TECHNICAL PROCEDURE

SOFTEK® for Spartan Bus • AIRTEK® for Spartan Motorhome Chassis

SUBJECT: Service Instructions
LIT NO: 17730-259
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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 the following Hendrickson equipment as installed on applicable Spartan Bus / Motorhome Chassis:

- **AIRTEK**® — An integrated front air suspension with the STEERTEK axle.
- **SOFTEK**® — An integrated steel spring mechanical suspension with the STEERTEK axle.
- **STEERTEK** — A durable, lightweight, fabricated steer axle assembly.

See Parts List Section of this publication to determine the components that are manufactured by Hendrickson. For components not manufactured or supplied by Hendrickson contact the vehicle manufacturer for proper preventive maintenance and rebuild instructions.

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

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

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

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

SECTION 2
Product Description

FIGURE 2-1 AIRTEK WITH DRUM BRAKE

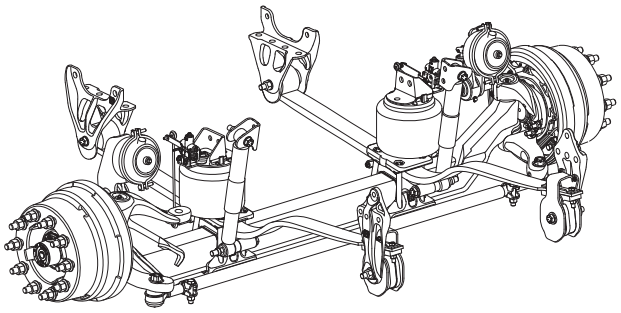


FIGURE 2-2
SOFTEK WITH DRUM BRAKE

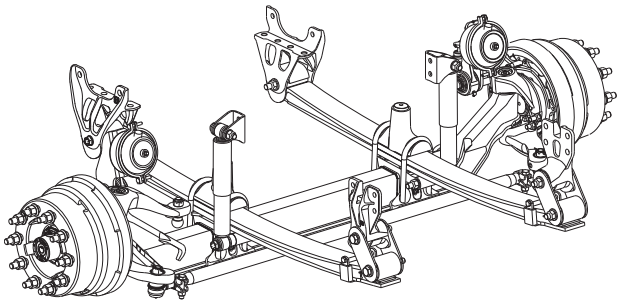
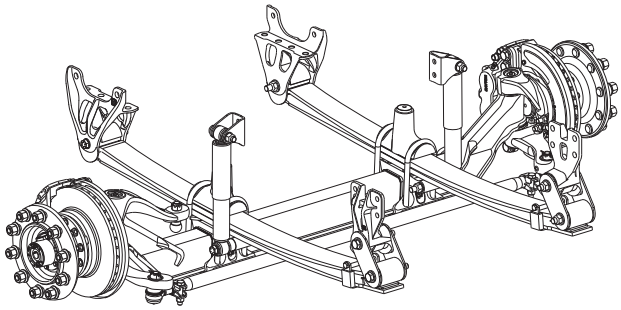


FIGURE 2-3
SOFTEK WITH DISC BRAKE



SOFTEK — is an integrated front mechanical suspension and robotically welded steer axle that work together to form an integrated torsion system. Utilizing a system approach, Hendrickson has engineered and optimized components to form a system delivering ride, stability and handling characteristics with reduced weight and maintenance.

AIRTEK — Winner of the 2001 Automotive News and Cap Gemini Ernst & Young PACE Award for Product Innovation. AIRTEK is an integrated front air suspension and fabricated steer axle that work together to form an integrated torsion system. This lightweight system provides driver comfort and is ideal for a variety of applications including on-highway line and bulk haul operations. Utilizing a system approach, Hendrickson has engineered and optimized the following components to form a system delivering unmatched ride, stability and handling characteristics with reduced weight and maintenance.

- **Air Springs** — Exclusive to Hendrickson AIRTEK, the lightweight air springs deliver an extremely soft ride. The air springs are engineered to support 50% of the vertical load while providing very low spring rate. The quick "snap" design and "push-to-connect" air supply design also provide fast and easy installation and removal.
- **Front and Rear Frame Brackets** — AIRTEK/SOFTEK brackets with optimized designs deliver weight reduction and proven durability.
- **Leaf spring assembly** — AIRTEK/SOFTEK leaf spring, with its innovative design, provides superior stability, performance and a soft ride. Durable rubber front and patented rear bushings are greaseless and only require periodic inspections.
- **Shock absorbers** — AIRTEK/SOFTEK utilizes premium shocks that have been tested and tuned specifically for the suspension system.

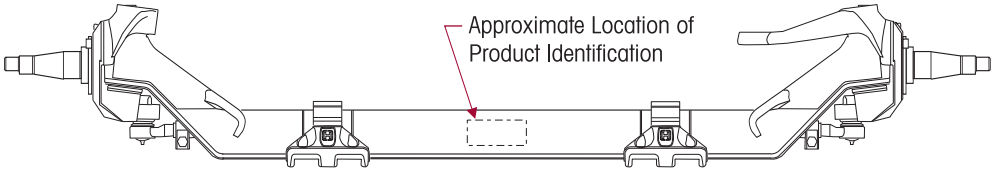
STEERTEK — Integrated into the AIRTEK/SOFTEK system, the box-shaped design provides a stiffer axle and resists torsional, longitudinal and vertical loads more effectively than traditional I-Beam axles. Together with the front limbs of the leaf springs, the fabricated axle beam forms a torsion system,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

- **Axle Clamp Group** — The axle-friendly clamp group provides four-sided clamping pressure. The Clamp Group consists of the following:
  - Top Axle Wrap
  - Top Axle Wrap Liner
  - Top pad
  - Bottom Axle Wrap
  - Bottom Axle Wrap Liner
  - ¾" U-bolts/Hex Bolts, Washers and Nylon Locknuts
- **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 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.
- **Hub and Drum / Rotor Assembly** — STEERTEK hub and drum / rotor assembly provides consistent performance and durability.

TECHNICAL NOTES

1. AIRTEK / SOFTEK are approved for 100% on-highway use with up to 10% off-highway uses; other applications that exceed 10% off-highway use must be pre-approved by Hendrickson and the vehicle manufacturer. The AIRTEK systems for Spartan Motorhome chassis are 10,500/12,000/12,600/14,600 pound capacity. System capacity represents maximum loads on tires at ground level. The SOFTEK systems for Spartan Motorhome chassis is 10,500 pound capacity.
2. The STEERTEK axle is available with 70.87" Kingpin Intersections (KPI).
3. The STEERTEK axle offers 4.25" axle beam drop height. Axle beam drop is measured from the kingpin intersection to the top of the axle.
4. AIRTEK / SOFTEK is integral to and available exclusively with the STEERTEK axle. This system is anti-lock braking system (ABS) ready. STEERTEK is compatible with industry standard wheel ends and brakes.
5. The STEERTEK 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. The steering knuckles and clamp group are part of the axle assembly.

FIGURE 2-4 Front view of STEERTEK axle showing approximate location of product identification.



SECTION 3

Important Safety Notice

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

The warnings and cautions should be read carefully to help prevent personal injury and to assure that proper methods are used. Improper maintenance, service or repair may damage the vehicle, cause personal injury, render the vehicle unsafe in operation, or void the manufacturer's warranty.

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

EXPLANATION OF SIGNAL WORDS

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

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

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

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

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

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

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

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

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

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

SAFETY PRECAUTIONS

WARNING

FASTENERS

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

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

WARNING

AIR SPRINGS

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

WARNING

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

WARNING

PRIOR TO AND DURING DEFLATION AND INFLATION OF THE 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

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.

CAUTION

PROCEDURES AND TOOLS

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

WARNING

SUPPORT THE VEHICLE PRIOR TO SERVICING

PLACE THE VEHICLE ON A LEVEL FLOOR AND CHOCK THE WHEELS TO HELP PREVENT THE VEHICLE FROM MOVING. ALWAYS SUPPORT A RAISED VEHICLE WITH SAFETY STANDS. DO NOT WORK UNDER A RAISED VEHICLE SUPPORTED ONLY BY A FLOOR JACK. A JACK CAN SLIP OR FALL OVER. ALWAYS WEAR EYE PROTECTION. FAILURE TO DO SO CAN CAUSE POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

⚠ WARNING

SHOCK ABSORBERS

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

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

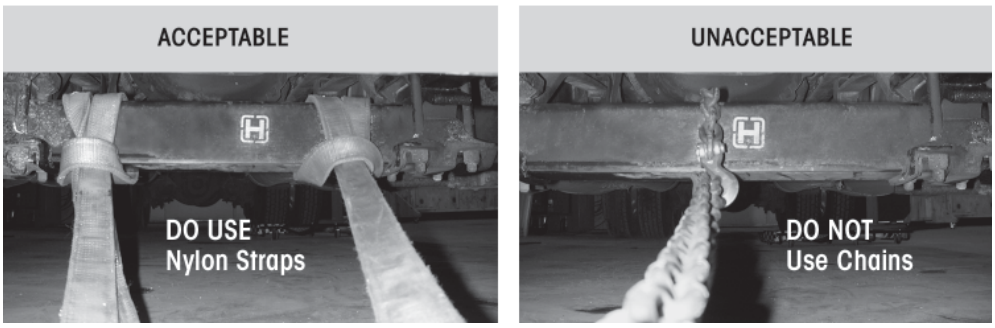
⚠ WARNING

OFF ROADWAY TOWING

WHEN A VEHICLE IS DISABLED AND EQUIPPED WITH A STEERTEK AXLE, CARE MUST BE TAKEN TO ENSURE THERE IS NO DAMAGE TO THE SUSPENSION OR AXLE WHEN TOWING THE VEHICLE. THE USE OF TOW STRAPS ARE NECESSARY TO TOW A DISABLED VEHICLE INTO A REPAIR FACILITY PARKING LOT INTO THE SHOP BAY. THE TOW STRAPS SHOULD BE CONNECTED TO THE TOW HOOKS PROVIDED BY THE VEHICLE MANUFACTURER AT THE FRONT OF THE BUMPER. IF THE USE OF TOW HOOKS IS NOT AN OPTION, THEN TOW STRAPS MAY BE WRAPPED AROUND THE FRONT, SEE FIGURE 3-1, IN A MANNER THAT IS ACCEPTABLE FOR TOWING THE VEHICLE FROM A REPAIR FACILITY PARKING LOT INTO THE SHOP BAY. DO NOT USE A TOW CHAIN AROUND THE FRONT AXLE TO TOW THE VEHICLE, SEE FIGURE 3-1, DOING SO WILL DAMAGE THE AXLE AND VOID WARRANTY. FOR DETAILED INSTRUCTIONS FOR ON-HIGHWAY TOWING, REFER TO TOWING PROCEDURE OF THIS PUBLICATION.

FIGURE 3-1

OFF-ROADWAY TOWING



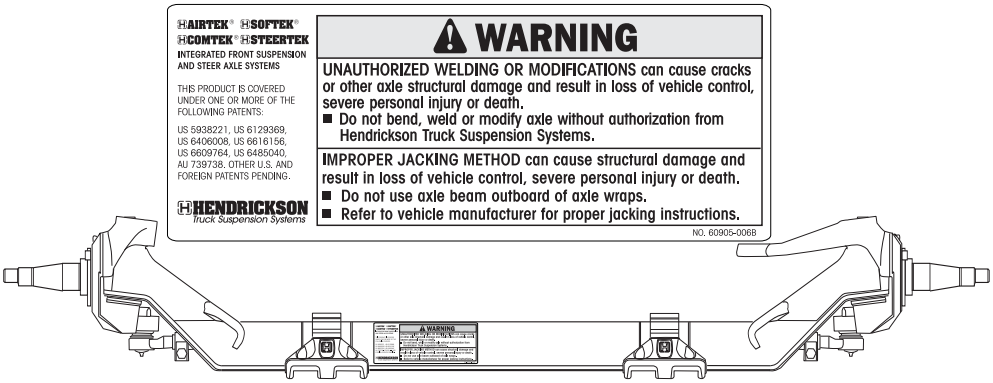
⚠ WARNING

AXLE CAMBER

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

AXLE CAMBER IS NOT ADJUSTABLE. DO NOT CHANGE THE AXLE CAMBER ANGLE OR BEND THE AXLE BEAM, SEE FIGURE 3-2. BENDING THE AXLE BEAM TO CHANGE THE CAMBER ANGLE CAN DAMAGE THE AXLE AND REDUCE AXLE STRENGTH, WILL VOID HENDRICKSON'S WARRANTY AND CAN CAUSE LOSS OF VEHICLE CONTROL, POSSIBLY CAUSING PERSONAL INJURY OR PROPERTY DAMAGE.

FIGURE 3-2 REPLACE ANY SAFETY DECALS THAT ARE FADED, TORN, MISSING, ILLEGIBLE, OR OTHERWISE DAMAGED. CONTACT HENDRICKSON TO ORDER REPLACEMENT LABELS.



⚠ WARNING

KINGPINS

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

⚠ WARNING

REPAIR AND RECONDITIONING

THE REPAIR OR RECONDITIONING OF SUSPENSION OR AXLE COMPONENTS IS NOT ALLOWED, SEE LABEL IN FIGURE 3-2. ANY AXLE COMPONENTS FOUND TO BE DAMAGED OR OUT OF SPECIFICATIONS MUST BE REPLACED. ALL MAJOR HENDRICKSON COMPONENTS ARE HEAT TREATED AND TEMPERED. AIRTEK COMPONENTS CANNOT BE BENT, WELDED, HEATED, OR REPAIRED WITHOUT REDUCING THE STRENGTH OR LIFE OF THE COMPONENT. FAILURE TO FOLLOW THESE GUIDELINES CAN CAUSE LOSS OF VEHICLE CONTROL, POSSIBLE PERSONAL INJURY, DEATH, OR PROPERTY DAMAGE AND WILL VOID APPLICABLE WARRANTIES.

⚠ WARNING

DAMAGED COMPONENTS

IF A VEHICLE EQUIPPED WITH A STEERTEK 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

SUPPORT OF A RAISED VEHICLE

NEVER WORK UNDER A RAISED VEHICLE SUPPORTED BY ONLY A JACK. ALWAYS SUPPORT A RAISED VEHICLE WITH STANDS. BLOCK THE WHEELS AND MAKE SURE THE UNIT WILL NOT ROLL BEFORE RELEASING BRAKES. ALWAYS WEAR EYE PROTECTION. FAILURE TO DO SO CAN CAUSE POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

⚠ WARNING

PERSONNEL PROTECTIVE EQUIPMENT

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

⚠ WARNING

PARTS CLEANING

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

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

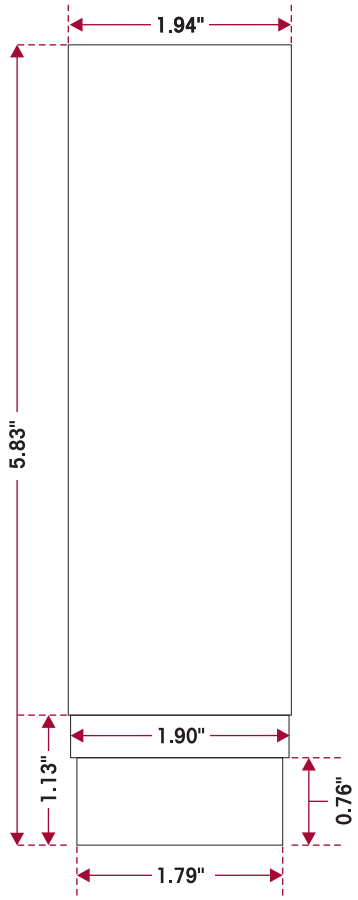
DO NOT USE HOT SOLUTION TANKS OR WATER AND ALKALINE SOLUTIONS TO CLEAN GROUND OR POLISHED PARTS. DOING SO WILL CAUSE DAMAGE TO THE PARTS AND VOID WARRANTY.

SECTION 4
Special Tools

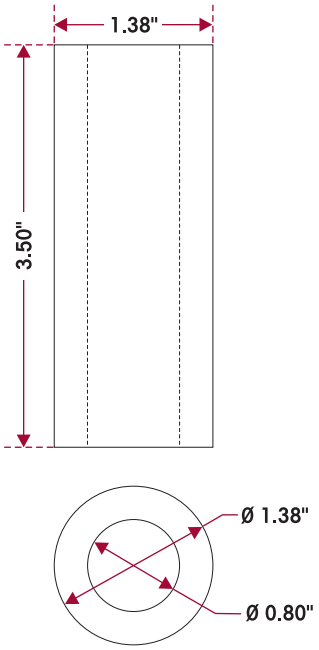
These shop made tools are designed to install and remove kingpin bushings. Bushing tools are made from cold rolled steel or equivalent. Drawings are for reference only. Hendrickson does not supply these tools.

KINGPIN BUSHING TOOLS

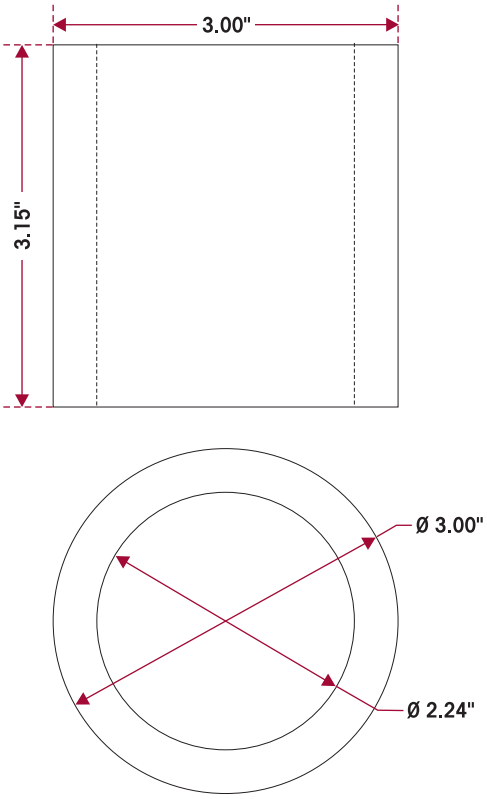
Kingpin Bushing Installer



Kingpin Bushing Remover

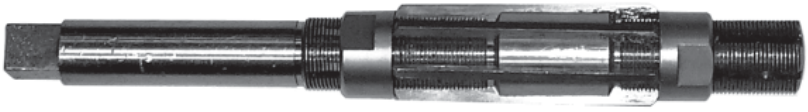


Steering Arm Receiver



ADJUSTABLE STRAIGHT FLUTE REAMER

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



HUB WHEEL SEAL TOOLS

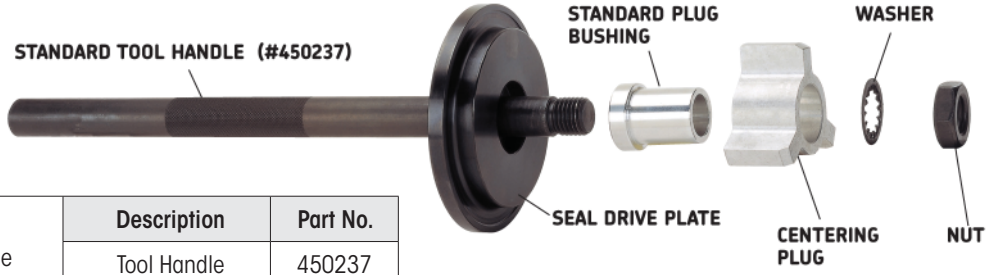
Hub Wheel Seal Removal Tool

SKF SRT-1

To order contact your local distributor or call SKF customer service 1-800-882-0008 for a local distributor in your area.

Hub Wheel Seal Installation Tool

SKF Scotseal® *Classic* / Scotseal® *Longlife*



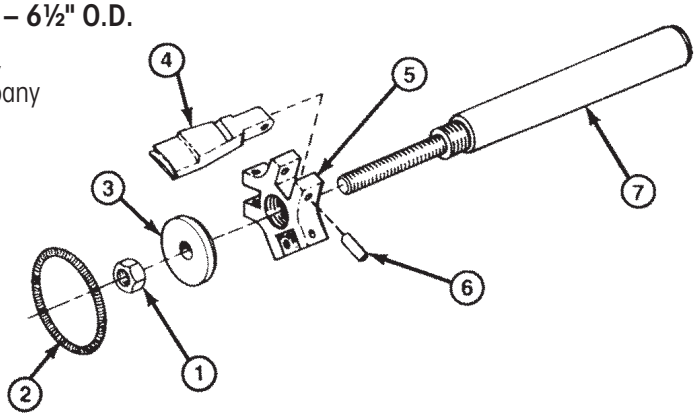
	Description	Part No.
The seal drive plates and centering plug that fit on the end of the tool handle come in different sizes. Refer to these part nos. while ordering.	Tool Handle	450237
	Seal Drive Plate	436
	Centering Plug	706

Bearing Cup Installation Tool

OTC Tool No. 7180

Capacity: 3⅝" O.D. – 6½" O.D.

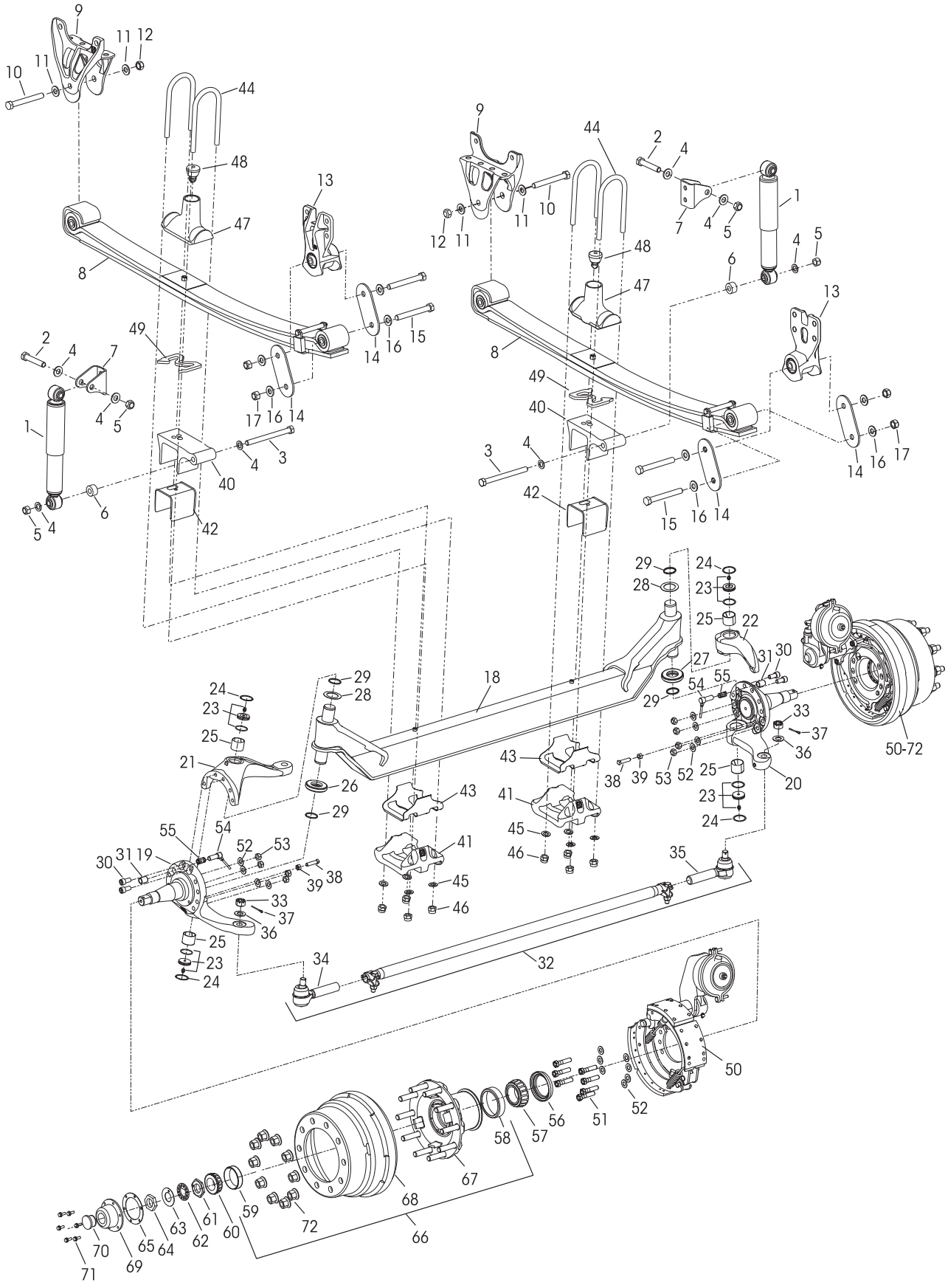
To order contact OTC,
Owatonna Tool Company
800-533-6127
www.otctools.com



No.	Description
1	Hex Nut (⅝"-18)
2	Extension Spring
3	Expander
4	Jaw
5	3 way Head
6	Pin
7	Handle

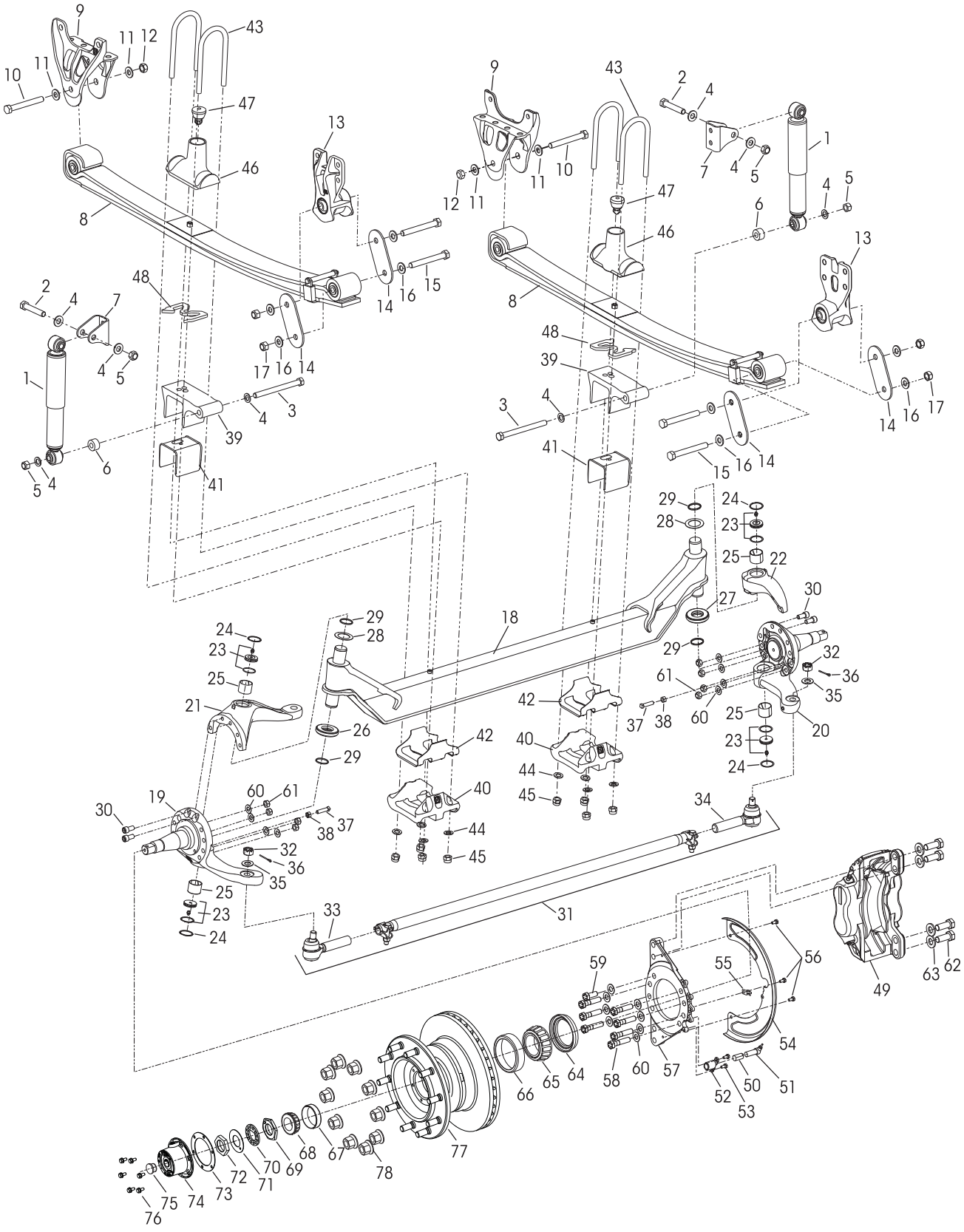
Parts Lists

SOFTEK® for Spartan Chassis — School Bus Applications with Drum Brakes



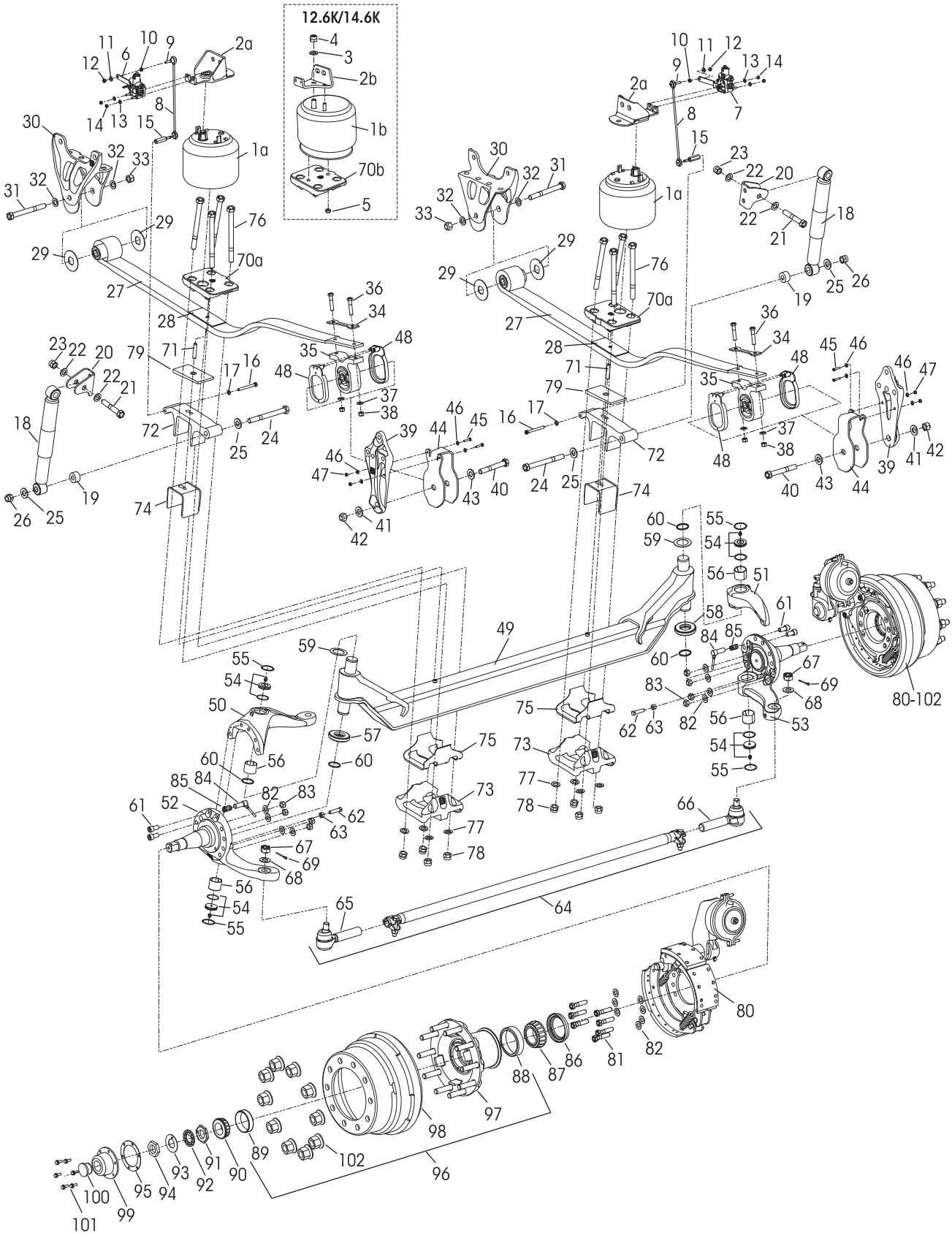
KEY NO.	PART NO.	DESCRIPTION	NO.REQ.
1	58913-009L	Shock Absorber	2
2		*¾"-10 UNC Upper Shock Bolt	2
3		*¾"-10 UNC Lower Shock Bolt	2
4		*¾" Hardened Washer	8
5		*¾"-10 UNC Hex Locknut	4
6	59946-001	Shock Spacer	2
7	59423-002	Shock Bracket	2
	60961-162	**Leaf Spring Assembly Service Kit,** Includes Key Nos. 8, 13-14	
8	66624-001	Leaf Spring Assembly	2
9	64488-002	Front Hanger	2
10		*M20 Hex Bolt - 170mm	2
11		*M20 Hardened Washer	4
12		*M20 Locknut	2
13	66510-001	Rear Shackle Bracket	2
14	64314-000	Rear Shackle Plate	4
15		*M20 Hex Bolt - 150mm	4
16		*M20 Hardened Washer	8
17		*M20 Locknut	4
	64502-048	STEERTEK Axle Assembly Includes Key Nos. 18-43	1
18	64905-001	Axle & Kingpin Assembly	1
19	58900-027	LH Lower Steering Knuckle Assembly	1
20	58900-028	RH Lower Steering Knuckle Assembly	1
21	60903-004	LH Upper Steering Knuckle Assembly	1
22	60904-002	RH Upper Steering Knuckle Assembly	1
	60961-040	**Kingpin Bushing and Bearing Service Kit, Axle Set,** Includes Kit Nos. 60961-009 & -039	
	60961-009	**LH Kingpin Bushing w/Composite Thrust Bearing Service Kit,** Includes Key Nos. 23-26, 28-30 and Loctite	
	60961-039	**RH Kingpin Bushing w/Roller Thrust Bearing Service Kit,** Includes Key Nos. 23-25, 27-30 and Loctite	
23	59156-000	Grease Cap Assembly	4
24	58937-000	Retaining Ring	4
25	58909-000	Kingpin Bushing	4
	60961-043	**Thrust Bearing Service Kit, Axle Set,** Includes Kit Nos. 60961-041& -042	
	60961-041	**LH Composite Thrust Bearing Service Kit,** Includes Key Nos. 26, 28-30 and Loctite	
	60961-042	**RH Roller Thrust Bearing Service Kit,** Includes Key Nos. 27-30 and Loctite	
26	59828-000	LH Composite Thrust Bearing	1
27	64256-000	RH Roller Thrust Bearing	1
28		Kingpin Shim	
	60259-002	0.047"	2
	60259-001	0.005" (As needed for service)	
29	58910-001	Kingpin Seal	4
30	60236-001	⅝"-11 UNC Socket Head Cap Screw	4
Not Shown	60937-000	Loctite (Red) Compound Tube	1
31	64246-000	ABS Sensor Sleeve	2
32	60239-003	***Tie Rod Assembly, Includes Key Nos. 33-37	1
33		**⅞" Castle Nut	2
	60961-010	***Tie Rod End Service Kit, Axle Set,** Includes Kit Nos. 60961-025 & -026	
	60961-025	***LH Tie Rod End Service Kit,** Includes Key Nos. 34, 36-37	
	60961-026	***RH Tie Rod End Service Kit,** Includes Key Nos. 35-37	
34	64000-001	***LH Tie Rod End	1
35	64000-002	***RH Tie Rod End	1
36	22962-007	⅞" Flat Washer	2
37	17800-004	Tie Rod Nut Cotter Pin	2
	60961-069	**Stop Bolt Service Kit, One Side,** Includes Key Nos. 38-39	
38	60238-001	½"-13 UNC Square Head Bolt	2
39	60240-000	½"-13 UNC Hex Jam Nut	2
40	59952-003	Top Axle Wrap	2
41	64722-003	Bottom Axle Wrap	2
	60961-640	**Top/Bottom Axle Wrap Liner Service Kit, One Side,** Includes Key Nos. 42-43	
42	59449-000	Top Axle Wrap Liner	2
43	59845-000	Bottom Axle Wrap Liner	2
	60961-140	**Clamp Group Service Kit, One side,** Includes Key Nos. 44-46	
44	64804-110	¾"-16 UNF U-bolt	4
45	22962-001	¾" Flat Washer	8
46	17700-035	¾"-16 UNF 2B Nylon Locknut	8
	64506-000	Top Pad/Axle Stop Assembly Includes Key Nos. 47-48	
47	64519-000	Top Pad	2
48	64080-000	Rubber Axle Stop	2
49	64536-010	Front Axle Spacer	2
Not Shown	18831-021	Dowel Pin 2.0"	2
50		****Brake Assembly	
	66261-001	LH 15 x 4	1
	66261-002	RH 15 x 4	1
51	32043-002	⅝"-11 UNC 2.75" Hex Bolt	14
52	22962-036	⅝" Hardened Washer	22
53	47764-000	⅝"- UNC Locknut	8
	64627-001	**ABS Sensor Service Kit, Axle Set,** Includes Key Nos. 54-55	
54	64547-000	ABS Sensor	2
55	64550-000	ABS Sensor Clip	2
	64626-008	**Front Bearing Wheel End Service Kit, One End,** Includes Key Nos. 56-65	
56	64531-000	Wheel Seal	2
57	64529-000	Inner Bearing Cone	2
58	66810-000	Inner Bearing Cup	2
59	66811-000	Outer Bearing Cup	2
60	64530-000	Outer Bearing Cone	2
61	64671-000	1½"-12 UNF Inner Wheel Bearing Adj. Nut	2
62	64672-000	1½"-12 UNF Pierced Lock Ring - 0.19"	2
63	64673-000	1½" Lock Washer - 0.03"	2
64	64674-000	1½"-12 UNF Wheel Bearing Outer Nut	2
65	64546-000	Hubcap Gasket	2
66	66238-002	Hub & Drum Assembly, Includes Key Nos. 58-59, 67-68, 72	2
67		**Hub	2
68		**Drum	2
69	64532-000	Hubcap Assembly - 6.0", Includes Key No. 70	2
70		**Rubber Plug	2
71	64545-002	5/16"-18 UNC 0.75" Hex Bolt w/Retained Washer (Hubcap Bolts)	12
72	70017-000	M22 Flange Nut	20

