



H TECHNICAL PROCEDURE

AIRTEK® Front Air Suspension System for Tiffin Motorhome Chassis

SUBJECT: Service Instructions

LIT NO: 17730-319

DATE: March 2019

REVISION: A

TABLE OF CONTENTS

| | | | | | |
|------------------|---|----|-------------------|---|----|
| Section 1 | Introduction | 2 | Section 8 | Alignment & Adjustments | |
| Section 2 | Product Description | 2 | | Alignment Definitions | 26 |
| Section 3 | Important Safety Notice | 4 | | Inspection Prior to Alignment | 28 |
| Section 4 | Special Tools | 9 | | Front Wheel Alignment | 29 |
| Section 5 | Parts Lists | 10 | | Ride Height Verification | 31 |
| Section 6 | Towing Procedure | 13 | | Steering Stop | 31 |
| Section 7 | Preventive Maintenance | | | Toe Setting | 32 |
| | Visual Inspection | 15 | Section 9 | Component Replacement | |
| | Component Inspection | 15 | | Fasteners | 35 |
| | Lubrication Intervals | 16 | | Air Spring | 35 |
| | Kingpin Lubrication | 16 | | Front Leaf Spring Frame Hanger | 37 |
| | Tie Rod End Lubrication | 17 | | Rear Shackle Bracket | 38 |
| | Tie Rod End | 17 | | Leaf Spring Assembly | 39 |
| | Height Control Valve | 19 | | Shock Absorber | 42 |
| | Brakes and Wheel Bearing End Play | 20 | | Front Axle Assembly – STEERTEK NXT Axle | 42 |
| | Clamp Group Re-Torque | 20 | | STEERTEK NXT Axle Removal | 42 |
| | Kingpin Bushing | 20 | | Tie Rod End and Cross Tube | 55 |
| | Steering Knuckle | 21 | Section 10 | Front Wheel Alignment Specifications | 57 |
| | Surface Paint Wear | 22 | Section 11 | Troubleshooting Guide | 58 |
| | Shock Absorber | 22 | Section 12 | Torque Specifications | 60 |
| | Tire Inspection | 24 | Section 13 | Reference Material | 63 |

SECTION 1

Introduction

This publication is intended to acquaint and assist maintenance personnel in the preventive maintenance, service, repair and rebuild of the following Hendrickson equipment as installed on applicable Tiffin Motorhome Chassis:

- **AIRTEK®** — An integrated front air suspension with the STEERTEK NXT axle
- **STEERTEK NXT** — A durable, lightweight, fabricated steer axle assembly

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 the AIRTEK Suspensions and the STEERTEK NXT axle.

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

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

SECTION 2

Product Description

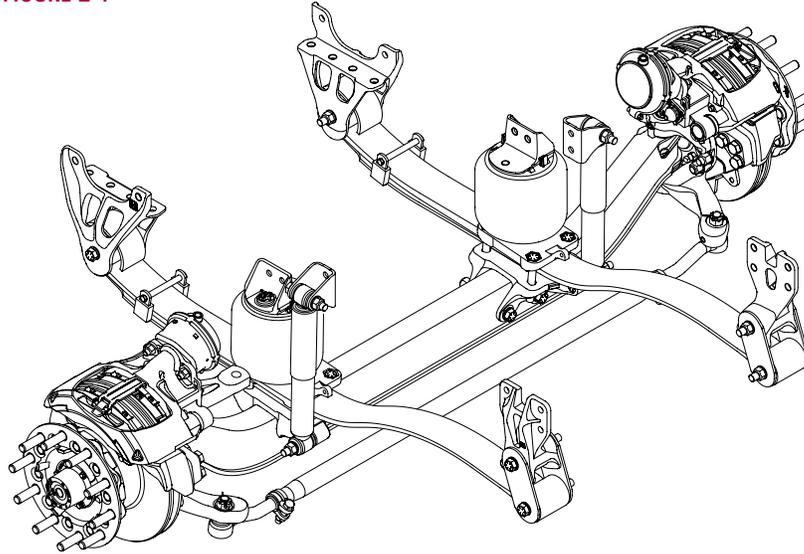
AIRTEK — An integrated front air suspension and fabricated steer axle that work together to form an integrated torsion system. This lightweight system provides driver comfort and is ideal for a variety of applications. Utilizing a system approach, Hendrickson has engineered and optimized the following components to form a system delivering superior ride, stability and handling characteristics with reduced weight and maintenance.

- **Air springs** — Exclusive to Hendrickson, the lightweight air springs deliver a soft ride. The “push-to-connect” air supply design also provide fast and easy installation and removal.
- **Frame brackets** — Optimized design delivers weight reduction and proven durability. The front and rear frame brackets are common between the AIRTEK suspensions.
- **Leaf spring assembly** — With its innovative design, the leaf spring provides superior stability, performance and a soft ride. The patented leaf spring shares loads with the air spring. Durable rubber front and patented rear bushings are greaseless and only require periodic inspections.
- **Shock absorbers** — AIRTEK utilizes premium shocks that have been tested and tuned specifically for the suspension system.

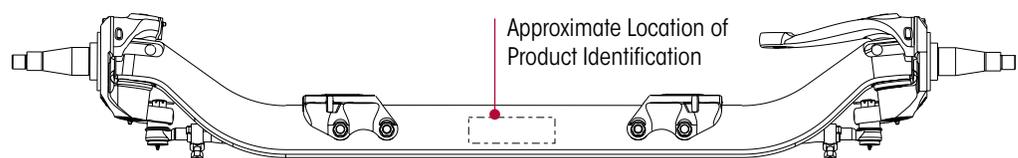
STEERTEK NXT — Integrated into the AIRTEK system, the box-shaped design provides a stiffer axle and resists torsional, longitudinal and vertical loads more effectively than traditional I-Beam axles. Together with the front limbs of the leaf springs, the fabricated axle beam forms a torsion system, enhancing roll stability characteristics and improving handling.

- **Adjustable tie rod** — To help maximize tire life, the tie rod easily adjusts toe-in/out.
- **Axle clamp group** — The Clamp Group consists of the top pad, 3/4" hex bolts, washers, and nylon locknuts
- **Brake Compatibility** — Compatible with ADB 22X air disc brakes.

- **Integrated axle seats** — Integrated axle seats to improve ground clearance, reduce part count, and simplify assembly.
- **Steering knuckles** — The steering and tie rod arms are integrated for increased strength and reduced weight. The unique steering knuckle packaging delivers up to a maximum of 50° wheel cut. The two piece knuckle design makes replacing the kingpin bushings easier by eliminating the need to remove the kingpins.

FIGURE 2-1**TECHNICAL NOTES**

1. AIRTEK is approved for on-highway use; other applications must be pre-approved by Hendrickson Sales Engineering. System capacity rating for the suspension represents maximum loads on tires at ground level.
2. The STEERTEK NXT axle is available with 70.9" kingpin intersection (KPI).
3. AIRTEK suspension weight includes frame and leaf springs, air springs, shocks, upper shock brackets and axle clamp group.
4. STEERTEK NXT axle weight includes the axle beam, knuckle/steering arm assemblies and tie rod assemblies.
6. AIRTEK is integral to and available exclusively with the STEERTEK NXT axle. This system is anti-lock braking system (ABS) ready. STEERTEK NXT is compatible with most industry standard wheel ends and brakes. Contact OEM for more information.
7. The STEERTEK NXT axle product identification is etched on the center front of the axle beam, see Figure 2-2, providing the following information:
 - Axle part number: Identifies the features of the axle beam.
 - Axle assembly number: Identifies the complete assembly, which includes the steering knuckles, bracket assemblies and tie rod assemblies

FIGURE 2-2

SECTION 3

Important Safety Notice

Proper maintenance, service and repair are 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 the manufacturer's warranty.

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

■ EXPLANATION OF SIGNAL WORDS

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



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

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

 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 REGULARLY CALIBRATED TORQUE WRENCH. 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. ALWAYS CHECK TORQUE IN TIGHTENING DIRECTION.

WARNING

AIR SPRINGS INFLATION AND DEFLATION

AIR SPRING ASSEMBLIES MUST BE COMPLETELY DEFLATED PRIOR TO LOOSENING ANY CLAMP GROUP HARDWARE, OR OTHERWISE PERFORMING ANY MAINTENANCE, SERVICE OR REPAIR OF THE SUSPENSION SYSTEM. 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.

PRIOR TO AND DURING DEFLATION AND INFLATION OF THE AIR SUSPENSION SYSTEM, ENSURE 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

AIR SPRING INFLATION

INFLATE THE SUSPENSION SLOWLY TO ENSURE THE RUBBER BLADDER OF THE AIR SPRING INFLATES UNIFORMLY AND IS NOT BINDING. FAILURE TO DO SO CAN CAUSE DAMAGE TO THE AIR SPRING AND/OR MOUNTING BRACKETS AND VOID WARRANTY.

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 LOCATER 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

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 CAN RESULT IN FAILURE AND LOSS OF VEHICLE CONTROL, POSSIBLY CAUSING PERSONAL INJURY OR PROPERTY DAMAGE.

WARNING

SHOCK ABSORBERS

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

WARNING

PERSONNEL PROTECTIVE EQUIPMENT

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

! 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**REPAIR AND RECONDITIONING**

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

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

! CAUTION**PROCEDURES AND TOOLS**

A MECHANIC USING A SERVICE PROCEDURE OR TOOL WHICH HAS NOT BEEN RECOMMENDED BY HENDRICKSON MUST FIRST SATISFY HIMSELF THAT NEITHER HIS SAFETY NOR THE VEHICLE'S SAFETY WILL BE JEOPARDIZED BY THE METHOD OR TOOL SELECTED. INDIVIDUALS DEVIATING IN ANY MANNER FROM THE INSTRUCTIONS PROVIDED ASSUME ALL RISKS OF POTENTIAL PERSONAL INJURY OR DAMAGE TO EQUIPMENT INVOLVED.

! WARNING**TORCH/WELDING**

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

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

! WARNING**STEERTEK NXT AXLE SPRING SEATS**

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

! WARNING**AXLE KINGPINS**

STEERTEK NXT IS A UNIQUE AXLE, IN THAT THE KINGPIN IS CRYOGENICALLY INSTALLED IN THE AXLE. THE KINGPIN IS A NON-REPLACEABLE COMPONENT OF THE AXLE ASSEMBLY. DO NOT TRY TO REMOVE THE KINGPIN. IF THE KINGPIN SHOWS SIGNS OF MOVEMENT, CONTACT THE HENDRICKSON TECH SERVICES DEPARTMENT.



WARNING

DAMAGED AXLE COMPONENTS

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

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

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

WARNING

AXLE CAMBER

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

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

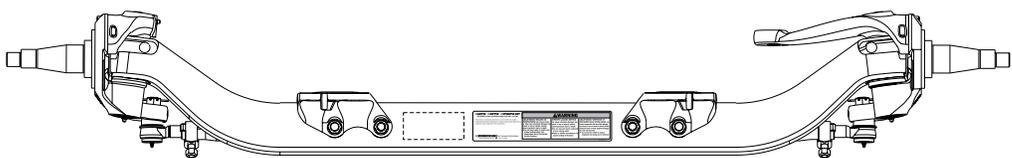
WARNING

IMPROPER JACKING METHOD

IMPROPER JACKING METHOD CAN CAUSE STRUCTURAL DAMAGE AND RESULT IN LOSS OF VEHICLE CONTROL, SEVERE PERSONAL INJURY OR DEATH. DO NOT USE AXLE BEAM OUTBOARD OF AXLE SPRING SEATS. REFER TO VEHICLE MANUFACTURER FOR PROPER JACKING INSTRUCTIONS. REPLACE ANY SAFETY DECALS THAT ARE FADED, TORN, MISSING, ILLEGIBLE, OR OTHERWISE DAMAGED. CONTACT HENDRICKSON TO ORDER REPLACEMENT LABELS, SEE FIGURE 3-1. DECAL PART NUMBER 60905-021

FIGURE 3-1

| | | | | | |
|---|---|---|--|---|---|
| <p>AIRTEK® SOFTEK® STEERTEK NXT INTEGRATED FRONT SUSPENSION AND STEER AXLE SYSTEMS</p> <p><small>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</small></p> <p>HENDRICKSON Truck Commercial Vehicle Systems <small>www.hendrickson-intl.com 1.866.755.5968</small></p> | <p style="text-align: center;">WARNING</p> <table border="0"> <tr> <td data-bbox="836 1312 1031 1449"> <p>UNAUTHORIZED WELDING OR MODIFICATIONS can cause cracks or other axle structural damage and result in loss of vehicle control, severe personal injury or death.</p> <ul style="list-style-type: none"> Do not bend, weld or modify axle without authorization from Hendrickson Truck Commercial Vehicle Systems. </td> <td data-bbox="1039 1312 1234 1449"> <p>IMPROPER JACKING METHOD can cause structural damage and result in loss of vehicle control, severe personal injury or death.</p> <ul style="list-style-type: none"> Do not use axle beam outboard of axle spring seats. Refer to vehicle manufacturer for proper jacking instructions. </td> <td data-bbox="1242 1312 1461 1449"> <p>UNAUTHORIZED TAMPERING OF INTEGRATED AXLE SPRING SEATS can cause component and structural damage and result in loss of vehicle control, severe personal injury or death, property damage, and will void warranty.</p> <ul style="list-style-type: none"> Do not remove, modify or replace integrated axle spring seat or fasteners </td> </tr> </table> | | <p>UNAUTHORIZED WELDING OR MODIFICATIONS can cause cracks or other axle structural damage and result in loss of vehicle control, severe personal injury or death.</p> <ul style="list-style-type: none"> Do not bend, weld or modify axle without authorization from Hendrickson Truck Commercial Vehicle Systems. | <p>IMPROPER JACKING METHOD can cause structural damage and result in loss of vehicle control, severe personal injury or death.</p> <ul style="list-style-type: none"> Do not use axle beam outboard of axle spring seats. Refer to vehicle manufacturer for proper jacking instructions. | <p>UNAUTHORIZED TAMPERING OF INTEGRATED AXLE SPRING SEATS can cause component and structural damage and result in loss of vehicle control, severe personal injury or death, property damage, and will void warranty.</p> <ul style="list-style-type: none"> Do not remove, modify or replace integrated axle spring seat or fasteners |
| <p>UNAUTHORIZED WELDING OR MODIFICATIONS can cause cracks or other axle structural damage and result in loss of vehicle control, severe personal injury or death.</p> <ul style="list-style-type: none"> Do not bend, weld or modify axle without authorization from Hendrickson Truck Commercial Vehicle Systems. | <p>IMPROPER JACKING METHOD can cause structural damage and result in loss of vehicle control, severe personal injury or death.</p> <ul style="list-style-type: none"> Do not use axle beam outboard of axle spring seats. Refer to vehicle manufacturer for proper jacking instructions. | <p>UNAUTHORIZED TAMPERING OF INTEGRATED AXLE SPRING SEATS can cause component and structural damage and result in loss of vehicle control, severe personal injury or death, property damage, and will void warranty.</p> <ul style="list-style-type: none"> Do not remove, modify or replace integrated axle spring seat or fasteners | | | |



WARNING**OFF ROADWAY TOWING**

WHEN A VEHICLE IS DISABLED AND EQUIPPED WITH A STEERTEK NXT AXLE, CARE MUST BE TAKEN TO ENSURE THERE IS NO DAMAGE TO THE SUSPENSION OR AXLE WHEN TOWING THE VEHICLE. THE USE OF TOW STRAPS ARE NECESSARY TO TOW A DISABLED VEHICLE FROM A REPAIR FACILITY PARKING LOT INTO THE SHOP BAY. THE TOW STRAPS SHOULD BE CONNECTED TO THE TOW HOOKS PROVIDED BY THE VEHICLE MANUFACTURER AT THE FRONT OF THE BUMPER. IF THE USE OF TOW HOOKS IS NOT AN OPTION, THEN TOW STRAPS MAY BE WRAPPED AROUND THE FRONT STEERTEK NXT AXLE, (SEE FIGURE 3-2) IN A MANNER THAT IS ACCEPTABLE FOR TOWING THE VEHICLE FROM A REPAIR FACILITY PARKING LOT INTO THE SHOP BAY. DO NOT USE A TOW CHAIN AROUND THE FRONT STEERTEK 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 IN 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 PROCEDURES:

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

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



SECTION 4 Special Tools

KINGPIN BUSHING TOOL – ADJUSTABLE STRAIGHT FLUTE REAMER

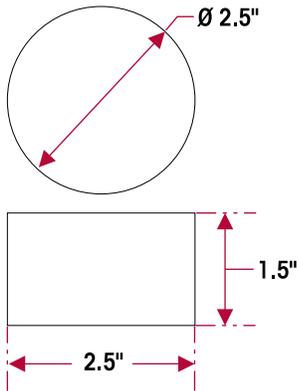
The dimension of cutting diameter must facilitate a range of 1.802"-1.812"



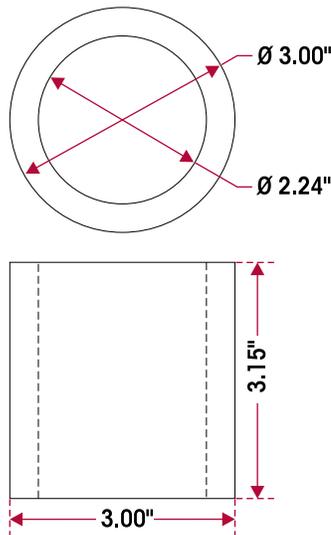
KINGPIN TOOLS

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

Bushing Driver

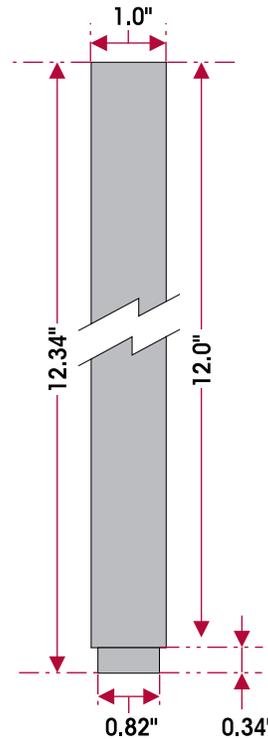


Bushing Receiving Tool (for press bushing replacement)

