



**H HENDRICKSON**  
*The World Rides On Us®*

**Pro Gear**  
AND TRANSMISSION

## HN Service Manual

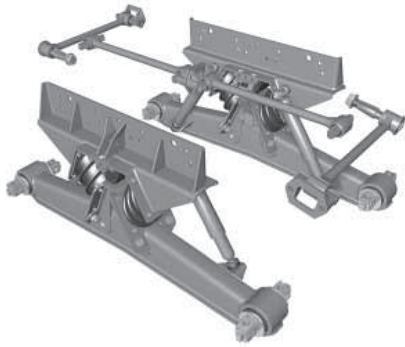
Pro Gear's Hendrickson HN Service Manual to assist in identifying your Hendrickson unit.

If you need any assistance identifying the correct transfer case unit for your truck and equipment, contact your Hendrickson replacement part specialists at Pro Gear and Transmission.

Pro Gear Transmission has same day shipping and 1000's of products in stock and ready to ship internationally for your next project.

For parts or service contact the Hendrickson specialists at Pro Gear & Transmission, Inc.

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# **H** TECHNICAL PROCEDURE

## HN® Series Rear Suspension

SUBJECT: Service Instructions

LIT NO: 17730-227

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REVISION: C

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## SECTION 1

# Introduction

This publication is intended to acquaint and assist maintenance personnel in the preventive maintenance, service, repair and rebuild of the HN® Series suspension system. Refer to Hendrickson Technical Publication 17730-285 for Fire/Rescue vehicles.

### NOTE

Use only  Hendrickson parts for servicing this suspension system, see the Parts List Section of this publication for component replacement parts.

It is important to read and understand the entire Technical Procedure publication prior to performing any maintenance, service, repair, or rebuild of this product. The information in this publication contains parts lists, safety information, product specifications, features, proper maintenance and rebuild instructions for the HN Series suspension system.

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

**The latest revision of this publication is also available online at [www.hendrickson-intl.com](http://www.hendrickson-intl.com).**

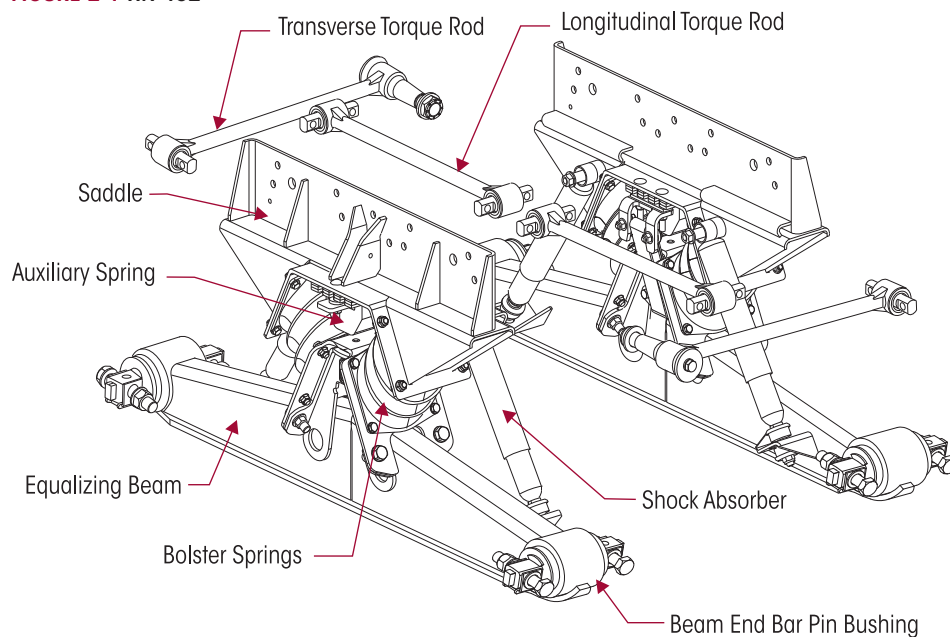
## SECTION 2

# Product Description

The HN 402/462/522 suspension systems uses VariRate® spring system which delivers a combination of superior stability, articulation and ride. Proven with extensive lab & vehicle durability testing, suspension weight has been reduced through innovative suspension design.

The vehicle manufacturer determines the vehicle capacity. To help determine the vehicle capacity, use the VIN number and contact the vehicle manufacturer. See the Parts List Section of this publication to assist with identifying replacement parts.

**FIGURE 2-1 HN 462**





- **Auxiliary springs** — Engages while loaded to provide added stability when dumping or maneuvering.
- **Bar pin end connection** — Rugged axle connection extends bushing life and allows easy axle alignment capability for accurate wheel tracking, improved tire life and serviceability.
- **Equalizing beam** — Formed and robotically-welded equalizing beam design eliminates center bushings and lubrication requirements — significantly reducing scheduled maintenance. It provides a narrow profile for weight savings; distributes load equally between both axles for improved traction; lowers the center of gravity to increase stability and establishes a solid axle connection for improved handling.
- **Rubber bolster springs** — Lightweight, diagonally mounted rubber bolster springs deliver a smooth ride and outstanding articulation in empty or lightly loaded conditions. The wide spring centers enhance stability and eliminate need for cross tube.
- **Saddle and frame brackets** — Weight-saving, high-strength design increases carrying capacity and durability.
- **Shock absorbers** — Integrated design reduces axle hop and enhances ride quality.
- **ULTRA RODS®** — Heavy duty forgings reduce weight; yet provide improved durability over conventional rods. Transverse rods ensure maximum lateral axle control and straight line suspension stability and Longitudinal rods are engineered to optimize resistance to wind up during acceleration and braking hence improve cornering by controlling lateral forces. ULTRA ROD's unique bonded bushing greatly increases its service life. By eliminating the outer metal sleeve, Hendrickson made re-bushing faster and easier.
- **VariRate® Spring System** — Delivers a combination of superior stability, articulation and ride. System can be tailored to meet the specific needs of unique vehicle applications

### HN® SERIES SPECIFICATIONS

|   | HN 402               | HN 462          | HN 522       |
|---|----------------------|-----------------|--------------|
| Installed Weight <sup>1</sup><br>(54 inch axle spacing) | 935 lbs.             | 948 lbs.        | 955 lbs.     |
| Suspension Rating                                       | 40,000 lbs.          | 46,000 lbs.     | 52,000 lbs.  |
| GVW Approval <sup>2</sup>                               | 73,000 lbs.          | 80,000 lbs.     | 80,000 lbs.  |
| GCW Approval  | 160,000 lbs.         | 190,000 lbs.    | 245,000 lbs. |
| Site Travel Rating <sup>3</sup>                         | 55,000 lbs.          | 60,000 lbs.     | 65,000 lbs.  |
| Diagonal Articulation <sup>4</sup>                      | 17"                  | 17"             | 17"          |
| Lift Axles <sup>3</sup>                                 | Approved             | Approved        | Approved     |
| Axle Spacing  | 52", 54", 60", 72.5" | 54", 60", 72.5" | 54", 60"     |
| Wheel Base Restriction                                  | None                 | None            | None         |

HN Series suspensions are intended for a wide range of applications\*, including dump, refuse, mixer and logging . If you have any questions, contact Hendrickson or your local truck dealer.

1 Installed weight includes complete suspension, torque rods, axle brackets, shock absorbers and frame brackets.

2 Contact Hendrickson for applications that may exceed GVW approval ratings.

3 Site Travel Rating — Operators using vehicles equipped with liftable pusher or tag axles must not exceed published ratings. Ratings are limited to no more than 5 percent of vehicle operation at speed not to exceed 5 mph. Liftable pusher or tag axles should only be raised (or unloaded) to improve vehicle maneuverability in off-road use or when vehicle is empty. Site travel ratings are consistent with published axle manufacturer's limitations. Axle and suspension site travel specifications must not be exceeded.

4 Suspension articulation may exceed vehicle's capability and may be limited by vehicle manufacturer; vehicle manufacturer installed axle stops may restrict suspension's articulation.

\* Not approved for tractor applications.

## 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 it unsafe in operation, or void manufacturer's warranty.

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

### EXPLANATION OF SIGNAL WORDS

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



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

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



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



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



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

#### NOTE

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

#### SERVICE HINT

A helpful suggestion that 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 VALUES AT ALL TIMES. CHECK TORQUE VALUES ON A REGULAR BASIS AS SPECIFIED USING A TORQUE WRENCH THAT IS REGULARLY CALIBRATED. TORQUE VALUES SPECIFIED IN THIS TECHNICAL PUBLICATION ARE FOR HENDRICKSON SUPPLIED FASTENERS ONLY. IF NON-HENDRICKSON FASTENERS ARE USED, FOLLOW TORQUE SPECIFICATION LISTED IN THE VEHICLE MANUFACTURER'S SERVICE MANUAL.

 **WARNING**

### LOAD CAPACITY

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

 **WARNING**

### MODIFYING COMPONENTS

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

 **WARNING**

### TORCH/WELDING

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

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

 **WARNING**

### PERSONAL PROTECTIVE EQUIPMENT

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

 **CAUTION**

### PROCEDURES AND TOOLS

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

 **WARNING**

### SUPPORT THE VEHICLE PRIOR TO SERVICING

DO NOT AT ANY TIME WORK AROUND OR UNDER A VEHICLE SUPPORTED ONLY ON LIFTING DEVICES. THE VEHICLE MUST BE SECURELY CHOCKED AND SUPPORTED ON RIGID STANDS OF SUFFICIENT STRENGTH BEFORE WORK MAY COMMENCE.

**WARNING****TRANSVERSE RODS**

THE HN 402/462/522 SUSPENSION INCORPORATE TRANSVERSE RODS FOR VEHICLE STABILITY. IF THESE COMPONENTS ARE DISCONNECTED OR ARE NON-FUNCTIONAL, THE VEHICLE SHOULD NOT BE OPERATED. FAILURE TO DO SO CAN RESULT IN ADVERSE VEHICLE HANDLING, LOSS OF VEHICLE CONTROL, POSSIBLE TIRE CONTACT WITH THE FRAME, PREMATURE COMPONENT DAMAGE, OR SEVERE PERSONAL INJURY.

**WARNING****PARTS CLEANING**

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

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

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

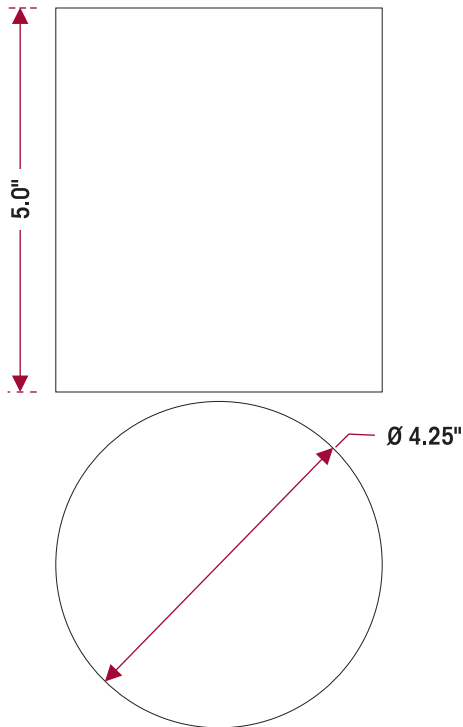
## SECTION 4

# Special Tools

These shop made tools are designed to remove and install rubber mounted torque rod bushings. The shop made tool set will service both the straddle mount and the tapered stud bushings. Bushing tools are made from cold rolled steel or equivalent. Drawings are for reference only. Hendrickson does not supply these tools.

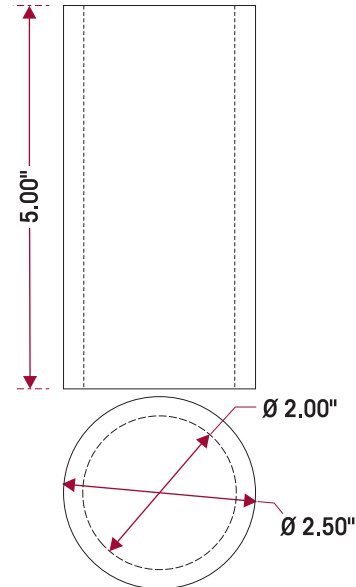
### BAR PIN END BUSHING TOOL

Push Out Tool

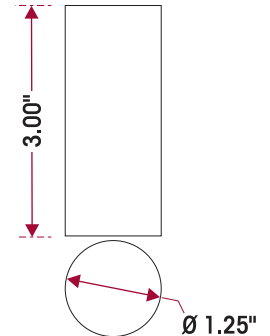


### TORQUE ROD BUSHING TOOLS

Receiving Tool



Push Out Tool



### BAR PIN ADAPTER SET TOOL

#### OTC Tool No. 1757

Servicing bar pin end bushings used on Hendrickson HN equalizing beam suspensions requires the use of special tooling.

OTC's No. 1757 adapter set is used with the equalizing beam removed from the truck, and in conjunction with OTC No. 51100 press plate and a 100 ton hydraulic shop press.

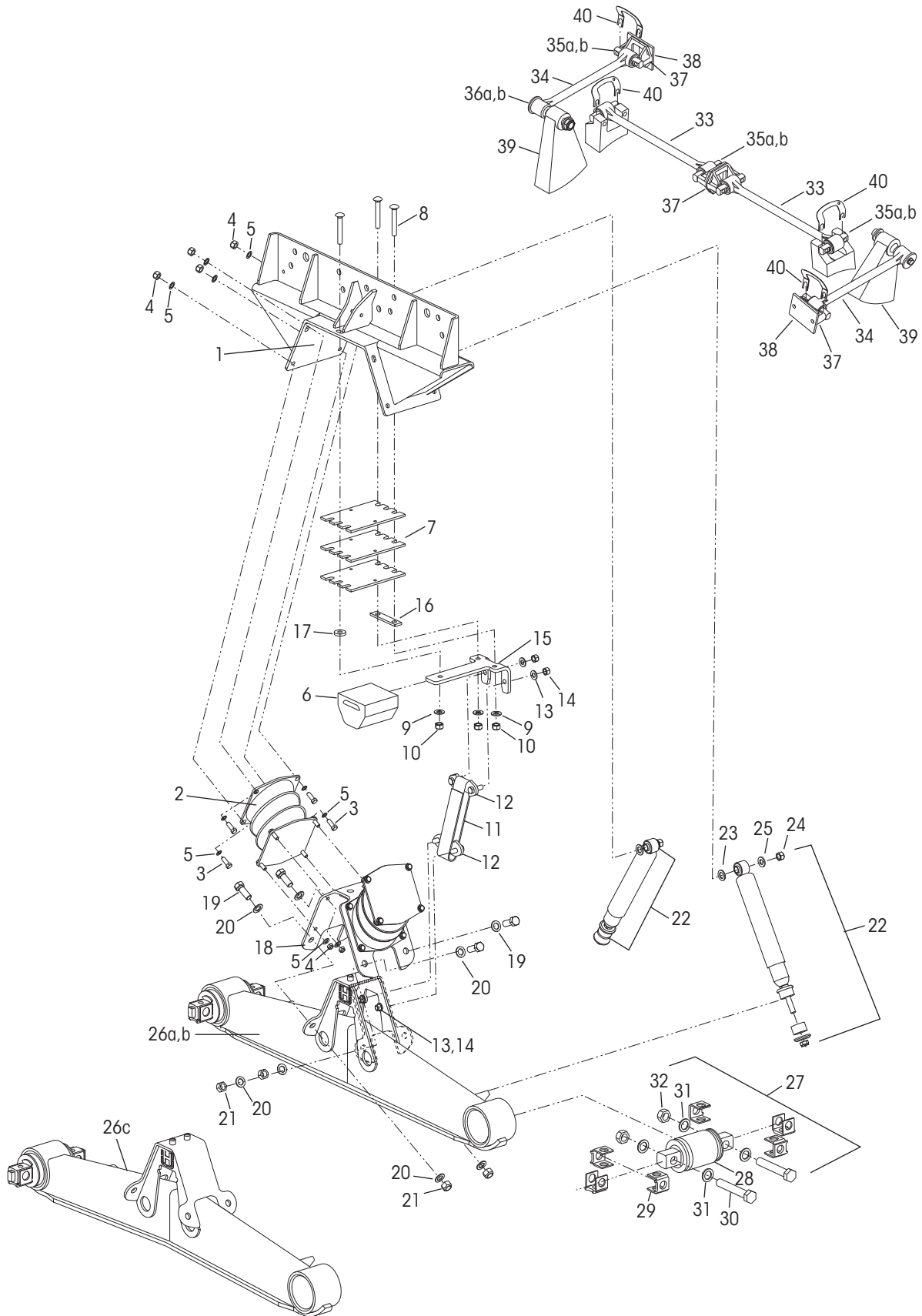
To order, contact OTC, 507.455.7000 or visit: [www.otctools.com](http://www.otctools.com) for an OTC distributor.





# SECTION 5 Parts Lists

HN® 402/462/522 – Vehicles built after 11/00





| KEY NO. | PART NO.   | DESCRIPTION   | NO.REQ. | KEY NO.   | PART NO.   | DESCRIPTION   | NO.REQ. |
|---------|------------|---|---------|-----------|------------|---|---------|
| 1       |            | HN 402/462/522 Saddle Assembly,<br>See Figure 1 below, Includes Key Nos. 2-18 | 2       | c         |            | Equalizing Beam Assembly  | 2       |
|         | 60686-0XX  | 16½", 17½", or 18½"   |         |           | 57889-004  | HN 402, 52" Non-Shim Type   |         |
|         | 58650-0XX  | 20¼" or 22½"  |         |           | 57889-005  | HN 402, 52" Shim Type   |         |
|         | 60879-000L | <b>Bolster Spring Kit, One Set, (2 pc)</b><br>Includes Key No. 3              |         |           | 57889-001  | HN 402, 54" Non-Shim Type   |         |
| 2       |            | *Bolster Spring   | 4       |           | 57889-002  | HN 402, 54" Shim Type   |         |
| 3       | 25114-011  | 7/16"-20 UNF 1.25" Bolt   | 32      | 27        |            | <b>Bar Pin End Bushing Service Kit, One Wheel End,</b><br>Includes Key Nos. 28-32 |         |
| 4       | 48949-000  | 7/16"-20 UNF-2B Locknut   | 32      |           | 34013-088L | Shim Type   |         |
| 5       | 22962-027  | 7/16" Washer  | 64      |           | 34013-188L | Rotating, Shim Type   |         |
| 6       | 60314-000  | Auxiliary Spring  | 2       | 28        |            | *Bar Pin End Bushing  | 4       |
| 7       | 58960-003  | Auxiliary Spring Shim   | 6       | 29        |            | Bar Pin Shim  | 8       |
| 8       | 58196-005  | ½"-13 UNC Round Head Square Neck 3.25" Bolt                                   | 6       |           | 50130-000  | 0.19" /0.19"  |         |
| 9       | 22962-011  | ½" Washer   | 6       |           | 50131-000  | 0.25"/0.12" (Not shown)   |         |
| 10      | 49846-000  | ½"-13 UNC-2A Locknut  | 6       | 30        | 48941-000  | 1"-8 UNC 6.0" Hex Bolt  | 4       |
| 11      | 57878-003  | Rebound Strap   | 2       | 31        | 22962-008  | 1" Hardened Washer  | 8       |
|         | 60639-000  | Anchor Plate Assembly, Includes Key Nos. 12-14                                | 4       | 32        | 48942-000  | 1"-8 UNC Locknut  | 4       |
| 12      |            | *Anchor Plate   | 4       | 33        |            | Longitudinal Torque Rod Assembly  |         |
| 13      |            | *½" Washer  | 8       |           |            | **One-piece Straddle/Straddle   |         |
| 14      |            | *½"-13 UNC-2A Locknut   | 8       |           | 62000-XXX  | • ULTRA ROD®, Includes Key No. 35a<br>Front, Specify Length in mm                 | 1       |
| 15      | 58948-001  | Auxiliary Spring Mounting Plate   | 2       |           | 62001-XXX  | Rear, Specify Length in mm  | 1       |
| 16      | 58949-000  | Auxiliary Spring Mounting Plate Shim<br>(Inboard - ¼" thick)                  | 2       |           | 72000-XXX  | • ULTRA ROD® PLUS™, Includes Key No. 35b<br>Front, Specify Length in mm           | 1       |
| 17      | 22962-020  | Outboard Spacer (¼" thick)  | 2       |           | 72001-XXX  | Rear, Specify Length in mm  | 1       |
| 18      | 58343-001  | Saddle Vee Bracket  | 2       |           | 60218-000  | **Two-Piece Straddle/Straddle Kit<br>• ULTRA ROD, Includes Key No. 35a            |         |
|         | 58440-001  | <b>Vee Bracket Fastener Kit, One Side,</b><br>Includes Key Nos. 19-21         |         | 34        |            | ***Transverse Torque Rod Assembly   | 2       |
| 19      | 50764-006  | ¾"-10 UNC-2A Hex Head Bolt  | 8       |           |            | **One-piece Straddle/Taper, Specify Length in mm                                  |         |
| 20      | 22962-001  | ¾" Washer   | 16      |           | 62350-XXX  | • ULTRA ROD, Includes Key No. 35a-36a   |         |
| 21      | 49842-000  | ¾"-10 UNC-2B Locknut  | 8       |           | 72350-XXX  | • ULTRA ROD PLUS, Includes Key No. 35b-36b  |         |
| 22      | 60680-003L | Shock Absorber  | 4       |           | 60215-000  | **Two-Piece Straddle/Taper Kit,<br>• ULTRA ROD, Includes Key No. 35a-36a          |         |
| 23      | 22962-001  | ¾" Washer   | 4       |           | 65781-000  | • ULTRA ROD PLUS, Includes Key No. 35b-36b  |         |
| 24      | 30585-000  | 5/8" Upper Shock Locknut  | 4       | 35        |            | Straddle Bushing  | 4       |
| 25      | 22962-004  | 5/8" Upper Shock Washer   | 4       | a         | 47691-000  | ULTRA ROD   |         |
| 26 a    |            | Equalizing Beam Assembly  | 2       | b         | 64400-002L | ULTRA ROD PLUS  |         |
|         | 58494-001  | HN 462, 54" Non-Shim Type   |         | 36        |            | Taper Bushing   | 2       |
|         | 58494-002  | HN 462, 54" Shim Type   |         | a         | 64697-000H | ULTRA ROD   |         |
|         | 58494-005  | HN 402/462, 60" Non-Shim Type   |         | b         | 64400-004L | ULTRA ROD PLUS  |         |
|         | 58494-006  | HN 402/462, 60" Shim Type   |         | 37        | 22186-000  | Torque Rod Frame Bracket  | 4       |
|         | 58494-009  | HN 402/462, 72.5" Non-Shim Type   |         | 38        | 45045-003  | Backup Plate  | 2       |
|         | 58494-010  | HN 402/462, 72.5" Shim Type   |         | 39        |            | ****Torque Rod Axle Bracket   | 2       |
| b       | 59973-003  | HN 522, 54" Shim Type   |         | 40        | 49689-000  | Torque Rod Shim (As Required)   |         |
|         |            |   |         | Not Shown | 70867-001  | Torque Rod Bushing P-80 Lubricant -10 ml.<br>(per each bushing)                   |         |

**NOTE:** Equalizing beam axle brackets for drive axles are supplied by the axle manufacturer.

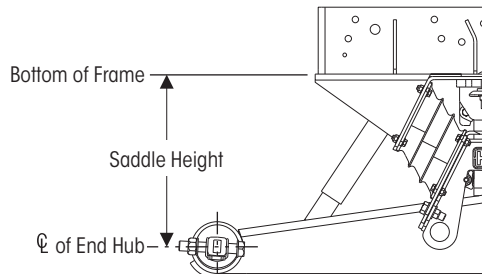
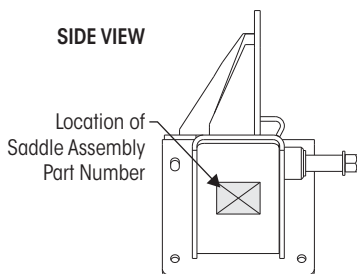
\* Item included in assembly/kit only, part not sold separately.

\*\* Hendrickson's part number is stamped on the torque rod for identification. Be sure to include the suffix number when ordering, this number indicates torque rod length. The Hendrickson 2-piece torque rods can be used to create the desired length, see Torque Rod Selection Guide Literature No. 45745-148.