SOFTEK® for Spartan Chassis — School Bus Applications with Disc Brakes



KEY NO.	PART NO.	DESCRIPTION	NO.REQ.
1	58913-009L	Shock Absorber	2
2		*¾"-10 UNC Upper Shock Bolt	2
3		*¾"-10 UNC Lower Shock Bolt	2
4		*¾" Hardened Washer	8
5		*¾"-10 UNC Hex Locknut	4
6	59946-001	Shock Spacer	2
7	59423-002	Shock Bracket	2
	60961-162	**Leaf Spring Assembly Service Kit,** Includes Key Nos. 8, 13-14	
8	66624-001	Leaf Spring Assembly	2
9	64488-002	Front Hanger	2
10		*M20 Hex Bolt - 170mm	2
11		*M20 Hardened Washer	4
12		*M20 Locknut	2
13	66510-001	Rear Shackle Bracket	2
14	64314-000	Rear Shackle Plate	4
15		*M20 Hex Bolt - 150 mm	4
16		*M20 Hardened Washer	8
17		*M20 Locknut	4
	64502-048	STEERTEK Axle Assembly Includes Key Nos. 18-40	1
18	64905-001	Axle & Kingpin Assembly	1
19	58900-061	LH Lower Steering Knuckle Assembly	1
20	58900-062	RH Lower Steering Knuckle Assembly	1
21	60903-004	LH Upper Steering Knuckle Assembly	1
22	60904-002	RH Upper Steering Knuckle Assembly	1
	60961-040	**Kingpin Bushing and Bearing Service Kit, Axle Set,** Includes Kit Nos. 60961-009 & -039	
	60961-009	**LH Kingpin Bushing w/Composite Thrust Bearing Service Kit,** Includes Key Nos. 23-26, 28-30 and Loctite	
	60961-039	**RH Kingpin Bushing w/Roller Thrust Bearing Service Kit,** Includes Key Nos. 23-25, 27-30 and Loctite	
23	59156-000	Grease Cap Assembly	4
24	58937-000	Retaining Ring	4
25	58909-000	Kingpin Bushing	4
	60961-043	**Thrust Bearing Service Kit, Axle Set,** Includes Kit Nos. 60961-041& -042	
	60961-041	**LH Composite Thrust Bearing Service Kit,** Includes Key Nos. 26, 28-30 and Loctite	
	60961-042	**RH Roller Thrust Bearing Service Kit,** Includes Key Nos. 27-30 and Loctite	
26	59828-000	LH Composite Thrust Bearing	1
27	64256-000	RH Roller Thrust Bearing	1
28		Kingpin Shim	
	60259-002	0.047"	2
	60259-001	0.005" (As needed for service)	
29	58910-001	Kingpin Seal	4
30	60236-001	⅝"-11 UNC Socket Head Cap Screw	4
Not Shown	60937-000	Loctite (Red) Compound Tube	1
31	60239-003	***Tie Rod Assembly, Includes Key Nos. 32-36	1
32		**⅞" Castle Nut	2
	60961-010	***Tie Rod End Service Kit, Axle Set,** Includes Kit Nos. 60961-025 & -026	
	60961-025	***LH Tie Rod End Service Kit,** Includes Key Nos. 33, 35-36	
	60961-026	***RH Tie Rod End Service Kit,** Includes Key Nos. 34-36	
33	64000-001	***LH Tie Rod End	1
34	64000-002	***RH Tie Rod End	1
35	22962-007	⅞" Flat Washer	2
36	17800-004	Tie Rod Nut Cotter Pin	2
	60961-069	**Stop Bolt Service Kit, One Side,** Includes Key Nos. 37-38	
37	60238-001	½"-13 UNC Square Head Bolt	2
38	60240-000	½"-13 UNC Hex Jam Nut	2
39	59952-003	Top Axle Wrap	2
40	64722-003	Bottom Axle Wrap	2
	60961-640	**Top/Bottom Axle Wrap Liner Service Kit, One Side,** Includes Key Nos. 41-42	
41	59449-000	Top Axle Wrap Liner	2
42	59845-000	Bottom Axle Wrap Liner	2
	60961-140	**Clamp Group Service Kit, One side,** Includes Key Nos. 43-45	
43	64804-110	¾"-16 UNF U-bolt	4
44	22962-001	¾" Flat Washer	8
45	17700-035	¾"-16 UNF 2B Nylon Locknut	8
	64506-000	Top Pad/Axle Stop Assembly Includes Key Nos. 46-47	
46	64519-000	Top Pad	2
47	64080-000	Rubber Axle Stop	2
48	64536-010	Front Axle Spacer	2
Not Shown	18831-021	Dowel Pin 2.0"	2
49		Caliper Assembly	2
	64526-003	Left Hand	
	64526-004	Right Hand	
50	64624-000	ABS Sensor Clip	2
51	64623-000	ABS Sensor	2
52	64542-000	ABS Bracket	2
53	18160-012	5/16"-18 UNC Bolt - 0.5" (ABS Bracket)	4
54	64540-000	Dust Shield	2
55	64541-000	Dust Shield Clip	2
56	64201-001	M8 x 1.25"-6G Cap Screw (Dust Shield)	6
57		Torque Plate	2
	64561-001	Left Hand	
	64561-002	Right Hand	
	64625-011	**Brake Fastener Kit, One Wheel End** Includes Key Nos. 58-63	
58	32043-002	⅝"-11 UNC Hex Bolt - 2.75" (Torque Plate)	14
59	32043-021	⅝"-11 UNC Hex Bolt - 1.5" (Torque Plate)	2
60	22962-036	⅝" Hardened Washer (Torque Plate)	24
61	47764-000	⅝"-11 UNC Locknut (Torque Plate)	8
62	58258-017	M20 x 2.5"-6G Hex Bolt (Caliper)	8
63	58246-009	M20 Hardened Washer (Caliper)	8
	64626-008	**Front Bearing Wheel End Service Kit One Wheel End,** Includes Key Nos. 64-73	
64	64531-000	Wheel Seal	2
65	64529-000	Inner Bearing Cone	2
66	66810-001	Inner Bearing Cup	2
67	6811-001	Outer Bearing Cup	2
68	64530-000	Outer Bearing Cone	2
69	64671-000	1½"-12 UNF Adj. Inner Nut	2
70	64672-000	1½"-12 UNF Pierced Lock Ring	2
71	64673-000	1½" Lock Washer	2
72	64674-000	1½"-12 UNF Outer Nut	2
73	64546-000	Hubcap Gasket	2
74	64532-000	Hubcap Assembly, Includes Key No. 75	2
75		**Rubber Plug	
76	64545-002	5/16"-18 UNC Bolt - 0.75" (Hubcap)	12
77	64528-001	Hub & Rotor Assembly Steel Hub 15.38 x 1.54 Rotor	2
78	70017-000	M22 Flange Nut	20

AIRTEK®


12.6K/14.6K
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KEY NO.	PART NO.	DESCRIPTION	NO.REQ.
1		Air Spring	2
a	66349-002L	10.5K/12K	
b	65790-002L	12.6K/14.6K	
2		Upper Air Spring Bracket	2
a	60850-002	10.5K/12K	
b	66140-000	12.6K/14.6K	
3		*¾" Flat Washer	2
4		*¾"-16 UNF Locknut	2
5		*½"-13 UNC Locknut	2
		HCV & Linkage Assembly	
	66277-001	LH, Includes Key Nos. 6, 8-14	1
	66277-002	RH, Includes Key Nos. 7-14	1
6	66414-001	LH Height Control Valve	1
7	66414-002	RH Height Control Valve	1
8	59428-001	HCV Linkage - 335mm	2
9	59169-000	5/16"-18 UNC Stud	2
10	17491-011	5/16"-18 UNC Nut	2
11	22962-029	5/16" Hardened Washer	2
12	59016-000	5/16"-18 UNC Locknut	2
13	22962-028	¼" Hardened Washer	4
14	49983-000	¼"-20 UNC Locknut	4
15	59429-001	Lower Link Mount	2
16		*⅜"-16 UNC 3.5" Hex Bolt	2
17		*⅜" Flat Washer	2
18		Shock Absorber, *Replaces 66153-001*	2
	66153-006	10.5K/12K/12.6K	
	66153-007	14.6K	
19	59946-001	Shock Spacer	2
20	66589-002	Shock Bracket	2
21		*¾" Upper Shock 3.75" Bolt	2
22		*¾" Upper Shock Washer	4
23		*¾" Upper Shock Locknut	2
24		*¾" Lower Shock 7.5" Bolt	2
25		*¾" Lower Shock Washer - 2.0" Wide	4
26		*¾" Lower Shock Locknut	2
		Leaf Spring Assembly, Includes Key Nos. 27-29, 34-38, 48	
	59930-031	Left Hand	1
	59930-032	Right Hand	1
27		**Leaf Spring with Spring Eye Bushing	2
28		**Galvanized Liner	2
29	67495-000	Thrust Washer - Front Hanger, *Replaces 66264-001*	4
30	64488-000	Front Hanger	2
31		*M20 Bolt x 170	2
32		*M20 Washer	4
33		*M20 Locknut	2
	60961-002	**Rear Spring Mount Service Kit, One Side,** Includes Key Nos. 34-38	
34	58920-000	Spring End Plate	2
35	58918-000	Rear Spring Mount	2
36	30970-011	½"-20 UNF 2.25" Hex Bolt	4
37	22962-014	½" Hardened Washer	4
38	17700-034	½"-20 UNF Nylon Locknut	4
	59829-001	Rear Hanger Assembly, Includes Key Nos. 39, 43-47	2
39	59825-000	Rear hanger	2
40		*¾"-10 UNC 4.75" Hex Bolt	2
41		*¾" Flat Washer	2
42		*¾"-10 UNC Locknut	2
	60961-016	**Rear Hanger Clamp Service Kit, One Side,** Includes Key Nos. 43-48	
43	22962-033	¾" Wide Washer	2
44	59830-001	Rear Hanger Clamp	2
45	56935-001	¼"-20 UNC 1.25" Hex Bolt	4
46	22962-028	¼" Hardened Washer	8
47	49983-000	¼"-20 UNC Locknut	4
48	59346-001	Thrust Washer	4

KEY NO.	PART NO.	DESCRIPTION	NO.REQ.
		STEERTEK Axle Assembly, Includes Key Nos. 49-69,72-75,79-100	1
	64502-044	10.5K/12K/12.6K w/15x4 Wheel Ends, *Replaces 64502-041*	
	64502-045	14.6K w/16.5x5 Wheel Ends, *Replaces 64502-042*	
49		Axle & Kingpin Assembly	1
	64905-001	10.5K/12K/12.6K	
	64905-005	14.6K	
50	60903-004	LH Upper Steering Knuckle Assembly	1
51	60904-002	RH Upper Steering Knuckle Assembly	1
52	58900-027	LH Lower Steering Knuckle Assembly	1
53	58900-028	RH Lower Steering Knuckle Assembly	1
	60961-040	**Kingpin Bushing and Bearing Service Kit, Axle Set,** Includes Kit Nos. 60961-009 & 60961-039	
	60961-009	**LH Kingpin Bushing and Composite Thrust Bearing Service Kit,** Includes Key Nos. 54-57, 59-61, Loctite	
	60961-039	**RH Kingpin Bushing and Roller Thrust Bearing Service Kit,** Includes Key Nos. 54-56, 58-61, Loctite	
54	59156-000	Grease Cap Assembly	4
55	58937-000	Retaining Ring	4
56	58909-000	Kingpin Bushing	4
57	59828-000	LH Composite Thrust Bearing	1
58	64256-000	RH Roller Thrust Bearing	1
59		Kingpin Shim	
	60259-002	0.047"	2
	60259-001	0.005" (As needed for service)	
60	58910-001	Kingpin Seal, *Replaces 58910-000*	4
61	60236-001	⅝"-11 UNC Socket Head Cap Screw	4
Not Shown	60937-000	Loctite (Red) Compound Tube	1
	60961-069	**Stop Bolt Service Kit, One End,** Includes Key Nos. 62-63	
62	60238-001	½"-13 UNC Square Head Bolt	2
63	60240-000	½"-13 UNC Hex Jam Nut	2
64		***Tie Rod Assembly, Includes Key Nos. 65-69	
	60239-003	10.5K/12K/12.6K	1
	64006-003	14.6K	1
		***Tie Rod End Service Kit, Axle Set**	
	60961-010	10.5K/12K/12.6K, Includes Kit Nos. 60961-025 & 60961-026	
	60961-011	14.6K, Includes Kit Nos. 60961-027 & 60961-028	
		***LH Tie Rod End Service Kit,** Includes Key Nos. 65, 67-69	
	60961-025	10.5K/12K/12.6K	
	60961-027	14.6K	
		***RH Tie Rod End Service Kit,** Includes Key Nos. 66-69	
	60961-026	10.5K/12K/12.6K	
	60961-028	14.6K	
65		***LH Tie Rod End	1
	64000-001	10.5K/12K/12.6K	
	64002-001	14.6K	
66		***RH Tie Rod End	1
	64000-002	10.5K/12K/12.6K	
	64002-002	14.6K	
67		**⅞" Castle Nut	2
68	22962-007	⅞" Hardened Washer	2
69	17800-004	Cotter Pin	2
70		Top Pad	
a	66144-000	10.5K/12K	2
b	66191-000	12.6K/14.6K	2
71	57159-004	½" Dowel Pin - 2.63"	2
72	59952-028	Top Axle Wrap, *Replaces 59952-001*	2
73	64723-005	Bottom Axle Wrap	2

KEY NO.	PART NO.	DESCRIPTION	NO.REQ.
		Top/Bottom Axle Wrap Liner Service Kit, One Side, Includes Key Nos. 74-78	
	60961-164	• For all vehicles built **after** 02/07	
		• For vehicles built **prior to** 02/07	
	60961-013	10.5K/12K/12.6K	
	60961-164	14.6K	
74	59449-000	Top Axle Wrap Liner	2
75	59845-000	Bottom Axle Wrap Liner	2
		Clamp Group Hardware Kit, Axle Set, Includes Key Nos. 76-78	
	60961-113	• For all vehicles built **after** 02/07	
		• For vehicles built **prior to** 02/07	
	60961-150	10.5K/12K/12.6K	
	60961-113	14.6K	
76		¾"-10 UNC 9.0" Hex Bolt	8
	58917-013	• For all vehicles built **after** 02/07	
		• For vehicles built **prior to** 02/07	
	58917-016	10.5K/12K/12.6K	
	58917-013	14.6K	
77	22962-001	¾" Hardened Washer	8
78	17700-033	¾"-10 UNC-2B Nylocknut	8
79	68861-000	Caster Wedge	2
80		****Brake Assembly	
	66261-001	LH 15x4 - 10.5K/12K/12.6K	1
	66261-002	RH 15x4 - 10.5K/12K/12.6K	1
	64560-003	LH 16.5x5 - 14.6K	1
	64560-004	RH 16.5x5 - 14.6K	1
81	32043-002	⅝"-11 UNC 2.75" Hex Bolt	14
82	22962-036	⅝" Hardened Washer	22
83	47764-000	⅝"- UNC Locknut	8

KEY NO.	PART NO.	DESCRIPTION	NO.REQ.
	64627-001	**ABS Sensor Service Kit, Axle Set,** Includes Key Nos. 84-85	
84	64547-000	ABS Sensor	2
85	64550-000	ABS Sensor Clip	2
	64626-008	**Front Bearing Wheel End Service Kit, One End,** Includes Key Nos. 86-95	
86	64531-000	Wheel Seal	2
87	64529-000	Inner Bearing Cone	2
88	66810-000	Inner Bearing Cup	2
89	66811-000	Outer Bearing Cup	2
90	64530-000	Outer Bearing Cone	2
91	64671-000	1½"-12 UNF Inner Wheel Bearing Adj. Nut	2
92	64672-000	1½"-12 UNF Pierced Lock Ring - 0.19"	2
93	64673-000	1½" Lock Washer - 0.03"	2
94	64674-000	1½"-12 UNF Wheel Bearing Outer Nut	2
95	64546-000	Hubcap Gasket	2
96		Hub & Drum Assembly, Includes Key Nos. 88-89, 97-98	2
	66238-000	10.5K/12K/12.6K	
	66239-000	14.6K (Not Shown)	
97		**Hub	2
98		**Drum	2
99	64532-000	Hubcap Assembly - 6.0", Includes Key No. 100	2
100		**Rubber Plug	2
101	64545-002	5/16"-18 UNC 0.75" Hex Bolt w/Retained Washer (Hubcap Bolts), *Replaces 64545-001*	12
102	70017-000	M22 Flange Nut	20

NOTE:

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

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

*** Hendrickson supplies different tie rod assemblies and each type may take a different replacement tie rod end kit to service. Prior to ordering, find the part number on the tie rod tube, refer to Hendrickson Publication No. SEU-0223 or contact Hendrickson Truck Parts tor corresponding kit numbers.

**** Brake pads available from the vehicle manufacturer, not sold by Hendrickson.

HENDRICKSON AIRTEK Ride Height Gauge for Spartan Motorhome Chassis:
Literature number 45745-289 for 10.5K/12K Capacity and 45745-288 for 12.6K/14.6K Capacity
Height Gauges can be obtained by calling Hendrickson fulfillment at 800.973.0360 or order online www.hendrickson-intl.com/literature/litform.asp

SECTION 6
Towing Procedure

ON-HIGHWAY AND ON-ROADWAY

Hendrickson recommends that a vehicle equipped with a 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

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

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

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

METHOD 1 — WHEEL LIFT

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

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

FIGURES 6-1


LIFTING AT THE TIRES

FIGURE 6-2


WOOD BLOCK UNDER THE TIRES

METHOD 3 — AXLE FORK LIFT

This is an alternative method for towing the vehicle, which requires standard 5" forks, see Figures 6-3 and 6-4, and designated lift points between the two axle clamp groups. The following procedure must be used:

- Place a spacer on the boom, to provide adequate clearance between the oil pan and the boom if necessary. Lift the vehicle in order to place spacer under tires. This will provide sufficient room under the axle to locate forks in the proper position.
- Install the fork in the boom properly.
- Position the tow forks directly under the axle, between the two axle clamp groups as shown in Figure 6-3.

FIGURES 6-3 AND 6-4

Proper tow fork location on inside clamp group on the STEERTEK Axle

- 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 6-5 and 6-6.

FIGURE 6-5

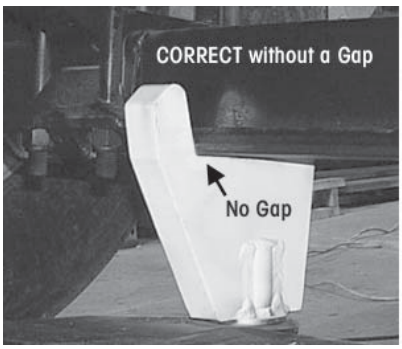
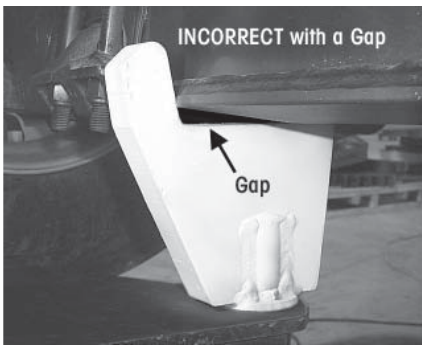


FIGURE 6-6



NOTE

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

- Lift vehicle and secure the vehicle to the boom.
- Install safety straps, it is preferred to use nylon safety straps. Chains have a tendency to bind and may cause damage to the axle.

OFF ROADWAY TOWING METHOD

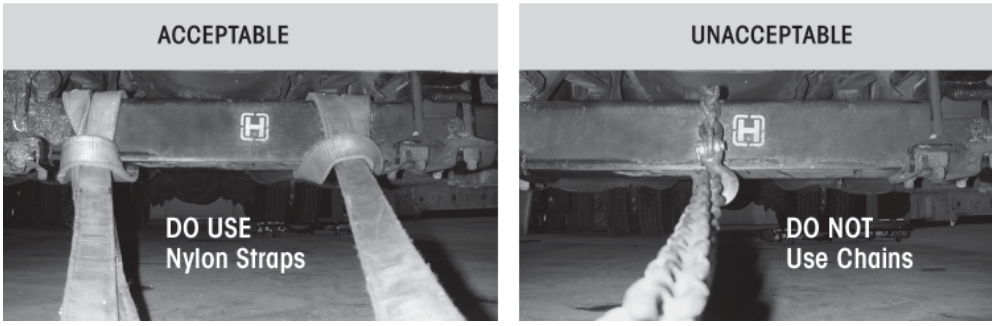
WARNING

WHEN A VEHICLE IS DISABLED AND EQUIPPED WITH A 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 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 INTO THE SHOP BAY. DO NOT USE A TOW CHAIN AROUND THE FRONT AXLE OR WITH A SINGLE POINT LOCATION TO TOW THE VEHICLE, SEE FIGURE 6-8. DOING SO WILL DAMAGE THE AXLE AND VOID WARRANTY,.

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

FIGURE 6-7

OFF-ROADWAY TOWING



SECTION 7

Preventive Maintenance

The AIRTEK®/SOFTEK® systems installed on STEERTEK axle are low maintenance systems. Following appropriate inspection procedure is important to help ensure the proper maintenance and operation of the AIRTEK/SOFTEK suspension system and component parts function to their highest efficiency.

HENDRICKSON RECOMMENDED PREVENTIVE MAINTENANCE INTERVALS

- The first 1,000 miles
- On-highway – every 25,000 miles (40,225 km) or 6 months, whichever comes first

COMPONENT INSPECTION

- **Air Spring** — Look for chaffing or any signs of spring or component damage.
- **Clamp group** — Check torque on clamp group mounting hardware. Refer to Torque Specifications Section of this publication.
- **Fasteners** — Look for any loose or damaged fasteners on the entire suspension. Make sure all fasteners are tightened to the specified torque. See Torque Specification Section of this publication for recommended torque requirements. Use a calibrated torque wrench to check torque in a tightening direction. As soon as the fastener starts to move, record the torque. Correct the torque if necessary. Replace any worn or damaged fasteners.
- **Front and rear spring hangers** — Check for cracks or loose mounting hardware. Replace if necessary, see Component Replacement Section of this publication for replacement procedure.
- **Hub** — Visually inspect the hubcap and any signs of leakage and proper fluid level. Visually inspect the wheel seal for any signs of leakage. Replace if necessary, see Component Replacement Section of this publication for replacement procedure.
- **Operation** — All steering components must move freely through the full range of motion from axle stop to axle stop.
- **Rear spring mount** — Check for proper alignment with spring taper and check for proper torque on rear spring mount fasteners. See Torque Specification Section of this publication for recommended torque requirements.
- **Shock absorber** — Look for any signs of dents or leakage, misting is not considered a leak. See Shock Absorber Inspection in this section.
- **Steel leaf spring** — Look for cracks. Replace if cracked or broken. Check the front and rear bushings for any wear or deterioration. Replace leaf spring assembly if any of the previous conditions are observed. See Component Replacement Section of this publication for replacement procedure.
- **Steering pivot points** — Check for looseness at all pivot points. Inspect and lubricate all pivot points, maximum service interval is 25,000 miles. Refer to the Lubrication matrix in this section.
- **STEERTEK axle** — The axle should be free of any nicks or gouges. Inspect for any cracks or dents on axle.
- **Thrust washers and rear hanger clamp** — Look for any signs of excessive wear to the thrust washers and rear hanger clamp. See Thrust Washer Inspection detailed in this section.
- **Tire wear** — Inspect tires for wear patterns that may indicate suspension damage or misalignment. See Tire Inspection in this section.
- **Top and bottom axle wrap liners** — Look for any cracking or broken pieces on liner in load bearing areas. See Axle Wrap Liner Inspection in this section.

- **Top pad** — Look for cracks. Replace if necessary, see Component Replacement Section of this publication for replacement procedure.
- **Wear and damage** — Inspect all parts of suspension for wear and damage. Look for bent or cracked parts. Replace all worn or damaged parts.
- **Wheel bearing** — Verify wheel bearing end play is within specification, see Wheel Bearing Inspection in this section.

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

LUBRICATION INTERVALS

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

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

TABLE 7-1

STEERTEK GREASING AND LUBRICATION SPECIFICATIONS				
Component	**Greasing Interval**	**Grease**	**NLGI Grade**	**Outside Temperature**
Kingpin Bushings	Maximum of 25,000 miles (40,225 kilometers) or 90 days, whichever comes first.	Multipurpose Grease	2	Refer to the lubricant manufacturer's specifications for the temperature service limits applicable to your area.
Tie Rod Ends				
Drag Link	See Vehicle Manufacturer			
Front Wheel Bearing	15,000 miles (24,000 kilometers)	SAE 80W-90 GL-5	2	Refer to the lubricant manufacturer's specifications for the temperature service limits applicable to your area.
NOTE: Lubrication greases acceptable for use on the STEERTEK axle will carry a designation of NLGI #2 EP and rated GC-LB or equivalent.				

KINGPIN LUBRICATION

On the Hendrickson STEERTEK front axle the kingpin grease fittings are located on the top and bottom of the kingpin grease caps.

1. Place vehicle on the ground.
2. Prior to greasing the kingpins on the vehicle, the suspension must be in a loaded condition.
3. Clean off all the grease fittings and grease gun tip with a clean shop towel prior to lubrication.
4. Lubricate the kingpins through the grease fittings on the top and bottom of the steering knuckle, see STEERTEK Greasing and Lubrication Specifications Table 7-1.
5. Force the required lubricant into the upper and lower kingpin grease fittings, until new lubricant flows from upper axle beam and knuckle locations, see grease purging from composite bearing in Figure 7-1.

FIGURE 7-1

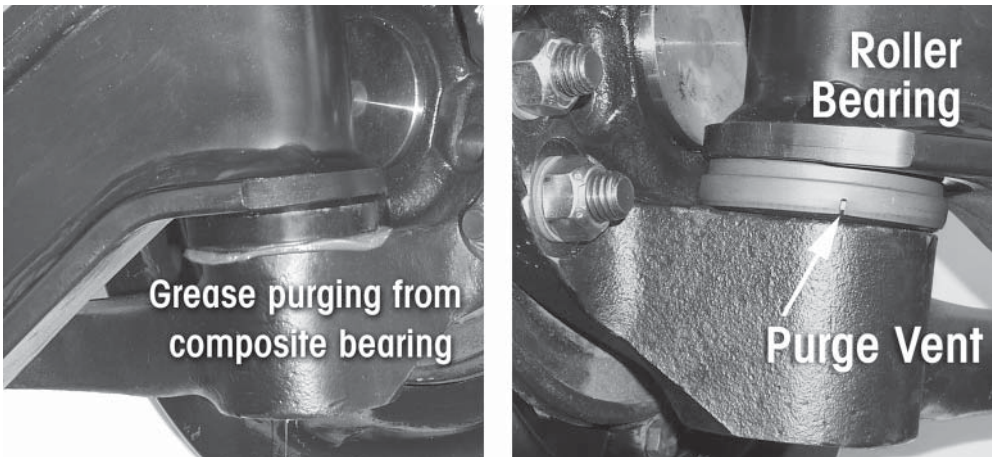


FIGURE 7-2

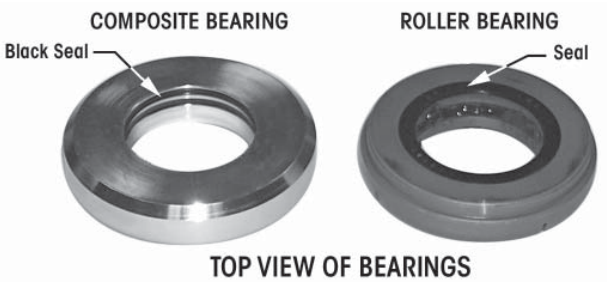


FIGURE 7-3

NOTE

Greasing at the lower zerk should purge grease from the thrust bearing shell. The left side of the axle has a composite style thrust bearing, see Figure 7-2 and the right side of the axle has a steel roller thrust bearing, see Figure 7-3. Both purge in the same area.

TIE ROD END LUBRICATION

LUBRICATION PROCEDURE

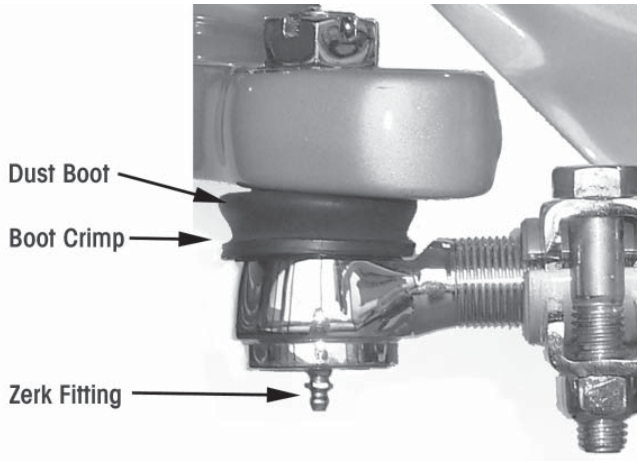
1. Turn the vehicle wheels straight ahead.
2. Wipe the zerk fitting and grease gun tip with clean shop towels.
3. Wipe the seal/boot clean with shop towels.
4. Attach a grease gun to the zerk fitting. Either a hand or pneumatic grease gun is acceptable. If air operated grease gun is used, system air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

⚠ CAUTION

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

5. Dirt, water, and discolored old grease should flow from the relief vents or purge holes near the boot crimp or bellows area, see Figure 7-4. Continue to purge grease until fresh grease flows from the purge area.

FIGURE 7-4



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

TIE ROD END INSPECTION

INSPECTION PROCEDURE

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

⚠ CAUTION

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

⚠ CAUTION

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

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

⚠ WARNING

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

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

⚠ WARNING

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

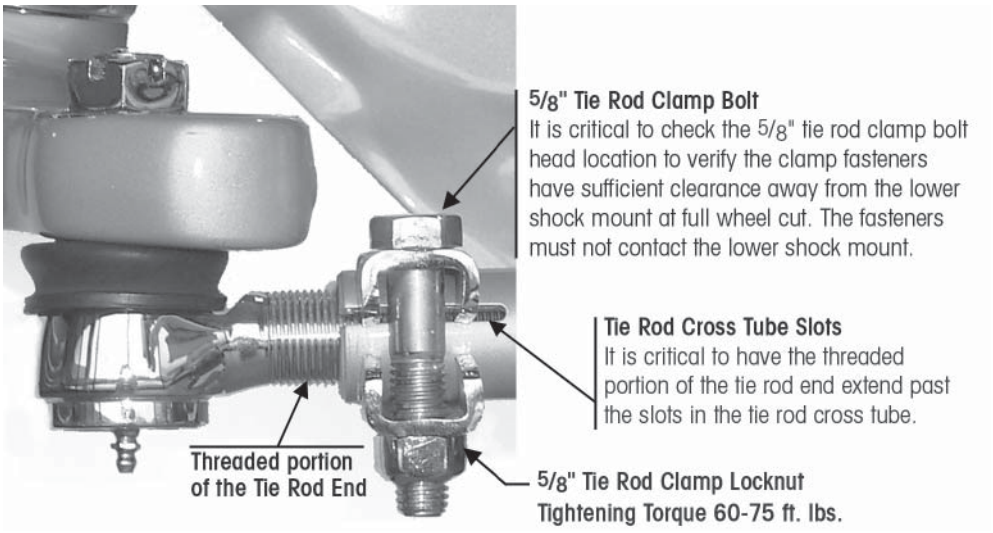
6. Verify the 5/8" tie rod clamp bolt head does not contact the lower shock mount at full wheel cut, see Figure 7-5.

⚠ WARNING

THE THREADED PORTION OF THE TIE ROD END MUST EXTEND PAST THE SLOTS INTO THE TIE ROD CROSS TUBE, SEE FIGURE 7-5. FAILURE TO DO SO CAN CAUSE COMPONENT DAMAGE, LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

7. Check that the tie rod end is threaded correctly into the cross tube and is engaged deeper than the end of the cross tube slot. The tie rod end must be visible the entire length of the cross tube slot, see Figure 7-5.

FIGURE 7-5



8. Check that zerk fittings are installed. Replace a damaged zerk fitting with a new one.

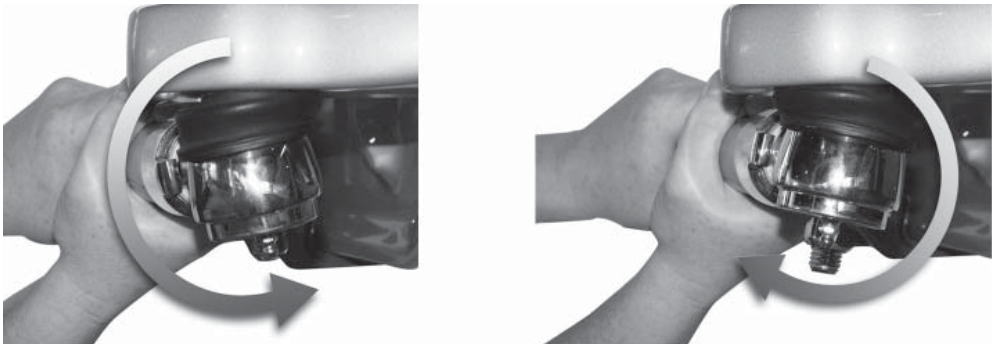
CAUTION

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 ARE USED.
- 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 IS APPLIED TO THE TIE ROD ENDS OR THE JOINTS OF THE ASSEMBLY.

9. By hand or using a pipe wrench, with jaw protectors to avoid gouging the cross tube, rotate the cross tube toward the front of the vehicle and then toward the rear. After rotating, center the cross tube. If the cross tube will not rotate in either direction, replace both tie rod ends, see Figure 7-6.

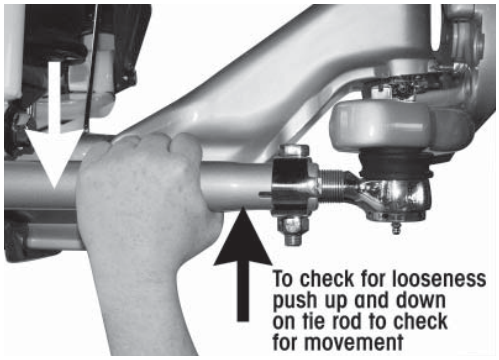
FIGURE 7-6



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

11. assembly, install a magnetic based dial indicator on the Ackermann arm, see Figure 7-8.
12. Set the dial indicator to zero.
13. Apply hand pressure with reasonable human effort vertically up and down in a push-pull motion several times (using approx. 50-100 lbs. of force). Observe the reading on the dial indicator.

FIGURE 7-7



14. If a tie rod end exhibits ≥ 0.125" of movement by hand, the vehicle should be removed immediately from use and the tie rod end be replaced.

FIGURE 7-8

NOTE

According to the Commercial Vehicle Safety Alliance (CVSA), the "out of service" criteria for any commercial vehicle is: Any motion other than rotational between any linkage member and its attachment point of more than ⅛" (3 mm) measured with hand pressure only. (393.209(d)), (published in the North American Standard Out-of-Service Criteria Handbook, April 1, 2006.)

CLAMP GROUP RE-TORQUE INTERVAL

1. Clamp group locknuts must be torqued to specification at preparation for delivery.
2. Clamp group locknuts must be re-torqued at 1,000 miles.
3. Thereafter follow the 6 month/ 25,000 mile inspection and annual re-torque interval.
4. Ensure that the clamp group is properly aligned and the hex bolts / U-bolts are seated in the top pad, and the bottom axle wrap is centered on the top axle wrap, see Figures 7-9.

FIGURE 7-9

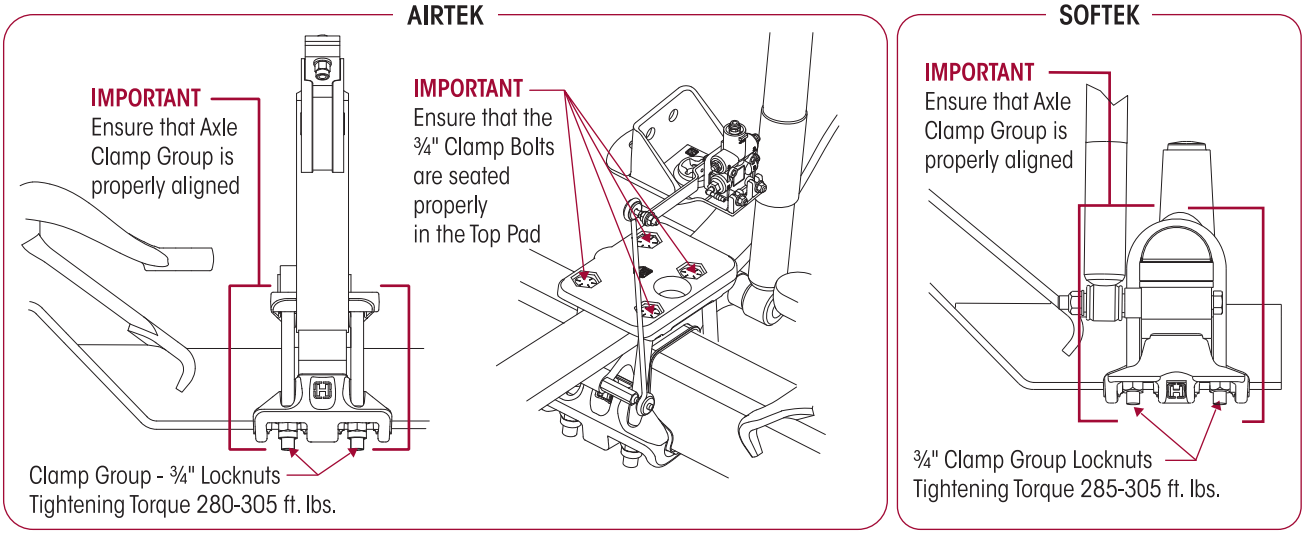
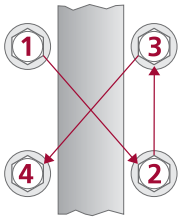


FIGURE 7-10



5. Tighten the clamp group locknuts evenly in 50 foot pounds increments to 280-305 foot pounds torque in the proper pattern to achieve uniform bolt tension, see Figure 7-10.
6. After tightening the clamp group, check for the signs of component or bolt movement.
7. If signs of movement are present, disassemble the clamp group fasteners, check for component wear or damage and replace as necessary, then install new clamp group fasteners and repeat Steps 1 through 5.