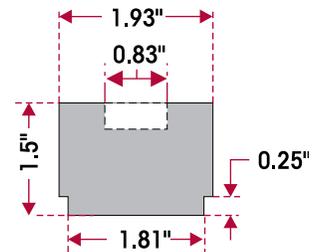


NOTE: Kingpin Handle is used for both Bushing Driver and Seal Tools

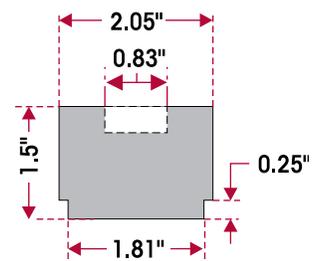
Kingpin Handle



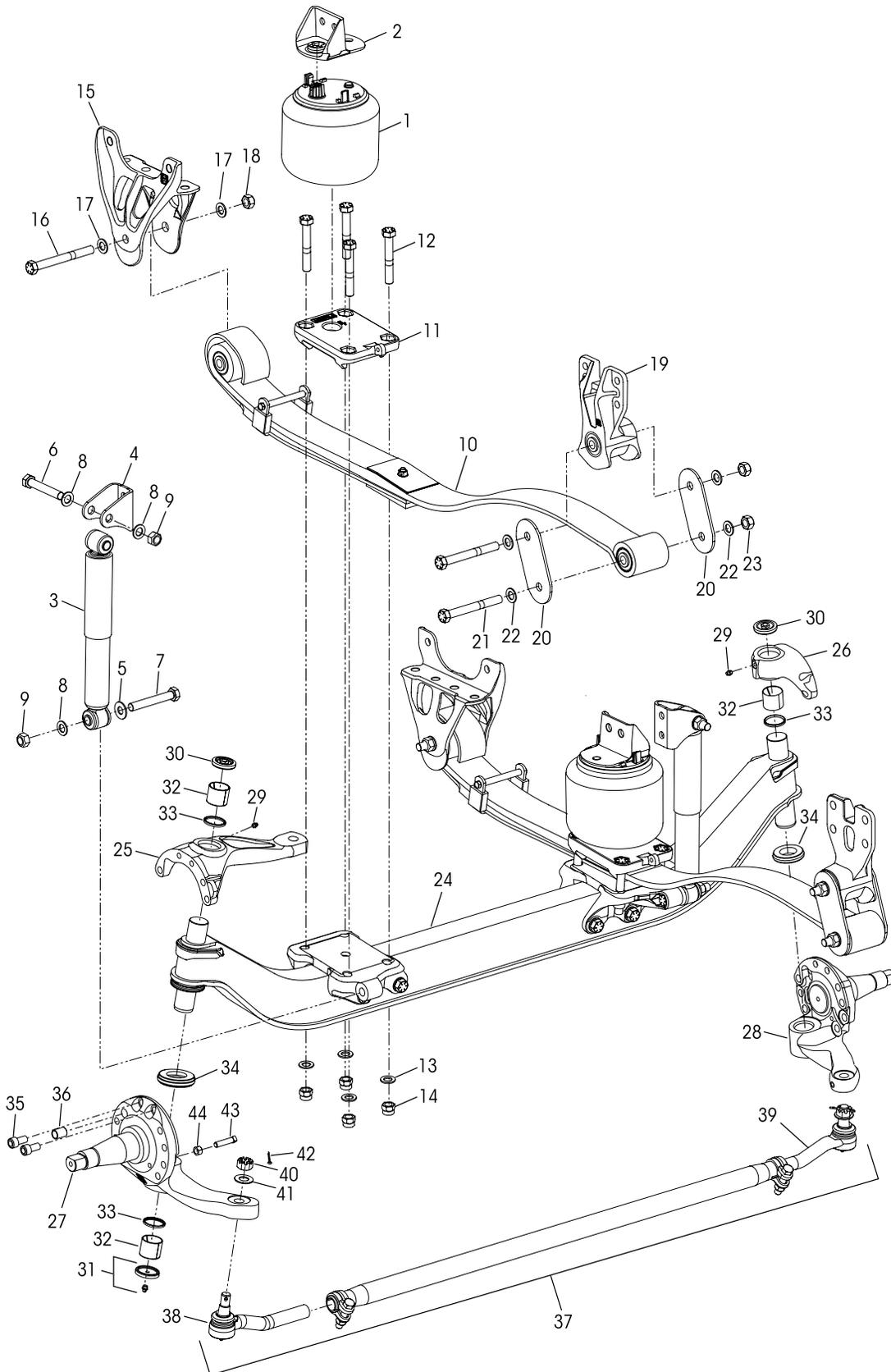
Bushing Driver Installer / Remover Tool (to seat bushing)



Seal Driver Installer Tool (to seat seal)



SECTION 5 Parts Lists

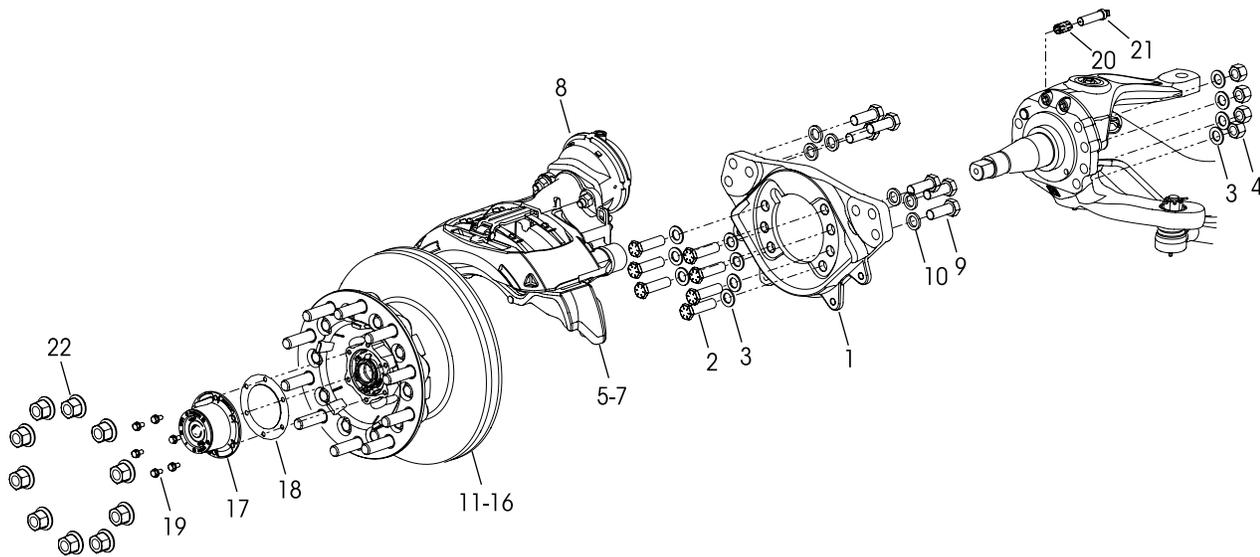




| KEY NO. | PART NO. | DESCRIPTION | VEHICLE QTY. | KEY NO. | PART NO. | DESCRIPTION | VEHICLE QTY. |
|---------|------------|--|--------------|-----------|------------|--|--------------|
| 1 | 64075-002L | Air Spring | 2 | | 68977-005 | Axle Assembly, Includes Key Nos. 24-42 | 1 |
| 2 | 60850-001 | Air Spring Bracket | 2 | 24 | 68976-004M | Axle & Kingpin Assembly | 1 |
| 3 | 58913-009L | Shock Absorber | 2 | | | Upper Steering Knuckle Assembly, Includes Key Nos. 29-30, 32-33 | |
| 4 | 59423-002 | Upper Shock Bracket | 2 | 25 | 60903-478 | Left Hand | 1 |
| | 34013-296 | Shock Absorber Fasteners Service Kit, One Side, Includes Key Nos. 5-9 | | 26 | 60904-402 | Right Hand | 1 |
| 5 | 22962-046 | Shock Spacer | 2 | | | Lower Steering Knuckle Assembly, Includes Key Nos. 31-33, 36, 43-44 | |
| 6 | 68716-369 | ¾"-16 UNF x 4½" Upper Shock Bolt | 2 | 27 | 58900-431 | Left Hand | 1 |
| 7 | 68716-370 | ¾"-16 UNF x 5" Lower Shock Bolt | 2 | 28 | 58900-432 | Right Hand | 1 |
| 8 | 22962-001 | ¾" Flat Washer | 6 | | 60961-630 | Kingpin Bushing and Roller Bearing Service Kit, Includes Key Nos. 29-33, 34-35, Loctite | |
| 9 | 30191-000 | ¾"-16 UNF Locknut | 4 | 29 | 33117-000 | Grease Zerk | 2 |
| 10 | 53487-000 | Leaf Spring Assembly | 2 | 30 | 68687-003 | Upper Grease Cap Assembly | 2 |
| 11 | | Top Pad | | 31 | 68687-002 | Lower Grease Cap Assembly | 2 |
| | 64516-001 | Left Hand | 1 | 32 | 58909-001 | Kingpin Bushing | 4 |
| | 64516-002 | Right Hand | 1 | | 60961-633 | Roller Thrust Bearing Service Kit, Includes Key Nos. 33-35, Loctite | |
| | | Top Pad Fasteners Service Kit, Includes Key Nos. 12-14 | | 33 | 68731-000 | Kingpin Seal | 4 |
| | 34013-236 | Axle Set | | 34 | 64256-000 | Roller Thrust Bearing | 2 |
| | 34013-297 | One Side | | 35 | 60236-001 | ⅝" Socket Head Cap Screw | 4 |
| 12 | 21867-036 | ¾"-16 UNF x 5" Bolt | 8 | Not Shown | 60937-000 | Loctite® (Red) Compound Tube | 1 |
| 13 | 22962-001 | ¾" Flat Washer | 8 | 36 | 64246-000 | ABS Sensor Sleeve | 2 |
| 14 | 17700-035 | ¾"-16 UNF Nylocknut | 8 | 37 | 76878-002 | Tie Rod Assembly, Drop, Includes Key Nos. 38-40 | 1 |
| 15 | 64488-002 | Front Hanger | 2 | | | Tie Rod End Service Kits | |
| | | Front Hanger Fasteners Service Kit, Includes Key Nos. 16-18 | | | 60961-737 | Axle Set, Includes Kits Nos. 60961-739 & -740 | |
| | 64105-015 | Axle Set | | | 60961-739 | Left Hand, Includes Key Nos. 38, 41-42 | |
| | 34013-298 | One Side | | | 60961-740 | Right Hand, Includes Key Nos. 39, 41-42 | |
| 16 | 21867-006 | ¾"-16 UNF x 7" Bolt | 2 | | | Tie Rod End, Includes Key No. 40 | |
| 17 | 22962-001 | ¾" Flat Washer | 4 | 38 | 76875-001 | Left Hand | 1 |
| 18 | 30191-000 | ¾"-16 UNF Nylocknut | 2 | 39 | 76875-002 | Right Hand | 1 |
| 19 | 66510-001 | Rear Shackle Bracket Assembly | 2 | 40 | | *⅞" Castile Nut | 2 |
| 20 | 64314-000 | Shackle Plate | 4 | 41 | 22962-007 | ⅞" Flat Washer | 2 |
| | | Rear Shackle Bracket Fasteners Service Kit, Includes Key Nos. 21-23 | | 42 | 17800-004 | Tie Rod Nut Cotter Pin | 2 |
| | 60961-872 | Axle Set | | | 60961-069 | Stop Bolt Service Kit, One Side, Includes Key Nos. 43-44 | |
| | 34013-299 | One Side | | 43 | | *½"-13 UNC Square Head Bolt | 2 |
| 21 | 21867-023 | ¾"-16 UNF x 6½" Bolt | 4 | 44 | | *½"-13 UNC Hex Jam Nut | 2 |
| 22 | 22962-001 | ¾" Flat Washer | 8 | | | | |
| 23 | 30191-000 | ¾"-16 UNF Nylocknut | 4 | | | | |

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

Air Disc Brake Assembly



| KEY NO. | PART NO. | DESCRIPTION | VEHICLE QTY. |
|---------|------------|---|--------------|
| 1 | | *Bendix® Torque Plate Assembly Left Hand Part No. K114010 Right Hand Part No. K114011 | 1 1 |
| 2 | 80135-002 | 3/4"-10 UNC x 2.75" Torque Plate Mounting Bolt | 14 |
| 3 | 22962-001 | 3/4" Torque Plate Mounting Flat Washer | 22 |
| 4 | 49842-000 | 3/4"-10 UNC Hex Nut | 8 |
| 5 | | *Bendix Brake Caliper/Caliper Assembly Left Hand Part No. K097851SC Right Hand Part No. K097850SC | 1 1 |
| 6 | | *Bendix Brake Pad Kit No. K129276, Axle Set (Includes hardware) | |
| 7 | | *Bendix Shear Adapter for the Adjuster, Part No. 802455 | |
| 8 | | *Bendix Air Brake Chamber Part No. K028226 | |
| 9 | SA-13200-2 | M20 x 2.5 x 60 mm Caliper Bolt | 12 |
| 10 | 58246-007 | M20 Flat Washer | 12 |
| | | *Conmet® Hub and Rotor Assembly, Part No. 10083194, Includes Key Nos. 11-16 | 2 |

| KEY NO. | PART NO. | DESCRIPTION | VEHICLE QTY. |
|---------|-----------|---|--------------|
| 11 | | *Conmet Hub Bearing Rebuild Kit, Part No. 10081727 | |
| 12 | | *Conmet Inner Bearing Cup and Cone Assembly, Part No. 10041905 | |
| 13 | | *Conmet Outer Bearing Cup and Cone Assembly, Part No. 10041906 | |
| 14 | | *Conmet Wheel Seal and Spacer Kit, Part No. 10081518 | |
| 15 | | *Conmet Seal Kit Part No. 10045885 | |
| 16 | | *Conmet Rotor Service Kit Part No. 10082074 | |
| 17 | | *Stemco® Hub Cap Part No. 343-4346 Includes Key No. 18 | 2 |
| 18 | | *Stemco Hub Cap Gasket Part No. 330-3024 | 2 |
| 19 | 64545-002 | 5/16"-18 UNC x 3/4" Hub Cap Hex Bolt with Retaining Washer | 12 |
| 20 | A-22930-4 | ABS Sensor | 2 |
| 21 | 64550-000 | Sensor Clip | 2 |
| 22 | | **Lug Nuts | 20 |

NOTES: * Not supplied by Hendrickson for aftermarket service purposes. Description and part number listed for reference only. For more information and assistance with service, maintenance and rebuild instructions on these components see below component manufacturers:

- Bendix 1-800-AIR-BRAKE, customer service option 1, Tech Team, option 2. Online part number support go to: www.bendix.com/en/servicessupport/partnumbersearch/partnumbersearch_1.jsp
Online technical support training go to: www.brake-school.com
- Conmet Technical and Part Support 800.547.9473 or go to www.conmet.com/general/literature, go to Wheel End Literature, scroll down to Service Manual, Lit No. 10084476
- Stemco Technical and Part Support 800.527.8492 or go to www.stemco.com

** Not supplied by Hendrickson. Refer to the vehicle manufacturer for more information. Hendrickson is not responsible for components supplied by vehicle manufacturer.

SECTION 6 Towing Procedure

ON-HIGHWAY AND ON-ROADWAY

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

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

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

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

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

■ **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.

It may be necessary to raise the vehicle and place a block of wood under the tires to provide adequate clearance below the axle to locate the wheel lift equipment for towing, see Figure 6-2.

FIGURES 6-1



FIGURE 6-2



■ **METHOD 2 — TOWING VEHICLE FROM THE REAR**

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

■ **METHOD 3 — AXLE FORK LIFT**

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

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.

FIGURE 6-2



FIGURE 6-3



OFF-ROADWAY TOWING METHOD

WARNING

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

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

FIGURE 6-4





SECTION 7

Preventive Maintenance

Following appropriate inspection procedures is important to help ensure the proper maintenance and operation of the AIRTEK•STEERTEK NXT system and component parts function to their highest efficiency. Look and replace any bent, cracked, worn or damaged parts.

