TECHNICAL PROCEDURE

AIRTEK® • SOFTEK® Front Suspension and Steer Axle System for Blue Bird Buses

SUBJECT: Service Instructions
LIT NO: 17730-248
DATE: March 2026 **REVISION:** I

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HENDRICKSON
The World Rides On Us®

SECTION 1
Introduction

This publication is intended to acquaint and assist maintenance personnel in the preventive maintenance, service, repair and rebuild of Hendrickson AIRTEK® integrated front air suspension and SOFTEK® integrated front mechanical suspensions. It applies to systems equipped with either (1) the STEERTEK™ NXT axle system on applicable Blue Bird buses built after October 2012 or (2) the STEERTEK axle system on applicable Blue Bird buses built prior to October 2012.

NOTE Use only Hendrickson Genuine parts for servicing this suspension system.

It is important to read and understand this entire Technical Procedure publication and all work instructions and safety related information provided by the vehicle manufacturer prior to performing any maintenance, service, repair, or rebuild of this product. The information in this publication contains parts lists, safety information, product specifications, features, and proper maintenance, service, repair, and rebuild instructions for AIRTEK • SOFTEK suspensions with STEERTEK NXT or STEERTEK axles, as applicable.

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 855-743-3733 (toll-free U.S. and Canada), 630-910-2800 (outside U.S. and Canada), or email: wdtechservices@hendrickson-intl.com.

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

SECTION 2
Product Description

AIRTEK Integrated Front Air Suspension and Steer Axle System (Figures 2-1 and 2-2) – is an integrated front air suspension and steer axle system that combines simple, functional design and state-of-the-art technology for superior ride, stability, and handling. The same smooth, comfortable ride that cradles passengers and drivers reduces vibration induced wear-and-tear on the bus itself to help extend overall vehicle and component durability.

- **Air springs** – provide a softer and more comfortable ride.

SOFTEK Integrated Front Suspension and Steer Axle System (Figures 2-3 and 2-4) – is a front mechanical suspension and steer axle system that works to form an integrated torsion system. Utilizing a system approach, Hendrickson has engineered and optimized the following components to form a system delivering ride, stability, and handling characteristics with reduced weight and maintenance.

AIRTEK • SOFTEK

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

STEERTEK NXT Front Steer Axle — The box-shaped cross section resists horizontal, vertical, and twisting forces more effectively than I-beam axles to improve handling.

- **Axle Clamp Group** — The Clamp Group consists of the top pad, U-bolts, washers, and nylon locknuts
- **Integrated Axle Spring Seats** — Improve ground clearance, reduce part count, and simplify assembly.
- **Adjustable Tie Rod** — To help maximize tire life, the tie rod easily adjusts toe-in/out.
- **Steering Knuckles** — The steering and tie rod arms are integrated for increased strength and reduced weight. The unique steering knuckle packaging delivers up to a maximum of 50° wheel cut. The two-piece knuckle design makes replacing the kingpin bushings easier by eliminating the need to remove the kingpins.

Blue Bird Vision Buses

FIGURE 2-1 AIRTEK Air Suspension and Steer Axle System
Capacity: 10K • 12K pounds

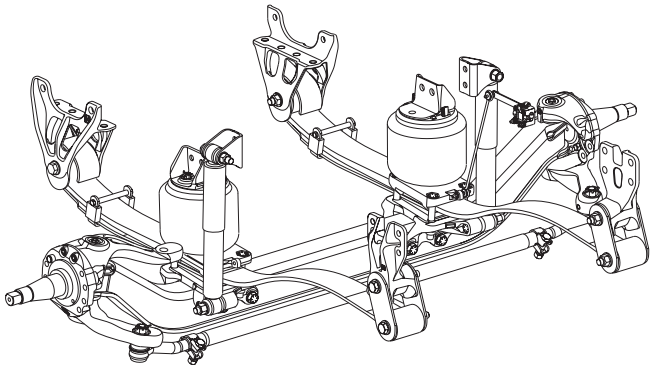
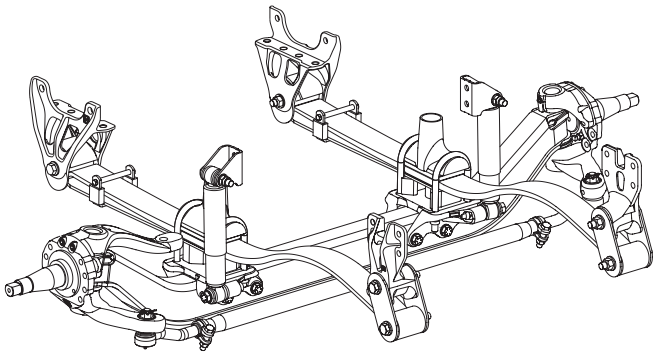


FIGURE 2-3 SOFTEK Mechanical Suspension and Steer Axle System. **Capacity:** 8.5K • 10K • 12K pounds



Blue Bird All American Buses

FIGURE 2-2 AIRTEK Air Suspension and Steer Axle System
Capacity: 13.2K • 14.6K pounds

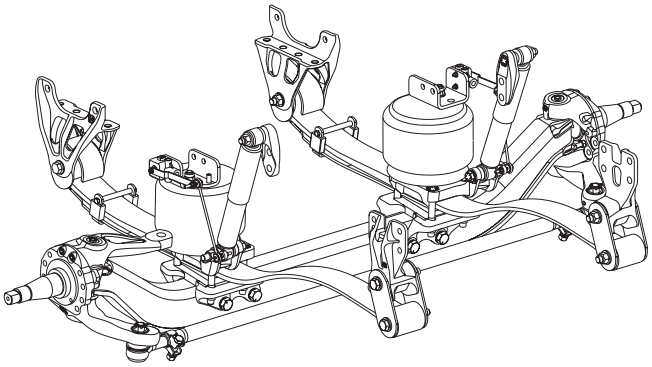
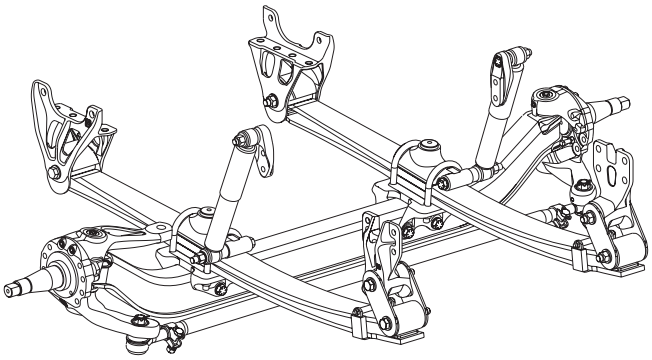


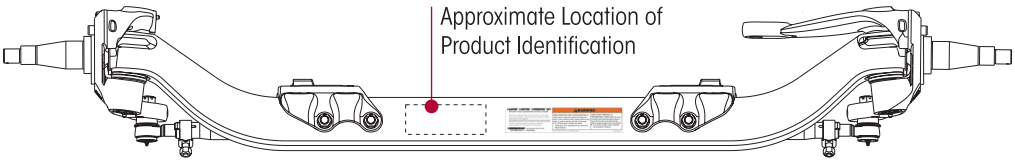
FIGURE 2-4 SOFTEK Mechanical Suspension and Steer Axle System. **Capacity:** 13.2K • 14.6K pounds



TECHNICAL NOTES

1. AIRTEK • SOFTEK systems are approved for on-highway use; other applications must be pre-approved by Hendrickson and the vehicle manufacturer. This axle system has 8.5K, 10K, 12K, 13.2K and 14.6K pounds capacities. The system capacity rating for the suspension represents the maximum loads on tires at ground level.
2. The STEERTEK NXT axle is available with a 69" kingpin intersection (KPI) for the Blue Bird Vision bus and with a 71" kingpin intersection (KPI) for the Blue Bird All American bus.
3. Suspension and axle system weight for Blue Bird buses may vary depending on the vehicle. Contact Hendrickson or the vehicle manufacturer for the final weight:
4. AIRTEK and SOFTEK systems are integral to and available exclusively with the STEERTEK NXT axle. These systems are anti-lock braking system (ABS) ready. The STEERTEK NXT axle is compatible with most industry standard wheel-ends and brakes. Contact the vehicle manufacturer for more information.
5. The STEERTEK NXT axle product identification is etched on the center front of the axle beam 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 assembly

FIGURE 2-5 Front view of the axle showing the approximate location of product identification.



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.

The warnings and cautions should be read carefully to help prevent personal injury and to assure that proper methods are used. Improper maintenance, service, and 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 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 the 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, POSSIBLE PERSONAL INJURY, OR PROPERTY DAMAGE.

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

⚠ WARNING

LOAD CAPACITY

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

⚠ WARNING

SUPPORT THE VEHICLE PRIOR TO SERVICING

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

⚠ CAUTION

PROCEDURES AND TOOLS

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

⚠ WARNING

PERSONNEL PROTECTIVE EQUIPMENT

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

⚠ WARNING

MODIFYING COMPONENTS

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

⚠ WARNING

TORCH / WELDING

DO NOT USE A CUTTING TORCH TO REMOVE ANY 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 MAIN SUPPORT MEMBER. DO NOT CONNECT ARC WELDING GROUND LINE TO THE MAIN SUPPORT MEMBER. DO NOT STRIKE AN ARC WITH THE ELECTRODE ON THE MAIN SUPPORT MEMBER. DO NOT USE HEAT NEAR THE MAIN SUPPORT MEMBER ASSEMBLY. DO NOT NICK OR GOUGE THE MAIN SUPPORT MEMBER. SUCH IMPROPER ACTIONS CAN DAMAGE TO THE MAIN SUPPORT MEMBER ASSEMBLY AND CAN CAUSE AND CAN CAUSE LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

⚠ WARNING

AIR SPRINGS

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

⚠ WARNING

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

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

⚠ WARNING

SHOCK ABSORBERS

THE SHOCK ABSORBERS ARE THE REBOUND TRAVEL STOPS FOR THE SUSPENSION. ANYTIME THE AXLE ON AIRTEK • SOFTEK SUSPENSIONS IS SUSPENDED IT IS MANDATORY THAT THE SHOCK ABSORBERS REMAIN CONNECTED. FAILURE TO DO SO CAN CAUSE THE AIR SPRINGS TO SEPARATE FROM THE PISTON AND RESULT IN PREMATURE AIR SPRING FAILURE. REPLACEMENT OF SHOCK ABSORBERS WITH NON-HENDRICKSON PARTS CAN ALTER THE REBOUND TRAVEL OF THE SUSPENSION.

⚠ WARNING

UNAUTHORIZED REPAIR AND RECONDITIONING

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

⚠ WARNING

STEERTEK NXT AXLE

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

⚠ 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 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, WILL VOID WARRANTY, AS APPLICABLE AND CAN CAUSE LOSS OF VEHICLE CONTROL, POSSIBLY CAUSING PERSONAL INJURY OR PROPERTY DAMAGE.

⚠ 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 OR ADJACENT MATING SURFACE SHOW SIGNS OF DAMAGE OR MOVEMENT, DO NOT OPERATE THE VEHICLE AND IMMEDIATELY CONTACT THE HENDRICKSON TECH SERVICES DEPARTMENT.

⚠ WARNING

IMPROPER JACKING METHOD

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

⚠ WARNING

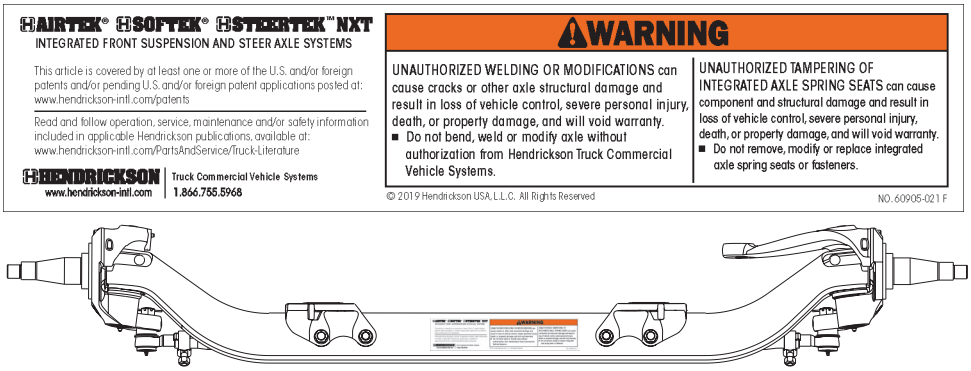
AXLE SPRING SEATS

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

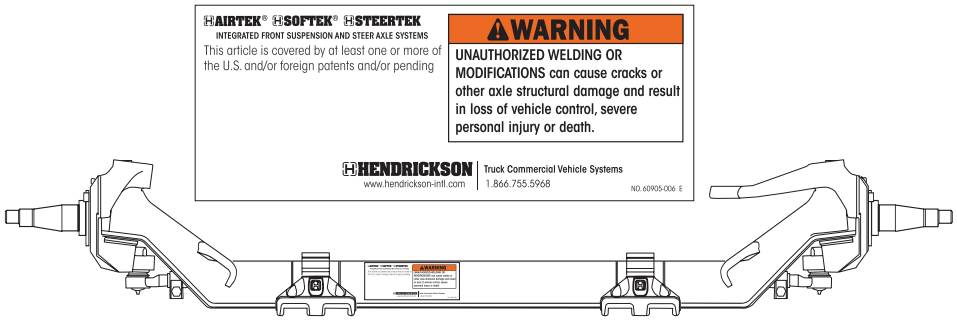
NOTE: REPLACE ANY SAFETY DECALS THAT ARE FADED, TORN, MISSING, ILLEGIBLE, OR OTHERWISE DAMAGED. CONTACT HENDRICKSON TO ORDER REPLACEMENT LABELS.

FIGURE 3-1

STEERTEK NXT Axle | Vehicles built after October 2012



STEERTEK Axle | Vehicles built prior to October 2012



⚠ WARNING

PARTS CLEANING

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

1. WEAR PROPER EYE PROTECTION.
2. WEAR CLOTHING THAT PROTECTS YOUR SKIN.
3. WORK IN A WELL VENTILATED AREA.
4. DO NOT USE GASOLINE, OR SOLVENTS THAT CONTAIN GASOLINE. GASOLINE CAN EXPLODE.
5. ACIDIC SOLUTIONS CANNOT BE USED ON ALUMINUM COMPONENTS.
6. 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.

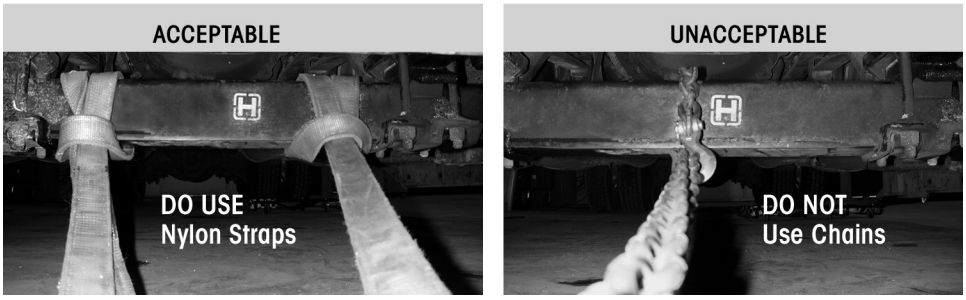
⚠ WARNING

OFF ROADWAY TOWING

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

FIGURE 3-2

OFF-ROADWAY TOWING



SECTION 4
Parts Lists

Refer to Hendrickson Literature Number SP-172, AIRTEK • SOFTEK Front Suspension Systems with STEERTEK NXT Axle Parts List for Blue Bird Buses, available at www.hendrickson-intl.com or click below for the link.

FIGURE 4-1

HENDRICKSON The World Rides On Us

Ride Solutions | Parts & Service | Literature | Contact | Work For Us | Company | Corporate Responsibility | Suppliers | Where To Buy

SP-172 AIRTEK • SOFTEK PARTS LIST FOR BLUE BIRD BUS

Rev.	Date	Size
L	12/24	2.26 MB

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Related Products

STEERTEK™ NXT for Bus/RV or Medium-Duty
Fabricated front steer-axle for medium-duty, bus and motorhome

SOFTEK® for Bus/RV or Medium-Duty
Integrated front mechanical suspension and steer-axle system designed for passenger and driver comfort

AIRTEK® for Bus/RV or Medium-duty
Integrated front air suspension and steer-axle system designed for comfort and improved performance

SECTION 5

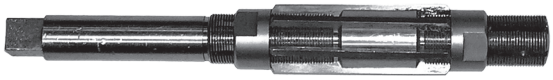
Special Tools

KINGPIN BUSHING TOOLS

ADJUSTABLE STRAIGHT FLUTE REAMER

1.802" to 1.812" Cutting Diameter

McMaster-Carr #3141A28



EXTENSION PILOT TOOL

McMaster-Carr #3004A32

OR

PRECISION-FINISH CYLINDER HONE

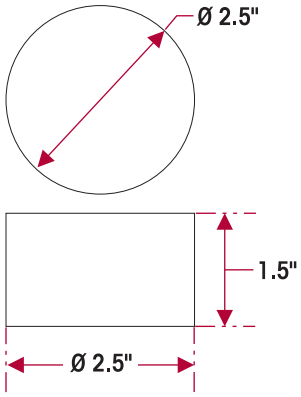
1.75" to 2.75" Cylinder ID

McMaster-Carr #7362A45

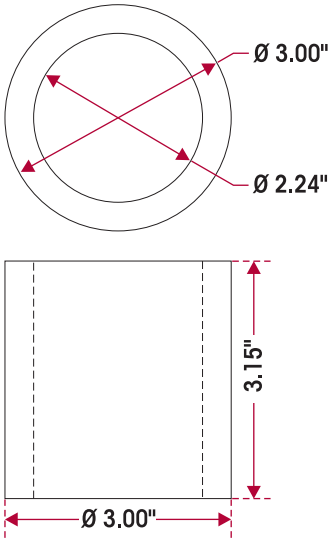
KINGPIN BUSHING AND SEAL TOOLS – SHOP MADE TOOLS

These shop made tools are designed to help 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**



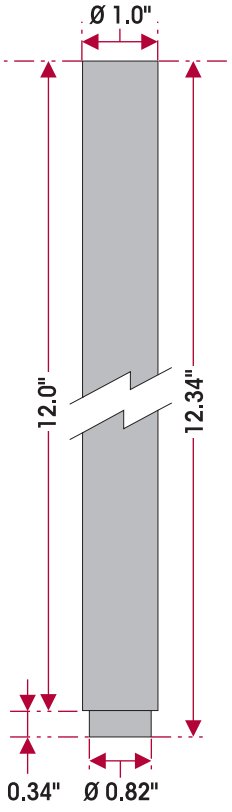
Bushing Receiving Tool
(press bushing replacement)



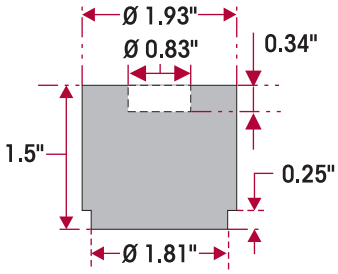
NOTE: *The bushing driver is necessary to sink the kingpin bushing flush into the steering knuckle bore.

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

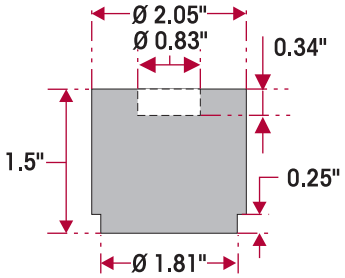
Kingpin Handle



Bushing Installer / Remover Tool
(to seat bushing)



Seal Installer Tool
(to seat seal)



SECTION 6

Towing Procedure

ON-HIGHWAY AND ON-ROADWAY

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

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

For questions regarding proper towing procedures for vehicles equipped with a STEERTEK NXT or STEERTEK axle, please contact Hendrickson Tech Services at 855-743-3733 (U.S. and Canada) or send email to: wdtechservices@hendrickson-intl.com.

Hendrickson recommends that a vehicle equipped with a STEERTEK NXT • STEERTEK 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** — Conventional axle fork

METHOD 1 — WHEEL LIFT

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

FIGURE 6-1

METHOD 2 — CONVENTIONAL AXLE FORK

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

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

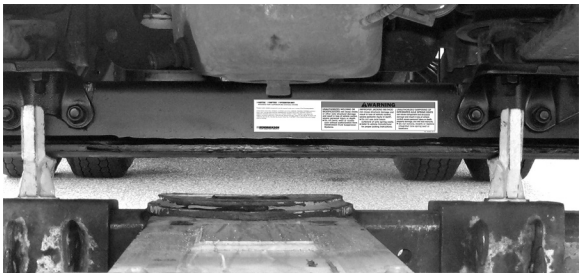
- Ensure there is sufficient clearance between the underbody components and the boom.
- Release the tractor brakes.
- Install the safety straps prior to towing the vehicle. It is preferred to use nylon safety straps. Chains have a tendency to bind and may cause damage to the axle.

STEERTEK NXT Axle equipped (vehicles built after October 2012)

1. Use a Miller Short Frame Fork, Part No. 0200019, or comparable (3.25" Clearance), 4.5" Opening, 2" Shank, see Figure 6-2.
2. Install the fork in the boom properly.
3. The proper tow fork location is centered between the locknuts on the axle spring seats, see Figure 6-3.

FIGURE 6-2

FIGURE 6-3



STEERTEK Axle equipped (vehicles built prior to October 2012)

1. Install the fork in the boom properly.
2. Position the proper tow forks directly under the axle, inside the axle clamp groups as shown in Figures 6-4 and 6-5.
3. Prior to lifting the vehicle, ensure that the bottom axle plate is flat in the tow fork to minimize any gap between the bottom axle plate and the tow fork, see Figure 6-6.
4. Lift vehicle and secure the vehicle to the boom.

FIGURE 6-4

FIGURE 6-5

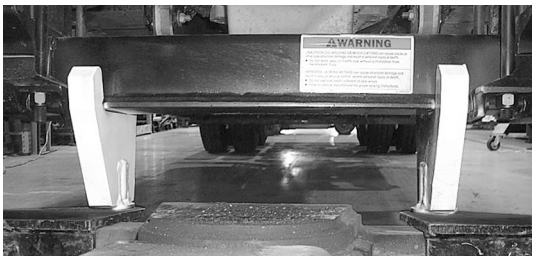
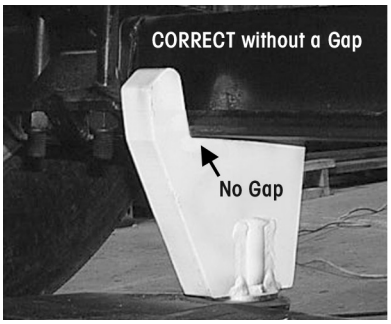
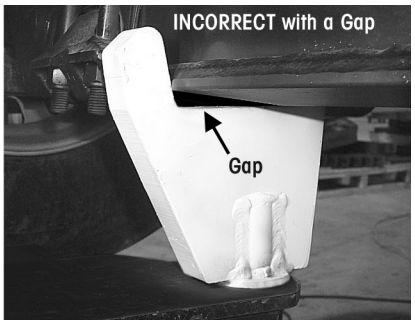


FIGURE 6-6





OFF ROADWAY TOWING METHOD

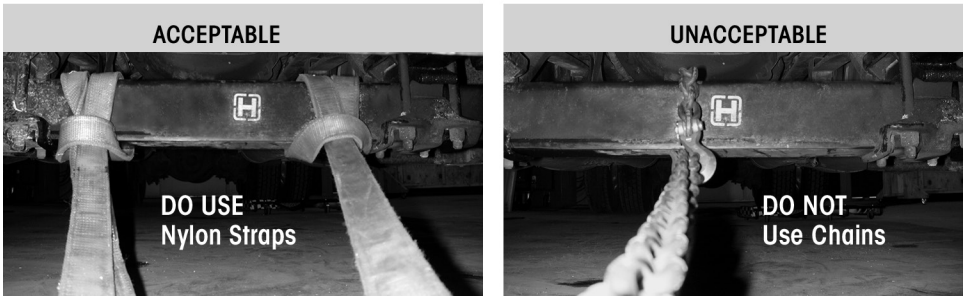
WARNING

WHEN A VEHICLE IS DISABLED AND EQUIPPED WITH A STEERTEK NXT • STEERTEK AXLE, CARE MUST BE TAKEN TO ENSURE THERE IS NO DAMAGE TO THE SUSPENSION OR AXLE WHEN TOWING THE VEHICLE. THE USE OF A TOW STRAP IS NECESSARY TO TOW A DISABLED VEHICLE TO A REPAIR FACILITY PARKING LOT AND INTO THE SHOP BAY. THE TOW STRAPS SHOULD BE CONNECTED TO THE TOW HOOKS PROVIDED BY THE VEHICLE MANUFACTURER AT THE FRONT OF THE BUMPER. IF THE USE OF TOW HOOKS IS NOT AN OPTION, THEN A TOW STRAP MAY BE WRAPPED AROUND THE FRONT AXLE, (SEE FIGURE 6-7) IN A MANNER THAT IS ACCEPTABLE FOR TOWING THE VEHICLE FROM A REPAIR FACILITY PARKING LOT AND INTO THE SHOP BAY. DO NOT USE A TOW CHAIN AROUND THE FRONT AXLE OR WITH A SINGLE POINT LOCATION TO TOW THE VEHICLE. DOING SO WILL DAMAGE THE AXLE AND VOID ANY APPLICABLE WARRANTY, SEE FIGURE 6-7. FOR DETAILED TOWING INSTRUCTIONS FOR ON-HIGHWAY TOWING, SEE TOWING PROCEDURES SECTION IN THIS PUBLICATION.

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

FIGURE 6-7

OFF-ROADWAY TOWING



SECTION 7

Preventive Maintenance

Following appropriate inspection procedures are important to help ensure the proper maintenance and operation of the AIRTEK • SOFTEK front suspension systems equipped with STEERTEK NXT • STEERTEK axles and component parts.

HENDRICKSON RECOMMENDED INSPECTION INTERVALS

	PRE-DELIVERY	FIRST IN-SERVICE	PREVENTIVE MAINTENANCE	
	within the first 100 miles (160 km)	1,000 miles (1,600 km), 100 hours or whichever comes first	25,000 miles (40,200 km), every 6 months or whichever comes first	50,000 miles (80,400 km), every 12 months or whichever comes first
Hendrickson recommends to visually inspect for proper assembly, function, overall condition, and any signs of damage. During the inspection intervals as shown, check for any unusual movement, loose or missing components, abrasive or adverse contact with other parts, damaged or cracked parts, and improper suspension function or alignment. Replace components as necessary.				
Air Springs and Air Lines	■	■	■	
Clamp Group	■	■	■	
Fasteners	■	■		■
Front Hangers and Shackle Brackets	■	■	■	
Front and Rear Spring Eye Connection	■	■	■	
Front Wheel Alignment	■	■		■
Leaf Spring Assembly	■	■	■	
Ride Height	■	■		■
Shock Absorbers	■		■	
Steering Operation	■		■	
STEERTEK NXT • STEERTEK Axle Assembly and Tie Rods	■	■	■	
Thrust Washers (if equipped)	■		■	
Tire Wear			■	
Top and Bottom Axle Wrap Liners (if equipped)	■		■	
Top Pad and Bump Stop (if equipped)	■	■	■	
Wear and Damage	■		■	

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

COMPONENT INSPECTION

- **AIRTEK Air springs and air lines** — Inspect for chaffing, any visible damage, any leaks or any signs of spring or component damage
- **Clamp group** — Visually inspect for any loose or damaged fasteners. Check torque on clamp group mounting hardware. Refer to the Clamp Group in this section.
- **Fasteners** — Visually inspect for any loose or damaged fasteners on the entire suspension. Make sure all fasteners are tightened to the specified torque. Refer to the Torque Specifications section of this publication. 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.

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

- **Front hangers and rear shackle brackets** — Visually inspect for cracks, excessive wear or loose mounting hardware. Ensure the torque is per specifications. Replace if necessary, refer to the Component Replacement section of this publication.
- **Front and rear spring eye connection** — Ensure the proper fastener torque values using a calibrated torque wrench on front and rear spring eye connection.
- **Front wheel alignment** — Refer to Front Wheel Alignment Specifications section of this publication.
- **Leaf spring and wrap leaf assembly** — Visually inspect for any cracks. Replace if cracked or broken, see the Component Replacement section of this publication for replacement procedure.
- **Ride height —** Verify the ride height, refer to the Alignment & Adjustments section of this publication.
- **Shock absorbers** — Visually inspect for any signs of dents or leakage, misting is not considered a leak. See Shock Absorbers in this section.
- **Steering operation** — All steering components must move freely through the full range of motion from axle stop to axle stop. Check for any looseness at all pivot points. Inspect and lubricate all pivot points. Refer to the Lubrication Intervals in this section of this publication.
- **STEERTEK NXT • STEERTEK axle and tie rods** – Visually inspect for any cracks or dents on the axle, and also refer to Tie Rod Ends in this section. Replace as necessary.
- **Thrust washers (if equipped)** — Visually inspect for any signs of excessive wear to the thrust washers, shackles and shackle bracket. See Shackle Thrust Washer Inspection detailed in this section.
- **Tire wear** — Visually inspect tires for wear patterns that may indicate suspension damage or misalignment, see Visual Tire Inspection in this section.
- **Top and bottom axle wrap liners (if equipped)** — Visually inspect for any cracking or broken pieces on liner in load bearing areas. See Axle Wrap Liner Inspection in this section.
- **AIRTEK Top pad** — Visually inspect for cracks or damage. Replace as necessary, see the Component Replacement section of this publication for replacement procedure.
- **SOFTEK Top pad & bump stop** — Visually inspect for cracks and/or missing rubber bump stops. Replace as necessary, see the Component Replacement section of this publication.
- **Wear and damage** — Visually inspect all parts of suspension for wear and damage. Look for bent or cracked parts, replace as necessary.