TIRE INSPECTION

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

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

The following tire Inspection guidelines are based upon Technology & Maintenance Council (TMC) recommended practices. Any issues regarding irregular tire wear where Hendrickson is asked for assistance will require tire and alignment maintenance records, reference TMC's literature numbers RP219A, RP230, or RP 642.

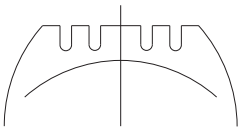
Tire wear is normally the best indicator of vehicle alignment condition. If tires are wearing too rapidly or irregularly, alignment corrections may be needed. The tire wear patterns described below can help isolate specific alignment problems.

The most common conditions of concern are:

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

FIGURE 7-11

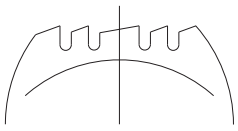
OVERALL FAST WEAR (Miles per 32nd)



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

FIGURE 7-12

FEATHER WEAR



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

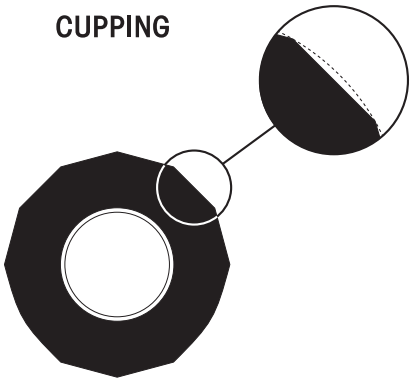
With one hand flat on the tread of the tire and a firm down pressure, slide your hand across the tread of the tire. In one direction, the tire will feel smooth and in the opposite direction there will be a sharp edge to the tread. Typical causes of feather wear include: excessive side force scrubbing,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

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

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

FIGURE 7-13

CUPPING



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

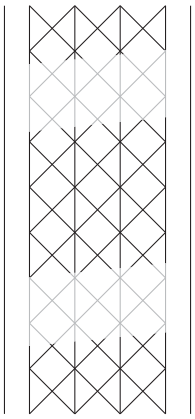
Cupping is usually a result of moderate-to-severe imbalance, improper rim/wheel mounting, excessive wheel end play or other assembly non-uniformity. It can also be due to lack of shock absorber control on some suspension types.

To solve cupping problems:

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

FIGURE 7-14

DIAGONAL WEAR



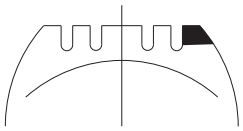
Diagonal Wear — Can be described as localized flat spots worn diagonally across the tread at approximately 25-35° angles, often repeating around the tread circumference. For more information, see TMC RP 219A publication, page 20.

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

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

FIGURE 7-15

RAPID SHOULDER WEAR (One Shoulder Only)



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

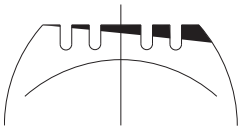
This wear condition is usually caused by excessive toe or excessive camber. These conditions can be created by a misaligned or bent axle and can also be caused by loose or worn wheel bearings.

To correct this type of rapid shoulder wear:

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

FIGURE 7-16

ONE-SIDED WEAR



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

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

To correct one-sided wear:

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

SHOCK ABSORBER INSPECTION

Hendrickson uses a long service life, premium shock absorber on all AIRTEK suspensions. When the shock absorber replacement is necessary, Hendrickson recommends that the shock absorbers be replaced with identical Hendrickson Genuine parts for servicing. Failure to do so will affect the suspension performance, durability, and will void the warranty.

Inspection of the shock absorber can be performed by doing a heat test, and a visual inspection. For instructions on shock absorber replacement see Component Replacement Section of this publication. It is not necessary to replace shock absorbers in pairs if one shock absorber requires replacement.

HEAT TEST

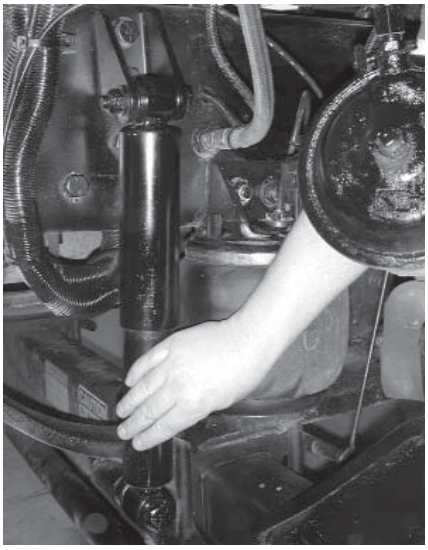
1. Drive the vehicle at moderate speeds on rough road for minimum of fifteen minutes.

WARNING

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

2. Lightly touch the shock body carefully below the dust cover, see Figure 7-17.
3. Touch the frame to get an ambient reference. A warm shock absorber is acceptable,a cold shock absorber should be replaced.
4. To inspect for an internal failure, remove and shake the suspected shock. Listen for the sound of metal parts rattling inside. Rattling of metal parts can indicate that the shock has an internal failure.

FIGURE 7-17



VISUAL INSPECTION

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

FIGURE 7-18

Damaged upper or lower mount

Damaged upper or lower bushing

Damaged dust cover and / or shock body

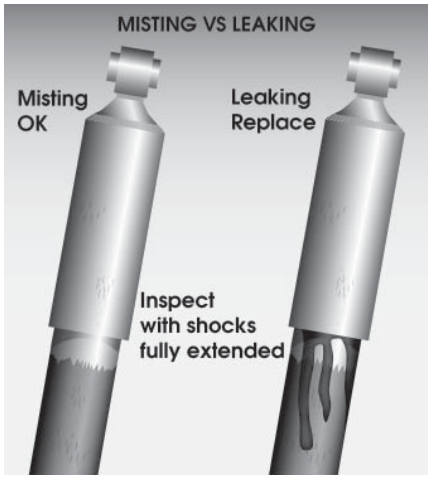
Bent or dented shock

Improper installation Example: washers (if equipped) installed backwards.

LEAKING VS. MISTING SHOCK VISUAL INSPECTION

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

FIGURE 7-19



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

NOTE

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

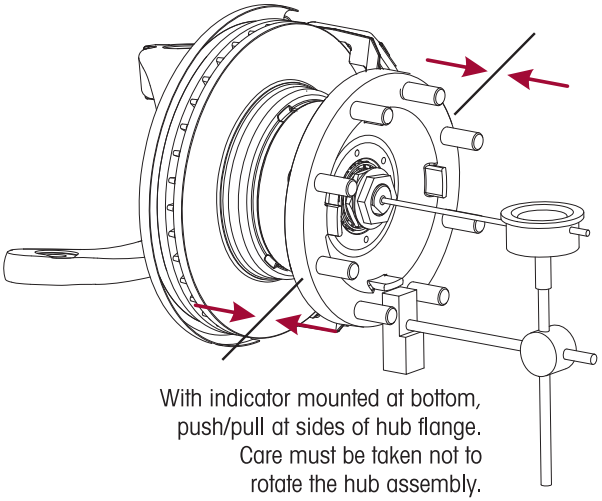
If the shock is damaged install new shock absorber as detailed in Component Replacement Section of this publication.

WHEEL BEARING END PLAY INSPECTION

This inspection can be made with or without the wheel assembly on the vehicle.

NOTE The correct specification to allow the wheel to rotate freely is 0.001" to 0.005" end play.

FIGURE 7-20



With indicator mounted at bottom, push/pull at sides of hub flange. Care must be taken not to rotate the hub assembly.

1. Verify end play with a dial indicator, see Figure 7-20. Wheel end play is the free movement of the wheel assembly along the spindle axis.
   a. Attach a dial indicator with its magnetic base to the hub.
   b. Adjust the dial indicator so that its plunger or pointer is against the end of the spindle with its line of action parallel to the axis of the spindle.
   c. Grasp the hub assembly at the 3 o'clock and 9 o'clock positions. Push the hub in and out while oscillating it to seat the bearings. Read bearing end play as the total indicator movement.

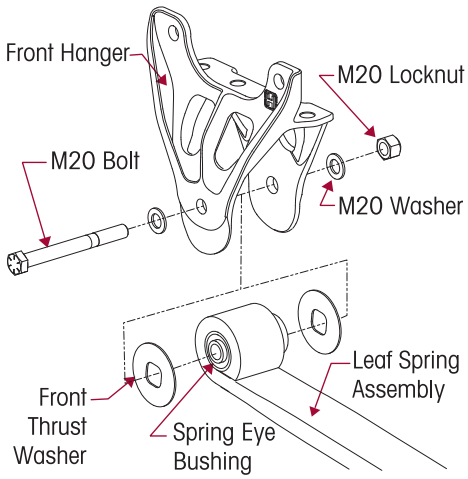
NOTE If end play is not within specification, an wheel bearing adjustment is required, see Wheel Bearing Adjustment in Alignment & Adjustments Section of this publication.

THRUST WASHER INSPECTION

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

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

FIGURE 7-21



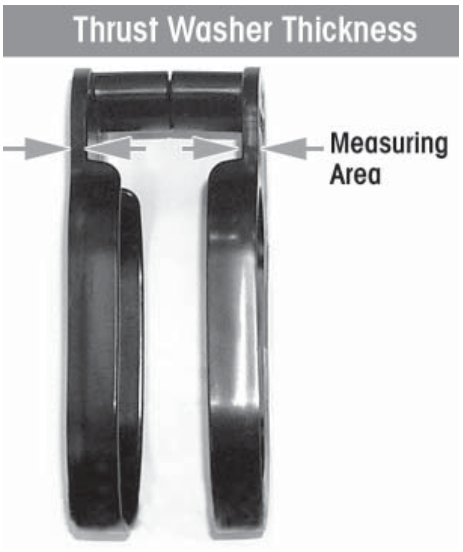
FRONT HANGER

1. Excessive lateral movement of the leaf spring.
2. Thrust washers are worn and cause the front leaf spring eye to rub against the inside of the front hanger, see Figure 7-21.
3. Normal and unacceptable thickness of the thrust washers can be measured with a micrometer or a ruler.
   - The **normal** thickness of a new thrust washer is 3/32" (0.09") or 2.3 mm
   - The **minimum** thickness allowable for a thrust washer is 1/16" (0.06") or 1.5 mm

REAR HANGER

1. Excessive lateral movement of the leaf spring.
2. The leaf spring taper is making contact with the rear hanger clamp or the rear hanger.
3. The location to measure the thrust washer thickness is shown in Figure 7-22. Thickness can be measured with a micrometer or a ruler.
   - The **normal** thickness of a new thrust washer is 7/32" (0.22") or 5.6 mm
   - The **minimum** thickness allowable for a thrust washer is 3/32" (0.090") or 2.3 mm

FIGURE 7-22



If one or more of these conditions is experienced, disassembly of the front/rear leaf spring hanger is required to replace the thrust washers.

If one 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 Thrust Washer replacement procedure in Component Replacement Section of this publication.

KINGPIN BUSHING INSPECTION

INSPECTION PROCEDURE (STEERING KNUCKLE LATERAL MOVEMENT)

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

FIGURE 7-23

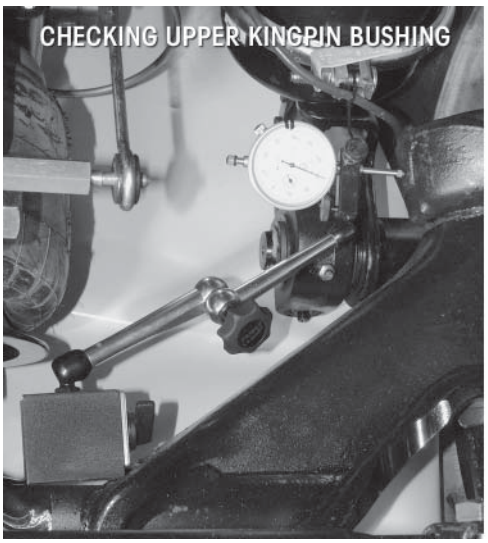
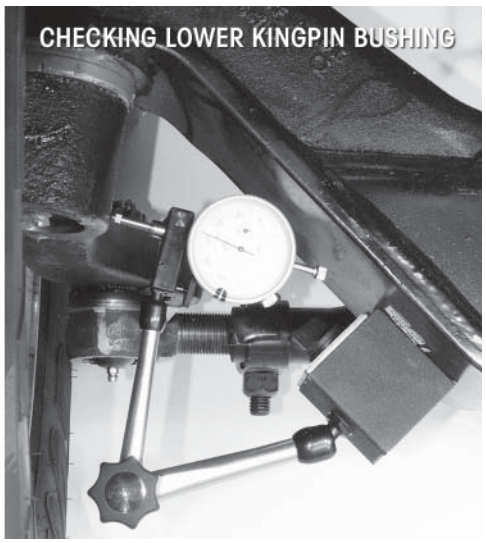


FIGURE 7-24



3. **CHECKING THE UPPER KINGPIN BUSHING**. Install the base of a dial indicator onto the axle beam and face the tip against the steering knuckle, see Figure 7-23.
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 7-25.
6. Check the reading on the dial indicator. If the dial indicator moves more than 0.015", the upper bushing is worn or damaged. Replace both bushings. Refer to the Kingpin Bushing replacement procedure in the Component Replacement Section of this publication.

FIGURE 7-25

7. **CHECKING THE LOWER KINGPIN BUSHING**. Install a dial indicator so that the base is on the axle and the indicator tip is against the inside of the bottom of the knuckle, see Figure 7-24.
8. Set the dial indicator to "0" zero.
9. Move the bottom of the tire in and out. If the dial indicator moves more than 0.015", the lower bushing is worn or damaged. Replace both kingpin bushings. Refer to the Component Replacement Section of this publication.

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

STEERING KNUCKLE INSPECTION

CHECKING VERTICAL END PLAY (UP AND DOWN MOVEMENT)

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

1. Chock the rear tires to help prevent the vehicle from moving.
2. Set the parking brakes.
3. Use a jack to raise the vehicle until both tires are 1" off the ground.
4. Place a dial indicator on each side of the axle as follows:

FIGURE 7-26

   a. Index the wheels slightly (left or right).
   b. Place the magnetic dial indicator base on the axle, see Figure 7-26.
   c. Place the tip of the dial indicator on the top of the upper steering knuckle (not on the grease cap).
5. Set the dial indicator to "0" (zero).
6. Lower the jack.
7. If vertical clearance is greater than 0.030", adjust the upper knuckle to obtain clearance specifications, if adjustment does not achieve clearance specification, 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 clearance specification. See Steering Knuckle Assembly in Component Replacement Section of this publication for proper shim installation.

8. If vertical clearance is below 0.008", adjust the upper steering knuckle to obtain the proper clearance specification, if adjustment does not achieve clearance specification, remove shims. See Steering Knuckle Assembly in Component Replacement Section of this publication for proper shim removal.

AXLE WRAP LINER INSPECTION

INSPECTION PROCEDURE

- 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 that the axle wrap liner be replaced.
- Liner Crack Criteria:

  It is possible for the axle wrap liner to crack during service. If the liner is cracked and all the pieces are intact it is not necessary to replace the liner. If the liner is broken out and there are pieces missing the liner must be replaced immediately, see Figure 7-27. See Axle Wrap replacement in Component Replacement Section of this publication.

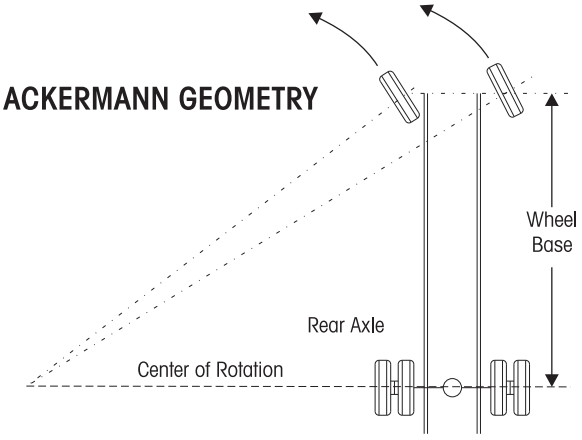
FIGURE 7-27

Axle Wrap Liners
Unacceptable Cracks

SECTION 8
Alignment & Adjustments

ALIGNMENT DEFINITIONS

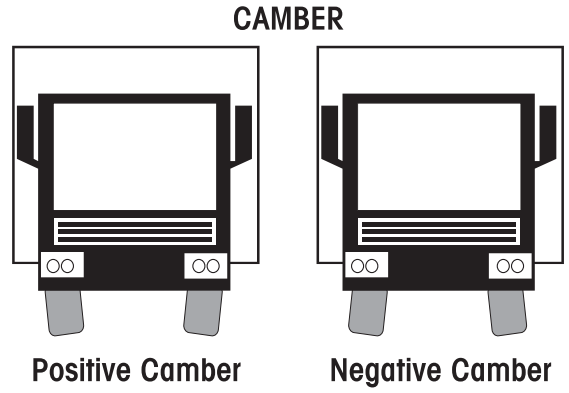
FIGURE 8-1



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

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

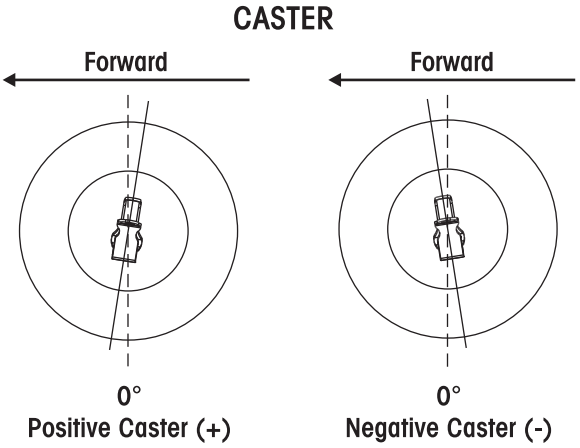
FIGURE 8-2



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

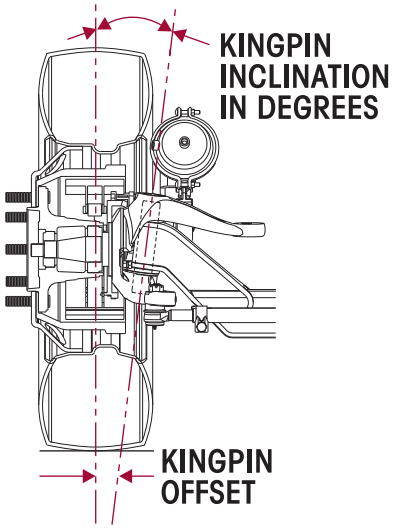
Excessive positive camber may cause smooth wear on the outer half of the tire tread. Excessive negative camber may cause wear on the inner half of the tread. Static-unloaded camber angles are built into the axle to put the loaded tire perpendicular to the road.

FIGURE 8-3



Caster — The forward or rearward tilt of the steering axle kingpin in reference to a vertical line. The angle is measured in degrees. Caster is positive when the top of the steering axis is 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.

FIGURE 8-4



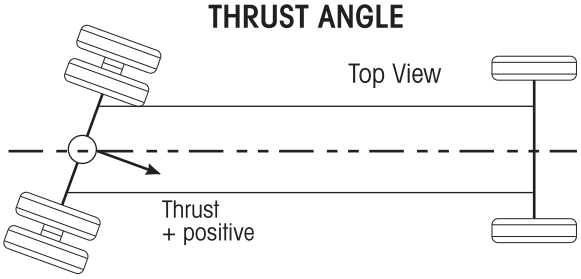
Kingpin Inclination (KPI) — The inward tilt of the kingpin from the vertical. This front suspension parameter has a pronounced effect on steering effort and returnability. As the front wheels are turned around an inclined kingpin, the front of the truck is lifted. This lifting of the vehicle is experienced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

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

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

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

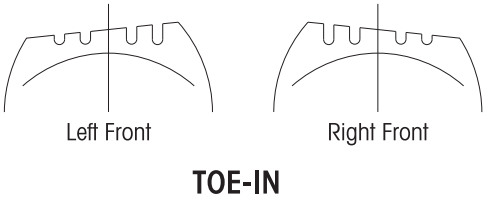
FIGURE 8-5



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.

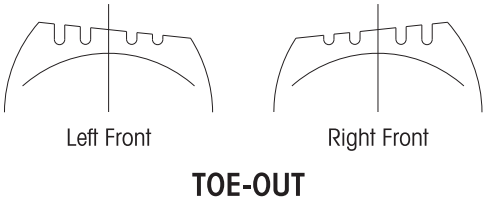
A steering correction is required to offset the effect of the thrust angles and keeps the vehicle traveling in a straight line. It results in a lateral offset between the steer and drive axle tires commonly referred to as "dog tracking."

FIGURE 8-6



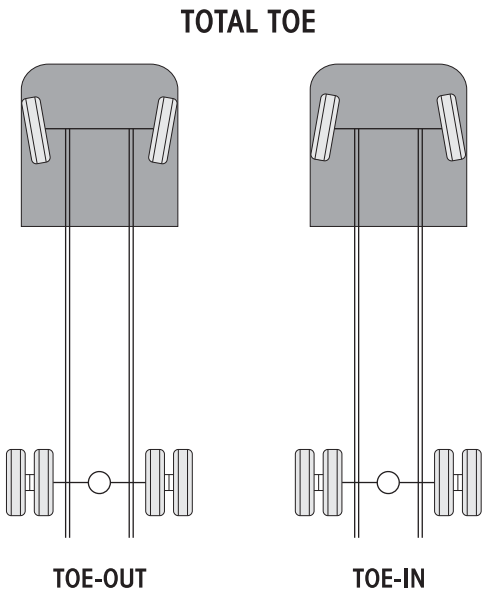
Toe-in — is when the horizontal line intersects in front of the wheels, or the wheels are closer together in front than in the back. Toe-in is commonly designated as positive, toe-out as negative. Excessive toe-in wears the outside edge of the tires. Steer axle toe is adjustable to reduce wear to the 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 the turning angles, the more that toe and camber change. If you have any doubt regarding the optimum turning angles for your operation, contact the vehicle's manufacturer, axle OEM, tire OEM and alignment equipment manufacturer for advice.

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

INSPECTION PRIOR TO ALIGNMENT

WHEELS AND TIRES

Examine the following items:

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

FRONT SUSPENSION

Inspect the following:

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

INSPECT TIE ROD ENDS

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

REAR AXLE AND REAR SUSPENSION

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

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

FRONT WHEEL ALIGNMENT

Hendrickson recommends technicians review The Technology & Maintenance Council's publication (TMC) "Guidelines for Total Vehicle Alignment" (TMC RP 642).

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

- Every 80,000 to 100,000 miles, or 12-18 months (normal maintenance).
- When the vehicle does not steer correctly.
- To correct a tire wear condition.

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

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

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

MINOR FRONT WHEEL ALIGNMENT

Perform the minor front wheel alignment in the following sequence:

1. Inspect all systems that affect wheel alignment. Refer to the Inspection Prior to Alignment in this section.
2. Check the wheel bearing endplay.
3. Check and adjust toe.
4. Check and adjust the vehicle ride height as specified in the Preventive Maintenance Section of this publication.

MAJOR FRONT WHEEL ALIGNMENT

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

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

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

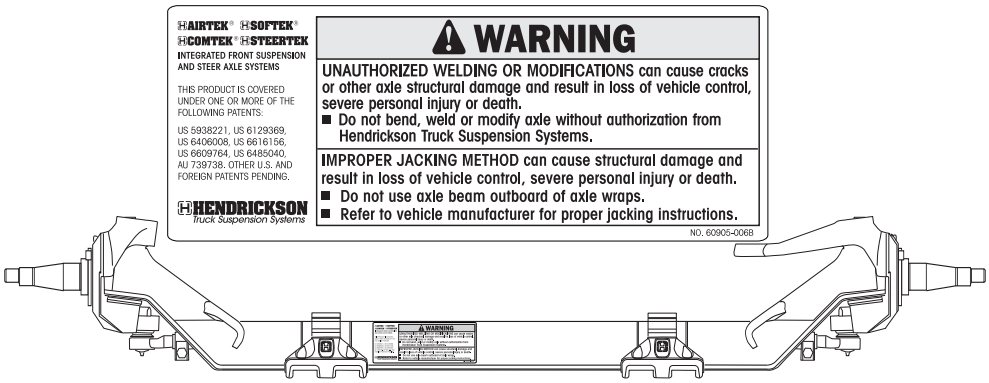
FIGURE 8-9

3. If the vehicle is equipped with power steering, check the pressure relief in the power steering system and reset if necessary. Refer to the vehicle manufacturer regarding the subject: Adjusting the Pressure Relief in the Power Steering System.
4. Check the turning angle. Refer to the original equipment manufacturer specifications.
5. Check the kingpin (or steering axis) inclination, refer to Kingpin Inclination under Alignment Definitions in this section.

⚠ WARNING

AXLE CAMBER IS NOT ADJUSTABLE. DO NOT CHANGE THE AXLE CAMBER ANGLE OR BEND THE AXLE BEAM. BENDING THE AXLE BEAM TO CHANGE THE CAMBER ANGLE CAN DAMAGE THE AXLE AND REDUCE AXLE STRENGTH, AND WILL VOID HENDRICKSON'S WARRANTY. A BENT AXLE BEAM CAN CAUSE LOSS OF VEHICLE CONTROL, POSSIBLY CAUSING PERSONAL INJURY OR PROPERTY DAMAGE, SEE FIGURE 8-10.

FIGURE 8-10



NOTE

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

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

NOTE

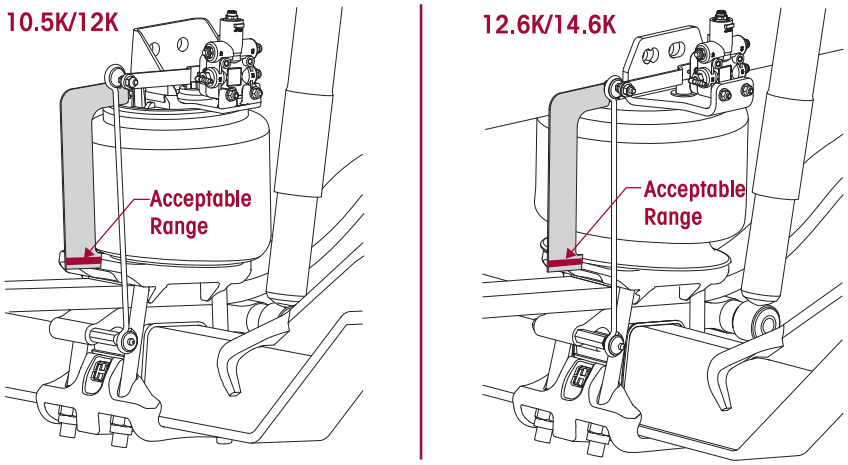
The use of two different angle caster shims will not change cross caster. Cross caster is the difference between the caster readings for left and right side of the vehicle.

9. Check and adjust toe-in, refer to adjusting the Toe-In under Alignment Definitions in this section.

AIRTEK – RIDE HEIGHT VERIFICATION

1. Drive the vehicle onto a level surface.
2. Free and center all suspension joints by slowly moving vehicle back and forth several times without using the brakes. It is **IMPORTANT** when coming to a complete stop to verify the brakes are released.
3. Chock drive wheels.
4. Verify that the air system is at full operating pressure.
5. Detach the lower rubber grommet of the height control valve linkage from the lower stud and exhaust the suspension system air by lowering the height control valve linkage arms.
6. Re-attach the lower grommet of the height control valve linkages onto the lower studs to fill the suspension system with air. Wait until the airflow to the front air springs has stopped.
7. Place the gauge so the flat surface of the gauge is against the side of the frame rail, the horizontal flat is sitting on top of the air spring bead plate, and is aligned to the bottom piston flange of the air spring as shown in Figure 8-11. Verify that the air spring height is within the "ACCEPTABLE" tolerance indicated on the gauge.
8. If the air spring piston flange edge contacts to the "BELOW SPEC" region, the ride is set too low. If the air spring piston flange contacts to the "ABOVE SPEC" region, the ride height is set too high.

FIGURE 8-11

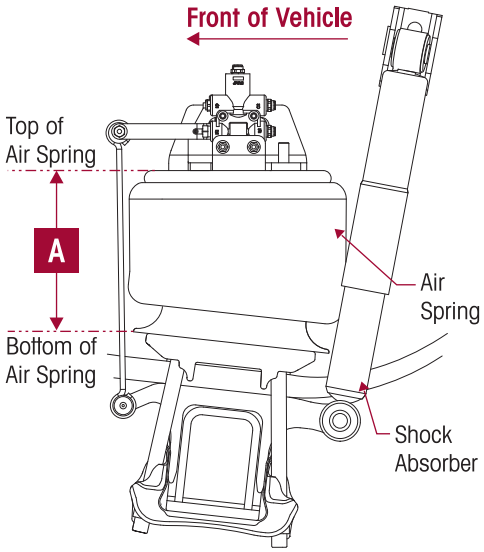


9. If a gauge is not available, measure the suspension reference ride height on the front axle (top front of the air spring to the bottom of the air spring flange), see Figure 8-12.

Capacity	Reference Ride Height A (see Figure 8-12)
12.6K / 14.6K	7¾" ± 1/8"
10.5K / 12K	7½" ± 1/8"

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

FIGURE 8-12



ADJUSTMENT PROCEDURE

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

SERVICE HINT

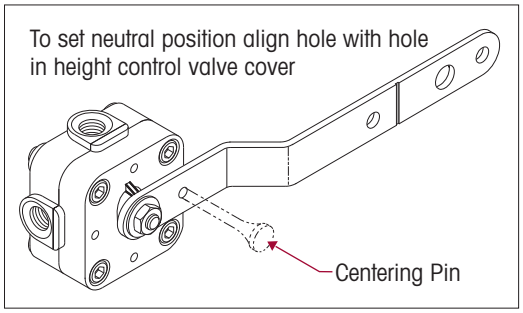
It is very important that the leveling valve be cycled completely before and after any ride height adjustments. Cycling of the leveling valve will help make the adjustment more accurate.

⚠ 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.

2. See additional Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to deflating or inflating the air system.
3. Detach the lower rubber grommet(s) of the height control valve linkage(s) from the lower stud and exhaust the suspension system air by lowering the height control valve linkage arm.
4. Refill the suspension by raising the height control valve arm(s) by hand, so that the air springs are above the proper ride height.
5. Lower the leveling 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 leveling arm(s) with the hole in the height control valve cover, as shown in Figure 8-13. **DO NOT** use a metal rod or nail as this may cause damage to the height control valve.

FIGURE 8-13



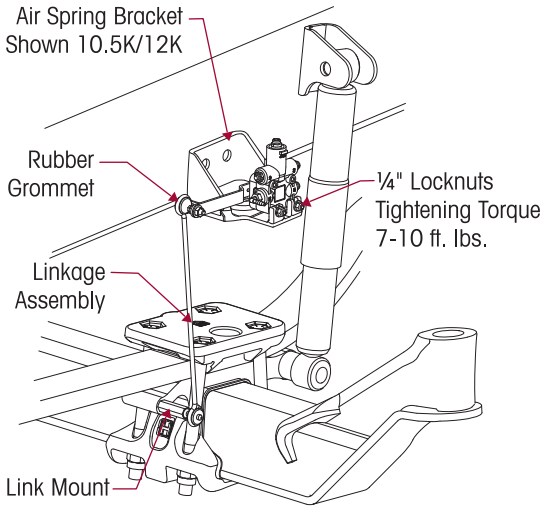
NOTE

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.

7. Prior to adjusting the height control valves, clean the threads of the mounting fasteners of any debris and corrosion.
8. To adjust the height control valve, loosen the mounting locknuts.
9. Adjust the height control valves by loosening the mounting locknuts and pivoting the valve body about the mounting bolt so the link mount stud inserts directly into the center hole of the rubber grommet at the proper height. Check the rubber grommet for any tearing or damage, replace as necessary.
10. Facing the air spring from the outboard side for the left side of the vehicle, pivot the valve body counter clockwise to increase the ride height and counter clockwise to decrease the ride height. For the right side of the vehicle, pivot the valve body clockwise to increase the ride height and counter clockwise to decrease the ride height.
11. Tighten the mounting locknuts to 7-10 foot pounds torque after the adjustment is made, see Figure 8-14. 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 from the height control valves.

13. Cycle the air from the system by lowering the height control valve arm.
14. Reconnect the height control valve linkage rubber grommet to the link mounts. Allow the air suspension system to completely fill with air.
15. Recheck the ride height after adjustment, (if equipped with dual height control valves check both sides of the vehicle).
16. Repeat adjustments Steps 2 through 13 until the ride height is within specification.

FIGURE 8-14



STEERING STOP

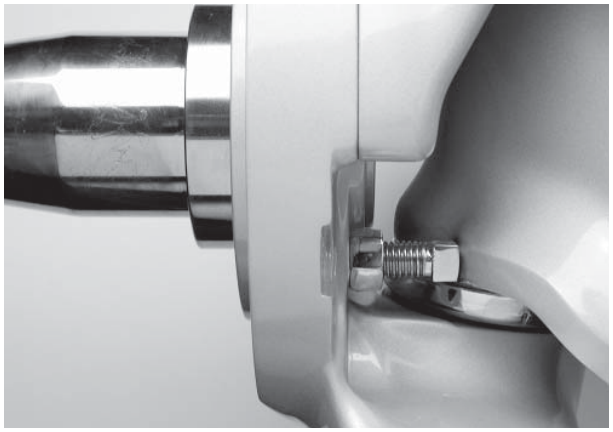
ADJUSTMENT PROCEDURE

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

The steering stop adjustment procedure is as follows:

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

FIGURE 8-15



NOTE

It is very important that the sides of the square head axle stops are set parallel to the axle beam to ensure a good contact point on the axle, see Figure 8-15.

5. Decrease the wheel cut by loosening the jam nuts and screw the axle stops out counter-clockwise.
6. Tighten the jam nuts to 40-60 foot pounds torque.
7. Measure the wheel cut and check for any interference with related steering components.

⚠ WARNING

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

WHEEL BEARING ADJUSTMENT

This procedure follows the guidelines of TMC RP 618.

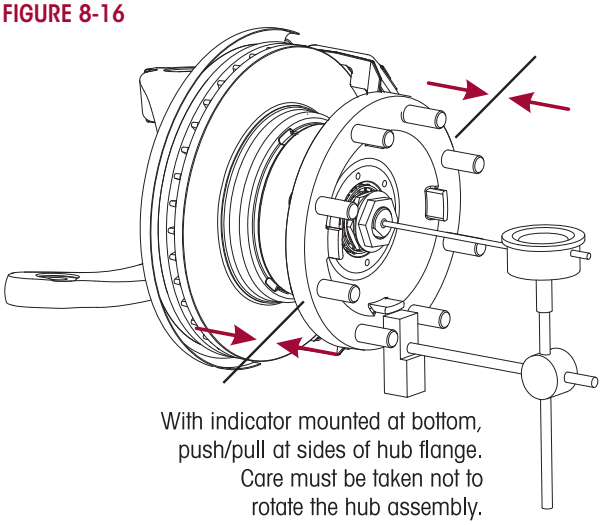
1. Lubricate the bearing with clean axle lubricant of the same type used in the hub assembly.
2. After the wheel hub and bearings are assembled on the spindle, tighten the inner wheel bearing adjusting nut to 200 foot pounds torque while rotating the wheel hub assembly.
3. Back off the inner wheel bearing adjusting nut one full turn. Rotate the wheel.
4. Re-tighten the inner wheel bearing adjusting nut to 50 foot pounds torque while rotating the wheel hub assembly.
5. Back off the inner wheel bearing adjusting nut one third turn.
6. Install the locking washer. If dowel pin and washer are not aligned, remove the washer and turn it over and reinstall. If required, loosen the inner wheel bearing adjusting nut just enough for alignment.

⚠ CAUTION

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

7. Install and tighten the outer (jam) nut to 240-260 foot pounds torque.

FIGURE 8-16



With indicator mounted at bottom, push/pull at sides of hub flange. Care must be taken not to rotate the hub assembly.

8. Verify end play with a dial indicator, see Figure 8-16. Wheel end play is the free movement of the wheel assembly along the spindle axis.
   a. Attach a dial indicator with its magnetic base to the hub.
   b. Adjust the dial indicator so that its plunger or pointer is against the end of the spindle with its line of action parallel to the axis of the spindle.
   c. Grasp the hub assembly at the 3 o'clock and 9 o'clock positions. Push the hub in and pull out while oscillating it to seat the bearings. Care must be taken not to rotate the hub assembly. Read bearing end play as the total indicator movement.

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

9. Re-adjustment Procedure
   - **Excessive End Play** — If the end play is too loose, remove the outer (jam) nut and pull the washer away from the inner wheel bearing adjusting nut, but not off the spindle. Tighten the inner wheel bearing adjusting nut to the next alignment hole of the washer. Reassemble the washer and re-tighten the outer (jam) nut to 240-260 foot pounds torque. Verify end play with a dial indicator.
   - **Insufficient End Play** — If end play is not present, remove the outer (jam) nut and pull the washer away from the inner wheel bearing adjusting nut, but not off the spindle. Loosen the inner wheel bearing adjusting nut to the next alignment hole of the washer. Re-assemble the washer and re-tighten the outer (jam) nut to 240-260 foot pounds torque. Verify end play with a dial indicator.