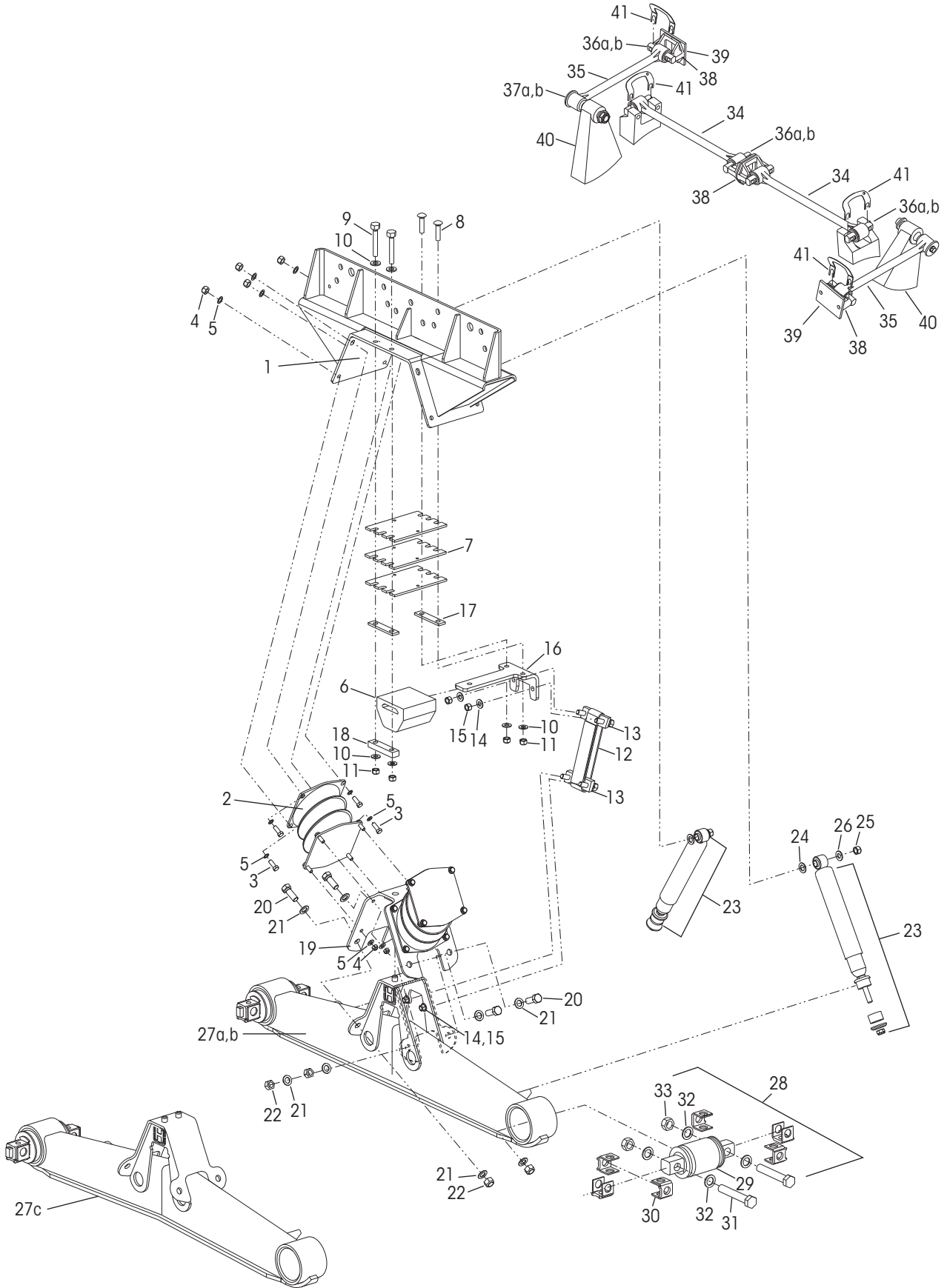
\*\*\* Transverse torque rods are mandatory for HN Suspension regardless of axle spacing, see Literature No. 59310-004 for more information.

\*\*\*\* Not supplied by Hendrickson, used for reference only, refer to the vehicle manufacturer for more information. Hendrickson is not responsible for components supplied by the vehicle manufacturer.

**FIGURE 1 SADDLE ASSEMBLY (KEY NO. 1)** Locate the part number on the saddle assembly **OR** have the VIN number and saddle height (for part verification) if the saddle assembly number is not legible or available and contact vehicle manufacturer for part number. Questions? Contact Hendrickson Truck Parts



Vehicles built between 9/98 and 11/00





# HN® 402/462/522 – Vehicles built between 9/98 and 11/00

| KEY NO. | PART NO.   | DESCRIPTION  | NO.REQ. | KEY NO.   | PART NO.   | DESCRIPTION   | NO.REQ. |
|---------|------------|--|---------|-----------|------------|---|---------|
| 1       |            | HN 402/462/522 Saddle Assembly, See Figure 1 on page 9, Includes Key Nos. 2-19 | 2       | c         |            | Equalizing Beam Assembly  | 2       |
|         | 60686-0XX  | 1 6/2", 1 7/2", or 1 8/2"  |         |           | 57889-004  | HN 402, 52" Non-Shim Type   |         |
|         | 58650-0XX  | 20 3/4" or 22 1/2"   |         |           | 57889-005  | HN 402, 52" Shim Type   |         |
| 2       | 60879-000L | <b>Bolster Spring Kit, One Set (2 pc)</b>                                      |         |           | 57889-001  | HN 402/462, 54" Non-Shim Type   |         |
| 3       | 25114-011  | 7/16"-20 UNF 1.25" Bolt  | 32      |           | 57889-002  | HN 402/462, 54" Shim Type   |         |
| 4       | 48949-000  | 7/16"-20 UNF-2B Locknut  | 32      | 28        |            | <b>Bar Pin End Bushing Service Kit, One Wheel End,</b><br>Includes Key Nos. 29-33   |         |
| 5       | 22962-027  | 7/16" Washer   | 64      |           | 34013-088L | Shim Type   |         |
|         | 57974-012  | <b>Auxiliary Spring Service Kit, Axle Set</b><br>Includes Key Nos. 6, 9-11     |         |           | 34013-188L | Rotating, Shim Type   |         |
| 6       | 58947-000  | Auxiliary Spring   | 2       | 29        |            | *Bar Pin End Bushing  | 4       |
| 7       | 58960-001  | Auxiliary Spring Shim  | 6       | 30        |            | Bar Pin Shim  | 8       |
| 8       | 58196-004  | 1/2"-13 UNC Round Head 2.25" Bolt  | 4       |           | 50130-000  | 0.19"X0.19"   |         |
| 9       | 24531-016  | 1/2"-13 UNC 3.50" Bolt   | 4       |           | 50131-000  | 0.25"X0.12"   |         |
| 10      | 22962-011  | 1/2" Washer  | 12      | 31        | 48941-000  | 1"-8 UNC 6.0" Hex Bolt  | 4       |
| 11      | 49846-000  | 1/2"-13 UNC-2A Locknut   | 8       | 32        | 22962-008  | 1" Hardened Washer  | 8       |
| 12      | 57878-003  | Rebound Strap  | 2       | 33        | 48942-000  | 1"-8 UNC Locknut  | 4       |
| 13      | 60639-000  | Anchor Plate Assembly, Includes Key Nos. 14-15<br><i>Replaces 59779-000</i>    | 4       | 34        |            | Longitudinal Torque Rod Assembly  |         |
| 14      |            | *1/2" Washer   | 8       |           | 62000-XXX  | **One-piece Straddle/Straddle   |         |
| 15      |            | *1/2"-13 UNC-2A Locknut  | 8       |           | 62001-XXX  | • ULTRA ROD®, Includes Key No. 36a<br>Front, Specify Length in mm                   | 1       |
| 16      | 58948-001  | Auxiliary Spring Mounting Plate<br><i>Replaces 58948-000</i>                   | 2       |           | 72000-XXX  | Rear, Specify Length in mm  | 1       |
| 17      | 58949-000  | 1/4" Auxiliary Spring Mounting Plate Shim                                      | 4       |           | 72001-XXX  | • ULTRA ROD® PLUS™, Includes Key No. 36b<br>Front, Specify Length in mm             | 1       |
| 18      | 58524-000  | 7/8" Rebound Strap Mounting Plate  | 2       |           | 72001-XXX  | Rear, Specify Length in mm  | 1       |
| 19      | 58343-001  | Saddle Vee Bracket<br><i>Replaces 58343-000</i>                                | 2       |           | 60218-000  | **Two-Piece Straddle/Straddle Kit   |         |
|         | 58440-001  | <b>Vee Bracket Fastener Kit, One Side,</b><br>Includes Key Nos. 20-22          |         |           |            | • ULTRA ROD, Includes Key No. 36a   |         |
| 20      | 50764-006  | 3/4"-10 UNC-2A Hex Head Bolt   | 8       | 35        |            | ***Transverse Torque Rod Assembly   | 2       |
| 21      | 22962-001  | 3/4" Washer  | 16      |           | 62350-XXX  | **One-piece Straddle/Taper, Specify Length in mm                                    |         |
| 22      | 49842-000  | 3/4"-10 UNC-2B Locknut   | 8       |           | 72350-XXX  | • ULTRA ROD, Includes Key No. 36a-37a<br>• ULTRA ROD PLUS, Includes Key No. 36b-37b |         |
| 23      | 60680-003L | Shock Absorber   | 4       |           | 60215-000  | **Two-Piece Straddle/Taper Kit,   |         |
| 24      | 22962-001  | 3/4" Washer  | 4       |           | 65781-000  | • ULTRA ROD, Includes Key No. 36a-37a<br>• ULTRA ROD PLUS, Includes Key No. 36b-37b |         |
| 25      | 30585-000  | 5/8" Upper Shock Locknut   | 4       | 36        |            | Straddle Bushing  | 4       |
| 26      | 22962-004  | 5/8" Upper Shock Washer  | 4       | a         | 47691-000  | ULTRA ROD   |         |
| 27 a    |            | Equalizing Beam Assembly   | 2       | b         | 64400-002L | ULTRA ROD PLUS  |         |
|         | 58494-001  | HN 462, 54" Non-Shim Type  |         | 37        |            | Taper Bushing   | 2       |
|         | 58494-002  | HN 462, 54" Shim Type  |         | a         | 64697-000H | ULTRA ROD   |         |
|         | 58494-005  | HN 402/462, 60" Non-Shim Type  |         | b         | 64400-004L | ULTRA ROD PLUS  |         |
|         | 58494-006  | HN 402/462, 60" Shim Type  |         | 38        | 22186-000  | Torque Rod Frame Bracket  | 4       |
|         | 58494-009  | HN 402/462, 72.5" Non-Shim Type  |         | 39        | 45045-003  | Backup Plate  | 2       |
|         | 58494-010  | HN 402/462, 72.5" Shim Type  |         | 40        |            | ****Torque Rod Axle Bracket   | 2       |
| b       | 59973-003  | HN 522, 54" Shim Type  |         | 41        | 49689-000  | Torque Rod Shim (As Required)   |         |
|         |            |  |         | Not Shown | 70867-001  | Torque Rod Bushing P-80 Lubricant -10 ml.<br>(per each bushing)                     |         |

**NOTE:** Equalizing beam axle brackets for drive axles are supplied by the axle manufacturer.

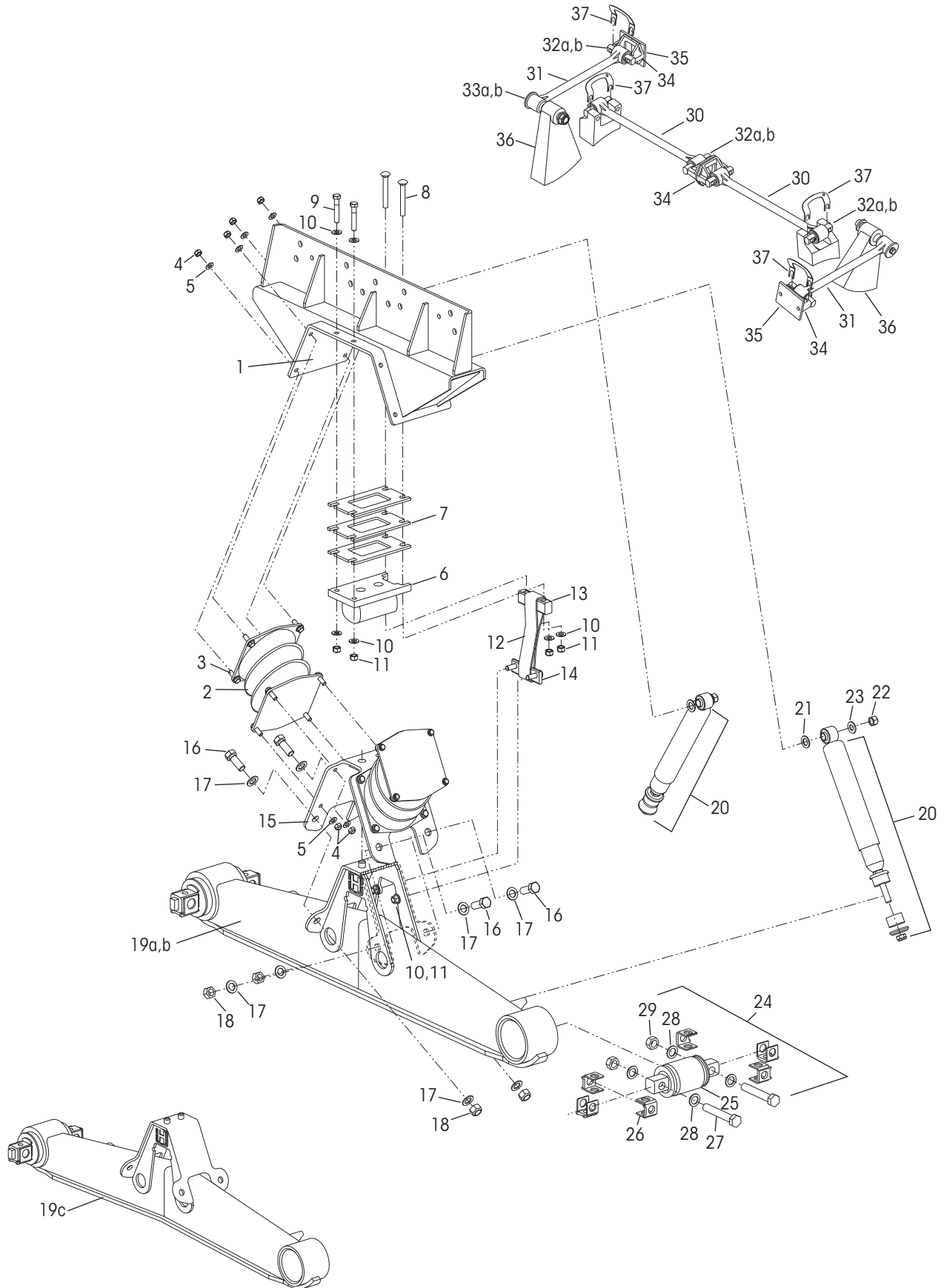
\* Item included in assembly/kit only, part not sold separately.

\*\* Hendrickson's part number is stamped on the torque rod for identification. Be sure to include the suffix number when ordering, this number indicates torque rod length. The Hendrickson 2-piece torque rods can be used to create the desired length, see Torque Rod Selection Guide Literature No. 45745-148.

\*\*\* Transverse torque rods are mandatory for HN Suspension regardless of axle spacing, see Literature No. 59310-004 for more information.

\*\*\*\* Not supplied by Hendrickson, used for reference only, refer to the vehicle manufacturer for more information. Hendrickson is not responsible for components supplied by the vehicle manufacturer.

Vehicles built between 4/96 and 8/98





| KEY NO. | PART NO.   | DESCRIPTION  | NO.REQ. | KEY NO.   | PART NO.   | DESCRIPTION   | NO.REQ. |
|---------|------------|--|---------|-----------|------------|---|---------|
| 1       |            | HN 402/462/522 Saddle Assembly, See Figure 1 on Page 9, Includes Key Nos. 2-15       | 2       | 23        | 22962-004  | 5/8" Washer   | 4       |
|         | 60686-0XX  | 1 1/2", 1 7/8", or 1 8 1/2"  |         | 24        |            | <b>Bar Pin End Bushing Service Kit, One Wheel End,</b>          |         |
|         | 58650-0XX  | 20 1/4" or 22 1/2"   |         |           |            | Includes Key Nos. 25-29   |         |
| 2       | 60879-000L | <b>Bolster Spring, One Set (2 pc)</b>  |         |           | 34013-088L | Shim Type   |         |
| 3       | 25114-011  | 7/16"-20 UNF 1.25" Bolt  | 32      |           | 34013-188L | Rotating, Shim Type   |         |
| 4       | 48949-000  | 7/16"-20 UNF-2B Locknut  | 32      | 25        |            | *Bar Pin End Bushing  | 4       |
| 5       | 22962-027  | 7/16" Washer   | 64      | 26        |            | Bar Pin Shim  | 8       |
| 6       |            | Auxiliary Spring (58189-000 no longer available, see conversion kit 57974-011 below) | 2       |           | 50130-000  | 0.19" / 0.19"   |         |
| 7       | 57993-002  | Auxiliary Spring Shim  | 6       |           | 50131-000  | 0.25" / 0.12"   |         |
| 8       | 58196-002  | 1/2"-13 UNC-2A Round Head Square Neck Bolt   | 4       | 27        | 48941-000  | 1"-8 UNC 6.0" Hex Bolt  | 4       |
| 9       | 24531-017  | 1/2"-13 UNC-2A Hex Head Bolt   | 4       | 28        | 22962-008  | 1" Hardened Washer  | 8       |
| 10      | 22962-011  | 1/2" Washer  | 16      | 29        | 48942-000  | 1"-8 UNC Locknut  | 4       |
| 11      | 49846-000  | 1/2"-13 UNC-2A Locknut   | 12      | 30        |            | Longitudinal Torque Rod Assembly                                |         |
| 12      | 57878-003  | Rebound Strap  | 2       |           |            | **One-piece Straddle/Straddle                                   |         |
| 13      | 58524-000  | Rebound Strap Mounting Plate   | 2       |           | 62000-XXX  | Front, Specify Length in mm                                     | 1       |
| 14      | 60639-000  | Anchor Strap Assembly, Includes Fasteners<br><i>Replaces 59779-000</i>               | 2       |           | 62001-XXX  | Rear, Specify Length in mm                                      | 1       |
| 15      | 58343-001  | Saddle Vee Bracket   | 2       |           | 72000-XXX  | Front, Specify Length in mm                                     | 1       |
|         | 58440-001  | <b>Vee Bracket Fastener Kit, One Side,</b><br>Includes Key Nos. 16-18                |         |           | 72001-XXX  | Rear, Specify Length in mm                                      | 1       |
| 16      | 50764-006  | 3/4"-10 UNC-2A Hex Head Bolt   | 8       |           | 60218-000  | <b>**Two-Piece Straddle/Straddle Kit</b>                        |         |
| 17      | 22962-001  | 3/4" Washer  | 16      | 31        |            | ***Transverse Torque Rod Assembly                               | 2       |
| 18      | 49842-000  | 3/4"-10 UNC-2B Locknut   | 8       |           |            | **One-piece Straddle/Taper, Specify Length in mm                |         |
| 19 a    |            | Equalizing Beam Assembly   | 2       |           | 62350-XXX  | • ULTRA ROD, Includes Key No. 32a-33a                           |         |
|         | 58494-001  | HN 462, 54" Non-Shim Type  |         |           | 72350-XXX  | • ULTRA ROD PLUS, Includes Key No. 32b-33b                      |         |
|         | 58494-002  | HN 462, 54" Shim Type  |         |           |            | <b>**Two-Piece Straddle/Taper Kit,</b>                          |         |
|         | 58494-005  | HN 402/462, 60" Non-Shim Type  |         |           | 60215-000  | • ULTRA ROD, Includes Key No. 32a-33a                           |         |
|         | 58494-006  | HN 402/462, 60" Shim Type  |         |           | 65781-000  | • ULTRA ROD PLUS, Includes Key No. 32b-33b                      |         |
|         | 58494-009  | HN 402/462, 72.5" Non-Shim Type  |         | 32        |            | Straddle Bushing  | 4       |
|         | 58494-010  | HN 402/462, 72.5" Shim Type  |         | a         | 47691-000  | ULTRA ROD   |         |
| b       | 59973-003  | HN 522, 54" Shim Type  |         | b         | 64400-002L | ULTRA ROD PLUS  |         |
| c       | 57889-004  | HN 402, 52" Non-Shim Type  |         | 33        |            | Taper Bushing   | 2       |
|         | 57889-005  | HN 402, 52" Shim Type  |         | a         | 64697-000H | ULTRA ROD   |         |
|         | 57889-001  | HN 402/462, 54" Non-Shim Type  |         | b         | 64400-004L | ULTRA ROD PLUS  |         |
|         | 57889-002  | HN 402/462, 54" Shim Type  |         | 34        | 22186-000  | Torque Rod Frame Bracket  | 4       |
| 20      | 60680-003L | Shock Absorber   | 4       | 35        | 45045-003  | Backup Plate  | 2       |
| 21      | 22962-001  | 3/4" Washer  | 4       | 36        |            | ****Torque Rod Axle Bracket                                     | 2       |
| 22      | 30585-000  | 5/8" Locknut   | 4       | 37        | 49689-000  | Torque Rod Shim (As Required)                                   |         |
|         |            |  |         | Not Shown | 70867-001  | Torque Rod Bushing P-80 Lubricant -10 ml.<br>(per each bushing) |         |

**NOTE:** Equalizing beam axle brackets for drive axles are supplied by the axle manufacturer.

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

\*\* Hendrickson's part number is stamped on the torque rod for identification. Be sure to include the suffix number when ordering, this number indicates torque rod length. The Hendrickson 2-piece torque rods can be used to create the desired length, see Torque Rod Selection Guide Literature No. 45745-148.

\*\*\* Transverse torque rods are mandatory for HN Suspension regardless of axle spacing, see Literature No. 59310-004 for more information.

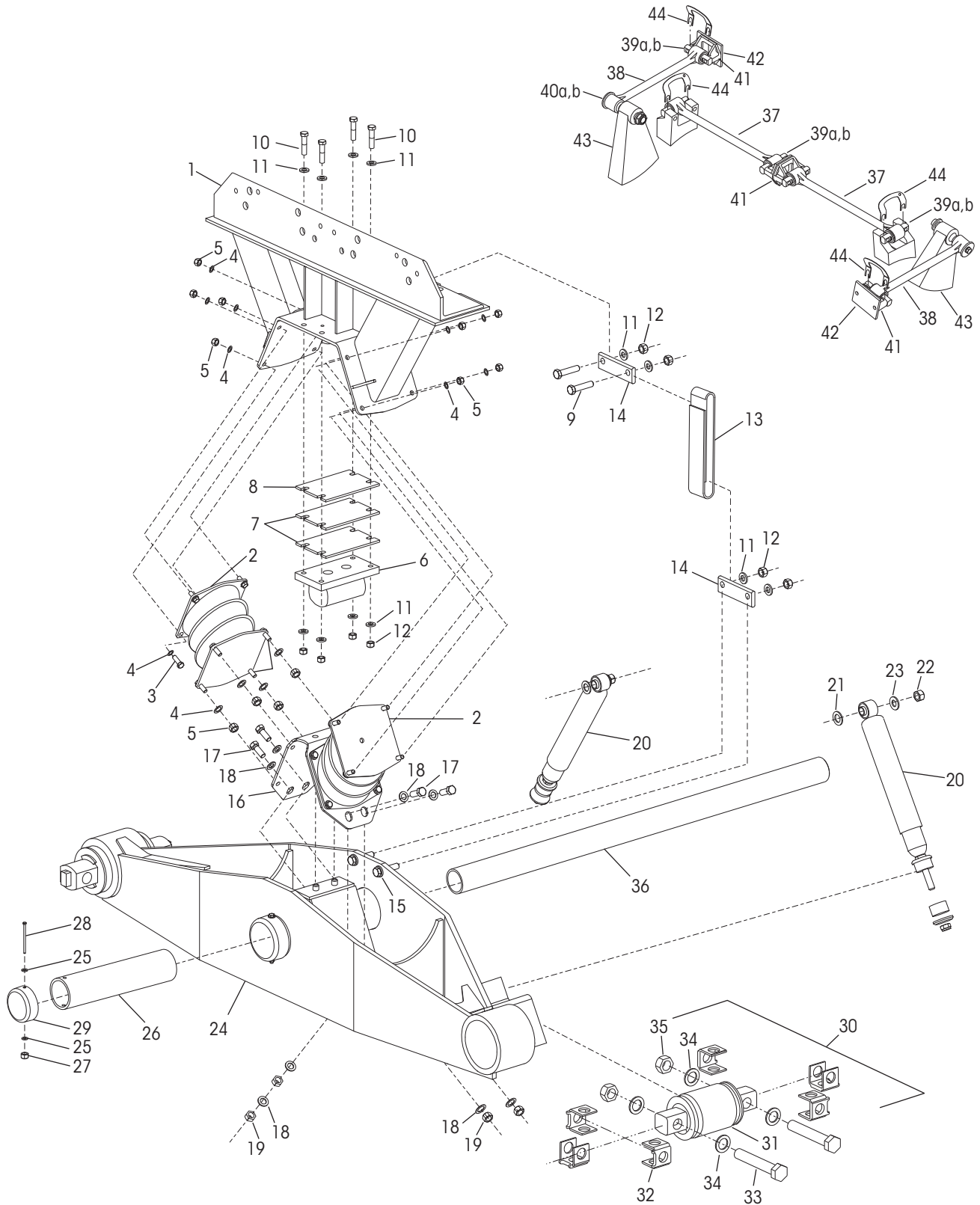
\*\*\*\* Not supplied by Hendrickson, used for reference only, refer to the vehicle manufacturer for more information. Hendrickson is not responsible for components supplied by the vehicle manufacturer.