LUBRICATION INTERVALS

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

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

TABLE 7-1

STEERTEK NXT • STEERTEK Greasing and Lubrication Specifications					
	Application	Component	Greasing Intervals	Grease	Outside Temperature
GENERAL	Does not include linehaul or medium-duty applications	Kingpin Bushings	Maximum of 25,000 miles (40,200 km) or 90 days, whichever comes first.	Multipurpose Grease NGLI Grade 2 EP, rated GC-LB or equivalent.	Refer to the lubricant manufacturer's specifications for the temperature service limits applicable to your area.
		Tie Rod Ends			
		Drag Link	See Vehicle Manufacturer		
	Application Specific Recommendations				
ON-HIGHWAY	Linehaul Only High Mileage Accumulation 95% Highway Surface No off-road operation Greater than 50,000 miles per year (80,500 kilometers per year)	Kingpin Bushings	Maximum of 100,000 miles (161,000 km) or 1 year, whichever comes first.	Multipurpose Grease NGLI Grade 2 EP, rated GC-LB or equivalent.	Refer to the lubricant manufacturer's specifications for the temperature service limits applicable to your area.
		Tie Rod Ends			
		Drag Link	See Vehicle Manufacturer		
MEDIUM-DUTY	Low Mileage Accumulation 95% Highway Surface No off-road operation City Delivery, Inner City Coach, Heavy-haul, school bus, motor home, transit coach Less than 50,000 miles per year (80,400 kilometers per year)	Kingpin Bushings	Maximum of 40,000 miles (64,000 km) or 6 months, whichever comes first.	Multipurpose Grease NGLI Grade 2 EP, rated GC-LB or equivalent.	Refer to the lubricant manufacturer's specifications for the temperature service limits applicable to your area.
		Tie Rod Ends			
		Drag Link	See Vehicle Manufacturer		

KINGPIN LUBRICATION

FIGURE 7-1
STEERTEK NXT
Upper Grease Zerk

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 STEERTEK NXT models, the grease zerk is located on the bottom of the lower steering knuckle.

STEERTEK kingpin grease zerks are located on the top and bottom of the kingpin grease caps.

1. Place vehicle on the ground.
2. Chock the wheels and set parking brake.
3. Prior to greasing the kingpins on the vehicle, the suspension must be in a loaded condition.
4. Clean off all the grease zerks and grease gun tip with a clean shop towel prior to lubrication.
5. Lubricate the kingpins through the grease zerks on the top and bottom of the steering knuckle, see Lubrication Specification Table above.
6. 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 locations, see Figures 7-2 and 7-3.

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

FIGURE 7-2

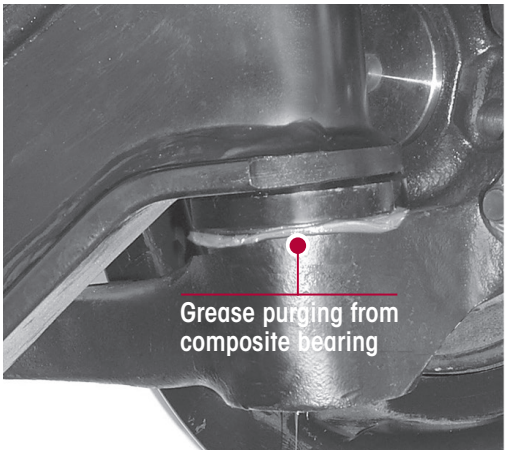
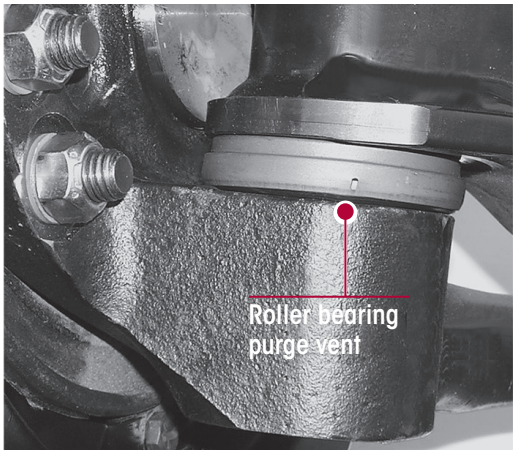


FIGURE 7-3



NOTE

The STEERTEK NXT• STEERTEK axle on Blue Bird buses is equipped with a composite thrust bearing on the left side and a steel roller thrust bearing on the right side, see Figures 7-4 and 7-5.

7. Remove the wheel chocks.

FIGURE 7-4

FIGURE 7-5

Top View of Thrust Bearings

Composite – Left Side **Roller – Right Side**

TIE ROD ENDS

INSPECTION

Prior to inspection the entire system must be unloaded (i.e., the front end of the vehicle must be raised and supported with frame 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. Chock the rear wheels of the vehicle.
2. Use the bottom of the axle beam or the frame rails to raise the front end off the ground and support the frame with safety stands.
3. With the engine off, turn the wheels from full left to full right and then return to the straight-ahead position.
4. Check that the boots are in place and completely installed over the tie rod ends.
5. Check for cracking or tears in the boots. Also check the boot seals for damage. If the boot is damaged, replace the tie rod end.

⚠ 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 POSSIBLY RESULT IN TOTAL LOSS OF VEHICLE CONTROL.

6. 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 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.

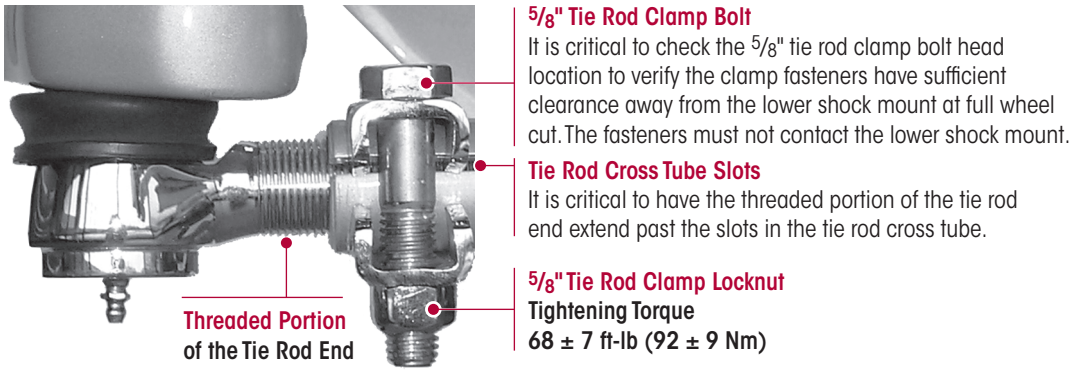
7. Verify the tie rod clamp bolt head does not contact the lower shock mount at full wheel cut, see Figure 7-6.

⚠ WARNING

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

8. Check that the tie rod end is threaded correctly into the cross tube and is engaged deeper than the end of the cross tube slot. The tie rod end must be visible the entire length of the cross tube slot, see Figure 7-6.

FIGURE 7-6



9. 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

10. By hand or using a pipe wrench, with jaw protectors to avoid gouging the cross tube, rotate the cross tube toward the front of the vehicle and then toward the rear. After rotating, center the cross tube. If the cross tube will not rotate in either direction, replace both tie rod ends, see Figure 7-7.
11. 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 7-8.

FIGURE 7-7

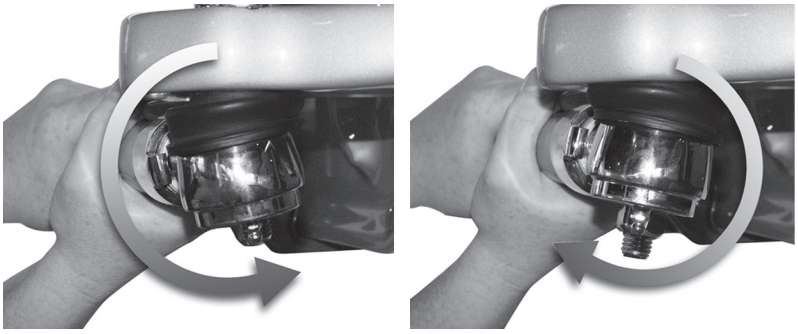


FIGURE 7-8

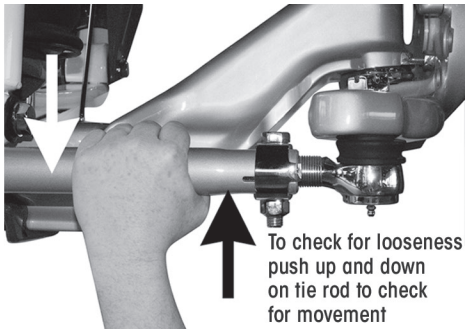


FIGURE 7-9

12. If there is any movement in the tie rod assembly, install a magnetic based dial indicator on the lower steering knuckle, see Figure 7-9.
13. Set the dial indicator to zero.
14. Apply hand pressure with reasonable human effort vertically up and down in a push-pull motion several times (using approximately 75 ± 25 pounds of force). Observe the reading on the dial indicator.
15. If the reading is more than 0.060", replace both tie rod ends at the next service interval.
16. If a tie rod end exhibits ≥ 0.125" of movement by hand, the vehicle should be removed immediately from use and the tie rod end be replaced.

NOTE

According to the Commercial Vehicle Safety Alliance (CVSA), the "out of service" criteria for front steer axle tie rod assemblies on any commercial vehicle is: Any motion other than rotational between any linkage member and its attachment point of more than 0.125" (3 mm) measured with hand pressure only. (393.209(d)), (published in the North American Standard Out-of-Service Criteria Handbook, 2026.)

17. Remove the vehicle frame safety stands and lower the vehicle.
18. Remove the rear wheel chocks.

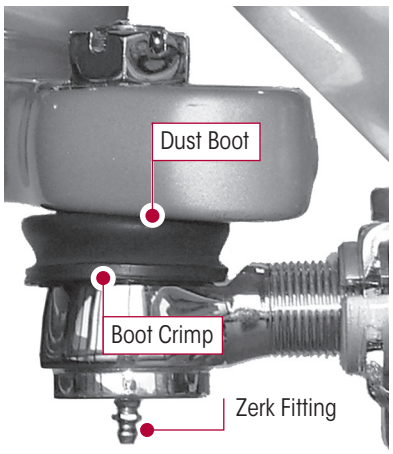
LUBRICATION PROCEDURE

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

⚠ CAUTION

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

FIGURE 7-10



6. Dirt, water, and discolored old grease should flow from the relief vents or purge holes near the boot crimp or bellows area, see Figure 7-10.
7. Continue to purge grease until fresh grease flows from the purge area.
8. The tie rod ends are designed for lube service. If a tie rod end will not accept grease proceed as follows:
   a. Remove the grease zerk.
   b. Inspect the threaded grease zerk hole in the tie rod end and remove any obstructions.
   c. Install a new grease zerk.
   d. Continue the lubrication procedure.

NOTE

If the tie rod end still does not accept grease following this procedure, replace the tie rod end (see Tie Rod End and Cross Tube in the Component Replacement section of this publication).

9. Remove the wheel chocks.

CLAMP GROUP

RE-TORQUE INTERVALS

WARNING

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

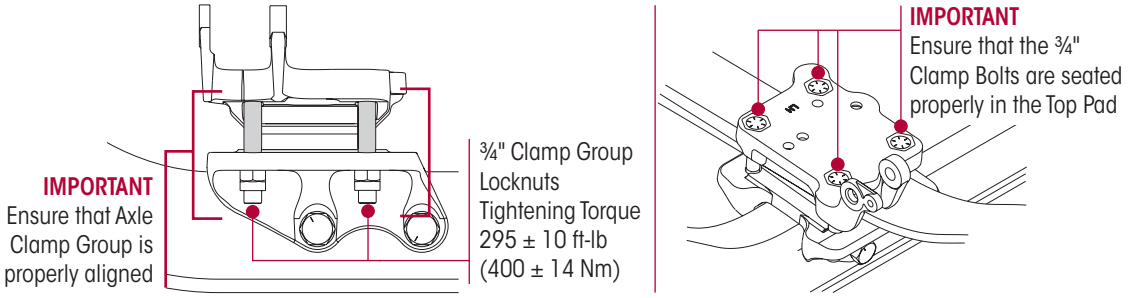
1. Clamp group locknuts must be torqued to specification at preparation for delivery and re-torqued at 1,000 miles thereafter. Follow the 6 month / 25,000 mile inspection and annual re-torque intervals.

WARNING

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

- **STEERTEK NXT Axle** — Ensure the clamp group is properly aligned, the hex bolts are seated in the top pad properly, and the top pad is centered on the axle spring seat, see Figures 7-11 and 7-12.
- **STEERTEK Axle** — Ensure the clamp group is properly aligned, the hex bolts are seated in the top pad properly and the bottom axle wrap is centered on the top axle wrap, see Figures 7-11 and 7-12.

FIGURE 7-11
AIRTEK with STEERTEK NXT Axle | Vehicles built after October 2012



AIRTEK with STEERTEK Axle | Vehicles built prior to October 2012

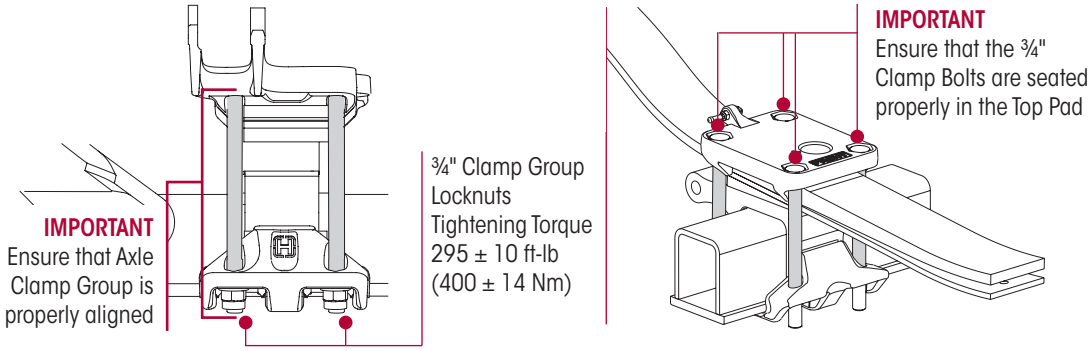
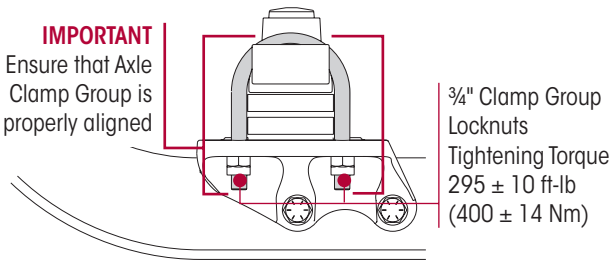


FIGURE 7-12
SOFTEK with STEERTEK NXT Axle | Vehicles built after October 2012



SOFTEK with STEERTEK Axle | Vehicles built prior to October 2012

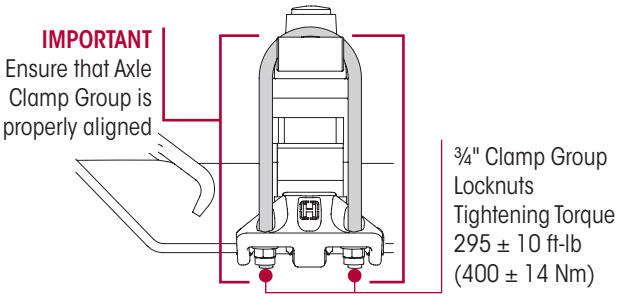
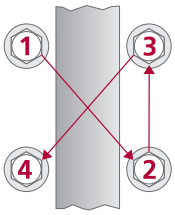


FIGURE 7-13



2. Visually inspect for the signs of component or bolt movement. If signs of movement are present:
   a. Disassemble the clamp group fasteners, check for component wear or damage and replace as necessary, then install new clamp group fasteners.
   b. Tighten the clamp group locknuts evenly in 50 foot pounds increments in the proper pattern, see Figure 7-13, to achieve uniform bolt tension to 295 ± 10 foot pounds torque.

KINGPIN BUSHING

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

INSPECT 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. **CHECK THE UPPER KINGPIN BUSHING**. Install the base of a dial indicator onto the axle beam and place the tip against the side of the steering knuckle, see Figure 7-14.
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 7-16.
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 kingpin bushings. Refer to the Kingpin Bushing replacement procedure in the Component Replacement section of this publication.
   - less than 0.015", proceed to Step 7.
7. **CHECK 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 7-15.
8. Set the dial indicator to "0" zero.

FIGURE 7-14

Check the UPPER Kingpin Bushing

FIGURE 7-15

Check the LOWER Kingpin Bushing

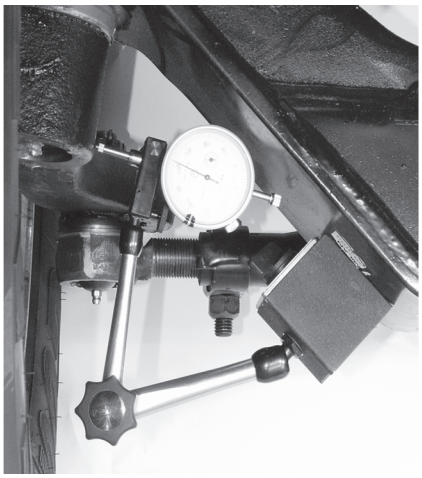


FIGURE 7-16

Move the TOP and BOTTOM of the tire in and out

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 Kingpin Bushing replacement procedure in the Component Replacement section of this publication.
   - Less than 0.015", proceed to Step 10.
10. Lower the vehicle and remove the safety stands.
11. Remove the wheel chocks.

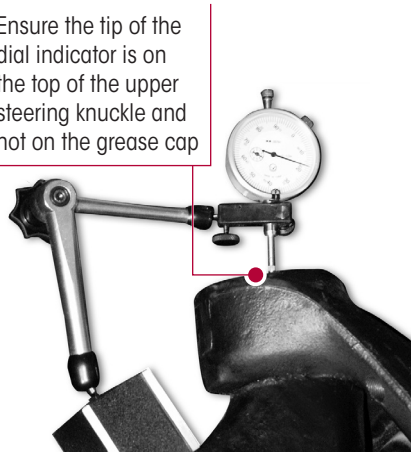
STEERING KNUCKLE

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".

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. Support the vehicle with safety stands.
5. 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 7-17.
   c. Place the tip of the dial indicator on the top of the upper steering knuckle (not on grease cap).
6. Set the dial indicator to "0" (zero).
7. Lower the jack.
8. If vertical end play is greater than 0.030", or below 0.008" an adjustment of the upper steering knuckle is necessary.

FIGURE 7-17



9. **Upper steering knuckle adjustment:** Refer to Steering Knuckle in Component Replacement section of this publication for proper shim installation / removal.

   STEERTEK NXT Axle: Vehicles built **after** October 2012, 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.
   - **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.

   STEERTEK Axle: Vehicles built **prior** to October 2012, if the vertical end play is:
   - **Greater than 0.030"** — Install shims (Hendrickson Part No. 60259-002) between the top of the axle and the bottom of the upper steering knuckle to obtain the proper vertical end play specification.
   - **Less than 0.008"** — Remove shims (Hendrickson Part No. 60259-002) between the top of the axle and the bottom of the upper steering knuckle to obtain the proper vertical end play specification.
10. Retighten the socket head cap screws to 187 ± 12 foot pounds torque.
11. Remove the safety stands and lower the vehicle.
12. Remove wheel chocks.

SHOCK ABSORBER INSPECTION

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

Hendrickson uses a long service life, premium shock absorber on all AIRTEK and SOFTEK 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.

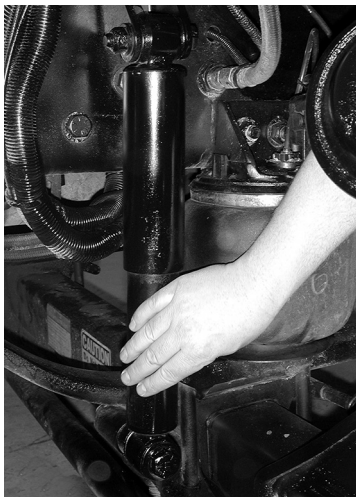
Inspection of the shock absorber can be performed by doing a heat test and a visual inspection. Replace as necessary, refer to the Component Replacement section of this publication.

HEAT TEST AND PHYSICAL INSPECTION

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

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

FIGURE 7-18



2. Perform heat test by carefully touching or placing a hand near the shock absorber body below the dust cover. Touch the frame to get an ambient reference, see Figure 7-18. A shock absorber that is warm to the touch is acceptable, a cold shock absorber should be replaced.
3. **Physical Inspection:** To inspect for an internal failure, remove and shake the suspected shock absorber. Listen for the sound of metal parts rattling inside. Rattling of metal parts can indicate that the shock absorber has an internal failure and the shock absorber should be replaced.

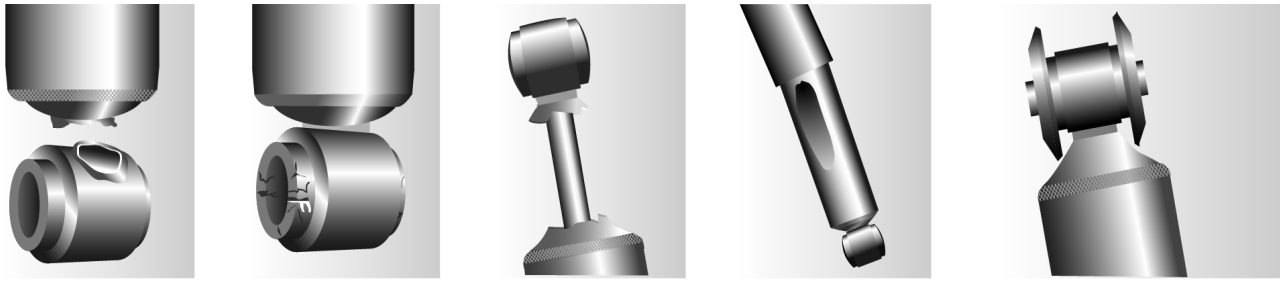
VISUAL INSPECTION

Look for these potential problems when doing a visual inspection, see Figure 7-19. Inspect the shock absorbers fully extended. Replace as necessary.

NOTE Figure 7-19 shows a general representation of an unacceptable shock absorber. Refer to your specific model's inspection guidelines for more details.

FIGURE 7-19

SHOCK ABSORBER VISUAL INSPECTION – UNACCEPTABLE CONDITIONS



Damaged upper or lower mount

Damaged upper or lower bushing

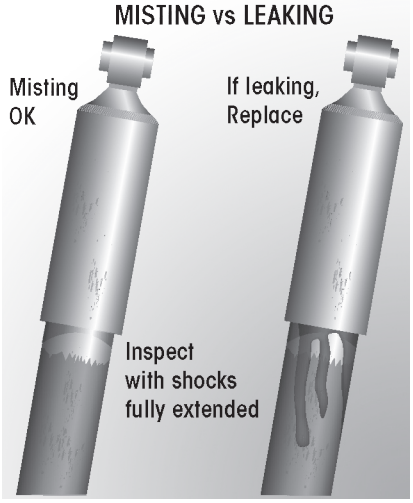
Damaged dust cover and / or shock body

Bent or dented shock absorber

Improper installation Example: washer (if equipped) installed backwards

LEAKING VS. MISTING VISUAL INSPECTION

FIGURE 7-20



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

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 a 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.

NOTE

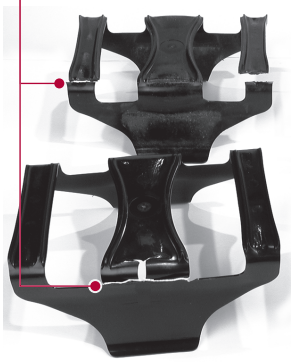
AIRTEK•SOFTEK suspension systems are equipped with a premium seal on the shock absorber; however, this seal will allow for misting to appear on the shock absorber body. Misting is not a leak and is considered acceptable.

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

STEERTEK AXLE WRAP LINER (if equipped)

INSPECTION PROCEDURE

FIGURE 7-21
Axle Wrap Liners Cracks



- Axle wrap liners are installed on the **STEERTEK** axle to help prevent any type of abrasion on the axle at the clamp group area. Any time an axle wrap is removed, it is mandatory to replace the axle wrap liner.
- Liner Crack Criteria:
  It is possible for the axle wrap liner to crack during service. If the liner is cracked and all the pieces are intact it is not necessary to replace the liner. If the liner is broken out and there are pieces missing the liner must be replaced immediately, see Figure 7-21. See Axle Wrap replacement in the Component Replacement section of this publication.

SHACKLE THRUST WASHER (if equipped)

NOTE

SOFTEK for Vision 8.5K pound capacity vehicles built **after** 02/2007, and all other vehicles built **after** 11/2006 are not equipped with shackle thrust washers.

In normal use these components will function satisfactorily, even though the components may show some wear.

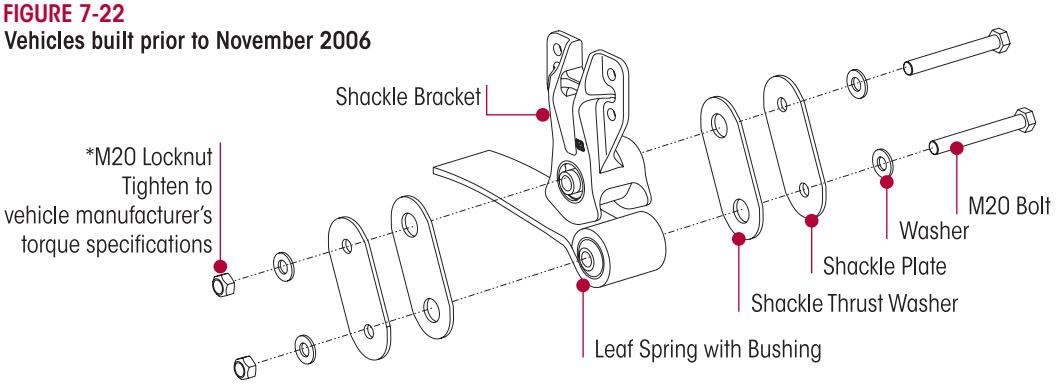
An indication that the shackle thrust washers are worn, or need replacement is when the suspension exhibits one or more of the following conditions:

- Excessive lateral movement of the spring.
- The rear spring eye and or shackle thrust washers are in contact with the shackle plates.
- Normal and unacceptable thickness of the thrust washers, see Figure 7-22, can be measured with a micrometer or a ruler. The normal thickness of a new thrust washer is 0.187" (3⁄16"), the minimum thickness allowable for a thrust washer is 0.090" (3⁄32"). If one or more of these conditions is experienced, disassembly of the rear shackle assembly is required to replace the thrust washers.

NOTE

If one (1) thrust washer is worn out, Hendrickson recommends both thrust washers on that side of the suspension be replaced. Inspect the thrust washers on the other side of the vehicle and replace if necessary. See Shackle Thrust Washer replacement procedure in the Component Replacement section of this publication.

FIGURE 7-22
Vehicles built prior to November 2006



SURFACE PAINT WEAR

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

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

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

- Front hanger inboard leg minimum thickness of 9.15 mm and the outboard leg minimum thickness 11.00 mm, see Figure 7-24.
- Rear shackle plate minimum thickness of 5.8 mm, see Figure 7-24.

FIGURE 7-23

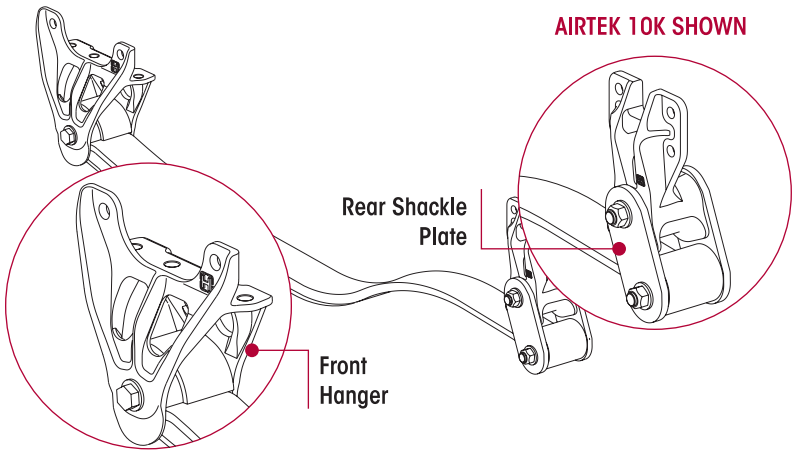
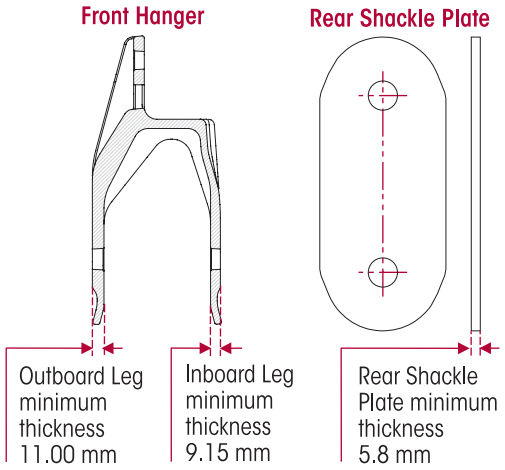


FIGURE 7-24



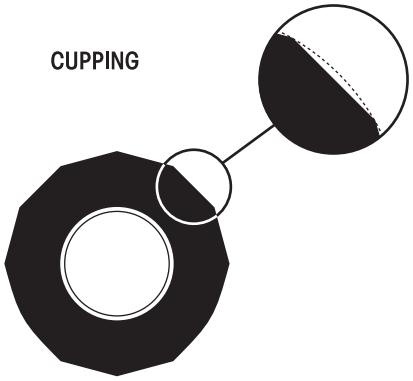
VISUAL TIRE INSPECTION

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

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

The most common conditions of concern for steer tires are: cupping, diagonal wear, feather wear, one-sided wear, overall fast wear (Miles per 32nd), and rapid shoOulder wear (one shoulder only).