- **Fine Tuning Adjustment** — If after performing the readjustment procedures, end play is 0.001"-0.005" range, if less play is desired, repeat the appropriate procedures, removing the washer from the spindle, tighten or loosen the inner wheel bearing adjusting nut the equivalent of ½ of an alignment hole, or reversing the alignment washer, and re-installing it onto the spindle. Reassemble and re-tighten the outer (jam) nut to 240-260 foot pounds torque. Verify end play with a dial indicator.

Secure outer nut by bending one washer tang over the outer nut.

CAUTION

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

TOE SETTING

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

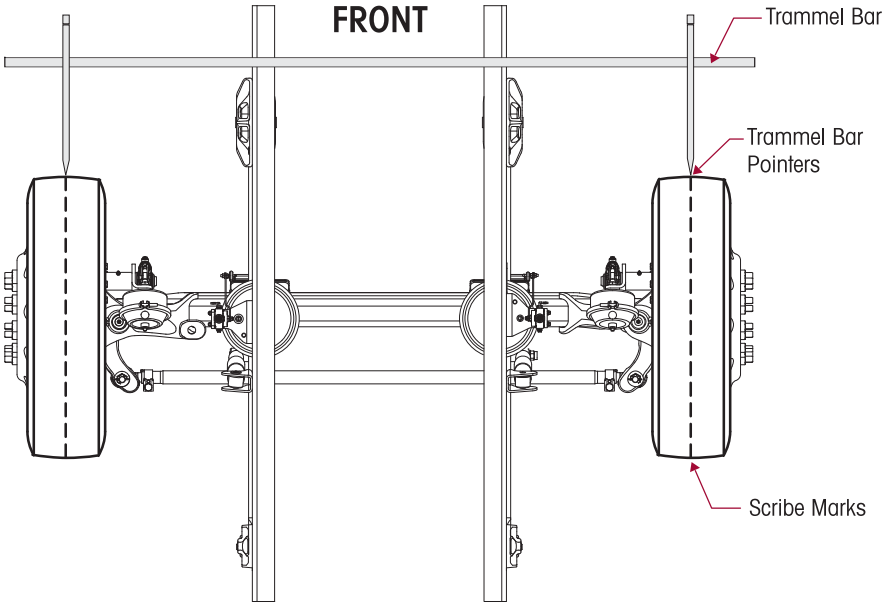
NOTE Do not measure toe-in with the front axle off the ground. The weight of the vehicle must be on the front axle when toe-in is measured.

7. Use a trammel bar and measure the distance between the scribe marks at the rear of the steer axle tires. Record the measurement.
8. Install the trammel bar and measure the distance between the scribe marks at the front of the steer axle tires. Record the measurement, see Figure 8-17.

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

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

FIGURE 8-17



10. If the toe measurement is not within the specifications of 1/16" ± 1/32" (0.06" ± 0.03"), it will be necessary to adjust the toe setting. Refer to the following procedure.
    a. Loosen the tie rod cross tube clamp bolts and locknuts.
    b. Turn the tie rod cross tube until the specified toe-in distance is achieved.

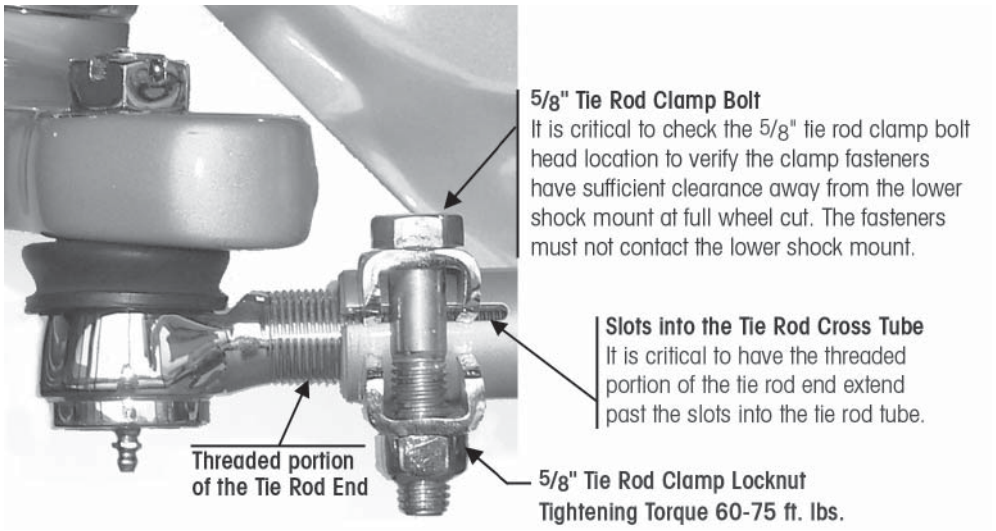
WARNING

THE THREADED PORTION OF THE TIE ROD END MUST EXTEND PAST THE SLOTS INTO THE TIE ROD CROSS TUBE, SEE FIGURE 8-18. FAILURE TO DO SO CAN CAUSE COMPONENT TO FAIL CAUSING LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

    c. Tighten the bolt and locknut on the tie rod cross tube to 60-75 foot pounds torque.

11. Repeat Steps 1 through 9 until the correct toe setting is achieved.

FIGURE 8-18



SPRING EYE RE-TORQUE

This procedure to re-torque is necessary when replacing

- Front hanger
- Rear hanger
- Steel leaf spring

AIRTEK RE-TORQUE PROCEDURE

1. Chock the wheels.
2. Remove the front fairing or air tank(s) if equipped.

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.

3. Deflate the air springs by removing the height control valve linkage and lowering the linkage arm. This will exhaust the air pressure in the air springs.
4. Raise the truck and install frame stands in front of the leaf spring hangers under the radiator area or behind the rear spring mounts.
5. Lower the front axle. Allow at least 3" of wheel clearance to the ground. The shock absorbers must be connected. **DO NOT** reverse arch springs.

⚠ WARNING

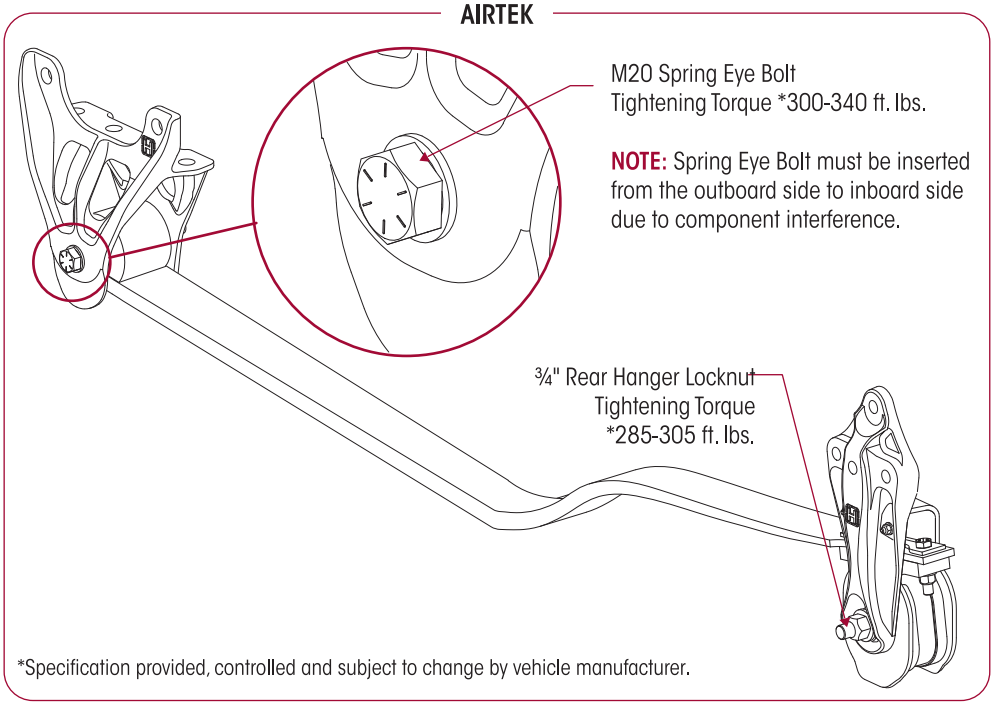
ANYTIME THE FRONT AXLE ON AN AIRTEK SUSPENSION IS SUSPENDED IT IS MANDATORY THAT THE SHOCK ABSORBERS REMAIN CONNECTED. THE SHOCK ABSORBERS ARE THE REBOUND TRAVEL STOPS FOR THE SPRINGS. FAILURE TO DO SO COULD CAUSE THE AIR SPRINGS TO EXCEED THEIR MAXIMUM LENGTH, CAUSING THE AIR SPRINGS TO SEPARATE FROM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

6. Loosen all four (4) front and rear spring eye bolts, see Figure 8-19. The suspension may drop down slightly.

NOTE

DO NOT remove the spring eye bolts. The tires must not contact the ground.

FIGURE 8-19



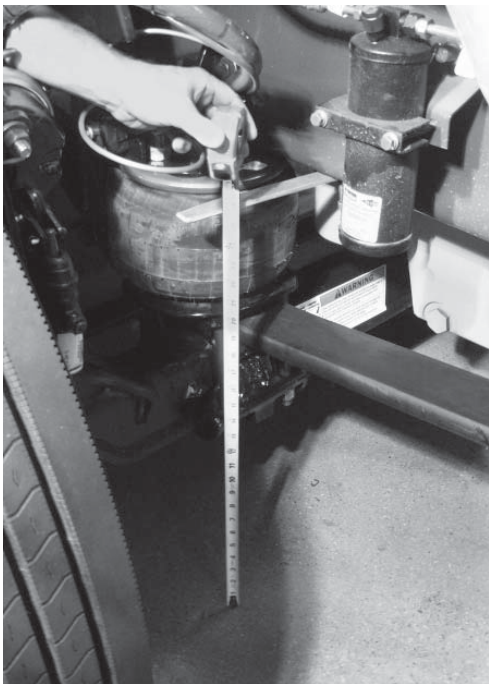
7. Let the suspension settle.
8. Tighten the M20 front leaf spring eye and ¾" rear spring mount fasteners to vehicle manufacturer's specifications.
9. Jack the front axle and remove the frame stands.
10. Lower the vehicle.

⚠ WARNING

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

11. Reconnect the height control valve and air up the system.
12. Measure using one of the following methods.

FIGURE 8-20



METHOD A

a. Affix a straight edge to the bottom of the frame rail in front of the air spring, see Figure 8-20.

b. 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.

METHOD B

a. Measure from the centerline of the front spring eye bolt to the ground on both side of the vehicle and record the measurements.

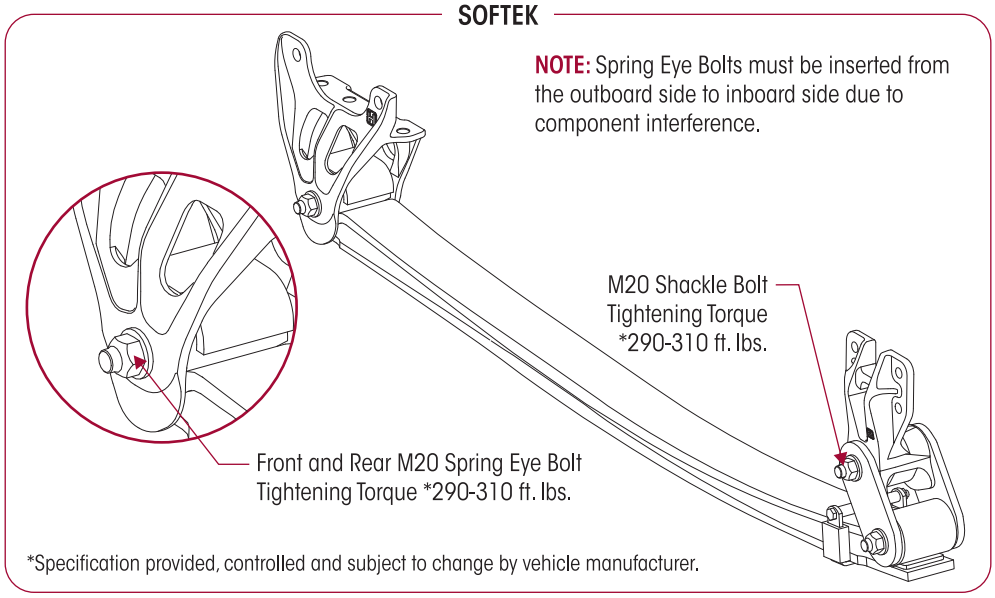
13. Subtract the difference from one side to the other.
14. Do a road test and repeat measurement Steps 12 through 14.
15. If the measurement is acceptable if less than ⅜". If measurement is more than ⅜" contact the vehicle manufacturer.
16. Attach the front fairing or air tanks if removed.
17. Remove the wheel chocks.

SOFTEK RE-TORQUE PROCEDURE

1. Chock the wheels.
2. Loosen all six (6) front and rear spring eye bolts, see Figure 8-21.

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

FIGURE 8-21



3. Let the suspension settle.

4. Tighten the front M20 spring eye bolt locknuts to vehicle manufacturer's specifications.
5. Tighten the rear M20 spring eye bolt and shackle bolt locknuts to vehicle manufacturer's specifications.
6. Affix a straight edge to the bottom of the frame rail behind frame hanger, see Figure 8-20.
7. 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.
8. Measure the difference from one side to the other.
9. Do a road test and repeat measurement Steps 7 to 9.
10. If the measurement is less than ⅜" the vehicle is level. If measurement is more than ⅜" contact Hendrickson Tech Services.

SECTION 9
Component Replacement

FASTENERS

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

AIRTEK – HEIGHT CONTROL VALVE

DISASSEMBLY

1. 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.

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

⚠ CAUTION

THE HEIGHT CONTROL VALVE FITTINGS ARE NON-SERVICEABLE. IF THE HEIGHT CONTROL VALVE IS TO BE RE-INSTALLED; CARE MUST BE TAKEN TO REMOVE DIRT AND DEBRIS FORM THE PUSH-TO-CONNECT FITTINGS. FAILURE TO DO SO CAN RESULT IN THE PUSH-TO-CONNECT FITTINGS FAILING TO SEAL PROPERLY WITH THE AIR LINE.

4. Disconnect the air line(s) from the height control valve(s), see Figure 9-1.
5. Remove the mounting locknuts and washers.
6. Remove the height control valve .

FIGURE 9-1

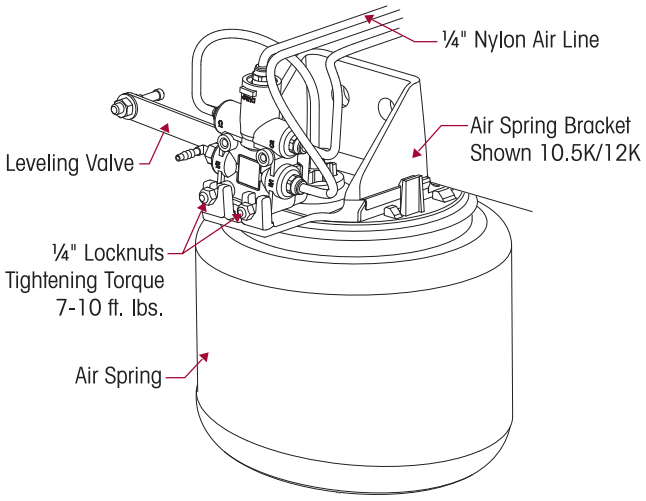
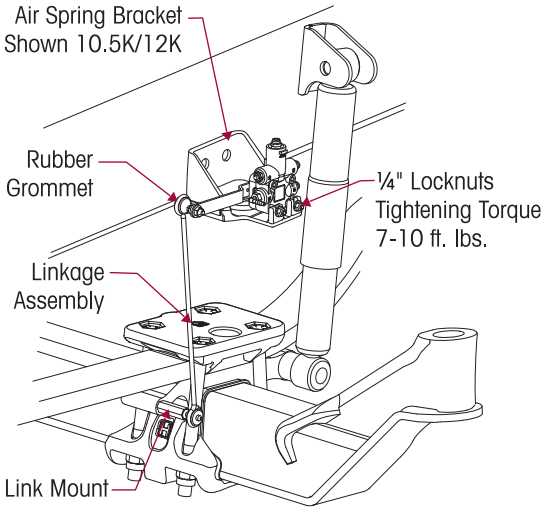


FIGURE 9-2



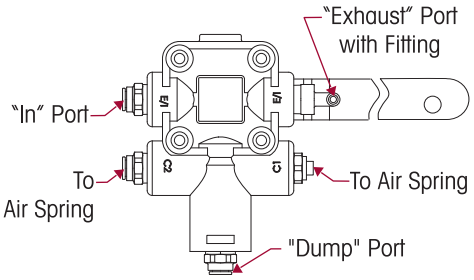
ASSEMBLY

1. Attach the height control valve(s) on the mounting bracket as shown in Figure 9-1.
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 the flange of the upper air spring bracket, see 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. Attach the air lines to the height control valve(s), see Figure 9-3.
4. Install the height control valve linkage assembly(s).
5. Adjust the height control valve(s) to proper specifications. See Alignment & Adjustments Section of this publication for proper ride height adjustment.
6. After the adjustment is made, install a 3/16" allen wretch in the bottom socket head cap screws to prevent the screws from turning while tightening to torque the ¼" in locknuts.
7. Tighten the ¼" locknuts to 7-10 foot pounds torque.

AIRTEK – AIR SPRING

■ 10.5K/12K Capacity

DISASSEMBLY

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

⚠ WARNING

WHEN SERVICING 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 BRACKET PROPERLY, THE LOCK TABS ARE SNAPPED INTO PLACE, AND THE AIR SPRING IS FULLY SEATED ON THE AIR SPRING BRACKET. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN PREMATURE AIR SPRING FAILURE AND CAUSE PERSONAL INJURY, OR PROPERTY DAMAGE.

⚠ CAUTION

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

⚠ 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.

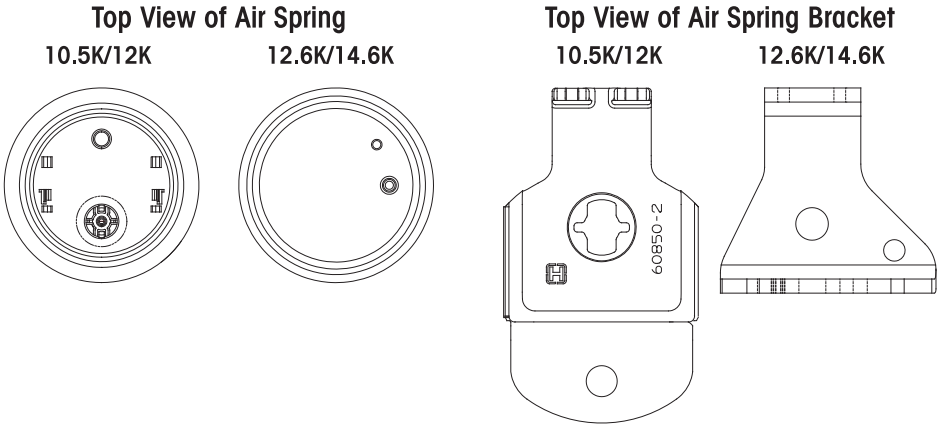
3. See additional Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to deflating or inflating the air system.
4. Remove the air from the air system by disconnecting the height control valve linkage at the rubber grommet and allowing the lever to drop. This will exhaust air from the system.
5. Raise the vehicle with floor jack.

6. Support the frame with frame stands.
7. Lower the axle.
8. Raise the frame to allow for air spring removal.
9. Remove air lines from the air springs.
10. Separate the air spring from the upper air spring bracket by applying downward pressure on air spring, see Figure 9-4, pushing outward on the lock-tabs outside the bracket, and inward on inlet lock-tabs, see Figure 9-6 for lock locations. This will dislodge the air spring from the upper air spring bracket.
11. 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 9-5.
12. Remove the air spring.

FIGURE 9-4

FIGURE 9-5

FIGURE 9-6



ASSEMBLY

1. Compress the air spring and slide into vertical position. There is a locating nodule on the air spring to index the position in the upper air spring bracket. Make sure the lock tabs click in place.
2. 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 9-6.
3. Properly seat the air spring piston into the top axle pad and install the air line into the air spring.

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.

⚠ WARNING

WHEN SERVICING 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 BRACKET PROPERLY, THE LOCK TABS ARE SNAPPED INTO PLACE, AND THE AIR SPRING IS FULLY SEATED ON THE AIR SPRING BRACKET. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN PREMATURE AIR SPRING FAILURE AND CAUSE PERSONAL INJURY, OR PROPERTY DAMAGE.

4. See additional Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to deflating or inflating the air system.
5. Remove the frame stands and lower the frame.
6. Air up the suspension.
7. Check the air spring for leaks.
8. Check the ride height and adjust if necessary. See Alignment & Adjustments Section of this publication for the proper ride height adjustment.
9. Remove the wheel chocks.

12.6K/14.6K Capacity

DISASSEMBLY

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

⚠ WARNING

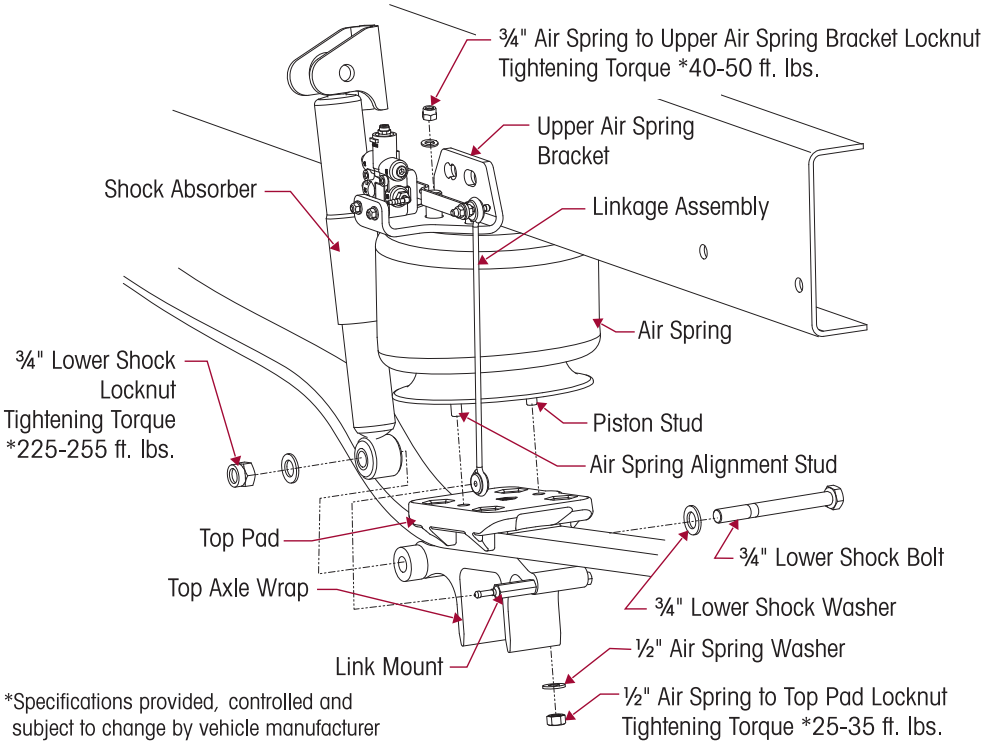
WHEN SERVICING THE VEHICLE OR ATTACHING AN AIR SPRING AND THE VEHICLE IS ON THE GROUND, PRIOR TO AIRING THE SUSPENSION SYSTEM MAKE CERTAIN THE AIR SPRING LOCATOR IS INDEXED INTO THE UPPER AIR SPRING BRACKET PROPERLY, AND THE AIR SPRING IS FULLY SEATED ON THE TOP PAD. FAILURE TO FOLLOW THESE INSTRUCTIONS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

⚠ WARNING

PRIOR TO AND DURING DEFLATION AND INFLATION OF THE 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 deflating or inflating the air system.
6. Remove the air from the air system by disconnecting the height control valve linkage(s) at the rubber grommet(s) and allowing the lever(s) to drop. This will exhaust air from the system.
7. If the air spiring is damaged and the suspension is deflated, it will be necessary to raise the frame and support the vehicle with frame stands to obtain adequate clearance for air spring removal.
8. Disconnect the ¼" NPT air fitting from the air spring.
9. Remove the lower ½" air spring locknut from the piston stud to remove the air spring from the top pad, see Figure 9-7.
10. Remove the ¾" upper air spring locknut from the air spring bracket.
11. Remove the air spring.

FIGURE 9-7



*Specifications provided, controlled and subject to change by vehicle manufacturer

ASSEMBLY

1. Compress the air spring and slide into 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 pad. Secure the ½" inboard stud locknut to the piston, see Figure 9-7.
4. Tighten the ¾" upper air spring locknuts and the ½" lower air spring locknuts to vehicle manufacturer's specifications.

⚠ WARNING

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

5. Install the air line into the air spring.
6. Remove the frame stands and lower the frame.
7. See additional Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to deflating or inflating the air system.
8. Air up the suspension.
9. Check the air spring for leaks.
10. Check the ride height and adjust if necessary. See Alignment & Adjustments Section of this publication for the proper ride height adjustment.
11. Remove the wheel chocks.

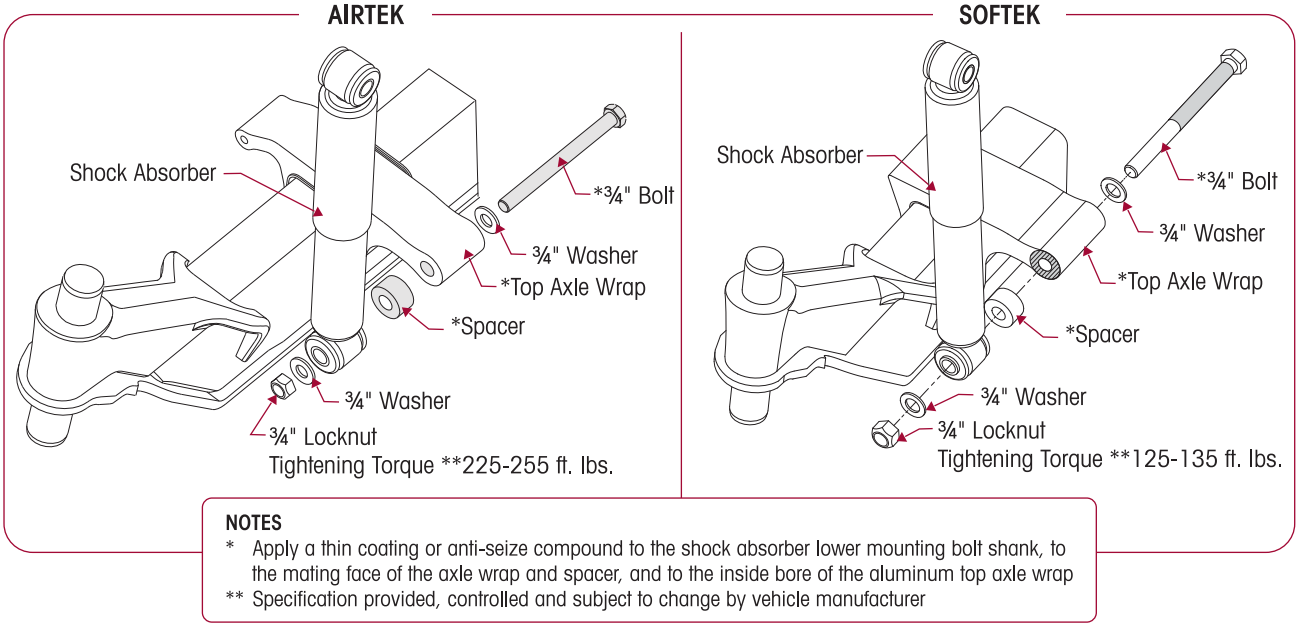
AIRTEK / SOFTEK – SHOCK ABSORBER

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

WARNING

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

FIGURE 9-8



NOTES

* Apply a thin coating or 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 top axle wrap

** Specification provided, controlled and subject to change by vehicle manufacturer

DISASSEMBLY

1. Place the vehicle on a level floor.
2. Chock the wheels.
3. Remove the lower mounting bolts and fasteners.
4. Remove the upper mounting bolts and fasteners.
5. Slide out the shock absorber.
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 mounting bracket.
2. Install the upper shock mounting bolt, washers and locknut.
3. 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.
4. Install the lower bolt from the inboard side to the outboard side of the top axle wrap and attach the spacer, washer and locknut, see Figure 9-8.
5. Tighten both shock eye locknuts to vehicle manufacturer's specifications.
6. Remove wheel chocks.

AIRTEK – FRONT LEAF SPRING FRAME HANGER

DISASSEMBLY

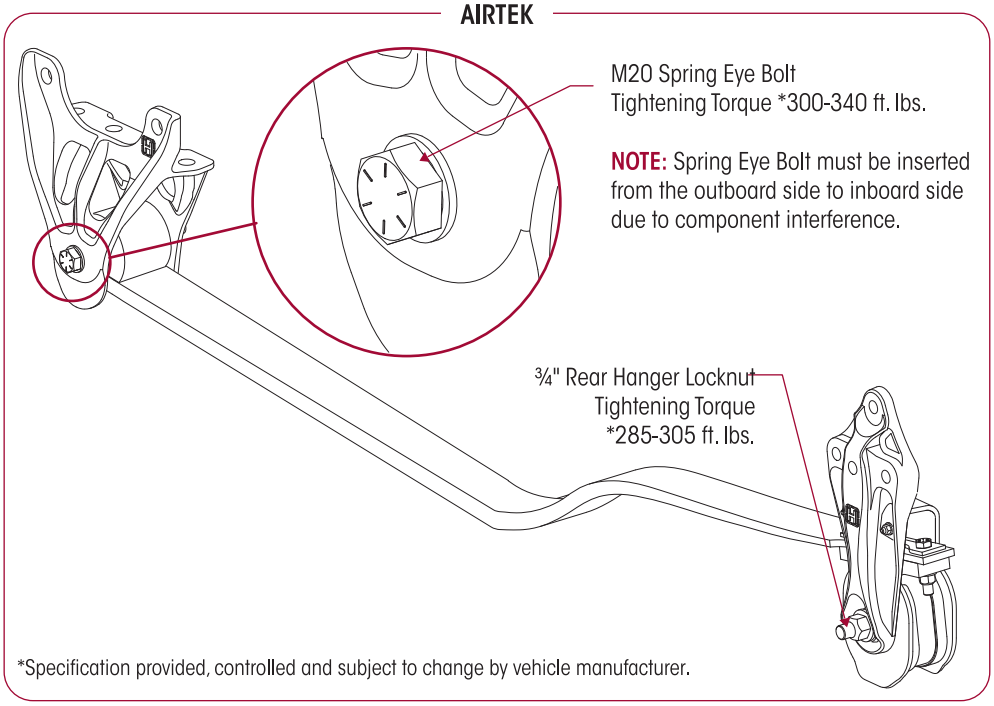
1. Place the vehicle on a level floor.
2. Chock the wheels.
3. Raise the frame.
4. Support the frame with frame stands.
5. Suspend the front axle from the shocks.
6. Remove the leaf spring eye bolt, washers and locknut.

SERVICE HINT

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

7. Remove the frame mounting fasteners from the hanger. See manufacturer's guidelines.
8. Remove the hanger from the vehicle, see Figure 9-9.

FIGURE 9-9



ASSEMBLY

1. Install the new hanger on the frame.
2. Install new frame fasteners. Follow manufacturer's guidelines.
3. Snug the new M20 leaf spring eye bolt from the outboard side of the hanger, see Figure 9-9, washers and locknut. **DO NOT** tighten.
4. Remove the frame stands and lower the frame.
5. Tighten M20 locknut to vehicle manufacturer's specifications at proper ride height.
6. Remove wheel chocks.

SOFTEK – FRONT LEAF SPRING FRAME HANGER

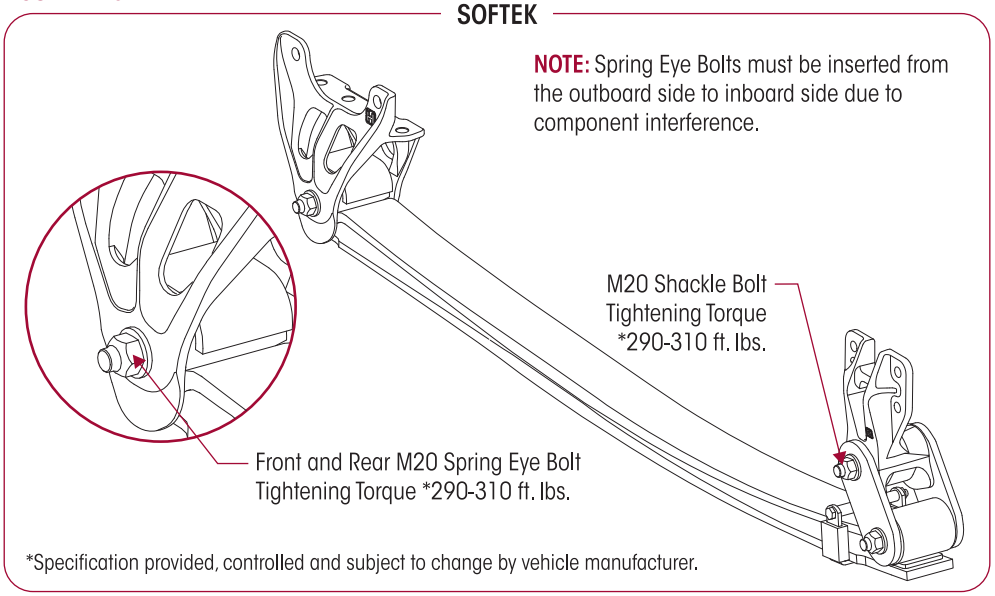
DISASSEMBLY

1. Place the vehicle on level floor.
2. Chock the wheels.
3. Raise the frame.
4. Support the vehicle with frame stands.
5. Suspend the front axle from the shocks.
6. Remove the M20 spring eye bolt, washers and locknut.

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

7. Remove the frame mounting fasteners from the hanger. See manufacturer's guidelines.
8. Remove the hanger from the vehicle, see Figure 9-10.

FIGURE 9-10



ASSEMBLY

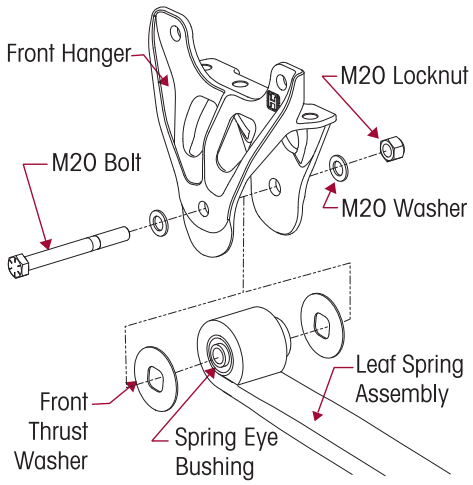
1. Install the new hanger on the frame.
2. Install new frame fasteners. Follow manufacturer's guidelines.
3. Install the new M20 spring eye bolt from the outboard side of the hanger, see Figure 9-10, washers and locknut.
4. Remove the frame stands and lower frame.
5. Tighten M20 shackle locknut to vehicle manufacturer's specifications.
6. Remove the wheel chocks.

AIRTEK – FRONT HANGER THRUST WASHERS

DISASSEMBLY

1. Place the vehicle on a level floor.
2. Chock the wheels.
3. Raise the vehicle.
4. Support the vehicle with frame stands.
5. Suspend the front axle to remove the load from the leaf spring assemblies.
6. Support the axle with a floor jack with a four (4") inch lifting plate.

FIGURE 9-11



7. Remove the front M20 spring eye bolts from both leaf springs, see Figure 9-11.
8. Loosen the rear spring eye shackle bolts, but do not remove.
9. Remove the lower shock mounting bolts.
10. Lower the floor jack, allowing the front spring eyes to drop out of the front spring hangers.
11. Remove the thrust washers.
12. Inspect the front leaf spring hanger for any damage or wear, replace component as necessary.

ASSEMBLY

1. Install the new thrust washers on the front springs.
2. Raise the floor jack and install the spring eyes and thrust washers into the front leaf spring hangers, see Figure 9-11.
3. Install the M20 front leaf spring eye bolt into the hanger.
4. Install the lower shock mounting bolts.
5. Remove the frame stands and lower the frame.
6. Inflate the suspension to normal operating pressure.
7. Tighten the front and rear spring eye fasteners to vehicle manufacturer's specifications.
8. Tighten the lower shock mounting bolts to vehicle manufacturer's specifications.
9. Remove wheel chocks.

AIRTEK – REAR SPRING HANGER

DISASSEMBLY

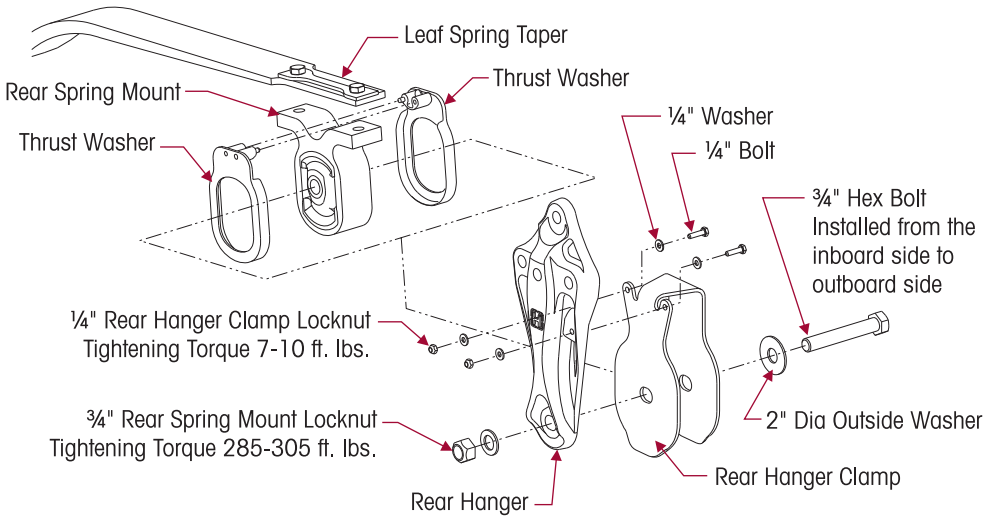
1. Place the vehicle on a level floor.
2. Chock the wheels.
3. Raise the frame.
4. Support the frame with frame stands.
5. Suspend the front axle from the shock absorbers.