HENDRICKSON RECOMMENDED PREVENTIVE MAINTENANCE INTERVALS

VISUAL INSPECTION

- **The first 1,000 miles (1,609 km)**
- **On-highway** – every 25,000 miles (40,000 km) or 6 months, whichever comes first

COMPONENT INSPECTION

- **Air spring** — Look for chaffing or any signs of spring or component damage.
- **Clamp group** — Check torque on clamp group mounting hardware. Refer to Clamp Group Re-torque in this section and 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, see Torque Specification Section of this publication for recommended torque requirements. Use a calibrated torque wrench to check torque in a tightening direction. As soon as the fastener starts to move, record the torque. Correct the torque if necessary. Replace any worn or damaged fasteners.
- **Front and rear spring hangers** — Check for cracks or loose mounting hardware. Replace if necessary, see Component Replacement Section of this publication for replacement procedure.
- **Hub** — Visually inspect the hubcap and any signs of leakage and proper fluid level. Visually inspect the wheel seal for any signs of leakage. Replace if necessary, refer to component manufacturer for replacement procedure.
- **Leaf spring assembly** — Look for cracks. Check the front and rear bushings for any wear or deterioration. Replace spring assembly as necessary. See the Component Replacement Section of this publication for replacement procedure.
- **Operation** — All steering components must move freely through the full range of motion from axle stop to axle stop.
- **Rear spring mount** — Check for proper alignment with spring taper and check for proper torque on rear spring mount fasteners. See Torque Specification Section of this publication for recommended torque requirements.
- **Shock absorber** — Look for any signs of dents or leakage, misting is not considered a leak. See Shock Absorber Inspection in this section.
- **Steering pivot points** — Check for looseness at all pivot points. Inspect and lubricate all pivot points. Refer to the Trouble Shooting Guide Section in the Appendix of this publication.
- **STEERTEK NXT Axle** — The axle should be free of any nicks or gouges. Inspect for any cracks or dents on axle.
- **Thrust washers** — Look for any signs of excessive wear to the thrust washers. See Thrust Washer Inspection detailed in this section.
- **Tire wear** — Inspect tires for wear patterns that may indicate suspension damage or misalignment. See Tire Inspection in this section.
- **Top pad** — Check for cracks or damage. Replace if necessary, see the Component Replacement Section of this publication for replacement procedure.

- **Wear and damage** — Inspect all parts of suspension for wear and damage. Look for bent or cracked parts. Replace all worn or damaged parts.
- **Wheel bearing** — Verify wheel bearing end play is within specification, see Wheel Bearing Inspection in this section.

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

LUBRICATION INTERVALS

For vehicles equipped with the STEERTEK NXT axle, regular lubrication intervals should be followed to help prevent premature wear to the kingpin bushings and tie rod ends, see lubrication chart below.

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

TABLE 7-1

| STEERTEK NXT GREASING AND LUBRICATION SPECIFICATIONS | | | | |
|--|--|---------------------|------------|--|
| COMPONENT | GREASING INTERVAL | GREASE | NLGI GRADE | OUTSIDE TEMPERATURE |
| Kingpin Bushings | Maximum of 25,000 miles (40,000 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 | | | | |
| Front Wheel Bearing | 15,000 miles (24,000 kilometers) | SAE 80W-90 GL-5 | | |
| Drag Link | See Vehicle Manufacturer | | | |

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

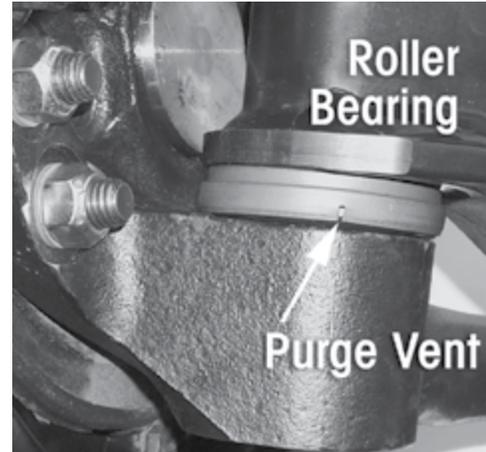
KINGPIN LUBRICATION

STEERTEK NXT upper kingpin grease zerks are located on the inboard side of the steering knuckle and upper kingpin connection, see Figure 7-1. On some models of the STEERTEK NXT a grease zerk is located on the bottom of lower steering knuckle on the inboard side.

FIGURE 7-1



FIGURE 7-2



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.

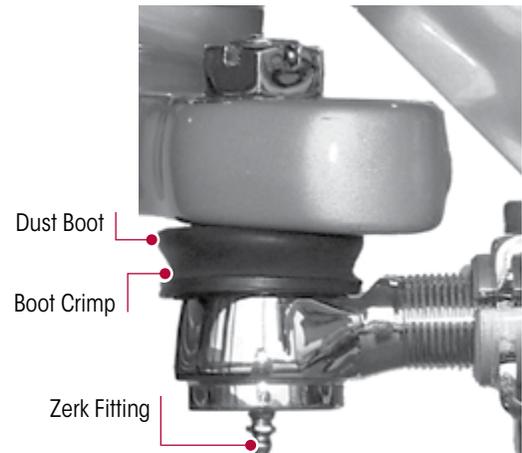
7. Force the required lubricant into the upper and lower kingpin grease zerks, until new lubricant flows out from the upper kingpin connection and steering knuckle and the thrust bearing purge location, see Figure 7-2.

NOTE

Greasing at the lower zerk should purge grease from the thrust bearing shell. The left and right side of the AIRTEK for Tiffin Motorhome Chassis system have steel roller thrust bearing.

TIE ROD END LUBRICATION

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).

FIGURE 7-3

CAUTION

EXCEEDING THE MAXIMUM AIR PRESSURE TO THE GREASE ZERK CAN CAUSE DAMAGE TO THE DUST BOOT CAUSING 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 7-3. Continue to purge grease until fresh grease flows from the purge area.
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. Refer to Tie Rod End replacement in 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 PROCEDURE

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

CAUTION

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

CAUTION

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

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

WARNING

THE COTTER PIN MUST BE INSTALLED CORRECTLY THROUGH THE TIE ROD END WITH THE CASTLE NUT TIGHTENED TO THE PROPER TORQUE SPECIFICATION IN ORDER TO SECURELY ATTACH THE TIE ROD. LOSS OF THE COTTER PIN CAN CAUSE THE TIE ROD END NUT TO BECOME LOOSE AND ADVERSELY AFFECT VEHICLE STEERING AND POSSIBLY RESULT IN TOTAL LOSS OF STEERING CONTROL.

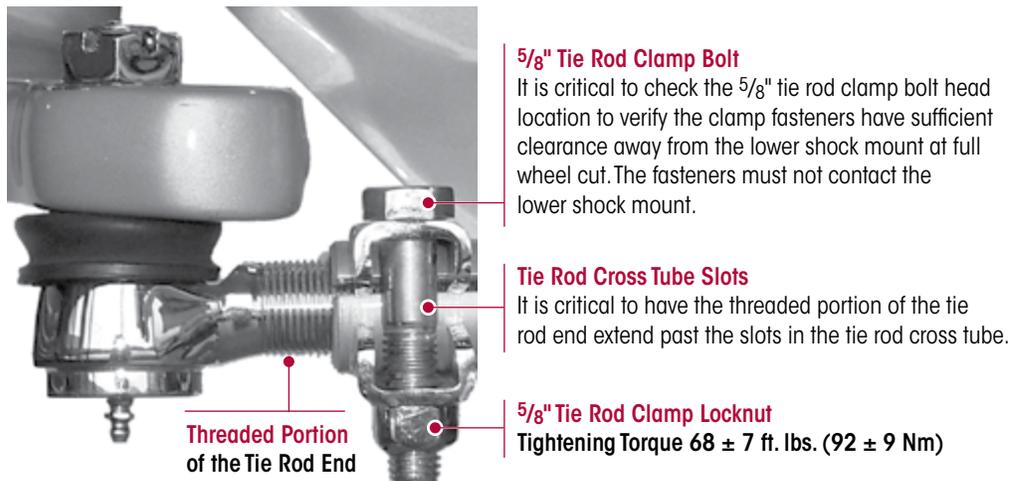
5. Check that the tie rod end nut is installed and secured with a cotter pin. If the cotter pin is missing, check the nut torque specification and then install a new cotter pin. Always tighten the castle nut to specified torque when setting the cotter pin. **DO NOT** back off the nut to insert cotter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

WARNING

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

6. Verify the 5/8" tie rod clamp bolt head does not contact the lower shock mount at full wheel cut, see Figure 7-4.

FIGURE 7-4



WARNING

THE THREADED PORTION OF THE TIE ROD END MUST EXTEND PAST THE SLOTS INTO THE TIE ROD CROSS TUBE, SEE FIGURE 7-4. FAILURE TO DO SO CAN CAUSE COMPONENT DAMAGE, LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

7. Check that the tie rod end is threaded correctly into the cross tube and is engaged deeper than the end of the cross tube slot. The tie rod end must be visible the entire length of the cross tube slot, see Figure 7-4.
8. Check that grease zerks are installed. Replace a damaged grease zerk with a new one.

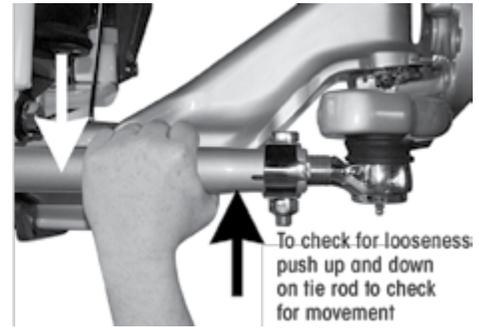
CAUTION

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

- A CROW BAR, PICKLE FORK OR 2 X 4.
- ANYTHING OTHER THAN HANDS USED TO GRASP AND ROTATE THE CROSS TUBE ASSEMBLY (CAN RESULT IN DAMAGE TO THE CROSS TUBE).
- EXCESSIVE PRESSURE OR FORCE APPLIED TO THE TIE ROD ENDS OR THE JOINTS OF THE ASSEMBLY.

9. By hand or using a pipe wrench, with jaw protectors to avoid gouging the cross tube, rotate the cross tube toward the front of the vehicle and then toward the rear. After rotating, center the cross tube. If the cross tube will not rotate in either direction, replace both tie rod ends, see Figure 7-5.
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 75 ± 25 foot pounds of force. Check for any movement or looseness at both tie rod end locations, see Figure 7-6.

FIGURE 7-5

FIGURE 7-6


11. If there is any movement in the tie rod assembly, install a magnetic based dial indicator on the Ackermann arm, see Figure 7-7.
12. Set the dial indicator to zero.
13. Apply hand pressure with reasonable human effort vertically up and down in a push-pull motion several times, using approximately 75 ± 25 foot pounds of force. Observe the reading on the dial indicator.
14. If the reading is more than 0.060", replace both tie rod ends at the next service interval.
15. If a tie rod end exhibits ≥ 0.125 " of movement by hand, the vehicle should be removed immediately from use and replace the tie rod end.

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 7-7

HEIGHT CONTROL VALVE

Refer to component manufacturer for height control valve inspection and adjustment procedures.

BRAKES AND WHEEL BEARING END PLAY

Refer to component manufacturer for wheel bearing end play inspection and wheel bearing adjustment procedures, see Parts List Section under Brake Assembly for contact information.

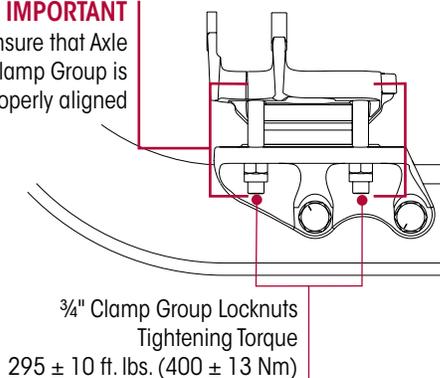
! WARNING
CLAMP GROUP RE-TORQUE

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

1. Clamp group locknuts must be torque to specification at preparation for delivery.
2. Clamp group locknuts must be re-torqued at 1,000 miles (1,609 km).
3. Thereafter follow the 6 month/25,000 miles (40,000 km) visual inspection and annual re-torque interval.
4. Ensure that the clamp group is properly aligned and the hex bolts are seated in the top pad, and the top pad/bottom axle wrap is centered on the axle spring seat/top axle wrap, see Figures 7-8 and 7-9.
5. Check for the signs of component or bolt movement.
6. If signs of movement are present, disassemble the clamp group fasteners, check for component wear or damage and replace as necessary, then install new clamp group fasteners and repeat Steps 1 through 5.
7. Tighten the clamp group locknuts evenly in 50 foot pounds increments in the proper pattern, see Figure 7-10, to achieve uniform bolt tension to $\pm 295 \pm 10$ foot pounds torque.

FIGURE 7-8

IMPORTANT
Ensure that Axle
Clamp Group is
properly aligned

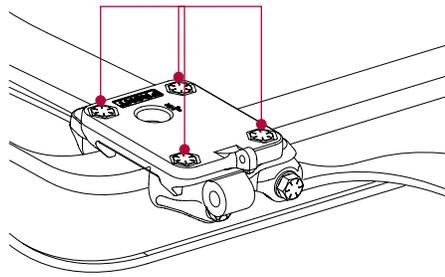
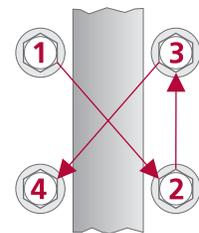


$\frac{3}{4}$ " Clamp Group Locknuts
Tightening Torque
 295 ± 10 ft. lbs. (400 ± 13 Nm)

FIGURE 7-9

IMPORTANT

Ensure that the $\frac{3}{4}$ " Clamp Bolts
are seated properly in the Top Pad


FIGURE 7-10

KINGPIN BUSHING
INSPECTION PROCEDURE (STEERING KNUCKLE LATERAL MOVEMENT)

1. Chock the wheels to help prevent the vehicle from moving. Set the parking brake.
2. Use a jack to raise the vehicle until the wheels are off the ground. Support the vehicle with safety stands.
3. **CHECKING THE UPPER KINGPIN BUSHING.** Install the base of a dial indicator onto the axle beam and place the tip against the steering knuckle, see Figure 7-11.
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 7-13.
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 7-12.
8. Set the dial indicator to "0" zero.

FIGURE 7-11
CHECKING UPPER KINGPIN BUSHING

FIGURE 7-12
CHECKING LOWER KINGPIN BUSHING


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.

STEERING KNUCKLE
CHECKING VERTICAL END PLAY (UP AND DOWN MOVEMENT)

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

FIGURE 7-13

FIGURE 7-14


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 7-14.
 - 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 $\boxed{188} \pm 12$ foot pounds torque.

SURFACE PAINT WEAR

FIGURE 7-15

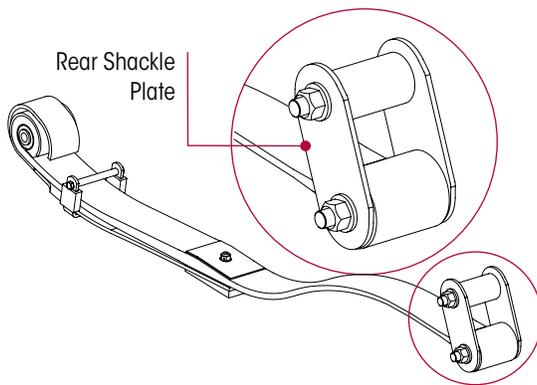
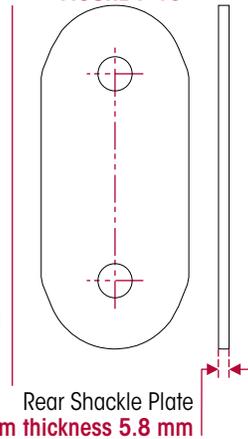


FIGURE 7-16



Rear Shackle Plate — The Hendrickson AIRTEK suspension system equipped on Tiffin Motorhome Vehicles, utilizes rubber bushings in the leaf springs. These rubber bushings allow the leaf spring to deflect and may contact the shackle plates when the vehicle encounters high lateral acceleration (e.g. a highway clover leaf). The rubber bushing will center the leaf spring between the legs of the shackle plates once the vehicle is driven straight.

This function of the rubber bushing may allow the leaf spring to contact the rear shackle plate and possibly remove surface paint from the contact area, see Figure 7-15. Surface paint wear does not cause damage that will affect the function or durability of the rear shackle plate or their mating components when a minimum wall thickness is maintained.

INSPECTION

An indication that the rear shackle plates are worn and require replacement is when the thickness decreases to 5.8 mm or less, see Figure 7-16.

SHOCK ABSORBER

NOTE

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

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

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

FIGURE 7-17



HEAT TEST
WARNING

1. Drive the vehicle at moderate speeds on rough road for minimum of fifteen minutes.
DO NOT GRAB THE SHOCK ABSORBER AS IT COULD POSSIBLY BE HOT AND 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 absorber body below the dust cover. Touch the frame to get an ambient reference, see Figure 6-19. 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 absorber. Listen for the sound of metal parts rattling inside. Rattling of metal parts can indicate that the shock absorber has an internal failure and the shock absorber should be replaced.

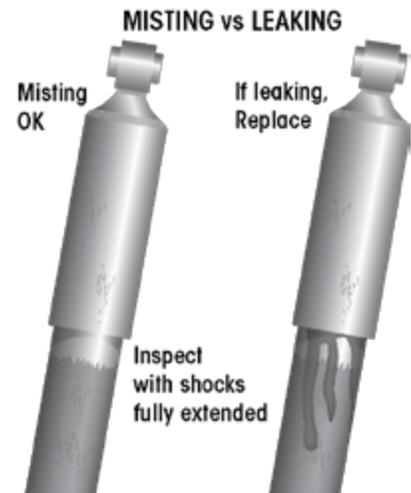
VISUAL INSPECTION

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

FIGURE 7-18
SHOCK ABSORBER VISUAL INSPECTION - UNACCEPTABLE CONDITIONS

LEAKING VS. MISTING SHOCK ABSORBER VISUAL INSPECTION

The inspection must not be conducted after driving in wet weather or a vehicle wash. The shock absorber needs to be free from water. Many shock absorbers are often misdiagnosed as failures. Misting is the process whereby very small amounts of shock absorber fluid evaporate at a high operating temperature through the upper seal of the shock absorber. When the "mist" reaches the cooler outside air, it condenses and forms a film on the outside of the shock absorber body. Misting is perfectly normal and necessary function of the shock absorber. The fluid which evaporates through the seal area helps to lubricate and prolong the life of the seal.