FIGURE 7-25



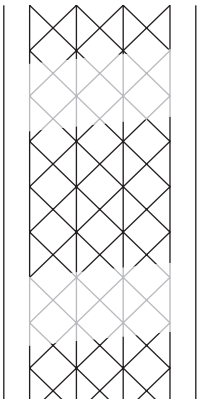
Cupping — Localized, dished out areas of fast wear creating a scalloped appearance around the tire. Cupping, which appears around the tire on the shoulder ribs, may also progress to adjoining ribs.

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

To solve cupping problems:

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

FIGURE 7-26



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

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

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

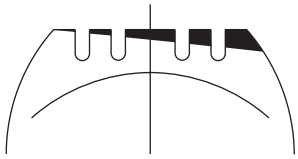
FIGURE 7-27

Feather wear — Tread ribs or blocks worn so that one side is higher than the other resulting in step–offs across the tread face. Generally, all ribs or blocks exhibit this wear.

To spot this problem do the following: With one hand flat on the tread of the tire and a firm down pressure, slide your hand across the tread of the tire. In one direction, the tire will feel smooth and in the opposite direction there will be a sharp edge to the tread.

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

FIGURE 7-28
ONE-SIDED WEAR



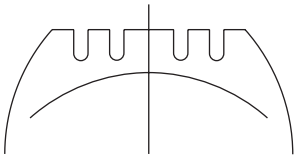
One-sided wear — Excessive wear on one side of tire extending from the shoulder towards the center of the tread.

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

To correct one-sided wear:

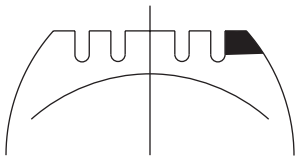
- **Tires** – Depending on severity, rotate tires to another axle position or, if worn to minimum tread depths, submit for possible retreading.
- **Vehicle** – Diagnose mechanical problem and correct.

FIGURE 7-29
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, reference RP 230 in TMC Manual.

FIGURE 7-30
RAPID SHOULDER WEAR
(One Shoulder Only)



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

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

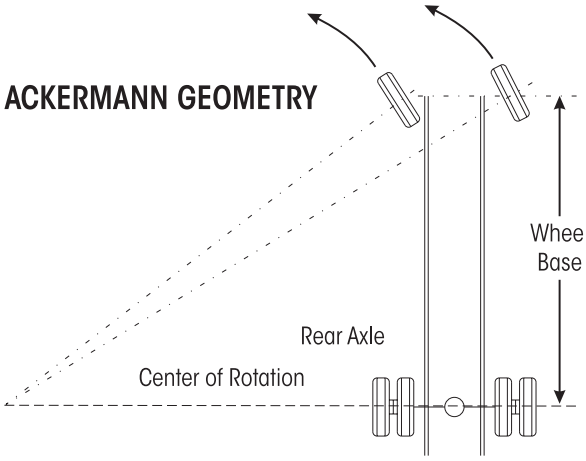
To correct this type of rapid shoulder wear:

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

SECTION 8
Alignment & Adjustments

ALIGNMENT DEFINITIONS

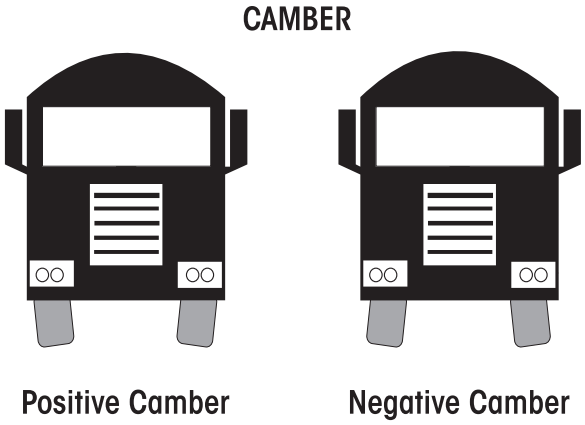
FIGURE 8-1



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

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

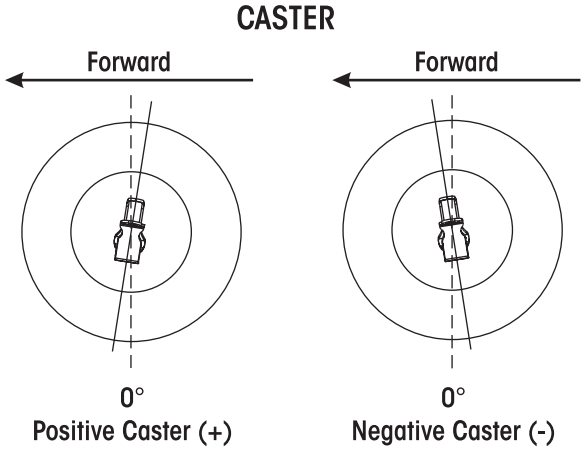
FIGURE 8-2



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.

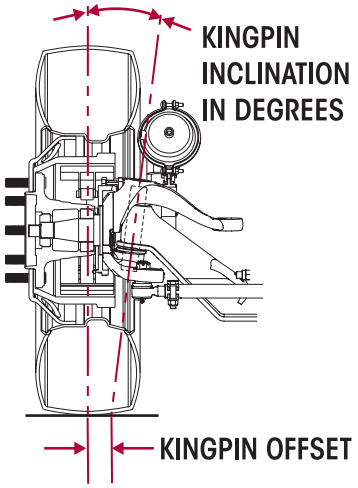
FIGURE 8-3



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 titled rearward and is negative when the tilt is forward. Proper caster is important for directional stability and returnability. Too much positive caster can cause shimmy, excessive steering effort and is normally a vehicle performance and handling consideration. Uneven positive caster may create a steering pull toward the side with the lower caster. This attribute may be used to compensate for crowned roads.

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

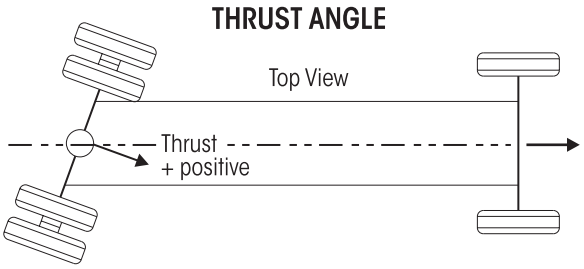
FIGURE 8-4



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

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

FIGURE 8-5

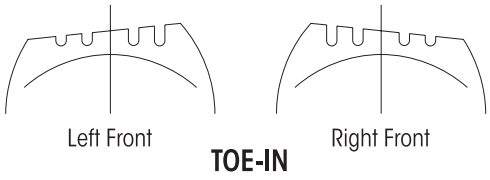


Thrust Angle, Tracking, or Square — The angle formed by the centerline of the vehicle frame (geometric centerline) and the direction that an axle points. As indicated by the term "square", the ideal value for the angle is 0° or when the axle centerline is at 90° or perpendicular to the geometric centerline.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

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

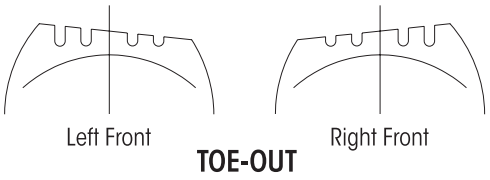
Tie Rod Arm (lower steering knuckle, cross tube arm) — The component that transmits steering forces between left and right axle knuckle assemblies through the cross tube assembly.

FIGURE 8-6



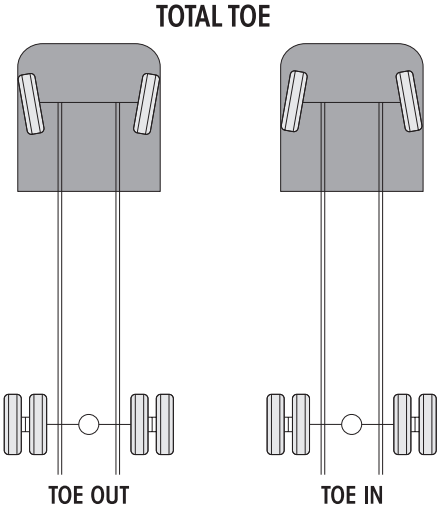
Toe-in — is when the horizontal line intersects in front of the wheels, or the wheels are closer together in front than in the back. Toe-in is commonly designated as positive, toe-out as negative. Excessive toe-in wears the outside edge of the tires. Steer axle toe is adjustable to reduce wear to the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

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.

FIGURE 8-8



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

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

INSPECTION PRIOR TO ALIGNMENT

WHEELS AND TIRES

Examine and ensure the following items:

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

FRONT SUSPENSION

Inspect and ensure the following:

- All fasteners are installed and tightened to the specified torque, refer to the Torque Specifications section of this publication.
- Leaf springs are free of wear or damage.
- Air springs are free of wear or damage.
- Shock absorbers are free of wear and damage.
- AIRTEK equipped – vehicle ride height is within specification, see Ride Height in this section.
- Front and rear spring mounts for wear or damage.

TIE ROD ENDS

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

REAR AXLE AND REAR SUSPENSION

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

- Ensure the rear axle is correctly aligned and at the proper ride height (if AIRTEK equipped). Follow the vehicle or suspension manufacturer's guidelines.
- All fasteners, including U-bolts (if applicable) are installed and tightened to the specified torque.
- Ensure the leaf spring and leaf spring bushings are not worn or damaged.
- Ensure the torque rods (if equipped) are correctly adjusted (if adjustable).
- Verify the vehicle frame is not bent or twisted.
- Refer to any additional recommendations and specifications from the vehicle, rear axle, and/or suspension manufacturer. Reference the TMC (The Technology & Maintenance Council) Guidelines for Total Vehicle Alignment.

FRONT WHEEL ALIGNMENT

Hendrickson recommends technicians review TMC's publication "Guidelines for Total Vehicle Alignment" (TMC RP 642).

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

- Every 50,000 miles (80,400 kms), or 12 months, whichever comes first.
- When the vehicle does not steer correctly.
- When correcting 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 Front Wheel Alignment Specifications section of this publication. There are two types of front wheel alignment:

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

MINOR FRONT WHEEL ALIGNMENT

Perform a minor front wheel alignment in the following sequence:

1. Inspect all systems that affect wheel alignment. Refer to the Inspection Prior to Alignment in this section.
2. Check the wheel bearing end play per the vehicle manufacturer's instructions.
3. Check and adjust toe if necessary, refer to Toe Setting in this section.
4. Check and adjust the vehicle ride height, see Ride Height in this section.

MAJOR FRONT WHEEL ALIGNMENT

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

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

1. Inspect all the systems that influence the wheel alignment. Refer to the Inspection Prior to Alignment in this section.
2. Check and adjust the maximum turn angle, refer to the Steering Stop adjustment procedure in this section, see Figures 8-9 and 8-10.
3. If the vehicle is equipped with power steering, check the pressure relief in the power steering system and reset if necessary, refer to the vehicle manufacturer specifications.
4. Check the turning angle. Refer to the vehicle manufacturer's specifications.
5. Check the kingpin (or steering axis) inclination. Refer to Kingpin Inclination under Alignment Definitions in this section.

FIGURE 8-9

FIGURE 8-10

⚠ 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.

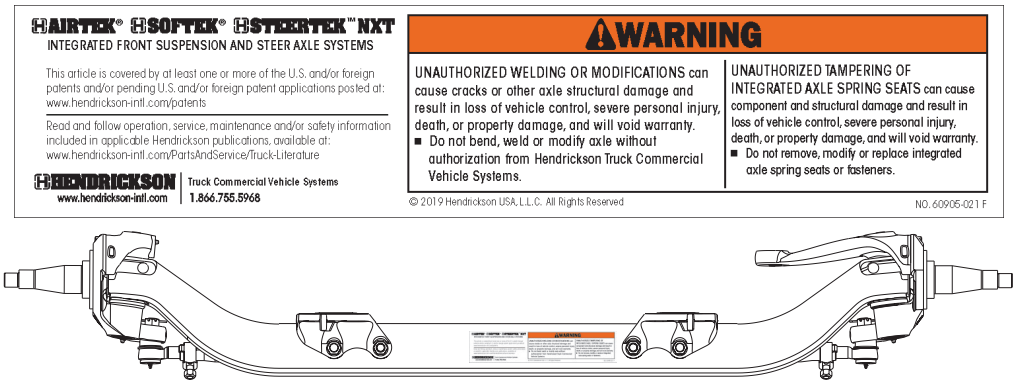
⚠ WARNING

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

6. Check camber angle. **DO NOT** attempt to adjust. Refer to Camber in Front Wheel Alignment Specifications section.

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

FIGURE 8-11



7. It is necessary to verify that all ride heights (front and rear if AIRTEK equipped) are within the vehicle manufacturer's specifications prior to checking caster to get an accurate caster reading.
8. Check and adjust caster angle. Refer to Caster in the Front Wheel Alignment Specifications section. **The use of two (2) different angle caster shims will not change cross caster.** Cross caster is the difference between the caster readings for left and right side of the vehicle.
9. Check and adjust toe-in, refer to Toe Setting in this section.

STEERING STOP

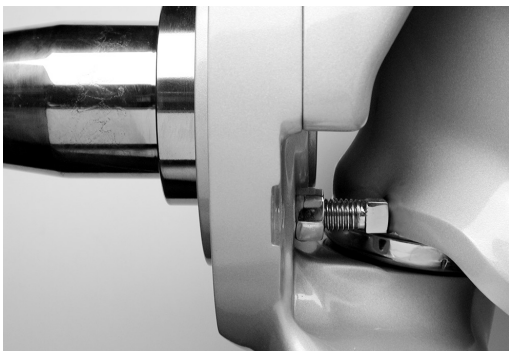
ADJUSTMENT PROCEDURE

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

WARNING

ALWAYS CHECK/RESET THE STEERING GEAR BOX POPPET WHEN THE WHEEL CUT IS DECREASED. FOLLOW VEHICLE 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.

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

3. **Increase** the wheel cut:
   a. Loosen the jam nuts and screw the axle stop bolts **in (clockwise)**.
   b. Tighten the stop bolts to 50 ± 10 foot pounds torque.
4. **Decrease** the wheel cut:
   a. Loosen the jam nuts and screw the axle stop bolts **out** (**counter-clockwise**).
   b. Tighten the stop bolts to 50 ± 10 foot pounds torque.
5. Measure the wheel cut and check for any interference with related steering components.
6. Remove wheel chocks.

TOE SETTING

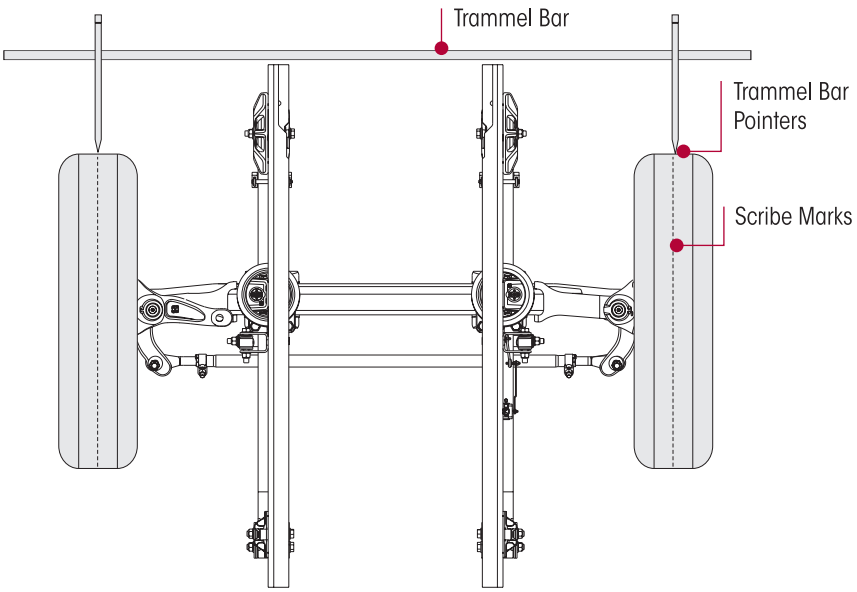
1. Place the vehicle on a level floor with the wheels in a straight ahead position.
2. Raise the vehicle and support the front axle with safety stands.
3. Chock the rear wheels of the vehicle.
4. Use paint and mark the center area of tread on both steer axle tires around the complete outer diameter of the tires.
5. Scribe a line through both steer axle tires in the painted area around the complete outer diameter of the tires.
6. Raise the vehicle and remove the safety stands.
7. 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.

8. Use a trammel bar and measure the distance between the scribe marks at the rear of the steer axle tires. Record the measurement.
9. 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.

FIGURE 8-13



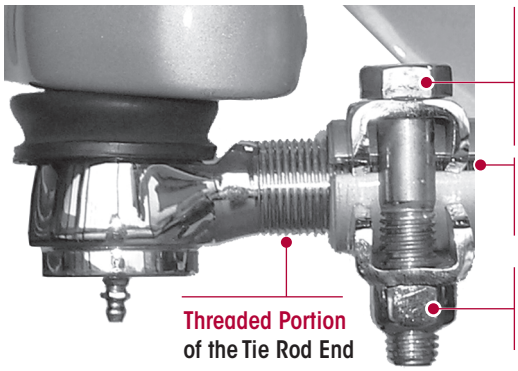
10. To calculate the toe setting subtract the front measurement from the rear measurement. The difference between the two will equal the toe-in/toe-out measurement.
11. If the toe measurement is not within the specifications of 1/16" ± 1/32" (0.060" ± 0.030"), it will be necessary to adjust the toe setting as per 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 68 ± 7 foot pounds torque.

⚠ WARNING

THE THREADED PORTION OF THE TIE ROD END MUST EXTEND PAST THE SLOTS INTO THE TIE ROD (SEE FIGURE 8-14). IT IS CRITICAL TO CHECK THE 5/8" 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.

12. Verify the tie rod clamp bolt head does not contact the lower shock mount at full wheel cut, see Figure 8-14.
13. Repeat Steps 1-12 until the correct toe setting is achieved.
14. Remove the vehicle frame safety stands and lower the vehicle.
15. Remove the rear wheel chocks.

FIGURE 8-14



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

Tie Rod Cross Tube Slots
It is critical to have the threaded portion of the tie rod end extend past the slots in the tie rod cross tube.

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

LEAF SPRING EYE RE-TORQUE

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

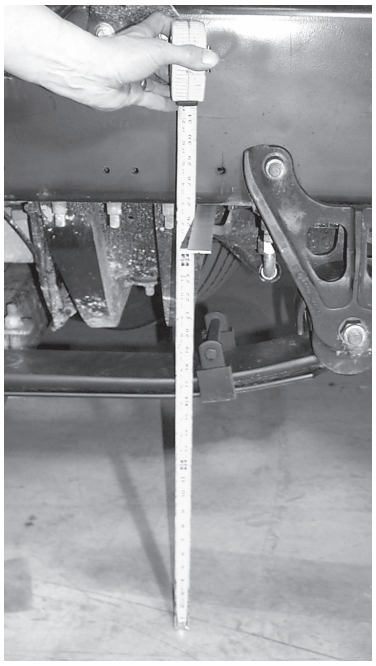
RE-TORQUE PROCEDURE

1. Chock the rear wheels of the vehicle to prevent movement.
2. Verify ride height and adjust if necessary, see AIRTEK Ride Height adjustment procedure in this section.

NOTE **DO NOT** remove the spring eye bolts.

3. Loosen all six (6) front and rear spring eye bolts.
4. Let the suspension settle.
5. Tighten the front M20 spring eye bolt locknuts to vehicle manufacturer's specifications.
6. Tighten the rear M20 spring eye bolt and shackle bolt locknuts to the vehicle manufacturer's specifications.
7. Affix a straight edge to the bottom of the frame rail in front of the air spring, see Figure 8-15.
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 3/8" the vehicle is level. If measurement is more than 3/8" contact Hendrickson Tech Services.
12. Remove rear wheel chocks.

FIGURE 8-15



AIRTEK – RIDE HEIGHT

VERIFICATION

IMPORTANT NOTE

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

1. Drive the vehicle onto a level surface.
2. Free and center all suspension joints by slowly moving vehicle back and forth several times without using the brakes. **It is important when coming to a complete stop to verify that the brakes are released.**
3. Chock the front wheels.
4. Verify that the air system is at full operating pressure.

NOTE

Hendrickson recommends the following be performed during any type of ride height adjustment to help prevent socket head cap screws from loosening from the height control valve housing, and any subsequent air leaks from the height control valve.

5. Prior to adjusting the ride height control valve, clean the threads of the ¼" valve mounting fasteners to remove any debris and corrosion.

⚠ WARNING

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

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.

SERVICE HINT

It is very important that the leveling valve be cycled completely before and after any ride height adjustments. This cycling of the leveling valve will help to make the adjustment as accurate as possible.

10K • 12K lb Capacity equipped with single ride height control valve:

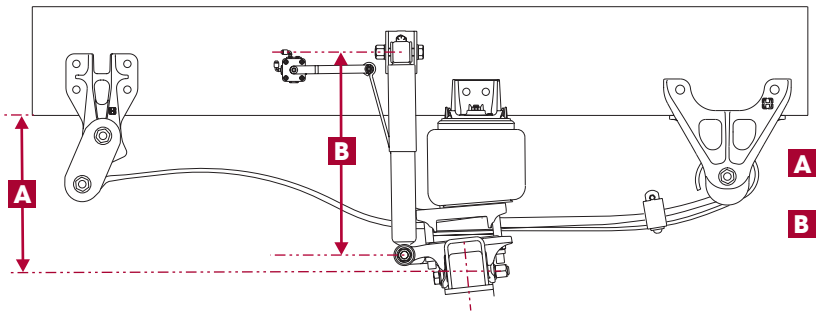
a. Detach the **UPPER** rubber grommet of the linkage assembly from the upper stud and exhaust the suspension system air by lowering the height control valve arm.
b. Re-attach the upper grommet of the linkage assembly onto the upper stud to refill the suspension system with air. Wait until the airflow to front air springs has stopped.
c. Measure the suspension reference ride height on the shock absorber, measuring the center of the top mounting bolt to the center of the bottom mounting bolt, see Figure 8-16.
d. The referenced ride height measurements are specified in Table 8-1.
e. Proceed to Step 7.

13.2K • 14.6K lb Capacity equipped with dual ride height control valves:

a. Detach the **LOWER** rubber grommet from both linkage assemblies from the lower stud and exhaust the suspension system air by lowering the height control valve arms.
b. Reattach the lower grommets of the linkage assemblies onto the lower studs to refill the suspension system with air. Wait until the airflow to the front air springs has stopped.
c. Measure the suspension reference ride height on the shock absorbers, measuring the center of the top mounting bolt to the center of the bottom mounting bolt, see Figure 8-17.
d. The referenced ride height measurements are specified in Table 8-2.

7. If the reference ride height measurement is not within ± 0.25" of specification, the ride height **MUST** be adjusted, see Ride Height Adjustment in this section. If the ride height measurement is within specification, than no adjustment is necessary, proceed to the next step.
8. Remove the wheel chocks if no adjustment is necessary.

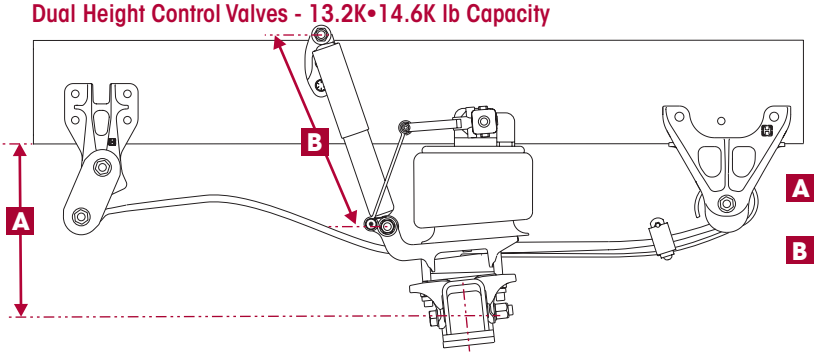
FIGURE 8-16
Single Height Control Valve - 10K•12K lb Capacity



A From the bottom of the frame to the center of axle beam
B Shock Absorber Length at ride height with a tolerance of ¼"

TABLE 8-1	Ride Height	Shock Absorber Length
Blue Bird VISION Model 10K • 12K lb Capacity	Dimension A	Dimension B
STEERTEK NXT • STEERTEK Axle	12½"	18 9/16"

FIGURE 8-17
Dual Height Control Valves - 13.2K•14.6K lb Capacity



A From the bottom of the frame to the center of axle beam
B Shock Absorber Length at ride height with a tolerance of ¼"

TABLE 8-2	FRONT ENGINE		REAR ENGINE	
ALL AMERICAN Model 13.2K • 14.6K lb Capacity	Ride Height	Shock Absorber Length	Ride Height	Shock Absorber Length
	Dimension A	Dimension B	Dimension A	Dimension B
STEERTEK NXT Axle Built after October 2012	14 7/8"	17 15/16"	14 7/8"	18 5/32"
STEERTEK AXLE Built prior to October 2012		17¼"		17 15/32"

ADJUSTMENT

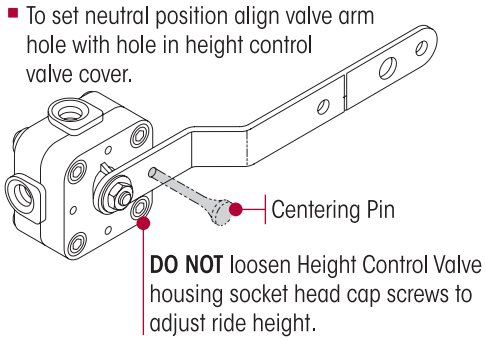
1. Verify that the air system is at full operating pressure.

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

2. See Air Spring Safety Notice in the Important Safety Notice section of this publication prior to deflating or inflating the suspension system.
3. Cycle the air system. Detach the lower rubber grommet(s) of the linkage assembly(s) from the lower stud and exhaust the suspension system air by lowering the height control valve arm.
4. Refill the suspension by raising the height control valve arm(s) by hand, so that the air springs are above the proper ride height.
5. Lower the height control valve arm(s) to exhaust the air system until the suspension is at the proper ride height.

6. Use a 1/8" wooden dowel rod (golf tee) to set the neutral position for the height control valve(s) by aligning the hole in the height control valve arm(s) with the hole in the height control valve cover, as shown in Figure 8-18. **DO NOT** use a metal rod or nail as this may cause damage to the height control valve.

FIGURE 8-18



NOTE

Hendrickson recommends the following be performed during any type of ride height adjustment to help prevent socket head cap screws from loosening from the height control valve housing, potentially causing subsequent air leaks from the height control valve, see Figure 8-18.

7. Loosen the height control valve mounting locknuts.
8. Check the rubber grommet for any tearing or damage, replace the linkage assembly as necessary.
9. Prior to adjusting the height control valves, clean the mounting fastener threads of any debris and corrosion.

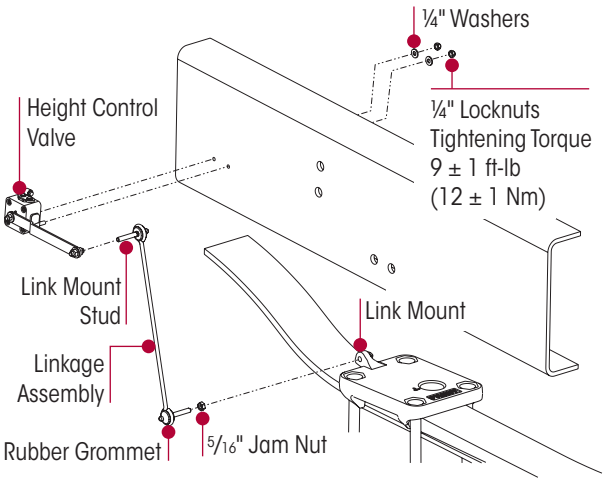
SERVICE HINT

It is necessary to place a 3/16" Allen wrench in the head of the mounting bolts while adjusting ride height to prevent movement of the bolts, which can cause air leakage in the body of the leveling valve, see Figure 8-18.

10. Adjust the ride height control valve until the lower rubber grommet fits into the lower link mounting stud. Repeat for the other side if equipped with dual height control valves.
11. Tighten the height control valve mounting locknuts to 9 ± 1 foot pounds torque after the adjustment is made, see Figure 8-19. Install a (5 mm) Allen wrench in the bottom socket head cap screws to prevent the screws from turning while re-tightening the locknuts.
12. Remove the dowel rod from the height control valve(s).
13. Recheck the ride height after adjustment, (if equipped with dual height control valves check both sides of the vehicle).
14. Repeat the adjustment Steps 3 through 13 until the ride height is within specification.
15. Remove the wheel chocks.

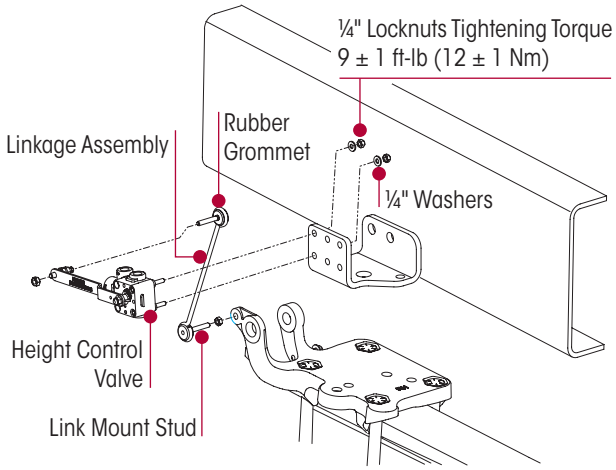
FIGURE 8-19

Single Height Control Valve for 10K•12K lb Capacity



Dual Height Control Valves for 13.2K•14.6K lb Capacity

Vehicles built after November 2013



SECTION 9
Component Replacement

FASTENERS

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

SPACERS

There are different front axle spacer configurations for each front suspension system. Prior to disassembly of the front axle clamp group, note the orientation and quantity of the front axle spacer(s) (if equipped). It is required that the axle spacers be installed in the same orientation and location as removed to preserve the existing vertical alignment. Refer to the Parts List section of this publication.

AIRTEK HEIGHT CONTROL VALVE

- **Single Height Control Valve – AIRTEK 10K • 12K Pound Capacity**

DISASSEMBLY

1. Place the vehicle on level floor.
2. Chock the wheels.
3. Raise the vehicle frame and support with safety stands.
4. Drain the air from the secondary air tank.