⚠ 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 deflating or inflating the air system.
7. Deflate the air springs by detaching the upper rubber grommet of the height control valve linkage from the upper stud and exhaust the suspension system air by lowering the height control valve linkage arm.
8. Remove the air lines from air springs.
9. Loosen both front spring eye bolts, do not remove the bolts.
10. Support the axle with a floor jack with a four (4") inch lifting plate.
11. Remove both rear ¾" leaf spring hex bolts, see Figure 9-12.
12. Remove the lower shock mounting bolts.
13. Lower the jack until the rear spring mounts are below the spring hangers.
14. Remove the two ¼" hex bolts from the rear hanger. Remove the rear hanger clamp.
15. Remove the frame mounting fasteners from the rear leaf spring hanger. See vehicle manufacturer's guidelines.
16. Remove the rear hanger from the vehicle, see Figure 9-12.
17. Inspect the rear spring mount, rear hanger clamp and both thrust washers for excessive wear or damage. See Thrust Washer Inspection in Preventive Maintenance Section of this publication.
18. If damaged or worn excessively, replace with Genuine Hendrickson Parts as detailed in Component Replacement Section of this publication.

FIGURE 9-12



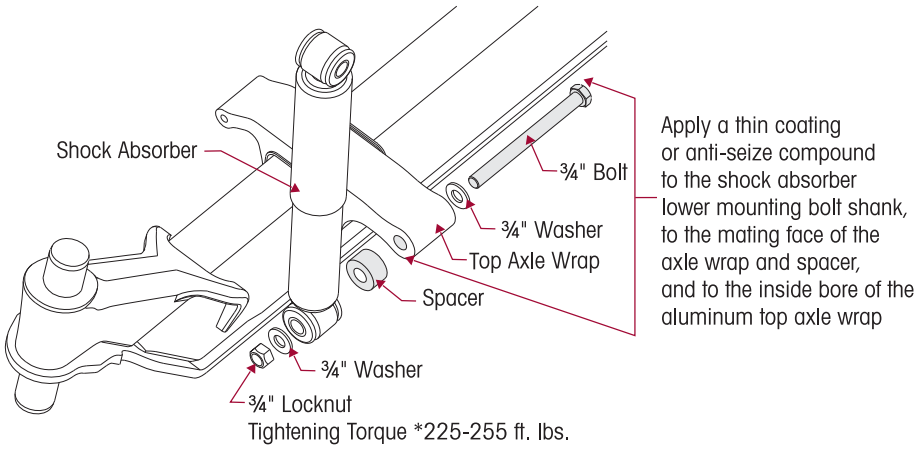
*Specifications provided, controlled and subject to change by vehicle manufacturer

ASSEMBLY

1. Install the thrust washers on the rear spring mount.
2. Install the rear hanger clamp on the rear spring hanger.
3. Install the two ¼" bolts and fasteners into rear hanger clamp and rear hanger assembly. Tighten ¼" locknuts to 7-10 foot pounds torque, see Figure 9-12.
4. Install the rear spring hanger on the frame.
5. Install new frame mounting fasteners. Follow vehicle manufacturer's guidelines.
6. Raise the axle to install the rear spring mounts into the rear hanger clamps.
7. Place the 2" outside diameter washer against the rear hanger clamp on the inboard side, see Figure 9-12.

8. Install the ¾" hex bolts from the inboard side to outboard side.
9. Apply a thin coating of anti-seize to the lower shock mounting bolts.
10. Install the lower shock mounting bolts from the inside facing out, see Figure 9-13, and tighten to vehicle manufacturer's specifications.

FIGURE 9-13



*Specification provided, controlled and subject to change by vehicle manufacturer

11. Lower the jack and let the suspension hang.
12. Snug the front spring eye and rear spring mount fasteners, **DO NOT** tighten.
13. Raise the vehicle and remove the frame stands.
14. Lower the vehicle and remove the jack.
15. Install the air lines into the air springs.
16. See additional Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to deflating or inflating the air system.
17. Inflate the suspension to normal operating pressure.
18. Tighten the front spring eye and rear spring mount fasteners to vehicle manufacturer's specifications.
19. Remove wheel chocks.

AIRTEK – THRUST WASHER AND REAR HANGER CLAMP

DISASSEMBLY

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

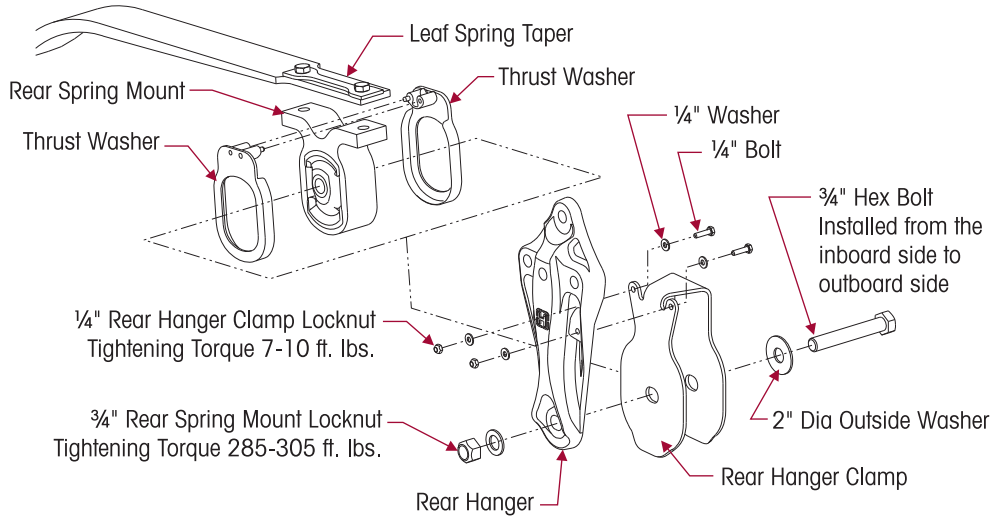
⚠ WARNING

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.

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. Deflate the air springs by detaching the upper rubber grommet of the height control valve linkage from the upper stud and exhaust the suspension system air by lowering the height control valve linkage arm.
5. Remove the air lines from the air springs.
6. Raise the frame.
7. Support the frame with frame stands.

8. Suspend the front axle. There must be enough clearance to allow the rear spring mount to clear the bottom of the rear spring hanger.
9. Loosen both front spring eye bolts, do not remove the bolts.
10. Support the axle with a floor jack and install a floor jack with a 4 inch lifting plate.
11. Remove both rear ¾" spring eye bolts.
12. Remove the lower shock mounting bolts.
13. Lower the jack until the rear spring mounts are below the spring hangers.
14. Remove the ¼" rear hanger clamp bolts and remove the rear hanger clamp.
15. Remove the two thrust washers from the rear spring mount, see Figure 9-14.
16. Inspect the spring mount for torn rubber, if the metal sleeve is worn through or if the housing is cracked. If any of these conditions exist, replacement is necessary.

FIGURE 9-14



*Specifications provided, controlled and subject to change by vehicle manufacturer

ASSEMBLY

1. Install the new rear hanger clamp and snug the ¼" mounting bolts.
2. Tighten bolts to a torque of 7-10 foot pounds torque.
3. Install two new thrust washers on the rear spring mount.
4. Raise the axle to install the rear spring mounts into the rear hanger clamps.
5. Place the 2" outside diameter washer against the rear hanger clamp on the inboard side, see Figure 9-14.
6. Install the rear spring eye mounting bolts from the inside facing out.
7. Apply a thin coating of anti-seize to the lower shock mounting bolts.
8. Install the lower shock mounting bolts from the inside facing out, see Figure 9-13, and tighten to vehicle manufacturer's specifications.
9. Lower the jack and let the suspension hang.
10. Snug the front and rear spring eye fasteners. **DO NOT** tighten.
11. Raise the vehicle and remove the frame stands.
12. Lower the vehicle and remove the jack.
13. Install the air lines into the air springs.
14. See additional Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to deflating or inflating the air system.

15. Inflate the suspension to normal operating pressure.
16. Tighten the front and rear spring eye fasteners to vehicle manufacturer's specifications.
17. Remove wheel chocks.

AIRTEK – REAR SPRING MOUNT

DISASSEMBLY

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

⚠ 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.

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. Deflate the air springs by detaching the upper rubber grommet of the height control valve linkage from the upper stud and exhaust the suspension system air by lowering the height control valve linkage arm.
5. Disconnect the air lines from the air spring.
6. Support the vehicle with frame stands. It may be necessary to remove peripheral components for installation of the frame stands.
7. Install a floor jack with a four (4) inch lifting plate below the axle and raise the vehicle.
8. Install frame stands behind the rear spring mounts.
9. Remove the tires.
10. Lower the jack allowing the axle to hang, but do not remove the jack from the axle.
11. Loosen, **DO NOT REMOVE** both front spring eye bolts.
12. Remove both lower shock absorber mounting bolts.

SERVICE HINT

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

13. Remove both rear spring mount hex bolts.
14. Disconnect both air springs from the top pads of the clamp groups.
15. Loosen the clamp group Grade 8 nylon locknuts.
16. Lower the jack allowing the suspension to pivot down out of the rear hanger clamps.
17. Remove the ½" rear spring mounting fasteners.
18. Remove rear spring mount.
19. Inspect leaf spring taper for cracks or damage. Replace leaf spring if damaged.

ASSEMBLY

1. Install the spring end plate so that it is centered on the spring taper, see Figure 9-15.
2. Install new ½" bolts through the spring end plate and spring taper.
3. Install the rear spring mount centered on the underside of the leaf spring taper.
4. Install new washers and locknuts to snug. **DO NOT TIGHTEN** at this time.
5. Align the rear spring mount and the leaf spring taper so that the mating surfaces are flush with each other, see Figure 9-16.
6. Tighten rear spring mount locknuts to 80-110 foot pounds torque.
7. Install the thrust washers on the rear spring mount.

8. Raise the leaf springs into the rear hangers.

FIGURE 9-15

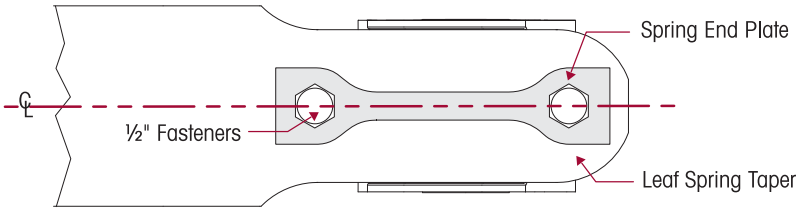
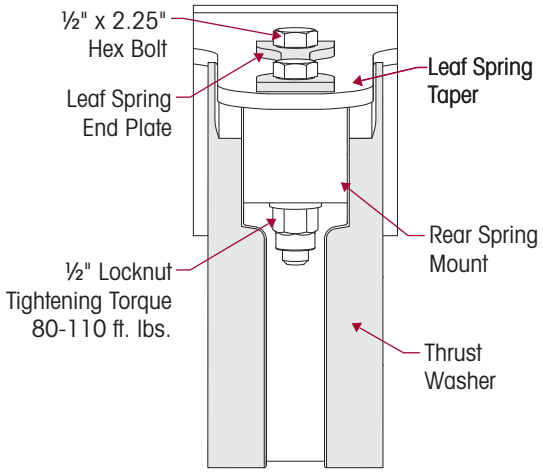
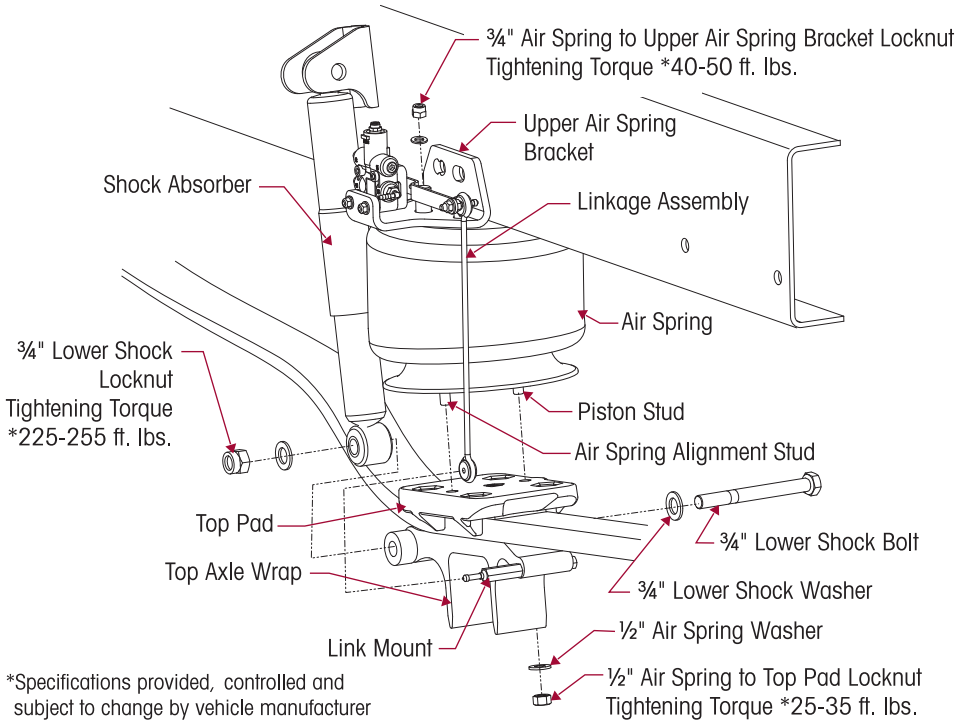


FIGURE 9-16



9. Place the 2" outside diameter washer against the rear hanger clamp on the inboard side.
10. Install the rear spring eye mounting bolts from the inside facing out.
11. Snug rear spring eye bolts. **DO NOT** tighten.
12. Apply a thin coating of anti-seize to the lower shock mounting bolts.
13. Install lower shock absorber mounting bolts.
14. Install the air spring into the top pad. Make sure the air spring piston seats into the top pad correctly, see Figure 9-17.

FIGURE 9-17



*Specifications provided, controlled and subject to change by vehicle manufacturer

15. Lower the floor jack and allow the suspension to hang.
16. Install tires.
17. Raise the vehicle and remove the frame supports.
18. Install air lines to the air spring.

19. See additional Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to deflating or inflating the air system.
20. Install the height control valve linkage and inflate the suspension to normal operating pressure.
21. Remove the floor jacks.
22. 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 on the top axle wrap, see Figure 9-18.

FIGURE 9-18

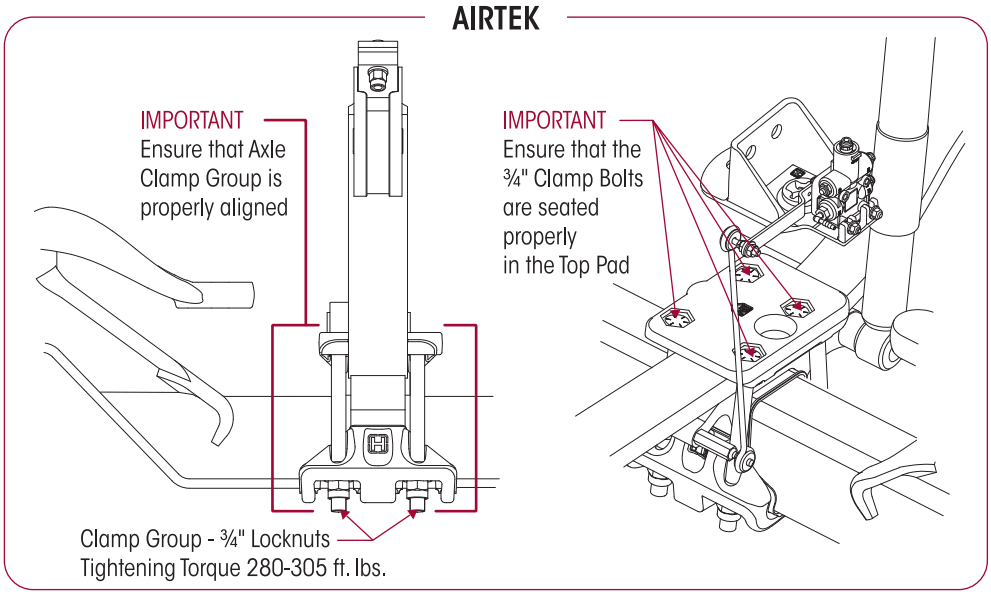
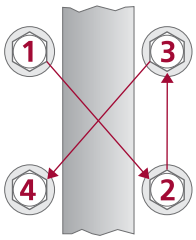


FIGURE 9-19



23. Tighten the clamp group locknuts evenly in 50 foot pounds increments to 280-305 foot pounds torque in the proper pattern to achieve uniform bolt tension, see Figure 9-19.
24. Tighten the lower shock mounting bolts to vehicle manufacturer's specifications.
25. Tighten the front and rear spring eye fasteners to vehicle manufacturer's specifications.
26. Verify proper ride height, see Alignment & Adjustments Section of this publication.
27. Remove wheel chocks.

SOFTEK – REAR SHACKLE BRACKET

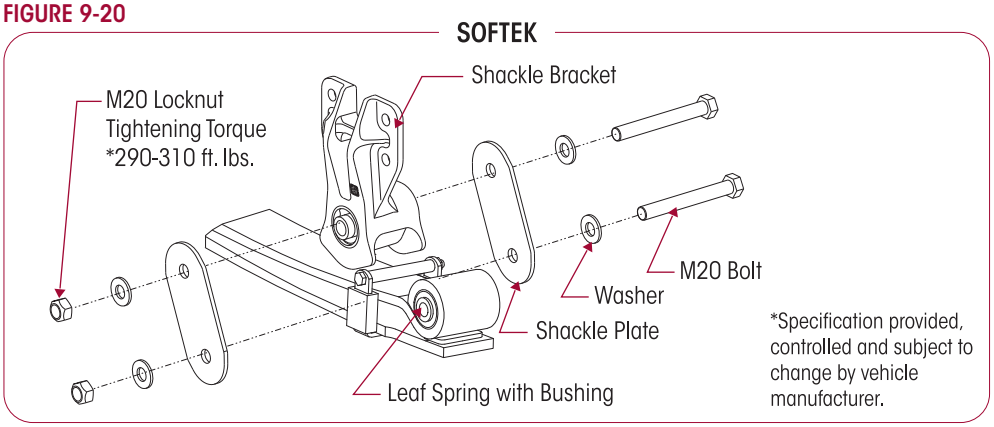
DISASSEMBLY

1. Place the vehicle on level floor.
2. Chock the wheels.
3. Raise the frame.
4. Support the vehicle with frame stands.
5. Suspend the front axle from the shocks.
6. 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 rear spring eye bolt.

7. Remove the frame fasteners from the shackle bracket. See manufacturer's guidelines.
8. Remove the shackle bracket from the vehicle, see Figure 9-20.
9. 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.
10. If damaged or worn excessively, replace with Genuine Hendrickson Parts as detailed in the Component Replacement Section of this publication.

FIGURE 9-20

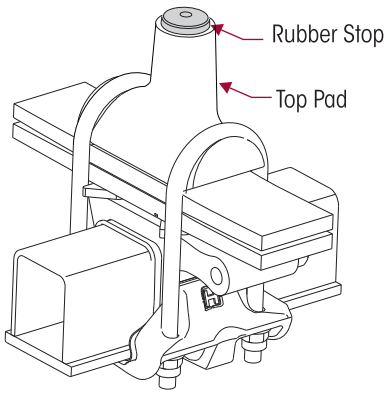


ASSEMBLY

1. Install the shackle bracket on the frame.
2. Install new frame fasteners. Follow manufacturer's guidelines.
3. Install the thrust washers (if equipped) and shackle plates with the M20 bolts, washers and locknuts, see Figure 9-20.
4. Remove the frame stands and lower frame.
5. Tighten M20 locknuts to vehicle manufacturer's specifications.
6. Remove the wheel chocks.

SOFTEK - RUBBER AXLE STOP

FIGURE 9-21



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 9-21.
3. Inspect the top pad and frame rail flange for any contact damage.
4. Clean any debris from inside the top pad.

INSTALLATION

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

AIRTEK - LEAF SPRING ASSEMBLY

DISASSEMBLY

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

⚠ 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.

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. Deflate the air springs by detaching the upper rubber grommet of the height control valve linkage from the upper stud and exhaust the suspension system air by lowering the height control valve linkage arm.
5. Disconnect the air lines from the air spring.
6. Install a floor jack with a 4" lifting plate below the axle and raise the truck.
7. Remove the tires.
8. Install frame stands behind the rear spring mounts to support the vehicle. It may be necessary to remove peripheral components for installation.
9. Lower the jack allowing the axle to hang, but do not remove the jack from the axle.
10. Loosen both front spring eye bolts, but **DO NOT** remove the bolts.
11. Remove both rear spring eye bolts.
12. Remove both lower shock absorber mounting bolts.

SERVICE HINT

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

13. Disconnect the lower air spring mounting fasteners from the top pad and discard.
14. Loosen (**DO NOT remove**) the clamp group nylon locknuts for the leaf spring that is **NOT** being serviced.

⚠ 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.

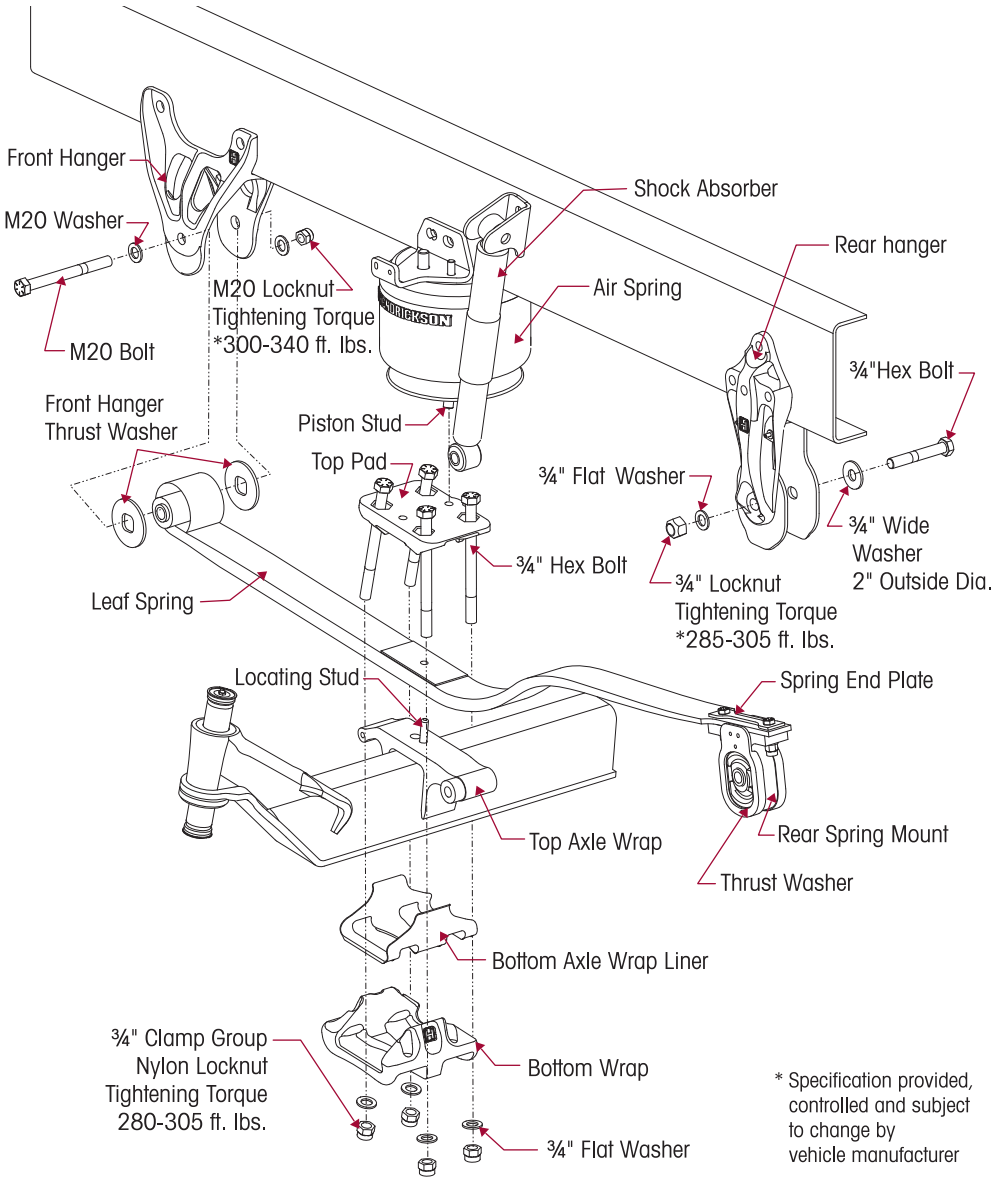
15. Remove the ¾" clamp group fasteners, top pad, and the bottom axle wrap and liner from the leaf spring that is going to be removed, see Figure 9-22.
16. Lower the jack, allowing the suspension to pivot down out of the rear hanger.
17. Remove the front spring eye bolts and the front hanger thrust washers from the leaf spring being serviced and discard.
18. Remove the leaf spring assembly. Approximate weight of the spring is 60 pounds.
19. Note the amount and orientation of caster wedges (if equipped) on top axle wrap that may slide during leaf spring removal. Caster wedges are supplied by the vehicle manufacturer.

ASSEMBLY

1. Install new front hanger thrust washers on the front spring eye bushing sleeve.
2. Install the leaf spring assembly over the axle and into the front spring hanger.
3. Install the M20 front spring eye bolt and fastener, but **DO NOT** tighten.

4. Ensure to replace any caster wedges (if equipped) that may have been displaced during leaf spring disassembly, in the same orientation as removed prior to disassembly. Caster wedges are supplied by the vehicle manufacturer.

FIGURE 9-22



5. Engage the leaf spring to the axle with the leaf spring locating stud into the aligning hole of the top axle wrap.
6. Install the top pad on top of the leaf spring.
7. Install a new bottom axle wrap liner in the bottom axle wrap.
8. Install the bottom axle wrap.
9. Install the new clamp group bolts (Grade 8), washers, and the new nylon locknuts (Grade C). The nylon locknuts must be replaced when the clamp group is removed.
10. Snug the clamp group fasteners to 100 foot pounds pre-torque.
11. Raise the axle and the rear spring assembly into the rear spring hanger.
12. Place the 2" outside diameter washer against the rear hanger clamp on the inboard side, see Figure 9-22.
13. Install the rear spring eye mounting bolts from the inside facing out.

14. Apply a thin coating of anti-seize to the lower shock mounting bolts.
15. Install the lower shock mounting bolts from the outboard side to the inboard side.
16. Lower the floor jack.

IMPORTANT NOTE

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

17. Tighten the lower shock mounting bolts to vehicle manufacturer's specifications.
18. Snug the front and rear spring eye fasteners. **DO NOT** tighten.
19. Install the air spring into the top pad. Make sure the air spring piston seats into the top pad correctly, see Figure 9-22.
20. Install the tires.
21. Install air lines to the air spring.
22. Raise the vehicle and remove the frame supports.
23. Remove the floor jack.
24. 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 on the top axle wrap, see Figure 9-23.

FIGURE 9-23

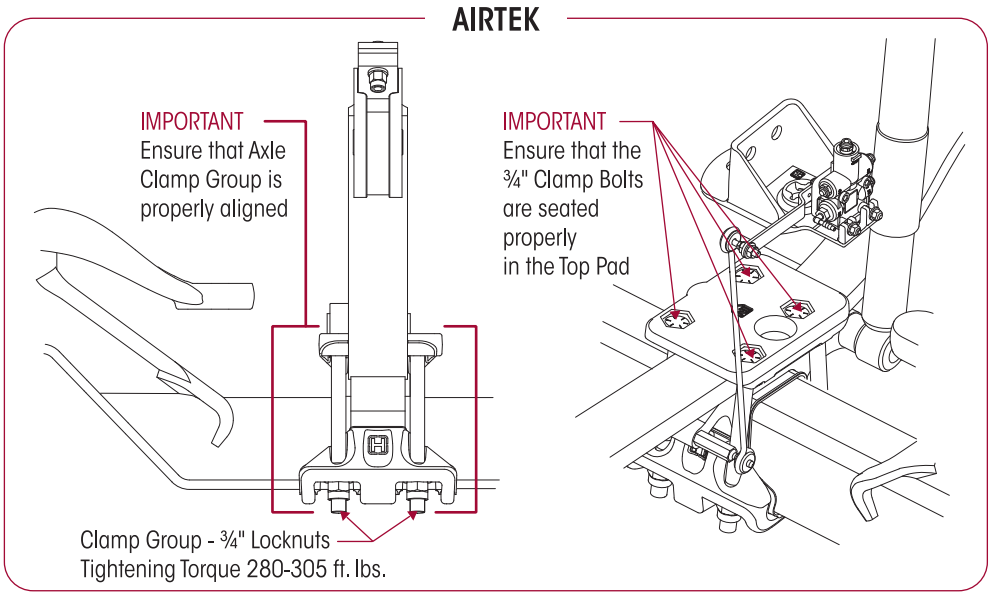
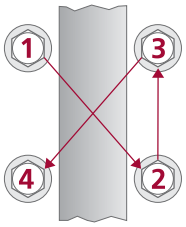


FIGURE 9-24

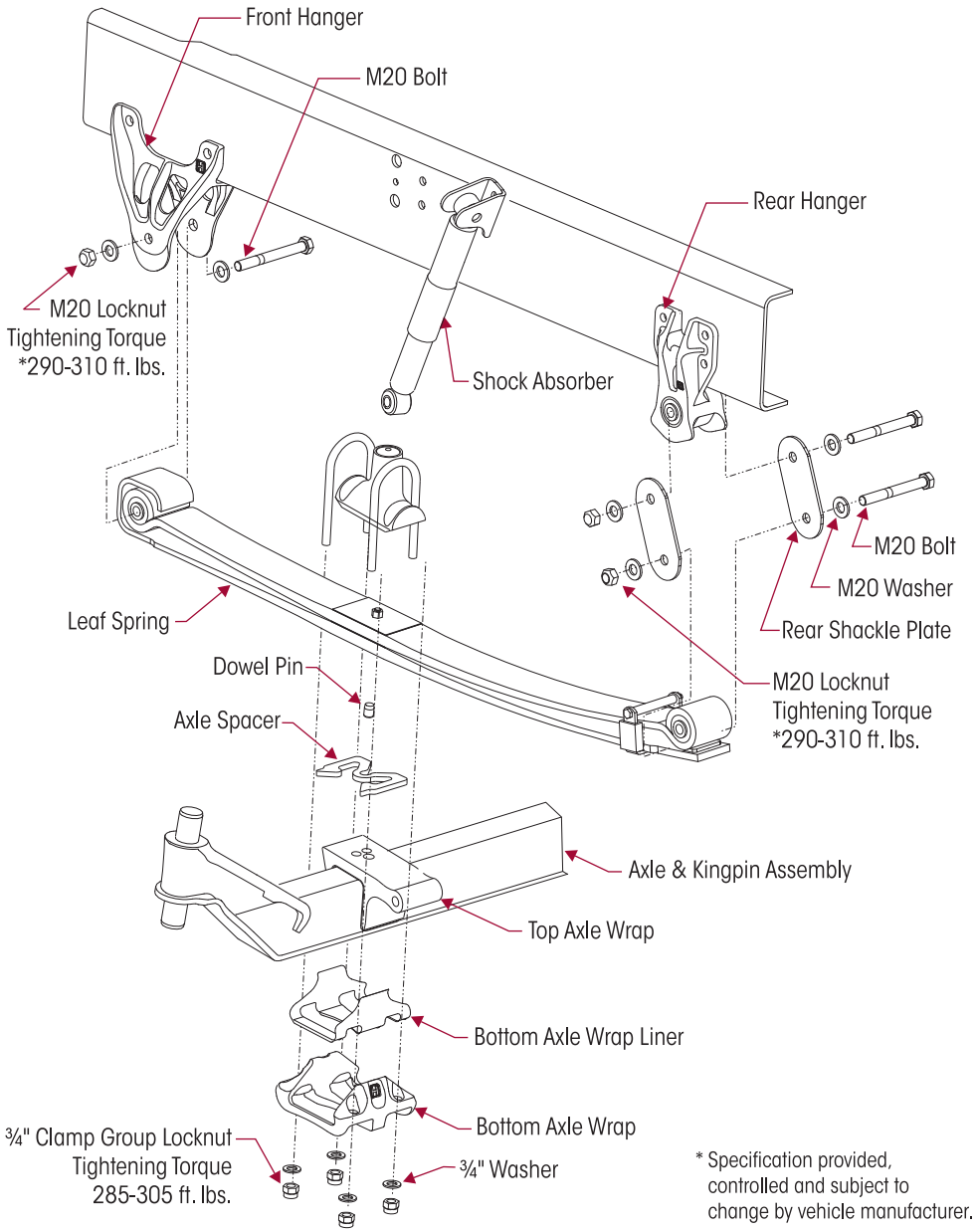


25. Tighten the clamp group locknuts evenly in 50 foot pounds increments to 280-305 foot pounds torque in the proper pattern to achieve uniform bolt tension, see Figure 9-24.
26. See additional Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to deflating or inflating the air system.
27. Install the height control valve linkage and inflate the suspension to normal operating pressure.
28. Tighten the front and rear spring eye fasteners to vehicle manufacturer's specifications at proper ride height.
29. Verify proper ride height. See Alignment & Adjustments Section of this publication.
30. Remove wheel chocks.

SOFTEK - LEAF SPRING ASSEMBLY

DISASSEMBLY

FIGURE 9-25



1. Place the vehicle on a level floor.
2. Chock the wheels.
3. Raise the vehicle.
4. Support the vehicle with frame stands.
5. Suspend the front axle to remove the load from leaf spring assembly.
6. Remove the front and rear M20 spring eye bolts washer and locknuts. Loosen the M20 shackle pivot bolt.

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

7. Remove the ¾" clamp group U-bolts, washers and locknuts. Discard the fasteners.

⚠ 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

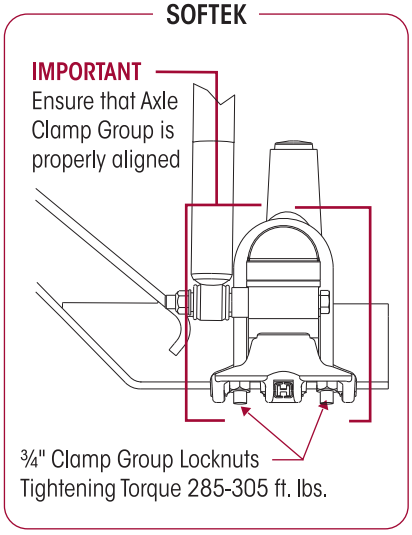
If a clamp group nut fails to come off bolt, cut half way through the bolt with an abrasive cut off wheel, taking care not to contact axle beam or other components. Using an impact wrench, spin the locknut to fracture the bolt and remove.

8. Remove the top pad, galvanized liner and the bottom axle wrap, see Figure 9-25.
9. Remove the spring assembly.

ASSEMBLY

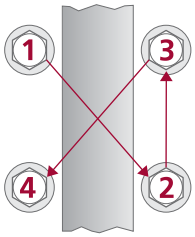
1. Install the new spring and wrap leaf assembly on the axle. Verify that the center bolt is located properly in the top axle wrap and spacer (if equipped), see Figure 9-25.
2. Install the new galvanized liner and the top pad onto the spring.
3. Remove and replace the bottom axle wrap liner located in bottom axle wrap.
4. Install the bottom axle wrap.
5. Install the new ¾" clamp group U-bolts, washers, and locknuts. The locknuts must be replaced when the clamp group is removed, to prevent premature bolt fatigue.
6. Snug the clamp group, **DO NOT** torque at this time.
7. Raise the axle and the spring and wrap leaf assembly into the front hanger and rear shackle assembly.

FIGURE 9-26



8. Install the M20 spring eye bolts, washers and locknuts. Snug bolts. **DO NOT** tighten at this time.
9. Ensure that the clamp group is properly aligned and the U-bolts are seated in the top pad, and the bottom axle wrap is centered with the top axle wrap, see Figure 9-26.

FIGURE 9-27



10. Tighten the clamp group locknuts evenly in 50 foot pounds increments to 285-305 foot pounds torque in the proper pattern to achieve uniform bolt tension, see Figure 9-27.
11. Remove the frame supports and load the front axle with the vehicle weight.
12. Tighten the M20 spring eye bolt locknuts to vehicle manufacturer's specifications.

FRONT LEAF SPRING EYE BUSHING

The spring eye bushings for the AIRTEK and SOFTEK spring and wrap leaf assemblies 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 spring leaf and are not serviceable. If a bushing wears prematurely, the spring and wrap leaf assembly must be replaced. Follow the procedure for the Front Leaf Spring removal in the Component Replacement Section of this publication.

AIRTEK - BOTTOM AXLE WRAP

DISASSEMBLY

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

⚠ 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.