**Key No. 6 Auxiliary Spring Conversion Kit No. 57974-011**

**Axle Set – Includes Part Nos. 1-11**

|    |           |   |    |
|----|-----------|---|----|
| 1  | 60314-000 | Auxiliary Spring                          | 2  |
| 2  | 58960-003 | Auxiliary Spring Shim                     | 6  |
| 3  | 58196-006 | 1/2"-13 UNC 2.75" Round Head Bolt         | 4  |
| 4  | 24531-016 | 1/2"-13 UNC 3.50" Bolt                    | 4  |
| 5  | 22962-011 | 1/2" Hardened Washer                      | 14 |
| 6  | 49846-000 | 1/2"-13 UNC Locknut                       | 14 |
| 7  | 57878-003 | Rebound Strap                             | 2  |
| 8  | 64700-000 | Anchor Plate Assembly                     | 4  |
| 9  | 58948-001 | Auxiliary Spring Mounting Plate           | 2  |
| 10 | 58949-000 | 1/4" Auxiliary Spring Mounting Plate Shim | 4  |
| 11 | 58524-000 | 7/8" Rebound Strap Mounting Plate         | 4  |

Vehicles built between 3/96 and 9/97





# HN® 400/460 – Vehicles built between 3/96 and 9/97

| KEY NO. | PART NO.   | DESCRIPTION   | NO.REQ. | KEY NO.   | PART NO.   | DESCRIPTION  | NO.REQ. |
|---------|------------|---|---------|-----------|------------|--|---------|
| 1       | 58223-0XX  | Saddle Assembly, See Figure 1 on Page 9<br>Includes Key Nos. 2-9                  | 2       | 31        |            | *Bar Pin End Bushing   | 4       |
| 2       | 60879-000L | <b>Bolster Spring Kit, One Set (2 pc)</b>   | 2       | 32        |            | Bar Pin Shim   | 8       |
| 3       | 25114-011  | 7/16"-20 UNF 1.25" Bolt   | 32      |           | 50130-000  | 0.19" /0.19"   |         |
| 4       | 22962-027  | 7/16" Hardened Washer   | 64      |           | 50131-000  | 0.25"/0.12"  |         |
| 5       | 48949-000  | 7/16"-20 UNF Locknut  | 32      | 33        | 48941-000  | 1"-8 UNC 6.0" Hex Bolt   | 4       |
| 6       | 57962-000  | Auxiliary Spring  | 2       | 34        | 22962-008  | 1" Hardened Washer   | 8       |
| 7       | 57993-002  | Auxiliary Spring Shim   | 4       | 35        | 48942-000  | 1"-8 UNC Locknut   | 4       |
| 8       | 57993-003  | Auxiliary Spring Shim   | 6       | 36        | 44643-011  | Cross Tube   | 1       |
| 9       | 24531-018  | 1/2"-13 UNC 1.75" Bolt  | 4       | 37        |            | Longitudinal Torque Rod Assembly<br>**One-piece Straddle/Straddle<br>• ULTRA ROD®, Includes Key No. 39a  |         |
| 10      | 24531-019  | 1/2"-13 UNC 2.75" Bolt  | 8       |           | 62000-XXX  | Front, Specify Length in mm  | 1       |
| 11      | 22962-014  | 1/2" Hardened Washer  | 40      |           | 62001-XXX  | Rear, Specify Length in mm   | 1       |
| 12      | 49846-000  | 1/2"-13 UNC Locknut   | 16      |           | 72000-XXX  | Front, Specify Length in mm  | 1       |
| 13      | 57878-003  | Rebound Strap   | 2       |           | 72001-XXX  | Rear, Specify Length in mm   | 1       |
| 14      | 57787-000  | Anchor Plate  | 2       |           |            | **Two-Piece Straddle/Straddle Kit<br>• ULTRA ROD, Includes Key No. 39a   |         |
| 15      | 24531-017  | 1/2"-13 UNC 2.25" Bolt  | 4       | 38        |            | ***Transverse Torque Rod Assembly<br>**One-piece Straddle/Taper, Specify Length in mm<br>• ULTRA ROD, Includes Key No. 39a-40a<br>• ULTRA ROD PLUS, Includes Key No. 39b-40b | 2       |
| 16      | 57461-000  | Saddle Vee Bracket  | 2       |           | 60218-000  | **Two-Piece Straddle/Taper Kit,<br>• ULTRA ROD, Includes Key No. 39a-40a<br>• ULTRA ROD PLUS, Includes Key No. 39b-40b   |         |
|         | 58440-001  | <b>Vee Bracket Fastener Kit, One Side,</b><br>Includes Key Nos. 17-19             |         |           | 60215-000  |  |         |
| 17      | 50764-006  | 3/4"-10 UNC-2A Hex Head Bolt  | 8       |           | 65781-000  |  |         |
| 18      | 22962-001  | 3/4" Washer   | 16      | 39        |            | Straddle Bushing   | 4       |
| 19      | 49842-000  | 3/4"-10 UNC-2B Locknut  | 8       | a         | 47691-000  | ULTRA ROD  |         |
| 20      | 60680-003L | Shock Absorber  | 4       | b         | 64400-002L | ULTRA ROD PLUS   |         |
| 21      | 22962-001  | 3/4" Washer   | 4       | 40        |            | Taper Bushing  | 2       |
| 22      | 30585-000  | 5/8" Upper Shock Locknut  | 4       | a         | 64697-000H | ULTRA ROD  |         |
| 23      | 22962-004  | 5/8" Upper Shock Washer   | 4       | b         | 64400-004L | ULTRA ROD PLUS   |         |
| 24      | 58227-     | Beam Assembly, Specify Length,<br>Includes Key Nos. 11-15, 25-31                  | 2       | 41        | 22186-000  | Torque Rod Frame Bracket   | 4       |
| 25      | 22962-028  | 1/4" Washer   | 4       | 42        | 45045-003  | Backup Plate   | 2       |
| 26      | 49972-000  | Nylon Bushing   | 2       | 43        |            | ****Torque Rod Axle Bracket  | 2       |
| 27      | 49983-000  | 1/4"-20 UNC Locknut   | 2       | 44        | 49689-000  | Torque Rod Shim (As Required)  |         |
| 28      | 50698-000  | 1/4"-20 UNC 4.50" Bolt  | 2       | Not Shown | 70867-001  | Torque Rod Bushing P-80 Lubricant -10 ml.<br>(per each bushing)  |         |
| 29      | 56910-000  | Center End Cap  | 2       |           |            |  |         |
| 30      |            | <b>Bar Pin End Bushing Service Kit, One Wheel End,</b><br>Includes Key Nos. 31-35 |         |           |            |  |         |
|         | 34013-088L | Shim Type   |         |           |            |  |         |
|         | 34013-188L | Rotating, Shim Type   |         |           |            |  |         |

**NOTE:** Equalizing beam axle brackets for drive axles are supplied by the axle manufacturer.

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

\*\* Hendrickson's part number is stamped on the torque rod for identification. Be sure to include the suffix number when ordering, this number indicates torque rod length. The Hendrickson 2-piece ULTRA RODS® can be used to create the desired length, see Torque Rod Selection Guide Literature No. 45745-148.

\*\*\* Transverse torque rods are mandatory for HN Suspension regardless of axle spacing. See Literature No. 59310-004 for more information.

\*\*\*\* Not supplied by Hendrickson, used for reference only, refer to the vehicle manufacturer for more information. Hendrickson is not responsible for components supplied by the vehicle manufacturer.



## SECTION 6

# Preventive Maintenance

Hendrickson recommends that preventive maintenance be performed on a regular basis to ensure all components function to their highest efficiency. Proper preventive maintenance programs will help control repair costs, reduce downtime, and provide safe and reliable operation. All new equipment should be given an initial pre-service inspection.

### HENDRICKSON RECOMMENDED PREVENTIVE MAINTENANCE INTERVALS

#### ■ PRE-DELIVERY INSPECTION – First 100 Miles / 150 Kilometers

##### Total Suspension Miles / Kms.

1. Visually inspect suspension for proper assembly.
2. Check all fasteners for proper torque with special attention to the equalizing beam end connections.
3. Set auxiliary spring shims to required specifications, the number of shims is dependent on the following criteria:
  - Vehicle empty weight
  - Vehicle application
  - Roll stability versus ride requirements
4. Verify the lateral alignment of axles are within the vehicle manufacturer's tolerances (consult the applicable vehicle manufacturer's instructions).

#### ■ INSPECTION – First 1,000 Miles / 1,600 Kilometers of Pre-delivery or Suspension Service

1. Visually inspect suspension components. Check for:
  - Proper suspension function
  - Signs of unusual movement, loose or missing components
  - Signs of abrasive or adverse contact with other components
  - Damaged, bent or cracked parts
2. Check all fasteners for proper torque with special attention to the equalizing beam end connections.

#### ■ PREVENTIVE MAINTENANCE

1. **Every three months** inspect auxiliary springs and bolster springs.
2. **Every six months** inspect equalizing beam end connections.
3. **Every twelve months:**
  - a. Visually inspect suspension for proper assembly
  - b. Check all fasteners for proper torque with special attention to the equalizing beam end connections.
  - c. Verify the lateral alignment of axles are within the vehicle manufacturer's tolerances (consult the applicable vehicle manufacturer's instructions).
  - d. Visually inspect suspension components. Check for all of the following and replace components as necessary:
    - Proper suspension function
    - Signs of unusual movement, loose or missing components
    - Signs of abrasive or adverse contact with other components
    - Damaged, bent or cracked parts



## COMPONENT INSPECTION

The following inspections should be performed at vehicle pre-delivery and other intervals as may be specified. Visually inspect all parts of the suspension for signs of wear, damage or movement. Look for bent or cracked parts. Replace all worn or damaged parts.

### IMPORTANT NOTE

Replace all worn or damaged parts.

- **Auxiliary spring and Bolster spring** — See auxiliary spring and bolster spring inspection in this section.
- **Equalizing beam assembly** — Check the overall condition of the equalizing beam for cracks, dents, dings, or other damage on the outer edges of the beam. Check the beam end connections every six months for tearing or extreme bulging. Check for any metal-to-metal contact in the bushed joints. Replace all worn or damaged parts.
- **Fasteners** — All fasteners must be inspected at vehicle pre-delivery, first 1,000 miles, and every twelve months thereafter. Look for any loose or damaged fasteners on the entire suspension. Make sure all fasteners are tightened to a torque value within the specified torque range. See Torque Specification Chart in this publication for Hendrickson recommended torque requirements. Use a calibrated torque wrench to check torque in the tightening direction. As soon as the fastener starts to move, record the torque. Correct the torque if necessary. Replace any worn or damaged fasteners.

### NOTE

Hendrickson recommends the use of Grade 8 bolts, Grade C locknuts and hardened washers for all suspension component attachments.

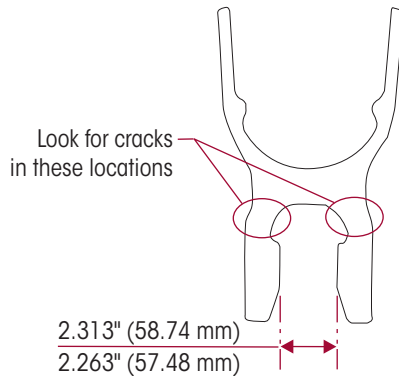
- **Saddle assembly** — Check all attaching fasteners for proper torque. Visually inspect the saddle for signs of movement on the frame rail or damage. Inspect the area around the saddle gussets for cracks. Saddles with a single center gusset may have the center gusset weld repaired and a center reinforcing bracket installed. Refer to Hendrickson Literature Number 59310-006 for specific details.
- **Shock absorber** — Look for any signs of dents or leakage. Misting is not considered a leak. See Shock Absorber Inspection in this section.
- **Torque rod** — All torque rods must be inspected every six months for looseness, torn or shredded rubber, bushing walk-out, and for proper fastener torque. Inspect for bent, cracked or broken torque rods and also for end hubs that have an elongated “oval” shape. If there is metal-to-metal contact in the bushing joint, this is a sign of excessive bushing wear and the bushing needs to be replaced. Replace all worn or damaged parts.
- **Vee Bracket** — Raise the vehicle frame and visually inspect the Vee bracket for wear or damage. Look for excessive wear or cracks on the Vee bracket’s auxiliary spring contact surface. Replace all worn or damaged parts.
- **Wear and Damage** — Inspect all parts of the suspension for wear and damage. Look for bent or cracked parts. Replace all worn or damaged parts.

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

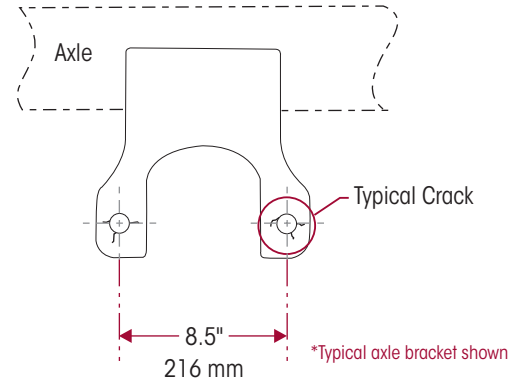
## AXLE BRACKET

The axle brackets are furnished and welded into position by the vehicle or axle manufacturer.

**FIGURE 6-1**  
Axle Bracket\* Leg Dimensions



**FIGURE 6-2**  
Axle Bracket\* Leg



- **When inspecting the equalizing beam end connection** also inspect the axle brackets for damage or cracks, see Figure 6-1. Measure the dimension as shown in Figure 6-1, any axle bracket that is found damaged or cracked must be repaired or replaced. Consult the vehicle manufacturer for inspection, component repair and replacement instructions.
- **When an equalizing beam is removed for repair, or an inspection of the equalizing beam end connection reveals movement,** measure the distance between the axle bracket legs for correct width. Refer to Figure 6-2 for measurement location and dimensions. An axle bracket outside of the measurement range must be repaired or replaced. Consult the vehicle manufacturer for inspection, component repair and replacement instructions.

## EQUALIZING BEAM END CONNECTION

An inspection of the beam end connection is necessary when a vehicle is in the shop for major repair work or every six months, whichever comes first. Periodic visual inspection by the driver and service personnel is also recommended. Off-highway and severe service operating conditions require more frequent inspections than on-highway service operation.

### NOTE

The equalizing beam end connection requires that the fasteners are tightened to torque specifications to maintain the clamp load of the axle bracket legs to the bar pin. All bushing motion is accommodated by rubber deflection.

### VISUAL INSPECTION

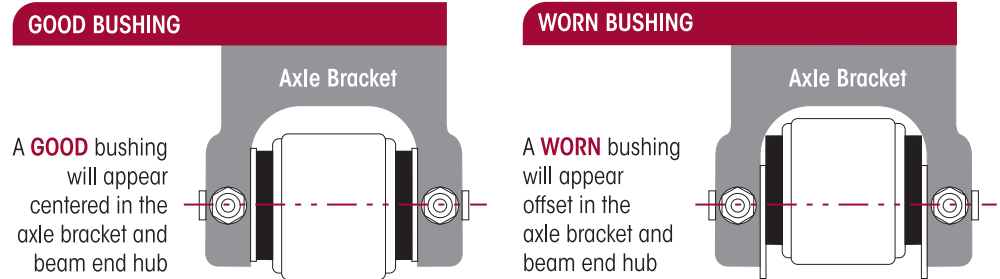
1. Chock the wheels.
2. Visually inspect suspension components for signs of movement or excessive wear.
  - Inspect alignment shims in equalizing beam end for looseness. Lightly tap on the alignment shims to see if they can be moved. If the movement is detected, refer to the bar pin fastener re-torque in the Equalizing Beam Component Replacement Section.
  - Inspect equalizing beam end connection for signs of excessive wear or looseness.

### SERVICE HINT

An equalizing beam end connection, which is visibly cleaner than the other connections, may indicate a loose connection.

- Look for worn, frayed or distorted rubber in the beam end bushing, see Figure 6-3.
- Look for the equalizing beam to be lower in the beam hanger, see Figure 6-3.

FIGURE 6-3



A **GOOD** bushing will appear centered in the axle bracket and beam end hub

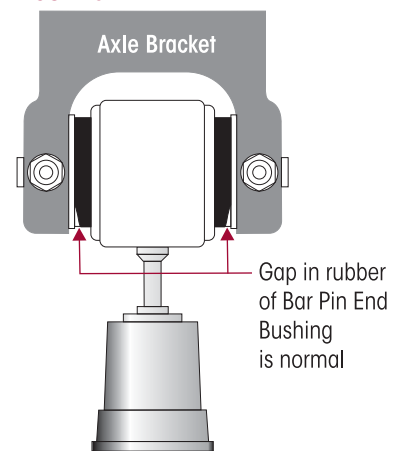
A **WORN** bushing will appear offset in the axle bracket and beam end hub

- If it is visually offset a jack test should be performed. Place a jack under each beam end as shown. Raise the jack to check for movement in the connection or rubber components, see Figure 6-4.

**NOTE**

The gap at each side of the visible rubber on the lower part of the end bushing is normal, see Figure 6-4, and is not an indication to replace the bushing. Because all rubber end bushings are in compression, with the load bearing on the top side, the lower side of the rubber is slightly relieved, allowing the rubber to move inward, and a gap appears.

FIGURE 6-4


**WARNING**
**PHYSICAL INSPECTION**

IF BAR PIN MOVEMENT OR LOOSENESS IS NOTED IN THE EQUALIZING BEAM END HUB, DO NOT OPERATE THE VEHICLE. REPLACE THE RUBBER END BUSHINGS AND ALL CONNECTING PARTS. THE ABOVE CONDITION CAN RESULT IN COSTLY REPAIR, DOWNTIME, POSSIBLE SEPARATION OF COMPONENTS, LOSS OF VEHICLE CONTROL, PROPERTY DAMAGE, OR PERSONAL INJURY.

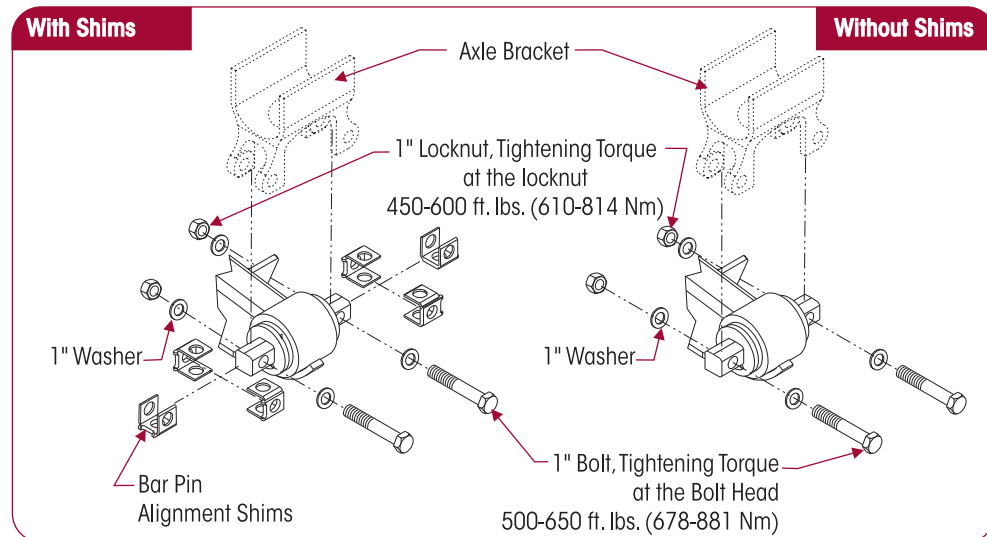
1. If bar pin movement or looseness is detected in the equalizing beam end hub, **DO NOT** operate vehicle. Replace the equalizing beam end bushings and all connecting parts. Refer to the Component Replacement Section of this publication.
2. Check and record torque values, as received, for each 1" bar pin fastener, see Figure 6-5. Correct torque values as required making sure all fasteners are tightened to:
  - At the **locknuts** tighten to 450-600 foot pounds torque or
  - At the **bolt head** tighten to 500-650 foot pounds torque
3. Recheck equalizing beam end connections for signs of looseness.
  - Inspect alignment shims in equalizing beam end for looseness. Lightly tap on the alignment shims to see if they can be moved. If the movement is detected, refer to the bar pin fastener re-torque in the Equalizing Beam Component Replacement Section.
  - Inspect equalizing beam end connection for signs of excessive wear or looseness.

**NOTE**

An equalizing beam end connection, which is visibly cleaner than the other connections, may indicate a loose connection.

4. If bar pin looseness is still detected in the equalizing beam end hub, **DO NOT** operate the vehicle. One or more components will require replacement, see Component Replacement Section of this publication.

FIGURE 6-5

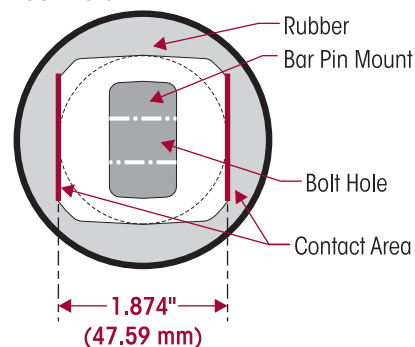


### BAR PIN END BUSHING

An indication that the bar pin end bushing requires replacement is when one or more of the following conditions apply:

- Visual inspection of contact areas (the flat face areas where bar pin contacts the axle bracket) on the bar pin reveals signs of excessive wear. If the thickness between the bar pin contact areas measures less than 1.874", bar pin end bushing requires replacement, see Figure 6-6.
- Visual inspection of the bolt holes in the bar pin reveals signs of elongation or wear, see Figure 6-6.

FIGURE 6-6



If bar pin measurement is **less than 1.874" (47.59 mm)**, component replacement is required.

### BAR PIN SHIM

An indication that the bar pin shims require replacement is when one or more of the following conditions apply:

- Visual inspection of contact areas, see Figure 6-7, on the shim reveals signs of excessive wear.
- The thickness of any single leg on the shim, is less than the measurement shown in Figure 6-7, replacement of bar pin shim is required.