⚠ WARNING

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

5. See additional Air Spring Warnings in the Important Safety Notice section of this publication prior to deflating or inflating the air system.
6. Disconnect the linkage assembly at the rubber grommet and lower the height control valve arm. This will exhaust the air pressure in the air springs.
7. Exhaust the air in the air springs and deflate the front suspension.

⚠ CAUTION

THE PUSH-TO-CONNECT FITTINGS ARE NON-SERVICEABLE. IT IS NECESSARY TO CLEAN THE DIRT AND DEBRIS AWAY FROM THE PUSH-TO-CONNECT FITTINGS AND THE AIR LINES TO HELP PREVENT ANY FOREIGN MATERIAL FROM ENTERING THE AIR SPRING. AIR SYSTEM OR DAMAGING THE PUSH-TO-CONNECT FITTINGS. CLEAN PUSH-TO-CONNECT FITTINGS USING SOAPY WATER AND A SOFT BRISTLED BRUSH AND DRY WITH COMPRESSED AIR.

8. Remove the air lines from the height control valve, see Figure 9-1. The air lines are push-to-connect. Push in on the air line to release the tension, push down on the collar and pull out the air line.
9. Remove the two (2) ¼" nuts and washers that attaches to the upper air spring bracket.
10. Remove the height control valve.

ASSEMBLY

1. Attach the height control valve on the vehicle frame as shown in Figure 9-2.
2. Attach the ¼" washers and the locknuts. **DO NOT** tighten the locknuts to specified torque until after the proper ride height is attained. Mount the height control valve parallel to flange of the frame, see Figure 9-2.

FIGURE 9-1

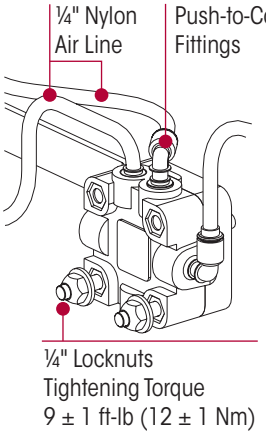
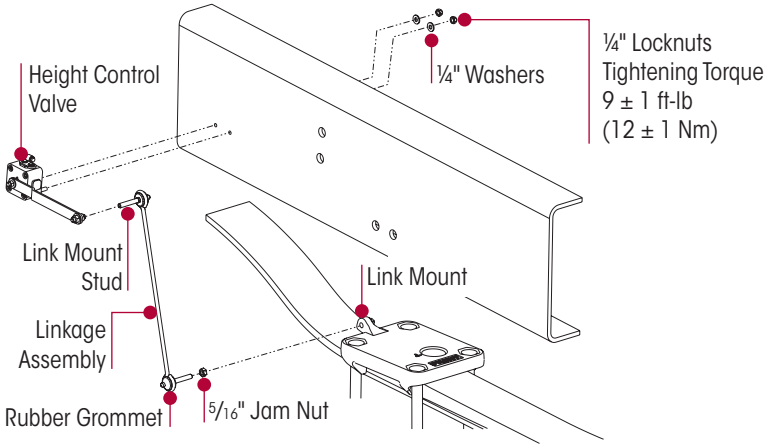


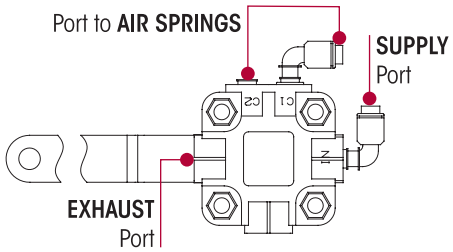
FIGURE 9-2



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.

FIGURE 9-3



3. Re-install the air fittings into the height control valve. Ensure the Teflon® thread sealing ring is seated around the base of the fitting's hex shoulder. Tighten to 9 ± 1 foot pounds torque.
4. Attach the air lines to the height control valve, see Figure 9-3.
5. Install the linkage assembly.
6. Adjust the height control valve to proper specifications. See the Alignment & Adjustments section of this publication for proper ride height adjustment.
7. Tighten the ¼" locknuts to 9 ± 1 foot pounds torque. Install a (5 mm) Allen wrench in the bottom socket head cap screws to prevent the screws from turning while re-tightening the locknuts.
8. See additional Air Spring Cautions and Warnings in the Important Safety Notice section of this publication prior to inflating or deflating the suspension system.
9. Inflate the suspension by connecting the linkage assembly to the height control valve arm and lower mounting bracket. Verify the air springs inflate uniformly without binding.
10. Lower the vehicle frame and remove safety stands.
11. Remove wheel chocks.

■ Dual Height Control Valves – AIRTEK 13.2K • 14.6K Pound Capacity

DISASSEMBLY

1. Place the vehicle on level floor.
2. Chock the wheels.
3. Raise the vehicle frame and support with safety stands.
4. Drain the air from the secondary air tank.

⚠ WARNING

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

5. See additional Air Spring Warnings in the Important Safety Notice section of this publication prior to deflating or inflating the air system.

6. Disconnect the linkage assembly at the rubber grommet and lower the height control valve arm. This will exhaust the air pressure in the air springs.
7. Exhaust the air in the air springs and deflate the front suspension.

⚠ CAUTION

THE PUSH-TO-CONNECT FITTINGS ARE NON-SERVICEABLE. IT IS NECESSARY TO CLEAN THE DIRT AND DEBRIS AWAY FROM THE PUSH-TO-CONNECT FITTINGS AND THE AIR LINES TO HELP PREVENT ANY FOREIGN MATERIAL FROM ENTERING THE AIR SPRING. AIR SYSTEM OR DAMAGING THE PUSH-TO-CONNECT FITTINGS. CLEAN PUSH-TO-CONNECT FITTINGS USING SOAPY WATER AND A SOFT BRISTLED BRUSH AND DRY WITH COMPRESSED AIR.

8. Remove the air lines from the height control valve, see Figure 9-4. The air lines are push-to-connect. Push in on the air line to release the tension, push down on the collar and pull out the air line.
9. Remove the two (2) ¼" nuts and washers that attaches to the upper air spring bracket.
10. Remove the height control valve.

FIGURE 9-4

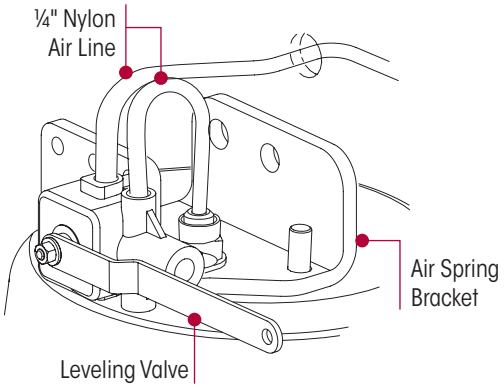
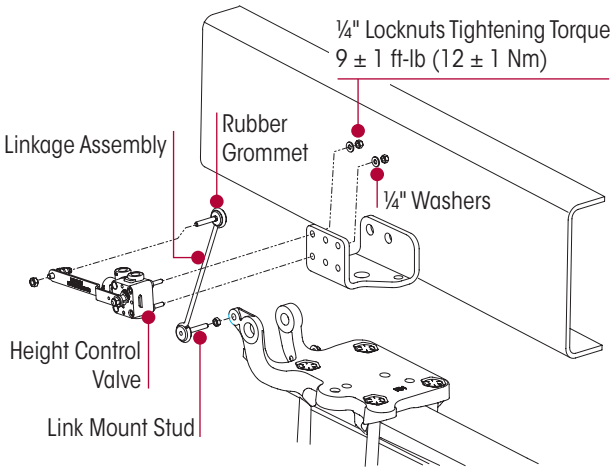


FIGURE 9-5



ASSEMBLY

1. Attach the height control valve on the vehicle frame as shown in Figure 9-5.
2. Attach the ¼" washers and the locknuts. **DO NOT** tighten the locknuts to specified torque until after the proper ride height is attained. Mount the height control valve parallel to flange of the frame, see Figure 9-5.

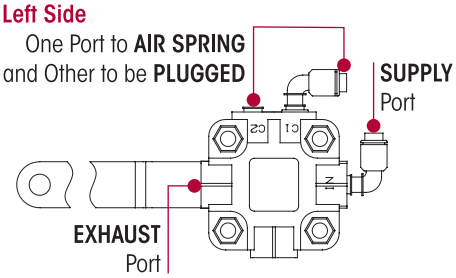
SERVICE HINT

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

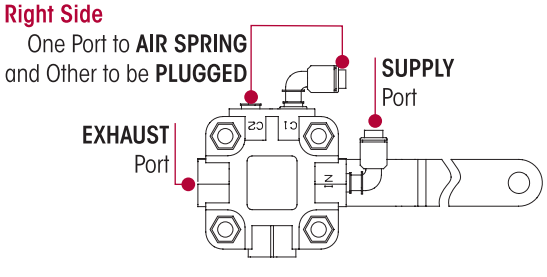
3. Re-install the air fittings into the height control valve. Ensure the Teflon® thread sealing ring is seated around the base of the fitting's hex shoulder. Tighten to 9 ± 1 foot pounds torque.
4. Attach the air lines to the height control valve, see Figure 9-6.
5. Install the linkage assembly.

FIGURE 9-6

Left Side



Right Side



6. Adjust the height control valve to proper specifications. See the Alignment & Adjustments section of this publication for proper ride height adjustment.
7. Tighten the ¼" locknuts to 9 ± 1 foot pounds torque.
8. See additional Air Spring Cautions and Warnings in the Important Safety Notice section of this publication prior to inflating or deflating the suspension system.
9. Inflate the suspension by connecting the linkage assembly to the height control valve arm and lower mounting bracket. Verify the air springs inflate uniformly without binding.
10. Lower the vehicle frame and remove safety stands.
11. Remove wheel chocks.

AIRTEK AIR SPRING

- **10K • 12K Pound Capacity**

DISASSEMBLY

1. Place the vehicle on level floor.
2. Chock the wheels.
3. Raise the vehicle frame and support with safety stands.

WARNING

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

4. See additional Air Spring Warnings in the Important Safety Notice section of this publication prior to deflating or inflating the air system.
5. Disconnect the linkage assembly at the rubber grommet and lower the height control valve arm. This will exhaust the air pressure in the air springs.
6. Exhaust the air in the air springs and deflate the front suspension.

WARNING

IF THE AIR SPRING IS TO BE RE-INSTALLED, INSPECT THE LOCK-TABS FOR DAMAGE OR CRACKS PRIOR TO RE-INSTALLATION. 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 9-7, 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 9-8.
11. Remove the air spring.

FIGURE 9-7

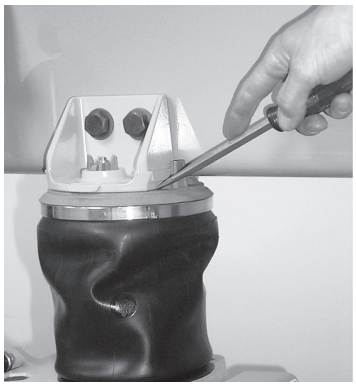
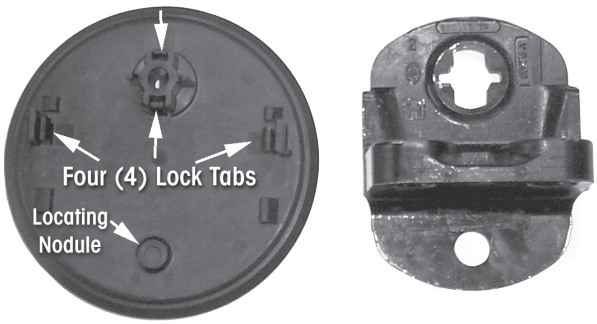


FIGURE 9-8

FIGURE 9-9



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 it into the 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 9-9.

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. The improper cut of the end of the air line tubing can cause the air line to seat improperly in the quick connect fitting and cause air leakage.

4. Install the air line into the air spring.

⚠ 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. Air up the suspension.
7. Check the air spring for leaks.
8. Check the ride height and adjust as necessary. See the Alignment & Adjustments Section of this publication for the proper single ride height adjustment.
9. Remove safety stands and lower the vehicle.
10. Remove the wheel chocks.

■ 13.2K • 14.6K Pound Capacity

DISASSEMBLY

1. Place the vehicle on level floor.
2. Chock the wheels.
3. Raise the vehicle frame and support with safety stands.

⚠ WARNING

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

4. See additional Air Spring Warnings in the Important Safety Notice section of this publication prior to deflating or inflating the air system.
5. Disconnect the linkage assembly at the rubber grommet and lower the height control valve arm. This will exhaust the air pressure in the air springs.
6. Exhaust the air in the air springs and deflate the front suspension.

NOTE

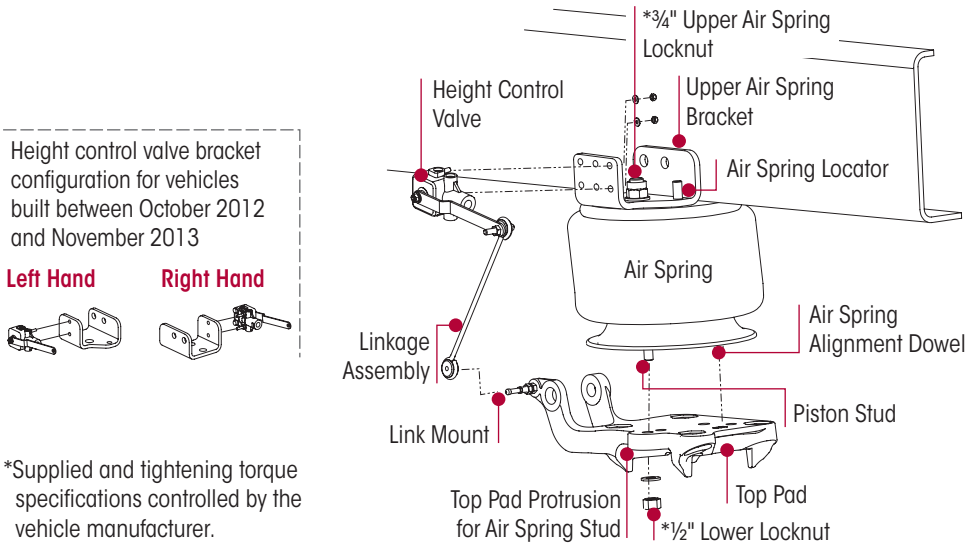
If the air spring is damaged and the suspension is deflated, it will be necessary to raise the frame and support the vehicle with safety stands to obtain adequate clearance for air spring removal.

7. Disconnect the ¼" NPT air fitting from the air spring.
8. Remove the lower ½" air spring locknut from the piston stud to remove the air spring from the top pad, see Figure 9-10.
9. Remove the ¾" upper air spring locknut from the air spring bracket.
10. Remove the air spring.

ASSEMBLY

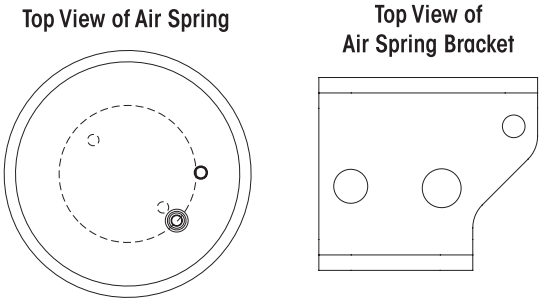
1. Compress the air spring and slide into the vertical position.
2. There is a locating ½" stud and ¾" threading stud on top of the air spring.
3. There are two studs on the bottom of the air spring. Guide studs through the air spring bracket and properly seat the lower air spring piston into the top axle pad. Secure the ½" locknut to the piston, see Figure 9-10.

FIGURE 9-10
13.2K • 14.6K lb Capacity | Vehicles built after November 2013



4. Tighten the ¾" upper air spring locknuts to vehicle manufacturer's specifications and the ½" lower air spring locknuts to 25 ± 5 foot pounds torque.
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 line into the air spring.
7. Air up the suspension.
8. Check the air spring for leaks.
9. Check the ride height and adjust as necessary. See the Alignment & Adjustments Section of this publication for the proper dual ride height adjustment.
10. Remove safety stands and lower the vehicle.
11. Remove the wheel chocks.

FIGURE 9-11



SHOCK ABSORBER

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

WARNING

THE SHOCK ABSORBERS ARE THE REBOUND TRAVEL STOPS FOR THE SPRINGS. ANYTIME THE FRONT AXLE ON AN AIRTEK • SOFTEK SUSPENSION IS SUSPENDED IT IS MANDATORY THAT THE SHOCK ABSORBERS REMAIN CONNECTED. FAILURE TO DO SO COULD 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.

DISASSEMBLY

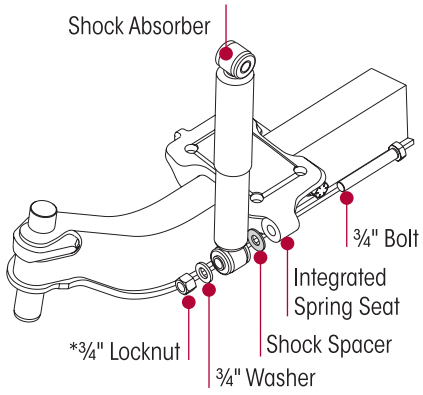
1. Place the vehicle on a level floor.
2. Chock the wheels.
3. Remove and discard the lower shock absorber mounting bolts and fasteners.
4. Remove and discard the upper shock absorber mounting bolts and fasteners.
5. Remove the shock absorber and the lower shock absorber spacer.
6. Inspect the shock absorber mounting brackets and hardware for damage or wear, replace as necessary.

ASSEMBLY

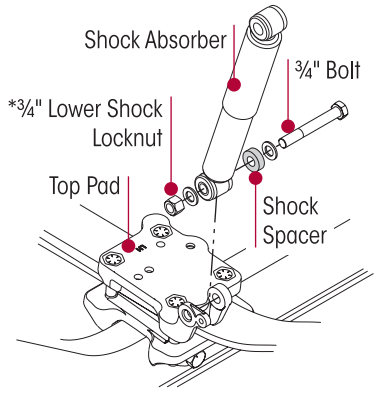
1. Install the shock absorber into the upper shock mounting bracket.
2. Install the upper ¾" shock mounting fasteners per the vehicle manufacturer's instructions.

FIGURE 9-12
STEERTEK NXT Axle | Vehicles built after October 2012

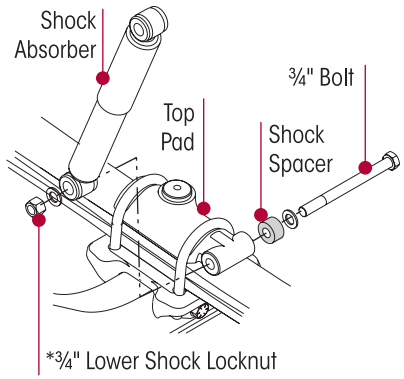
AIRTEK / SOFTEK 8.5K•10K•12K lb Capacity



AIRTEK 13.2K•14.6K lb Capacity



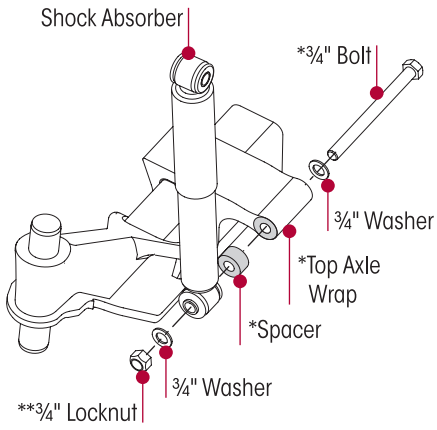
SOFTEK 13.2K•14.6K lb Capacity



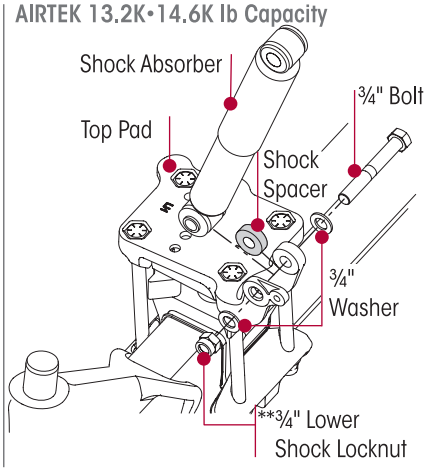
*Torque specification is controlled and provided by the vehicle manufacturer.

FIGURE 9-13
STEERTEK Axle | Vehicles built prior to October 2012

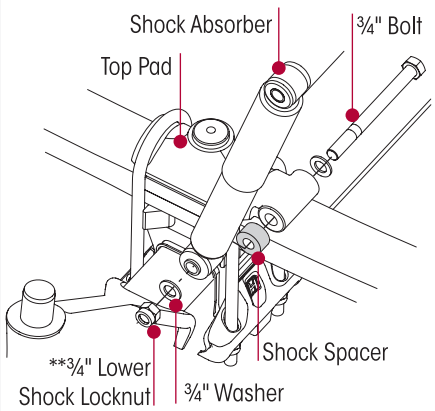
AIRTEK / SOFTEK 8.5K•10K lb Capacity



AIRTEK 13.2K•14.6K lb Capacity



SOFTEK 13.2K•14.6K lb Capacity



* Apply a thin coating or anti-seize compound to the shock absorber lower mounting bolt shank, spacer and to the mating face and inside bore of the integrated spring seat.
** Torque specification is controlled and provided by the vehicle manufacturer.

3. **STEERTEK NXT** axle – vehicles built **after** October 2012
   a. Install the lower bolt from the inboard side to the outboard side of the integrated spring seat or top pad. Install the spacer, washer, and locknut as illustrated in Figure 9-12. Fastener and spacer installation configuration varies.
   b. Proceed to Step 5.
4. **STEERTEK** axle – vehicles built **prior to** October 2012
   a. Apply a thin coating of anti-seize compound to the shock absorber lower mounting bolt shank, to the mating face of the axle wrap and spacer, and to the inside bore of the aluminum axle wrap. This is necessary to help prevent seizing of the bolt to the aluminum axle wrap, see Figure 9-13.
   b. Install the lower shock absorber bolt from the inboard side to the outboard side of the top axle wrap. Install the spacer, and fasteners as illustrated in Figure 9-13.
5. Tighten the upper and lower ¾" fasteners to the vehicle manufacturer's specifications, see Figures 9-12 and 9-13.
6. Remove the wheel chocks.

FRAME HANGER

DISASSEMBLY

1. Place the vehicle on level floor.
2. Chock the wheels.
3. Raise the vehicle frame at ride height and support with safety stands.
4. Remove the wheel assemblies per the vehicle manufacturer's instructions
5. Support the axle with safety stands.
6. **SOFTEK equipped vehicles** – proceed to Step 11.
7. **AIRTEK equipped vehicles** – proceed to next Step.

⚠ WARNING

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

8. See additional Air Spring Warnings in the Important Safety Notice section of this publication prior to inflating or deflating the suspension system.
9. Disconnect the linkage assembly at the upper rubber grommet and lower the height control valve arm to exhaust the air pressure in the air springs.
10. Remove the air lines from air springs (if equipped).
11. Remove and discard the front leaf spring eye fasteners per the vehicle manufacturer's instructions, see Figure 9-14.

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

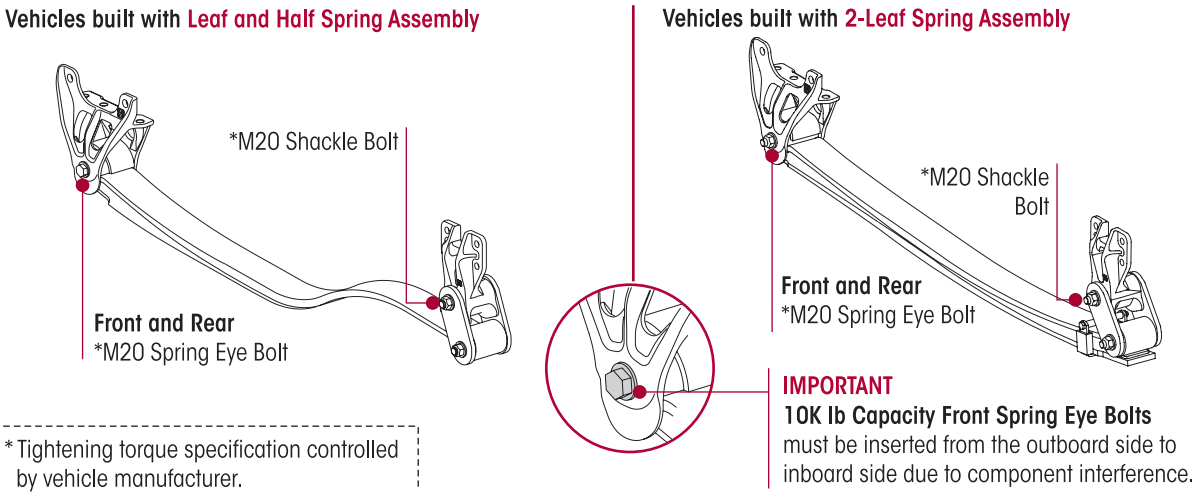
12. Remove the frame mounting fasteners from the hanger per vehicle manufacturer's guidelines.
13. Remove the hanger from the vehicle, see Figure 9-14.

ASSEMBLY

1. Install the frame hanger on the frame.
2. Install frame fasteners per the vehicle manufacturer's instructions.
3. Install and snug the M20 spring eye bolt from the outboard side of the hanger, washers and locknut per manufacturer's instructions, see Figure 9-14.
4. **SOFTEK equipped vehicles** – proceed to Step 6.

5. **AIRTEK equipped vehicles** – See additional Air Spring Warnings in the Important Safety Notice section of this publication prior to inflating or deflating the suspension system.
   a. Install the air line into the air spring.
   b. Inflate the suspension by connecting the linkage assembly to the height control valve arm . Verify the air springs inflate uniformly without binding.
6. Tighten the M20 front and rear spring eye locknuts to the vehicle manufacturer's specifications.
7. Remove the safety stands and lower the frame.
8. Install the wheel assemblies per the vehicle manufacturer's instructions.
9. Remove the axle safety stands.
10. **AIRTEK equipped vehicles –** Verify the vehicle's ride height is within specification. See the Alignment & Adjustments section in this publication.
11. Remove the wheel chocks.

FIGURE 9-14



REAR SHACKLE BRACKET

DISASSEMBLY

1. Place the vehicle on level floor.
2. Chock the wheels.
3. Raise the vehicle frame at ride height and support with safety stands.
4. Remove the wheel assemblies as per the vehicle manufacturer's instructions.
5. Suspend the front axle from the shock absorbers.

- **SOFTEK equipped vehicles** proceed to Step 10
- **AIRTEK equipped vehicles** proceed to next Step.

⚠ WARNING

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

6. See additional Air Spring Warnings in the Important Safety Notice section of this publication prior to inflating or deflating the suspension system.
7. Disconnect the linkage assembly at the rubber grommet and lower the height control valve arm. This will exhaust the air pressure in the air springs.
8. Exhaust the air in the air springs and deflate the front suspension.
9. Remove the air lines from air springs (if equipped).

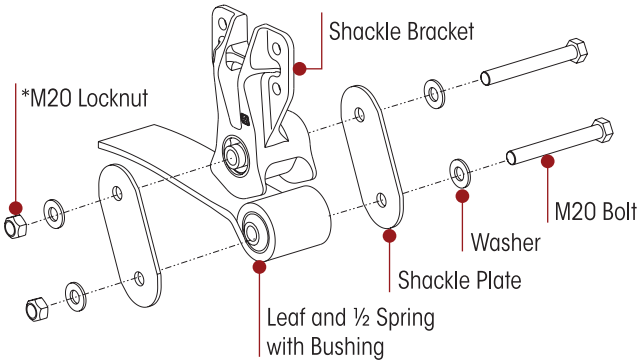
10. Remove the rear M20 spring eye and shackle pivot bolts, washers and locknuts.

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

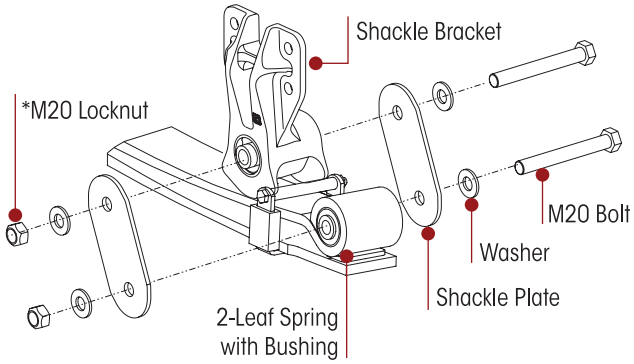
11. Remove the frame fasteners from the shackle bracket per vehicle manufacturer's guidelines.
12. Remove the shackle bracket from the vehicle, see appropriate configuration, Figures 9-15 and 9-16.

FIGURE 9-15

Vehicles built with Leaf and Half Spring Assembly



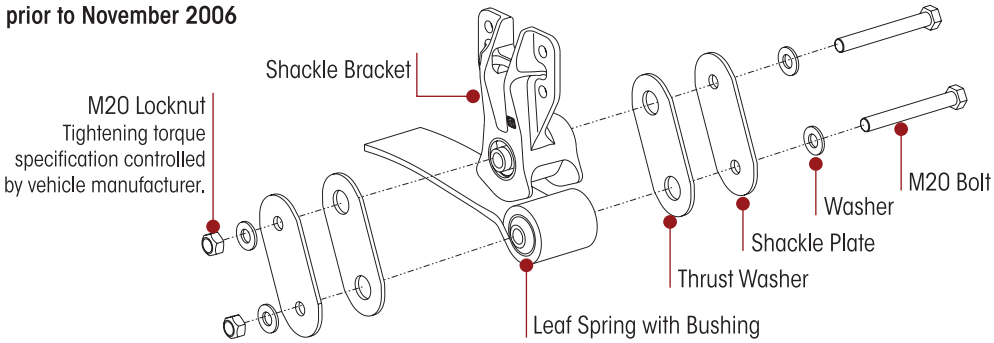
Vehicles built with 2-Leaf Spring Assembly



*Tightening torque specification controlled by vehicle manufacturer.