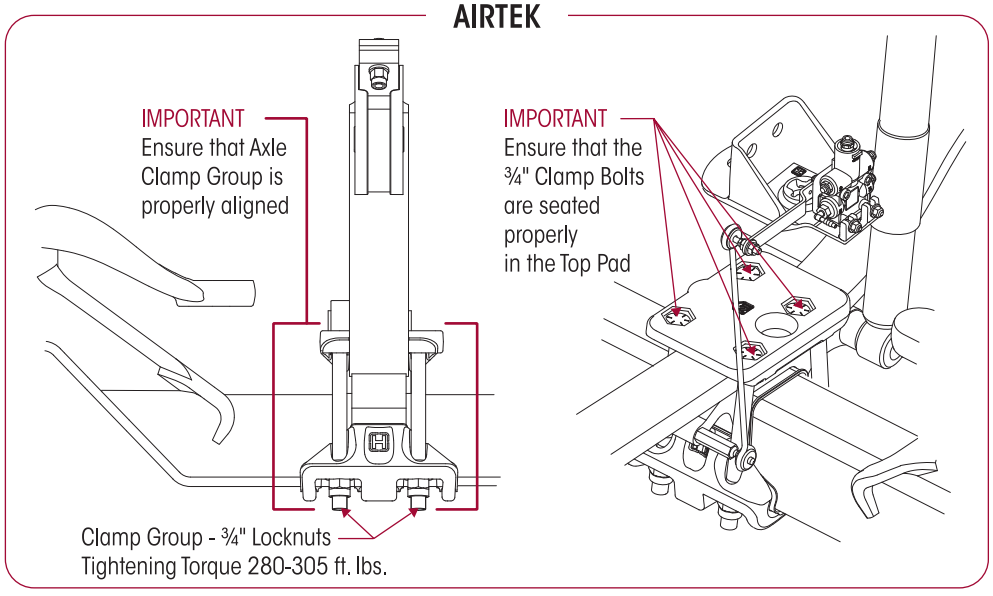
3. See additional Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to deflating or inflating the air system.
4. Deflate the air springs by detaching the upper rubber grommet of the height control valve linkage from the upper stud and exhaust the suspension system air by lowering the height control valve linkage arm.
5. Remove the air lines from the air springs. Remove air spring on side being replaced, see Air Spring replacement instructions in this section.
6. Raise the frame.
7. Support the frame with frame stands.
8. Remove Air Spring.

⚠ 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.

9. Remove ¾" clamp group hex bolts and Grade 8 nylon locknuts on the side being replaced, see Figure 9-28.
10. Remove bottom axle wrap. It may be necessary to use a dead blow mallet to dislodge axle wrap.
11. Once removed inspect axle wrap for damage. Replace if necessary.
12. Discard used bottom axle wrap liner.

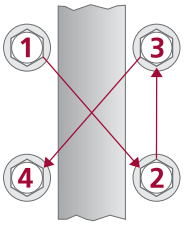
FIGURE 9-28



ASSEMBLY

1. Install new bottom axle wrap liner into bottom axle wrap.
2. Install bottom axle wrap on axle.
3. Install new ¾" hex bolts (if removed) and Grade 8 nylon locknuts. 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 on the top axle wrap, see Figure 9-28.

FIGURE 9-29



4. Tighten the clamp group locknuts evenly in 50 foot pounds increments to 280-305 foot pounds torque in the proper pattern to achieve uniform bolt tension, see Figure 9-29.
5. Install air spring, refer to Air Spring Assembly instructions in this section.
6. See additional Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to deflating or inflating the air system.
7. Install the height control valve linkage and inflate the suspension to normal operating pressure.
8. Remove the frame stands and wheel chocks.

SOFTEK - BOTTOM AXLE WRAP

DISASSEMBLY

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

WARNING

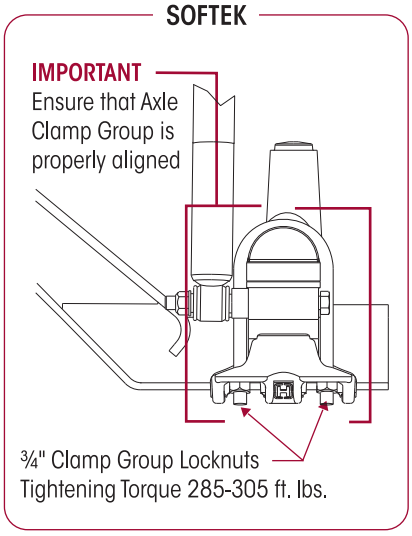
DO NOT USE A CUTTING TORCH TO REMOVE CLAMP GROUP BOLTS OR ATTACHING FASTENERS. THE USE OF SUCH HEAT ON SUSPENSION COMPONENTS CAN ADVERSELY AFFECT THE STRENGTH OF THESE PARTS. A COMPONENT DAMAGED IN THIS MANNER CAN RESULT IN THE LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

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.

5. Remove ¾" U-bolts, washers and locknuts. Discard fasteners.
6. Remove bottom axle wrap. It may be necessary to use a dead blow mallet to dislodge axle wrap.
7. Once removed inspect axle wrap for damage. Replace if necessary.
8. Discard used bottom axle wrap liner.

FIGURE 9-30



ASSEMBLY

1. Install new bottom axle wrap liner into bottom axle wrap.
2. Install bottom axle wrap on axle.

3. Install new ¾" U-bolts, washers and locknuts. Ensure that the clamp group is properly aligned and the U-bolts are seated in the top pad, and the bottom axle wrap is centered with the top axle wrap, see Figure 9-30.
4. Tighten locknuts evenly to 285-305 foot pounds torque, see Figure 9-30 for proper torque sequence.
5. Remove the wheel chocks.

AIRTEK - TOP AXLE WRAP (IN CHASSIS)

DISASSEMBLY

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

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.

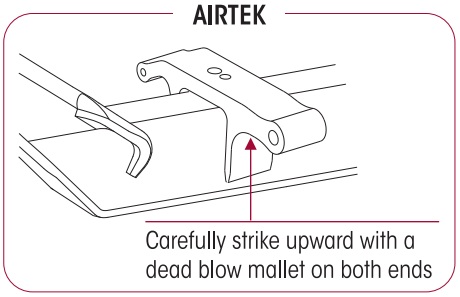
3. See additional Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to deflating or inflating the air system.
4. Deflate the air springs by detaching the upper rubber grommet of the height control valve linkage from the upper stud and exhaust the suspension system air by lowering the height control valve linkage arm.
5. Remove the air lines from the air springs.
6. Raise the truck and remove the tires.
7. Support the frame with frame stands and suspend the front axle to remove the load from the front leaf springs.
8. Install a floor jack that has a four inch lifting plate in the center of the axle.
9. Remove the air springs, refer to Air Spring disassembly instructions in this section.
10. Secure the axle on the jack to prevent the axle from rolling off the floor jack.

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.

11. Remove the ¾" clamp group hex bolts and fasteners.
12. Remove the top pad, the bottom axle wrap and liner (discard liner).
13. Remove the lower shock mounting bolts.
14. Lower the axle from the leaf springs.
15. Remove the dowel pin, alignment shim (if equipped).

FIGURE 9-31

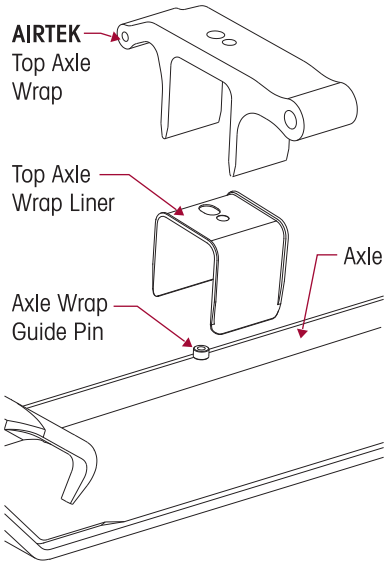


16. Strike the axle wrap with a dead blow mallet at the front and rear on the underside of the axle wrap to dislodge it from the axle, see Figure 9-31.
17. Clean and inspect the axle wrap and axle for cracks or damage, replace each if cracks or damage are present.

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 9-32.
4. Protect the top surface of the axle wrap with a block of wood, cardboard, or shop towels, see Figure 9-33.

FIGURE 9-32



CAUTION

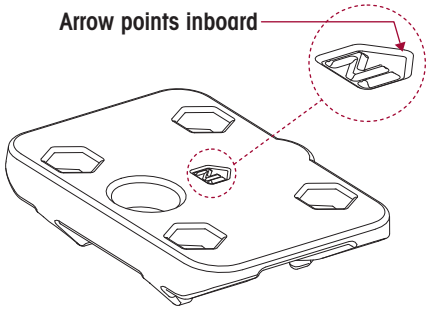
DO NOT STRIKE THE TOP AXLE WRAP WITH A HAMMER. HENDRICKSON RECOMMENDS USING A PLASTIC DEAD BLOW MALLET WITH CARE WHEN INSTALLING THE AXLE WRAP.

SERVICE HINT

To facilitate the installation of the top axle wrap, it may be helpful to slide the axle outside of the frame rail to obtain a clear path to strike the top axle wrap with a dead blow mallet.

5. Using a dead blow mallet drive the axle wrap onto the axle indexing the axle guide pin until the axle wrap is firmly seated on the axle.
6. Install the dowel pin(s) into the axle wrap.
7. Install the alignment shims (if equipped).
8. Raise the axle assembly and engage the dowel pins in the leaf spring bores.

FIGURE 9-33



9. Install the top pad on the leaf spring with the directional identification facing inboard on the vehicle, see Figure 9-33.
10. Install new clamp group hex bolts into the top pad.
11. Remove and replace the bottom axle wrap liner.
12. Install the bottom axle wrap.
13. Install the new clamp group washers and nylon locknuts (Grade C).
14. 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 on the top axle wrap, see Figure 9-34.
15. Snug the clamp group fasteners to 100 foot pounds pre-torque.
16. Install the lower shock mounting bolts from the outboard side to the inboard side.
17. Install the air spring into upper air spring mounting bracket and the top pad. Make sure the air spring piston seats into the top pad correctly, see Figure 9-35.
18. Attach new air spring mounting fasteners. Tighten ¾" upper and ½" lower air spring mounting fasteners to vehicle manufacturer's specifications.
19. Raise the vehicle and remove the frame supports.
20. Lower the floor jack and load the front axle with the truck's weight. Remove the floor jack.
21. Install air lines to the air spring.
22. See additional Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to deflating or inflating the air system.

FIGURE 9-34

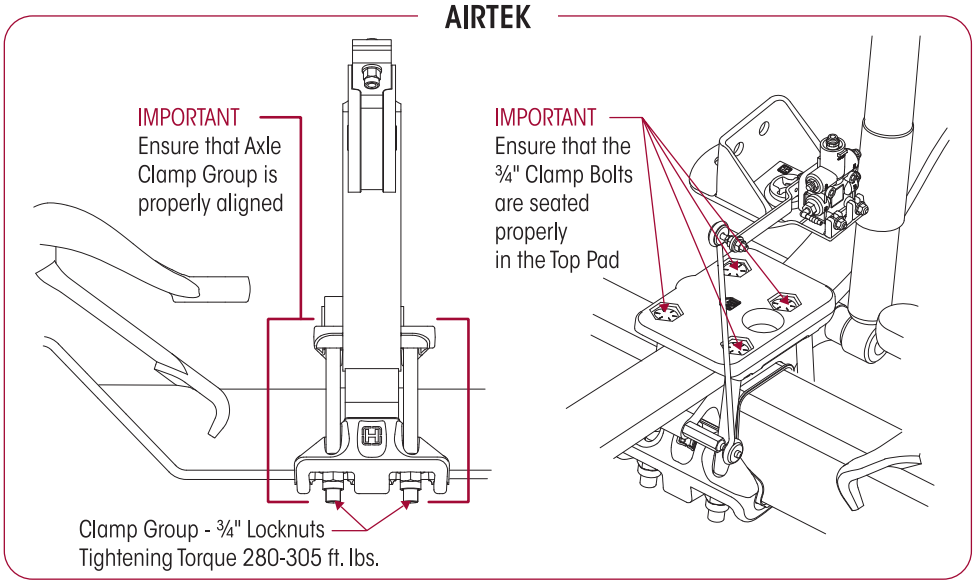
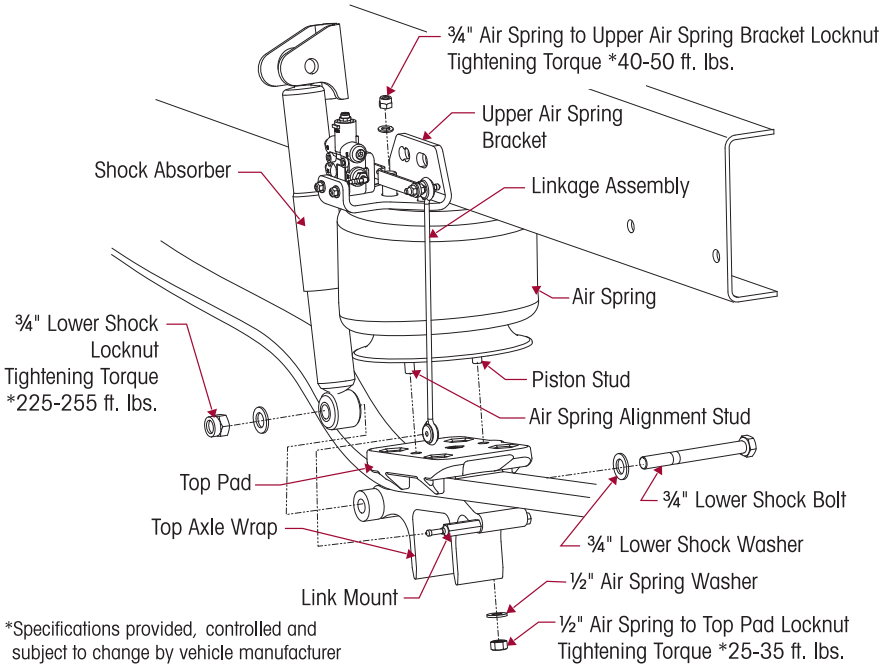
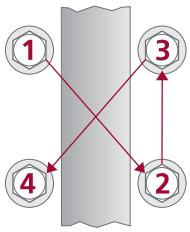


FIGURE 9-35



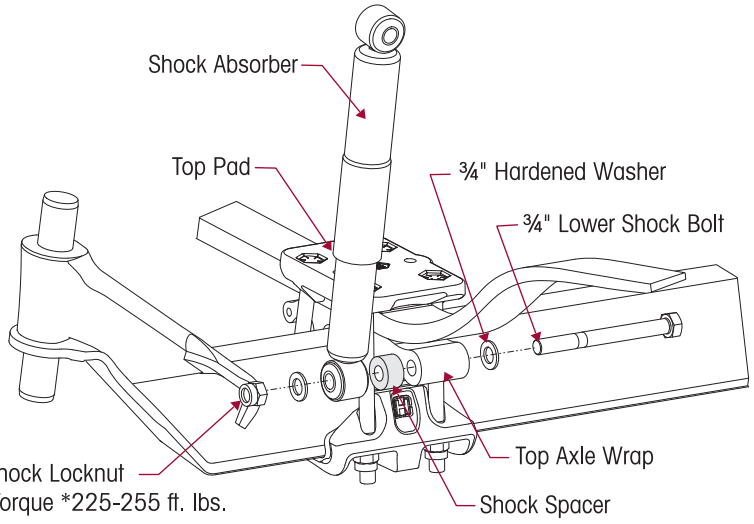
23. Install the height control valve linkage and inflate the suspension to normal operating pressure.

FIGURE 9-36



24. Tighten the clamp group locknuts evenly in 50 foot pounds increments to 280-305 foot pounds torque in the proper pattern to achieve uniform bolt tension, see Figure 9-36.
25. Tighten the lower shock mounting locknut to the vehicle manufacturer's torque specifications, see Figure 9-37.
26. Verify proper ride height. See Alignment & Adjustments Section of this publication.
27. Remove wheel chocks.

FIGURE 9-37



*Specification provided, controlled and subject to change by vehicle manufacturer

SOFTEK - TOP AXLE WRAP (In Chassis)

DISASSEMBLY

1. Place the vehicle on level floor.
2. Chock the wheels.
3. Raise the frame.
4. Support the vehicle with frame stands.
5. Suspend the front axle to remove the load from the spring and wrap leaf assembly.
6. Remove the front and rear M20 spring eye bolts, washers and locknuts. Loosen the M20 shackle pivot bolt.

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

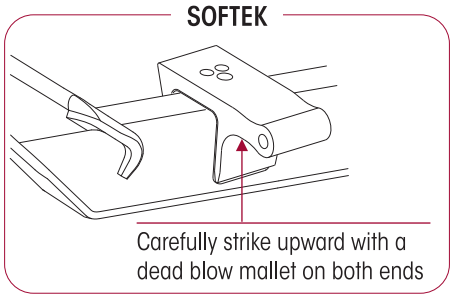
7. Support the axle with a jack.

⚠ 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.

8. Remove the ¾" clamp group U-bolts, washers and locknuts. Discard fasteners.
9. Remove the top pad and the bottom axle wrap.
10. Remove the lower shock mounting bolt.
11. Remove the spring and wrap leaf assembly.

FIGURE 9-38

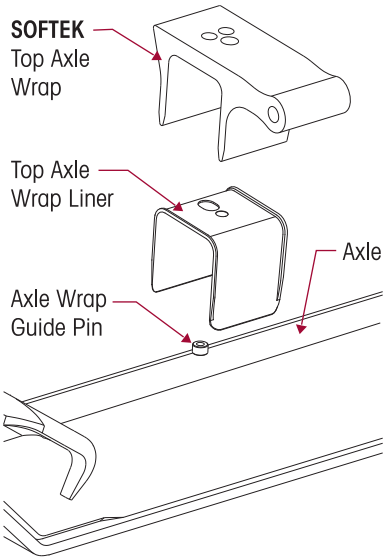


12. Strike the axle wrap with a dead blow mallet at the front and rear on the underside of the axle wrap to dislodge it from the axle, see Figure 9-38.
13. Clean and inspect the axle wrap and axle wrap liners for cracks or damage, replace each if cracks or damage are present.

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.

FIGURE 9-39



3. Position the axle wrap on the axle, see Figure 9-39.

⚠ 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.

4. Protect the top surface of the axle wrap with a block of wood, cardboard, or shop towels.
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 make sure the axle wrap bore indexes the locating bushing on the axle.
7. Install the spring and wrap leaf assembly on the axle wrap indexing the center bolt in the locating hole.
8. Install the top pad on the spring and wrap leaf assembly.
9. Remove and replace the bottom axle wrap liner.
10. Install the bottom axle wrap.
11. Install the new ¾" clamp group U-bolts, washers, and locknuts.
12. Snug the clamp group, **DO NOT** torque at this time.
13. Use a jack and raise the axle and spring assembly into the front spring hanger and shackle assembly.

SERVICE HINT

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

14. Install the M20 spring eye bolts, washer and locknuts in the front spring hanger and rear shackle assembly.

15. Ensure that the clamp group is properly aligned and the U-bolts are seated in the top pad, and the bottom axle wrap is centered with the top axle wrap, see Figure 9-40.

FIGURE 9-40

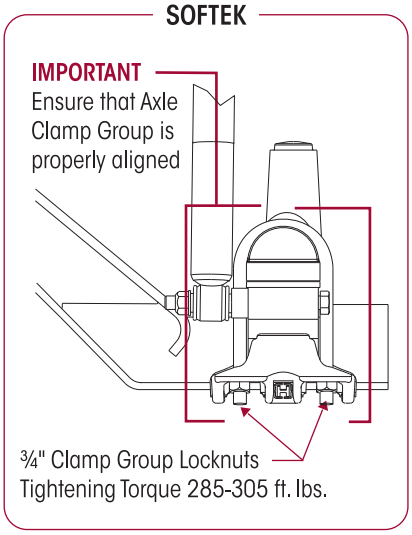
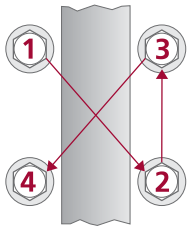


FIGURE 9-41



16. Tighten the ¾" clamp group locknuts evenly to 285-305 foot pounds torque in the proper sequence, see Figure 9-41.
17. Apply a thin coating of anti-seize to the lower shock mounting bolt.
18. Install shocks. (See shock absorber assembly in this section)
19. Remove the jack from the axle.
20. Remove the frame stands.
21. Tighten the M20 spring eye bolt locknuts to vehicle manufacturer's specifications.
22. Remove the wheel chocks.

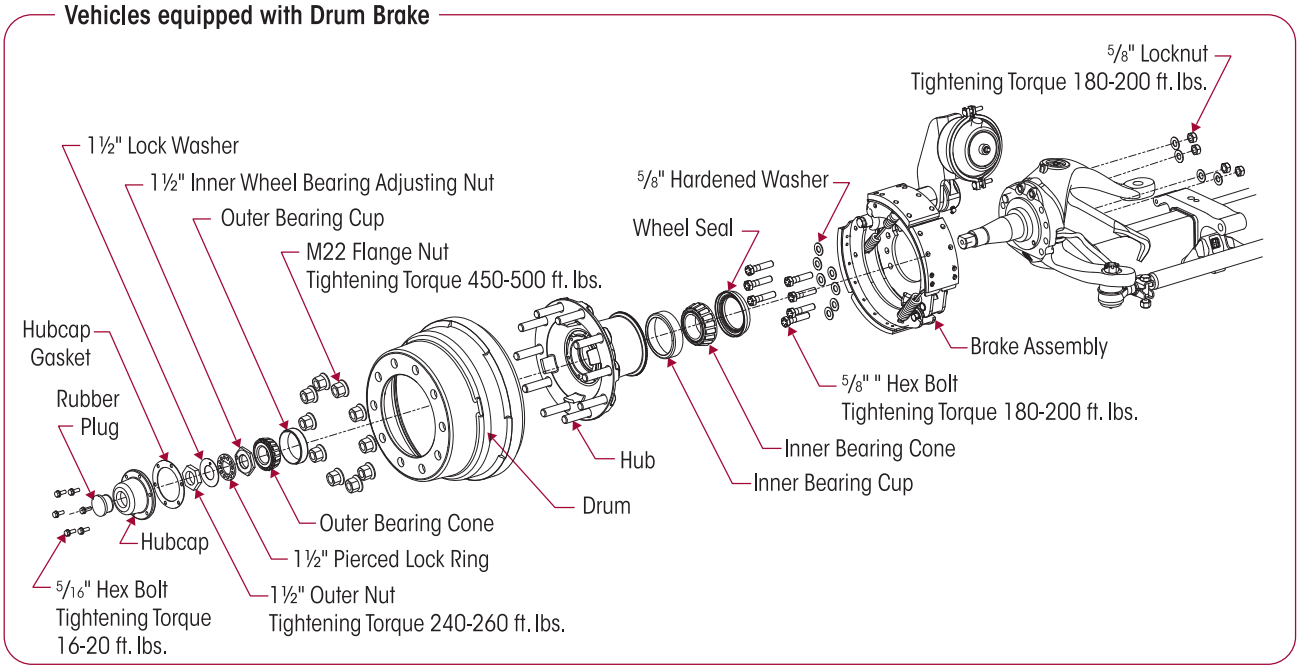
HUB ASSEMBLY AND BRAKE TORQUE PLATE

■ Vehicles equipped with Drum Brake

⚠ WARNING

NEVER WORK UNDER A RAISED VEHICLE SUPPORTED BY ONLY A JACK. ALWAYS SUPPORT A RAISED VEHICLE WITH STANDS. BLOCK THE WHEELS AND MAKE SURE THE UNIT WILL NOT ROLL BEFORE RELEASING BRAKES. ALWAYS WEAR EYE PROTECTION. FAILURE TO DO SO CAN CAUSE POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

FIGURE 9-42



DISASSEMBLY

1. Place the vehicle on a level floor.
2. Chock the wheels.
3. Raise the frame and support with frame stands.
4. Remove the tire, wheel and brake drum.
5. Install a suitable drain pan under hubcap.
6. Remove the hubcap and drain the lube oil.
7. Remove the outer wheel bearing nut, lock washers, inner wheel bearing adjusting nut, and outer wheel bearing, see Figure 9-42.
8. Slide the hub and drum assembly off the spindle.
9. Remove the seven (7) torque plate mounting fasteners.
10. Remove the brake torque plate.

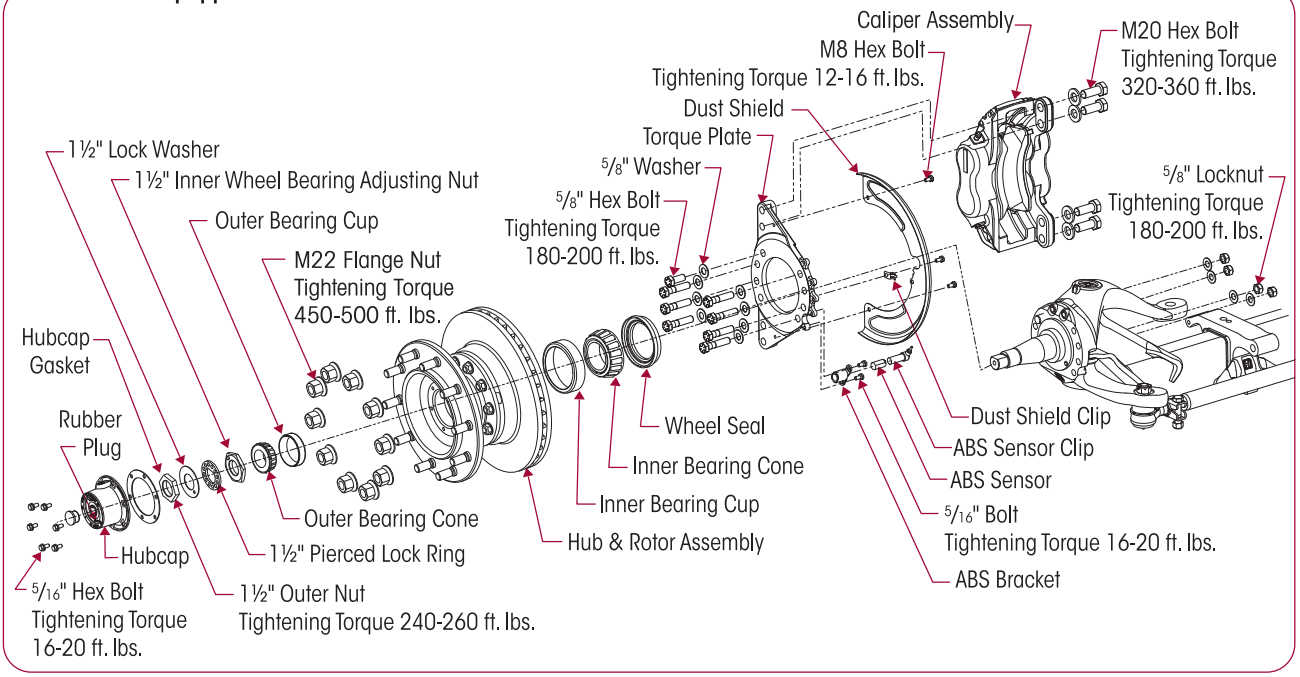
■ Vehicles equipped with Disc Brake

⚠ WARNING

NEVER WORK UNDER A RAISED VEHICLE SUPPORTED BY ONLY A JACK. ALWAYS SUPPORT A RAISED VEHICLE WITH STANDS. BLOCK THE WHEELS AND MAKE SURE THE UNIT WILL NOT ROLL BEFORE RELEASING BRAKES. ALWAYS WEAR EYE PROTECTION. FAILURE TO DO SO CAN CAUSE POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

FIGURE 9-43

Vehicles equipped with Disc Brake



DISASSEMBLY

1. Place the vehicle on a level floor.
2. Chock the wheels.
3. Raise the frame and support with frame stands.
4. Remove the tire and wheel.
5. Remove the four caliper mounting bolts. See Figure 9-43.
6. Remove the caliper and brake pads, secure with suitable strap. **DO NOT** let the caliper hang by brake line.

7. Install a suitable drain pan under hubcap.
8. Remove the hubcap and drain the lube oil.
9. Remove the outer wheel bearing nut, lock washers, inner wheel bearing adjusting nut, and outer wheel bearing, see Figure 9-43.
10. Slide the hub and drum assembly off the spindle.
11. Remove the seven (7) torque plate mounting fasteners.
12. Remove the brake torque plate.

HUB WHEEL SEAL REMOVAL AND INSPECTION OF THE HUB

You will need:

- SKF part number – SRT-1 Seal Removal Tool, see Special Tool Section of this publication.

1. Remove wheel seal. Wheel seal removal is best done with a specifically designed tool. Hendrickson recommends the use of SKF tooling and instructions to remove the wheel seal from the hub.

⚠ CAUTION

HAMMERS, CHISELS AND IMPROPER PRYING TOOLS CAUSE DAMAGE TO BEARINGS AND HUBS AND CAN LEAD TO COMPONENT DAMAGE. USE ONLY SPECIFIED TOOLS.

2. After removal of the wheel seal, remove the inner wheel bearing.
3. Clean and inspect wheel bearings, replace if damaged.
4. Clean residual oil from hub and any remaining hubcap gasket material.
5. Inspect the hub for broken fasteners, cracks in the hub, and damage to the hub and bore.
6. If a bearing cup is loose in the hub, this indicates a serious condition and the hub must be replaced.

BEARING CUP REMOVAL

1. Use a mild steel drift or cup driver to drive out the bearing cup. Alternate the location of impact on the cup by 180° and/or 90°.
2. Inspect the bearing bores and bearing cup stop for damage. If there is evidence of cup spinning, the hub must be replaced.
3. Use an emery cloth to remove any minor burrs or raised areas.

BEARING CUP INSTALLATION

You will need:

- OTC part number – OTC 7180 installation tool, see Special Tool Section of this publication.

1. Install bearing cup. Bearing cup installation is best done with a specifically designed tool. Hendrickson recommends the use of OTC tooling and instructions to install the bearing cup in the hub.
2. Use a 0.004" feeler gauge to check for a gap between the cup and the bearing cup stop. The feeler gauge should not fit between the cup and the bearing cup stop.
3. Inspect the bearing surface for any damage, which might have occurred during installation. There should be no scoring of the new bearing cup surface.

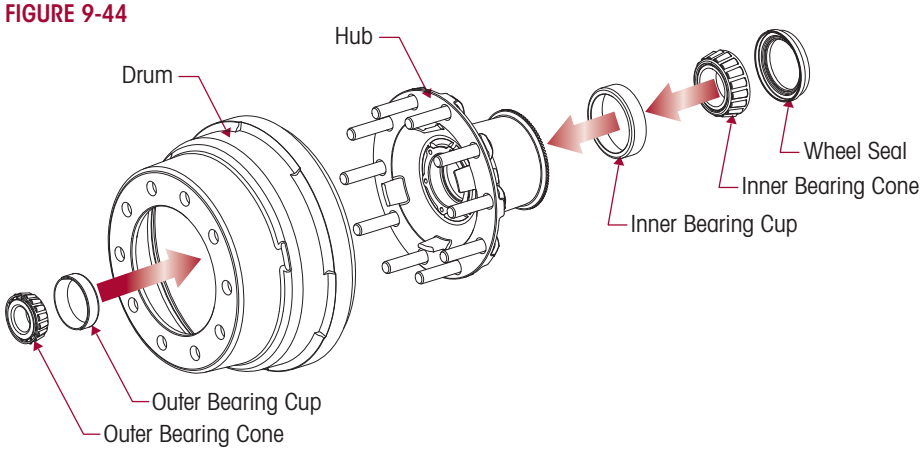
HUB WHEEL SEAL INSTALLATION

You will need:

- SKF Scotseal® Classic and Scotseal® Longlife Installation Tools, see Special Tool Section of this publication.

1. Install the wheel seal, see Figure 9-44. Seal installation is best done with specifically designed tools. Hendrickson recommends the use of SKF tooling and instructions to install the wheel seal in the hub.
2. Position hub on the wheel studs facing down.
3. Pre-lube the inner wheel bearing and install in the hub.
4. Position a new wheel seal into the hub bore and insert the tool assembly with centering plug into the seal.
5. Hold the tool handle firmly and straight, drive the seal with firm hammer strokes until the seal is squarely seated. Continue driving the seal the hub until the sound of impact changes.
6. After the seal is bottomed in the bore, check for freedom of movement by manually moving the packing of the seal up and down. Ensure that the inner bearing rotates freely.

FIGURE 9-44



CLEANING AND INSPECTION

1. Clean the face of the steering knuckle and spindle.
2. Inspect the spindle for any damage or fretting. Remove any light fretting with a fine grit emery cloth (220 and higher).
3. Check the spindle threads for any damage.
4. Clean steering knuckle threads with 5⁄8" tap.
5. Clean and install the brake torque plate.

ASSEMBLY

1. Install Loctite on the threaded bolts that do not have nuts.
2. Tighten the brake torque plate fasteners in a crisscross pattern to 180-200 foot pounds torque.
3. Carefully slide the hub and drum assembly onto the spindle.
4. Pre-lube the lube oil reservoir in the hub, see Lubrication Specifications in Preventive Maintenance Section of this publication.
5. Pre-lube and install the outer wheel bearing.
6. Adjust the wheel bearing end play to specification, see Wheel Bearing instructions in Alignment & Adjustments Section of this publication.

NOTE Always install and re-install a hubcap with a **NEW** gasket.

7. Install the **NEW** hubcap gasket.
8. Loosely install hubcap bolts, see Figure 9-45.
9. Uniformly tighten hubcap bolts in a star pattern to 16-20 foot pounds torque.
10. Fill wheel end assembly through the center fill port with the Grade 2 oil (SAE-80W-90, GL-5). Allow the oil to seep through the outer bearing and fill the hub cavity. Continue to add oil until the oil reaches the oil level fill line as indicated on the hubcap.
11. Install the brake drum and wheel and tighten lug nuts to the required torque specification per the vehicle manufacturer.
12. Remove wheel chocks and safety stands.

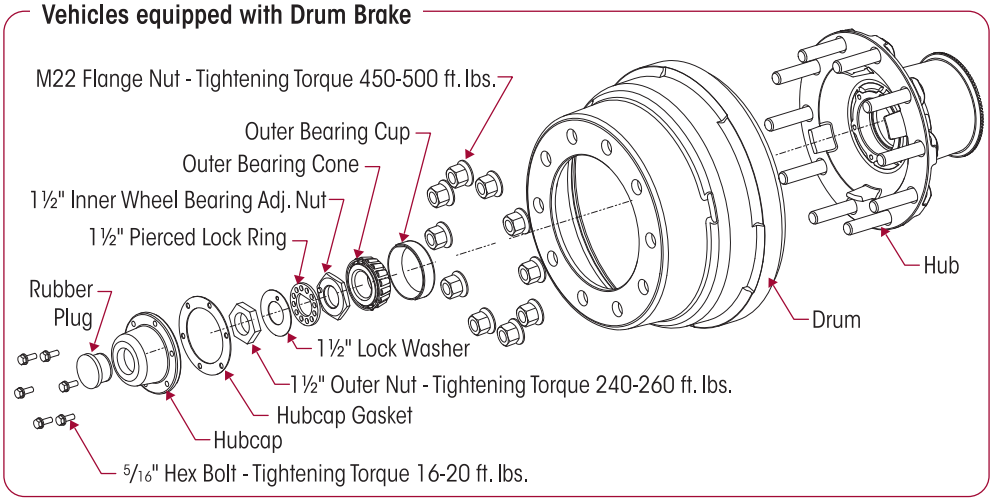
HUBCAP

DISASSEMBLY

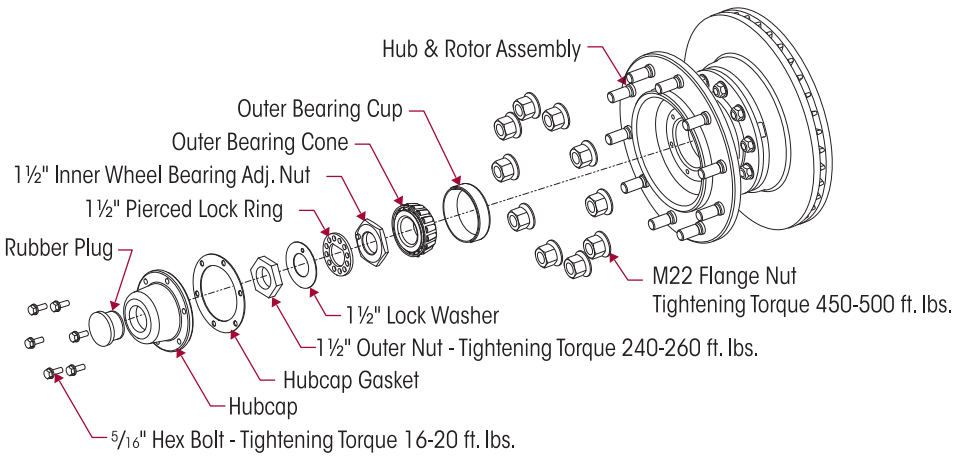
1. Install suitable drain pan under hubcap.
2. Remove hubcap mounting fasteners, see Figure 9-45.
3. Remove hubcap.
4. Remove hubcap gasket from hub assembly.
5. Clean any residual gasket material from hub.

FIGURE 9-45

Vehicles equipped with Drum Brake



Vehicles equipped with Disc Brake



ASSEMBLY

NOTE Always install and re-install a hubcap with a **NEW** gasket.

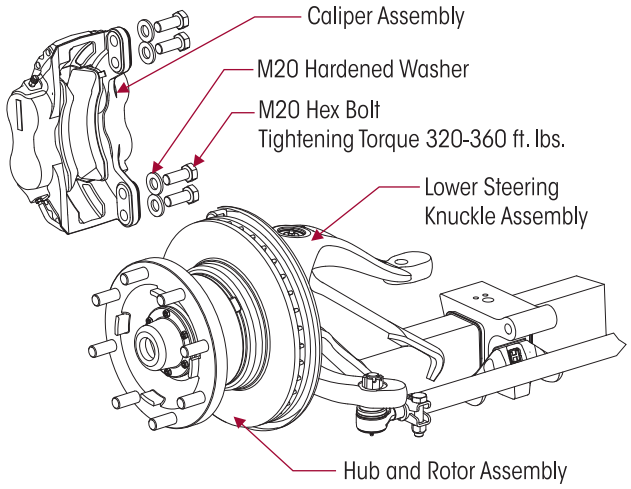
1. Install hubcap and **NEW** gasket.
2. Loosely install hubcap bolts.
3. Uniformly tighten hubcap bolts in a star pattern to 16-20 foot pounds torque.
4. Fill wheel end assembly through the center fill port with the Grade 2 oil (SAE-80W-90, GL-5). Allow the oil to seep through the outer bearing and fill the hub cavity. Continue to add oil until the oil reaches the oil level fill line as indicated on the hubcap.
5. Install center fill hubcap plug.

