ± 1/32" (0.06" ± 0.03")	1/32" (0.03")	3/32" (0.09")
TOE-IN NOTES: ¹ Toe-in is to be set and adjusted in the normal vehicle unladed configuration. Actual vehicle curb weight on the ground. Toe should be checked at the tires front and rear tread center, at a distance above ground equal to the tire's rolling radius. ² In most instances total toe is set by the vehicle manufacturer or body builder. Consult the vehicle manufacturer for specifications.			

**SECTION 14****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
2200 Mill Road
Alexandria, VA 22314

Phone: 703-838-1763
website: tmc.truckline.com
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
-----------	---

www.hendrickson-intl.com



Truck Commercial Vehicle Systems
800 South Frontage Road
Woodridge, IL 60517-4904 USA

1.866.755.5968 (Toll-free U.S. and Canada)
1.630.910.2800 (Outside U.S. and Canada)
Fax 1.630.910.2899