FIGURE 7-19

NOTE

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

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

TIRE INSPECTION

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

- a. Tire Pressure
- b. Toe Setting
- c. Thrust Angle
- d. Camber

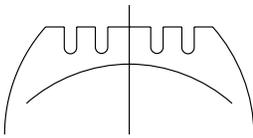
- The following tire Inspection guidelines are based upon Technology & Maintenance Council (TMC) recommended practices. Any issues regarding irregular tire wear where Hendrickson is asked for assistance, will require tire and alignment maintenance records, reference TMC's literature numbers RP 219A,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

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 7-20

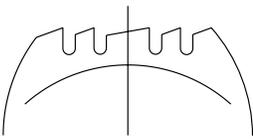
OVERALL FAST WEAR (Miles per 32nd)



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 7-21

FEATHER WEAR



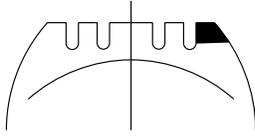
Feather wear — Tread ribs or blocks worn so that one side is higher than the other resulting in step-offs across the tread face. Generally, ribs or blocks exhibit this wear. To spot this problem, do the following:

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 7-22
RAPID SHOULDER WEAR
(One Shoulder Only)



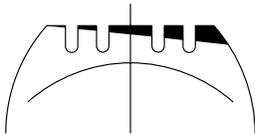
Rapid Shoulder Wear (One Shoulder Only) — Is defined as a tire worn on the edge of one shoulder, sometimes extending to inner ribs. It can progress to diagonal wipeout. For more information, see TMC RP 219A publication, page 22.

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 7-23
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.

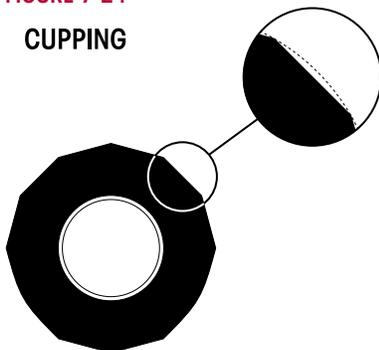
One-sided wear is usually caused by improper alignment, worn kingpins, loose wheel bearings, excessive camber, excessive axle loads, non-parallel axles, or non-uniform tire and wheel assembly caused by improper bead seating or bent wheel.

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 7-24

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

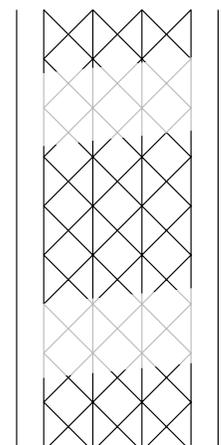
Diagonal Wear — Can be described as localized flat spots worn diagonally across the tread at approximately 25-35° angles, often repeating around the tread circumference. For more information, see TMC RP 219A publication, page 20.

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

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

FIGURE 7-25

DIAGONAL WEAR

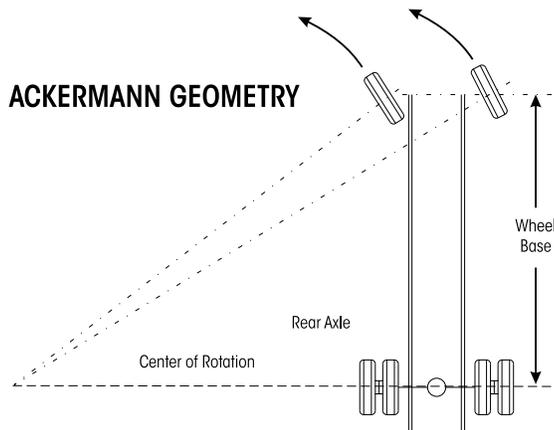


SECTION 8

Alignment & Adjustments

ALIGNMENT DEFINITIONS

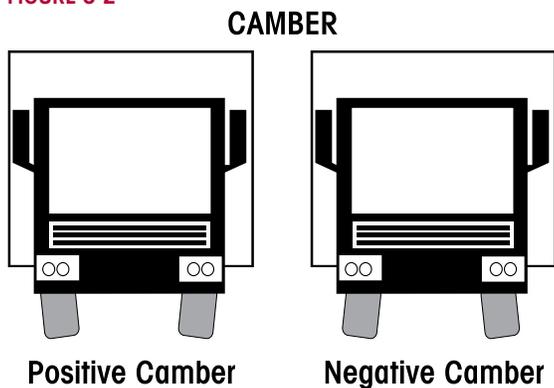
FIGURE 8-1



Ackermann Steering Geometry — The geometry of the four bar linkage consisting of the front axle beam pivot points, tie rod arms, and cross tube and attempts to provide free rolling of front tires in a turn. Ackermann geometry is dependent upon the steering axle track-width and wheelbase of the vehicle. Improper geometry results in wheel scrub in turns which generally appears as toe wear on the tire. Usually more wear is present 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.

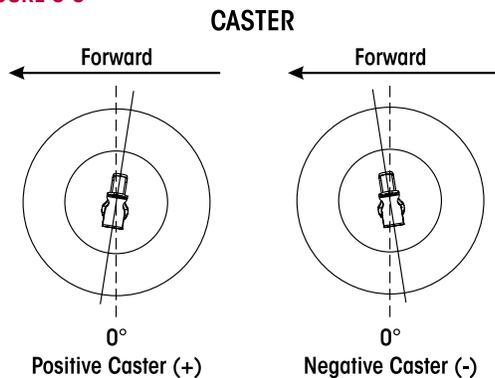
FIGURE 8-2



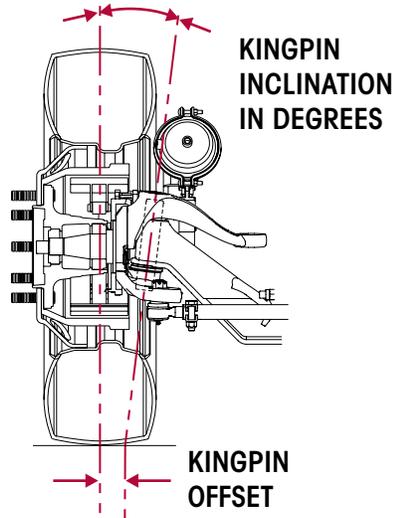
Camber — The angle formed by the inward or outward tilt of the wheel reference to a vertical line. Camber is positive when the wheel is tilted outward at the top and is negative when the wheel is tilted inward at the top.

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



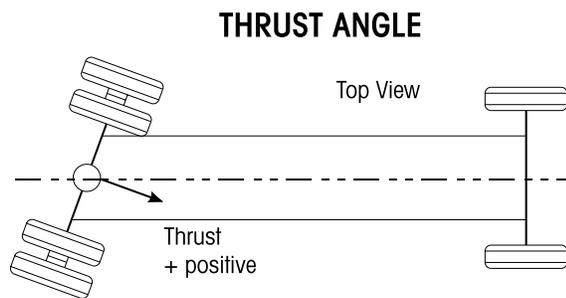
Caster — The forward or rearward tilt of the steering axle kingpin in reference to a vertical line. The angle is measured in degrees. Caster is positive when the top of the steering axis is tilted rearward and is negative when the tilt is forward. Proper caster is important for directional stability and return ability. 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 return ability. As the front wheels are turned around an inclined kingpin, the front of the truck is lifted. This lifting of the vehicle is experienced as steering effort when the turn is executed and exhibits itself as recovery force when the steering wheel is released.

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

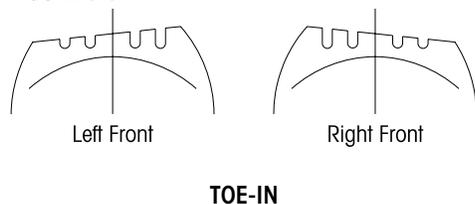
Steering Arm — The component that connects the drag link to the axle knuckle assembly.

FIGURE 8-5


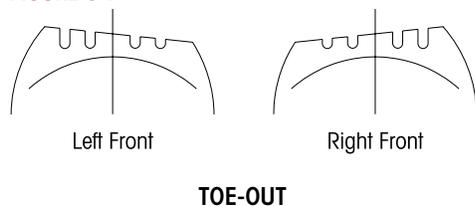
Thrust Angle, Tracking, or Square — The angle formed by the centerline of the vehicle frame (geometric centerline) and the direction that an axle points. As indicated by the term "square", the ideal value for the angle is 0° or when the axle centerline is at 90° or perpendicular to the geometric centerline.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

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

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

FIGURE 8-6


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

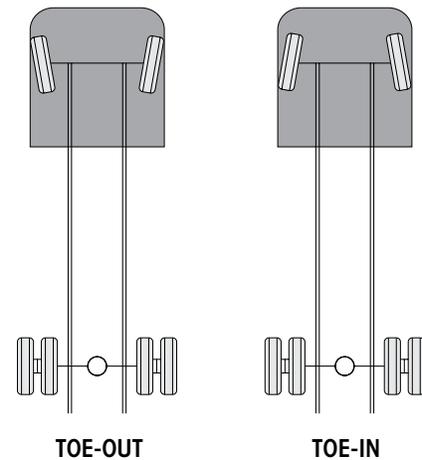
FIGURE 8-7


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

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

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

FIGURE 8-8

TOTAL TOE**INSPECTION PRIOR TO ALIGNMENT****WHEELS AND TIRES**

Examine the following items:

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

INSPECT TIE ROD ENDS

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

REAR AXLE AND REAR SUSPENSION

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

- Make sure the rear axle (especially a tandem axle) is correctly aligned. Refer to the procedure from the manufacturer of the vehicle or the suspension.



- 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 TMC (The Technology & Maintenance Council) Guidelines for Total Vehicle Alignment.

FRONT WHEEL ALIGNMENT

Hendrickson recommends technicians review TMC's publication TMC (Technology & Maintenance Council) "Guidelines for Total Vehicle Alignment".

The AIRTEK front wheel alignment specification can be found in the Front Wheel Alignment Specification Section of this publication.

Check the total vehicle wheel alignment when the following occur:

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

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

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

1. *Minor alignment* – a minor front wheel alignment is done **for all** normal maintenance conditions, see below.
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 "Inspection Prior to Alignment" in this section.
2. Check the wheel bearing end play.
3. Check and adjust the vehicle ride height as per the vehicle manufacturer's specifications.
4. Check toe-in and adjust if necessary.

MAJOR FRONT WHEEL ALIGNMENT

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

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

1. Inspect all the systems that influence the wheel alignment. Refer to the "Inspection Prior to Alignment" in this section.
2. Check and adjust the maximum turn angle, refer to the Steering Stop Adjustment Procedure in this section, see Figures 8-9 and 8-10.

FIGURE 8-9



FIGURE 8-10



3. If the vehicle is equipped with power steering, check the pressure relief in the power steering system and reset if necessary. Refer to vehicle manufacturer regarding the subject: Adjusting the Pressure Relief in the Power Steering System.
4. Verify the turning angle per Step 2, (toe-out during vehicle turns or the Ackermann angle). Refer to vehicle manufacturer's specifications.
5. Check the kingpin (or steering axis) inclination (the kingpin inclination is not adjustable). Refer to "Kingpin Inclination", in the Alignment Definitions in this section.
6. Check the camber angle. **DO NOT** attempt to adjust. Refer to "Camber" in the 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 FIGURES 8-11.

WARNING

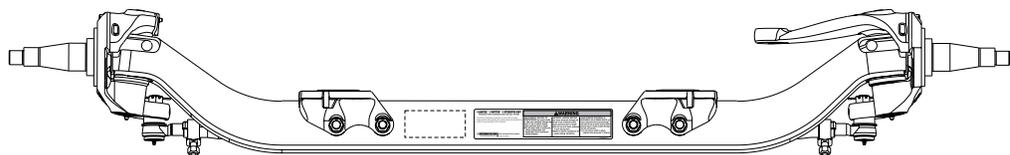
UNAUTHORIZED TAMPERING OF STEERTEK NXT INTEGRATED AXLE SPRING SEATS CAN CAUSE COMPONENT AND STRUCTURAL DAMAGE AND RESULT IN LOSS OF VEHICLE CONTROL, SEVERE PERSONAL INJURY OR DEATH, PROPERTY DAMAGE, AND WILL VOID ANY APPLICABLE WARRANTY, SEE FIGURE 8-11.

- DO NOT REMOVE, MODIFY OR REPLACE INTEGRATED AXLE SPRING SEAT OR FASTENERS.

FIGURE 8-11

| | | | |
|---|--|---|---|
| <p>AIRTEK® SOFTEK® STEERTEK NXT INTEGRATED FRONT SUSPENSION AND STEER AXLE SYSTEMS</p> <p><small>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</small></p> <p>HENDRICKSON Truck Commercial Vehicle Systems <small>www.hendrickson-intl.com 1.866.755.5968</small></p> | <p>WARNING</p> <p>UNAUTHORIZED WELDING OR MODIFICATIONS can cause cracks or other axle structural damage and result in loss of vehicle control, severe personal injury or death.</p> <ul style="list-style-type: none"> ■ Do not bend, weld or modify axle without authorization from Hendrickson Truck Commercial Vehicle Systems. | <p>IMPROPER JACKING METHOD can cause structural damage and result in loss of vehicle control, severe personal injury or death.</p> <ul style="list-style-type: none"> ■ Do not use axle beam outboard of axle spring seats. ■ Refer to vehicle manufacturer for proper jacking instructions. | <p>UNAUTHORIZED TAMPERING OF INTEGRATED AXLE SPRING SEATS can cause component and structural damage and result in loss of vehicle control, severe personal injury or death, property damage, and will void warranty.</p> <ul style="list-style-type: none"> ■ Do not remove, modify or replace integrated axle spring seat or fasteners |
|---|--|---|---|

NO. 80900-021D



NOTE

Contact Hendrickson Tech Services for any questions regarding STEERTEK NXT integrated axle spring seats and/or fasteners.

7. Check and adjust caster angle. Refer to "Caster" in the Alignment Definitions in this section. **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.

SERVICE HINT

Prior to checking caster confirm that the vehicle is at its proper ride height front and rear. The front and rear ride height must be correct to achieve proper caster.

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

RIDE HEIGHT VERIFICATION**NOTE**

The height control valve is not supplied by Hendrickson, although it is a required component. Hendrickson is not responsible for components supplied by the vehicle manufacturer. For assistance with inspection, maintenance and rebuild instructions of these components, refer to vehicle manufacturer.

STEERING STOP**ADJUSTMENT PROCEDURE**

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

WARNING

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

FIGURE 8-12

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

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 8-12.

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

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.

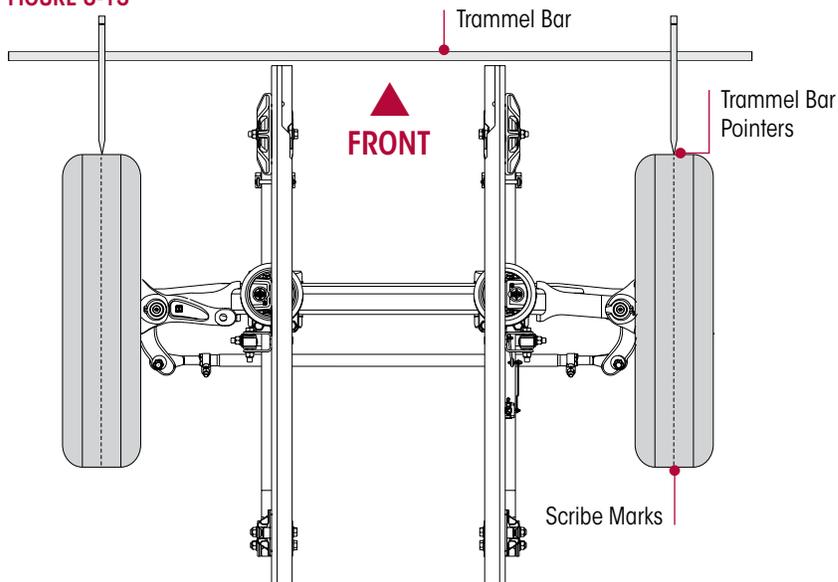
7. Use a trammel bar and measure the distance between the scribe marks at the rear of the steer axle tires. Record the measurement.
8. Install the trammel bar and measure the distance between the scribe marks at the front of the steer axle tires. Record the measurement, see Figure 8-13.

NOTE

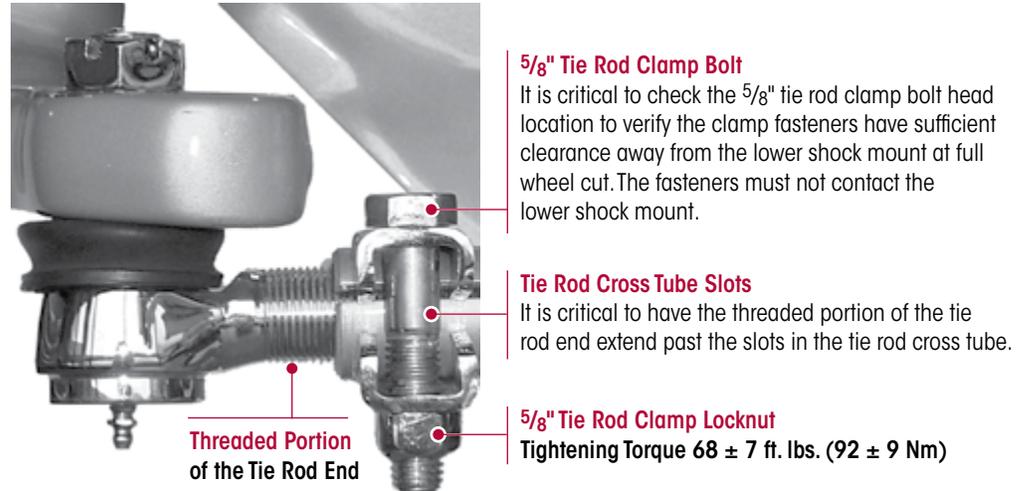
When setting up the trammel bar the pointers should be level with the spindles at the front and rear of the steer axle tires.