CALIPER ASSEMBLY

⚠ WARNING

NEVER WORK UNDER A RAISED VEHICLE SUPPORTED BY ONLY A JACK. ALWAYS SUPPORT A RAISED VEHICLE WITH STANDS. BLOCK THE WHEELS AND MAKE SURE THE UNIT WILL NOT ROLL BEFORE RELEASING BRAKES. ALWAYS WEAR EYE PROTECTION. FAILURE TO DO SO CAN CAUSE POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

FIGURE 9-46



DISASSEMBLY

1. Place the vehicle on a level floor.
2. Chock the wheels.
3. Raise the vehicle and install safety stands.
4. Remove the tire and wheel.
5. Remove the four caliper mounting bolts. See Figure 9-46.
6. Remove the caliper and brake pads, secure with suitable strap. **DO NOT** let the caliper hang by brake line.

INSPECTION

1. Inspect brake torque plate and mounting holes for cracks or damage. Replace as necessary.

ASSEMBLY

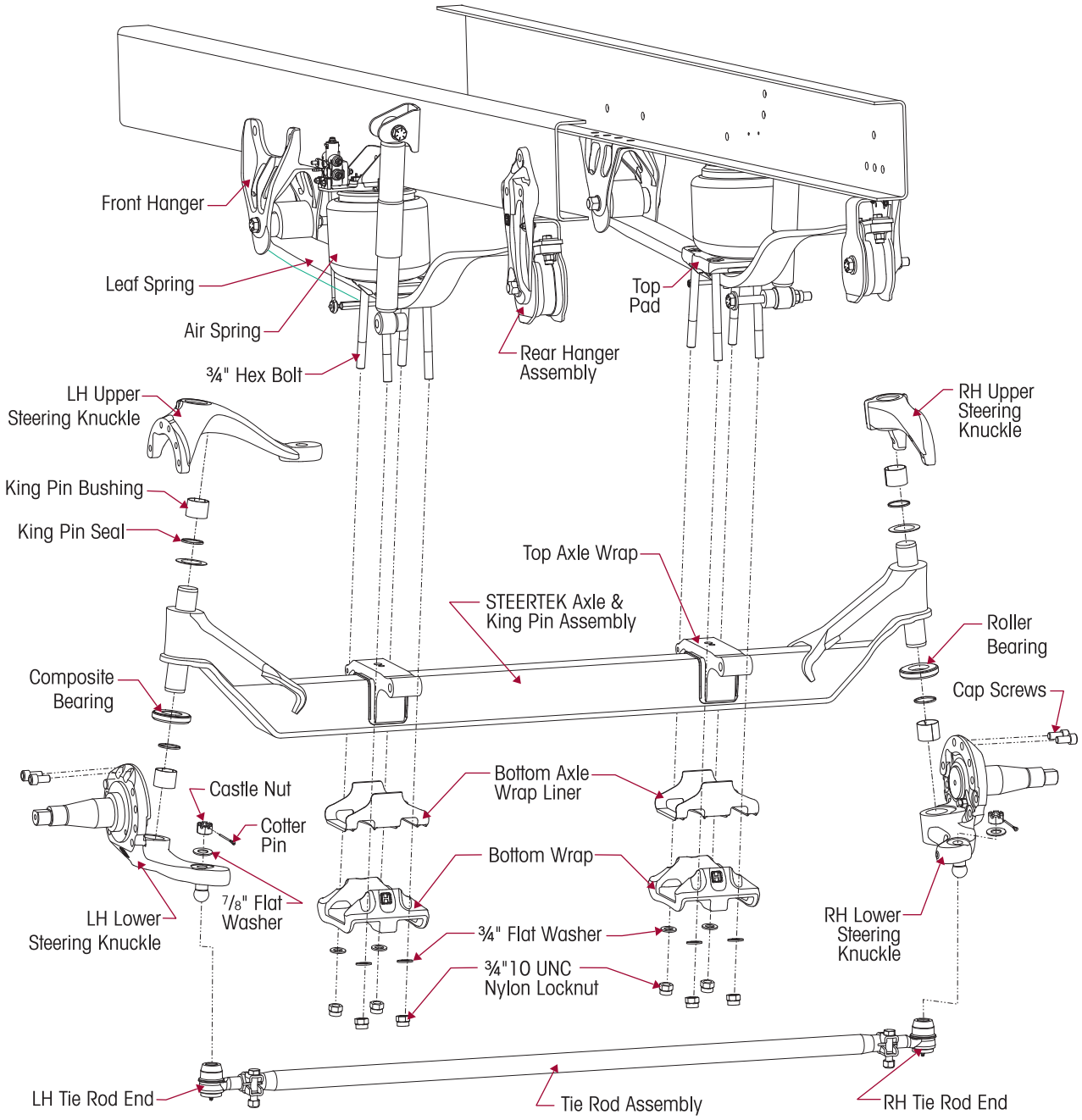
1. Install the caliper assembly on brake rotor.
2. Install the caliper bolts and tighten to 320-360 foot pounds torque, see Figure 9-46.
3. Install tire and wheel.
4. Remove wheel chocks and safety stands.

AIRTEK - FRONT AXLE ASSEMBLY

STEERTEK AXLE CLAMP GROUP CONSIST OF THE FOLLOWING COMPONENTS:

- Top axle wrap
- Top axle wrap liner
- Top pad
- Bottom axle wrap
- Bottom axle wrap liner
- ¾" Bolts, washers and nylon locknuts

FIGURE 9-47

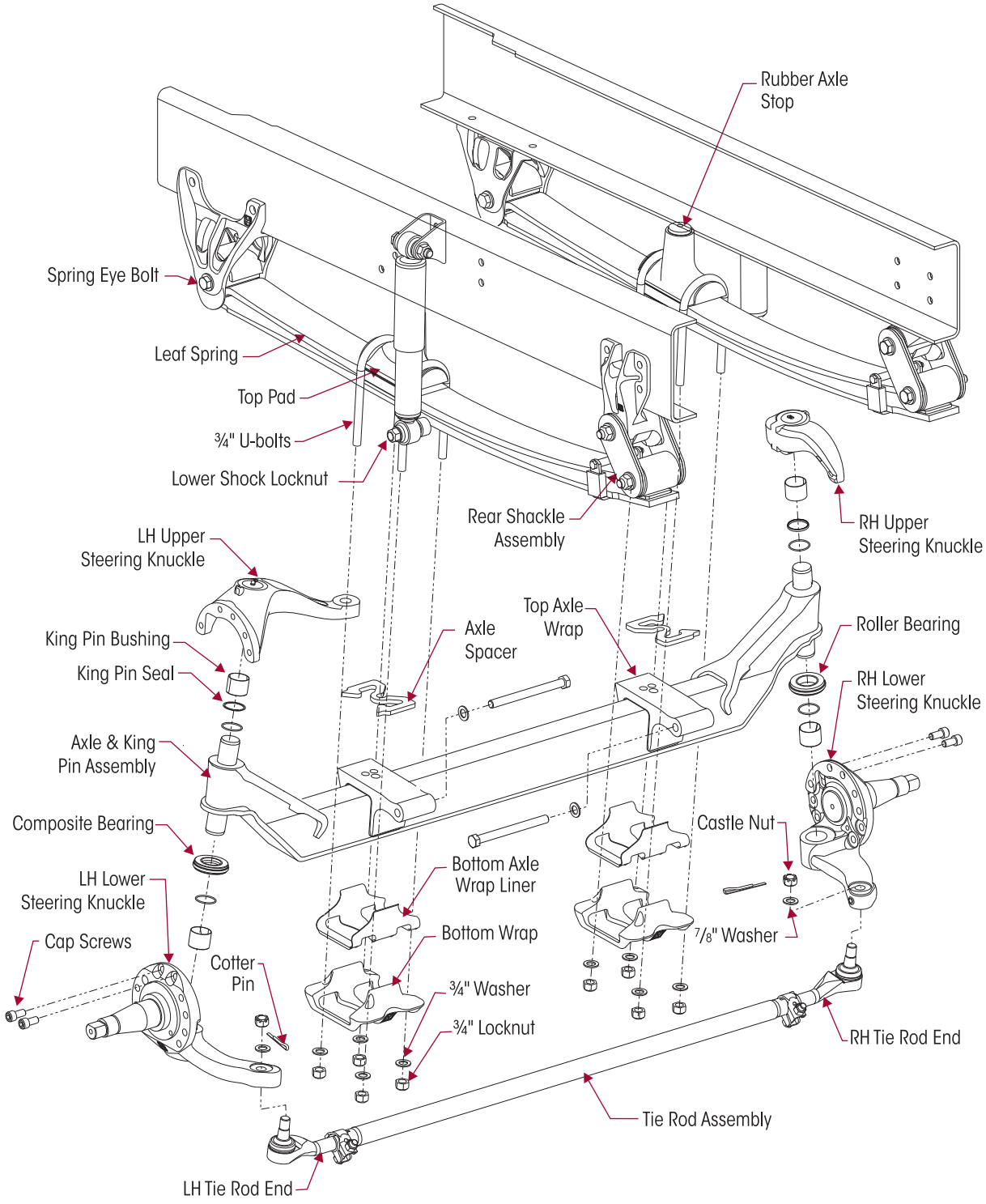


SOFTEK - FRONT AXLE ASSEMBLY

STEERTEK AXLE CLAMP GROUP CONSIST OF THE FOLLOWING COMPONENTS:

- Top axle wrap
- Top axle wrap liner
- Top pad
- Bottom axle wrap
- Bottom axle wrap liner
- ¾" U-bolts, washers and nylon locknuts

FIGURE 9-48



STEERTEK AXLE REMOVAL

AXLE DISASSEMBLY

Refer to Figures 9-47 and 9-48 when replacing the components of the STEERTEK axle.

⚠ WARNING

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

1. Place the vehicle on level floor.
2. Chock the wheels.
3. SOFTEK equipped vehicles — proceed to Step 6.

⚠ 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 Cautions and Warnings in the Important Safety Notice Section of this publication prior to inflating or deflating the suspension system.
5. AIRTEK equipped vehicles — Deflate the air springs by disconnecting the height control valve linkage and lowering the height control valve linkage arm. This will exhaust the air pressure in the air springs.
6. Raise the frame.
7. Support the vehicle with frame stands.
8. Suspend the front axle with the shocks attached.
9. Remove the front wheels, hubs, brake shoes and torque plate assembly.
10. Disconnect the drag link from the steering arm.
11. SOFTEK equipped vehicles — proceed to Step 13.
12. AIRTEK equipped vehicles — Remove lower air spring mounting fasteners for both air springs at the axle top pad and unseat from the top pad.
13. 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.

14. If the vehicle is equipped with the shock absorbers attached to the top axle wrap, 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.

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.

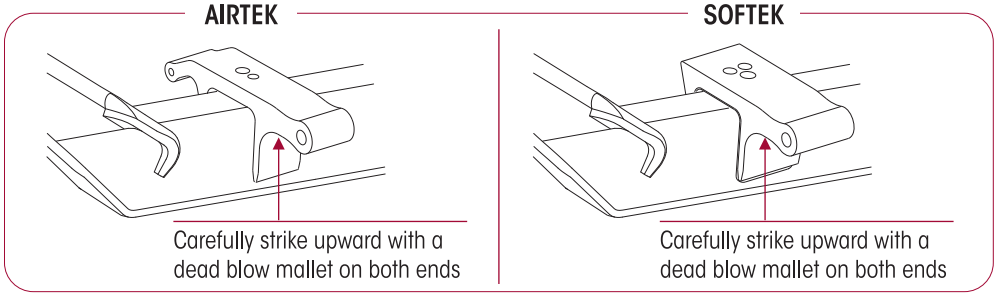
15. Remove the ¾" clamp group U-bolts/hex bolts, washers, and locknuts. Discard fasteners.
16. Lower the axle and remove from the vehicle.

STEERTEK AXLE (Removed From Chassis)

CLAMP GROUP DISASSEMBLY

1. Remove the bottom axle wrap and liner from the axle.
2. Strike the top 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 9-49.

FIGURE 9-49



3. After removal of the top axle wrap from the axle inspect for cracks or fretting.
4. Remove the tie rod assembly, see Tie Rod Disassembly in this section.

WARNING

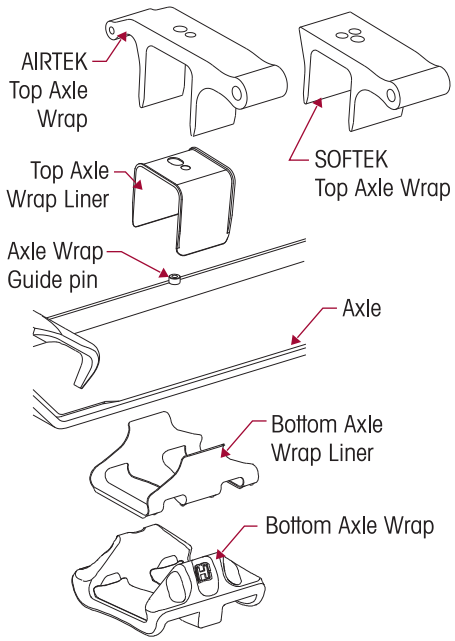
REMOVAL OF THE CAP SCREWS WILL ALLOW THE STEERING KNUCKLE TO SEPARATE FROM THE AXLE. THE BACKBONE MUST BE SUPPORTED BEFORE REMOVAL OF THESE TWO (2) CAP SCREWS. FAILURE TO DO SO CAN CAUSE COMPONENT DAMAGE OR PERSONAL INJURY.

5. Remove the two ⅝" socket head cap screws from the steering knuckle assembly.
6. Remove the steering knuckle, thrust bearing, and shims (if equipped).
7. After complete removal of the one side, repeat Steps 1-6 for the opposite side of the axle.
8. Inspect the steering kingpin bushings for excessive wear. If worn, replace the kingpin bushings and seals. See the Kingpin Bushing replacement instructions in this section.

CLAMP GROUP ASSEMBLY

1. Install the new upper axle wrap liner on the axle. Index the liner with the axle's guide pin, see Figure 9-50.

FIGURE 9-50



CAUTION

DO NOT STRIKE THE TOP AXLE WRAP WITH A HAMMER. DAMAGE TO THE ALUMINUM AXLE WRAP WILL OCCUR. USE A PLASTIC DEAD BLOW MALLET WITH CARE WHEN INSTALLING THE AXLE WRAP.

WARNING

SECURELY INSTALL THE TOP WRAP TO THE AXLE. FAILURE TO DO SO CAN CAUSE LOSS OF CONTROL OF THE VEHICLE, PERSONAL INJURY OR PROPERTY DAMAGE.

SERVICE HINT

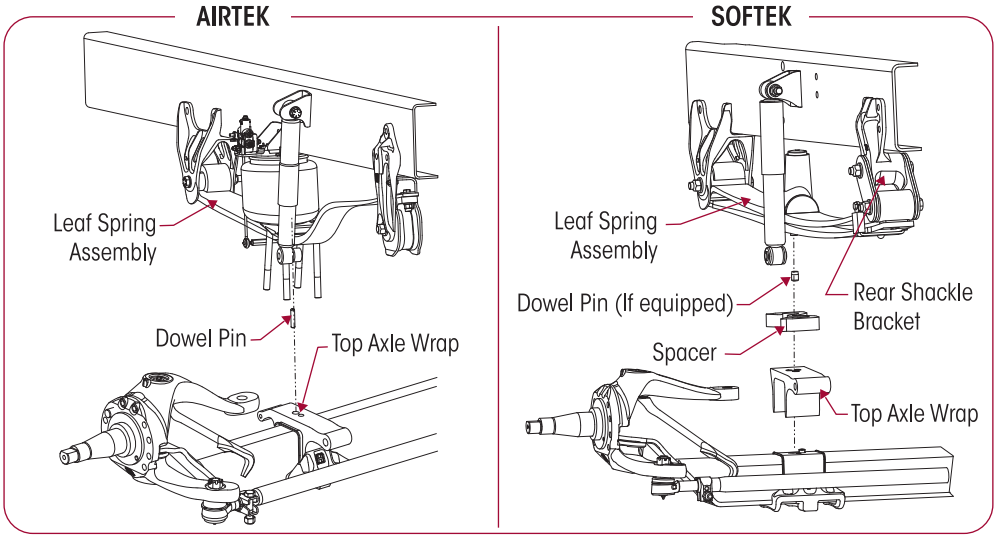
Apply a lubricant (such as an aerosol silicone) to the outer surface of the plastic liner to aid in assembly of the top axle wrap.

2. Install the top axle wrap, see Axle Wrap Assembly instructions located in this section. The axle wrap must be aligned with the guide pin on the axle.
3. At this point in the assembly, **DO NOT** install anything further on the axle.

AXLE INSTALLATION

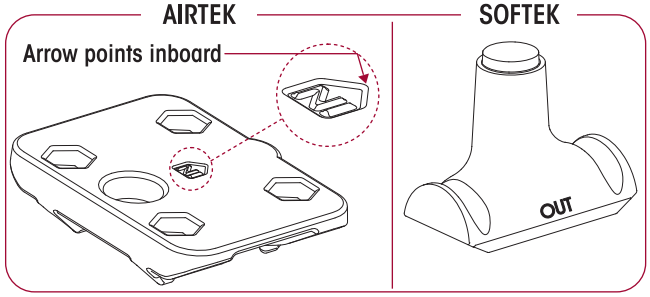
1. Place the new axle on the floor jack and position the axle under the vehicle.
2. Install the axle spacer (if equipped) on the top axle wrap prior to raising the axle into position.
3. Raise the axle into position, see Figure 9-51. Care must be taken at this point to ensure that the front leaf spring assemblies' center bolt is aligned correctly in the top axle wrap.

FIGURE 9-51



4. Verify that the galvanized liner is between the leaf springs and the top pad.
5. Install the new bottom axle wrap liners on the bottom axle wraps.
6. Install the bottom axle wraps on the axle.
7. Install the top pad with the directional identification facing correctly on the vehicle, see Figure 9-52.

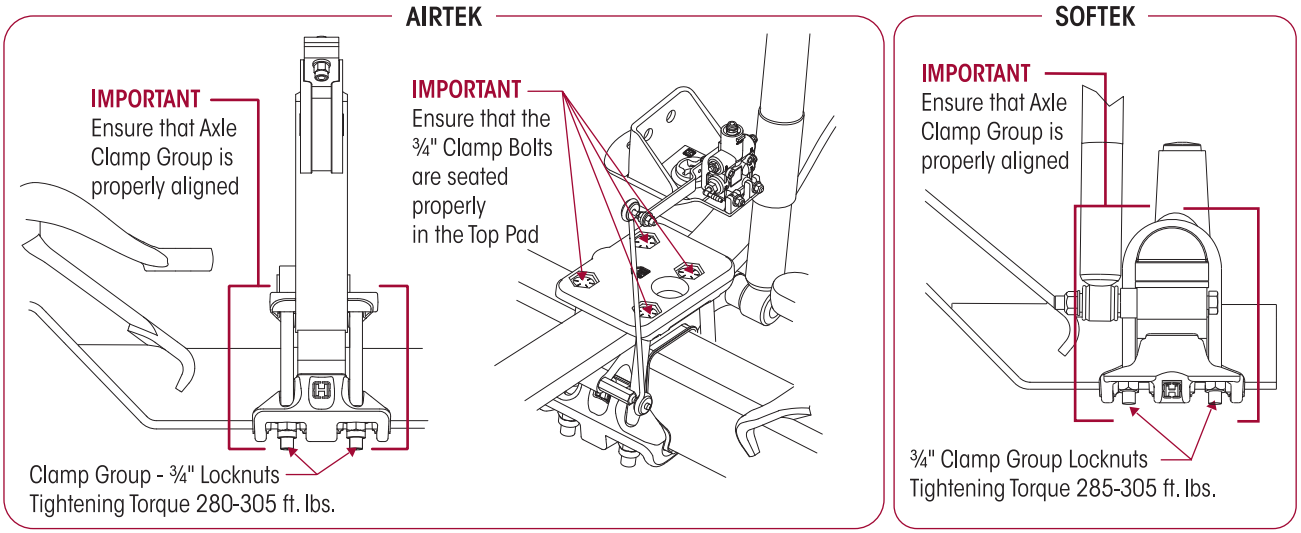
FIGURE 9-52



8. Install the new ¾" clamp group U-bolts/hex bolts, washers and locknuts. Snug the bolts , **DO NOT** tighten to the specified torque at this time.
9. Ensure that the clamp groups are properly aligned and the bolts are seated in the top pad, and the bottom axle wraps are centered on the top axle wraps, see Figure 9-53.
10. **SOFTEK equipped vehicles** — proceed to Step 13.
11. See additional Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to inflating or deflating the suspension system.
12. **AIRTEK equipped vehicles** —

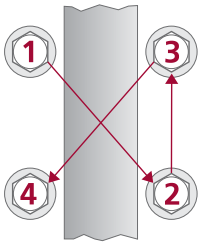
    Engage the air springs into the top pad and install new lower air spring mounting fasteners. Tighten the lower air spring mounting fastener to vehicle manufacturer's specifications.

FIGURE 9-53



13. Install the lower shock absorber connection (if removed) from the inboard side to the outboard side. Install the lower shock fasteners and tighten to vehicle manufacturer's specifications.
14. Install the steering knuckles as per the Steering Knuckle replacement instructions in this section.
15. Install the tie rod assembly as per the Tie Rod replacement instructions in this section.
16. Install the ⅞" hardened washers on the Ackermann arm 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 nut for cotter pin installation.
17. Install the tie rod end cotter pins.
18. Connect the drag link. Install the castle nut. Tighten the castle nut to 185 foot pounds, then rotate until the first castle slot lines up with the cotter pin bore in the drag link. **DO NOT** back off the nut for cotter pin installation.
19. Install the drag link cotter pin.
20. Install the brake backing plate assemblies.
21. Install the brakes, hubs, and wheels as per manufacturer's guidelines.
22. Fill the hubs with the proper lubricant (see manufacturer's guidelines for recommended lubrication specifications).
23. Raise the vehicle and remove the frame stands.
24. Lower the vehicle.
25. **SOFTEK equipped vehicles** — proceed to Step number 27.
26. **AIRTEK equipped vehicles** — Reconnect the height control valve and air up the system.

FIGURE 9-54



27. Tighten the ¾" clamp group locknuts evenly in 50 foot pounds increments to 285-305 foot pounds torque in the proper sequence to achieve uniform bolt tension, see Figure 9-54.
28. **SOFTEK equipped vehicles** — proceed to Step number 30.
29. **AIRTEK equipped vehicles** — Adjust ride height per instructions in the Alignment & Adjustments Section of this publication.
30. Grease the front steering components as per lubrication guidelines in the Preventive Maintenance Section of this publication.
31. Remove the wheel chocks.

STEERING KNUCKLE DISASSEMBLY

NOTE

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

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

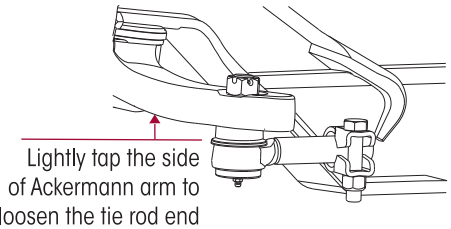
1. Place the vehicle on level floor.
2. Chock the wheels.
3. Support the vehicle with jack stands on the axle.
4. Remove the wheel and hub assembly.
5. Remove the brake components from steering knuckle.
6. Remove the tie rod assembly.

SERVICE HINT

Lightly tap the side of the Ackermann arm with a mallet to separate the tie rod end from the Ackermann arm, see Figure 9-55.

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

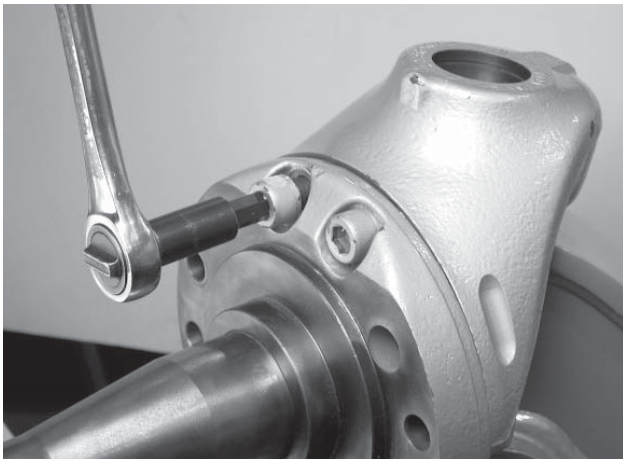
FIGURE 9-55



WARNING

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

FIGURE 9-56



8. Remove the 2 socket head cap screws that connect upper kingpin connection to the steering knuckle, see Figure 9-56.
9. Remove the lower steering knuckle from the kingpin by sliding it down the kingpin.
10. Remove the upper steering knuckle by sliding it up off the kingpin.

KINGPIN PREPARATION AND MEASUREMENT

CLEANING GROUND AND POLISHED PARTS

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

DRYING THE CLEANED PARTS

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

PREVENTING CORROSION ON CLEANED PARTS

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

⚠ WARNING

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

⚠ WARNING

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

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

⚠ CAUTION

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

⚠ WARNING

THE STEERTEK 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 9-57 through 9-60.
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 9-61 through 9-64.

   Kingpin minimum dimension is 1.802"

FIGURE 9-57

FIGURE 9-58

FIGURE 9-59

FIGURE 9-60

FIGURE 9-61

FIGURE 9-62

FIGURE 9-63

FIGURE 9-64

KINGPIN BUSHING REMOVAL

1. Remove the retaining ring for the grease cap.
2. A hydraulic shop press with a minimum forcing capacity of 2.5 tons (or use an arbor press) will be required.

⚠ WARNING

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

⚠ CAUTION

BEFORE APPLYING HYDRAULIC PRESSURE TO REMOVE OR INSTALL THE KINGPIN BUSHING, SUPPORT THE LOWER STEERING KNUCKLE AS SHOWN IN FIGURES 9-65 AND 9-66. IMPROPER SUPPORT TO THE STEERING KNUCKLES CAN CAUSE COMPONENT DAMAGE.

3. Use the grease cap to press out the kingpin bushing and seal. Remove the grease zerk in the grease cap or use a hollow driver, see Figure 9-65, to press out the kingpin bushing.
4. Install the lower steering knuckle upside down in press. Be sure to support the lower steering knuckle assembly so that it sits in-line with the press, see Figure 9-66.
5. Use the same procedure to remove the kingpin bushing in the upper kingpin connection or the steering arm, see Figures 9-65 through 9-67.
6. Clean the parts and inspect for reassembly, see Figure 9-68.

FIGURE 9-65

FIGURE 9-66

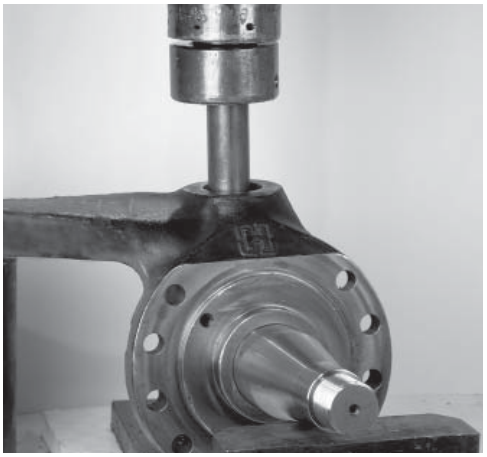


FIGURE 9-67

FIGURE 9-68

STEERING KNUCKLE BORE MEASUREMENT

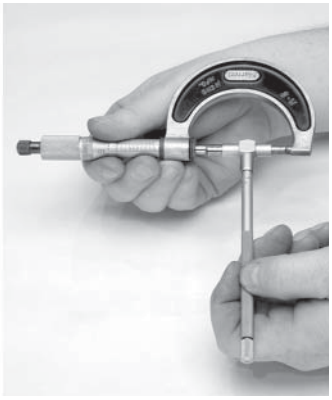
Complete the following steering knuckle bore inspection and the measurement instructions prior to installing the kingpin bushing.

1. Measure the upper knuckle bore inside diameter at two locations. Always use a an inside micrometer or a telescoping gauge when taking a knuckle bore measurement. Some out-of-roundness at the top and bottom of the bore edges is acceptable. Steering knuckle bore diameter is 1.938" ± 0.003".
2. Measure the upper and lower bore in two positions and at two locations. The two positions must be 90º opposed from each other, see Figures 9-69 through 9-71. If the average measurement is more than the knuckle bore maximum diameter specification, replace the knuckle.

FIGURE 9-69

FIGURE 9-70

FIGURE 9-71



KINGPIN BUSHING INSTALLATION

You will need:

- A hydraulic shop press with a minimum forcing capacity of 5 tons

WARNING

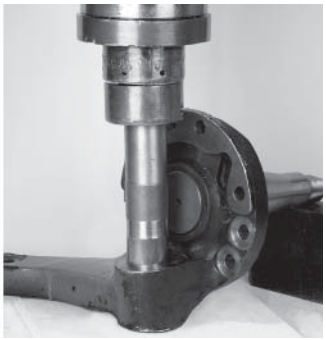
BEFORE APPLYING HYDRAULIC PRESSURE TO ANY TOOLING SET-UP, ALWAYS CHECK TO BE SURE THE PRESS PLATE, ADAPTERS, AND COMPONENTS BEING WORKED ON ARE POSITIONED PROPERLY, I.E. "IN LINE" WITH THE RAM. IMPROPER POSITIONING CAN CAUSE PERSONAL INJURY OR COMPONENT DAMAGE.

1. Install the lower or upper steering knuckle in the press.
2. Install the kingpin bushing from the machined side (axle side) of the lower steering knuckle using a bushing driver, (see driver specifications in Special Tools Section of this publication). Press in bushing to a depth of no less than 15⁄64" (0.234") or 6 millimeters and no more than 5⁄16" (0.32") or 8 millimeters, see Figures 9-72 and 9-74.
3. Following this procedure it is necessary to ream the kingpin bushings to fit the kingpins, see Kingpin Bushing Reaming Instructions.

FIGURE 9-72

FIGURE 9-73

FIGURE 9-74



KINGPIN BUSHING REAMING

CAUTION

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

WARNING

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

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

SERVICE HINT

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

2. Install the reamer into the lower steering knuckle until the blades touch the kingpin bushing.
3. Rotate the reamer with light downward pressure. Rotate the reamer smoothly. Do not apply too much pressure, see Figures 9-75 and 9-76.

FIGURE 9-75

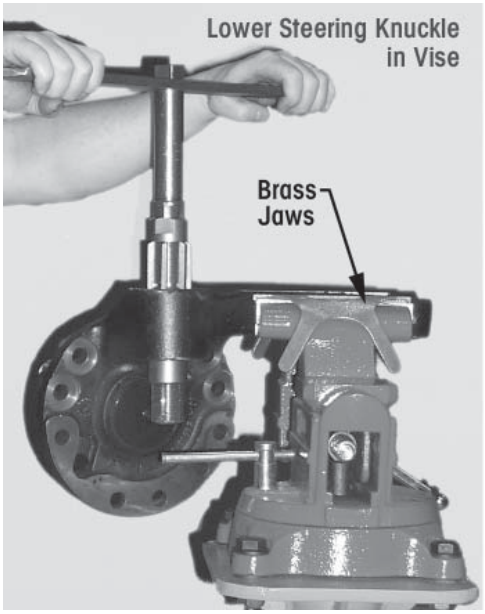
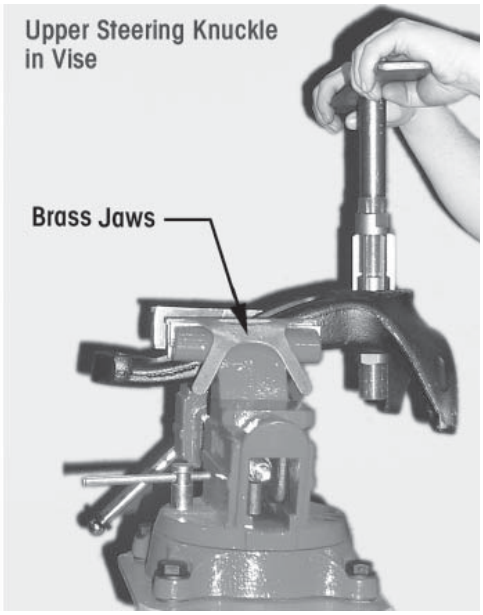


FIGURE 9-76



4. Slide the reamer out of the bottom of the steering knuckle assembly. If it is necessary to remove the reamer from the top, rotate the reamer opposite of cutting rotation.
5. Clean and remove all kingpin bushing material from the steering knuckle assembly. Take special attention to remove material from the grease channels and dimples.
6. Clean the ⅝" brake backing plate bolts with a wire wheel and run a tap through the threads of the lower steering knuckle assembly and then flush out with brake cleaner and dry with compressed air.

WARNING

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

NOTE

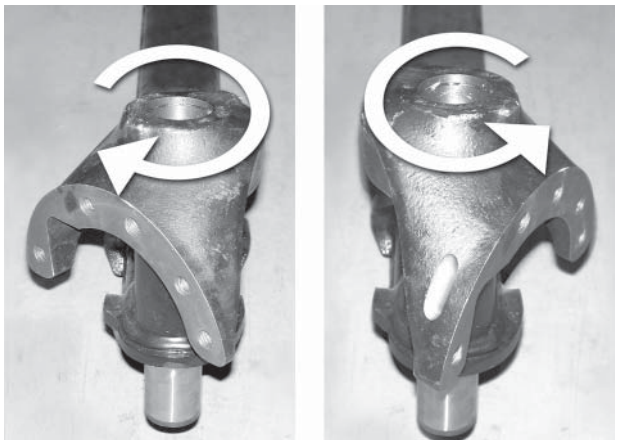
The Hendrickson Genuine part, socket head cap screw comes with a pre-applied loctite compound.

7. Install the upper and lower steering knuckle on the kingpin.

8. Check for the proper fit by rotating the knuckle assembly back and forth to verify there is no binding on the kingpin, see Figures 9-77.
9. If the bushing is too tight repeat Steps 1 through 8 until the proper clearance is achieved.

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

FIGURE 9-77



KINGPIN SEAL INSTALLATION

1. Place the steering knuckle assembly in a vise with brass jaws or place on a suitable workbench. The steering knuckle will have the machined surface facing up (axle side up).
2. Lay the kingpin seal into the bore of the steering knuckle. The seal lip should face outward or toward the axle.
3. Use a bushing driver tool and press seal firmly into the steering knuckle assembly.
4. Install the kingpin seal until it makes contact with the kingpin bushing, see Figures 9-78 and 9-79.

FIGURE 9-78

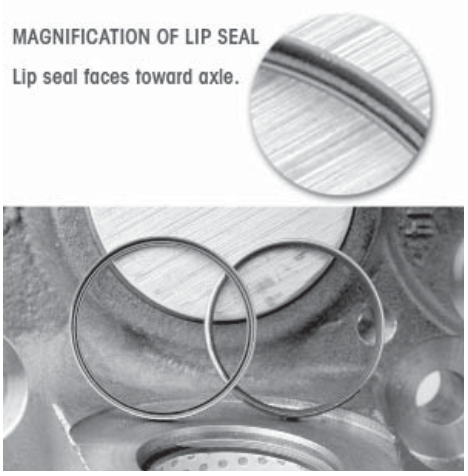


FIGURE 9-79

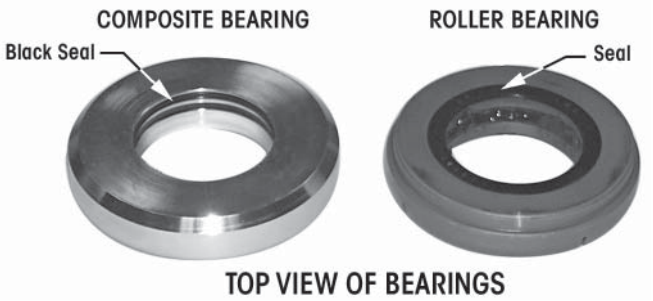
STEERING KNUCKLE ASSEMBLY

ASSEMBLY

After replacement of the kingpin bushings it is necessary to re-assemble the steering knuckle assemblies. The STEERTEK axle is equipped with two different thrust bearings installed. **DO NOT** substitute aftermarket components when servicing.

1. Install the thrust bearing on the lower kingpin with the seal facing up toward axle (the black seal will designate the top side, see Figure 9-80). The composite thrust bearing is installed on the left side of the axle. The roller bearing is installed on the right side of the axle.

FIGURE 9-80



2. Install the shim on the upper kingpin.
3. Pack the bushing dimples on the upper and lower steering knuckles with multi purpose Lithium based grease (NLGI Grade 2) before installation.
4. Install the upper steering knuckle on the upper arm kingpin.
5. Install the lower steering knuckle on the lower kingpin and install the old socket head cap screws loose into the top two threaded holes.

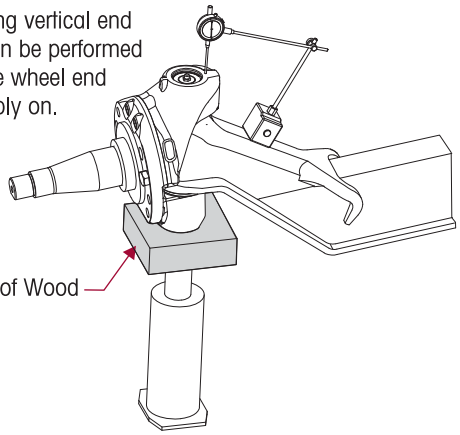
SERVICE HINT

The easiest way to achieve this is with the grease caps not installed in the knuckle assemblies. This eliminates back pressure. The assembly can then freely slide up and down on the kingpin. If the grease caps are still installed, remove the grease zerks to avoid creating back pressure. Grease zerks will be re-installed at the end of the procedure.