FIGURE 6-7

| Original Thickness of Shim Leg | Minimum Thickness Required | Part Number |
|--------------------------------|----------------------------|-------------|
| 1/8"                           | 0.123" (3.1 mm)            | 50131-000   |
| 3/16"                          | 0.186" (4.7 mm)            | 50130-000   |
| 1/4"                           | 0.248" (6.3 mm)            | 50131-000   |
| 3/8"                           | 0.371" (9.4 mm)            | 57026-000   |

Part No. 50130-000 shown

**WARNING**

## LONGITUDINAL AND TRANSVERSE TORQUE ROD

HN SUSPENSIONS INCORPORATE LONGITUDINAL AND TRANSVERSE RODS FOR VEHICLE STABILITY. IF THESE COMPONENTS ARE DISCONNECTED OR ARE NON-FUNCTIONAL, THE VEHICLE SHOULD NOT BE OPERATED. FAILURE TO DO SO CAN RESULT IN ADVERSE VEHICLE HANDLING, LOSS OF VEHICLE CONTROL, POSSIBLE TIRE CONTACT WITH THE FRAME, PREMATURE COMPONENT DAMAGE, OR SEVERE PERSONAL INJURY.

All torque rods need to be inspected for looseness by one of the following methods.

- **Method 1** — **For Tractor applications only** with brakes applied, slowly rock the empty vehicle with power while a mechanic visually checks the action at both ends.
- **Method 2** — with the vehicle shut down, a lever check can be made with a long pry bar placed under each rod end and pressure applied.

Visually inspect torque rod bushings for torn or shredded rubber, inspect for bent, cracked, or broken torque rods and also for end hubs that have an elongated "oval" shape. Any of these conditions require component replacement.

**NOTE**

Refer to vehicle manufacturer's service instructions for proper torque rod length.

The length of the torque rods is determined by the truck manufacturer for optimum drive line angles. The longitudinal torque rods control these angles and also absorb acceleration and braking forces. The mounting brackets at the axle ends of the torque rods are furnished and welded into position on the axle housings by vehicle manufacturer or the axle manufacturer. A two-piece torque rod is also available to cut and weld to the desired length, see Hendrickson publication 45745-148.

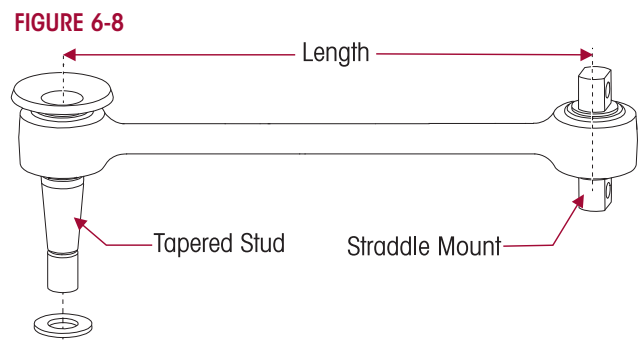
Straddle mount torque rod end attaching fasteners are furnished by the vehicle manufacturer. It is important that the tightening torque of the locknuts be checked during preventive maintenance service. Follow the vehicle manufacturer's specifications for torque values.

**NOTE**

Hendrickson Suspension recommends Grade 8 bolts, hardened flat washer and Grade C locknuts be used for all straddle mount torque rod attachments.

The longitudinal rod is straddle/straddle mount, and the transverse rod is straddle mount / taper pin mount, as shown in Figure 6-8.

Whether the bushings are straddle mount or taper pin mount, (see Figure 6-8) they can be replaced by pressing out the worn bushing and installing a new genuine Hendrickson bushing. Refer to the Component Replacement Section of this publication.

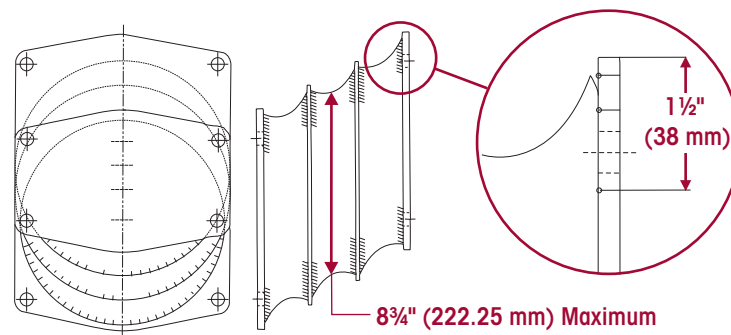


## BOLSTER SPRING

Inspect all four bolster springs on a periodic basis. Actual bolster spring service condition and performance may vary depending upon suspension and vehicle configuration, operation, service and other factors. The following inspection guidelines are intended to assist vehicle operators and maintenance personnel in examining the bolster springs and determining when replacements may be needed. In the event one bolster spring on one equalizing beam assembly shows signs of damage or excessive wear, Hendrickson recommends that both bolster springs installed on that equalizing beam assembly be replaced. When the bolster springs are replaced on one side only, the vehicle may lean slightly. The new bolster springs will tend to settle to some degree, and return the vehicle to its original condition. The following procedure is recommended for proper inspection.

1. Check the front wheels to prevent movement of the vehicle during inspection of the suspension.
2. Raise rear of vehicle approximately 4.0" - 5.0", (102 mm - 127 mm) just prior to lifting wheels off ground, and support with stands.
3. Inspect all bolster springs using the following criteria. If cuts, splits, or bonding separation are detected in the rubber, measure the depth of the damaged area using a six-inch machinist scale to determine if replacement is required.
  - **Bent, burred or overhanging edges** of the bolster spring metal plates may occur due to mishandling in service. If the rubber is not trapped, and there are no sharp metal edges in contact with the free surface of the rubber, this condition is acceptable.
  - **Creases** formed by folding of the rubber surface under load are acceptable. These creases appear as stripes on the surface, polished by wear or covered with tacky rubber.
  - **Minor oil and grease contamination** in the rubber due to vehicle operation is acceptable. A slight change in shape of the rubber due to permanent set should not be mistaken for oil and grease contamination. Certain softening of the rubber surface is acceptable. However, unacceptable swelling due to contamination will require bolster spring replacement. Measure bolster springs in the unloaded state. If the rubber diameter of the bolster spring exceeds  $8\frac{3}{4}$ " (222.25 mm), see Figure 6-9, then bolster spring replacement is necessary.
  - **Cuts or Splits** in the rubber of over 3.0" (76 mm) in length and an average depth of 1.0" (25.4 mm) are not acceptable and require bolster spring replacement. In particular, look for signs of cuts or splits in the rubber at points indicated in Figure 6-9 as "//////".
  - **Bonding separation** of the rubber from a bonded metal surface to a depth of up to  $1\frac{1}{2}$ " (38 mm) is acceptable. If any bonding separation is more than  $1\frac{1}{2}$ " (38 mm) deep, both bolster springs should be replaced on the affected side of the vehicle (see Figure 6-9). An unloaded bolster spring may be inspected for any bonding separation by measuring at points indicated in Figure 6-9 as "//////". Any thin film or other residual rubber material on the metal plates resulting from the molding process may be ignored during inspection.

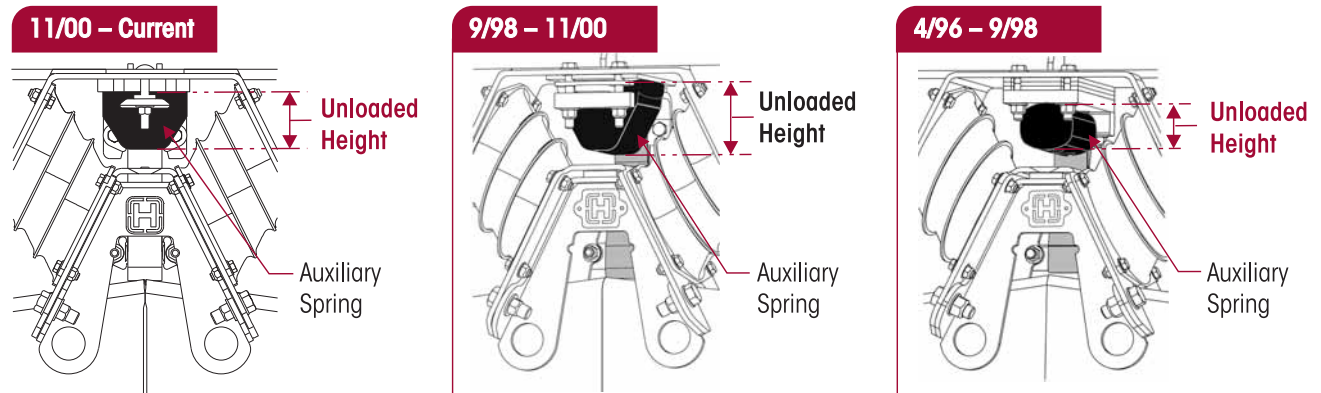
FIGURE 6-9



## AUXILIARY SPRING

A visual inspection of the auxiliary spring is required every three months. It is acceptable to have some scuffing on the bottom edges of the auxiliary spring due to contact with the bolster springs and/or Vee bracket. If the auxiliary spring is damaged, replace the auxiliary spring as outlined in the Component Replacement Section of this publication.

See Table 6-1 for the normal and minimum unloaded auxiliary spring height. If the unloaded height decreases below the minimum unloaded height as shown in the Table 6-1, replacement is required, see Figure 6-10.

**FIGURE 6-10**

**Table 6-1**

| Auxiliary Spring Unloaded Height |           |   |  |
|----------------------------------|-----------|---|--|
| Vehicles built between           | Part No.  | NORMAL                                    | MINIMUM                                    |
| November 2000-Current            | 60314-000 | 3 <sup>3</sup> / <sub>8</sub> " (85.7 mm) | 3" (76 mm)                                 |
|                                  | 65902-003 | 2 <sup>1</sup> / <sub>8</sub> " (53.9 mm) | 1 <sup>5</sup> / <sub>16</sub> " (49.2 mm) |
| September 1998-November 2000     | 58947-000 | 4" (101.6 mm)                             | 3 <sup>1</sup> / <sub>2</sub> " (88.9 mm)  |
| April 1996-September 1998        | 58189-000 | 2 <sup>3</sup> / <sub>4</sub> " (70.1 mm) | 2" (50.8 mm)                               |

## SHOCK ABSORBER

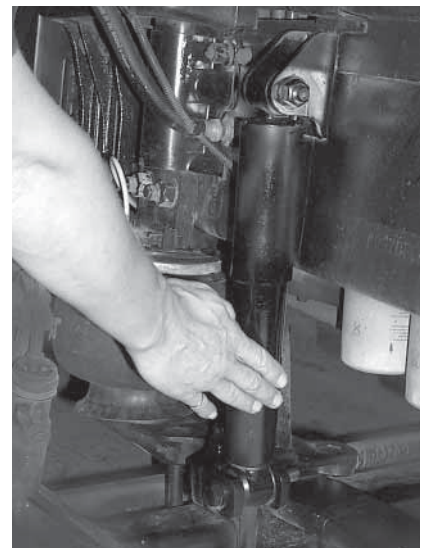
Hendrickson uses a long service life, premium shock absorber on all HN suspensions. If shock absorber replacement is necessary, Hendrickson recommends that the shock absorbers be replaced with identical Hendrickson Genuine parts for servicing. Failure to do so will affect the suspension performance,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

**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 6-11.
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 6-11**


**WARNING**

### VISUAL INSPECTION

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



FIGURE 6-12

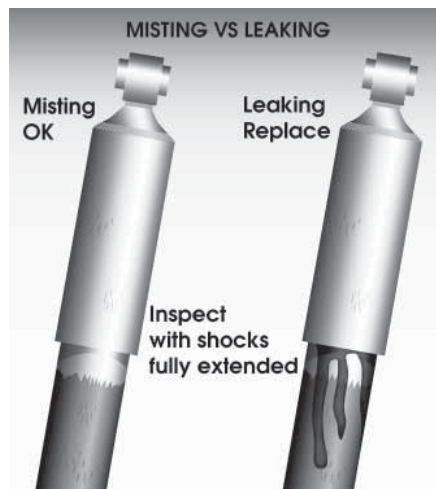


**LEAKING VS. MISTING SHOCK VISUAL INSPECTION**

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

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.

FIGURE 6-13



**NOTE**

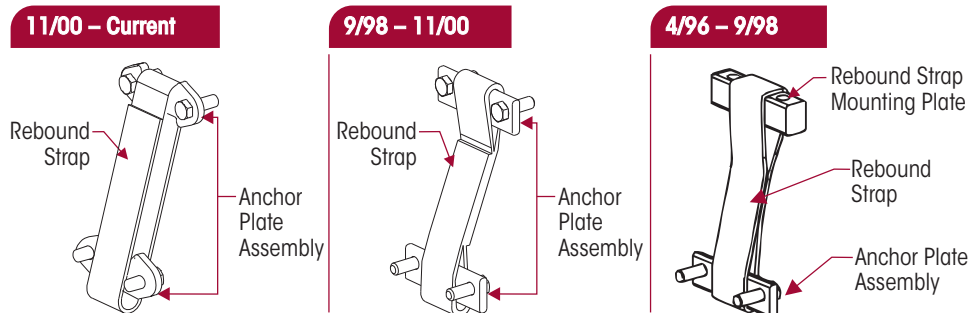
The HN suspension is equipped with a premium seal on the shock, however this seal will allow for misting to appear on the shock body (misting is not a leak and is considered acceptable).

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

**REBOUND STRAP**

The rebound strap, see Figure 6-14, helps prevent the overextension of the bolster springs during normal vehicle operation. Periodic visual inspection of the rebound strap is required every six months. If the rebound strap is torn, frayed or not intact, replace as outlined in the Component Replacement Section of this publication.

FIGURE 6-14



## SECTION 7

## Alignment &amp; Adjustments

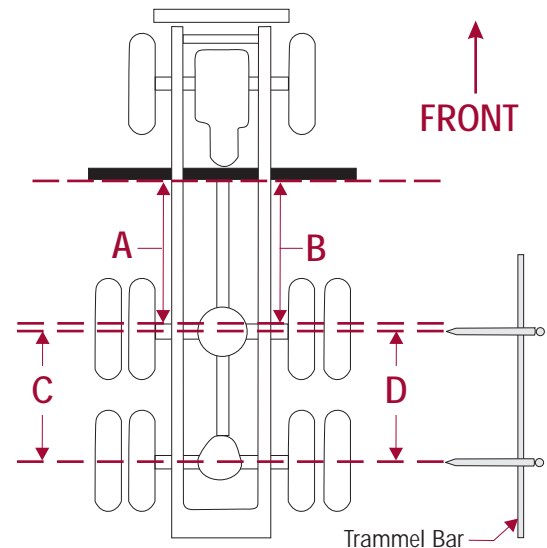
**DRIVE AXLE ALIGNMENT INSPECTION PROCEDURE**

Proper alignment is essential for maximum ride quality, performance, and tire service life. The following recommended alignment procedure as described below, should be performed if excessive or irregular tire wear is observed.

**NOTE**

Proper vehicle alignment can only be achieved when all axles are aligned to the vehicle's centerline and the steering axle's caster, camber and toe-in settings are within specifications. If, however, axle alignment equipment is not available the alignment of the drive axles may be checked by performing the following steps.

1. Use a work bay with a level, flat surface.
2. Relax the suspension by slowly moving the vehicle back and forth several times in a straight line without using the brakes. This will slacken or loosen the suspension as the vehicle is positioned. End with all wheels positioned straight ahead.
3. **DO NOT** set the parking brake. Chock the front wheels of the vehicle.
4. Verify all suspension components are in good condition. Repair or replace any worn or damaged suspension components before proceeding with the alignment process.
5. Ensure all drive axle tires are the same size.

**FIGURE 7-1**


6. Securely clamp a six-foot piece of STRAIGHT bar stock or angle iron across the lower frame flange as shown in Figure 7-1. Select a location for the bar stock or angle iron as far forward of the drive axle as possible where components will not interfere.
7. Accurately square the bar stock or angle iron to the frame using a carpenter's square.
8. Using a measuring tape, measure from the straight edge to the forward face of the front drive axle arms on both sides of the vehicle as shown in Figure 7-1, **A** and **B**.
9. Calculate the difference between measurements **A** and **B**.
  - a. If the front drive axle is within vehicle manufacturer's specifications, proceed to check the rear drive axle (Step 11).
  - b. If alignment of the front drive axle **IS NOT** within the vehicle manufacturer's specifications, then the alignment of this axle **MUST** be corrected **BEFORE** measuring the rear drive axle alignment (Step 11). Correct the alignment of this axle by following the bar pin alignment instructions.

**NOTE**

Since the remaining drive axle will be aligned relative to the front drive axle, it is essential that the front drive axle is aligned within the vehicle manufacturer's specifications prior to the alignment of the remaining drive axle.

10. Using a trammel bar, measure the distance from the spindle center of the front drive axle to the spindle center of the rear drive axle on both sides of the vehicle; see Figure 7-1, **C** and **D**.

11. Calculate the difference between measurements **C** and **D**.
  - a. If the measurements are within the vehicle manufacturer's specifications, then the rear drive axle alignment is acceptable.
  - b. If alignment of the rear drive axle **IS NOT** within the vehicle manufacturer's specifications, then the alignment of this axle **MUST** be corrected. Correct the alignment of this axle by following the bar pin alignment instructions.
12. Recheck measurements to confirm adjustments. Repeat Steps 9 through 12 until the correct alignment is achieved.
13. When all drive axle alignments are within the vehicle manufacturer's specifications then the alignment procedure is complete.

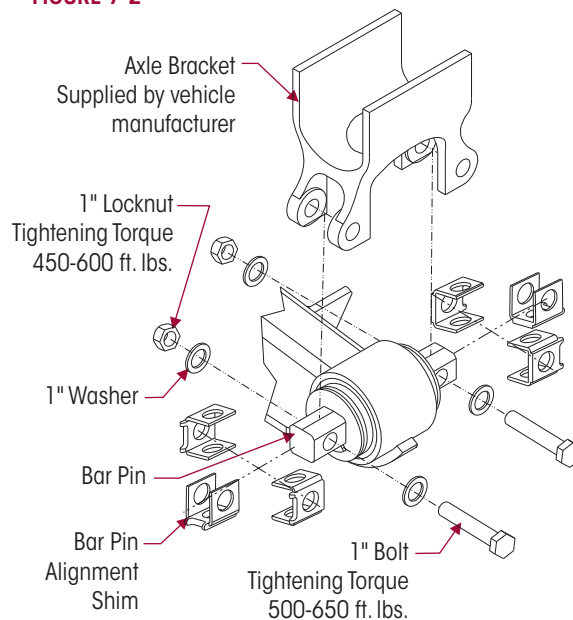
## BAR PIN ALIGNMENT

The alignment feature consists of specially designed, tightly tolerance steel shims which fill the  $\frac{3}{8}$ " (9.5 mm) total gap between the bushing's bar pin and the axle bracket legs. The gap must be filled by placing the shims on the bushing assembly in one of the positions shown in Figures 7-2 or 7-3. Hendrickson has three shim designs options for alignment, part number 50130-000 (provided), 50131-000 and 57026-000, see Figure 7-5.

### WARNING

A BAR PIN SHIM MUST BE INSTALLED AT EACH BOLT LOCATION. THE SAME PART NUMBER SHIM IN THE SAME ORIENTATION MUST BE USED AT BOTH BOLT LOCATIONS ON ANY ONE END BUSHING. DO NOT INSTALL OR STACK MORE THAN ONE SHIM AT EACH BOLT LOCATION. USE GENUINE HENDRICKSON BAR PIN SHIMS, DO NOT USE STANDARD WASHERS. FAILURE TO FOLLOW THESE WARNINGS MAY RESULT IN IMPROPER VEHICLE ALIGNMENT, FRACTURE OF THE AXLE BRACKET OR BAR PIN WHICH COULD RESULT IN THE LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

FIGURE 7-2



## ALIGNMENT ADJUSTMENT

If alignment of the drive axles is required, as determined by an alignment inspection procedure, the following steps will need to be performed.

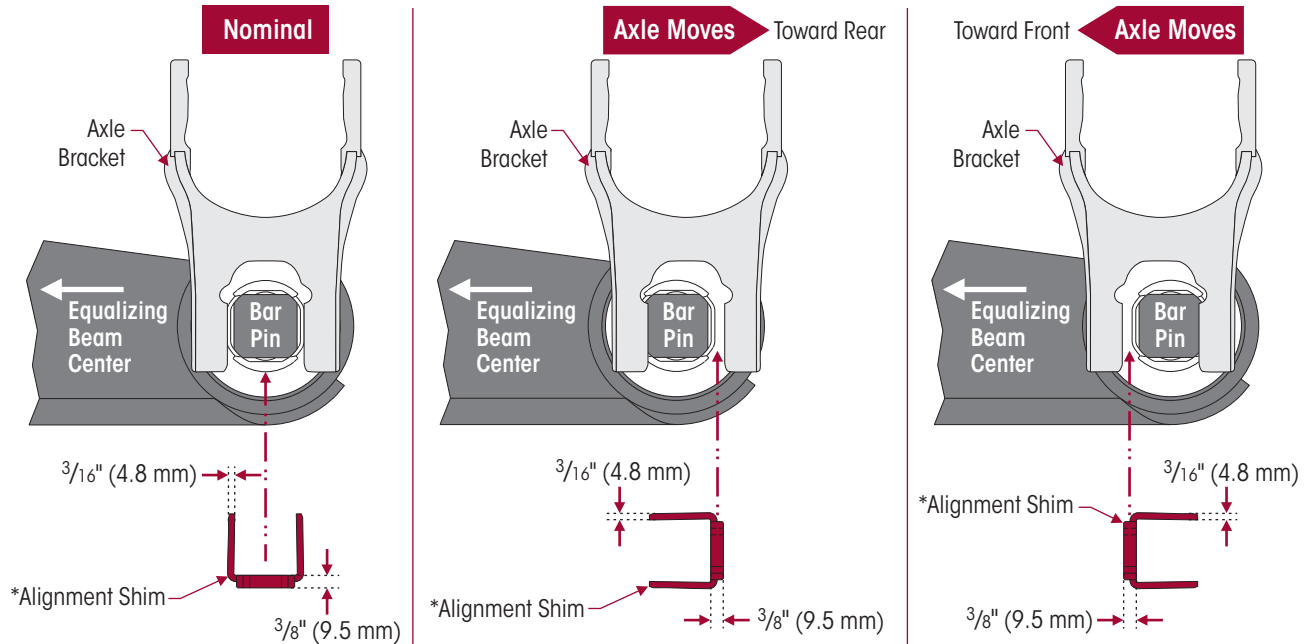
1. Determine direction of axle thrust angle. Figure 7-4 illustrates the forward drive axle with a thrust angle to the left (-negative thrust).

### SERVICE HINT

Axle movement is in the same direction as whichever side of the bar pin receives an increase in shim thickness, see Figure 7-3.

2. To determine where to adjust shim thickness use measurement **A** and **B** for front drive axle or **C** and **D** for rear drive axle, see Figure 7-1.

FIGURE 7-3

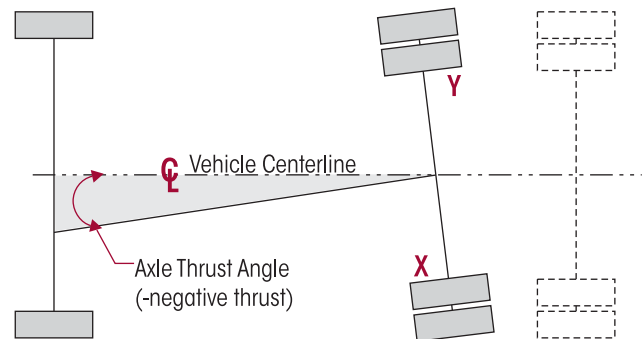


\* Alignment shim P/N 50130-000 is shown. Refer to Figure 7-5 for leg and back dimensions on shim P/Ns 50131-000 and 57026-000

**SERVICE HINT**

Axle movement will be on the side of the bar pin where shim thickness is increased. For example, to correct the axle thrust angle illustrated in Figure 7-4, shim thickness will need to be increased at the front of the bar pin (Location X) and/or the rear of the bar pin (Location Y).

FIGURE 7-4


**NOTE**

Computerized alignment equipment, such as a Hunter WT100 series, is the preferred method of alignment. Laser alignment equipment may be used, however, to calculate the shim thickness required the target offset must be converted to thrust angle, see alignment equipment manufacturer for procedures.