9. To calculate the toe setting subtract the front measurement from the rear measurement, the difference between the two will equal the toe-in/toe-out measurement.

FIGURE 8-13



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.
 - c. Tighten the bolt and locknut on the tie rod cross tube to $\mathbf{68 \pm 7}$ foot pounds torque.

FIGURE 8-14


WARNING

THE THREADED PORTION OF THE TIE ROD END MUST EXTEND PAST THE SLOTS INTO THE TIE ROD (SEE FIGURE 8-14) IT IS CRITICAL TO CHECK THE 5/8" 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 5/8" tie rod clamp bolt head does not contact the lower shock mount at full wheel cut, see Figure 8-14.
12. Repeat Steps 1-10 until the correct toe setting is achieved.

SPRING EYE RE-TORQUE

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

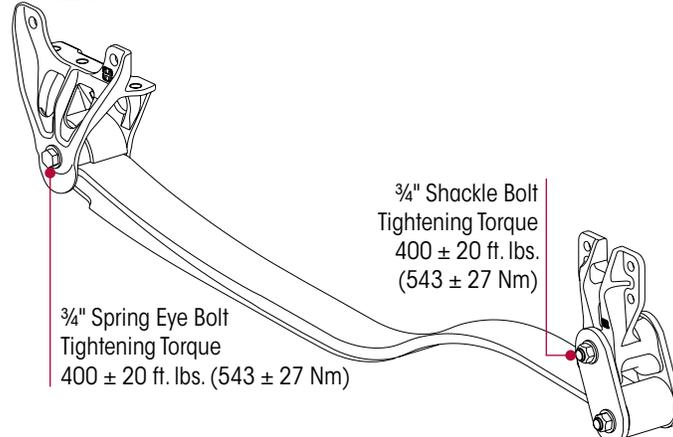
RE-TORQUE PROCEDURE

1. Chock the rear wheels of the vehicle to prevent movement.
2. Verify ride height. Adjust if necessary, as per the vehicle manufacturer's specifications.

NOTE

DO NOT remove the spring eye bolts.

3. Loosen all six (6) front and rear spring eye bolts, see Figures 8-15.

FIGURE 8-15


4. Let the suspension settle.
5. Tighten the front $\frac{3}{4}$ " spring eye bolt locknuts to \mathbb{N} 400 \pm 20 foot pounds torque.
6. Tighten the rear $\frac{3}{4}$ " spring eye bolt and shackle bolt locknuts to \mathbb{N} 400 \pm 20 foot pounds torque.
7. Affix a straight edge to the bottom of the frame rail in front of the air spring, see Figure 8-16.
8. 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.
9. Measure the difference from one side to the other.
10. Do a road test and repeat measurement Steps 7 to 9.
11. If the measurement is less than $\frac{3}{8}$ " the vehicle is level. If measurement is more than $\frac{3}{8}$ " contact Hendrickson Tech Services.

FIGURE 8-16





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 in the Appendix of this publication. If non-Hendrickson fasteners are used, follow torque specifications listed in the vehicle manufacturer's service manual.

HEIGHT CONTROL VALVE

NOTE

The height control valve is not supplied by Hendrickson, although it is a required component. Hendrickson is not responsible for components supplied by the vehicle manufacturer. For assistance with inspection, maintenance and rebuild instructions of these components, refer to vehicle manufacturer.

AIR SPRING

DISASSEMBLY

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

WARNING

PRIOR TO AND DURING DEFLATION AND INFLATION OF THE AIR SUSPENSION SYSTEM, ENSURE 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 inflating or deflating the suspension system.
6. Exhaust the air from the air system as per the vehicle manufacturer's instructions.

WARNING

IF THE AIR SPRING IS TO BE RE-INSTALLED; INSPECT LOCK-TABS FOR DAMAGE OR CRACKS PRIOR TO RE-INSTALLATION. 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 WITH THE AIR LINE.

7. Disconnect the air line to the air spring.
8. Raise the frame to allow for air spring removal.
9. Separate the air spring from the upper air spring bracket by applying downward pressure on air spring, see Figure 9-1, pushing outward on the lock-tabs outside the bracket, and inward on inlet lock-tabs. This will dislodge the air spring from the upper air spring bracket.
10. Apply upward pressure between the base of the air spring and the top pad. This will dislodge the air spring from the top pad, see Figure 9-2.
11. Remove the air spring.

FIGURE 9-1



FIGURE 9-2

**ASSEMBLY**

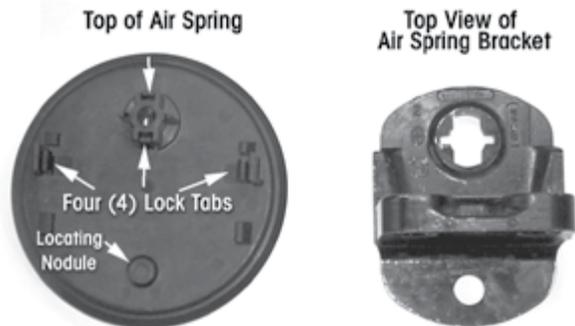
1. Insert the air spring into the top pad. Make sure the lock tabs click in place.
2. Compress the air spring and slide into vertical position. There is a locating nodule on the air spring to index the position in the upper air spring bracket.
3. Pull the air spring up into the upper air spring bracket until the air spring snaps into place in the upper air spring bracket. Verify all four lock-tabs are engaged, see Figure 9-3.

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.

4. Install the air line into the air spring.

FIGURE 9-3

**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 SPRING TOP PAD. FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN PREMATURE AIR SPRING FAILURE, CAUSE PERSONAL INJURY, OR PROPERTY DAMAGE.

5. See additional Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to inflating or deflating the suspension system.
6. Inflate the suspension to normal ride height per vehicle manufacturer's guidelines.
7. Check the air spring for leaks.
8. Check the ride height and adjust if necessary as per the vehicle manufacturer's specifications.
9. Remove the wheel chocks.

FRONT LEAF SPRING FRAME HANGER

DISASSEMBLY

1. Place the vehicle on level floor.
2. Chock the wheels.
3. Raise the frame.
4. Support the vehicle with frame stands.
5. Suspend the front axle from the shock absorbers.

WARNING

PRIOR TO AND DURING DEFLATION AND INFLATION OF THE AIR SUSPENSION SYSTEM, ENSURE 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.

6. See additional Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to inflating or deflating the suspension system.
7. Exhaust the air from the air system as per the vehicle manufacturer's instructions.
8. Remove the air lines from air springs.
9. Remove the $\frac{3}{4}$ " spring eye bolt, washers and locknut.

SERVICE HINT

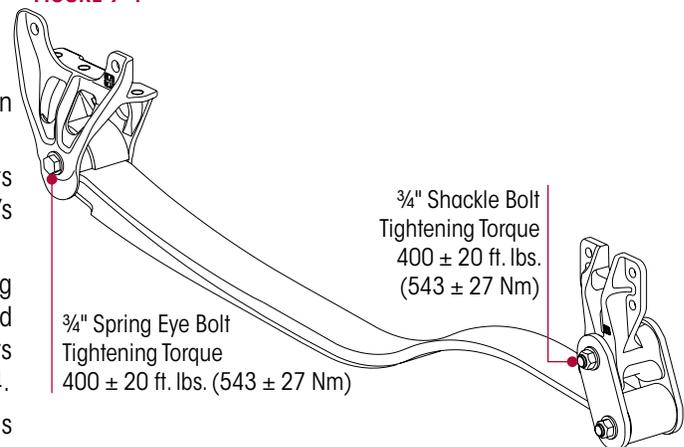
A bottle jack may be required to raise the axle slightly to facilitate removal of the spring eye bolt.

10. Remove the frame mounting fasteners from the hanger per vehicle manufacturer's instructions.
11. Remove the hanger from the vehicle, see Figure 9-4.

FIGURE 9-4

ASSEMBLY

1. Install the new hanger on the frame.
2. Install new frame fasteners per vehicle manufacturer's instructions.
3. Install the new $\frac{3}{4}$ " spring eye bolt from the outboard side of the hanger, washers and locknut, see Figure 9-4.
4. Remove the frame stands and lower frame.
5. See additional Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to inflating or deflating the suspension system.
6. Install the air lines into the air springs.
7. Inflate the suspension to normal ride height as per the vehicle manufacturer's specifications.
8. Tighten $\frac{3}{4}$ " locknut to 400 ± 20 foot pounds torque in loaded condition.
9. Remove the wheel chocks.



REAR SHACKLE BRACKET

DISASSEMBLY

1. Place the vehicle on level floor.
2. Chock the wheels.
3. Raise the frame.
4. Support the vehicle with frame stands.
5. Suspend the front axle from the shock absorbers.

WARNING

PRIOR TO AND DURING DEFLATION AND INFLATION OF THE AIR SUSPENSION SYSTEM, ENSURE 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.

6. See additional Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to inflating or deflating the suspension system.
7. Exhaust the air from the air system as per the vehicle manufacturer's instructions.
8. Remove the air lines from air springs.
9. Remove and discard the rear $\frac{3}{4}$ " spring eye and shackle fasteners.
10. Remove and discard shackle plates.

SERVICE HINT

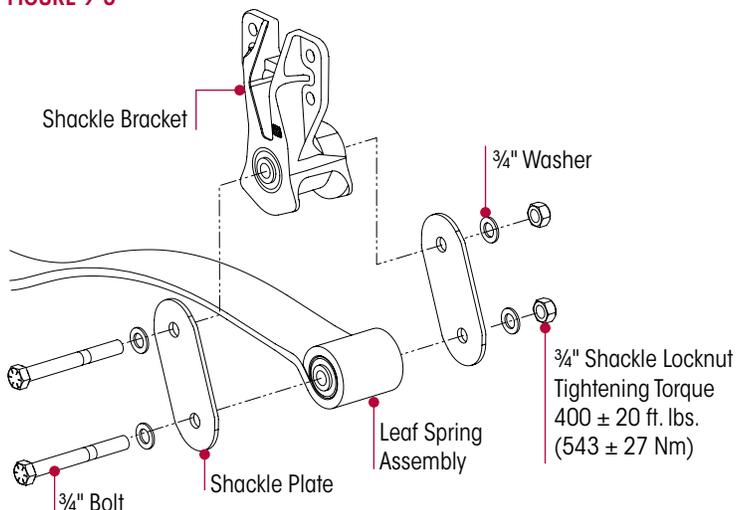
A bottle jack may be required to raise the axle slightly to facilitate removal of the spring eye bolt.

11. Remove the frame mounting fasteners from the rear shackle bracket per vehicle manufacturer's guidelines.
12. Remove the shackle bracket from the vehicle, see Figure 9-5.
13. Inspect the shackle assembly for excessive wear or damage, refer to the Preventive Maintenance Section of this publication. If damaged or worn excessively, replace with genuine Hendrickson parts as detailed in the Component Replacement Section of this publication.

ASSEMBLY

1. Install the shackle bracket on the frame with new frame fasteners per vehicle manufacturer's guidelines.
2. Install the shackle plates with the new $\frac{3}{4}$ " bolts, washers and locknuts. Snug the shackle bolts. **DO NOT** tighten at this time.

FIGURE 9-5



3. Remove the frame stands and lower the frame.
4. See additional Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to inflating or deflating the suspension system.
5. Install the air lines into the air springs.
6. Inflate the suspension to normal ride height as per the vehicle manufacturer's specifications.
7. Tighten $\frac{3}{4}$ " shackle locknuts to 400 ± 20 foot pounds torque in loaded condition, see Figure 9-5.
8. Remove the wheel chocks.



LEAF SPRING ASSEMBLY

DISASSEMBLY

1. Place the vehicle on a level floor.
2. Chock the wheels.
3. Exhaust the air from the air system as per the vehicle manufacturer's instructions.
4. Install a floor jack with a 4 inch lifting plate below the axle and raise the truck.
5. Remove the tires.
6. Install frame stands behind the rear spring mounts. It may be necessary to remove peripheral components for installation of the frame stands.

WARNING

PRIOR TO AND DURING DEFLATION AND INFLATION OF THE AIR SUSPENSION SYSTEM, ENSURE 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.

7. Lower the jack allowing the axle to hang, but **DO NOT** remove the jack from the axle.
8. Loosen both front spring eye bolts, but **DO NOT** remove the bolts.
9. Loosen the 3/4" shackle pivot bolts.
10. Remove and discard both rear spring eye bolts.
11. Remove and discard both lower shock absorber mounting fasteners and spacers.

SERVICE HINT

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

12. Disconnect the air lines at the air springs.
13. Disconnect the bottom of the air springs from the top pad per the Air Spring Component Disassembly in this section.

WARNING

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

SERVICE HINT

If a clamp group nut fails to come off bolt, cut half way through the bolt with an abrasive cut off wheel, taking care not to contact axle beam or other components. Using an impact wrench, spin the locknut to fracture the bolt and remove.

14. **Loosen** the clamp group locknuts for the leaf spring that **IS NOT** being replaced.
15. Lower the jack allowing the suspension to pivot down out of the rear hanger clamps.
16. Remove and discard the clamp group fasteners from the leaf spring being replaced.

WARNING

UNAUTHORIZED TAMPERING OF INTEGRATED AXLE SPRING SEATS CAN CAUSE COMPONENT AND STRUCTURAL DAMAGE AND RESULT IN LOSS OF VEHICLE CONTROL, SEVERE PERSONAL INJURY OR DEATH, PROPERTY DAMAGE, AND WILL VOID ANY APPLICABLE WARRANTY.

- DO NOT REMOVE, MODIFY OR REPLACE INTEGRATED AXLE SPRING SEAT OR FASTENERS

NOTE

Contact Hendrickson Tech Services for any questions regarding STEERTEK NXT axle spring seats and/or fasteners.

17. Remove the top pad, galvanized liner from the leaf spring assembly that is going to be replaced, see Figure 9-6.

WARNING

THE WEIGHT OF THE LEAF SPRING ASSEMBLY IS APPROXIMATELY 76 POUNDS. CARE SHOULD BE TAKEN AT REMOVAL AND INSTALLATION TO PREVENT PERSONAL INJURY OR DAMAGE TO COMPONENTS.

18. Remove the leaf spring assembly. Approximate weight of the leaf spring is 76 pounds.

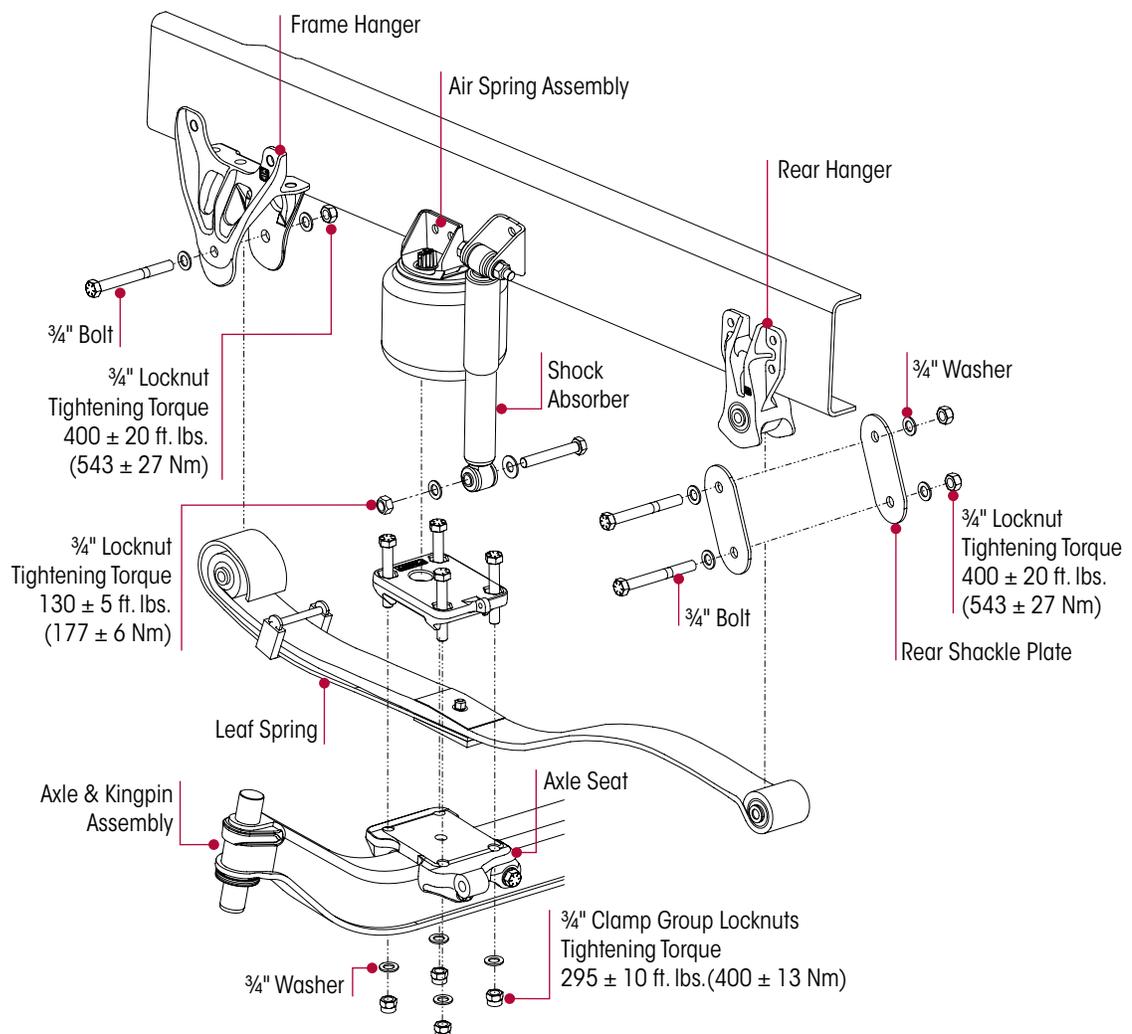
ASSEMBLY

WARNING

THE WEIGHT OF THE LEAF SPRING ASSEMBLY IS APPROXIMATELY 76 POUNDS. CARE SHOULD BE TAKEN AT REMOVAL AND INSTALLATION TO PREVENT PERSONAL INJURY OR DAMAGE TO COMPONENTS.