FIGURE 9-16

Vehicles built with Leaf and Half Spring Assembly prior to November 2006



13. Inspect the shackle assembly and both thrust washers (if equipped) for excessive wear or damage. See Thrust Washer Inspection in the Preventive Maintenance section of this publication. Hendrickson recommends the thrust washers be replaced when this assembly is serviced.
14. 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.
2. Install new frame fasteners per vehicle manufacturer's guidelines.
3. Install the thrust washers (if equipped) and shackle plates with the M20 bolts, washers and locknuts. Snug the shackle bolts. **DO NOT** tighten.
4. Remove the safety stands and lower the frame.

- **SOFTEK equipped vehicles** proceed to Step 8.
- **AIRTEK equipped vehicles** proceed to next Step.

5. See additional Air Spring Warnings in the Important Safety Notice section of this publication prior to inflating or deflating the suspension system.

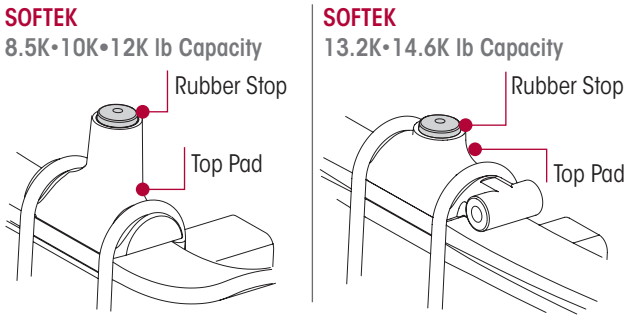
6. Install the air line into the air spring.
7. Inflate the suspension by connecting the linkage assembly to the height control valve arm and lower the mounting bracket. Verify the air springs inflate uniformly without binding.
8. Tighten the M20 shackle fasteners to the vehicle manufacturer's specifications, see Figures 9-15 and 9-16.
9. Install the wheel assemblies per the vehicle manufacturer's instructions.
10. **AIRTEK equipped vehicles –** Verify the vehicle's ride height is within specification, refer to the Alignment & Adjustments section in this publication.
11. Remove the wheel chocks.

SOFTEK RUBBER AXLE STOP

REMOVAL

1. Insert a small pry bar between the rubber stop and the inside of the top pad.
2. Apply downward force on the pry bar and pull the rubber stop out of the top pad, see Figure 9-17.
3. Inspect the top pad and frame rail flange for any contact damage.
4. Clean any debris from the inside rubber stop inset area of the top pad.

FIGURE 9-17



INSTALLATION

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

LEAF SPRING ASSEMBLY BUSHINGS

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

AIRTEK – LEAF SPRING ASSEMBLY

NOTE Service the AIRTEK leaf spring assembly one side at a time.

DISASSEMBLY

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

NOTE It may be necessary to remove the peripheral components for installation of the safety stands.

3. Raise the vehicle and support the frame with safety stands.
4. Remove the wheel assemblies per the vehicle manufacturer's instructions.

⚠ WARNING

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

5. See additional Air Spring Warnings in the Important Safety Notice section of this publication prior to deflating or inflating the air system.
6. Disconnect the linkage assembly at the rubber grommet and lower the height control valve arm. This will exhaust the air pressure in the air springs.
7. Install a floor jack with a 4 inch lifting plate at the underside of the axle.
8. Lower the jack to remove the load on the leaf spring assembly (keep the jack on axle, **DO NOT** remove).
9. Remove and discard front spring eye fasteners from the side being serviced per the vehicle manufacturer's instructions.
10. Remove and discard the rear shackle M20 pivot bolt fasteners from the side being serviced per the vehicle manufacturer's instructions.
11. Remove and discard the lower shock absorber mounting fasteners from the side being serviced per the vehicle manufacturer's instructions.

⚠ WARNING

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

SERVICE HINT

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

12. Disconnect the air lines at the air springs on the side being serviced.
13. On the side being serviced disconnect the bottom of the air spring from the top pad, see Air Spring in this section.
14. Remove and discard the clamp group fasteners from the leaf spring assembly being replaced.
15. Remove the top pad from the leaf spring assembly that is being serviced.
16. Lower the jack to allow enough clearance to remove the leaf spring assembly from the frame hangers.
17. It is not necessary to remove the axle spacer or dowel pin, although if it is removed it is required to re-install in the same location as prior to removal during assembly.
18. **STEERTEK** axle — vehicles built **prior to** October 2012
    a. Remove the bottom axle wrap and axle wrap liner. Inspect the axle wrap liner for cracks, refer to the Preventive Maintenance section of this publication, replace as necessary.
19. Remove the leaf spring assembly. Approximate weight of the leaf spring assembly is 48 pounds.

ASSEMBLY

1. **STEERTEK** axle — vehicles built **prior to** October 2012
    a. Install the bottom axle wrap liner and bottom axle wrap.
2. If removed, install the dowel pin and the axle spacer on the axle in the same location and orientation as prior to removal.
3. Install the leaf spring assembly on top of the axle spacer and the axle. Verify that the dowel pin is engaged properly in the axle spring seat / top wrap, see Figure 9-18.
4. Install the **FRONT** spring eye fasteners, snug but **DO NOT** tighten at this time.
5. Install the top pad on top of the leaf spring assembly.

SERVICE HINT

New clamp group fasteners must be used when the clamp group is removed, to prevent premature bolt fatigue.

6. Install clamp group fasteners.
7. Snug the clamp group, **DO NOT** tighten to torque at this time.
8. Install the air springs into the top pads, see Air Spring in this section. Ensure the air spring piston seats into the top pad correctly.
9. Raise the axle and the **REAR** of the leaf spring assembly into the rear shackle bracket hangers.
10. Install the rear spring eye bolts in the rear hangers, snug but **DO NOT** tighten at this time, see Figure 9-18.

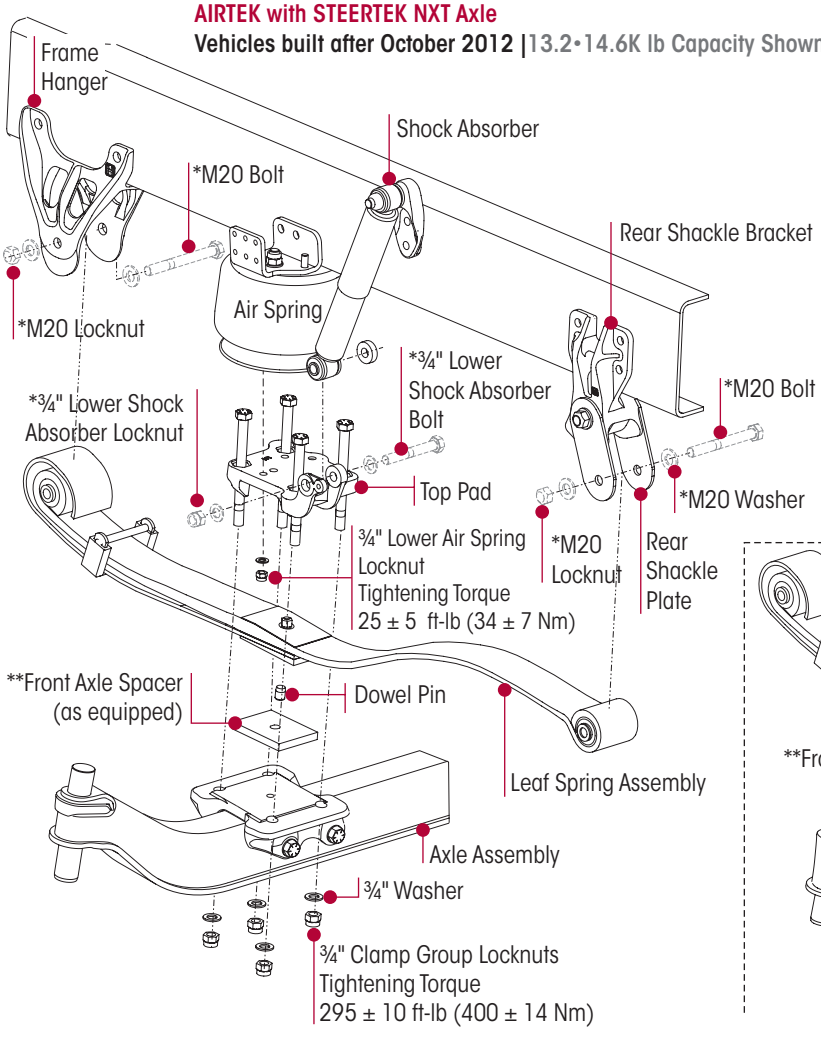
IMPORTANT NOTE

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

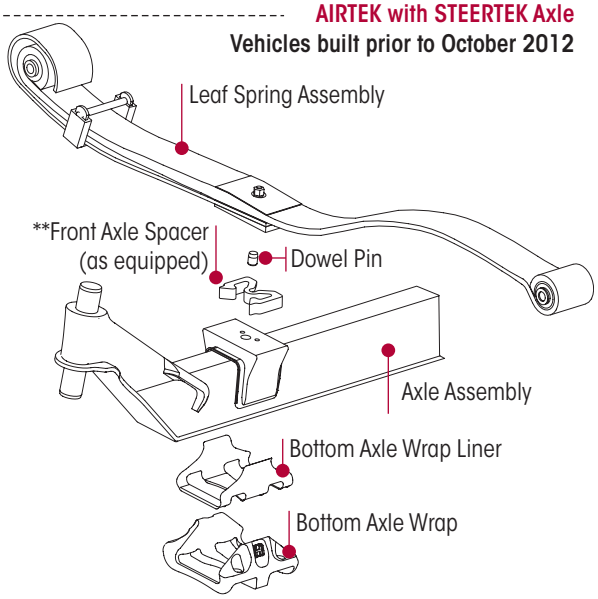
11. Install the wheel assemblies per the vehicle manufacturer's instructions.
12. Raise the vehicle and remove the frame safety stands.

FIGURE 9-18

AIRTEK with STEERTEK NXT Axle
Vehicles built after October 2012 | 13.2•14.6K lb Capacity Shown



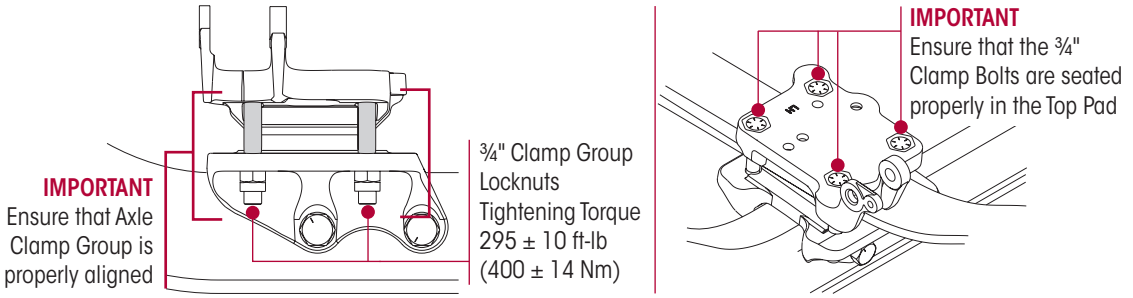
AIRTEK with STEERTEK Axle
Vehicles built prior to October 2012



* Tightening torque specification and fasteners controlled by the vehicle manufacturer.
** Refer to the Parts Lists section of this publication for the various configurations.

13. Lower the vehicle.
14. See additional Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to inflating or deflating the suspension system.
15. Re-install the air lines to the air spring.
16. Connect the linkage assembly at the rubber grommet to the height control valve arm to air up the system.
17. Install the lower shock absorber spacer and fasteners. Tighten fasteners per vehicle manufacture's instructions.
18. Ensure the clamp group is properly aligned and the hex bolts are seated in the top pad, see Figure 9-19.

FIGURE 9-19
AIRTEK with STEERTEK NXT Axle | Vehicles built after October 2012



AIRTEK with STEERTEK Axle | Vehicles built prior to October 2012

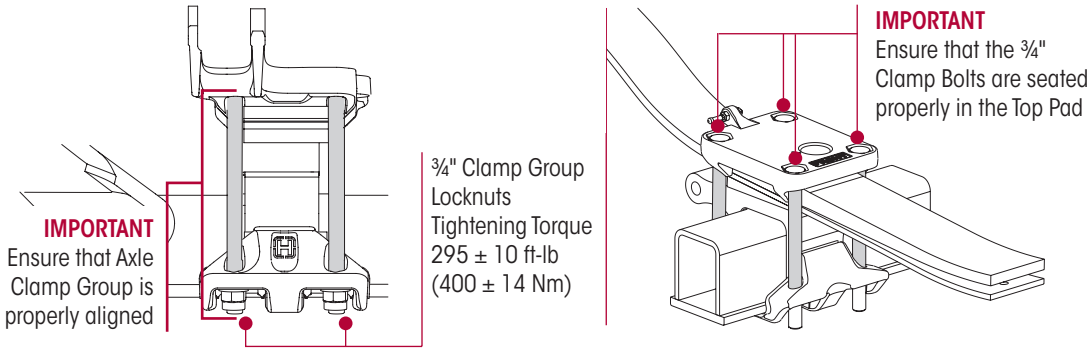
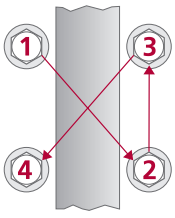


FIGURE 9-20



19. Tighten the clamp group locknuts evenly in 50 foot pounds increments to 295 ± 10 foot pounds torque in the proper pattern to achieve uniform bolt tension, see Figure 9-20.
20. Verify proper ride height, see Alignment & Adjustments section of this publication.
21. Tighten the M20 spring eye bolt fasteners to vehicle manufacturer's specifications.
22. Remove the wheel chocks.

SOFTEK – LEAF SPRING ASSEMBLY

DISASSEMBLY

NOTE Service the leaf spring assembly one side at a time.

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

NOTE It may be necessary to remove the peripheral components for installation of the safety stands.

3. Raise the vehicle and support the frame with safety stands.
4. Remove the wheel assemblies per the vehicle manufacturer's instructions.
5. Install a floor jack with a 4 inch lifting plate at the underside of the axle.
6. Lower the jack to remove the load on the leaf spring assembly (keep the jack on axle, **DO NOT** remove).
7. Remove and discard front spring eye fasteners from the side being serviced per the vehicle manufacturer's instructions.
8. Remove and discard the rear shackle M20 pivot bolt fasteners from the side being serviced per the vehicle manufacturer's instructions.
9. Remove and discard the lower shock absorber mounting fasteners from the side being serviced per the vehicle manufacturer's instructions.

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

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

10. Remove and discard the clamp group fasteners from the leaf spring assembly being replaced.
11. Disconnect the air lines at the air springs on the side being serviced.
12. On the side being serviced disconnect the bottom of the air spring from the top pad, see the Air Spring in this section.
13. Remove the top pad from the leaf spring assembly that is being serviced.
14. Lower the jack to allow enough clearance to remove the leaf spring assembly from the frame hangers.
15. It is not necessary to remove the axle spacer or dowel pin, although if it is removed it is required to re-install in the same location as prior to removal during assembly.
16. **STEERTEK** axle — vehicles built **prior to** October 2012
    a. Remove the bottom axle wrap and axle wrap liner. Inspect the axle wrap liner for cracks, refer to the Preventive Maintenance section of this publication, replace as necessary.
17. Remove the leaf spring assembly. Approximate weight of the leaf spring assembly is 48 pounds.

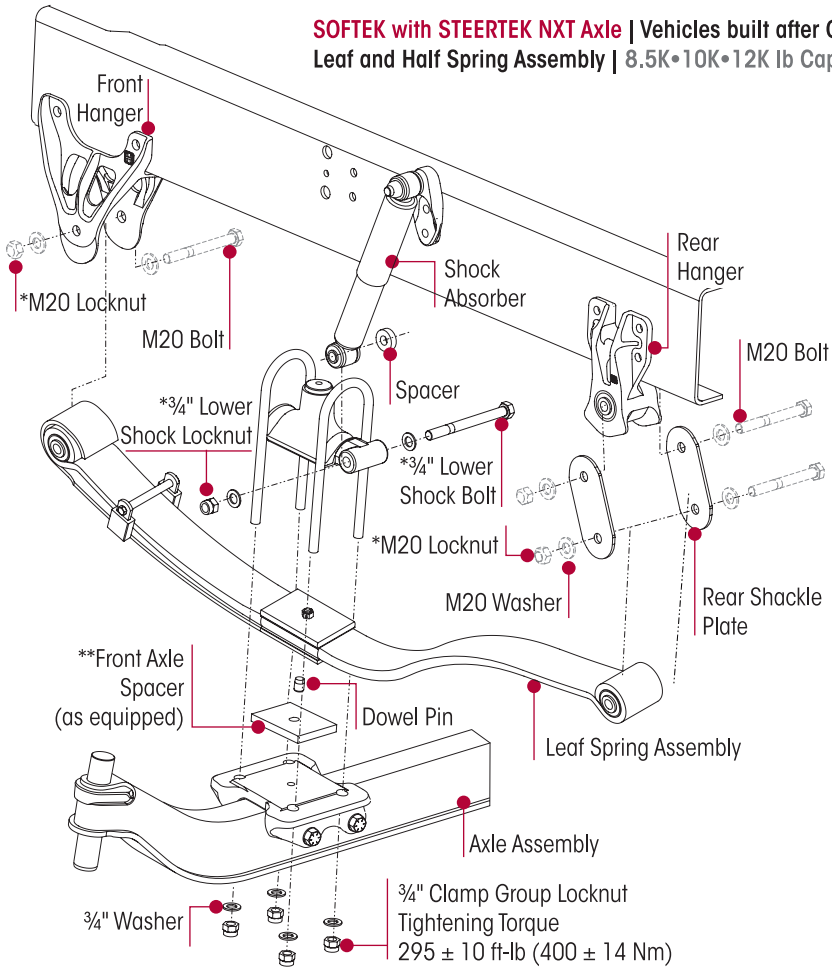
ASSEMBLY

1. **STEERTEK** axle — vehicles built **prior to** October 2012
    a. Install the bottom axle wrap liner and bottom axle wrap.
2. If removed, install the dowel pin and the axle spacer on the axle in the same location and orientation as prior to removal.
3. Install the leaf spring assembly on top of the axle spacer and the axle. Verify that the dowel pin is engaged properly in the axle spring seat / top wrap, see Figure 9-21.

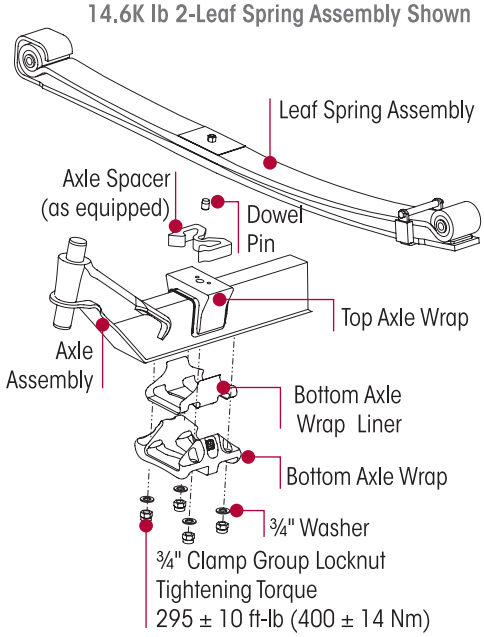
4. Install the **FRONT** spring eye fasteners, snug but **DO NOT** tighten at this time.
5. Install the top pad on top of the leaf spring assembly.
6. Install clamp group fasteners. New clamp group fasteners must be used when clamp group is removed to prevent premature bolt fatigue.
7. Snug the clamp group, **DO NOT** tighten to torque at this time.
8. Raise the axle and the **REAR** of the leaf spring assembly into the rear shackle bracket hangers.
9. Install the rear spring eye bolts in the rear hangers, snug but **DO NOT** tighten at this time, see Figure 9-21.

FIGURE 9-21

SOFTEK with STEERTEK NXT Axle | Vehicles built after October 2012
Leaf and Half Spring Assembly | 8.5K•10K•12K lb Capacity Shown



SOFTEK with STEERTEK Axle
Vehicles built prior to October 2012
14.6K lb 2-Leaf Spring Assembly Shown



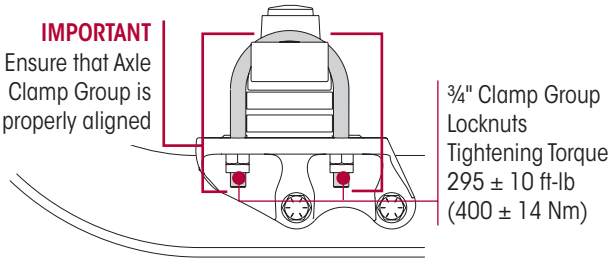
* Tightening torque specification and fasteners controlled by the vehicle manufacturer.
** Refer to the Parts Lists section of this publication for various configurations.

IMPORTANT NOTE Only the weight of the axle should be on the leaf spring assembly at the time the front and rear spring eye are tightened to torque. See the Spring Eye Re-torque procedure in the Alignment & Adjustments Section of this publication.

10. Install the wheel assemblies per the vehicle manufacturer's instructions.
11. Raise the vehicle and remove the frame safety stands.
12. Lower the vehicle.
13. Install the lower shock absorber spacer and fasteners. Tighten fasteners per vehicle manufacture's instructions.
14. Ensure the clamp group is properly aligned and the hex bolts are seated in the top pad, see Figure 9-22.

FIGURE 9-22

SOFTEK with STEERTEK NXT Axle | Vehicles built after October 2012



SOFTEK with STEERTEK Axle | Vehicles built prior to October 2012

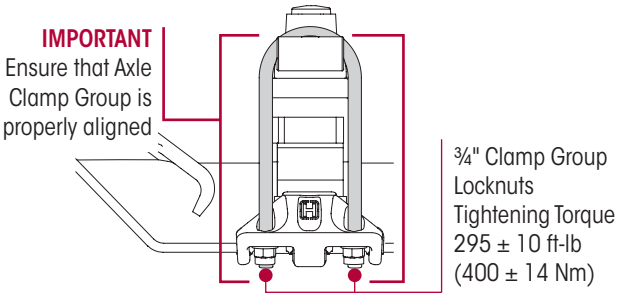
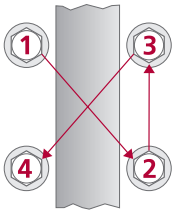


FIGURE 9-23



15. Tighten the clamp group locknuts evenly in 50 foot pounds increments to 295 ± 10 foot pounds torque in the proper pattern to achieve uniform bolt tension, see Figure 9-23.
16. Tighten the M20 spring eye bolt locknuts to the vehicle manufacturer's specifications.
17. Remove the wheel chocks.

BOTTOM AXLE WRAP (if equipped)

■ Vehicles built with STEERTEK Axle prior to October 2012

DISASSEMBLY

1. Place the vehicle on level floor.
2. Chock the wheels.
3. Raise the frame and support the vehicle with safety stands.
4. **SOFTEK equipped vehicles** – proceed to Step 8
   AIRTEK equipped vehicles – continue to Step 5

⚠ WARNING

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

⚠ WARNING

AIR SPRING ASSEMBLIES MUST BE COMPLETELY 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.

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. Deflate the air springs by disconnecting the height control valve linkage at the rubber grommet and lowering the height control valve linkage arm. This will exhaust the air pressure in the air springs.

⚠ WARNING

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

SERVICE HINT

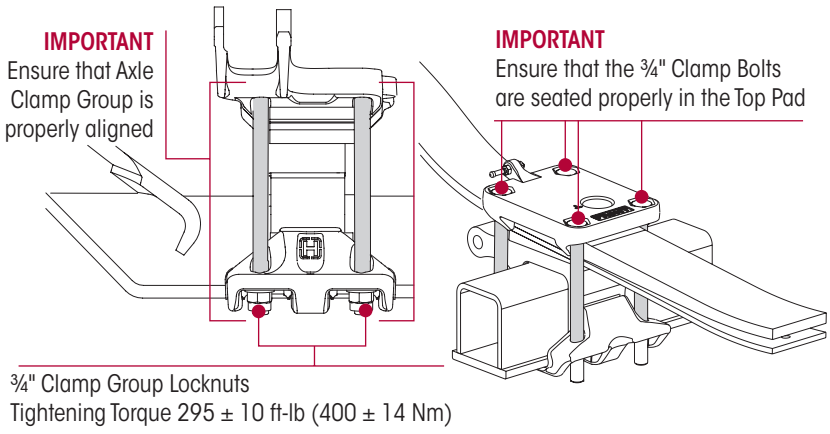
If a clamp group locknut is difficult to remove, cut half way through the bolt with an abrasive cut off wheel, taking care not to contact axle beam or other components. Use an impact wrench to spin the locknut to fracture the bolt and remove.

7. Remove the air spring on the side being replaced, see Air Spring in this section. Discard fasteners.
8. Remove ¾" clamp group fasteners on the side being replaced.
9. Remove bottom axle wrap. It may be necessary to use a dead blow mallet to dislodge axle wrap.
10. Once removed inspect axle wrap for damage. Replace if necessary.
11. Discard used bottom axle wrap liner.

ASSEMBLY

1. Install the bottom axle wrap liner into bottom axle wrap.
2. Install the bottom axle wrap on the axle.
3. Install the new ¾" clamp group fasteners.
4. Ensure that the clamp group is aligned, the hex bolts are seated properly in the top pad, and the bottom axle wrap is centered on the top axle wrap, see Figure 9-24.

FIGURE 9-24
AIRTEK with STEERTEK Axle
Vehicles built prior to October 2012



SOFTEK with STEERTEK Axle
Vehicles built prior to October 2012

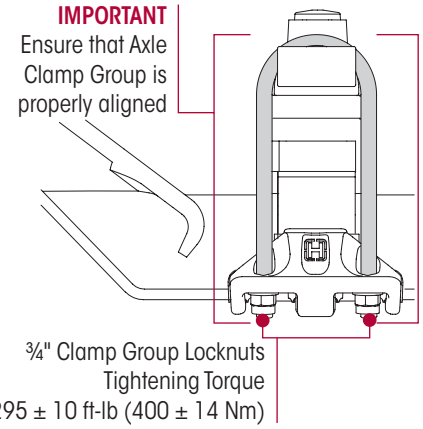
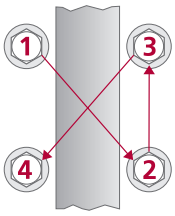


FIGURE 9-25



5. Tighten the fasteners evenly to 295 ± 10 foot pounds torque, see Figure 9-25 for proper torque sequence.
6. **SOFTEK equipped vehicles** – proceed to Step 10.
   AIRTEK equipped vehicles – continue to Step 7.
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.
8. Install the air spring, refer to the Air Spring instructions in this section.
9. Install the linkage assembly to inflate the suspension to the proper ride height, see Ride Height in the Alignment & Adjustments section of this publication.
10. Lower the vehicle and remove the safety stands.
11. Remove the wheel chocks.

TOP AXLE WRAP IN CHASSIS (if equipped)

- **Vehicles built with STEERTEK Axle prior to October 2012**

DISASSEMBLY

1. Place the vehicle on level floor.
2. Chock the wheels.
3. Raise the frame and support the vehicle with safety stands.
4. **SOFTEK equipped vehicles** – proceed to Step 8
   AIRTEK equipped vehicles – continue to Step 5

⚠ WARNING

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

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. Deflate the air springs by disconnecting the linkage upper rubber grommet and lowering the height control valve linkage arm. This will exhaust the air pressure in the air springs.
7. Disconnect the air spring on side being replaced, see Air Spring instructions in this section.
8. Suspend the front axle to remove the load from the leaf spring and wrap leaf assembly.
9. Install a floor jack that has a 4" lifting plate in the center of the axle.
10. Secure the axle on the jack to prevent the axle from rolling off the floor jack.

SERVICE HINT

A bottle jack may be required to raise the axle slightly in order to remove spring eye bolts.

⚠ 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.

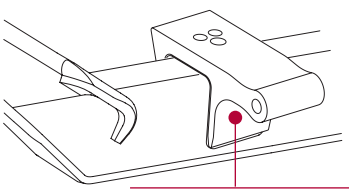
SERVICE HINT

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.

11. Remove the ¾" clamp group fasteners and discard.
12. Remove the top pad, the galvanized liner, and the bottom axle wrap. Discard the liner.
13. Remove the lower shock absorber mounting bolt.
14. Lower the axle from the leaf springs.
15. Strike the axle wrap with a dead blow mallet at the front and rear on the underside of the axle wrap to dislodge it from the axle, see Figure 9-26.
16. Clean and inspect the axle wrap and axle wrap liner for cracks or damage and replace if cracks or damage are present.

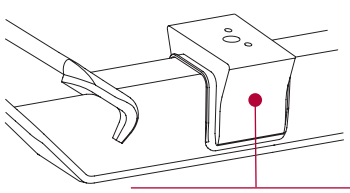
FIGURE 9-26

8.5K•10K lb Capacity Shown



Carefully strike upward with a dead blow mallet on both ends

13.2K•14.6K lb Capacity Shown



Carefully strike upward with a dead blow mallet on both ends

ASSEMBLY

1. Install the new axle wrap liner on the axle.
2. Spray the axle wrap liner and the axle wrap with a silicon lubricant.
3. Position the axle wrap on the axle, see Figure 9-27.
4. Protect the top surface of the axle wrap with a block of wood, cardboard, or shop towels.

CAUTION

DO NOT STRIKE THE TOP AXLE WRAP WITH A HAMMER. HENDRICKSON RECOMMENDS USING A PLASTIC DEAD BLOW MALLET WITH CARE WHEN INSTALLING THE AXLE WRAP.