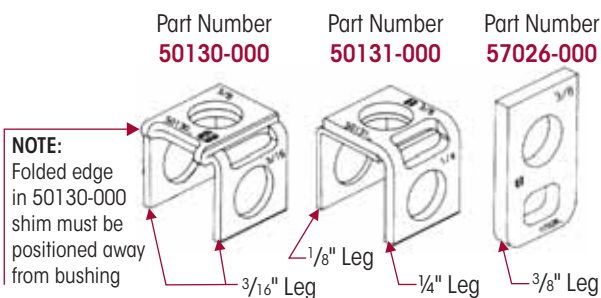
3. Chock the wheels of the front axles to prevent vehicle movement during service.
4. Raise the frame of the vehicle to remove the load from the suspension. Support the frame at this height with frame stands.
5. Support the equalizing beam and remove the fasteners from the end bushing where the bar pin alignment shim adjustment is being made.

## BAR PIN ALIGNMENT SHIM

The following service notes will help when performing Hendrickson equalizing beam bar pin alignment

- The standard alignment shims supplied with each suspension (P/N 50130-000) have two  $\frac{3}{16}$ " legs and a  $\frac{3}{8}$ " back, see Figure 7-5. Rotating the shim pairs 90° will change the axle alignment in  $\pm \frac{3}{16}$ " increments.
- If finer adjustments are required use an optional alignment shim (P/N 50131-000). This alignment shim has one  $\frac{1}{8}$ " leg, one  $\frac{1}{4}$ " leg, and a  $\frac{3}{8}$ " back, see Figure 7-5. A total of  $\frac{3}{4}$ " adjustment is achievable to the axle.
- An optional  $\frac{3}{8}$ " flat shim is also available (P/N 57026-000), see Figure 7-5.
- Shim thickness of  $\frac{1}{16}$ " increases 0.10° of thrust angle.
- To accomplish a thrust angle adjustment rotate the alignment shims on the bar pin of the end bushing. Axle movement will be in the same direction as whichever side of the bar pin receives a shim thickness increase.
- Axle thrust angle may be adjusted at either wheel end on an axle. If insufficient adjustment is available at one wheel end, the opposing wheel end will also need to be adjusted, but in the opposite direction.

FIGURE 7-5



**EXAMPLE:** The alignment equipment shows the front drive axle to have a 0.40° thrust angle to the left. This will require a  $\frac{1}{4}$ " shim thickness increase to the front side of the left front equalizing beam end bushing. If there is less than  $\frac{1}{4}$ " of adjustment available at this location then some of the adjustment will have to be made at the rear of the right front end bushing. In this case a  $\frac{1}{8}$ " shim thickness increase at the front side of the left front bar pin AND a  $\frac{1}{8}$ " shim thickness increase at the rear side of the right front bar pin will correct the 0.40° thrust angle.

6. Adjust shim thickness to move the axle in the desired direction, see Figure 7-3.

### WARNING

EACH BAR PIN END BUSHING HAS ONE INBOARD AND ONE OUTBOARD ALIGNMENT SHIM, FOR A TOTAL OF FOUR SETS OF TWO ALIGNMENT SHIMS PER SUSPENSION. EACH SET OF ALIGNMENT SHIMS ON A BAR PIN END BUSHING MUST BE INSTALLED IN THE SAME ORIENTATION. EACH OF THE FOUR BAR PIN END BUSHING SHIM LOCATIONS CAN DIFFER IN ORIENTATION. SEE FIGURE 7-2. FAILURE TO FOLLOW THESE WARNINGS MAY RESULT IN THE FRACTURE OF EITHER THE AXLE BRACKET OR BAR PIN WHICH COULD RESULT IN THE LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

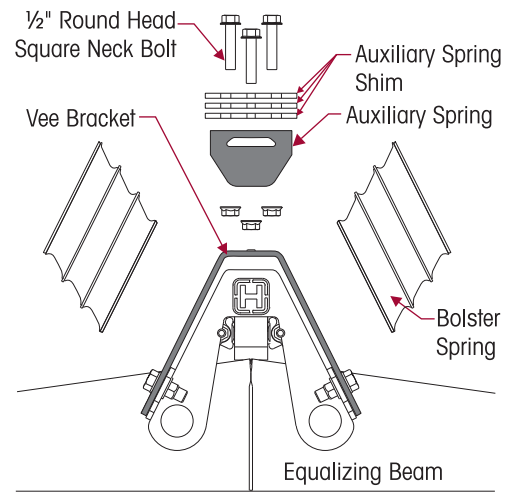
### WARNING

THE BAR PIN ALIGNMENT SHIM (P/N 50130-000) MUST BE INSTALLED WITH THE FOLDED EDGE FACING AWAY FROM THE BUSHING, SEE FIGURE 7-5. FAILURE TO DO SO MAY RESULT IN SHIM DAMAGE, IMPROPER ALIGNMENT, DAMAGE OR FRACTURE OF THE AXLE BRACKET OR BAR PIN WHICH COULD RESULT IN THE LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

7. Install new end bushing fasteners and tighten to:
  - At the **locknut** to 450-600 foot pounds torque, or
  - At the **bolt head** to 500-650 foot pounds
8. Remove support and lower the vehicle.
9. Verify the axle's alignments are within the vehicle manufactures tolerance.
10. Set brakes and remove wheel chocks.

## AUXILIARY SPRING SHIM EVALUATION

The HN suspension uses a dual spring design to achieve a good empty ride while maintaining a stable ride when loaded. When empty, the vehicle rides on the bolster springs and there is an air gap between the auxiliary springs and the vee brackets. When loaded, the weight of the vehicle compresses the bolster springs so the auxiliary spring engages the vee bracket thereby increasing roll stability. Vehicles with a low unladen tandem weight or a high center of gravity **may require** increased roll stability. On these vehicles, auxiliary spring shims can be added above the auxiliary spring so the auxiliary spring and the vee bracket engage sooner. This may eliminate any gap between the auxiliary springs and the vee bracket.

**FIGURE 7-6**


Production vehicles specified with the HN suspension are typically equipped with three (3) auxiliary spring shims, see Figure 7-6. Some vehicles are manufactured with less shims to minimize the need for adjustment after the body equipment is installed.

To achieve optimal ride quality and stability the unladen tandem weight of some vehicles will dictate the auxiliary spring shim arrangement, see Table 7-1.

**TABLE 7-1**

### RECOMMENDED NUMBER OF AUXILIARY SPRING SHIMS FOR THE FOLLOWING APPLICATIONS

| **Vehicle / Application | *Unladen Tandem Weight With Body / Equipment Installed |                              |                             |
|-------------------------|--|------------------------------|-----------------------------|
|                         | Normal<br>10,000-18,000 lbs.                           | Medium<br>18,001-23,000 lbs. | Heavy<br>23,001-28,000 lbs. |
| Dump Truck              | 3 Shims  | 2 Shims                      | 2 Shims                     |
| Refuse Front Load Dump  | 3 Shims  | 5 Shims                      | 5 Shims                     |
| Refuse Front Load Eject | 3 Shims  | 2 Shims                      | 1 Shim                      |
| Refuse Rear Load Eject  | 3 Shims  | 2 Shims                      | 1 Shim                      |
| Refuse Side Loader      | 3 Shims  | 2 Shims                      | 1 Shim                      |
| Refuse Side Loader Dump | 3 Shims  | 5 Shims                      | 5 Shims                     |
| Refuse Recycler Dump    | 3 Shims  | 5 Shims                      | 5 Shims                     |
| Refuse Recycler Eject   | 3 Shims  | 2 Shims                      | 1 Shim                      |
| Transit Mixer           | 3 Shims  | 3 Shims                      | 1 Shim                      |
| Crane Carrier           | 3 Shims  | 5 Shims                      | 5 Shims                     |

\* Matrix based on extensive field testing under varying conditions.  
 \*\* Contact Hendrickson Tech Services for applications not listed.

### ADJUSTMENT NOTES

- Both sides of the HN suspension **MUST** have an equal number of auxiliary spring shims, in place or a vehicle lean may result.
- A maximum of five (5) and a minimum of one (1) auxiliary shim(s) may be installed per side above the auxiliary spring.
- After determining the proper amount of shims required, install or remove the shims as needed, see Auxiliary Spring Shim Adjustment in this Section.

## AUXILIARY SPRING SHIM ADJUSTMENT

### DISASSEMBLY

1. Chock the front wheels of the vehicle.
2. Remove the fasteners that attach the auxiliary spring shims to the auxiliary spring mounting plate, see Figure 7-7.

### SERVICE HINT

If the auxiliary spring is in contact with the auxiliary spring shims, it will be necessary to raise the frame of the vehicle to service the auxiliary spring shims.

3. Remove or install additional shims as per the guidelines detailed in Table 7-1.

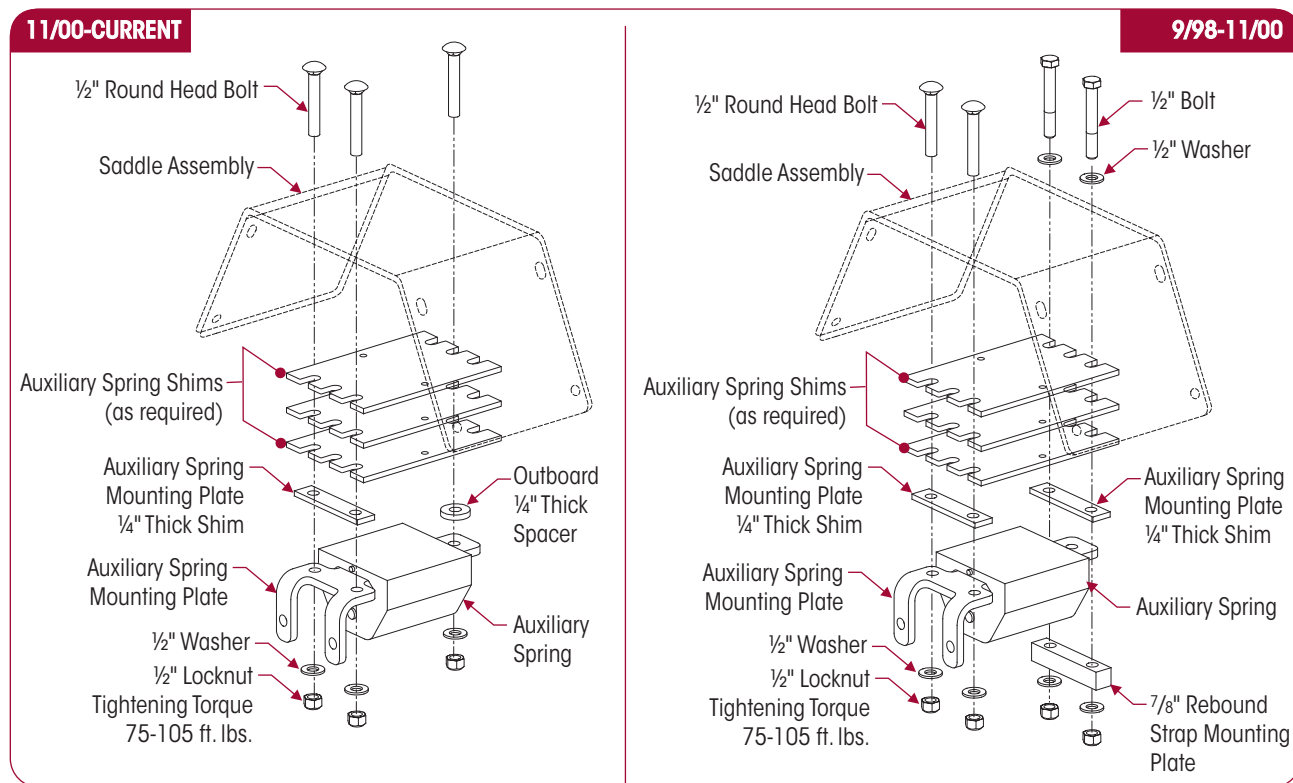
### ASSEMBLY

### NOTE

The bolt length varies with the amount of shims installed. Ensure there is at least three (3) threads exposed past the locknut.

1. Install the fasteners that attach the auxiliary spring shims to the auxiliary spring mounting plate and tighten to 75-105 foot pounds torque, see Figure 7-7.
2. Remove wheel chocks.

FIGURE 7-7



## SECTION 8

# Component Replacement

### FASTENERS

When servicing a vehicle Hendrickson recommends replacing all 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.

### SERVICE HINT

When replacing components on the HN suspension, work one side of the vehicle at a time and only lift the vehicle enough to remove load and component. This will help maintain axle orientation and help reduce labor time and effort.

### SADDLE

#### DISASSEMBLY

1. Chock the front wheels of the vehicle.
2. Remove the fasteners from the upper anchor plate assembly and auxiliary spring mounting plate, see Figure 8-1.
3. Remove the fasteners connecting the auxiliary spring to the saddle and the auxiliary spring outboard spacer, see Figure 8-2. Remove the auxiliary spring.
4. Loosen, **DO NOT** remove, the eight (8)  $\frac{7}{16}$ " fasteners connecting the bolster springs to the saddle assembly.
5. Remove the eight (8)  $\frac{7}{16}$ " fasteners connecting the bolster springs to the vee bracket.
6. Remove the four (4)  $\frac{3}{4}$ " fasteners from the vee bracket and the equalizing beam. Remove the vee bracket.
7. Remove the upper shock absorber fasteners, from the upper shock brackets. Push the shock absorbers down and clear of the upper shock brackets.

FIGURE 8-1

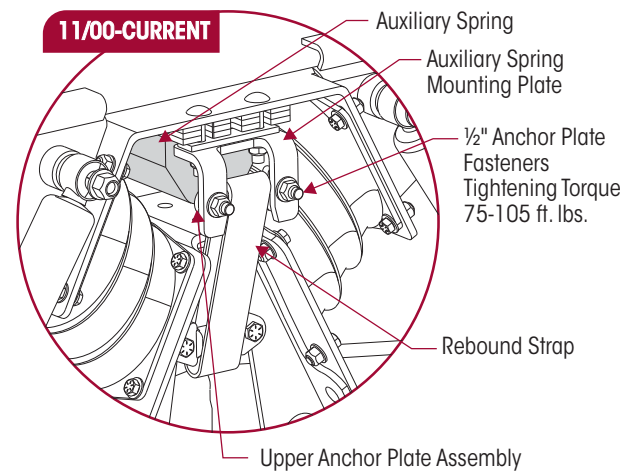
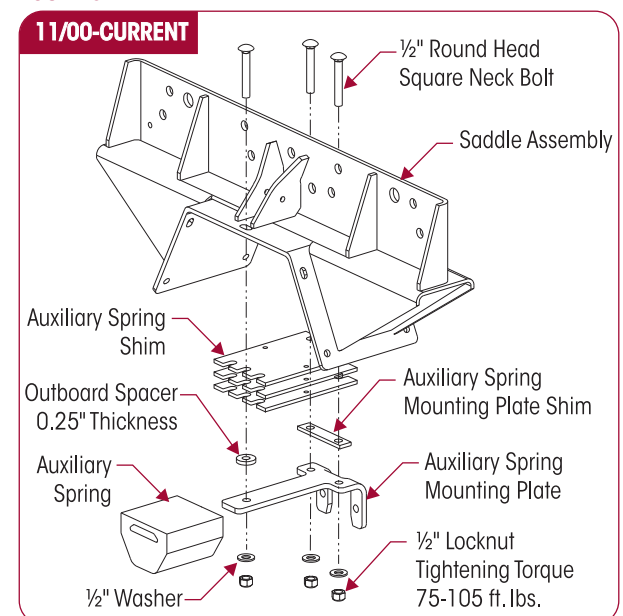


FIGURE 8-2





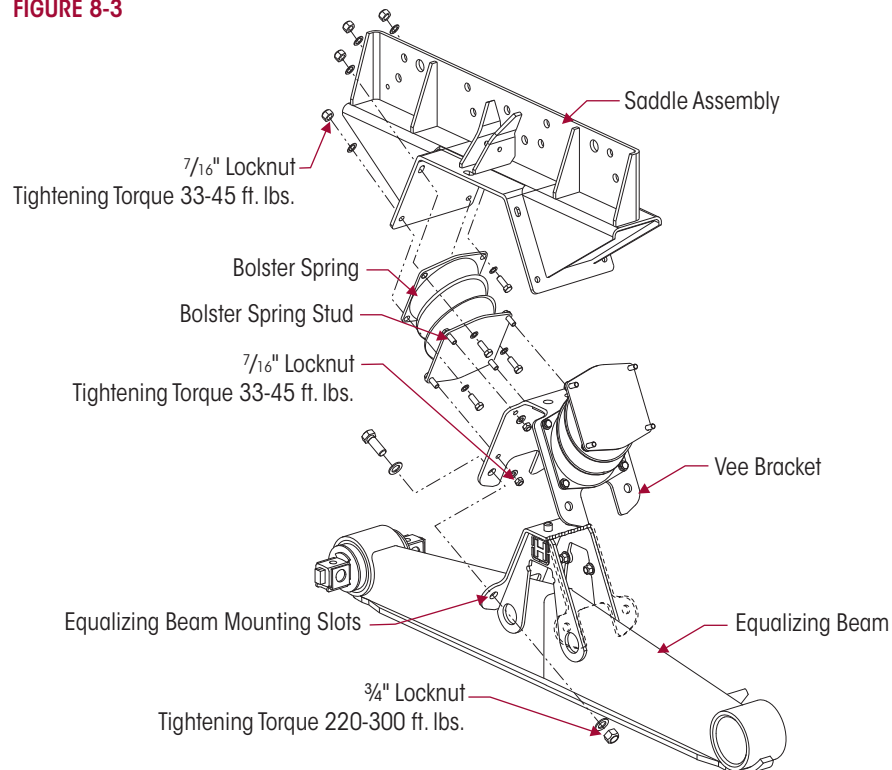
8. Raise the rear of the vehicle to clear the bolster springs from the equalizing beam. Support the vehicle at this height.
9. Remove the eight (8)  $\frac{7}{16}$ " fasteners that connect the bolster springs to the saddle, and remove the bolster springs, see Figure 8-3.

**WARNING**

THE WEIGHT OF THE SADDLE IS APPROXIMATELY 175 POUNDS. CARE SHOULD BE TAKEN AT REMOVAL AND INSTALLATION TO PREVENT PERSONAL INJURY OR DAMAGE TO COMPONENTS.

10. Remove saddle to frame fasteners per the vehicle manufacturer's specifications.
11. Remove the saddle.

**FIGURE 8-3**



**ASSEMBLY**

1. Mount the saddle to frame and tighten fasteners per the vehicle manufacturer's specifications.

**WARNING**

THE BOLSTER SPRING BOLT HEADS MUST BE POSITIONED AT THE RUBBER SIDE OF THE BOLSTER SPRINGS TO PREVENT THE BOLSTER SPRINGS FROM BEING DAMAGED BY THE THREADED ENDS OF BOLTS.

2. Mount the bolster springs to the saddle and loosely install the eight (8)  $\frac{7}{16}$ " fasteners on the bolster spring. Ensure the bolt heads are positioned to at the rubber side of the bolster springs. **DO NOT** tighten at this time.

**CAUTION**

IF THE VEE BRACKET LOCATED BETWEEN THE EQUALIZING BEAM AND THE BOLSTER SPRINGS IS DAMAGED, IT MUST BE REPLACED. FAILURE TO DO SO CAN CAUSE DAMAGE TO MATING COMPONENTS.

3. Remove the frame supports and lower the vehicle, guide the eight (8) lower bolster spring studs into the vee brackets. Ensure the vee bracket sits at the bottom of the mounting slots on the beam, see Figure 8-3.
4. Install the eight (8) lower  $\frac{7}{16}$ " fasteners on the bolster spring.
5. Tighten all sixteen bolster spring fasteners to 33-45 foot pounds torque.
6. Mount the lower anchor plate assembly on the equalizing beam. Tighten to 75-105 foot pounds torque, see Figure 8-3.

7. Install the shock absorber fasteners, tighten to 70-90 foot pounds torque.
8. Mount auxiliary spring and auxiliary spring shims to saddle by installing the ½" bolts and fasteners, see Figure 8-2.
9. Tighten to auxiliary spring fasteners to 90-105 foot pounds torque.
10. Mount the upper anchor plate assembly to auxiliary spring mounting plate by installing the two (2) ½" bolts and fasteners and tighten to 75-105 foot pounds torque, see Figure 8-1.
11. Remove wheel chocks.

## AUXILIARY SPRING

### NOTE

Tire removal is not necessary to service the auxiliary spring.

### DISASSEMBLY

1. Chock the front wheels of the vehicle.
2. Raise the frame of the vehicle just enough to remove the load from the bolster springs. Support the frame at this height.
3. Remove the fasteners securing the auxiliary spring mounting plate to the saddle, see Figure 8-4.
4. Slide the auxiliary spring off the auxiliary spring mounting plate.

### ASSEMBLY

1. Slide the auxiliary spring onto the auxiliary spring mounting plate.
2. Install the auxiliary spring mounting plate to the saddle.
  - a. **Auxiliary Spring (11/00-Current)**
    - i. Install the auxiliary spring shim(s) if removed, auxiliary spring mounting plate and auxiliary spring mounting plate shim onto the inboard fasteners. Loosely install the washers and locknuts, see Figure 8-5.
    - ii. Install the outboard fasteners through the saddle, auxiliary spring shim(s), 0.25" thick outboard spacer, and auxiliary spring mounting plate.
  - b. **Auxiliary Spring (9/98-11/00)**
    - i. Install the auxiliary spring shim(s) if removed; one of the auxiliary spring mounting plate shims, and the auxiliary spring mounting plate onto the inboard fasteners. Loosely install the washers and locknuts, see Figure 8-6.
    - ii. Install the outboard fasteners through the saddle, the auxiliary spring shim(s), the other auxiliary spring mounting plate shim, and the rebound strap mounting plate. Loosely install the washers and locknuts on the outboard fasteners, see Figure 8-6.
  - c. **Auxiliary Spring (4/96-8/98)**
    - i. Auxiliary spring is no longer available. Use conversion kit no. 57974-011, see Parts Lists Section of this publication, or contact Hendrickson Tech Services.
3. Tighten the fasteners to 75-105 foot pounds torque.
4. Remove the frame supports and lower the vehicle completely.
5. Remove the wheel chocks.