1. Install the new leaf spring assembly with the galvanized liner on the axle. Approximate weight of the leaf spring is 76 pounds.
2. Verify that the dowel pin is engaged properly in the axle spring seat, see Figure 9-6.
3. Install the **FRONT** spring eye bolt and fastener, snug but **DO NOT** tighten at this time.
4. Install the top pad on top of the leaf spring.
5. Install the new clamp group fasteners. New clamp group fasteners must be used when the clamp group is removed, to prevent premature bolt fatigue.
6. Snug the clamp group, **DO NOT** tighten to torque at this time.
7. Raise the axle and the **REAR** spring assemblies into the rear spring hangers.
8. Install the rear spring eye bolts in the rear hangers, snug but **DO NOT** tighten at this time, see Figure 9-6.
9. Install the lower shock mounting bolts to axle seat from the inboard side to the outboard side and attach fasteners and spacers.
10. Install the air spring.

FIGURE 9-6



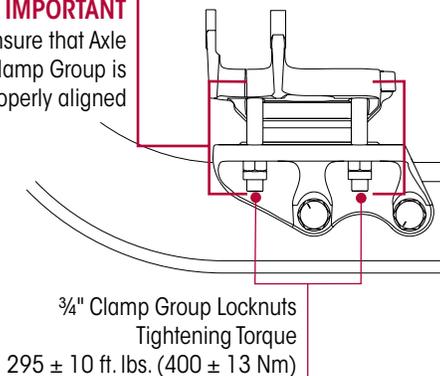
IMPORTANT NOTE

Only the weight of the axle should be on the spring at the time of the front and rear spring eye tightening torque. See the Spring Eye Re-torque procedure in the Alignment & Adjustments Section of this publication.

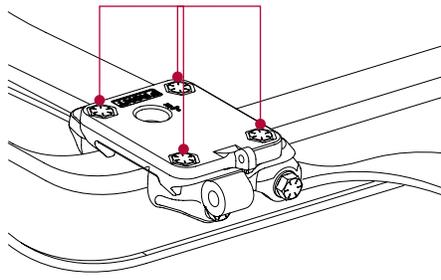
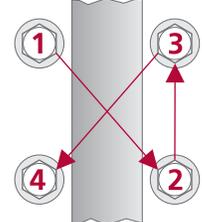
11. Install the tires.
12. Raise the vehicle and remove the frame supports and load the front axle and then lower the vehicle.
13. See additional Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to inflating or deflating the suspension system.
14. Install air lines, and air up system.
15. Tighten the lower shock mounting bolts to \mathbb{N} 130 \pm 5 foot pounds torque.
16. Tighten the rear spring eye fasteners to \mathbb{N} 400 \pm 20 foot pounds torque in the loaded condition.
17. Install the air springs into the top pads per the Air Spring Component Assembly instructions in this publication. Make sure the air spring piston seats into the top pad correctly.
18. Ensure that the clamp group is properly aligned and the hex bolts are seated top pad, see Figures 9-7 and 9-8.
19. Tighten the clamp group locknuts evenly in 50 foot pounds increments to \mathbb{N} 295 \pm 10 foot pounds torque in the proper pattern to achieve uniform bolt tension, see Figure 9-9.
20. Check the ride height and adjust if necessary as per the vehicle manufacturer's specifications.
21. Tighten the front $\frac{3}{4}$ " spring eye bolt locknuts to \mathbb{N} 400 \pm 20 foot pounds torque. Vehicle must be at ride height.
22. Remove the wheel chocks.

FIGURE 9-7

IMPORTANT
Ensure that Axle Clamp Group is properly aligned


FIGURE 9-8

IMPORTANT
Ensure that the $\frac{3}{4}$ " Clamp Bolts are seated properly in the Top Pad


FIGURE 9-9


SHOCK ABSORBER

NOTE

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

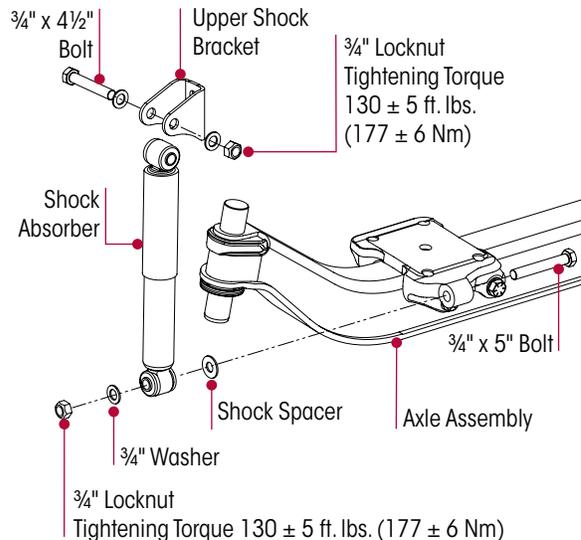
DISASSEMBLY

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

ASSEMBLY

1. Install the shock absorber into the upper mounting bracket.
2. Install the upper $\frac{3}{4}$ " shock mounting fasteners.
3. Install the lower shock mounting bolts to the axle seat from the inboard side to the outboard side and attach fasteners and spacers, see Figure 9-10.
4. Tighten both upper and lower $\frac{3}{4}$ " locknuts to \square 130 \pm 5 foot pounds torque, see Figure 9-10.

FIGURE 9-10



FRONT AXLE ASSEMBLY – STEERTEK NXT AXLE

The STEERTEK NXT axle clamp group consists of the top pad, $\frac{3}{4}$ " bolts, washers, and nylon locknuts.

STEERTEK NXT AXLE REMOVAL

DISASSEMBLY

Refer to Figure 9-11 when replacing the components of the STEERTEK NXT axle.

WARNING

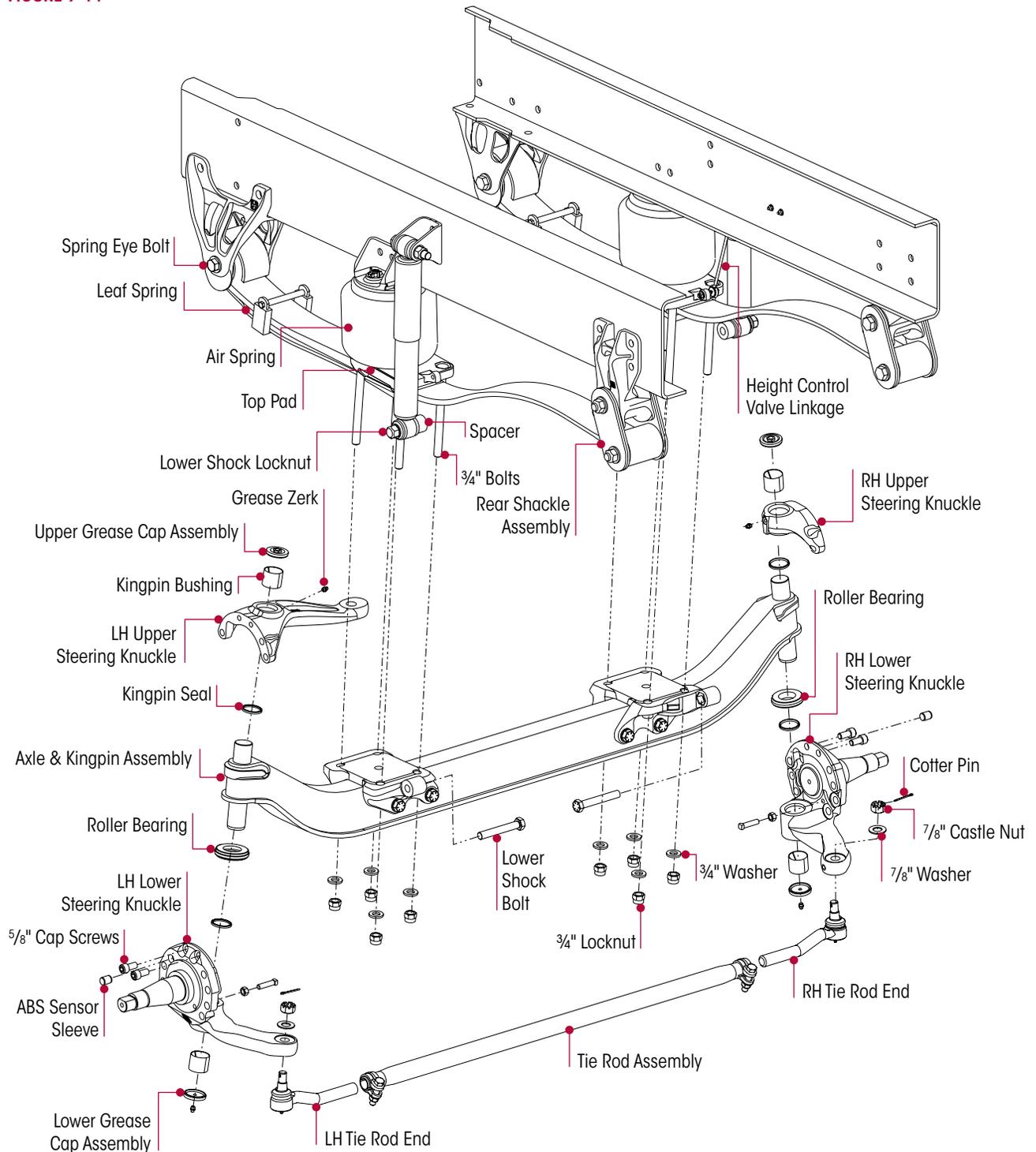
DO NOT USE A TORCH ON CLAMP GROUP BOLTS OR ANY OTHER PART OF THE AIRTEK SUSPENSIONS. IF THE CLAMP GROUP BOLTS WILL NOT COME LOOSE WITH AN IMPACT WRENCH, USE A CUT OFF WHEEL AND CUT THE SHANK OF THE BOLT. THE USE OF A TORCH CAN CAUSE DAMAGE TO CERTAIN AIRTEK COMPONENTS THAT CAN RESULT IN THE LOSS OF VEHICLE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

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

WARNING

PRIOR TO AND DURING DEFLATION AND INFLATION OF THE AIR SUSPENSION SYSTEM, ENSURE 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.

3. See additional Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to deflating or inflating the air system.

FIGURE 9-11


⚠ WARNING

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.

4. Exhaust the air from the air system as per the vehicle manufacturer's instructions.



5. Raise the vehicle.
6. Support the vehicle with frame stands.

! DANGER

THE INTEGRATED AXLE SPRING SEATS ON THE STEERTEK NXT AXLE ARE NON-SERVICEABLE. DO NOT REMOVE, MODIFY OR REPLACE INTEGRATED FASTENERS, DOING SO CAN CAUSE STRUCTURAL DAMAGE AND RESULT IN LOSS OF VEHICLE CONTROL, PROPERTY DAMAGE, SEVERE PERSONAL INJURY, OR DEATH AND VOID ANY APPLICABLE WARRANTY.

7. Suspend the front axle with the shock absorbers attached.
8. Remove the front wheels, hubs, brake shoes, ABS sensors, and backing plate assembly.
9. Disconnect the drag link from the steering arm.

! CAUTION

IF THE AIR SPRING IS TO BE RE-INSTALLED; CARE MUST BE TAKEN TO REMOVE DIRT AND DEBRIS FROM THE PUSH-TO-CONNECT FITTING. FAILURE TO DO SO COULD RESULT IN THE PUSH-TO-CONNECT FITTING FAILING TO SEAL WITH THE AIR LINE. INSPECT LOCK-TABS FOR DAMAGE OR CRACKS PRIOR TO RE-INSTALLATION.

10. Unseat both of the air springs at the axle top pad.
11. Support the axle with a floor jack.

! WARNING

THE REPAIR OR RECONDITIONING OF SUSPENSION OR AXLE COMPONENTS IS NOT ALLOWED. ANY SUSPENSION OR AXLE COMPONENTS FOUND TO BE DAMAGED OR OUT OF SPECIFICATIONS MUST BE REPLACED. ALL MAJOR HENDRICKSON COMPONENTS ARE HEAT TREATED AND TEMPERED. AIRTEK 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.

12. Remove the lower shock mounting locknut, washer and spacer from the axle seat. Remove the lower shock absorbers from the lower mounting bolts and push clear of leaf spring assembly.

SERVICE HINT

If a clamp group nut fails to come off bolt, cut half way through the bolt with an abrasive cut off wheel, taking care not to contact axle beam or other components. Using an impact wrench, spin the locknut to fracture the bolt and remove.

13. Remove the 3/4" clamp group fasteners and discard.
14. Lower the axle and remove from the vehicle.

■ STEERTEK NXT AXLE (Removed from Chassis)**AXLE REMOVAL**

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

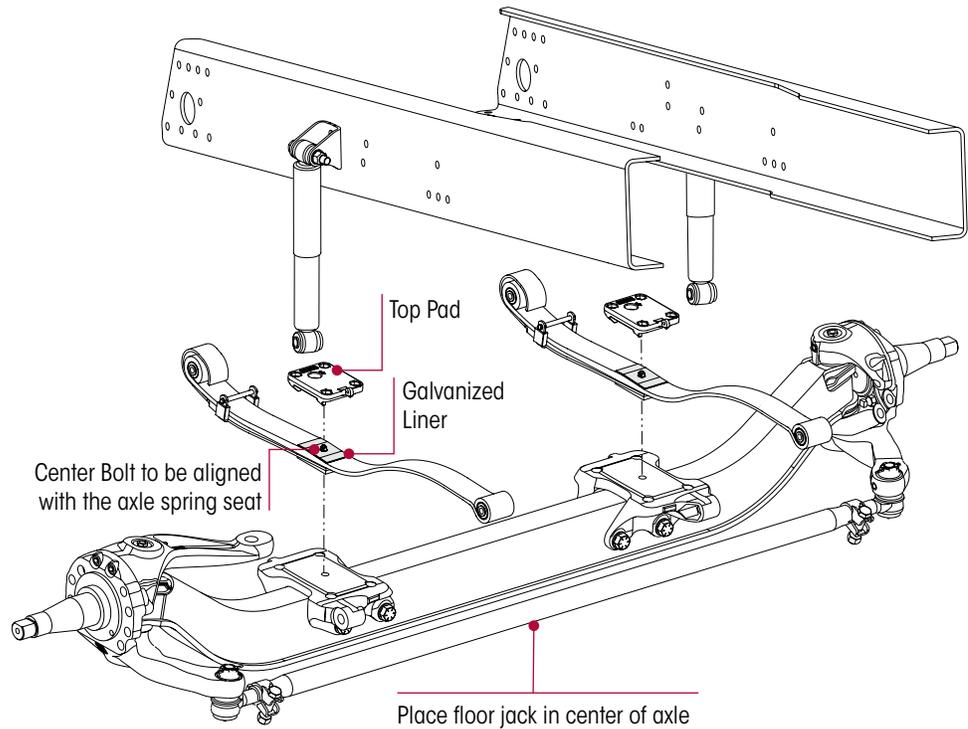
! WARNING

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

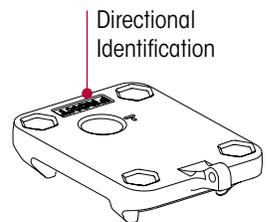
2. Remove the two 5/8" socket head cap screws from the steering knuckle assembly, see Figure 9-11.
3. Remove the steering knuckle and thrust bearing.
4. After complete removal of the one side, repeat Steps 1 through 3 for the opposite side of the axle.
5. Inspect the kingpin bushings for excessive wear. If worn, replace the kingpin bushings and seals. See the Kingpin Bushing replacement instructions in this section.

AXLE INSTALLATION

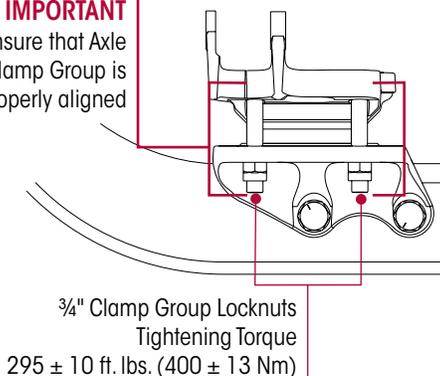
1. Place the new axle on the floor jack and position the axle under the vehicle, see Figure 9-12.
2. Raise the axle into position. Care must be taken at this point to ensure that the center bolt of front leaf spring assembly is aligned properly with the axle spring seat, see Figure 9-12.
3. Install the galvanized liner between the leaf spring and the top pad, see Figure 9-12.