6. Install a bottle jack under the lower knuckle and slightly raise the knuckle until it is possible to thread in the (3) brake backing plate bolts by hand. These are for guide purposes only.
7. Snug the two socket head cap screws.
8. Lower the bottle jack so that all the vertical clearance is on the underside of the axle.

FIGURE 9-81

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



9. Affix a magnetic base dial indicator on the axle and place the tip of the dial indicator on top of the knuckle assembly, see Figure 9-81.
10. Zero the dial indicator.
11. Raise the bottle jack until there is no clearance between the knuckle assembly and the bottom of the axle, slightly lifting the axle.
12. Check the reading on the dial indicator. The specification for vertical travel on the steering knuckle during assembly is 0.008" to 0.011".
13. If the clearance is above 0.011", loosen the socket head cap screws and push down on the knuckle assembly until the proper vertical clearance is achieved. Add (0.005") shim if necessary.
14. If the clearance is below the 0.008", loosen the two socket head cap screws and pull up on the knuckle assembly until the proper vertical clearance is achieved. If the 0.008" minimum clearance is unattainable 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 steering knuckle socket head cap screws come with a pre-applied loctite compound.

15. Remove one old socket head cap screw and replace with a new socket head cap screw.

16. Remove second socket head cap screw and replace with new socket head cap screw. Tighten both socket head cap screws to 175-200 foot pounds torque.
17. Recheck the vertical clearance with the dial indicator or a 0.010" feeler gauge, see Figure 9-81.
18. Remove the brake spider bolts, they should thread out freely.
19. Remove the bottle jack and continue assembling the wheel ends.

IMPORTANT NOTE Loctite applied to the three brake spider bolts is a critical procedure to ensure that these bolts sustain the torque requirement of Steering knuckle assembly.

20. Apply loctite to the three brake spider bolts prior to installation into the brake spider.Tighten bolts to 175-200 foot pounds torque.

WARNING

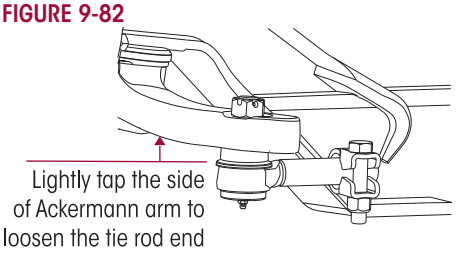
DO NOT GREASE KNUCKLES WITHOUT THE BRAKE SPIDER INSTALLED AND TIGHTENED TO PROPER TORQUE. FAILURE TO DO SO CAN CAUSE COMPONENT DAMAGE RESULTING IN FAILURE AND LOSS OF VEHICLE CONTROL, POSSIBLY CAUSING PERSONAL INJURY OR PROPERTY DAMAGE.

21. Install the tie rod end into the lower steering knuckle arm.
22. Tighten the castle nuts to 185 foot pounds torque then rotate the castle nut to the next castle slot and install cotter pin.
23. Install the drag link into the steering arm and tighten to the vehicle manufacturer's specifications.
24. Install new O-rings on the grease caps and lubricate O-rings with grease.
25. Install grease caps and new retaining rings.
26. Install brakes, drums, wheels and tires.
27. Remove jack and safety stands.
28. Grease steering knuckles with the vehicle on the floor.
29. Remove wheel chocks.

TIE ROD END AND CROSS TUBE

DISASSEMBLY

FIGURE 9-82



1. Chock the wheels.
2. Position the steer axle tires straight ahead.
3. Remove the cotter pin and castle nut.
4. Lightly tap the side of the Ackermann arm to loosen the tie rod end from the Ackermann arm, see Figure 9-82.
5. Repeat Steps 3 and 4 to remove the other tie rod end.
6. Remove the cross tube and tie rod ends from the vehicle.
7. Mount the cross tube in a soft jaw vice.
8. Remove the hardware from the clamp on the cross tube.
9. Count the exposed threads on the tie rod end being replaced.
10. Remove the tie rod end from the cross tube.

WARNING

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

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

ASSEMBLY

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

NOTE

When installing the cross tube the thread direction of the tie rod ends are as follows:
- A right hand threaded tie rod end will be installed into the right side Ackermann arm.
- A left hand threaded tie rod end will be installed into the left side Ackermann arm.

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

⚠ WARNING

THE THREADED PORTION OF THE TIE ROD END MUST EXTEND PAST THE SLOTS INTO THE TIE ROD CROSS TUBE, SEE FIGURE 9-83. FAILURE TO DO SO CAN CAUSE COMPONENT DAMAGE, LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

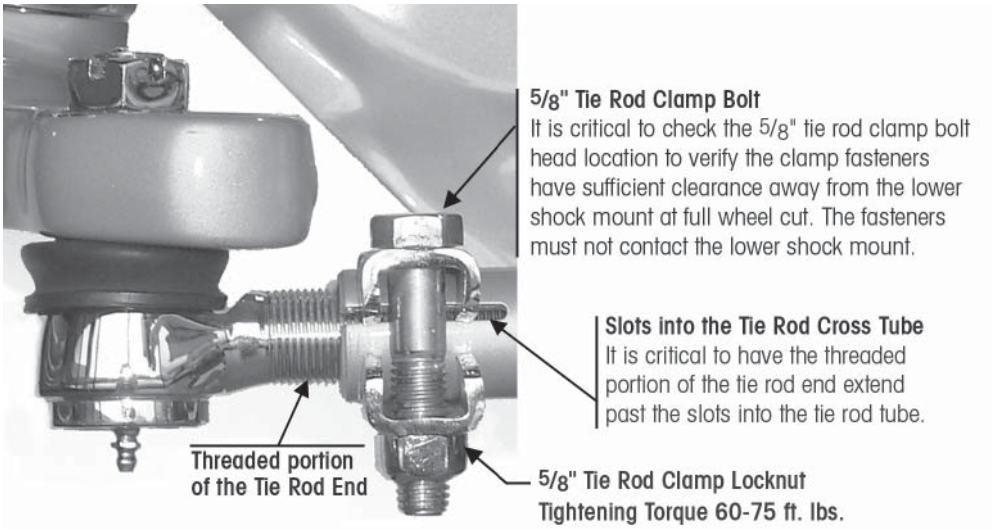
3. Replace the opposing tie rod end if necessary by repeating Steps 2 and 3.
4. If replacing opposing tie rod end, it is critical that the cross tube will rotate in the opposing tie rod end.

⚠ WARNING

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

5. Install the cross tube into the Ackermann arms.
6. Tighten the castle nuts to 185 foot pounds torque then rotate the castle nut to the next castle slot and install cotter pin.
7. Grease tie rod ends, see Lubrication Chart for required lubricant in Preventive Maintenance Section of this publication.
8. Set the toe, see the Toe Adjustment Procedure in Alignment & Adjustments Section of this publication.

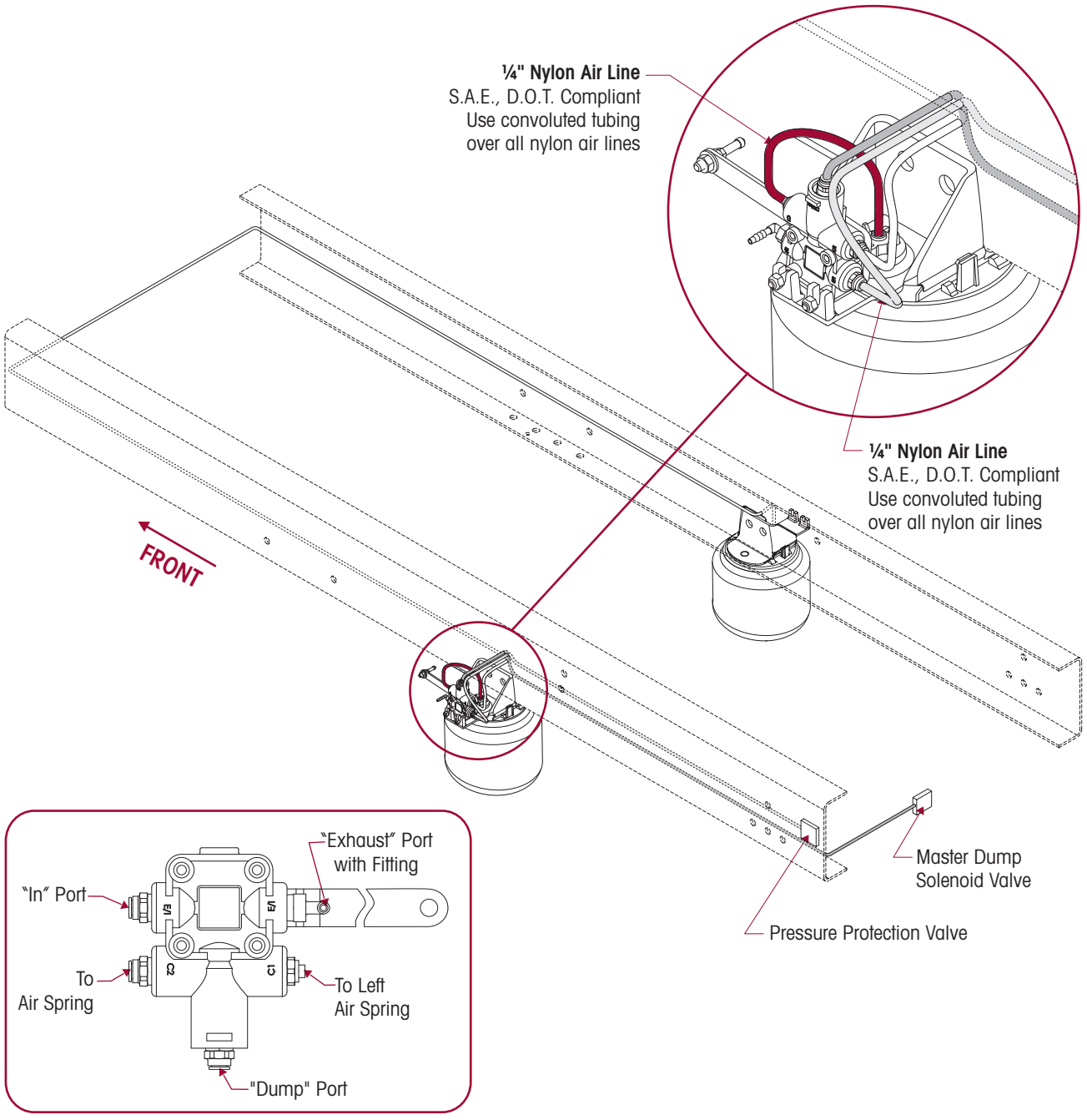
FIGURE 9-83



SECTION 10
Plumbing Diagrams

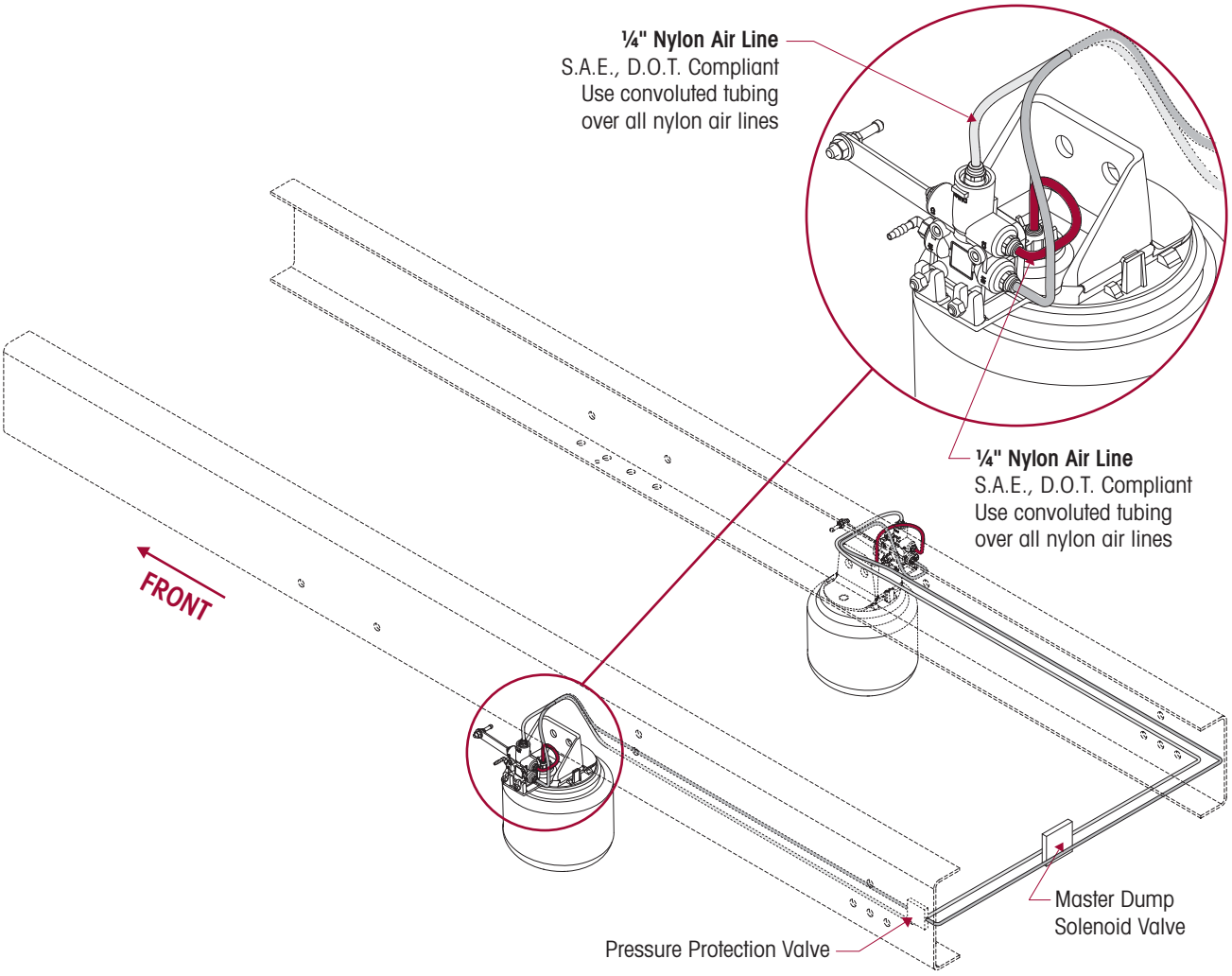
SINGLE HEIGHT CONTROL VALVE ORIGINALLY EQUIPPED FROM THE MANUFACTURER

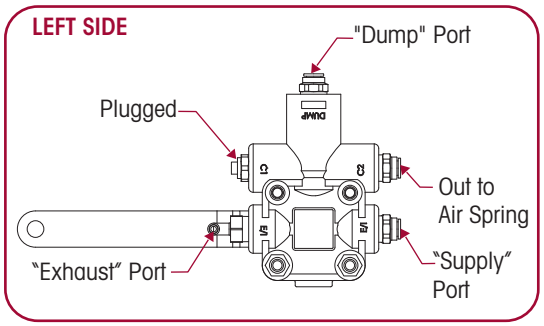
When replacing or installing nylon air line tubing into quick-connect fittings it is critical that the end of the air line is cut square. Improper cut of the end of the air line tubing can cause the air line to seat improperly in the quick connect fitting causing air leakage.

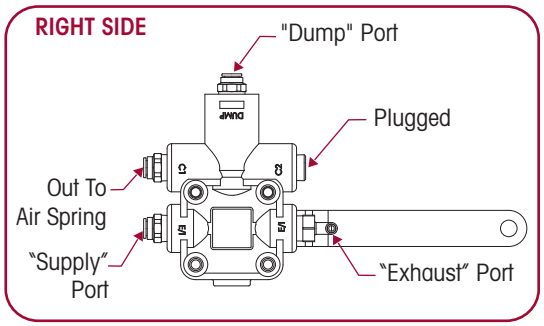


DUAL HEIGHT CONTROL VALVES ORIGINALLY EQUIPPED FROM THE MANUFACTURER

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.



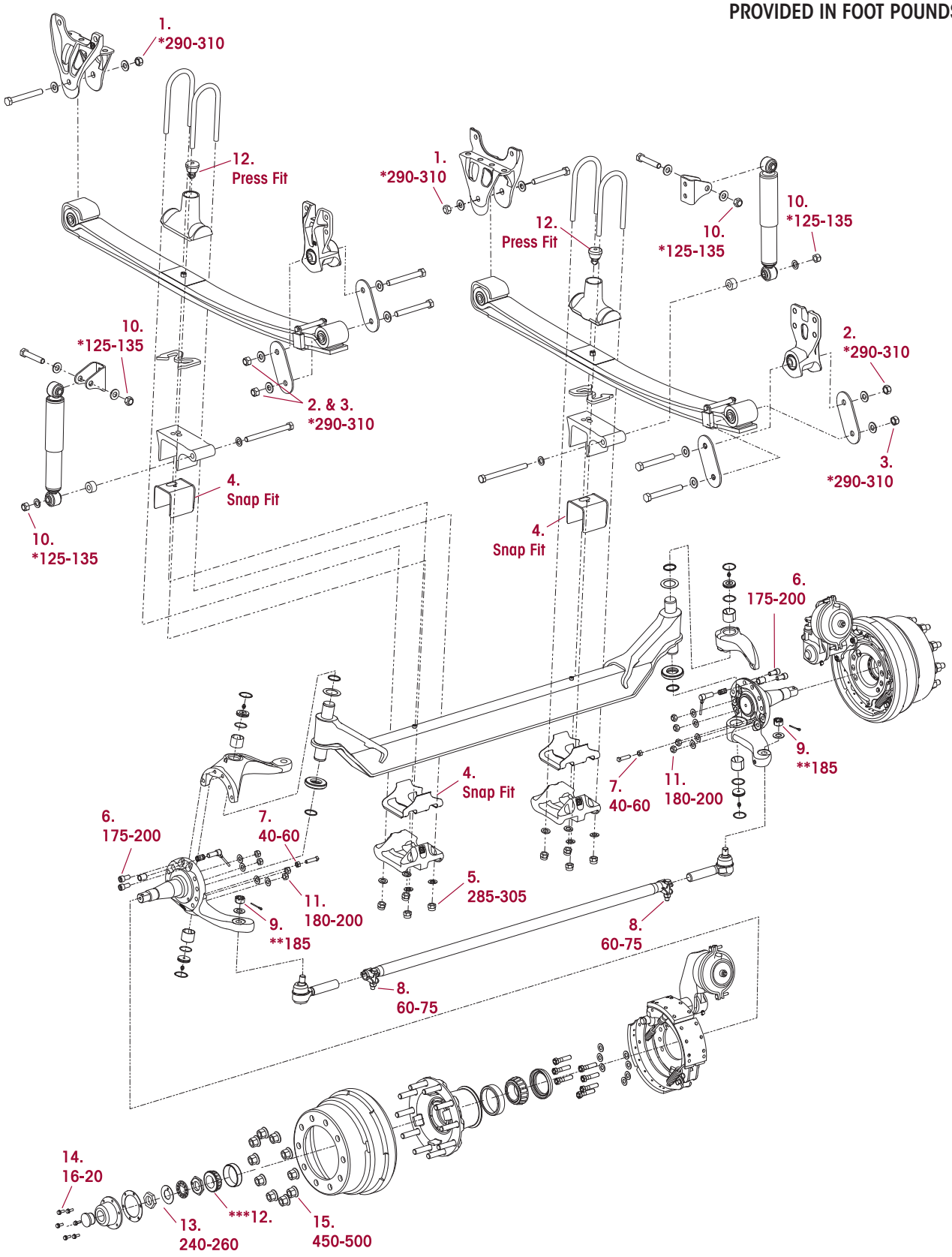




Torque Specifications

SOFTEK FOR SPARTAN BUS WITH DRUM BRAKES

HENDRICKSON RECOMMENDED TORQUE VALUES PROVIDED IN FOOT POUNDS



SOFTEK WITH DRUM BRAKES

HENDRICKSON RECOMMENDED TORQUE SPECIFICATIONS

NO.	COMPONENT	QTY.	SIZE	TORQUE VALUE in foot pounds
	Frame fasteners are furnished and installed by the vehicle manufacturer. Vehicle manufacturer may use an equivalent HUCK fastener at frame mount.			
1	Front Frame Hanger to Front Leaf Spring Eye	2	M20	*290-310
2	Rear Shackle Bracket to Shackle Plate	2	M20	*290-310
3	Rear Shackle Bracket to Leaf Spring Eye	2	M20	*290-310
4	Axle Wrap Liners for Clamp Group	4	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.			
5	Clamp Group Hardware	8	¾"	280-305
	⚠ WARNING ENSURE CLAMP GROUP IS ALIGNED PROPERLY PRIOR TO TIGHTENING HARDWARE. FAILURE TO DO SO CAN CAUSE LOSS OF VEHICLE CONTROL, PROPERTY DAMAGE OR PERSONAL INJURY.			
6	Knuckle Attachment Bolt (Socket Head Cap Screw)	4	⅝"	175-200
7	Knuckle / Steering Stop Bolt	2	½" Jam Nut	40-60
8	Tie Rod Tube to Tie Rod Ends	2	⅝"	60-75
9	Tie Rod Ends / Drag Link to Steering Knuckle	2	⅞" Castle Nut	**185
10	Upper and Lower Shock Eye Bolts	2	¾"	*125-135
11	Lower Steering Knuckle Assembly to Brake Assembly	8	⅝"	180-200
12	Inner Wheel Bearing Adjusting Nut	2	1½"	***
13	Wheel Bearing Outer Nut	2	1½"	240-260
14	Hubcap	12	5/16"	16-20
15	Wheel Flange Nut	20	M22	450-500

• All hardware ¼" and greater is Grade 8 with no additional lubrication.

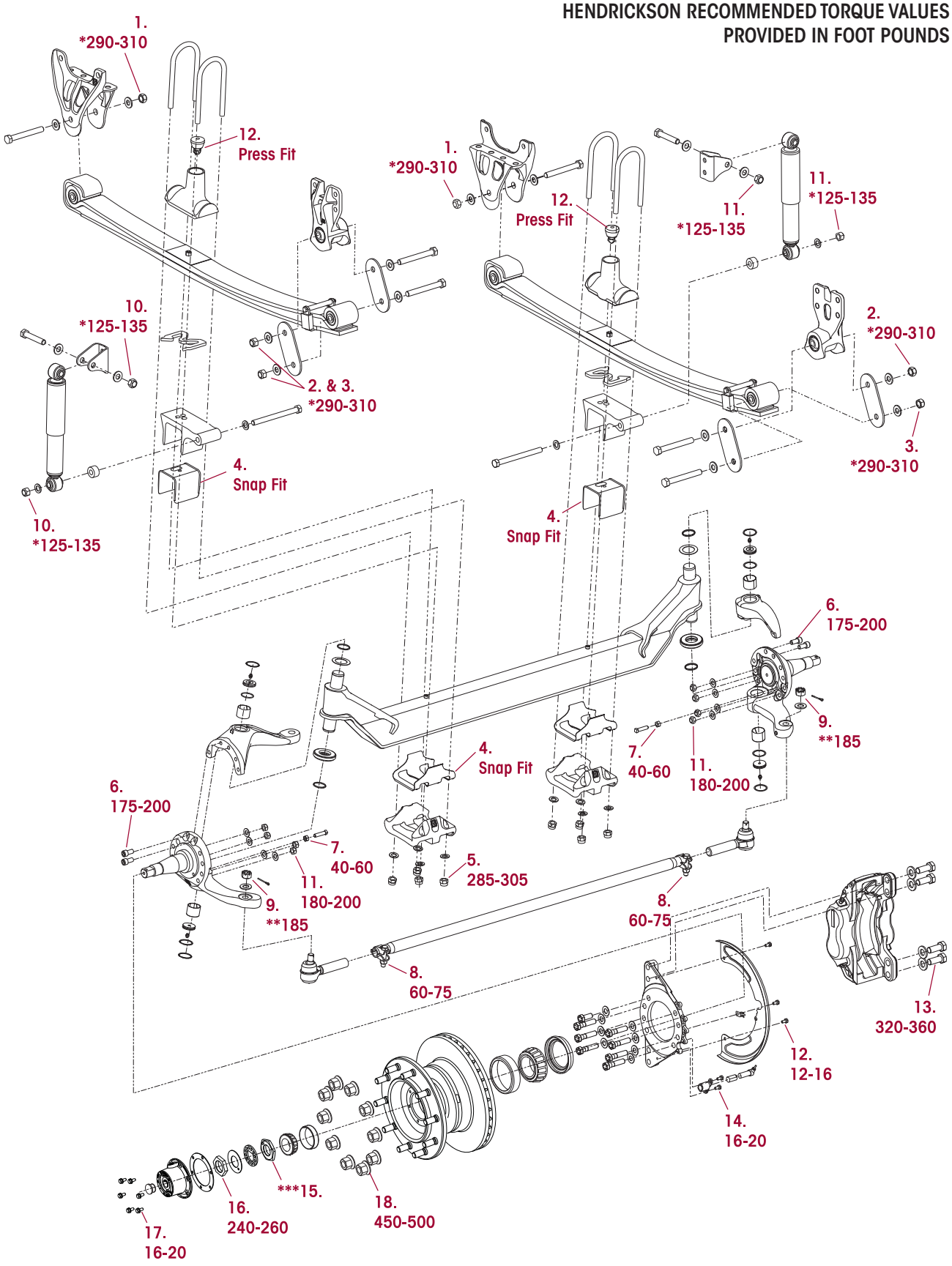
NOTE:

* All hardware information shown in gray denotes fasteners originally supplied by the vehicle manufacturer. Follow torque specifications listed in the vehicle manufacturer's manual. Hendrickson is not responsible for maintaining vehicle manufacturer's torque values.

** Torque to 185 foot lbs., advance nut to next hex face to install cotter pin. **DO NOT** back off nut for cotter pin installation.

*** See Wheel Bearing Adjustment in Alignment & Adjustments Section of this publication for proper torque procedure.

HENDRICKSON RECOMMENDED TORQUE VALUES
PROVIDED IN FOOT POUNDS



SOFTEK WITH DISC BRAKES

HENDRICKSON RECOMMENDED TORQUE SPECIFICATIONS

NO.	COMPONENT	QTY.	SIZE	TORQUE VALUE in foot pounds
	Frame fasteners are furnished and installed by the vehicle manufacturer. Vehicle manufacturer may use an equivalent HUCK fastener at frame mount.			
1	Front Frame Hanger to Front Leaf Spring Eye	2	M20	*290-310
2	Rear Shackle Bracket to Shackle Plate	2	M20	*290-310
3	Rear Shackle Bracket to Leaf Spring Eye	2	M20	*290-310
4	Axle Wrap Liners for Clamp Group	4	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.			
5	Clamp Group Hardware	8	¾"	280-305
	WARNING ENSURE CLAMP GROUP IS ALIGNED PROPERLY PRIOR TO TIGHTENING HARDWARE. FAILURE TO DO SO CAN CAUSE LOSS OF VEHICLE CONTROL, PROPERTY DAMAGE OR PERSONAL INJURY.			
6	Knuckle Attachment Bolt (Socket Head Cap Screw)	4	⅝"	175-200
7	Knuckle / Steering Stop Bolt	2	½" Jam Nut	40-60
8	Tie Rod Tube to Tie Rod Ends	2	⅝"	60-75
9	Tie Rod Ends / Drag Link to Steering Knuckle	2	⅞" Castle Nut	**185
10	Upper and Lower Shock Eye Bolts	2	¾"	*125-135
11	Lower Steering Knuckle Assembly to Torque Plate	8	⅝"	180-200
12	Torque Plate to Dust Shield	6	M8	12-16
13	Torque Plate to Caliper	8	M20	320-360
14	Torque Plate to ABS Bracket	4	5/16"	16-20
15	Inner Wheel Bearing Adjusting Nut	2	1½"	***
16	Wheel Bearing Outer Nut	2	1½"	240-260
17	Hubcap	12	5/16"	16-20
18	Wheel Flange Nut	20	M22	100-125

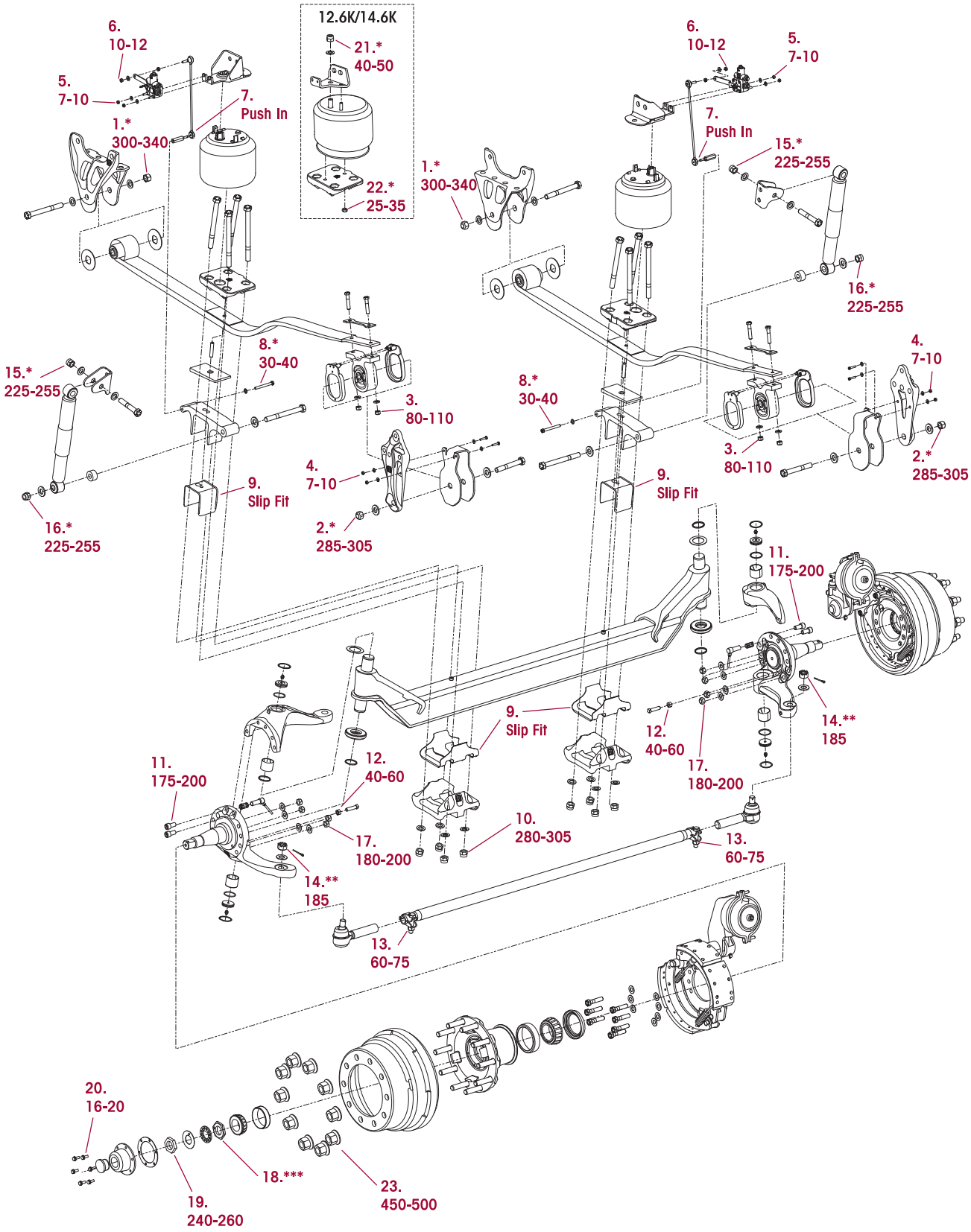
NOTE:

* All hardware information shown in gray denotes fasteners originally supplied by the vehicle manufacturer. Follow torque specifications listed in the vehicle manufacturer's manual. Hendrickson is not responsible for maintaining vehicle manufacturer's torque values.

** Torque to 185 foot lbs., advance nut to next hex face to install cotter pin. **DO NOT** back off nut for cotter pin installation.

*** See Wheel Bearing Adjustment in Alignment & Adjustments Section of this publication for proper torque procedure.

HENDRICKSON RECOMMENDED TORQUE VALUES
PROVIDED IN FOOT POUNDS



AIRTEK

HENDRICKSON RECOMMENDED TORQUE SPECIFICATIONS

NO.	COMPONENT	QTY.	SIZE	TORQUE VALUE in foot pounds
	Frame fasteners are furnished and installed by the vehicle manufacturer. Vehicle manufacturer may use an equivalent HUCK fastener at frame mount.			
1	Front Frame Hanger to Front Leaf Spring Eye	2	M20	*300-340
2	Rear Spring Hanger to Rear Spring Mount	2	¾"	*285-305
3	Rear Spring Mount to Leaf Spring	2	½"	80-110
4	Rear Hanger to Rear Hanger Clamp	2	¼"	7-10
5	Height Control Valve to Air Spring Bracket	2	¼"	7-10
6	Linkage Rod to Height Control Valve Arm	1	5/16"	10-12
7	Linkage Rod to Link Mount	None	Grommet	Push In
8	Link Mount to Top Axle Wrap	1	3/8"	*30-40
9	Axle Wrap Liners for Clamp Group	4	Formed	Slip 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.			
10	Clamp Group Hardware	8	¾"	280-305
	⚠ WARNING ENSURE CLAMP GROUP IS ALIGNED PROPERLY PRIOR TO TIGHTENING HARDWARE. FAILURE TO DO SO CAN CAUSE LOSS OF VEHICLE CONTROL, PROPERTY DAMAGE OR PERSONAL INJURY.			
11	Knuckle Attachment Bolt (Socket Head Cap Screw)	4	5/8"	175-200
12	Knuckle / Steering Stop Bolt	2	½" Jam Nut	40-60
13	Tie Rod Tube to Tie Rod Ends	2	5/8"	60-75
14	Tie Rod Ends / Drag Link to Steering Knuckle	2	7/8" Castle Nut	**185
15	Upper Shock Eye to Shock Bracket	2	¾"	*225-255
16	Lower Shock Eye to Top Axle Wrap	2	¾"	*225-255
17	Lower Steering Knuckle Assembly to Brake Assembly	8	5/8"	180-200
18	Inner Wheel Bearing Adjusting Nut	2	1½"	***
19	Wheel Bearing Outer Nut	2	1½"	240-260
20	Hubcap	12	5/16"	16-20
21	Air Spring to Air Spring Bracket (12.6/14.6K only)	2	¾"	*40-50
22	Air Spring to Top Pad (12.6/14.6K only)	2	½"	*25-35
23	Wheel Flange Nut	20	M22	100-125

• All hardware ¼" and greater is Grade 8 with no additional lubrication.

NOTE:

* All hardware information shown in gray denotes fasteners originally supplied by the vehicle manufacturer. Follow torque specifications listed in the vehicle manufacturer's manual. Hendrickson is not responsible for maintaining vehicle manufacturer's torque values.

** Torque to 185 foot lbs., advance nut to next hex face to install cotter pin. **DO NOT** back off nut for cotter pin installation.

*** See Wheel Bearing Adjustment in Alignment & Adjustments Section of this publication for proper torque procedure.

SECTION 12
Troubleshooting Guide

AIRTEK / SOFTEK FOR SPARTAN

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

AIRTEK / SOFTEK FOR SPARTAN

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

SECTION 13

Front Alignment Specifications

HENDRICKSON RECOMMENDED TORQUE VALUES PROVIDED IN FOOT POUNDS

AIRTEK • SOFTEK FOR SPARTAN

FRONT SUSPENSION ALIGNMENT SPECIFICATION

CAMBER[1]	DESIGN SPECIFICATION		RANGE			
	AIRTEK	SOFTEK	AIRTEK		SOFTEK	
			MINIMUM	MAXIMUM	MINIMUM	MAXIMUM
LEFT	0.0° ± 1.0°	0.0° ± 1.0°	-1.0°	+1.0°	-1.0°	+1.0°
RIGHT	0.0° ± 1.0°	0.0° ± 1.0°	-1.0°	+1.0°	-1.0°	+1.0°
CROSS	0.0°	0.0°	—	+2.0°	—	+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[1,2]	DESIGN SPECIFICATION		RANGE			
	AIRTEK	SOFTEK	AIRTEK		SOFTEK	
			MINIMUM	MAXIMUM	MINIMUM	MAXIMUM
LEFT	6.0° ± 1.0°	3.0° ± 1.0°	+5.0°	+7.0°	+2.0°	+4.0°
RIGHT	6.0° ± 1.0°	3.0° ± 1.0°	+5.0°	+7.0°	+2.0°	+4.0°
CROSS[3]	0.0°	0.0°	—	+2.0°	—	+2.0°

CASTER NOTES:

[1] Caster is determined with the vehicle at specified ride height for air suspension or at rated load for mechanical suspension systems. It is critical that the vehicle front and rear ride height is within specifications prior to performing a caster measurement or adjustment. See Hendrickson ride height specifications and procedure.

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

[3] **The cross caster angle is not adjustable – DO NOT** bend axle or otherwise try to adjust cross caster. If found out of specifications notify Hendrickson Tech Services for further information. Changes to caster can be attained by using caster shims as provided by the vehicle manufacturer or chassis and body manufacturer. Caster shims must match, side to side, to reduce uneven loading to the suspension components. **The use of two different angle caster shims will not correct cross caster.**

[4] **Example of caster adjustment:** 2.5° RH/3° LH, would require one, 1.0 shim on each side to increase caster and achieve 3.50° RH/4.00° LH, which is in specification. Do not attempt to use uneven shims.

Hendrickson recommends following TMC[2] practices:

	DESIGN SPECIFICATION[1]	RANGE	
		MINIMUM	MAXIMUM
TOTAL TOE[2]	1/16" ± 1/32" (0.06" ± 0.03")	1/32" (0.03")	3/32" (0.09")

TOE-IN NOTES:

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

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

SECTION 14
Reference Material

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

TMC

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

TMC/ATA
2200 Mill Road
Alexandria, VA 22314

Phone: 703-838-1763
website: tmc.truckline.com
online ordering: www.truckline.com/store

Important References

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

Video's

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

Other

TMC T0400	Wheel bearing Adjustment Procedure Wall Chart

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