FIGURE 8-4

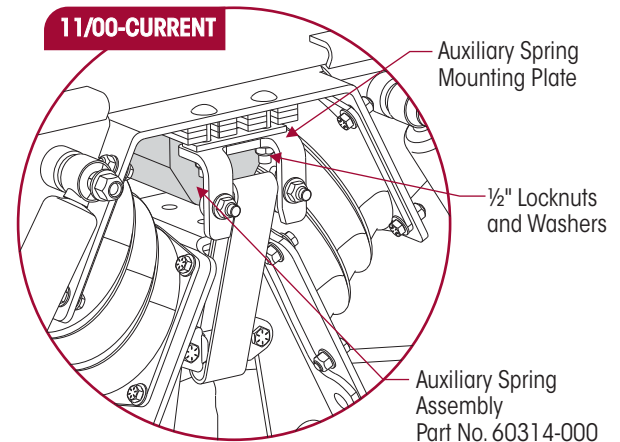


FIGURE 8-5

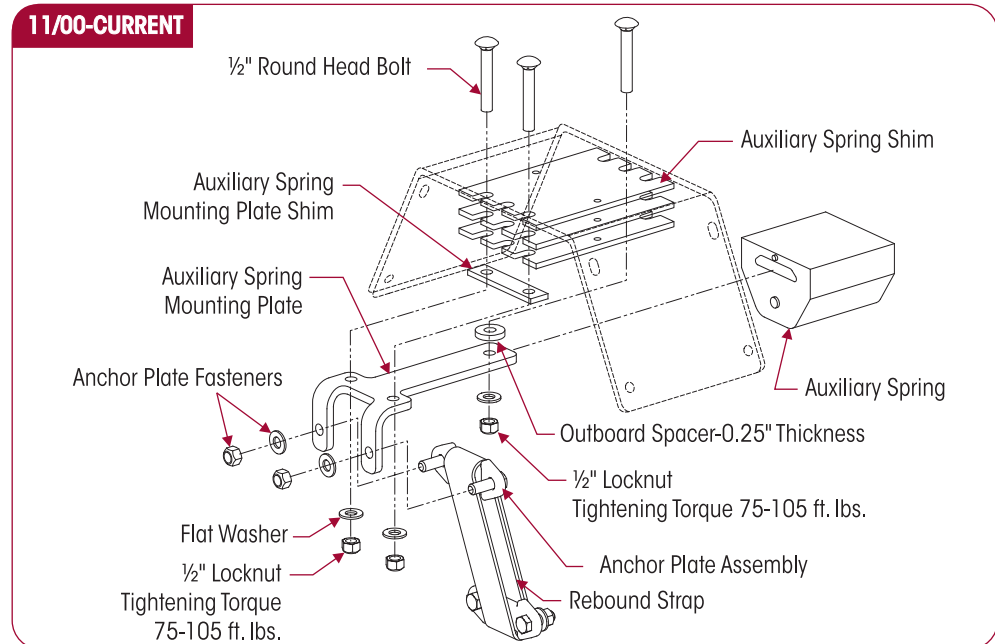
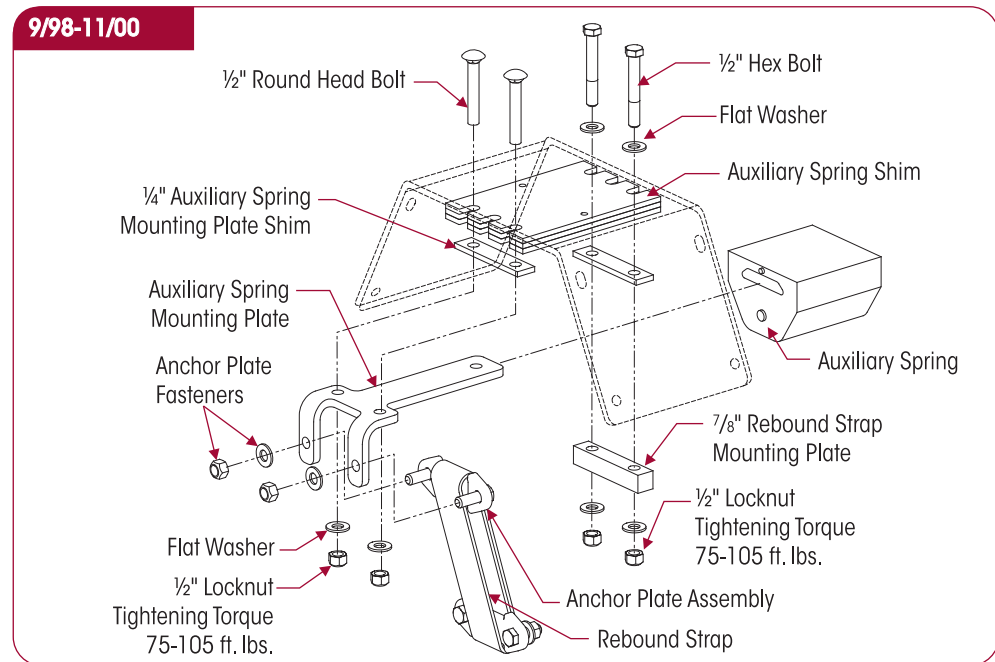


FIGURE 8-6



## REBOUND STRAP

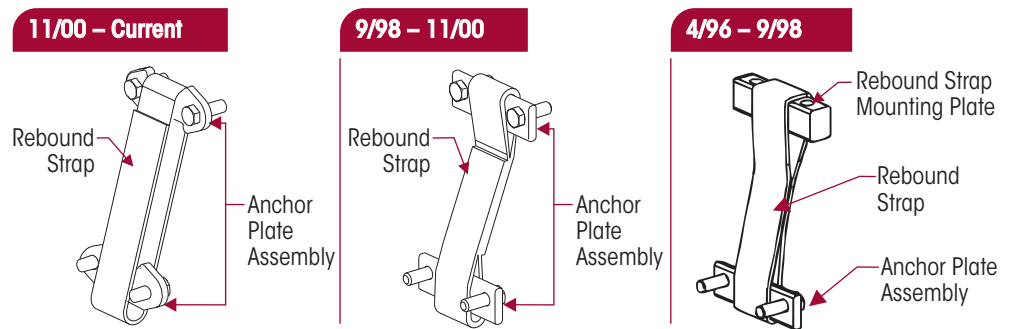
### DISASSEMBLY

1. Chock the front wheels.
2. Vehicle should be in the loaded condition for the rebound strap to be slack enough for removal.
3. From the inboard side of the saddle remove the 1/2" locknuts and 1/2" flat washers from the top of the rebound strap anchor plate assembly (11/00-current and 9/98-11/00) or the rebound strap mounting plate (4/96-9/98).

- From the outboard side remove the ½" locknuts and ½" flat washers from the anchor plate assembly of the rebound strap. This will free the rebound strap, anchor plate assembly and if applicable (4/96-9/98) rebound strap mounting plate. Slide off and free both ends of rebound strap from the anchor plate assembly and if applicable (4/96-9/98) the rebound strap mounting plate, see Figure 8-7.

**SERVICE HINT**

The anchor plate assembly welds of bolt heads do not need to be cut or separated to replace rebound strap.

**FIGURE 8-7**

**ASSEMBLY**

- Replace rebound strap by reversing procedure.
  - Vehicles built AFTER 9/98:** Slide one strap end loop over each end of anchor plate assembly, see Figure 8-7.
  - Vehicles built PRIOR TO 9/98:** Slide one strap end loop over the mounting plate and the other over the anchor plate assembly, see Figure 8-7.
- From the inboard side of the saddle, place the rebound strap back to its original position.
- From the inboard side reinstall ½" flat washers and locknuts to 75-105 foot pounds.
- From the outboard side reinstall the ½" flat washers and locknuts of the anchor plate assembly to the equalizing beam and torque the ½" locknuts to 75-105 foot pounds.
- Remove the wheel chocks.

**BOLSTER SPRING**
**NOTE**

Replacement of bolster springs is possible from under the vehicle without the removal of the tires, rims or wheels. Hendrickson recommends that both bolster springs on one side of vehicle be replaced even if only one shows wear.

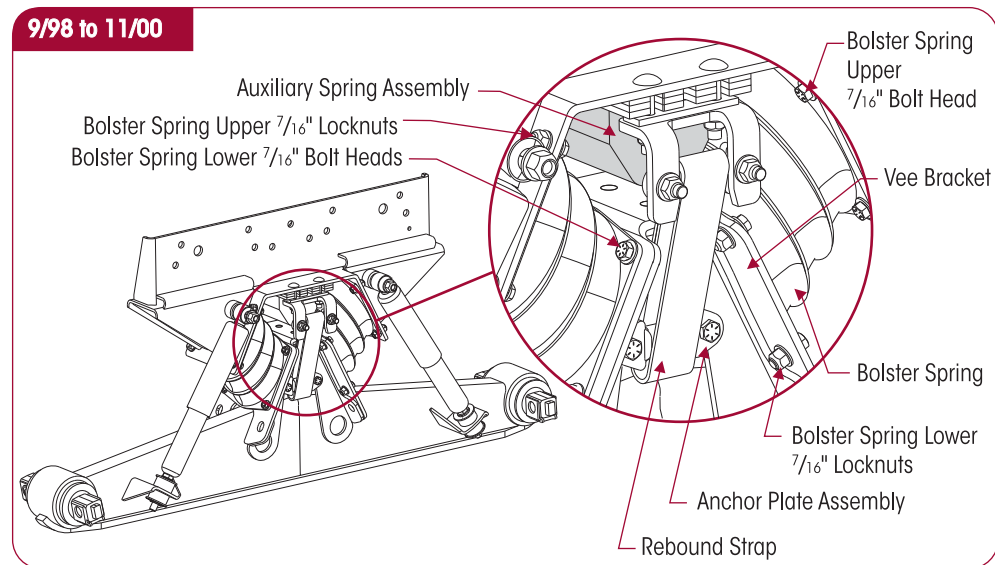
**DISASSEMBLY**

- Chock the front wheels of the vehicle.
- From the outboard side, remove the fasteners securing the anchor plate assembly to the auxiliary spring mounting plate. Remove the anchor plate.
- Remove the fasteners securing the bolster springs to the saddle and vee bracket (8 per bolster).
- Raise the frame of the vehicle just enough to remove the load from the bolster springs. Support the frame at this height.
- Remove the bolster springs.

**CAUTION**
**ASSEMBLY**

THE BOLSTER SPRING MOUNTING BOLT HEADS MUST BE POSITIONED AT THE RUBBER SIDE OF THE BOLSTER SPRINGS TO PREVENT THE BOLSTER SPRINGS FROM BEING DAMAGED BY THE THREADED ENDS OF BOLTS.

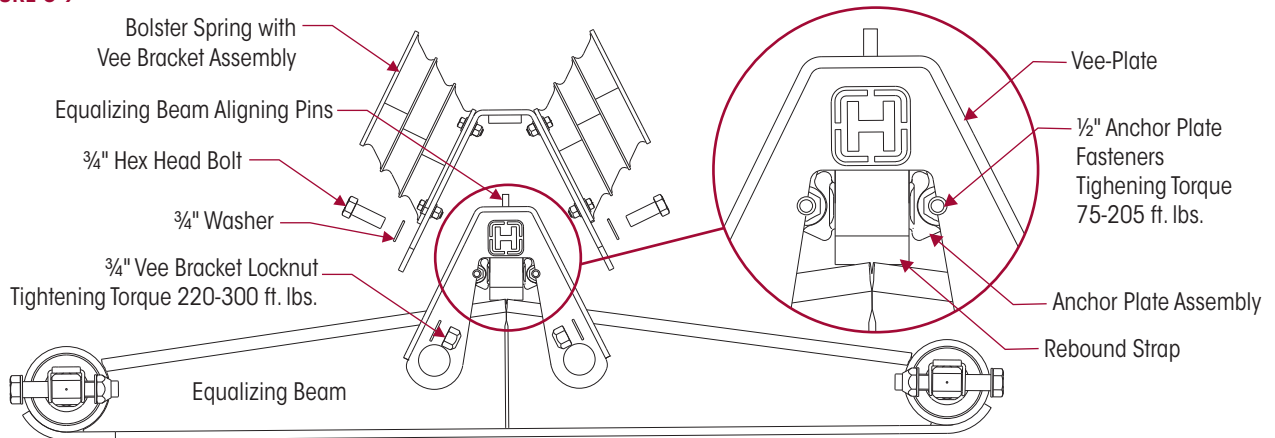
1. Install the bolster springs between the vee bracket and saddle.
2. Loosely install the fasteners securing the bolsters to the saddle and the vee bracket assembly making sure the fastener heads are on the rubber side of the bolsters, see Figure 8-8.

**FIGURE 8-8**

3. Once all fasteners have been loosely installed remove the frame supports and lower the vehicle to place the full load of the vehicle on the suspension.
4. Tighten the bolsters spring fastener locknuts to 33-45 foot pounds.
5. Install the anchor plate through the rebound strap loop.
6. Install the anchor plate and fasteners to the auxiliary spring mounting plate.
7. Tighten the anchor plate fastener locknuts to 75-105 foot pounds.

**VEE BRACKET****DISASSEMBLY**

1. Chock the wheels.
2. Remove the  $\frac{5}{8}$ " locknut, retainer washer, and rubber bushing from the bottom of both shock absorbers.
3. To remove the lower anchor plate fasteners, gain access from the outboard side through the opening of the vee-plate, see Figure 8-9. Remove the rebound strap anchor plate assembly and free the lower section of the rebound strap and anchor plate assembly from the equalizing beam.
4. Remove the lower bolster spring fasteners on the side being serviced (4 fasteners per bolster).
5. Raise the frame enough to clear the vee bracket from the equalizing beam aligning pins, see Figure 8-9.
6. Remove the four vee bracket  $\frac{3}{4}$ " fasteners.
7. Remove the vee bracket from the equalizing beam.

**FIGURE 8-9**


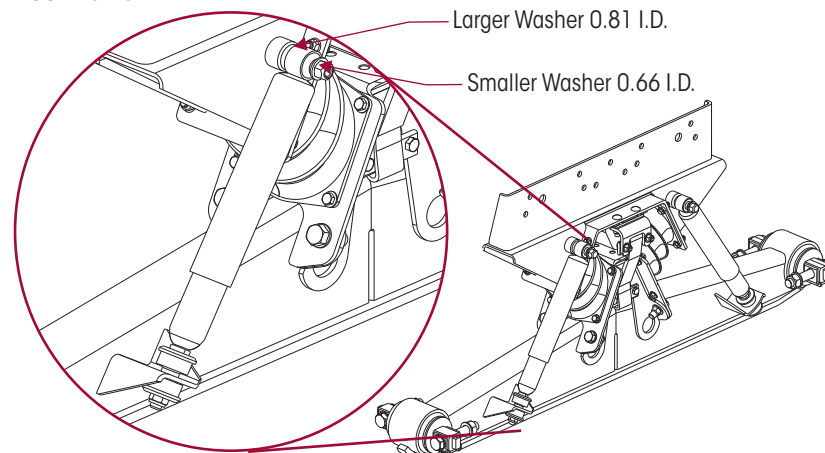
### ASSEMBLY

1. Mount vee bracket over aligning pins on equalizing beam, see Figure 8-9.
2. Install the four vee bracket fasteners. **DO NOT** tighten at this time.
3. Lower the frame enough to align the four **lower** bolster spring holes to the vee bracket.
4. Install the 7/16" **lower** bolster spring fasteners.
5. Completely lower the vehicle.
6. Torque all loosened or removed bolster spring fasteners to 33-45 foot pounds torque.
7. Torque vee bracket 3/4" fasteners to 220-300 foot pounds torque.
8. Reattach the lower end of the rebound strap and anchor plate to the equalizing beam.
9. Install the lower anchor plate assembly fasteners, gain access from the outboard side through the opening of the vee-plate, see Figure 8-9. Tighten fasteners to 75-105 foot pounds torque.
10. Reinstall the rubber bushing, 5/8" retainer washer, and locknut at the bottom of both shock absorbers to the equalizing beam.
11. Tighten shock absorber fasteners to 70-90 foot pounds torque.

### SHOCK ABSORBER

#### DISASSEMBLY

1. Remove the shock absorbers by loosening and removing the 5/8" locknuts, retainer washers, flat washers, and rubber bushings from the bottom and top of both shock absorbers, see Figure 8-10.

**FIGURE 8-10**


### ASSEMBLY

1. Replace the shock absorbers by installing the 5/8" UNF locknuts, retainer washers, flat washers and rubber bushings from the bottom and top of both shock absorbers as shown in Figures 8-11 and 8-12.

FIGURE 8-11

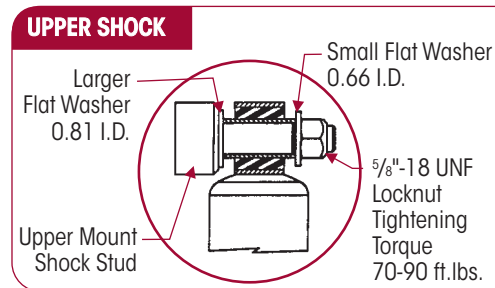
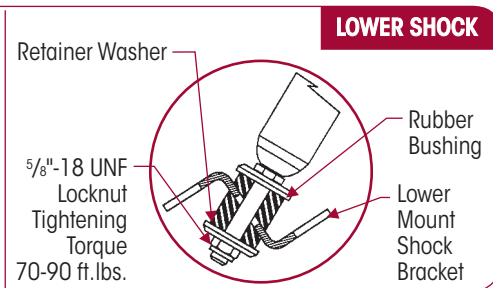


FIGURE 8-12



2. The larger 0.81" I.D. flat washers fit over the shoulder of the upper mount shock stud, and the smaller 0.66" I.D. flat washers are then installed over the threaded end of the upper mount shock stud, see Figure 8-11.
3. Install on lower shock a retainer washer, rubber bushing above shock mount, then install a rubber bushing, retainer washer and 5/8" locknut below the shock mount, see Figure 8-12. Tighten fasteners to 70-90 foot pounds torque.

### EQUALIZING BEAM

#### DISASSEMBLY

**CAUTION**

IF THE VEE BRACKET LOCATED BETWEEN THE EQUALIZING BEAM AND THE BOLSTER SPRINGS IS DAMAGED, IT MUST BE REPLACED. FAILURE TO DO SO CAN CAUSE DAMAGE TO MATING COMPONENTS. IF REPLACEMENT IS NEEDED, REFER TO VEE BRACKET REPLACEMENT IN THIS SECTION.

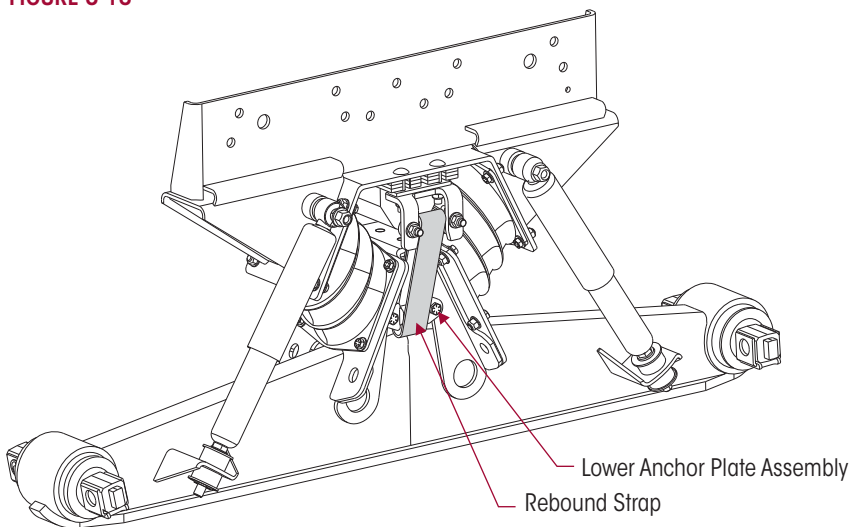
1. Chock the **FRONT** wheels of the vehicle.
2. If both equalizing beams need replacement repeat Steps 3 through 9 for removal of the opposing equalizing beam **AFTER** the first equalizing beam is reassembled.

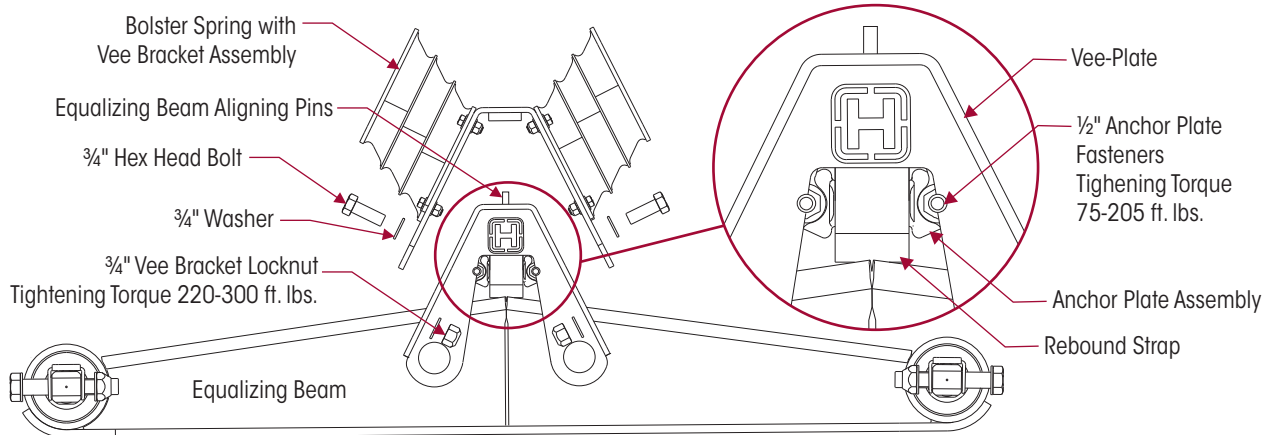
**SERVICE HINT**

Access to the lower anchor plate assembly fasteners can be gained from the outboard side of the equalizing beam.

3. Remove the lower end of the rebound strap from the equalizing beam by removing the lower anchor plate and fasteners, see Figure 8-13.

FIGURE 8-13



**FIGURE 8-14**


- Remove the (4) fasteners that connect the Vee bracket to the equalizing beam, see Figure 8-14.
- Raise the frame of the vehicle until the Vee bracket is 2"-3" above the equalizing beam. Support the frame at this height with frame stands.

**NOTE**

Prior to disassembly of the equalizing beam bar pin fasteners, note the orientation of the bar pin alignment shims, see Figure 8-15. It is required that the bar pin alignment shims are installed in the same orientation and location as removed to preserve the existing vehicle alignment. Improper vehicle alignment can increase tire wear.

- Note the orientation and location of the bar pin shims, see Figure 8-15.

**WARNING**

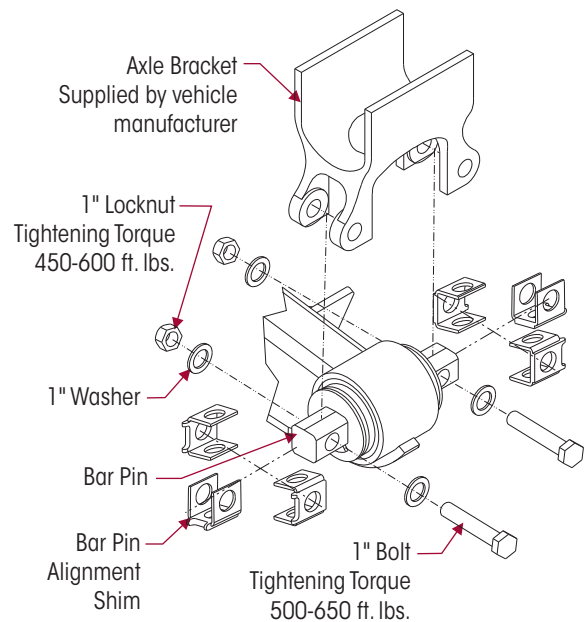
THE WEIGHT OF THE EQUALIZING BEAM ASSEMBLY IS APPROXIMATELY 155 POUNDS. PRIOR TO REMOVING THE BAR PIN BOLTS FROM THE EQUALIZING BEAM, SUPPORT THE END OF THE EQUALIZING BEAM TO PREVENT FROM DROPPING. CARE SHOULD BE TAKEN AT REMOVAL AND INSTALLATION TO PREVENT PERSONAL INJURY OR DAMAGE TO COMPONENTS.

- Support the center of the equalizing beam being serviced.
- Remove and discard bar pin fasteners that connect the end bushing bar pin to the axle bracket.

**NOTE**

Prior to removing both equalizing beams, support the pinion of each drive axle. Failure to do so can result in personal injury or allow the axles to shift making reassembly more difficult.

- Lower the beam support and remove the equalizing beam from the axle brackets.

**FIGURE 8-15**




**ASSEMBLY**

**NOTE** All equalizing beams are manufactured with the bar pin flats perpendicular to the equalizing beam's axis. It is not necessary to adjust the bar pins to the same pinion angle as prior to disassembly. The rubber in the bushings will gradually allow the bar pins to adapt to the pinion angles of the drive axles. This is a normal function of the bar pin bushings.

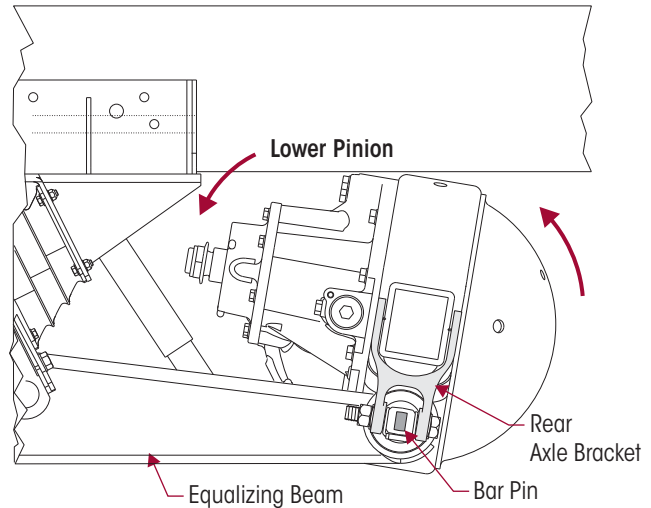
**SERVICE HINT** Installing the front bar pins prior to the rear bar pins will ease in the installation of the equalizing beam.