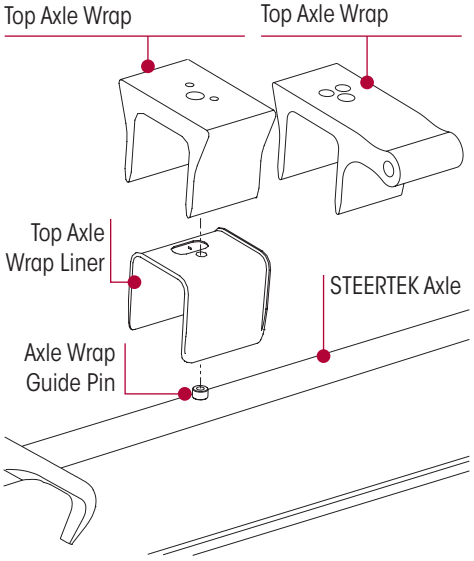
5. Install a bottle jack between the axle wrap and frame rail flange.
6. Jack the axle wrap down into position on the axle, using care to ensure the axle wrap bore indexes the locating axle wrap guide pin on the axle, see Figure 9-27..

NOTE

For Flat Floor Models install the intermediate dowel pin into the axle wrap.

7. Install the leaf spring and wrap leaf assembly on the axle wrap (indexing the dowel pin if equipped).

FIGURE 9-27



8. Install the galvanized liner and the top pad on the spring and wrap leaf assembly.
9. Install new clamp group hex bolts into the top pad.
10. Remove and replace the bottom axle wrap liner and bottom axle wrap, see Bottom Axle Wrap in this section.
11. Install the clamp group fasteners. Snug the clamp group fasteners, **DO NOT** torque at this time.
12. Ensure that the clamp group is properly aligned and the hex bolts are seated in the top pad, and the bottom axle wrap is centered with the top axle wrap, see Figure 9-24.
13. Tighten locknuts evenly to 295 ± 10 foot pounds torque, see Figure 9-25 for proper torque sequence.
14. Apply a thin coating of anti-seize to the lower shock mounting bolt.
15. Install shock absorbers, refer to Shock Absorber in this section.
16. Raise the vehicle and remove the frame supports.
17. Lower the floor jack and load the front axle with the truck's weight. Remove the floor jack.
18. **SOFTEK equipped vehicles** – proceed to Step 22

    AIRTEK equipped vehicles – continue to Step 19
19. See additional Air Spring Cautions and Warnings in the Important Safety Notice section of this publication prior to inflating or deflating the suspension system.
20. Install air spring, refer to Air Spring in this section.
21. Install the height control valve linkage and inflate the suspension to proper ride height, see Ride Height in the Alignment & Adjustments section of this publication.
22. Remove the wheel chocks.

STEERTEK NXT AXLE

NOTE

As of **July 2019**, the STEERTEK NXT axle has replaced the STEERTEK axle for Blue Bird buses. The STEERTEK axle is no longer available for field service applications, refer to the Replacement Guide in the Parts List section of this publication. Contact Hendrickson Tech Services for more information.

Refer to Figures 9-28 and 9-29 when replacing the STEERTEK NXT axle components.

FIGURE 9-28

AIRTEK with STEERTEK NXT Axle | Vehicles built after October 2012

10K lb Capacity Shown

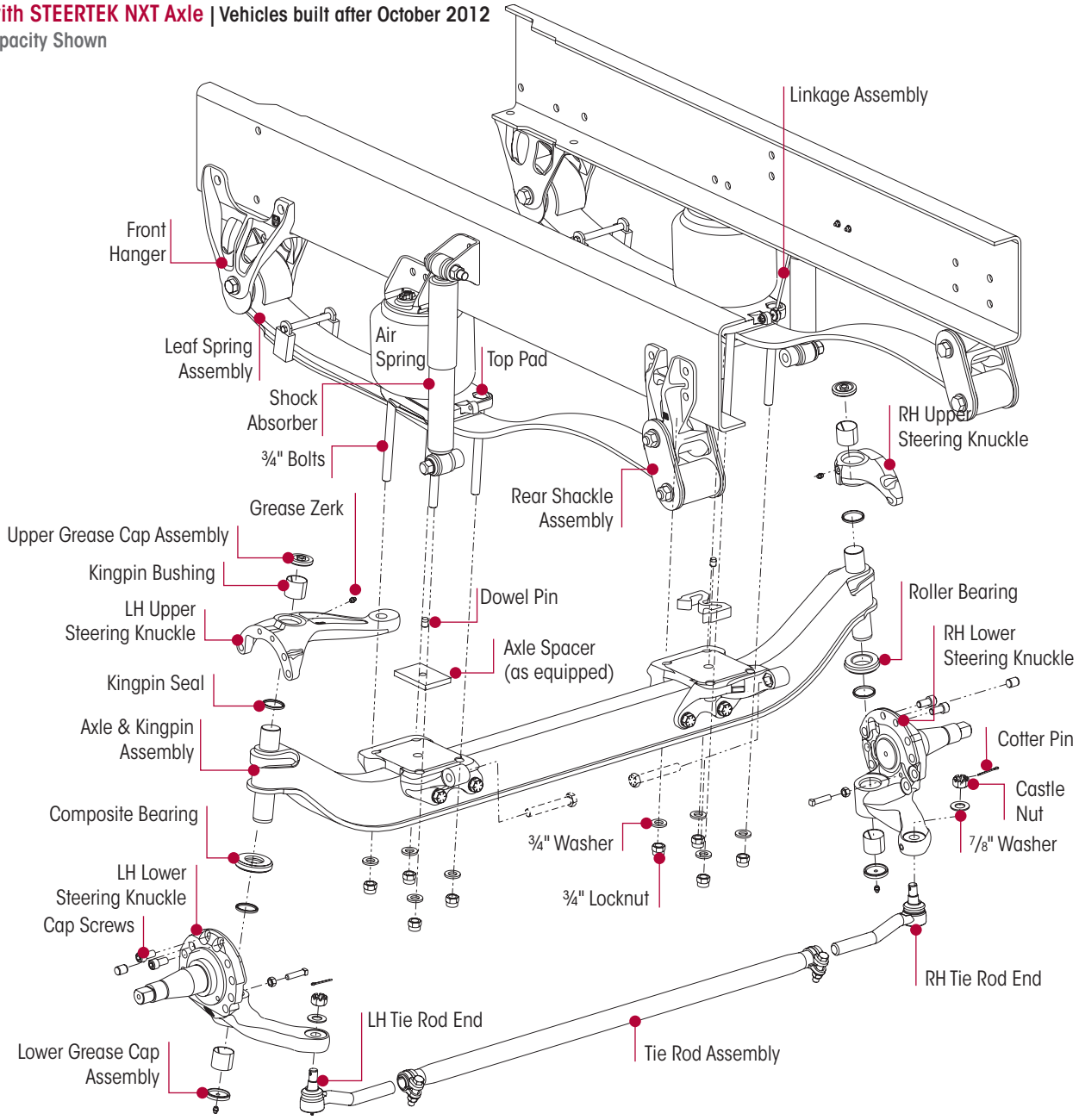
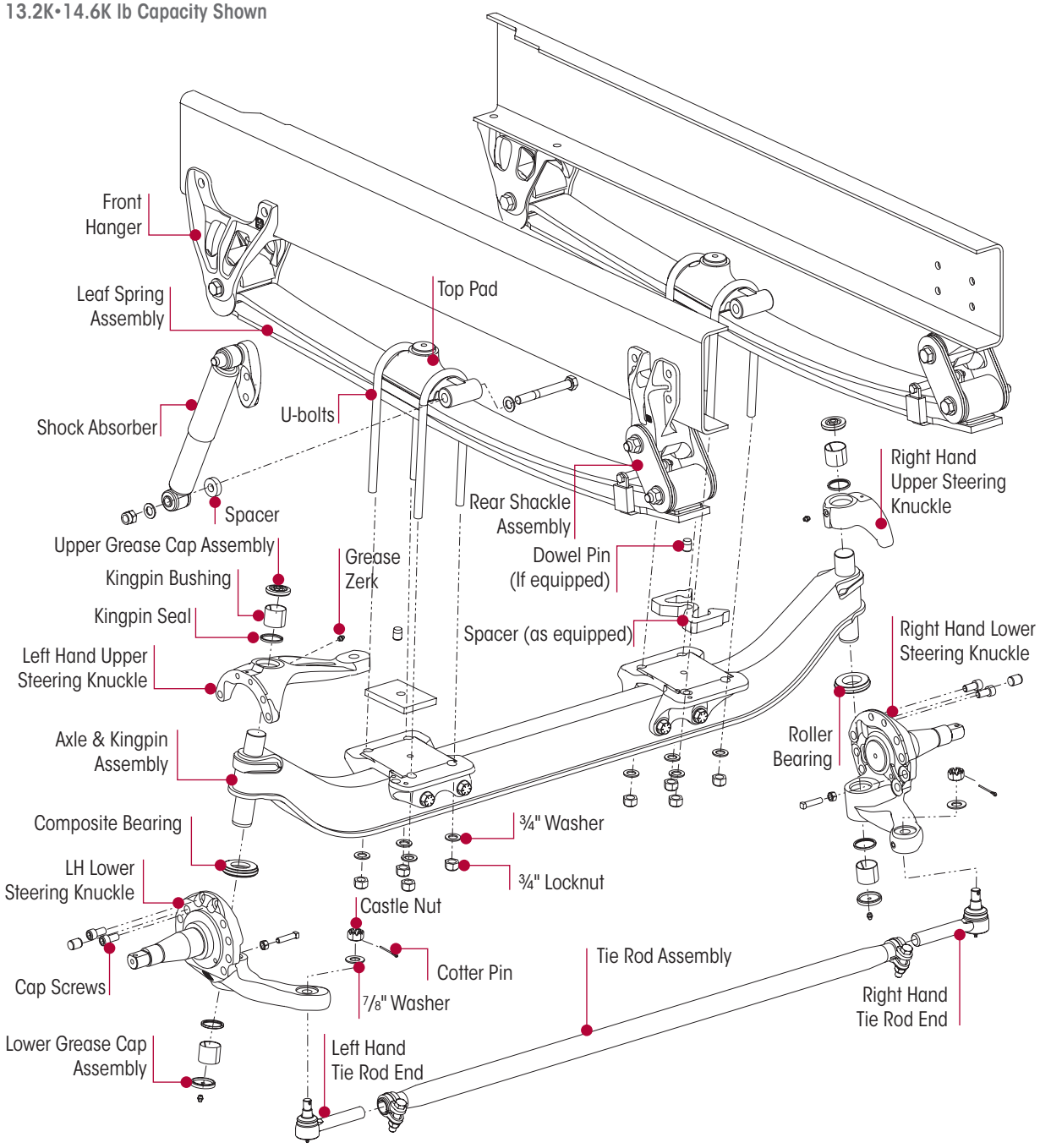


FIGURE 9-29
SOFTEK with STEERTEK NXT Axle | Vehicles built after October 2012
13.2K•14.6K lb Capacity Shown



STEERTEK NXT AXLE REMOVAL

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

WARNING

DO NOT USE A TORCH ON CLAMP GROUP BOLTS OR ANY OTHER PART OF THE AIRTEK/SOFTEK 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.

- **SOFTEK equipped vehicles**, proceed to Step 6
- **AIRTEK equipped vehicles,** continue to Step 3

WARNING

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

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.
4. Disconnect the linkage assembly at the rubber grommet and lower the height control valve arm. This will exhaust the air pressure in the air springs.
5. Exhaust the air in the air springs and deflate the front suspension.

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.

6. Raise the frame and support the vehicle with safety stands.
7. Suspend the front axle with the shocks attached.

WARNING

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

8. Remove the wheel assemblies per the vehicle manufacturer's instructions.
9. Disconnect the drag link from the steering arm.

- **SOFTEK equipped vehicles** proceed to Step 11
- **AIRTEK equipped vehicles** proceed to next Step

10. Unseat both air springs at the axle top pad, refer to the Air Spring instructions in this section.
11. Support the axle with a floor jack.

WARNING

THE REPAIR OR RECONDITIONING OF SUSPENSION OR AXLE COMPONENTS IS NOT ALLOWED. HENDRICKSON ADVISES REPLACING ALL COMPONENTS FOUND TO BE DAMAGED OR OUT OF SPECIFICATIONS. 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, AND POSSIBLE PERSONAL INJURY OR DEATH OR PROPERTY DAMAGE AND WILL VOID APPLICABLE WARRANTIES.

12. If the vehicle is equipped with the shock absorbers attached to the integrated axle spring seat, it will be necessary to remove the lower shock mounting locknuts and washers. Remove the shock absorbers from the lower mounting bolts and push clear of spring assembly. Refer to the Shock Absorber instructions in this section.

SERVICE HINT

If a clamp group locknut 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 ¾" clamp group fasteners and discard.
14. Lower the axle and remove from the vehicle.

STEERTEK NXT AXLE DISASSEMBLY (Removed from Chassis)

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

⚠ WARNING

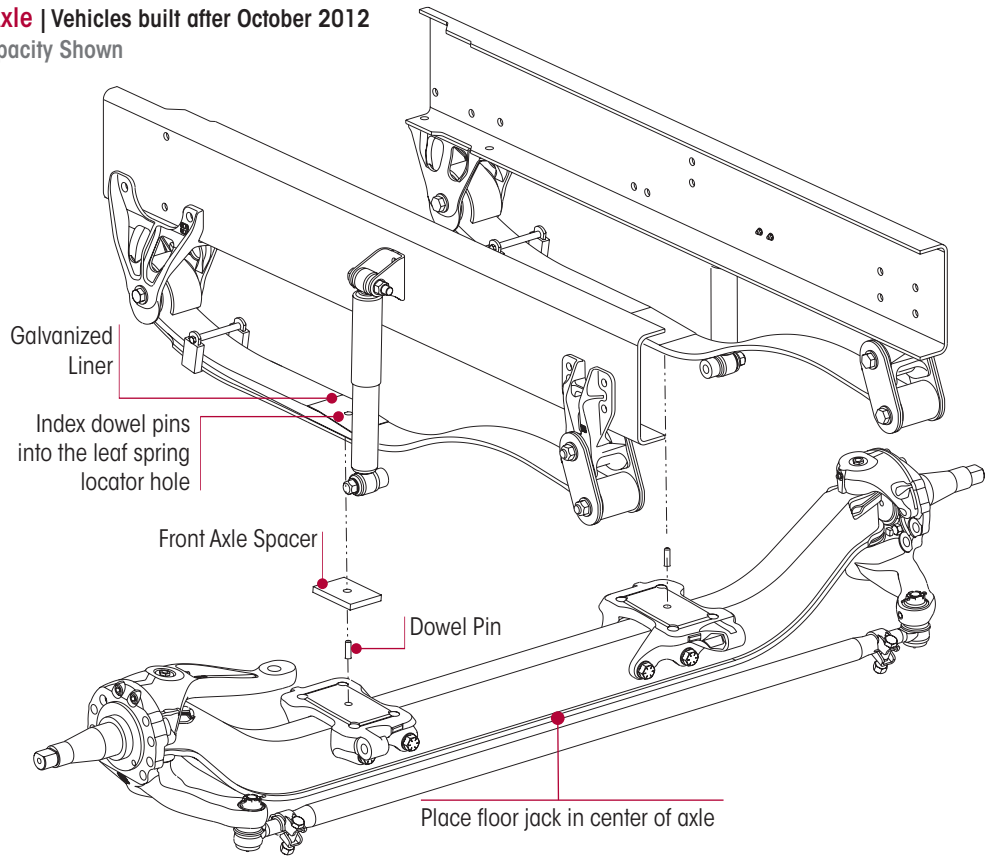
REMOVAL OF THE CAP SCREWS WILL ALLOW THE STEERING KNUCKLE TO SEPARATE FROM THE AXLE. THE STEERING KNUCKLE MUST BE SUPPORTED BEFORE REMOVAL OF THESE TWO (2) CAP SCREWS. FAILURE TO DO SO CAN CAUSE COMPONENT DAMAGE OR PERSONAL INJURY.

2. Remove the two (2) ⅝" socket head cap screws from the steering knuckle assembly.
3. Remove the steering knuckle and thrust bearing.
4. After complete removal of one side, repeat Steps 1 through 3 for the opposite side of the axle.
5. Visually inspect the kingpin bushings for excessive wear. If worn, replace the kingpin bushings and seals. Refer to the Kingpin Bushing in this section.

STEERTEK NXT AXLE INSTALLATION

1. Place the new axle on the floor jack and position the axle under the vehicle, see Figure 9-30.
2. Install the axle spacer (if equipped).
3. 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 9-30.
4. Install the galvanized liner on the leaf spring, see Figure 9-30.

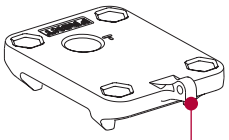
FIGURE 9-30
STEERTEK NXT Axle | Vehicles built after October 2012
AIRTEK 10K lb Capacity Shown



5. Install the top pad with the directional identification facing correctly on the vehicle, See Figure 9-31.
6. Install the new ¾" clamp group fasteners. Snug the bolts, **DO NOT** tighten to the specified torque at this time.

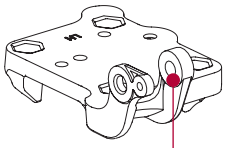
FIGURE 9-31

AIRTEK
10K lb Capacity



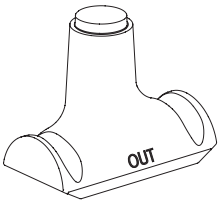
Height Control Valve Link mount to the rear

AIRTEK
13.2K•14.6K lb Capacity

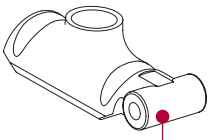


Shock mount to the rear

SOFTEK
8.5K•10K•12K lb Capacity



SOFTEK
13.2K•14.6K lb Capacity



Shock mount to the rear

WARNING

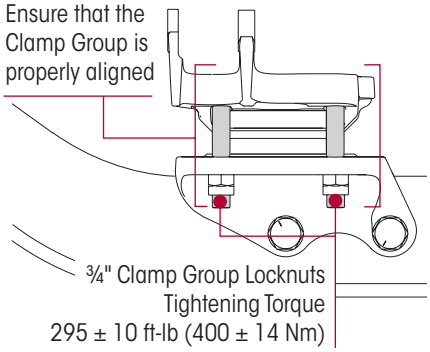
ENSURE THE CLAMP GROUP IS ALIGNED PROPERLY PRIOR TO TIGHTENING HARDWARE. FAILURE TO DO SO CAN CAUSE LOSS OF VEHICLE CONTROL, PROPERTY DAMAGE OR PERSONAL INJURY.

7. 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 Figure 9-32.

FIGURE 9-32

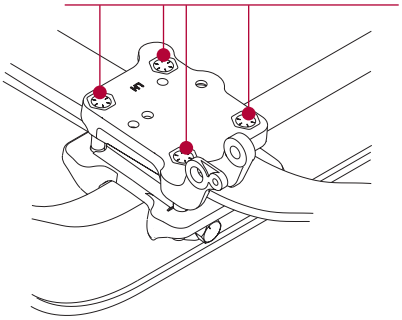
AIRTEK with STEERTEK NXT Axle
Vehicles built after October 2012

IMPORTANT
Ensure that the Clamp Group is properly aligned



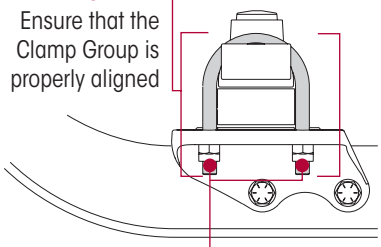
¾" Clamp Group Locknuts Tightening Torque
295 ± 10 ft-lb (400 ± 14 Nm)

IMPORTANT
Ensure that the ¾" Clamp Bolts are seated properly in the Top Pad



SOFTEK with STEERTEK NXT Axle
Vehicles built after October 2012

IMPORTANT
Ensure that the Clamp Group is properly aligned



¾" Clamp Group Locknuts Tightening Torque
295 ± 10 ft-lb (400 ± 14 Nm)

8. **SOFTEK equipped vehicles** — proceed to Step 11
   AIRTEK equipped vehicles – continue to Step 9
9. See additional Air Spring Cautions and Warnings in the Important Safety Notice section of this publication prior to inflating or deflating the suspension system.
10. Engage:
    - **10K • 12K** air springs into the top pad. The bottom of the air spring snaps into the top pad.
    - **13.2K • 14.6K** air springs into the top pad. Install new lower air spring mounting fasteners and tighten to 25 ± 5 foot pounds torque.
11. Install the lower shock absorber connection (if removed). Install the lower shock fasteners and tighten to vehicle manufacturer's specifications.
12. Install the steering knuckles, see Steering Knuckle in this section.
13. Install the tie rod assembly, see Tie Rod End and Cross Tube in this section. Install the ⅞" hardened washers on the lower steering knuckle and the castle nuts. Tighten the castle nuts to 185 foot pounds, then rotate until the first castle slot lines up with the cotter pin bore in the tie rod end. **DO NOT** back off the castle nut for cotter pin installation.
14. Install the tie rod end cotter pins.
15. Connect the drag link in the steering arms per the vehicle manufacturer's instructions.

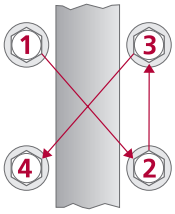
16. If the vehicle is equipped with the shock absorbers attached to the integrated axle spring seat, install the lower shock mounting bolts and tighten to vehicle manufacturer's specifications.
17. Install the wheel assemblies per the vehicle manufacturer's instructions.
18. Raise the vehicle and remove the safety stands.
19. Lower the floor jack and load the front axle with the truck's weight. Remove the floor jack.
20. **SOFTEK equipped vehicles** – proceed to Step 24
    AIRTEK equipped vehicles proceed to next Step

WARNING

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

21. See additional Air Spring Cautions and Warnings in the Important Safety Notice section of this publication prior to inflating or deflating the suspension system.
22. Reconnect the height control valve linkage and inflate the suspension to proper ride height, see Ride Height in the Alignment & Adjustments section of this publication.

FIGURE 9-33



23. Tighten the ¾" clamp group locknuts evenly in 50 foot pounds increments to 295 ± 10 foot pounds torque in the proper sequence to achieve uniform bolt tension, see Figure 9-33.
24. Remove the wheel chocks.
25. Fill the hubs with the proper lubricant (see manufacturer's guidelines for recommended lubrication specifications).
26. Grease the front steering components as per lubrication guidelines in the Preventive Maintenance section of this publication.

STEERING KNUCKLE DISASSEMBLY

You will need:

- A hydraulic shop press with a minimum forcing capacity of 2.5 tons
- Kingpin Bushing and Seal Installer/Remover tool, Driver and Receiver Tool, refer to the Special Tool section in this publication.

NOTE

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

1. Note the orientation of steering arm before removal.
2. Place the vehicle on level floor.
3. Chock the wheels.
4. Support the vehicle with safety stands.
5. Raise and support the axle with safety stands.
6. Remove the wheel assemblies per the vehicle manufacturer's instructions.
7. Remove the caliper brake assembly from the steering knuckle per the vehicle manufacturer's instructions.
8. Remove the hub and rotor assembly per the vehicle manufacturer's instructions.

CAUTION

DO NOT USE A PICKLE FORK STYLE TOOL TO SEPARATE THE TIE ROD END FROM THE STEERING KNUCKLE ARM. DOING SO WILL RESULT IN DAMAGE TO THE GREASE BOOT.

9. Remove the tie rod assembly using a ⅞" -14 tie rod end removal tool to separate the tie rod end from the lower steering knuckle, refer to Tie Rod End and Cross Tube in this section.

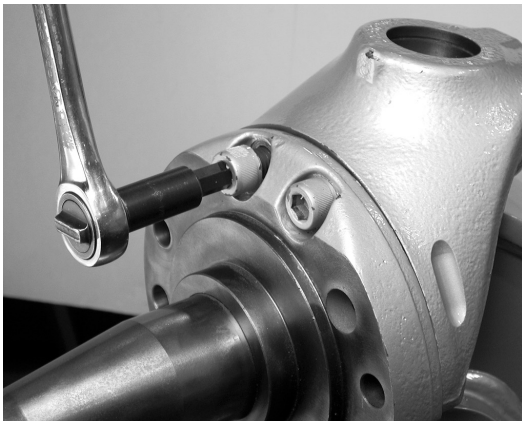
10. Remove the drag link from the steering knuckle if necessary per the vehicle manufacturer's instructions.

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.

11. Remove the two socket head cap screws that connect the upper kingpin to the steering knuckle, see Figure 9-34.

FIGURE 9-34



SERVICE HINT

Remove the grease zerks from the knuckle assemblies. This will allow the knuckle assemblies to freely slide up and down the kingpins without creating back pressure.

12. Remove the grease zerks from the knuckle assemblies.
13. Remove the lower steering knuckle from the kingpin by sliding it down the kingpin.
14. Remove the upper steering knuckle by sliding it up off the kingpin.

KINGPIN PREPARATION & MEASUREMENT

Cleaning the Ground and Polished Parts

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

Cleaning the Rough Parts

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

Drying the Cleaned Parts

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

Preventing Corrosion on Cleaned Parts

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

WARNING

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

WARNING

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

- WEAR PROPER EYE PROTECTION.
- WEAR CLOTHING THAT PROTECTS YOUR SKIN.
- WORK IN A WELL VENTILATED AREA.
- DO NOT USE GASOLINE, OR SOLVENTS THAT CONTAIN GASOLINE. GASOLINE CAN EXPLODE.

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

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

⚠ 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 9-35 through 9-38.

FIGURE 9-35

FIGURE 9-36

FIGURE 9-37

FIGURE 9-38

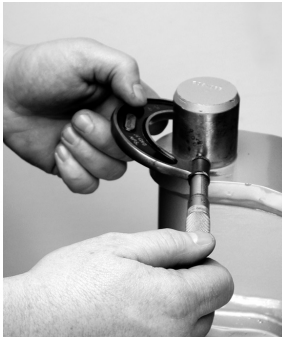
2. Inspect the kingpin for wear or damage. Use a micrometer and measure the upper and lower kingpin in two locations. Positions must be 90° opposed from each other. If the kingpin has less than 1.802" diameter, replacement of the axle is necessary, see Figures 9-39 through 9-42. **Kingpin minimum dimension is 1.802".**

FIGURE 9-39

FIGURE 9-40

FIGURE 9-41

FIGURE 9-42



KINGPIN BUSHING

You will need:

To conduct kingpin bushing removal, reaming or honing, and installation; and kingpin seal installation, you will need the following tools.

- **A hydraulic shop press** with a minimum forcing capacity of 2.5 tons (or an arbor press) or use hand tools. If a shop press is not available to remove/install the kingpin bushings, an acceptable **optional method** is to use a hammer along with the appropriate shop made tools on a work bench.
- Kingpin Bushing and Seal Tools (including Kingpin Handle, Kingpin Bushing Installer/Remover Tool, Bushing Driver and Bushing Receiving Tool), refer to the Special Tools section of this publication.
- An adjustable straight flute reamer with extension pilot tool **or** precision-finish cylinder hone, refer to the Special Tools section in this publication.
- Vise with brass jaws (soft jaws)

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

⚠ WARNING

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

⚠ CAUTION

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

KINGPIN BUSHING REMOVAL

NOTE

To remove the kingpin bushing, always **drive the bushing from the non-machined surface** of the upper or lower steering knuckle.

1. **STEERTEK NXT** axle, vehicles built **after** October 2012 – Remove the threaded grease cap and grease zerk.

   STEERTEK axle, vehicles built **prior to** October 2012 – Remove the threaded grease cap retaining ring.
2. Place the **machined surface** of the upper or lower steering knuckle face down (axle side down), ensure that each part of the steering knuckle assembly is squarely supported on the bushing receiving tool before applying hydraulic pressure to press out the kingpin bushings, see Figures 9-43 and 9-44.
3. From the **non-machined surface** of the upper or lower steering knuckle, use the kingpin bushing installer/remover tool (see Special Tools section of this publication) to drive the kingpin bushing and kingpin seal out of the steering knuckle, see Figure 9-45.
4. Clean the parts and inspect for reassembly, see Figure 9-46.

FIGURE 9-43

FIGURE 9-44

FIGURE 9-45

FIGURE 9-46

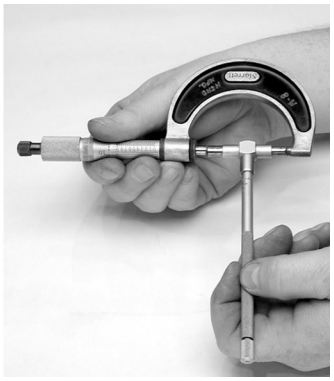
STEERING KNUCKLE BORE MEASUREMENT

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

FIGURE 9-47

FIGURE 9-48

FIGURE 9-49



1. Measure the upper and lower steering knuckle bore inside diameter at two locations. Always use an inside micrometer or a telescoping gauge when taking a knuckle bore measurement. The two positions must be 90° opposed from each other, see Figures 9-47 through 9-49. Some out-of-roundness at the top and bottom of the bore edges is acceptable. Steering knuckle bore diameter specification is 1.938" ± 0.003".
   a. If the average measurement is more than the knuckle bore maximum diameter specification, steering knuckle replacement is necessary.

KINGPIN BUSHING INSTALLATION

WARNING

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

NOTE

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

NOTE

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

1. Place the **machined surface** of the upper/lower steering knuckle **face up** (axle side up). Ensure that each part of the steering knuckle assembly is squarely supported before applying hydraulic pressure to press in the kingpin bushing, see Figure 9-50.
2. From the **machined surface** of the steering knuckle, use the kingpin bushing driver tool to drive the kingpin bushing flush into steering knuckle, see Figure 9-51.
3. Use the kingpin bushing installer / remover tool to sink the kingpin bushing into the steering knuckle bore to just below the seal bore, see Figures 9-52 and 9-53.
4. Properly size the kingpin bushings to fit the kingpins, see Kingpin Bushing Reaming or Honing instructions in this section.