FIGURE 9-12


4. Install the top pad with the directional identification facing correctly on the vehicle, See Figure 9-13.
5. Install the new $\frac{3}{4}$ " clamp group fasteners. Snug the bolts, **DO NOT** tighten to the specified torque at this time.
6. Ensure that the clamp groups are properly aligned and the bolts are seated in the top pad, and the top pad is centered on the axle spring seat, see Figures 9-14 and 9-15.
7. See additional Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to inflating or deflating the suspension system.

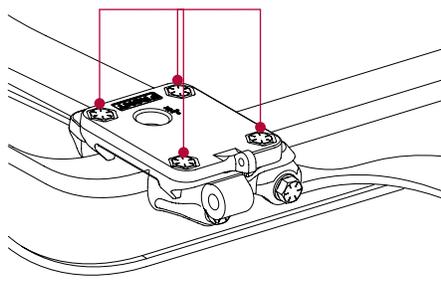
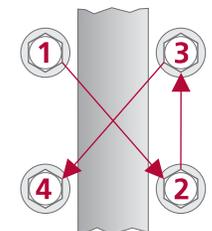
FIGURE 9-13

FIGURE 9-14

IMPORTANT
Ensure that Axle Clamp Group is properly aligned


FIGURE 9-15

IMPORTANT

Ensure that the $\frac{3}{4}$ " Clamp Bolts are seated properly in the Top Pad


FIGURE 9-16


8. Engage the air springs into the top pad. The bottom of the air spring snaps to the top pad.
9. Install the lower shock absorber connection (if removed). Install the lower shock fasteners and tighten to \mathbb{N} 130 \pm 5 foot pounds torque.
10. Install the steering knuckles as per the Steering Knuckle Assembly instructions in this section.
11. Install the tie rod assembly.
12. Install the $\frac{7}{8}$ " hardened washers on the Ackermann arm and the castle nuts. Tighten the castle nuts to \mathbb{N} 185 foot pounds, then rotate until the first castle slot lines up with the cotter pin bore in the tie rod end. **DO NOT** back off the nut for cotter pin installation.
13. Install the tie rod end cotter pins.
14. Connect the drag link in the steering arms.
15. Install the castle nut to install the steering arm. Tighten the castle nut to \mathbb{N} 185 foot pounds, then rotate until the first castle slot lines up with the cotter pin bore in the drag link. **DO NOT** back off nut for cotter pin installation.
16. Install the drag link cotter pin.
17. Install the brake backing plate assemblies and ABS sensor.
18. Install the brakes, hubs, and wheels as per manufacturer's guidelines.
19. Fill the hubs with the proper lubricant (see manufacturer's guidelines for recommended lubrication specifications).
20. Grease the front steering components as per lubrication guidelines in the Preventive Maintenance Section of this publication.
21. Raise the vehicle and remove the frame stands.
22. Lower the vehicle.
23. Inflate the suspension to normal ride height as per the vehicle manufacturer's specifications.
24. Tighten the $\frac{3}{4}$ " clamp group locknuts evenly in 50 foot pounds increments to \mathbb{N} 295 \pm 10 foot pounds torque in the proper sequence to achieve uniform bolt tension, see Figure 9-16.
25. Check the ride height and adjust if necessary as per the vehicle manufacturer's specifications.
26. Remove the wheel chocks.

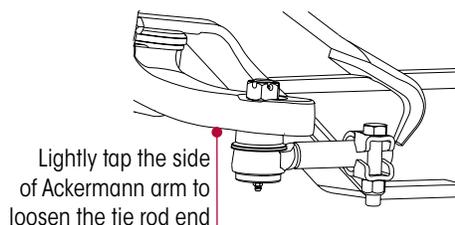
■ STEERING KNUCKLE DISASSEMBLY

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

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

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

FIGURE 9-17



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 9-17.

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

WARNING

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

9. Remove the two (2) socket head cap screws that connect upper kingpin connection to the steering knuckle, see Figure 9-18.

10. Remove the lower steering knuckle from the kingpin by sliding it down the kingpin.

11. Remove the upper steering knuckle by sliding it up and off the kingpin.

FIGURE 9-18

**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 STEERTEK NXT HAS A UNIQUE AXLE. THE KINGPIN IS CRYOGENICALLY INSTALLED IN THE AXLE. THE KINGPIN IS A NON-REPLACEABLE COMPONENT OF THE AXLE ASSEMBLY. DO NOT TRY TO REMOVE THE KINGPIN. DOING SO WILL DAMAGE THE AXLE AND MAY CAUSE LOSS OF VEHICLE CONTROL, PERSONAL INJURY OR PROPERTY DAMAGE. IF THE KINGPIN SHOWS SIGNS OF MOVEMENT, CONTACT HENDRICKSON PRODUCT ENGINEERING - 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 9-19 through 9-22.
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 9-23 through 9-26.

Kingpin minimum dimension is 1.802"

FIGURE 9-19

FIGURE 9-20

FIGURE 9-21

FIGURE 9-22

FIGURE 9-23

FIGURE 9-24


FIGURE 9-25



FIGURE 9-26



■ KINGPIN BUSHING REMOVAL

You will need:

- A hydraulic shop press with a minimum forcing capacity of 2.5 tons (or use an arbor press)
- Adjustable straight flute reamer tool, see Special Tool Section in this publication
- Kingpin Bushing Driver, Receiving and Remover/Installer Tools, see Special Tool Section in this publication

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 9-27 AND 9-28. 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 Figure 9-27 through 9-29.
3. Place the STEERTEK NXT installer/remover tool in the steering knuckle/kingpin bore. Then place the kingpin bushing push-out tool on top of the installer/remover.
4. Press out the kingpin bushing.
5. Clean the parts and inspect for reassembly.

FIGURE 9-27



FIGURE 9-28



FIGURE 9-29



■ 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 9-30 through 9-32. If the average measurement is more than the knuckle bore maximum diameter specification, replace the knuckle.

FIGURE 9-30



FIGURE 9-31



FIGURE 9-32



■ KINGPIN BUSHING INSTALLATION

You will need:

- A hydraulic shop press with a minimum forcing capacity of 2.5 tons.
- Kingpin Bushing Driver, Receiving and Remover/Installer Tools, see Special Tool Section in this publication
- Adjustable straight flute reamer, see Special Tools Section in this publication.

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 driver, (see driver specifications in the Special Tools Section of this publication). Press in bushing to a depth of no less than $1\frac{5}{64}"$ (0.236") or 6 millimeters and no more than $\frac{5}{16}"$ (0.32") or 8 millimeters, see Figures 9-33 and 9-35.
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 9-33

FIGURE 9-34

FIGURE 9-35


■ KINGPIN BUSHING REAMING

CAUTION

REAM THE KINGPIN BUSHINGS WITH AN ADJUSTABLE STRAIGHT FLUTE REAMER. 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.

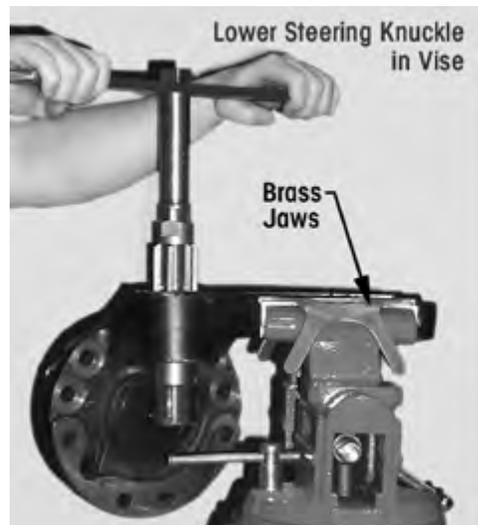
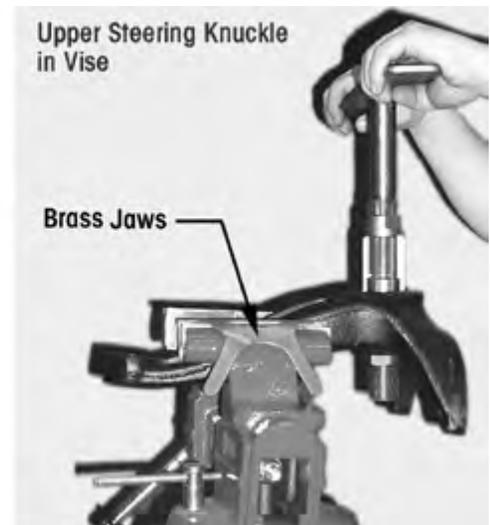
4. Install the lower steering knuckle assembly in a vise with brass jaws.

SERVICE HINT

It is acceptable to mount the knuckle components in a vise either vertically or horizontally when performing the reaming procedure.

5. Install the reamer into the lower steering knuckle until the blades touch the kingpin bushing.

6. Rotate the reamer with light downward pressure. Rotate the reamer smoothly. **DO NOT** apply too much pressure, see Figures 9-36 and 9-37.

FIGURE 9-36

FIGURE 9-37


7. Slide the reamer out of the lower steering knuckle assembly. If it is necessary to remove the reamer from the top, rotate the reamer opposite of cutting rotation.

8. Clean and remove all kingpin bushing material from the knuckle assembly. Take special attention to remove material from the grease channels and dimples.

9. Clean the $\frac{5}{8}$ " brake backing plate bolts with a wire wheel and run a tap through the threads of the upper kingpin connection/steering arm and then flush out with brake cleaner and dry with compressed air.

WARNING

PRIOR TO INSTALLATION ENSURE THAT ALL RESIDUAL LOCTITE MATERIAL IS REMOVED FROM THE MOUNTING BOLTS AND THE THREAD BORES IN THE UPPER KINGPIN CONNECTION OR STEERING ARM, 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.

NOTE

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

10. Install the steering arm and upper kingpin connection on the kingpin.
11. Check for the proper fit by rotating the knuckle assembly back and forth to verify there is no binding on the kingpin, see Figures 9-38 and 9-39.
12. If the bushing is too tight repeat Steps 1 through 8 until the proper clearance is achieved.

FIGURE 9-38

FIGURE 9-39

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, see Figure 9-40.
3. Use a kingpin bushing driver tool (see Special Tool Section) and press seal firmly into the steering knuckle assembly.
4. Double Lip design, see Figure 9-41. Install the kingpin seal until it bottoms out in the kingpin bore.

FIGURE 9-40

Magnification of lip seal
Lip seal faces toward axle


FIGURE 9-41

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



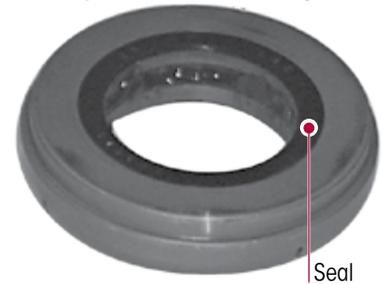
■ STEERING KNUCKLE ASSEMBLY

After replacement of the kingpin bushings it is necessary to re-assemble the steering knuckle assemblies. **DO NOT** substitute aftermarket components when servicing. The left and right side of the STEERTEK NXT axle for Tiffin Motorhome Chassis is equipped with steel roller thrust bearings, see Figure 9-42.

1. 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 9-42.
2. Install the shim, if equipped, on the upper kingpin.
3. Pack the bushing dimples on the upper and lower steering knuckles with multi purpose Lithium based grease (NLGI Grade 2) before installation.
4. Install the upper steering knuckle on the upper arm kingpin.
5. Install the lower steering knuckle on the lower kingpin and install the old socket head cap screws loose into the top two threaded holes.
6. Install a bottle jack under the lower knuckle and slightly raise the knuckle until it is possible to thread in the (3) brake backing plate bolts by hand. These are for guide purposes only.

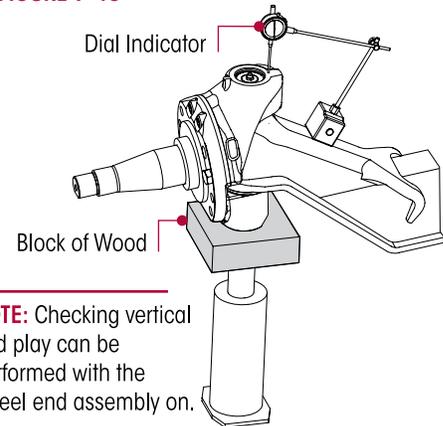
FIGURE 9-42

Top View of Roller Bearing



7. Snug the two socket head cap screws.
8. Lower the bottle jack so that all the vertical end play is on the underside of the axle.
9. 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 9-43.
10. Zero the dial indicator.
11. Raise the bottle jack until there is **NO CLEARANCE** between the knuckle assembly and the bottom of the axle, slightly lifting the axle.
12. Check the reading on the dial indicator. The specification for vertical travel on the steering knuckle during assembly is 0.008" to 0.011".
13. 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.

FIGURE 9-43



NOTE

The 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.

14. Remove one old socket head cap screw and replace with new socket head cap screw.
15. 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 torque.
16. Recheck the vertical end play with the dial indicator or a 0.010" feeler gauge, see Figure 9-43.

17. Remove the brake spider bolts, they should thread out freely.
18. Remove the bottle jack and continue assembling the wheel ends.

IMPORTANT NOTE

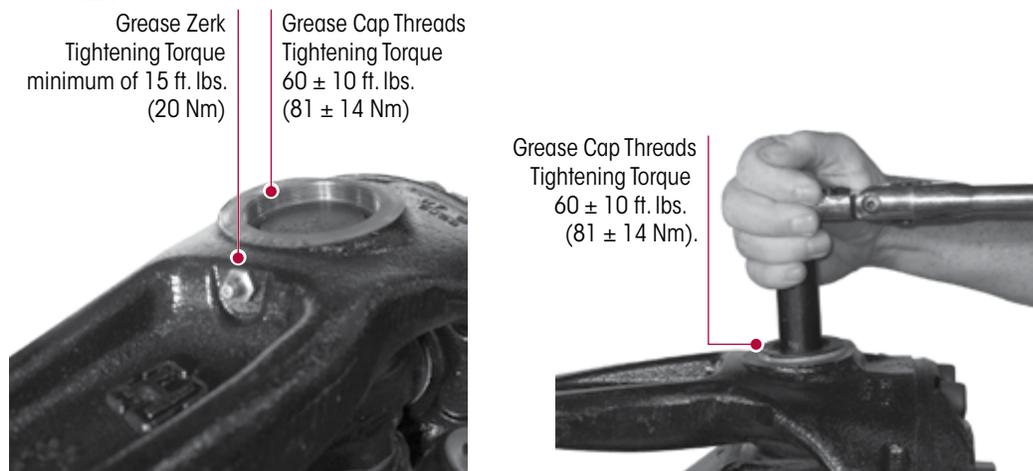
It is critical to apply Loctite to the three brake spider bolts to ensure that these bolts sustain the proper torque requirement of steering knuckle assembly.

19. Apply Loctite to the three brake spider bolts prior to installation into the brake spider. Tighten bolts to 188 ± 12 foot pounds torque.

WARNING

DO NOT GREASE KNUCKLES WITHOUT THE BRAKE SPIDER INSTALLED AND TIGHTENED TO PROPER TORQUE. FAILURE TO DO SO CAN CAUSE COMPONENT DAMAGE RESULTING IN FAILURE AND LOSS OF VEHICLE CONTROL, POSSIBLY CAUSING PERSONAL INJURY OR PROPERTY DAMAGE.

20. Install the tie rod end into the lower steering knuckle arm.
21. Tighten the castle nuts to 185 foot pounds torque then rotate the castle nut to the next castle slot and install cotter pin.
22. Install the drag link into the steering arm and tighten to the vehicle manufacturer's specifications.
23. Install new O-rings on the grease caps and lubricate O-rings with grease.
24. Install new grease caps. Note the grease caps on the STEERTEK NXT axle are threaded, tighten to 60 ± 10 foot pounds torque. Allow 30 minutes for thread sealant to cure before greasing. Install new grease zerk and tighten to a minimum of 15 foot pounds, see Figure 9-44.

FIGURE 9-44

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

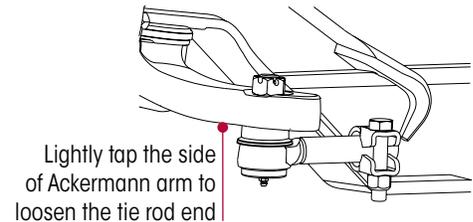
TIE ROD END AND CROSS TUBE

NOTE

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

DISASSEMBLY

1. Chock the wheels.
2. Position the steer axle tires straight ahead.
3. Remove the cotter pin and castle nut.
4. Lightly tap the side of the Ackermann arm to loosen the tie rod end from the Ackermann arm, see Figure 9-45.
5. Repeat Steps 3 and 4 to remove the other tie rod end.
6. Remove the cross tube and tie rod ends from the vehicle.
7. Mount the cross tube in a 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.