**WARNING**

THE WEIGHT OF THE EQUALIZING BEAM ASSEMBLY IS APPROXIMATELY 155 POUNDS. CARE SHOULD BE TAKEN AT REMOVAL AND INSTALLATION TO PREVENT PERSONAL INJURY OR DAMAGE TO COMPONENTS.

1. Mount the equalizing beam into the **FRONT** drive axle brackets. **DO NOT** install the alignment shims at this time.
2. Slide a 3/4" bolt through both front axle brackets and the bar pin holes to temporarily support the beams.
3. Lift the **REAR** of the beam until the front bar pin flats are parallel to the front drive axle bracket legs, see Figure 8-16.

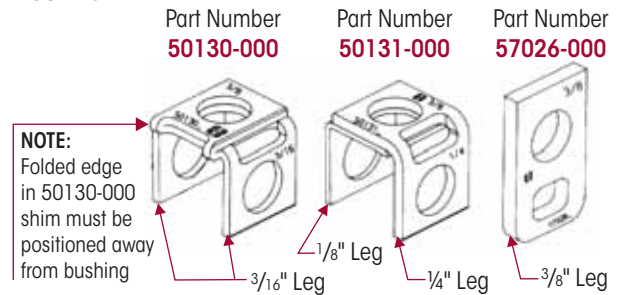
**FIGURE 8-16**



**WARNING**

A BAR PIN SHIM MUST BE INSTALLED AT EACH BOLT LOCATION. THE SAME PART NUMBER SHIM IN THE SAME ORIENTATION MUST BE USED AT BOTH BOLT LOCATIONS ON ANY ONE END BUSHING. DO NOT INSTALL OR STACK MORE THAN ONE SHIM AT EACH BOLT LOCATION. USE GENUINE HENDRICKSON BAR PIN SHIMS, DO NOT USE STANDARD WASHERS. FAILURE TO FOLLOW THESE WARNINGS MAY RESULT IN IMPROPER VEHICLE ALIGNMENT, FRACTURE OF THE AXLE BRACKET OR BAR PIN WHICH COULD RESULT IN THE LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

**FIGURE 8-17**



**WARNING**

THE BAR PIN ALIGNMENT SHIM (PART NO. 50130-000) MUST BE INSTALLED WITH THE FOLDED EDGE FACING AWAY FROM THE BUSHING, SEE FIGURE 8-17. FAILURE TO DO SO MAY RESULT IN SHIM DAMAGE, IMPROPER ALIGNMENT, DAMAGE OR FRACTURE OF THE AXLE BRACKET OR BAR PIN WHICH COULD RESULT IN THE LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

4. Partially install the **FRONT INBOARD** bar pin alignment shim and verify that the shim is in the same orientation as prior to disassembly, see Figure 8-15.
5. To complete installation of the alignment shim, remove the temporary 3/4" bolt from the inboard bar pin hole and complete installation of the inboard alignment shim.
6. Install the NEW 1" inboard bar pin fasteners. **DO NOT** tighten at this time.
7. Repeat Steps 4 through 6 for the **FRONT OUTBOARD** alignment shim.

8. Chock the **REAR** drive axle wheels to prevent movement while installing the rear bar pin into the axle bracket.
9. Support the current axle position of the rear axle pinion with a jack to assist with the installation of the rear bar pin.

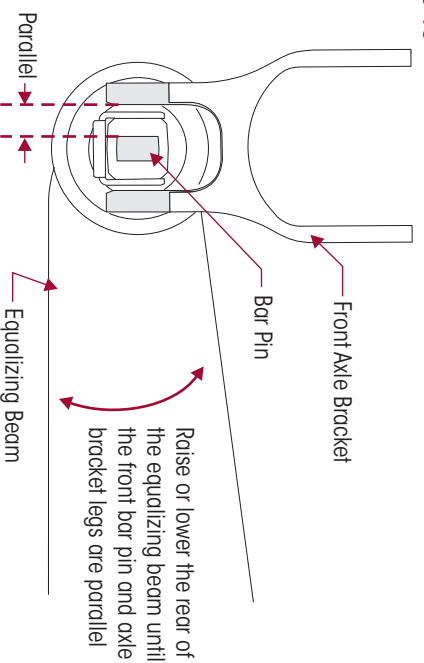
**NOTE**

Prior to disassembly of the longitudinal torque rod, note the quantity and orientation of the longitudinal torque rod shims. It is required that the longitudinal torque rod shims are installed in the same orientation and location as removed to preserve the existing pinion angle.

10. Disconnect the longitudinal torque rod from the axle bracket, see vehicle manufacturer's specifications.

11. Release the rear parking brakes, this will allow the rear axle to rotate without rotating the tires.

12. Lower the rear drive pinion until the rear drive axle bracket legs are parallel to the rear bar pin flats, see Figure 8-18.

**FIGURE 8-18**


13. Mount the equalizing beam into the **REAR** drive axle brackets. **DO NOT** install the bar pin alignment shims at this time.
14. Slide a  $\frac{3}{4}$ " bolt through all rear axle bracket and the bar pin holes to temporarily support the beams.
15. Partially install the **REAR INBOARD** bar pin alignment shim and verify that the shim is in the same orientation as prior to disassembly, see Figure 8-15.
16. To complete installation of the alignment shim, remove the temporary  $\frac{3}{4}$ " bolt from the inboard bar pin hole and complete installation of the inboard alignment shim.
17. Install NEW 1" inboard bar pin fasteners. **DO NOT** tighten at this time.
18. Repeat Steps 15 through 17 for the **REAR OUTBOARD** bar pin alignment shim.
19. Install the longitudinal torque rod as per the vehicle manufacturer's specifications.
20. Re-apply rear parking brake.

**NOTE**

Prior to assembly of the longitudinal torque rod, note the quantity and orientation of the longitudinal torque rod shims. It is required that the longitudinal torque rod shims are installed in the same orientation and location as removed to preserve the existing alignment.

21. Install the longitudinal torque rod and any longitudinal torque rod shims in the same orientation as prior to disassembly. Tighten the fasteners to the vehicle manufacturer's specifications.

22. Re-apply rear parking brake.

**NOTE**

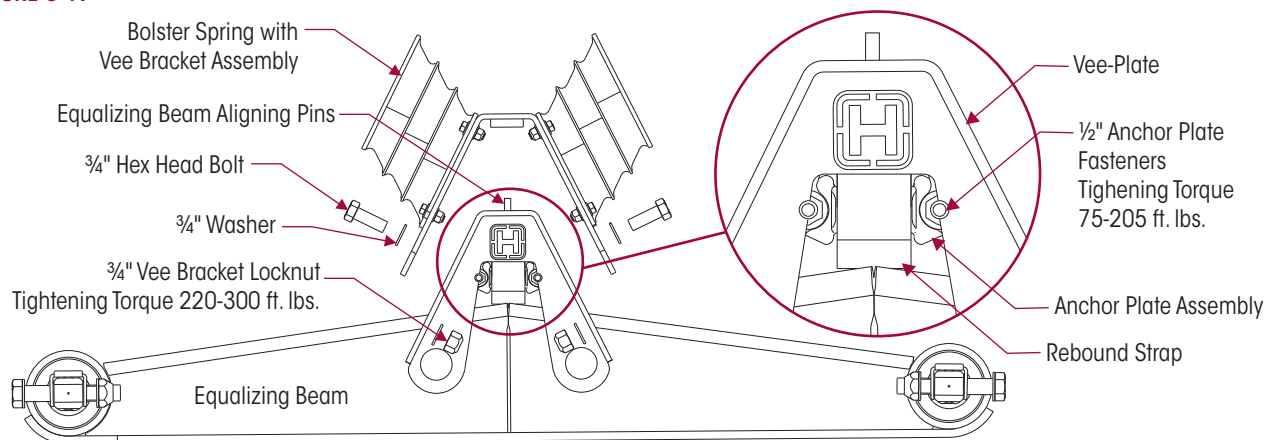
Prior to assembly of the rear fasteners, ensure that all the bar pin shims are installed in the same orientation as prior to disassembly.

23. Tighten the bar pin **locknuts** to 450-600 foot pounds torque, or if tightening on the **bolt head**, tighten to 500-650 foot pounds torque.
24. Remove the frame supports and lower the frame until the Vee bracket lightly touches the equalizing beam.
25. Slowly lower the frame while ensuring the alignment pins on the top of the equalizing beam engage the hole in the Vee bracket. Lower the frame until the weight of the vehicle is supported by the suspension.
26. Ensure the Vee bracket is fully seated on the equalizing beam and the alignment pins on the top of the equalizing beam are fully engaged in the Vee bracket holes, see Figure 8-19.
27. Install the fasteners that attach the Vee bracket to the equalizing beam. Tighten the fasteners to 220-300 foot pounds torque.

**SERVICE HINT**

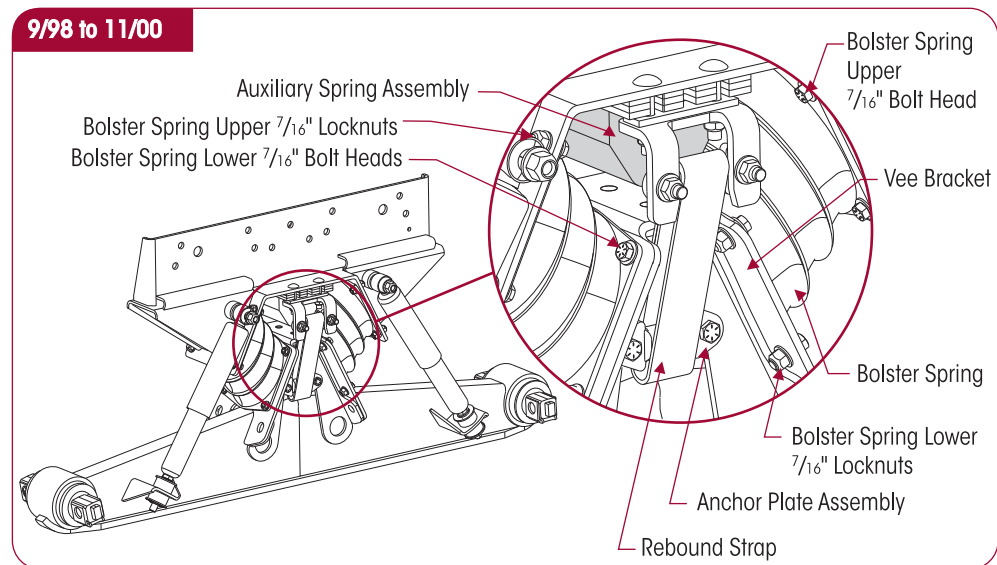
Access to the lower anchor plate assembly fasteners can be gained from the outboard side of the equalizing beam.

**FIGURE 8-19**



28. Install the lower anchor plate assembly through the rebound strap and attach it to the equalizing beam, see Figure 8-20. Tighten the fasteners to 90-105 foot pounds torque.
29. Remove the wheel chocks

**FIGURE 8-20**



## BAR PIN END BUSHING

**NOTE**

Hendrickson bar pin service kits containing alignment shims, (Kit No. 34013-088L) or (Rotating Bar Pin Bushing Kit No. 34013-188) contain all the components required for one equalizing beam end, see Parts List Section of this publication.

**YOU WILL NEED:**

- A shop press with a capacity of at least 100 tons
- Bar pin adapter set tool – Refer to Special Tools Section of this publication for the tools to remove and install the bar pin style rubber end bushings
- Receiving tool – The receiving tool is a shop made tool which completely supports the beam hub being serviced and is tall enough to receive the bushing as it is being pressed in or out, see Special Tools Section of this publication


**WARNING**

WHEN REMOVING AND INSTALLING BUSHINGS IN THE EQUALIZING BEAMS, FOLLOW THE PROCEDURES OUTLINED IN THIS PUBLICATION. DO NOT USE A CUTTING TORCH TO REMOVE THE BUSHING OUTER METALS PRESSED IN THE EQUALIZING BEAM BORES. WELDING, TORCHING OR ATTACHING MATERIAL TO THE EQUALIZING BEAM MUST NEVER BE PERFORMED. THE USE OF HEAT CAN ADVERSELY AFFECT THE STRENGTH OF THE EQUALIZING BEAMS AND CAN CAUSE DAMAGE TO THE EQUALIZING BEAM ASSEMBLY, LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.


**WARNING**

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

**NOTE**

Hendrickson recommends the use of Grade 8 bolts and Grade C locknuts. If flange head bolts and locknuts are not used then hardened structural washers must be used under bolt heads and locknuts.

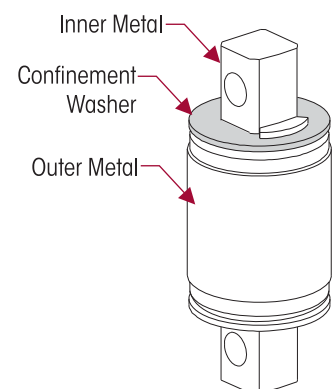
### BAR PIN END BUSHING REMOVAL

**NOTE**

Whenever an equalizing beam is removed for repair, or inspection of the equalizing beam end connection reveals movement, measure the distance between the axle bracket legs for correct width. Refer to Axle Bracket in Preventive Maintenance Section of this publication for measurement location and dimensions. An axle bracket outside of the measurement range must be repaired or replaced. Consult the vehicle manufacturer for inspection, component repair and replacement instructions.

1. Remove equalizing beam assembly from vehicle as detailed in the equalizing beam disassembly instructions in this section.
2. Place the equalizing beam in the shop press with the beam end hub squarely supported on the press bed.
3. If possible, mark the bar pin angle on the equalizing beam using a paint pen or marker. This will ease installation.
4. Press on the end bushing inner metal, see Figure 8-21, of the end bushing until the inner metal is flush with the top of the equalizing beam end hub. This will dislodge the confinement washer and move the bushing rubber away from the outer metal of the bushing so the push out tool can be installed, see Special Tools Section of this publication.

**FIGURE 8-21**  
**BAR PIN END BUSHING**



5. Center the bushing push out tool directly on the bushing's outer metal and press the bushing out of the equalizing beam end hub.
6. After removing the bar pin end bushings, thoroughly inspect each end hub bore.

### INSPECTION

After removing the bar pin end bushings, thoroughly inspect the beam bores. If the equalizing beam is damaged from end bushing removal, replacement of the equalizing beam is required, replace with a new equalizing beam. **DO NOT** re-bush or otherwise use an equalizing beam that has been damaged.

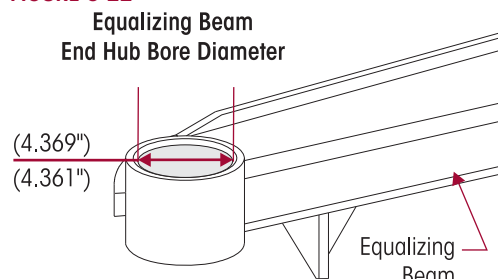
### WARNING

FAILURE TO REPLACE AN EQUALIZING BEAM THAT HAS BEEN DAMAGED FROM BUSHING REMOVAL CAN RESULT IN THE FAILURE OF THAT BEAM, LEADING TO LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

When installing bar pin end bushings the following steps will minimize the chance of damaging a new bushing:

1. Clean the end hub bores with emery cloth or hone, removing any nicks or metal buildup from bushing removal.
2. Measure the equalizing beam end hub bore inner diameter and the bushing outer diameter. The Hendrickson specification for the equalizing beam end hub bore diameter of equalizing beam is 4.369" / 4.361", see Figure 8-22. If components are **NOT** within the specified range, replacement is required.
3. The end hub bore may have a more substantial leading chamfer at one end of the bore than the other. Take advantage of the larger chamfer by pressing in the new bushing from this end.

**FIGURE 8-22**



### NOTE

Always use the bushing's outer metal for pressing operations, unless otherwise instructed. Pressing on the bushings inner metal may damage the bushing requiring bushing replacement.

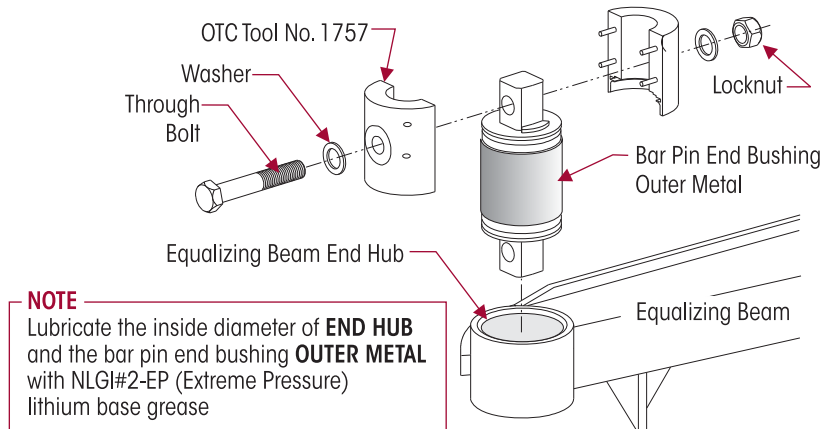
### BAR PIN END BUSHING INSTALLATION

1. Place the equalizing beam in a shop press with the end hub (see Figure 8-23) squarely supported on the press bed or receiving tool, see Special Tools Section of this publication.
2. Install OTC 1757 end bushing installation tool (refer to Special Tools Section of this publication) on the new end bushing as shown in Figure 8-23.
3. Tighten the through bolt until the two halves of the tool close.

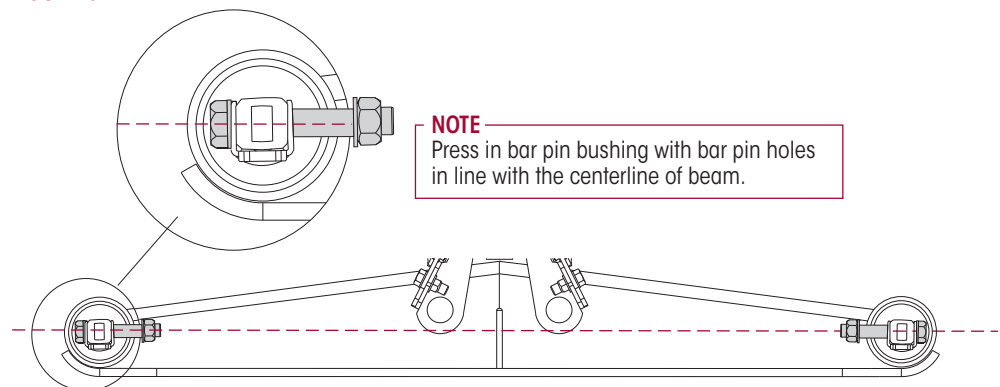
### NOTE

The installation tool compresses the rubber between the inner and outer metal of the bushing to allow press force to be transmitted only to the outer metal of the bushing.

4. Lubricate the equalizing beam end hub inside diameter **AND** the bar pin end bushing's outer metal with a heavy layer of NLGI #2 – EP (Extreme Pressure) lithium base grease, see Figure 8-23.

**FIGURE 8-23**


- Position the equalizing beam end bushing and installation tool on the end hub. Verify the new bushing lines up with the alignment marks made earlier or if no marks were made, make sure the bolt holes in the end bushing are in line with the beam axis, see Figure 8-24.

**FIGURE 8-24**

**NOTE**

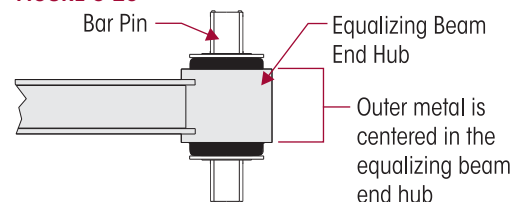
The end bushing must be square with the equalizing beam end hub before pressing the end bushing into the equalizing beam. End bushings pressed in at an angle will damage the end bushing and the equalizing beam.

- Verify the end bushing's outer metal is square with the end hub. Equalizing beam and end bushing damage will result if the bushings are pressed in at an angle.

**CAUTION**

CARE MUST BE TAKEN DURING THE INSTALLATION OF THE BUSHING. DO NOT PUSH ON THE INNER METAL OF THE BUSHING, DOING SO WILL CAUSE DAMAGE TO THE BUSHING AND VOID WARRANTY.

- Install the end bushing into the end hub by pressing on the installation tool until the installation tool contacts the end hub. This will center the bushing in the end hub, see Figure 8-25.
- Install the equalizing beam assembly into vehicle as detailed in Equalizing Beam Assembly in this Section.

**FIGURE 8-25**


## LONGITUDINAL TORQUE ROD

### DISASSEMBLY

**NOTE** Prior to disassembly of the longitudinal torque rod, note the quantity and orientation of the longitudinal torque rod shims. It is required that the longitudinal torque rod shims are installed in the same orientation and location as removed to preserve the existing alignment.

1. Chock the front wheels of the vehicle.
2. Support the pinion on the axle being serviced.

**SERVICE HINT** To remove all the load from the longitudinal torque rod, raise or lower the pinion as needed. This will ease the removal of the longitudinal torque rod.

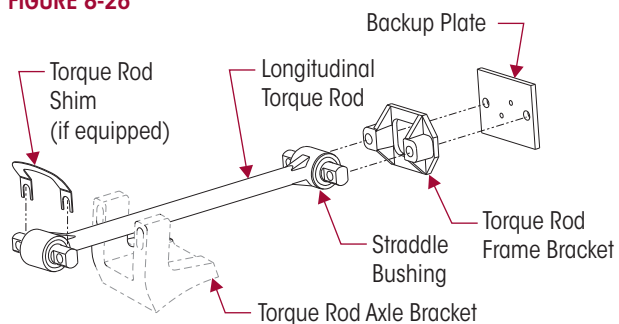
3. Remove and discard the fasteners that connect the longitudinal torque rod to the cross member and torque rod axle brackets.
4. Remove longitudinal torque rod, see Figure 8-26.

### ASSEMBLY

**NOTE** Hendrickson recommends the use of grade 8 bolts and grade C locknuts. If flange head bolts and locknuts are not used then hardened structural washers must be used under bolt heads and locknuts.

1. Install longitudinal torque rod by attaching the fasteners to the cross member and torque rod axle brackets, see manufacturer's specifications for tightening torque requirements.
2. Verify proper pinion angle, and correct with drop in shims between the torque rod bar pin and the cross member or torque rod axle bracket depending on the direction of adjustment needed. Contact the vehicle manufacturer for proper pinion angle specifications.

FIGURE 8-26

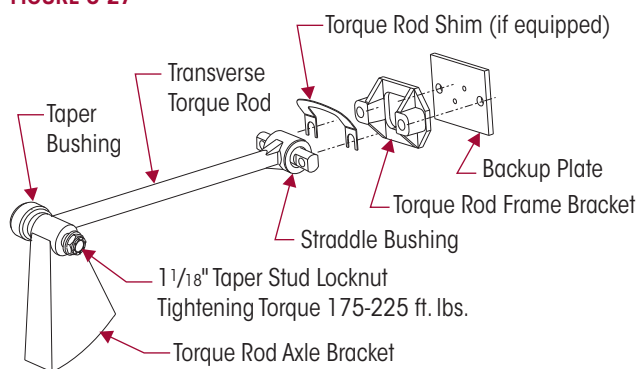


## TRANSVERSE TORQUE ROD



HN SUSPENSIONS INCORPORATE TRANSVERSE RODS FOR VEHICLE STABILITY. IF THESE COMPONENTS ARE DISCONNECTED OR ARE NON-FUNCTIONAL, THE VEHICLE SHOULD NOT BE OPERATED. FAILURE TO DO SO CAN RESULT IN ADVERSE VEHICLE HANDLING, LOSS OF VEHICLE CONTROL, POSSIBLE TIRE CONTACT WITH THE FRAME, PREMATURE COMPONENT DAMAGE, OR SEVERE PERSONAL INJURY.

FIGURE 8-27



### DISASSEMBLY

1. Chock the front wheels of the vehicle.
2. Remove the fasteners that connect the transverse torque rod to the frame bracket, and the 1 1/4" nylon locknut and washer from the tapered stud and torque rod axle bracket.
3. Remove the transverse torque rod, see Figure 8-27.

## ASSEMBLY

**NOTE**

Hendrickson recommends the use of grade 8 bolts and grade C locknuts. If flange head bolts and locknuts are not used then hardened structural washers must be used under bolt heads and locknuts.