FIGURE 9-50

FIGURE 9-51

FIGURE 9-52

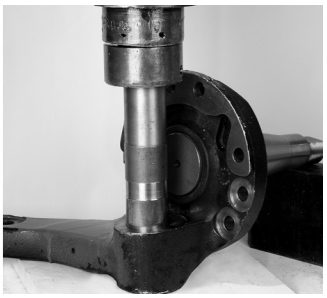
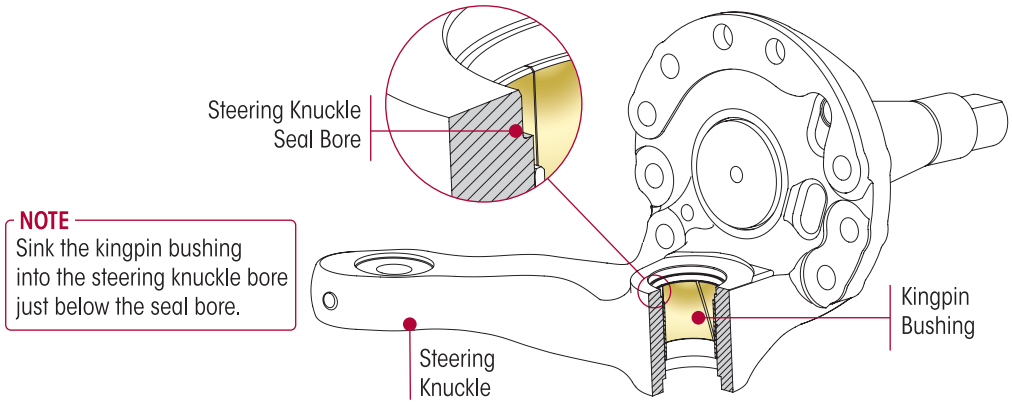


FIGURE 9-53



KINGPIN BUSHING REAMING / HONING

Once new replacement kingpin bushings are installed, they will need to be properly sized to fit the respective kingpins using one of the following two methods: **Method A – Reaming** or **Method B – Honing**.

NOTE Bushing inner diameter size is to be 0.001" larger than the measured kingpin outer diameter size.

CAUTION DO NOT BURNISH THE KINGPIN BUSHINGS. BURNISHING WILL DAMAGE THE BUSHINGS AND VOID ANY APPLICABLE WARRANTY.

WARNING WHEN INSTALLING THE STEERING KNUCKLE COMPONENTS IN A VISE, IT IS NECESSARY TO PROTECT THE MACHINED SURFACES FROM GOUGES OR MARRING BY USING BRASS JAWS (SOFT JAWS). FAILURE TO DO SO CAN CAUSE PREMATURE PART DAMAGE, DAMAGE TO THE STEERING KNUCKLE COMPONENTS, LOSS OF WARRANTY, LOSS OF VEHICLE CONTROL, CAUSING PERSONAL INJURY OR PROPERTY DAMAGE.

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

■ Method A – Reaming

NOTE Prior to reaming, re-assemble the steering knuckle, see Figures 9-54 and 9-55.

1. Place the steering knuckle (equipped with a replacement kingpin bushing) in a vise with brass jaws (soft jaws), see Figures 9-54 and 9-55.
2. Install the reamer onto the end of the extension pilot tool and position the extension pilot tool through the kingpin bushing.

SERVICE HINT The pilot tool helps keep the reamer straight during the reaming process.

3. Slide the reamer into the steering knuckle until the blades touch the kingpin bushing inner diameter surface.
4. Rotate the reamer with a light **DOWNWARD** pressure. **DO NOT** apply too much force. Rotate the reamer smoothly, see Figures 9-54 and 9-55.

NOTE To remove the reamer, rotate the tool in the opposite cutting direction.

5. Remove the steering knuckle from the vise and repeat Steps 1 through 5 for the other mating steering knuckle equipped with a replacement kingpin bushing.

FIGURE 9-54
Upper Steering Knuckle in Vise Shown

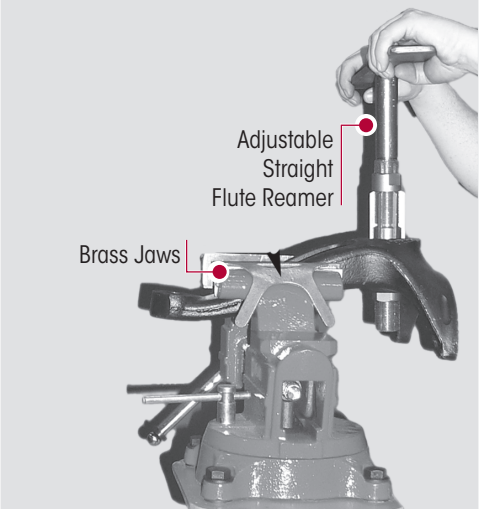
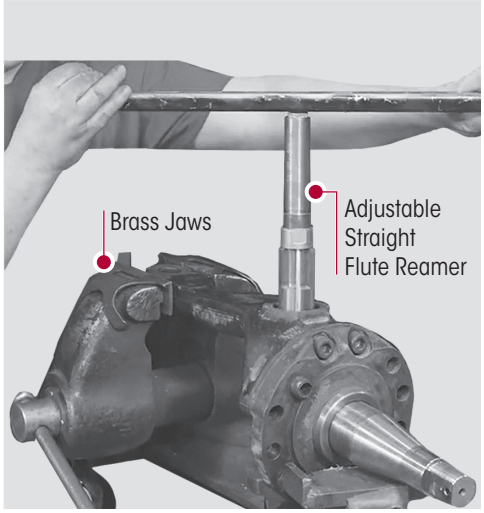
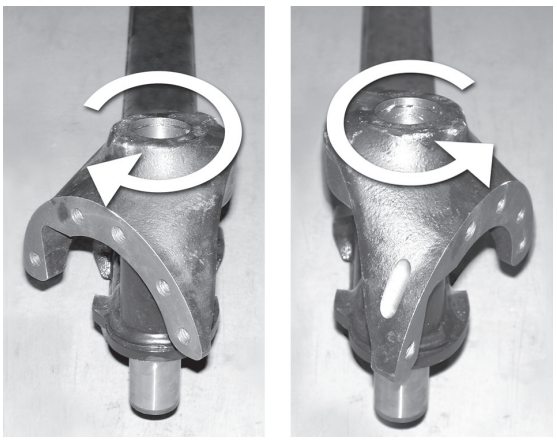


FIGURE 9-55
Lower Steering Knuckle in Vise Shown



6. Clean and remove all loose kingpin bushing material created by the reaming operation from the steering knuckle(s). Take special attention to remove material from the grease channels and dimples.
7. Clean the ⅝" brake backing plate bolts with a wire wheel and run a tap through the threads of the steering knuckle and then flush out with brake cleaner and dry with compressed air.
8. Lightly lubricate the mating kingpins with penetrating oil.
9. Temporarily install the steering knuckle on the mating kingpin to ensure a close slip fit.

FIGURE 9-56



NOTE

If the steering knuckle does not fit onto the kingpin, **DO NOT** force it.

10. Rotate the steering knuckle back and forth to verify there is no binding on the kingpin, see Figure 9-56.
11. If either of the bushings are too tight, repeat Steps 1 through 11 until proper clearance is achieved.
12. After verifying that the kingpin is free of binding, remove the steering knuckle assembly. Proceed with the Kingpin Seal Installation procedure.

■ Method B – Honing

1. Assemble the cylinder hone with clean, dry honing stones.

SERVICE HINT

If the honing stones are damaged or oily, they should be replaced.

2. Ensure the wiper blocks are clean and dry, see Figure 9-57.
3. Place the steering knuckle (equipped with a replacement kingpin bushing) on a work surface.
4. Size the precision cylinder hone slightly smaller than the kingpin bushing inner diameter and insert it into the kingpin bushing, see Figures 9-57 and 9-58.
5. Increase the precision cylinder hone's diameter until there is just enough pressure on the kingpin bushing inner diameter to hold the hone in place.
6. Connect a power drive to the precision cylinder hone, see Figure 9-59.
7. Using the power drive, rotate the precision cylinder hone about ten revolutions in the kingpin bushing. The power drive should rotate at a speed of **less than 30 revolutions per minute (RPM)**.
8. Stop the power drive rotation.

FIGURE 9-57

STEERTEK NXT Axle
Upper Steering Knuckle Shown

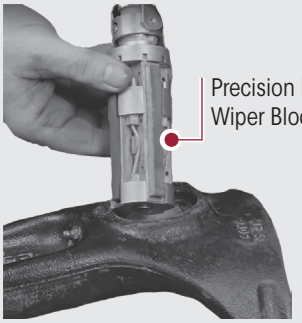
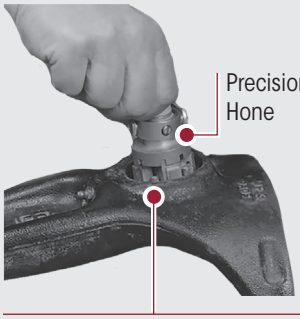


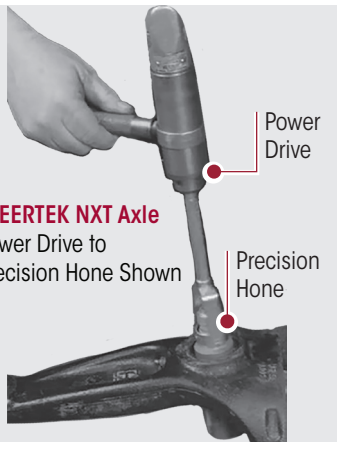
FIGURE 9-58

STEERTEK NXT Axle
Precision Hone in Kingpin Bushing Shown



Kingpin Bushing in Upper Steering Knuckle

FIGURE 9-59



STEERTEK NXT Axle
Power Drive to
Precision Hone Shown

9. Reduce the precision cylinder hone's diameter and remove it from the kingpin bushing.
10. Remove the steering knuckle from the work surface and repeat Steps 1 through 9 for the other steering knuckle.
11. Clean and remove all loose kingpin bushing material created by the honing operation from the steering knuckle(s). Take special attention to remove material from the grease channels and dimples.

NOTE

If the steering knuckle does not fit onto the kingpin, **DO NOT** force it.

12. Perform Steps 8 through 11 in the Method A – Reaming section of this publication.
13. If either of the bushings are too tight, repeat steps 1 through 12 until proper clearance is achieved.
14. After verifying that the kingpin is free of binding, remove the steering knuckle assembly. Proceed with the Kingpin Seal Installation procedure.

KINGPIN SEAL INSTALLATION

⚠ WARNING

WHEN INSTALLING STEERING KNUCKLE COMPONENTS IN A VISE IT IS NECESSARY TO PROTECT THE MACHINED SURFACES FROM GOUGES OR MARRING BY USING BRASS JAWS. FAILURE TO DO SO CAN CAUSE PREMATURE PART DAMAGE, DAMAGE TO THE STEERING KNUCKLE COMPONENTS, LOSS OF WARRANTY, LOSS OF VEHICLE CONTROL, CAUSING PERSONAL INJURY OR PROPERTY DAMAGE.

1. Place the steering knuckle assembly in a vise with brass jaws (soft jaws), see Figures 9-54 and 9-55, 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 9-60.
3. Use the seal installer tool (see tools specifications of this publication) and press seal firmly into the steering knuckle assembly.
4. **STEERTEK NXT** axle, **double lip** design, see Figure 9-61 – Install the kingpin seal until it bottoms out in the kingpin bore.

   STEERTEK axle, **single lip** design, see Figure 9-62 – Install the kingpin seal until it makes contact with the kingpin bushing.

FIGURE 9-60

Magnification of lip seal
Lip seal faces toward axle

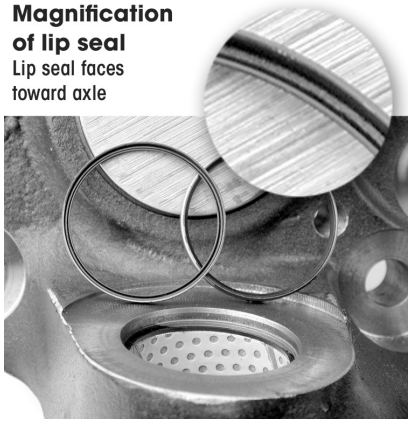


FIGURE 9-61

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

FIGURE 9-62

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

STEERING KNUCKLE ASSEMBLY

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

NOTE

Hendrickson STEERTEK NXT • STEERTEK axles are installed with a left hand composite thrust bearing and a right hand roller thrust bearing configuration.

1. Install the composite thrust bearing on the lower kingpin on the left side and the roller thrust bearing on the right side with the seal facing up toward axle (the black seal will designate the top side, see Figure 9-63).

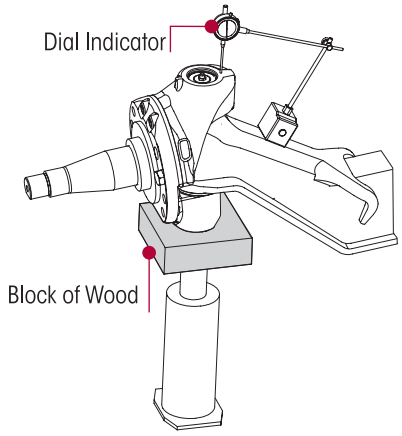
FIGURE 9-63

Top View of Thrust Bearings

Composite – Left Side Roller – Right Side

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

FIGURE 9-64



7. Lower the bottle jack so that all the vertical end play is on the underside of the axle.
8. Affix a magnetic base dial indicator on the axle and place the tip of the dial indicator on top of the knuckle assembly, see Figure 9-64.
9. Zero the dial indicator.
10. Raise the bottle jack until there is **NO CLEARANCE** between the knuckle assembly and the bottom of the axle, slightly lifting the axle.
11. Check the reading on the dial indicator. The specification for vertical travel on the steering knuckle during assembly is 0.008" to 0.011".
12. **STEERTEK NXT** axle – vehicles built **after** October 2012. If vertical clearance is:
    - **Above 0.011"**, loosen the socket head cap screws and **push down** on the knuckle assembly until the proper vertical end play is achieved
    - **Below 0.008"**, loosen the two (2) socket head cap screws and **pull up** on the knuckle assembly until the proper vertical end play is achieved

    STEERTEK axle – vehicles built **prior** to October 2012. If the vertical clearance is:
    - **Above 0.011"**, add a 0.005" shim
    - **Below 0.008"**, it may be necessary to remove a 0.005" shim

⚠ 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.

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

13. Remove one (1) old socket head cap screw and replace with new socket head cap screw.
14. Remove second socket head cap screw and replace with new socket head cap screw. Tighten both socket head cap screws to 188 ± 12 foot pounds torque.

15. Recheck the vertical end play with the dial indicator, see Figure 9-64 or a 0.010" feeler gauge.
16. Remove the brake spider bolts, they should thread out freely.
17. Remove the bottle jack and continue assembling the wheel ends.

IMPORTANT NOTE

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

18. Apply Loctite to the three (3) brake spider bolts prior to installation into the brake spider. Tighten bolts to 188 ± 12 foot pounds torque.

WARNING

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

19. Install the tie rod end into the lower steering knuckle arm.
20. Tighten the castle nuts to 185 foot pounds torque then advance the castle nut to the next hex face to install the cotter pin. **DO NOT** back off the castle nut to install cotter pin.
21. Install the drag link into the steering arm and tighten to the vehicle manufacturer's specifications.
22. **STEERTEK NXT** axle:
    a. Install the new threaded grease caps and tighten to 60 ± 10 foot pounds torque, see Figures 9-65 and 9-66. **Allow 30 minutes** for thread sealant to cure before greasing.
    b. Ensure the kingpin bushing is installed properly below the kingpin seal. Push kingpin seal up against the machined bore face to minimum 0.25 mm, see Figure 9-67.
    c. Install new grease zerk and thread until it bottoms out to: within a 1.2 mm maximum gap between hex and steering knuckle surface, see Figure 9-68.

STEERTEK axle – Install new grease caps and retaining rings.

FIGURE 9-65

FIGURE 9-66

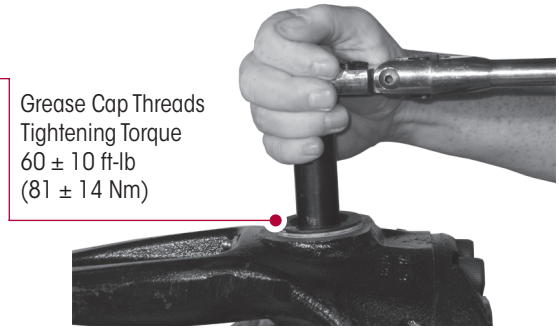


FIGURE 9-67

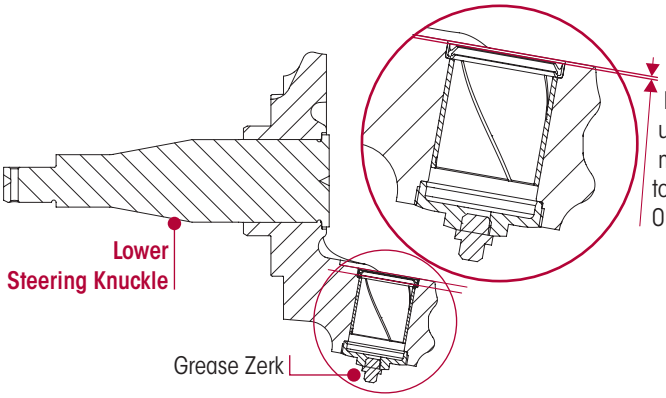
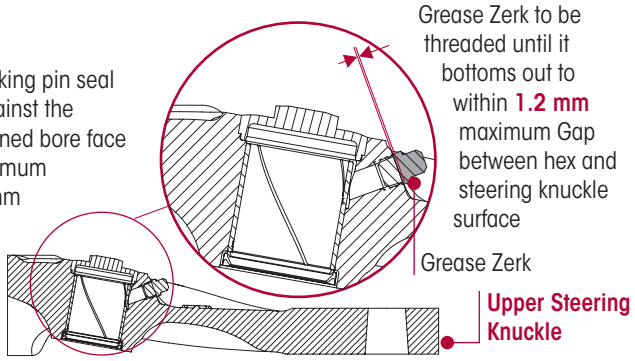


FIGURE 9-68



23. Install the brakes, drums, wheels and tires per the vehicle manufacturer's instructions.
24. Raise the vehicle and remove the safety stands.
25. Lower the vehicle.
26. Grease steering knuckles with the vehicle on the floor.
27. Remove the wheel chocks from the vehicle.

TIE ROD END AND CROSS TUBE

You will need:

- 7/8" -14 tie rod end removal tool (see Figure 9-70)

DISASSEMBLY

FIGURE 9-69

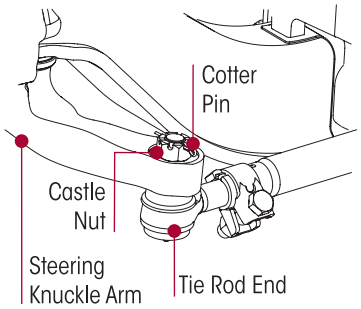


FIGURE 9-70
7/8" -14 Tie Rod End Removal Tool

1. Chock the wheels.
2. Position the steer axle tires straight ahead.
3. Remove the cotter pin and castle nut, see Figure 9-69.
4. Use a 7/8"-14 tie rod end removal tool (see Figure 9-70) to separate the tie rod end from the steering knuckle arm.
5. Repeat Steps 3 and 4 to remove the other tie rod end to remove the tie rod assembly.
6. Remove the tie rod assembly from the vehicle.
7. Mount the cross tube in a soft jaw vice.
8. Remove the tie rod clamp hardware from the cross tube.
9. Count the exposed threads on the tie rod end being replaced, see Figure 9-71.

⚠ WARNING

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

10. Remove the tie rod end from the cross tube.
11. If the opposing tie rod end is being replaced repeat Steps 8 through 10.
12. Inspect the cross tube for dents, cracks, or thread damage, replace as necessary.

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

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

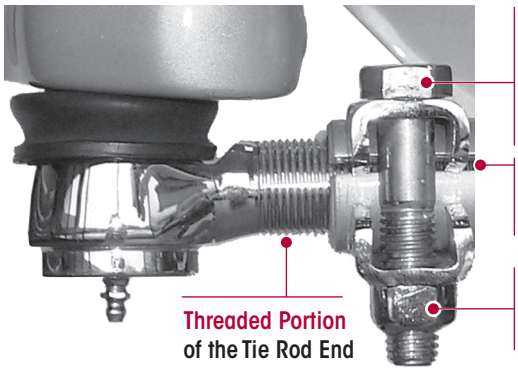
⚠ WARNING

THE THREADED PORTION OF THE TIE ROD END MUST EXTEND PAST THE SLOTS INTO THE TIE ROD CROSS TUBE, SEE FIGURE 9-71. FAILURE TO DO SO CAN CAUSE COMPONENT DAMAGE, LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

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

4. Replace the opposing tie rod end if necessary, by repeating Steps 1 and 2.
5. Install both tie rod ends into the lower steering knuckles.
6. Install the tie rod assembly by placing both tie rod ends into the lower steering knuckles.
7. Tighten the castle nuts to 185 foot pounds torque, then rotate the castle nut to the next castle slot and install the cotter pin. **DO NOT** back off the castle nut to install cotter pin.

FIGURE 9-71



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.

8. Grease the tie rod ends with the specified lubricant, see lubrication specifications and procedure in the Preventive Maintenance section of this publication.
9. Set the toe, refer to the Toe Adjustment procedure in the Alignment & Adjustments section of this publication.
10. After the alignment is acceptable, tighten the tie rod to tie rod tube fasteners to 68 ± 7 foot pounds tightening torque, see Figure 9-71.
11. Remove the wheel chocks.

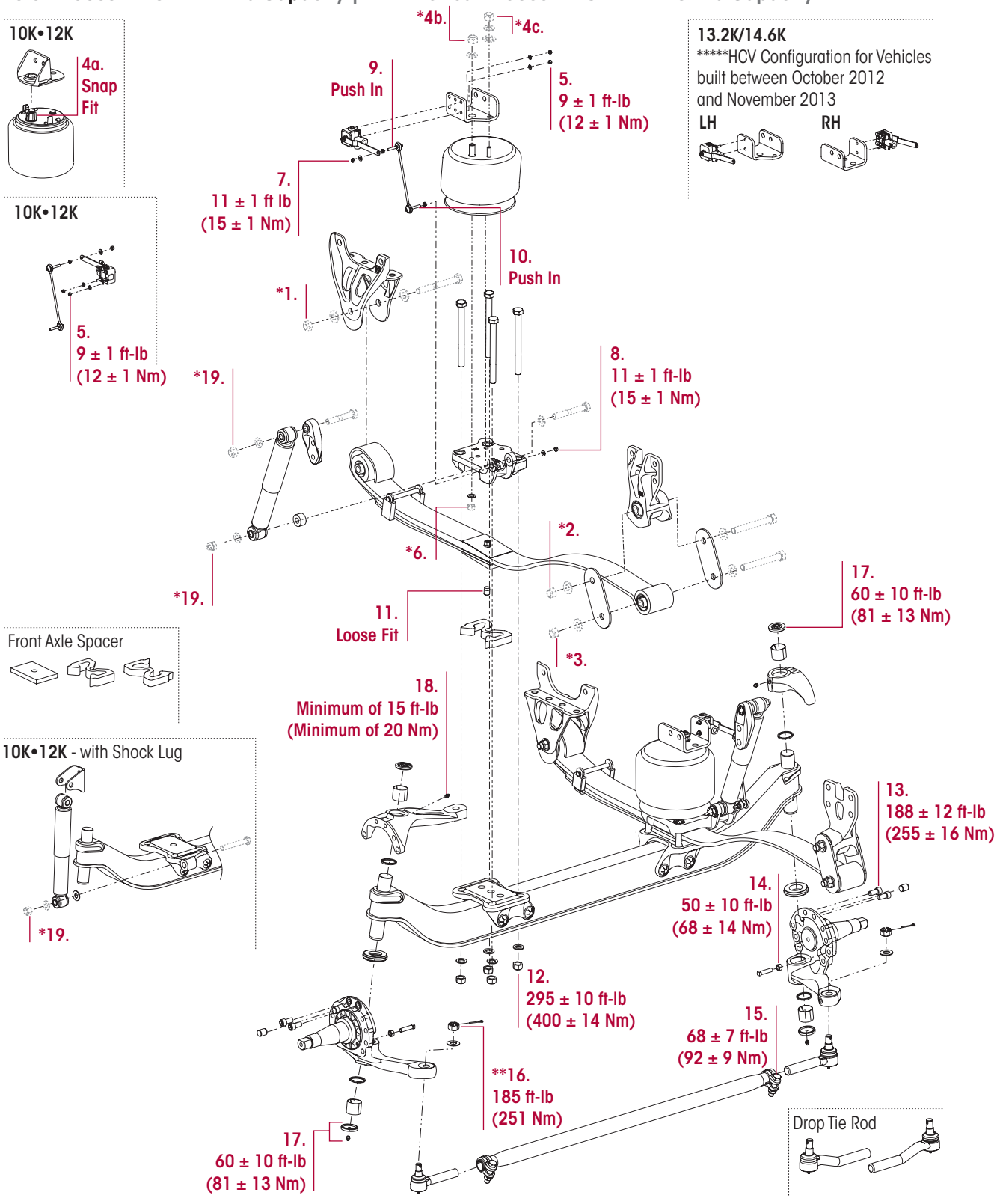
SECTION 10

Torque Specifications

Hendrickson Recommended Torque Values
Provided in Foot Pounds and in Newton Meters

■ AIRTEK® with STEERTEK™ NXT axle built after October 2012

Vision Buses – 10K • 12K lb Capacity | All American Buses – 13.2K • 14.6K lb Capacity



AIRTEK with STEERTEK NXT Axle built after October 2012 for Blue Bird Vision Buses 10K • 12K lb Capacity All American Buses – 13.2K • 14.6K lb Capacity

HENDRICKSON RECOMMENDED TORQUE SPECIFICATIONS

NO.	COMPONENT	FASTENER		TORQUE VALUE	
		Qty.	Size	Foot Pounds	Newton Meters
Frame fasteners are furnished and installed by the vehicle manufacturer. Vehicle manufacturer may use an equivalent HUCK fastener at frame mount. **All hardware ¼" and greater is Grade 8 with no additional lubrication.**					
1	Front Frame Hanger to Front Leaf Spring Eye	2	M20	*	*
2	Rear Shackle Bracket to Shackle Plate	2	M20	*	*
3	Rear Shackle Bracket to Spring Eye	2	M20	*	*
4a	Air Spring 10K • 12K lb Capacity	2	Self-Locking	Snap Fit	
4b	Air Spring 13.2K • 14.6K lb Capacity at the Air Fitting	2	¾"	*	*
4c	Air Spring 13.2K • 14.6K lb Capacity at the Mounting Stud	2	½"	*	*
5	Height Control Valve to Air Spring Bracket	2	¼"	9 ± 1	12 ± 1
6	Air Spring to Top Pad	2	½"	*	*
7	Linkage to Height Control Valve Arm	2	5⁄16"	11 ± 1	15 ± 1
8	Linkage to Top Pad	2	5⁄16"	11 ± 1	15 ± 1
9	Linkage Grommet to Height Control Valve Arm	1	Grommet	Push In	
10	Linkage Grommet to Top Pad	1	Grommet	Push In	
11	Spring Center Aligning Dowel Pin (Flat Floor Bus)	2	¾"	Loose Fit	
12	Clamp Group Hardware	8	¾"	295 ± 10	400 ± 14
	⚠ WARNING ENSURE THE CLAMP GROUP IS ALIGNED PROPERLY PRIOR TO TIGHTENING THE HARDWARE. FAILURE TO DO SO CAN CAUSE LOSS OF VEHICLE CONTROL, PROPERTY DAMAGE, OR PERSONAL INJURY.				
13	Knuckle Attachment Bolt (Socket Head Cap Screw)	4	⅝"	188 ± 12	255 ± 16
14	Knuckle / Axle Wheel Stop Bolt	2	⅝" Jam Nut	50 ± 10	68 ± 14
15	Tie Rod Tube to Tie Rod Ends	2	⅝"	68 ± 7	92 ± 9
16	Tie Rod Ends to Lower Steering Knuckle	2	⅞" Castle Nut	**185	**251
17	Grease Cap Assembly, Upper and Lower	4	½"	60 ± 10	81 ± 13
18	Grease Zerk	2		Minimum of 15	Minimum of 20
19	Shock Absorber Fasteners	2	¾"	*	*

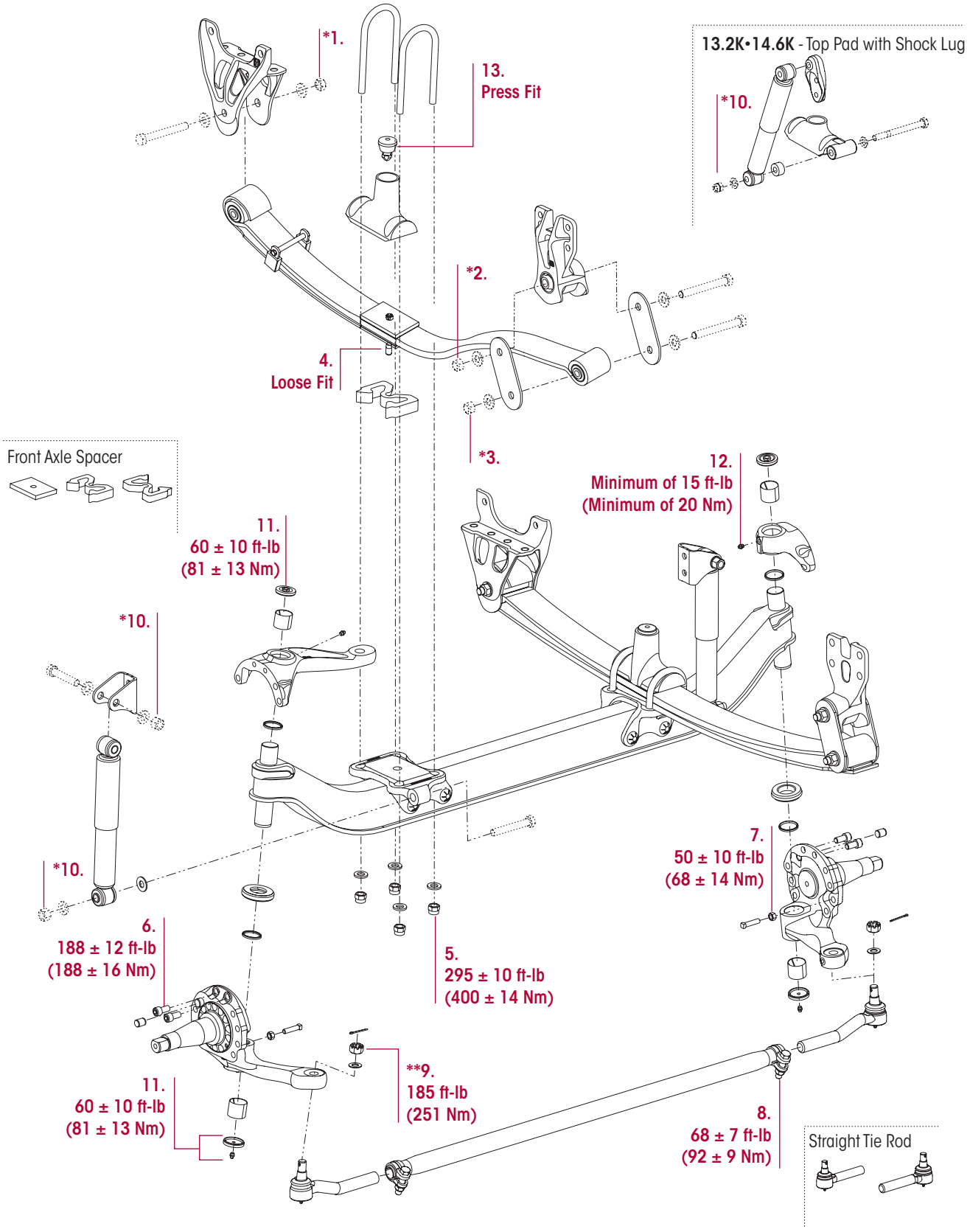
NOTE: * Fasteners originally supplied by the vehicle manufacturer. Follow the torque specifications listed in the vehicle manufacturer's manual. Hendrickson is not responsible for maintaining vehicle manufacturer's torque values.