FIGURE 9-45

WARNING

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

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

ASSEMBLY

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

NOTE

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

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

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

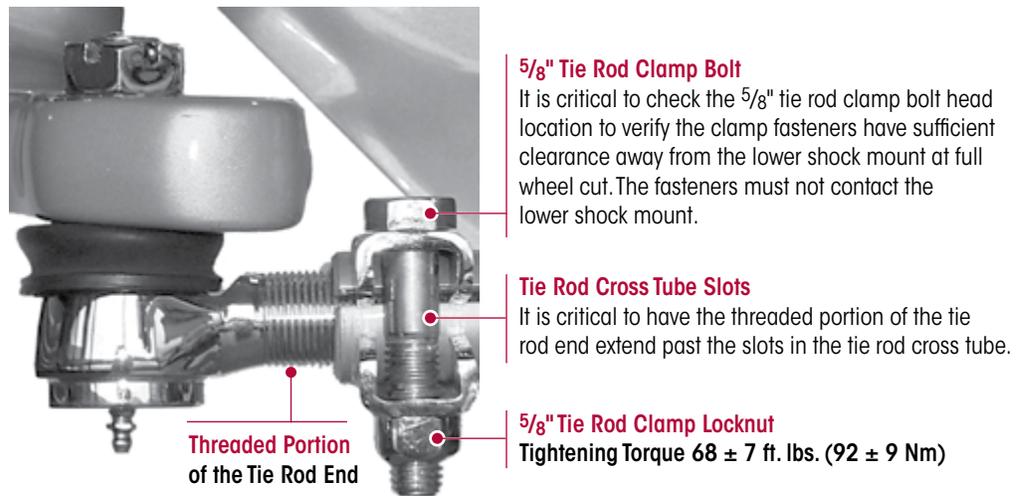
WARNING

THE THREADED PORTION OF THE TIE ROD END MUST EXTEND PAST THE SLOTS INTO THE TIE ROD CROSS TUBE, SEE FIGURE 9-46. FAILURE TO DO SO CAN CAUSE COMPONENT DAMAGE, LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

WARNING

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

FIGURE 9-46



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

⚠ WARNING

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

4. If replacing opposing tie rod end is not necessary it is critical that the cross tube will rotate in the opposing tie rod end.
5. Install the cross tube into the Ackermann arms.
6. Tighten the castle nuts to 185 foot pounds torque then rotate the castle nut to the next castle slot and install cotter pin.
7. Grease tie rod ends. See Lubrication Chart for required lubricant in the Preventive Maintenance Section of this publication.
8. Set the toe, see Toe Adjustment Procedure in the Alignment & Adjustments Section of this publication.
9. Remove the wheel chocks.



SECTION 10

Front Wheel Alignment Specifications

AIRTEK FOR TIFFIN MOTORHOME CHASSIS

| FRONT AIR MODULE SUSPENSION ALIGNMENT SPECIFICATION | | | |
|---|-----------------------------------|---------------|---------------|
| CAMBER ¹ | DESIGN SPECIFICATION | RANGE | |
| | | MINIMUM | MAXIMUM |
| LEFT | 0.00° ± 1.0° | -1.0° | +1.0° |
| RIGHT | - 0.25° ± 1.0° | -1.25° | +0.75° |
| CROSS | Max 2.0° | — | — |
| CAMBER NOTES: | | | |
| ¹ The camber angle is not adjustable. Do not bend axle or otherwise try to adjust camber. If found out of specification, notify Hendrickson Tech Services for further information. | | | |
| CASTER ^{1,2} | DESIGN SPECIFICATION | RANGE | |
| | | MINIMUM | MAXIMUM |
| LEFT | 5° ± 1° | +4° | +6° |
| RIGHT | 5° ± 1° | +4° | +6° |
| CROSS ³ | Max 1.0° | — | — |
| 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. Refer to vehicle manufacturer's 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: 2.5° RH/3° left hand, would require one, 1.0 shim on each side to increase caster and achieve 3.5° RH/4.0° left hand, which is in specification. Do not attempt to use uneven shims. | | | |
| Hendrickson recommends following TMC² practices: | | | |
| TOTAL TOE ² | DESIGN SPECIFICATION ¹ | RANGE | |
| | | MINIMUM | MAXIMUM |
| | 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 11

Troubleshooting Guide

AIRTEK with STEERTEK NXT Axle for Tiffin Motorhome Chassis

| TROUBLESHOOTING GUIDE | | |
|--|---|---|
| CONDITION | POSSIBLE CAUSE | CORRECTION |
| Worn or damaged kingpins and kingpin bushings | Dirt in system– contaminated lubricant | Polish and inspect kingpin, replace bushing and seals, then follow specified lubrication procedures |
| | Incorrect lubricant | Lubricate axle with specified lubricant |
| | Axle not lubricated at scheduled frequency | Lubricant axle at scheduled frequency |
| | Incorrect lubrication procedures | Use correct lubrication procedures |
| | Lubrication interval not compatible with operating conditions | Change lubrication interval to match operating conditions |
| | Worn or missing seals | Replace worn or missing seals |
| Vibration or shimmy of front axle during operation | Caster out of specification | Set proper ride height then adjust caster to specification |
| | Wheels and/or tires out of balance | Balance or replace wheels and/or tires |
| | Worn shock absorbers | Replace shock absorbers |
| | Broken engine mount | Replace engine mount |
| | Wheel bearing adjustment | Adjust wheel bearing to the vehicle manufacturers specifications. |
| Excessive wear on tires or uneven tire tread wear | Tires have incorrect air pressure | Adjust tire pressure to manufacturer's specification. |
| | Tires out of balance | Balance or replace tires |
| | Incorrect tandem axle alignment | Align tandem axles |
| | Incorrect toe setting | Adjust toe-in to manufacturer's specification |
| | Incorrect steering arm geometry | Repair steering system as necessary |
| | Worn kingpin bushings | Replace kingpin bushings |
| | Excessive wheel bearing end play | Check specified wheel nut torque, replace worn or damaged wheel bearings |
| | Wheel bearing adjustment | Adjust wheel bearing to the vehicle manufacturers 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 | Set proper ride height per the vehicle manufacturer's instructions, then 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 manufacturing guidelines. |
| 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 |

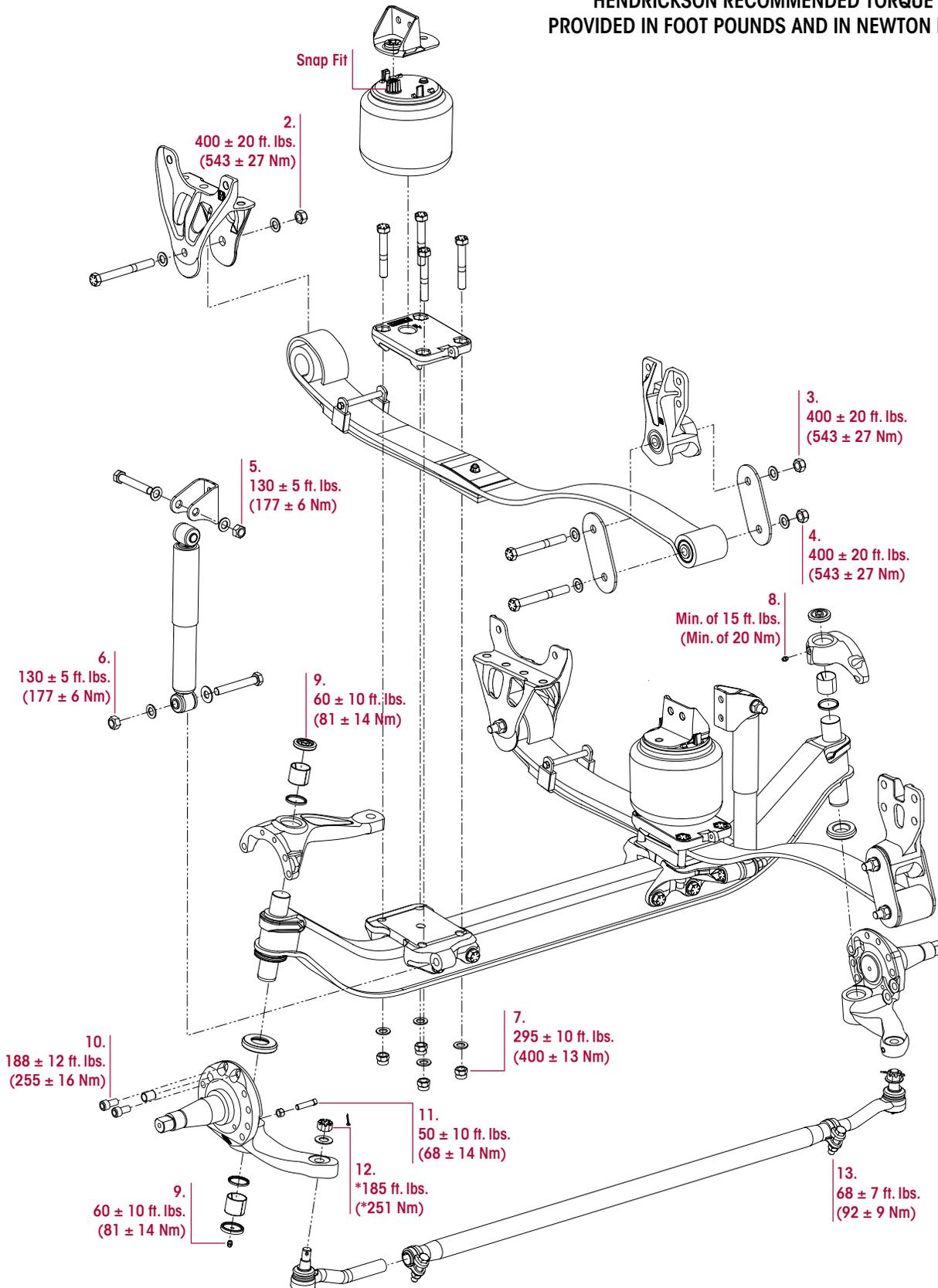


AIRTEK with STEERTEK NXT Axle for Tiffin Motorhome Chassis

| TROUBLESHOOTING GUIDE | | |
|---|---|--|
| CONDITION | POSSIBLE CAUSE | CORRECTION |
| Bent or broken tie rod 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 OEM specifications |
| | Axle stops improperly set | Set axle stops to OEM specifications |
| | Severe duty cycle service | Increase frequency of inspection and lubrication intervals |
| Worn or broken steering ball stud | Drag link fasteners lightened 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 OEM 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 specification per the vehicle manufacturer's instructions |
| | 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 per the vehicle manufacturer's instructions |
| | Air spring(s) are not inflated | Repair source of air pressure loss |
| | Suspension is not torqued correctly at installation | Perform spring eye re-torque procedure, see Alignment & Adjustments Section of this publication |
| | Leaf spring broken | Replace leaf spring |
| | Excessive weight bias | Contact the vehicle manufacturer or Hendrickson Tech Services |
| Vehicle wanders | Caster out of specifications | Set ride height to specification per the vehicle manufacturer's instructions then 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 per the vehicle manufacturer's instructions |
| | Front ride height out of adjustment | Adjust ride height to specification per the vehicle manufacturer's instructions |

SECTION 12 Torque Specifications

HENDRICKSON RECOMMENDED TORQUE VALUES
PROVIDED IN FOOT POUNDS AND IN NEWTON METERS





AIRTEK with STEERTEK NXT Axle for Tiffin Motorhome Chassis

HENDRICKSON RECOMMENDED TORQUE SPECIFICATIONS

| NO. | COMPONENT | FASTENERS | | TORQUE VALUE | |
|-----|---|-----------|---------------|---------------|---------------|
| | | QTY. | SIZE | Foot Pounds | Nm |
| 1 | Upper Air Spring | 2 | Self Locking | Snap Fit | |
| 2 | Front Frame Hanger to Front Leaf Spring Eye | 2 | ¾" | 400 ± 20 | 543 ± 27 |
| 3 | Rear Shackle Bracket to Shackle Plate | 2 | ¾" | 400 ± 20 | 543 ± 27 |
| 4 | Rear Shackle Bracket to Spring Eye | 2 | ¾" | 400 ± 20 | 543 ± 27 |
| 5 | Upper Shock Absorber | 2 | ¾" | 130 ± 5 | 177 ± 6 |
| 6 | Lower Shock Absorber | 2 | ¾" | 130 ± 5 | 177 ± 6 |
| | ⚠ 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. | | | | |
| 7 | Clamp Group | 8 | ¾" | 295 ± 10 | 400 ± 13 |
| 8 | Grease Zerk | 2 | | Minimum of 15 | Minimum of 20 |
| 9 | Grease Cap Assembly, Upper and Lower | 4 | ½" | 60 ± 10 | 81 ± 14 |
| 10 | Knuckle Attachment Bolt (Socket Head Cap Screw) | 4 | ⅝" | 188 ± 12 | 255 ± 16 |
| 11 | Knuckle/Axle Wheel Stop Bolt | 2 | ½" Jam Nut | 50 ± 10 | 68 ± 14 |
| 12 | Tie Rod Ends to Lower Steering Knuckle | 2 | ⅞" Castle Nut | *185 | *251 |
| 13 | Tie Rod Tube to Tie Rod Ends | 2 | ⅝" | 68 ± 7 | 92 ± 9 |

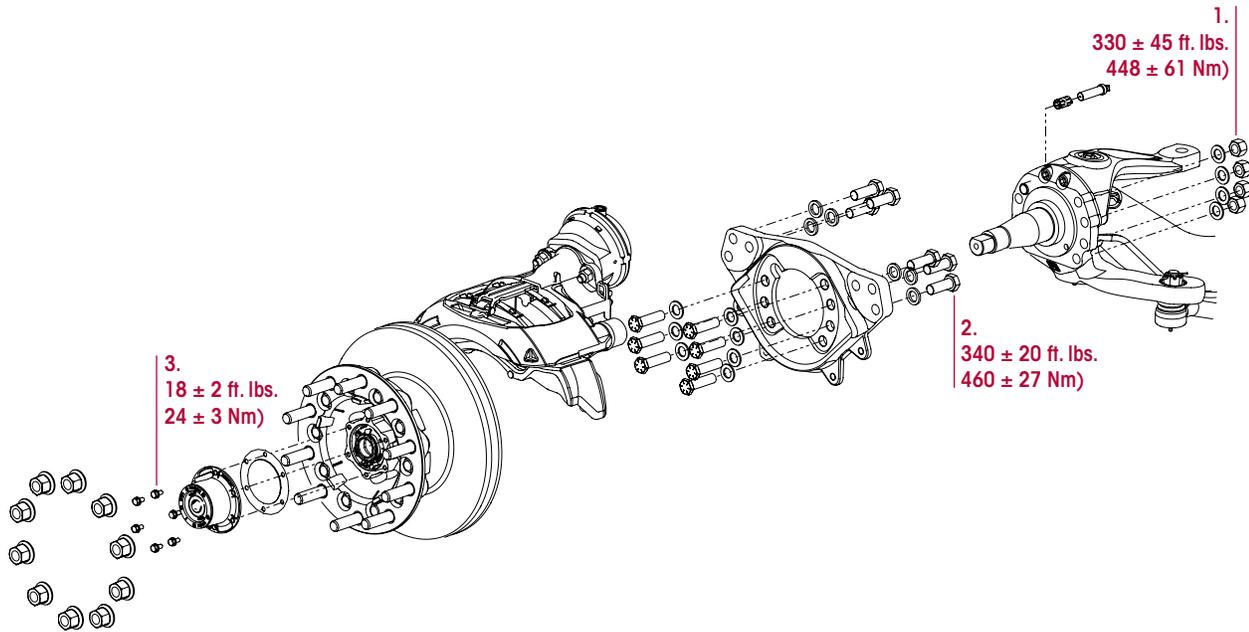
- All hardware ¼" and greater is Grade 8 with no additional lubrication.
Frame mount hardware in most cases are Huck style fasteners supplied by the OEM.

NOTE: Torque values shown apply only if Hendrickson supplied fasteners are used. If non Hendrickson fasteners are used, follow torque specifications listed in the vehicle manufacturer's service manual. Hendrickson is not responsible for maintaining vehicle manufacturer's torque values.

* Torque to 185 foot pounds (250 Nm), advance nut to next hex face to install cotter pin. Do not back off nut for cotter pin installation.

AIR DISC BRAKE ASSEMBLY

**HENDRICKSON RECOMMENDED TORQUE VALUES
PROVIDED IN FOOT POUNDS AND IN NEWTON METERS**



AIRTEK with STEERTEK NXT Axle for Tiffin Motorhome Chassis

HENDRICKSON RECOMMENDED TORQUE SPECIFICATIONS

| NO. | COMPONENT | FASTENERS | | TORQUE VALUE | |
|-----|---------------------------------|-----------|------|--------------|----------|
| | | QTY. | SIZE | Foot Pounds | Nm |
| 1 | Torque Plate Mounting Fasteners | 2 | ¾" | 330 ± 45 | 448 ± 61 |
| 2 | Caliper Assembly | 12 | M20 | 340 ± 20 | 460 ± 27 |
| 3 | Hub Cap Fasteners | 12 | ⅝" | 18 ± 2 | 24 ± 3 |

NOTE: Torque values shown apply only if Hendrickson supplied fasteners are used. If non Hendrickson fasteners are used, follow torque specifications listed in the vehicle manufacturer's service manual. Hendrickson is not responsible for maintaining vehicle manufacturer's torque values.



SECTION 13 Reference Material

This technical publication covers Hendrickson Truck Suspension's recommended procedures for our parts/products. Other components play a major role in overall performance and Hendrickson recommends you follow the specific vehicle manufacturer's recommendation for care and maintenance. Some recommended procedures have been developed by The Technology & Maintenance Council (TMC) and Hendrickson supports these recommendations. We have compiled a list of these below.

■ TMC

To obtain copies of the following RPs, videos, or charts, contact TMC at:

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

Important References

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

Videos

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

Other

| | |
|-----------|---|
| TMC T0400 | Wheel bearing Adjustment Procedure Wall Chart |
|-----------|---|

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

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



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

17730-319 Rev A 03-19

© 2019 Hendrickson USA, L.L.C. All Rights Reserved. All trademarks shown are owned by Hendrickson USA, L.L.C., or one of the affiliates, in one or more countries.
Information contained in this literature was accurate at the time of publication. Product changes may have been made after the copyright date that are not reflected.

Printed in United States of America