1. Install the transverse torque rod to the frame bracket and the torque rod axle bracket. See manufacturer specifications for torque requirements of the frame fasteners. Tighten the 1 ¼" nylon locknut to 175–225 foot pounds torque.
2. Verify the vehicle's lateral axle alignment is correct (centered  $\pm$  ¼"). Correct as needed with drop in shims between the torque rod bar pin and the frame bracket, see Figure 8-27.
3. Remove the wheel chocks.

## TORQUE ROD BUSHING

### ■ TAPERED AND STRADDLE MOUNT

#### You will need

- A vertical press with a capacity of at least 10 tons, a receiving tool, and a push out tool, see the Special Tools Section of this publication for more information.
1. Remove torque rods as detailed in Torque Rod Disassembly instructions in this section.


**WARNING**

DO NOT USE HEAT OR USE A CUTTING TORCH TO REMOVE THE BUSHINGS FROM THE TORQUE ROD. THE USE OF HEAT WILL ADVERSELY AFFECT THE STRENGTH OF THE TORQUE ROD, HEAT CAN CHANGE THE MATERIAL PROPERTIES. A COMPONENT DAMAGED IN THIS MANNER CAN RESULT IN THE LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

#### BUSHING REMOVAL

1. Support the torque rod end tube centered on the receiving tool. Be sure the torque rod is squarely supported on the press bed for safety.
2. Push directly on the straddle mount bar pin, see Figure 8-28, until the top of the pin is level with the top of torque rod end tube. Place the push out tool directly on top of the bar pin and press until the bushing clears the torque rod end tube.
3. Remove the fasteners from the tapered bar pin bushing, and support the torque rod end on the receiving tool with the tapered stud pointing up and the end tube centered on the tool. Be sure the torque rod is squarely supported on the press bed for safety.
4. Push directly on the tapered stud until the bushing clears the torque rod end tube.

**FIGURE 8-28**

Taper Pin and Straddle Bushing



#### BUSHING INSTALLATION

1. Clean and inspect the inner diameter of the torque rod end tubes.

**NOTE**

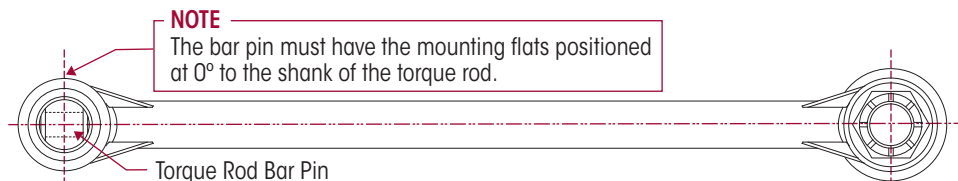
**DO NOT** use a paraffinic oil, or soap base lubricant. Such lubricants can cause adverse reactions with the bushing, such as deterioration of the rubber, causing premature failure.

**FIGURE 8-29**




2. Lubricate the inner diameter of the torque rod end hub and the new rubber bushing with P-80 Lubricant (refer to Parts List Section of this publication) or light Naphthenic Base Oil, such as 60 SUS at 100°F, see Figure 8-29.
3. Support the torque rod end tube centered on the receiving tool. Be sure the torque rod is squarely supported on the press bed for safety. The straddle mount bar pin bushings must have the mounting flats positioned at zero degrees to the shank of the torque rod, see Figure 8-30.

FIGURE 8-30



4. Push directly on the straddle mount bar pin, or the tapered stud. The bushing must be centered within the end tubes of the torque rod.
  - When pushing in the new bushings, overshoot the desired final position by approximately  $\frac{3}{16}$ ", see Figure 8-31.
  - Push the bushing again from the opposite side to center the bar pin, or tapered stud within the end tube, see Figure 8-32.

FIGURE 8-31

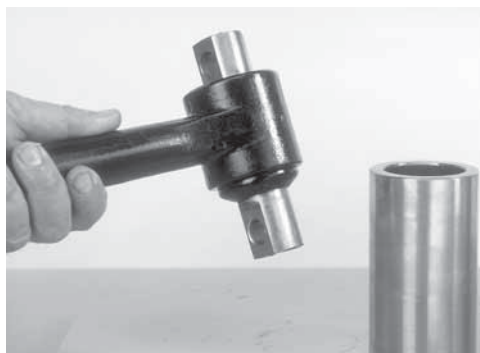
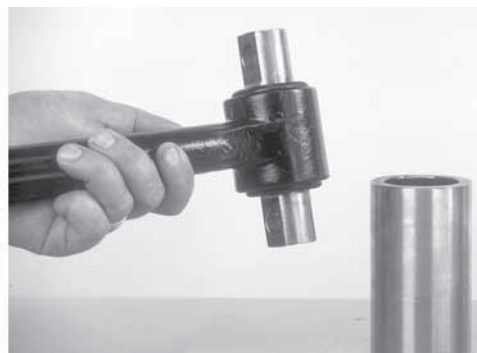


FIGURE 8-32


**CAUTION**

IF THE TORQUE ROD ASSEMBLY IS NOT ALLOWED THE ALLOTTED TIME FOR THE LUBRICANT TO DISSIPATE, THE BUSHING MAY SLIDE FROM THE TORQUE ROD END TUBE CAUSING THE BUSHING TO BE REMOVED AND A NEW BUSHING RE-INSTALLED.

5. Wipe off the excess lubricant. Allow the lubricant four hours to dissipate prior to operating the vehicle.
6. Replace torque rod assembly as detailed in the Transverse Torque Rod Assembly in this section.



## SECTION 9

# Troubleshooting Guide

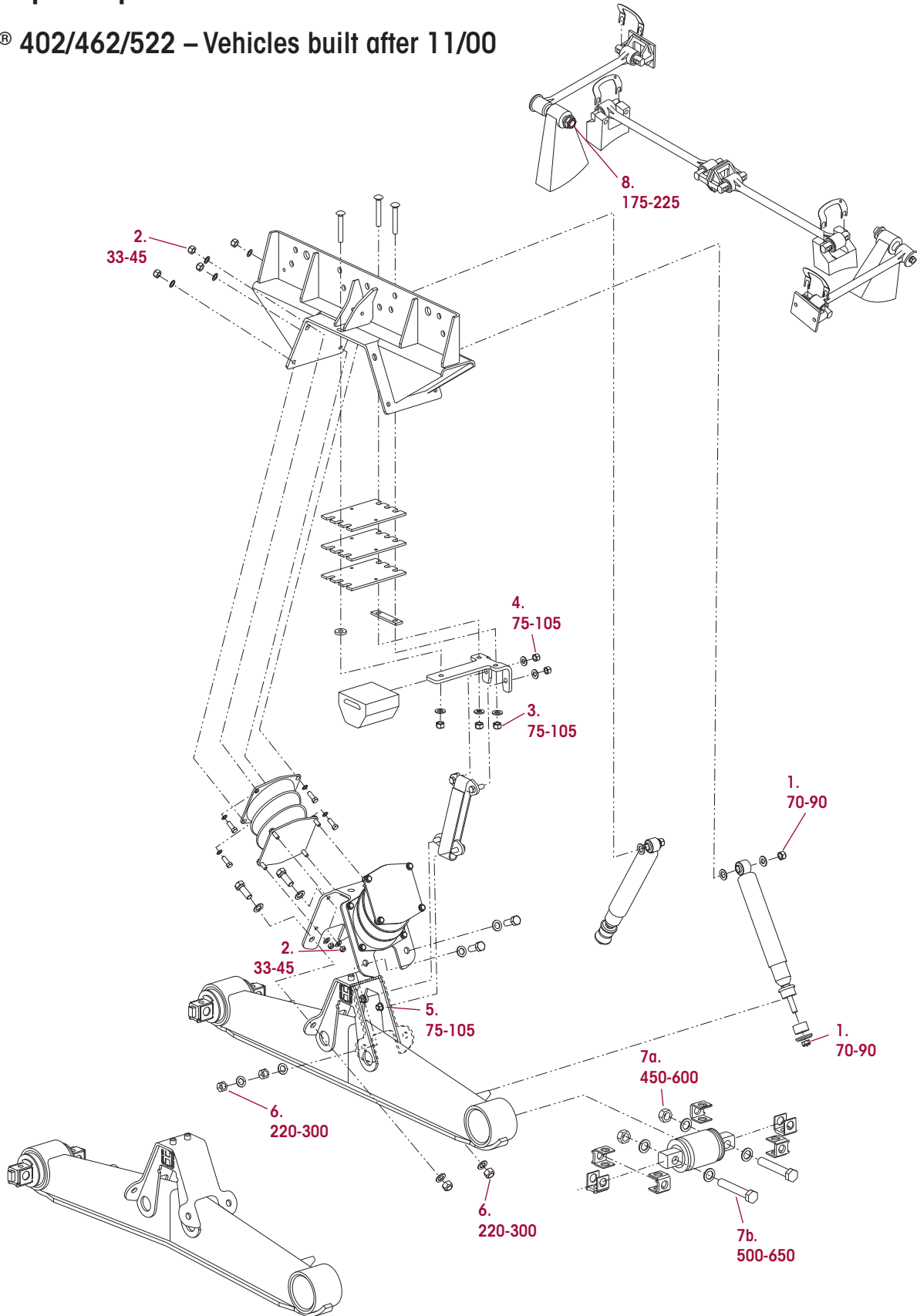
### HN SERIES

#### TROUBLESHOOTING GUIDE

| CONDITION                          | POSSIBLE CAUSE                        | CORRECTION   |
|------------------------------------|---------------------------------------|--|
| Vehicle bouncing excessively       | No shock absorber installed           | Install shock absorbers. See Component Replacement Section of this publication.  |
|                                    | Leaking shock absorber                | Replace shock absorber.  |
|                                    | Damaged shock absorber                | Replace shock absorber.  |
| Suspension has harsh or bumpy ride | Incorrect auxiliary spring adjustment | Adjust auxiliary spring to proper setting. See Auxiliary Spring Adjustment in the Alignment & Adjustments Section of this publication. |
|                                    | Damaged auxiliary spring              | Replace auxiliary spring.  |
|                                    | Damaged bolster spring assembly       | Replace bolster spring assembly.   |
| Vehicle leans                      | Incorrect auxiliary spring adjustment | Adjust auxiliary spring to proper setting. See Auxiliary Spring Adjustment in the Alignment & Adjustments Section of this publication. |
|                                    | Damaged auxiliary spring(s) assembly  | Replace auxiliary spring(s) assembly.  |
|                                    | Damaged bolster spring(s) assembly    | Replace bolster spring(s) assembly.  |
| Irregular tire wear                | Incorrect axle alignment              | Align axles. Refer to vehicle manufacturer's specifications.   |
| Bolster springs rubbing beam       | Incorrect lateral axle alignment      | Align axles. Refer to vehicle manufacturer's specifications.   |

# SECTION 10 Torque Specifications

HN® 402/462/522 – Vehicles built after 11/00



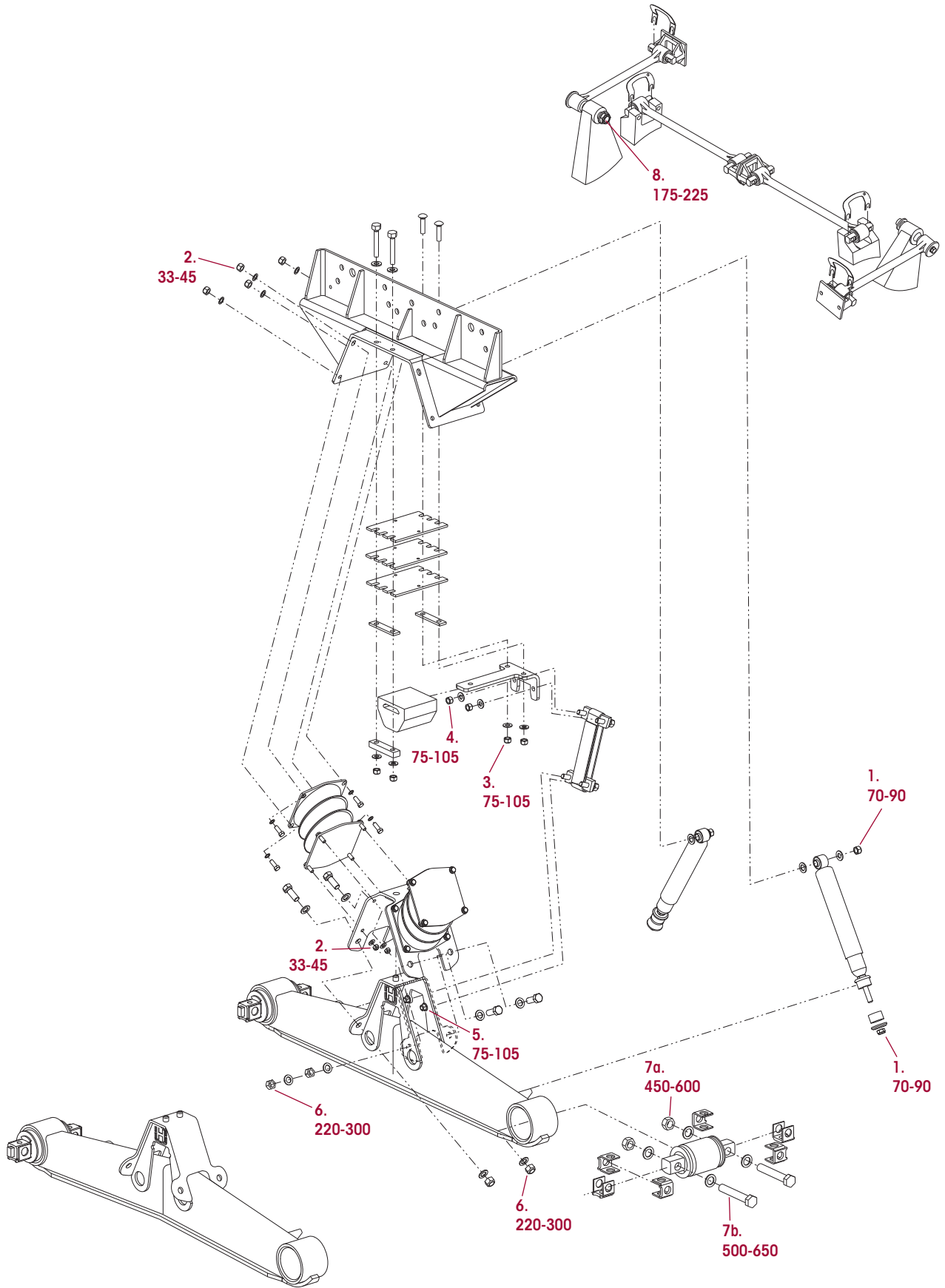


## HN® 402/462/522 – Vehicles built after 11/00

## HENDRICKSON RECOMMENDED TORQUE SPECIFICATIONS

| NO.   | COMPONENT  | QUANTITY         | SIZE                     | *TORQUE VALUE<br>in foot pounds |         |
|---|--|------------------|--------------------------|---------------------------------|---------|
|   | Frame fasteners are furnished and installed by the vehicle manufacturer. |                  |                          |                                 |         |
| 1   | Shock Absorber Upper and Lower Locknut                                   | 4                | 5/8"-18 UNF-2B Grade C   | 70-90                           |         |
| 2   | Bolster Spring Locknut   | 32               | 7/16"-20 UNF-2B Grade C  | 33-45                           |         |
| 3   | Saddle Assembly to Auxiliary Spring Mounting Plate                       | 6                | 1/2"-13 UNC-2B Grade C   | 75-105                          |         |
| 4   | Auxiliary Spring Mounting Plate to Anchor Plate                          | 4                | 1/2"-13 UNC-2B Grade C   | 75-105                          |         |
| 5   | Anchor Plate to Equalizing Beam Assembly                                 | 4                | 1/2"-13 UNC-2B Grade C   | 75-105                          |         |
| 6   | Vee Bracket Locknut  | 8                | 3/4"-10 UNC-2B Grade C   | 220-300                         |         |
| 7a  | Bar Pin Bushing  | at the Locknut   | 4                        | 1"-8 UNC Grade C                | 450-600 |
| 7b  |  | at the Bolt Head | 4                        | 1"-8 UNC-2A Grade 8             | 500-650 |
| 8   | Transverse Torque Rod Tapered Stud Locknut                               | 2                | 1 1/4"-12 UNC-2B Grade 5 | 175-225                         |         |
| <p><b>NOTE:</b> * If non Hendrickson fasteners are used, follow torque specification listed in vehicle manufacturer's service manual. Torque values listed above apply only if Hendrickson supplied fasteners are used.</p> |  |                  |                          |                                 |         |

HN® 402/462/522 – Vehicles built between 9/98-11/00

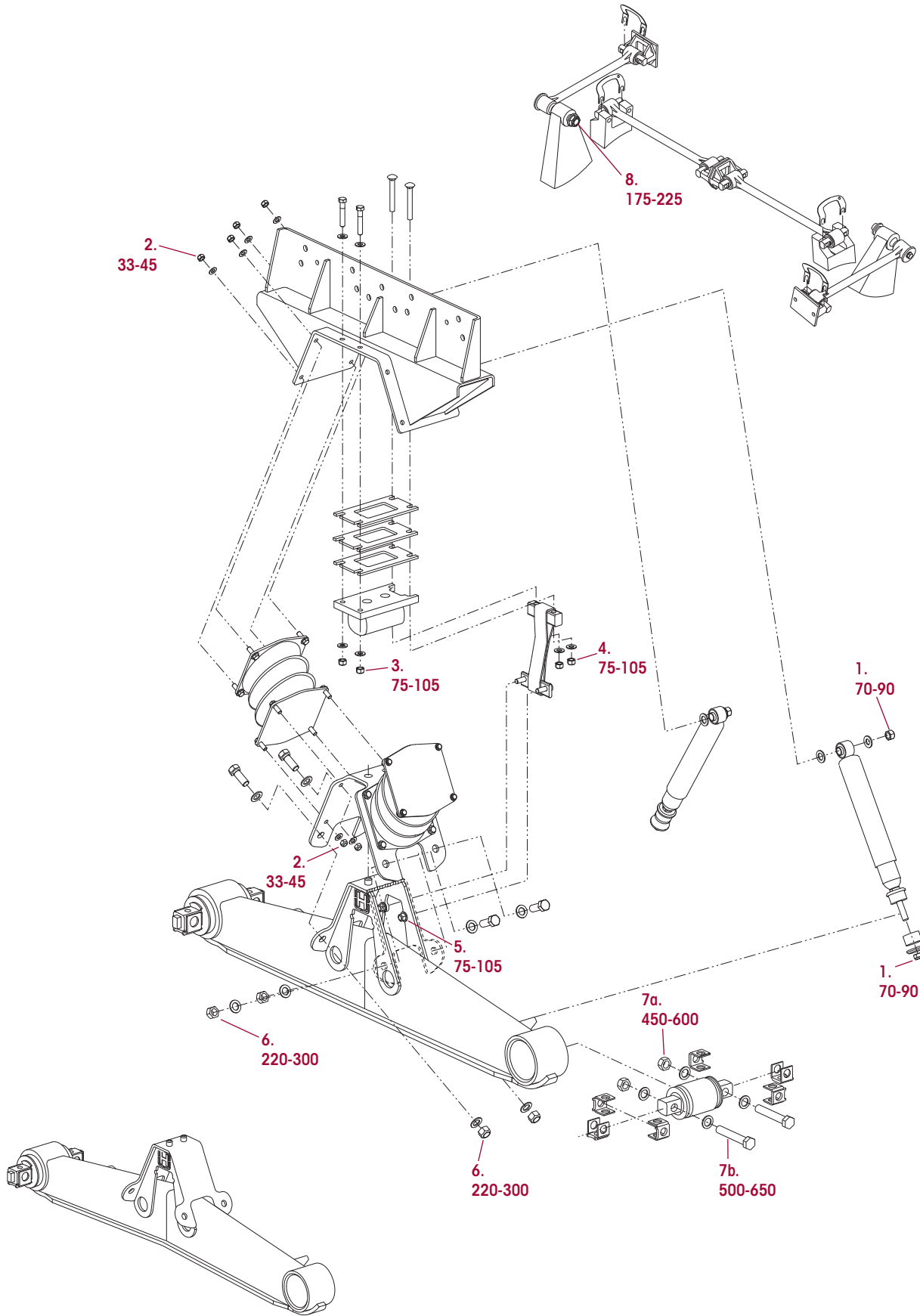




## HN® 402/462/522 – Vehicles built between 9/98-11/00

| HENDRICKSON RECOMMENDED TORQUE SPECIFICATIONS                            |   |                  |                          |                                 |         |
|--|---|------------------|--------------------------|---------------------------------|---------|
| NO.  | COMPONENT   | QUANTITY         | SIZE                     | *TORQUE VALUE<br>in foot pounds |         |
| Frame fasteners are furnished and installed by the vehicle manufacturer. |   |                  |                          |                                 |         |
| 1  | Shock Absorber Upper and Lower Locknut  | 4                | 5/8"-18 UNF-2B Grade C   | 70-90                           |         |
| 2  | Bolster Spring Locknut  | 32               | 7/16"-20 UNF-2B Grade C  | 33-45                           |         |
| 3  | Saddle Assembly to Auxiliary Spring Mounting Plate  | 4                | 1/2"-13 UNC-2B Grade C   | 75-105                          |         |
| 4  | Auxiliary Spring Mounting Plate to Anchor Plate   | 4                | 1/2"-13 UNC-2B Grade C   | 75-105                          |         |
| 5  | Anchor Plate to Equalizing Beam Assembly  | 4                | 1/2"-13 UNC-2B Grade C   | 75-105                          |         |
| 6  | Vee Bracket Locknut   | 8                | 3/4"-10 UNC-2B Grade C   | 220-300                         |         |
| 7a   | Bar Pin Bushing   | at the Locknut   | 4                        | 1"-8 UNC Grade C                | 450-600 |
| 7b   |   | at the Bolt Head | 4                        | 1"-8 UNC-2A Grade 8             | 500-650 |
| 8  | Transverse Torque Rod Tapered Stud Locknut  | 2                | 1 1/4"-12 UNC-2B Grade 5 | 175-225                         |         |
| <b>NOTE:</b>   | * If non Hendrickson fasteners are used, follow torque specification listed in vehicle manufacturer's service manual. Torque values listed above apply only if Hendrickson supplied fasteners are used. |                  |                          |                                 |         |

HN® 402/462/522 – Vehicles built between 4/96-8/98





## HN® 402/462/522 – Vehicles built between 4/96-8/98

| HENDRICKSON RECOMMENDED TORQUE SPECIFICATIONS                            |   |                  |                          |                                 |         |
|--|---|------------------|--------------------------|---------------------------------|---------|
| NO.  | COMPONENT   | QUANTITY         | SIZE                     | *TORQUE VALUE<br>in foot pounds |         |
| Frame fasteners are furnished and installed by the vehicle manufacturer. |   |                  |                          |                                 |         |
| 1  | Shock Absorber Upper and Lower Locknut  | 4                | 5/8"-18 UNF-2B Grade C   | 70-90                           |         |
| 2  | Bolster Spring Locknut  | 32               | 7/16"-20 UNF-2B Grade C  | 33-45                           |         |
| 3  | Saddle Assembly to Auxiliary Spring   | 2                | 1/2"-13 UNC-2B Grade C   | 75-105                          |         |
| 4  | Auxiliary Spring to Rebound Strap Mounting Plate  | 2                | 1/2"-13 UNC-2B Grade C   | 75-105                          |         |
| 5  | Anchor Plate to Equalizing Beam   | 2                | 1/2"-13 UNC-2B Grade C   | 75-105                          |         |
| 6  | Vee Bracket to Equalizing Beam Locknut  | 8                | 3/4"-10 UNC-2B Grade C   | 220-300                         |         |
| 7a   | Bar Pin End Bushing   | at the Locknut   | 4                        | 1"-8 UNC Grade C                | 450-600 |
| 7b   |   | at the Bolt Head | 4                        | 1"-8 UNC-2A Grade 8             | 500-650 |
| 8  | Transverse Torque Rod Taper Stud Locknut  | 2                | 1 1/4"-12 UNC-2B Grade 5 | 175-225                         |         |
| <b>NOTE:</b>   | * If non Hendrickson fasteners are used, follow torque specification listed in vehicle manufacturer's service manual. Torque values listed above apply only if Hendrickson supplied fasteners are used. |                  |                          |                                 |         |



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