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

■ SOFTEK® with STEERTEK™ NXT axle built after October 2012

Vision Buses – 8.5K • 10K • 12K lb Capacity |
All American Buses – 13.2K • 14.6K lb Capacity

Hendrickson Recommended Torque Values Provided in Foot Pounds and in Newton Meters



SOFTEK with STEERTEK NXT Axle built after October 2012 for Blue Bird Vision Buses 8.5K • 10K • 12K lb Capacity All American Buses – 13.2K • 14.6K lb Capacity

HENDRICKSON RECOMMENDED TORQUE SPECIFICATIONS

NO.	COMPONENT	FASTENER		TORQUE VALUE	
		Qty.	Size	Foot Pounds	Newton Meters
Frame fasteners are furnished and installed by the vehicle manufacturer. Vehicle manufacturer may use an equivalent HUCK fastener at frame mount. **All hardware ¼" and greater is Grade 8 with no additional lubrication.**					
1	Front Frame Hanger to Front Leaf Spring Eye	2	M20	*	*
2	Rear Shackle Bracket to Shackle Plate	2	M20	*	*
3	Rear Shackle Bracket to Spring Eye	2	M20	*	*
4	Spring Center Aligning Dowel Pin (Flat Floor Bus)	2	¾"	Loose Fit	
5	Clamp Group Hardware	8	¾"	295 ± 10	400 ± 14
	⚠ WARNING ENSURE THE CLAMP GROUP IS ALIGNED PROPERLY PRIOR TO TIGHTENING THE HARDWARE. FAILURE TO DO SO CAN CAUSE LOSS OF VEHICLE CONTROL, PROPERTY DAMAGE, OR PERSONAL INJURY.				
6	Knuckle Attachment Bolt (Socket Head Cap Screw)	4	⅝"	188 ± 12	255 ± 16
7	Knuckle / Axle Wheel Stop Bolt	2	⅝" Jam Nut	50 ± 10	68 ± 14
8	Tie Rod Tube to Tie Rod Ends	2	⅝"	68 ± 7	92 ± 9
9	Tie Rod Ends to Lower Steering Knuckle	2	⅞" Castle Nut	**185	**251
10	Shock Absorber Fasteners	4	¾"	*	*
11	Grease Cap Assembly, Upper and Lower	4	½"	60 ± 10	81 ± 13
12	Grease Zerk	2		Minimum of 15	Minimum of 20
13	Rubber Axle Stop	2	—	Press Fit	

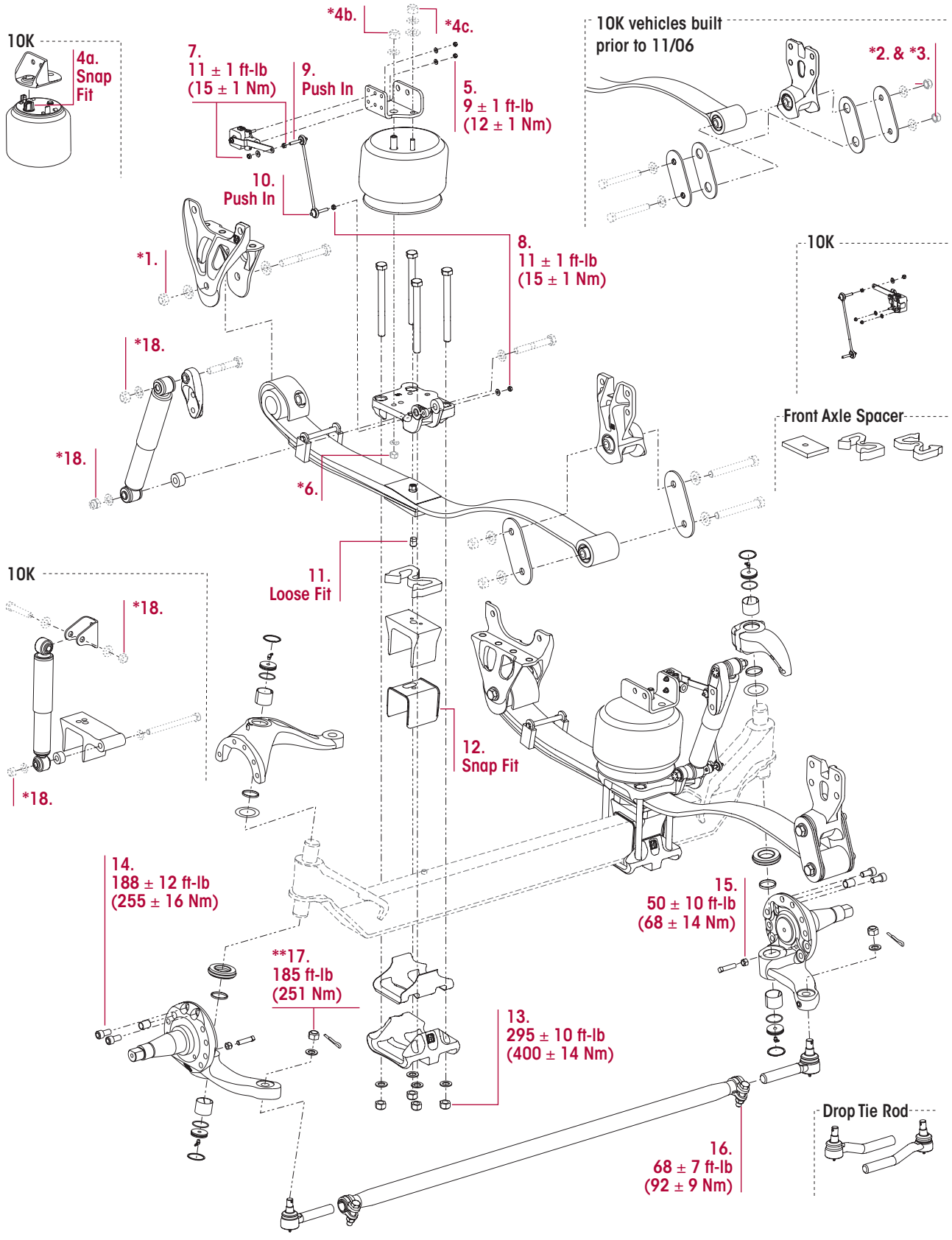
NOTE: * Fasteners originally supplied by the vehicle manufacturer. Follow the torque specifications listed in the vehicle manufacturer's manual. Hendrickson is not responsible for maintaining vehicle manufacturer's torque values.

** Tighten castle nut to 185 foot pounds (251 Nm) torque then advance castle nut to the next hex face to install the cotter pin. **DO NOT** back off nut for cotter pin installation.

■ AIRTEK® with STEERTEK™ axle built prior to October 2012

Vision Buses – 10K lb Capacity
All American Buses – 13.2K • 14.6K lb Capacity

Hendrickson Recommended Torque Values
Provided in Foot Pounds and in Newton Meters



AIRTEK with STEERTEK Axle built prior to October 2012 for Blue Bird Vision Buses 10K lb Capacity • All American Buses – 13.2K • 14.6K lb Capacity

HENDRICKSON RECOMMENDED TORQUE SPECIFICATIONS

NO.	COMPONENT	FASTENER		TORQUE VALUE	
		Qty.	Size	Foot Pounds	Newton Meters
Frame fasteners are furnished and installed by the vehicle manufacturer. Vehicle manufacturer may use an equivalent HUCK fastener at frame mount. **All hardware ¼" and greater is Grade 8 with no additional lubrication.**					
1	Front Frame Hanger to Front Leaf Spring Eye	2	M20	*	*
2	Rear Shackle Bracket to Shackle Plate	2	M20	*	*
3	Rear Shackle Bracket to Spring Eye	2	M20	*	*
4a	Air Spring 10K lb Capacity	2	Self-Locking	Snap Fit	
4b	Air Spring 13.2K • 14.6K lb Capacity at the Air Fitting	2	¾"	*	*
4c	Air Spring 13.2K • 14.6K lb Capacity at the Mounting Stud	2	½"	*	*
5	Height Control Valve to Upper Air Spring Bracket	2	¼"	9 ± 1	12 ± 1
6	Air Spring to Top Pad	2	½"	*	*
7	Linkage to Height Control Valve Arm	2	5/16"	11 ± 1	15 ± 1
8	Linkage to Top Pad	2	5/16"	11 ± 1	15 ± 1
9	Linkage Grommet to Height Control Valve Arm	1	Grommet	Push In	
10	Linkage Grommet to Top Pad	1	Grommet	Push In	
11	Spring Center Aligning Dowel Pin (Flat Floor Bus)	2	¾"	Loose Fit	
12	Axle Wrap Liners for Clamp Group	2	Formed	Snap Fit	
	⚠ WARNING DO NOT ASSEMBLE CLAMP GROUP WITHOUT AXLE WRAP LINERS. FAILURE TO DO SO CAN CAUSE LOSS OF VEHICLE CONTROL, PROPERTY DAMAGE OR PERSONAL INJURY.				
13	Clamp Group Hardware	8	¾"	295 ± 10	400 ± 14
	⚠ WARNING ENSURE THE CLAMP GROUP IS ALIGNED PROPERLY PRIOR TO TIGHTENING THE HARDWARE. FAILURE TO DO SO CAN CAUSE LOSS OF VEHICLE CONTROL, PROPERTY DAMAGE, OR PERSONAL INJURY.				
14	Knuckle Attachment Bolt (Socket Head Cap Screw)	4	⅝"	188 ± 12	255 ± 16
15	Knuckle / Axle Wheel Stop Bolt	2	⅝" Jam Nut	50 ± 10	68 ± 14
16	Tie Rod Tube to Tie Rod Ends	2	⅝"	68 ± 7	92 ± 9
17	Tie Rod Ends to Lower Steering Knuckle	2	⅞" Castle Nut	**185	**251
18	Shock Absorber Fasteners	2	¾"	*	*

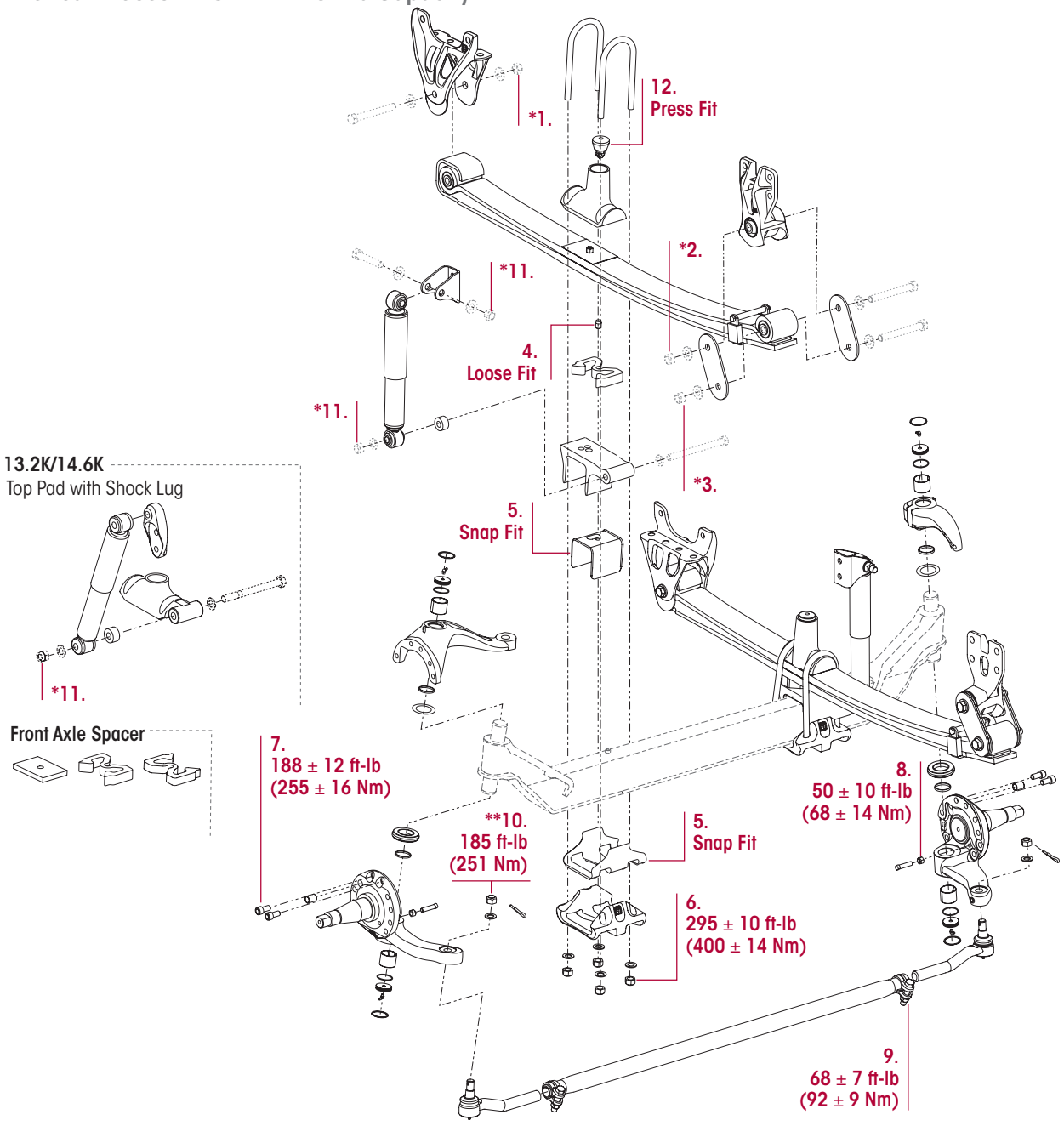
NOTE: * Fasteners originally supplied by the vehicle manufacturer. Follow the torque specifications listed in the vehicle manufacturer's manual. Hendrickson is not responsible for maintaining vehicle manufacturer's torque values.

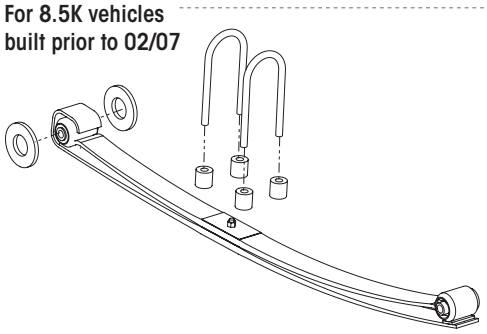
** Tighten the castle nut to 185 foot pounds (251 Nm) torque, then advance castle nut to the next hex face to install the cotter pin. **DO NOT** back off castle nut for cotter pin installation.

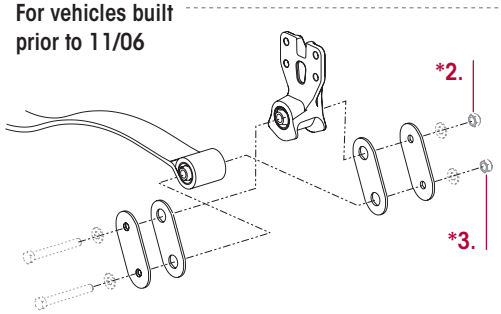
■ SOFTEK® with STEERTEK axle built prior to October 2012

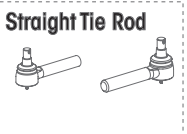
Vision Buses – 8.5K • 10K lb Capacity
All American Buses – 13.2K • 14.6K lb Capacity

Hendrickson Recommended Torque Values Provided in Foot Pounds and in Newton Meters









SOFTEK with STEERTEK Axle Vehicles built prior to 2012 for Blue Bird Vision Buses 8.5K • 10K lb Capacity All American Buses – 13.2K • 14.6K lb Capacity

HENDRICKSON RECOMMENDED TORQUE SPECIFICATIONS

NO.	COMPONENT	FASTENER		TORQUE VALUE	
		Qty.	Size	Foot Pounds	Newton Meters
Frame fasteners are furnished and installed by the vehicle manufacturer. Vehicle manufacturer may use an equivalent HUCK fastener at frame mount. **All hardware ¼" and greater is Grade 8 with no additional lubrication.**					
1	Front Frame Hanger to Front Leaf Spring Eye	2	M20	*	*
2	Rear Shackle Bracket to Shackle Plate	2	M20	*	*
3	Rear Shackle Bracket to Spring Eye	2	M20	*	*
4	Spring Center Aligning Dowel Pin (Flat Floor Bus)	2	¾"	Loose Fit	
5	Axle Wrap Liners for Clamp Group	2	Formed	Snap Fit	
	⚠ WARNING DO NOT ASSEMBLE CLAMP GROUP WITHOUT AXLE WRAP LINERS. FAILURE TO DO SO CAN CAUSE LOSS OF VEHICLE CONTROL, PROPERTY DAMAGE OR PERSONAL INJURY.				
6	Clamp Group Hardware	8	¾"	295 ± 10	400 ± 14
	⚠ WARNING ENSURE THE CLAMP GROUP IS ALIGNED PROPERLY PRIOR TO TIGHTENING THE HARDWARE. FAILURE TO DO SO CAN CAUSE LOSS OF VEHICLE CONTROL, PROPERTY DAMAGE, OR PERSONAL INJURY.				
7	Knuckle Attachment Bolt (Socket Head Cap Screw)	4	⅝"	188 ± 12	255 ± 16
8	Knuckle / Axle Wheel Stop Bolt	2	⅝" Jam Nut	50 ± 10	68 ± 14
9	Tie Rod Tube to Tie Rod Ends	2	⅝"	68 ± 7	92 ± 9
10	Tie Rod Ends to Lower Steering Knuckle	2	⅞" Castle Nut	**185	**251
11	Shock Absorber Fasteners	4	¾"	*	*
12	Rubber Axle Stop	2	—	Press Fit	

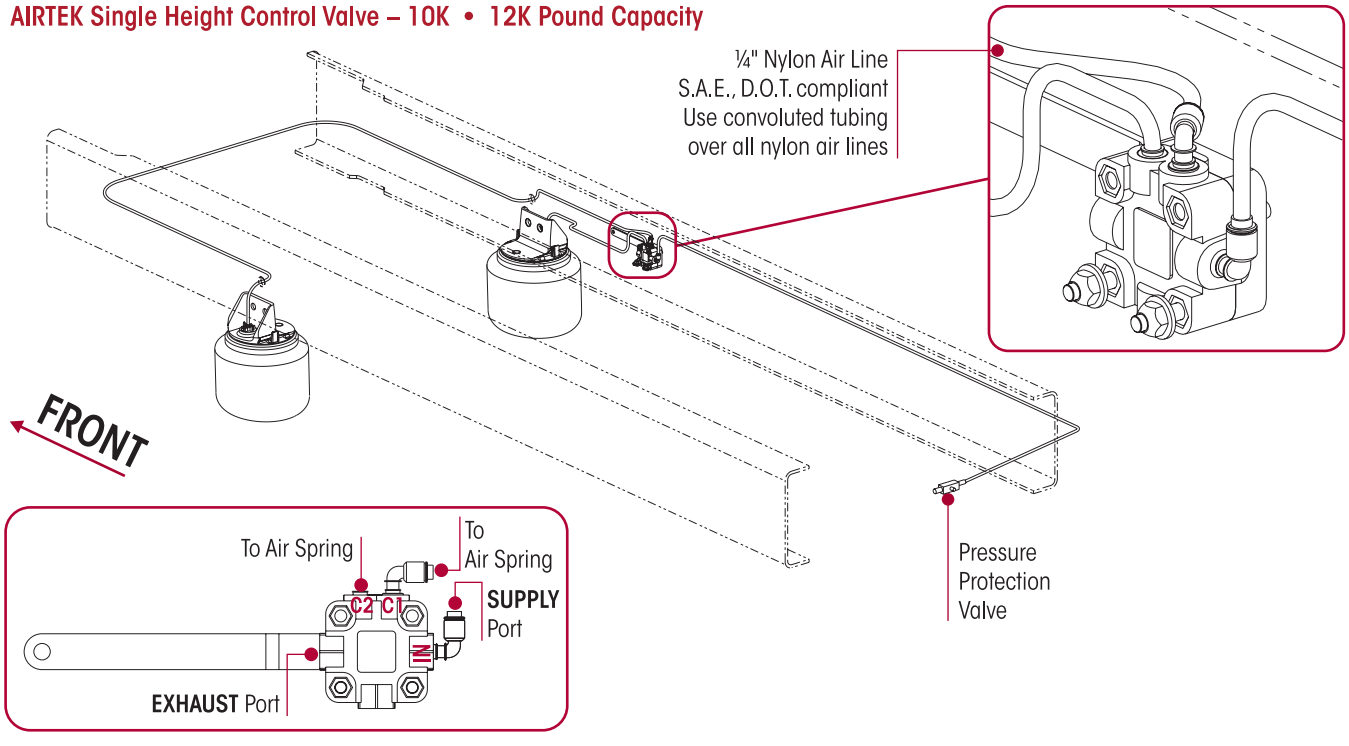
NOTE: * Fasteners originally supplied by the vehicle manufacturer. Follow the torque specifications listed in the vehicle manufacturer's manual. Hendrickson is not responsible for maintaining vehicle manufacturer's torque values.

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

SECTION 11
Plumbing Diagrams

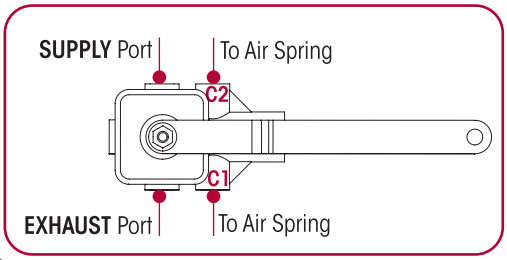
When replacing or installing the nylon air line tubing into the quick-connect fittings it is critical that the end of the air line is cut square. Improper cut of the end of the air line tubing can cause the air line to seat improperly in the quick connect fitting causing air leakage.

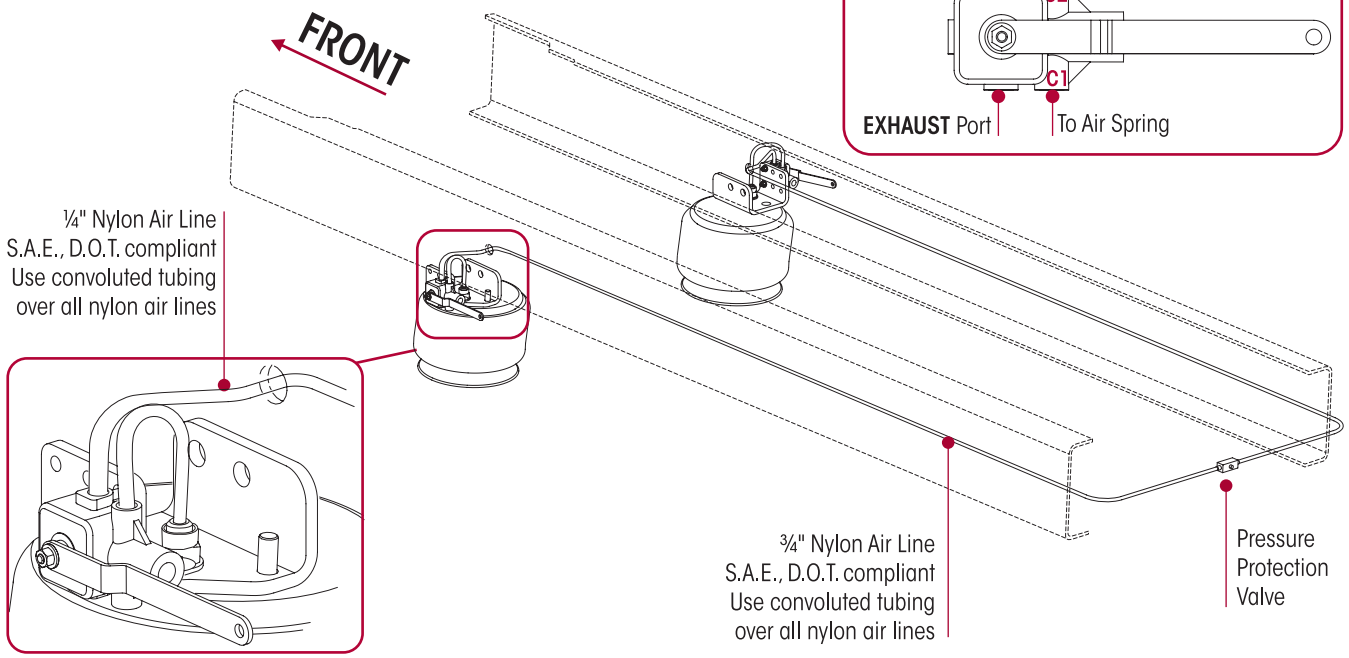
AIRTEK Single Height Control Valve – 10K • 12K Pound Capacity



AIRTEK Dual Height Control Valve – 13.2K • 14.6K Pound Capacity

AIRTEK Vehicles built after November 2013





SECTION 12

Front Wheel Alignment Specifications

AIRTEK • SOFTEK for Blue Bird Buses

FRONT AIR MODULE SUSPENSION ALIGNMENT SPECIFICATION

CAMBER[1]	DESIGN SPECIFICATION	RANGE	
	AIRTEK • SOFTEK	AIRTEK • SOFTEK	
		Minimum	Maximum
LEFT	0.00° ± 1.0°	-1.0°	+1.0°
RIGHT	- 0.25° ± 1.0°	-1.25°	+0.75°
CROSS	0.0°	—	+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[2,3,5]	DESIGN SPECIFICATION			RANGE					
	AIRTEK	SOFTEK		AIRTEK		SOFTEK			
	10K•12K 13.2K•14.6K	8.5K•10K 12K	13.2K•14.6K	10K•12K 13.2K•14.6K		8.5K•10K•12K		13.2K•14.6K	
				Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
LEFT	4.1° ± 1°	4.5° ± 1°	4.5° ± 1.5°	+3.1°	+5.1°	+3.5°	+5.5°	+3.0°	+6.0°
RIGHT	4.1° ± 1°	4.5° ± 1°	4.5° ± 1.5°	+3.1°	+5.1°	+3.5°	+5.5°	+3.0°	+6.0°
CROSS[4]	0.0°	0.0°		—	Max 1.0°	—	Max 1.0°	—	Max 1.0°

CASTER NOTES:

2. Caster is determined with the vehicle at specified ride height for air suspension or at rated load for mechanical suspension systems. It is critical that the vehicle front and rear ride height is within specifications prior to performing a caster measurement or adjustment. See Hendrickson ride height specifications4 and procedure.
3. 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.
4. **The Cross caster angle is not adjustable – DO NOT** bend axle or otherwise try to adjust cross caster. If found out of specifications notify Hendrickson Tech Services for further information. Changes to caster can be attained by using caster shims as provided by the vehicle manufacturer or chassis and body manufacturer. Caster shims must match, side to side, to reduce uneven loading to the suspension components. **The use of two (2) different angle caster shims will not correct cross caster.**
5. **Example of caster adjustment:** 2.5° Right Hand/3° Left Hand would require one (1), 1.0 shim on each side to increase caster and achieve 3.5° Right Hand / 4.0° Left Hand, which is in specification. **DO NOT** attempt to use uneven shims.

Hendrickson recommends the following TMC[7] practices:

	DESIGN SPECIFICATION[6]	RANGE	
		Minimum	Maximum
TOTAL TOE[7]	0.06" ± 0.03" (1/16" ± 1/32")	0.03" (1/32")	0.09" (3/32")

TOE-IN NOTES:

6. 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.
7. In most instances total toe is set by the vehicle manufacturer or body builder. Consult the vehicle manufacturer for specifications.

SECTION 13
Troubleshooting Guide

AIRTEK • SOFTEK for Blue Bird Buses

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

AIRTEK • SOFTEK for Blue Bird Buses

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

SECTION 14
Reference Material

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

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

TMC / ATA Headquarters
950 North Glebe Road, Suite 210
Arlington, VA 22203-4181

Phone: 703-838-1763
website: tmc.trucking.org
online ordering: atabusinessolutions.com/Shopping

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

*Call Hendrickson at **630.910.2800** or **855.RIDERED (855.743.3733)** for additional information.*

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www.hendrickson-intl.com

TRUCK COMMERCIAL VEHICLE SYSTEMS
800 South Frontage Road
Woodridge, IL 60517-4904 USA
855.743.3733 (Toll-free U.S. and Canada)
630.910.2800 (Outside U.S. and Canada)
Fax 630.910.2899

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