

# **H** TECHNICAL PROCEDURE

## HTS™ 210 for Spartan Chassis, Inc. Designed for Type C School Bus Application

**SUBJECT:** Service Instructions

**LIT NO:** 17730-278

**DATE:** January 2012

**REVISION:** A

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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 HTS™ 210 suspension system as installed on applicable Spartan Bus Vehicles.

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**NOTE**

Use only Genuine Hendrickson parts for servicing this suspension system.

It is important to read and understand the entire Technical Procedure publication prior to performing any maintenance, service, repair, or rebuild of this product. The information in this publication contains parts lists, safety information, product specifications, features, proper maintenance, service, repair and rebuild instructions for the HTS 210 Suspension for Spartan Chassis, Inc., designed for Type C School Bus Application.

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

Hendrickson’s HTS 210 suspension for Spartan Chassis, Inc., designed for Type C School Bus Application, is a mechanical suspension designed to achieve maximum durability with limited maintenance requirements. The system utilizes advanced spring technology to achieve extended service life with excellent ride characteristics.

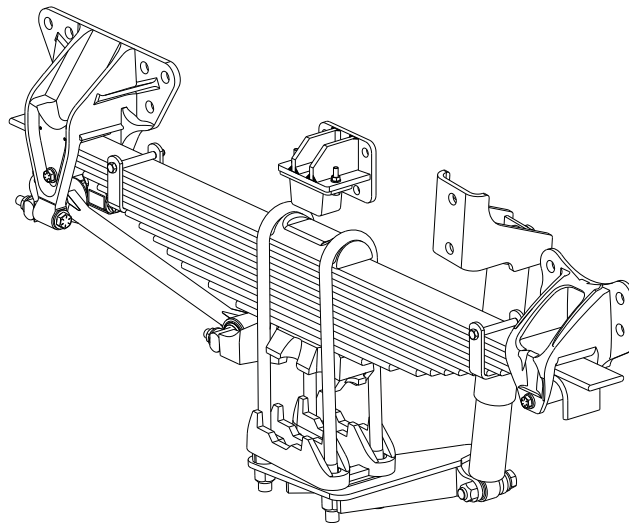
HTS for Spartan Chassis, Inc., designed for Type C School Bus Application, is available in 21,000 pound capacity, designated as HTS 210. These suspension configurations are intended primarily for over-the highway applications where the axle load does not exceed 21,000 pounds.

The HTS 210 suspension is approved for the school bus applications. Any other applications require approval from Hendrickson Engineering.

The HTS 210 suspension for Spartan Chassis, Inc., designed for Type C School Bus Application, is intended for installation on vehicles with overall frame widths of 33.94" to 34.19". The design features include:

- Springs designed by Hendrickson using advanced spring technology to achieve extended service life with excellent ride characteristics.
- Premium rubber bushings used for the longitudinal torque rods.
- Drop-in shims used for ease of alignment.
- Shock absorbers — HTS 210 utilizes shock absorbers that have been tested and tuned specifically for the HTS suspension system.

**FIGURE 2-1**



### HTS 210 FOR SPARTAN CHASSIS, INC. SPECIFICATIONS

	<b>HTS 210</b>
Installed Weight*	679 lbs.
Suspension Rating	21,000 lbs.
GVW Approval	33,000 lbs.
GCW Approval	33,000 lbs.
Lift Axles	Not Approved
Ride Heights	8.5"

\* Installed weight includes the complete suspension, frame brackets, and shock absorbers



## SECTION 3

# Important Safety Notice

Proper maintenance, service, and repair is important for 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.

All safety related information should be read carefully to help prevent personal injury and to assure that proper methods are used. Improper servicing 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 in all such materials provided by the vehicle manufacturer before conducting any maintenance, service or repair.

## ■ EXPLANATION OF SIGNAL WORDS

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



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

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



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, COULD RESULT IN DEATH OR SERIOUS INJURY.



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



### WARNING

#### 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 ATTACHING FASTENERS. THE USE OF HEAT ON SUSPENSION COMPONENTS WILL ADVERSELY AFFECT THE STRENGTH OF THESE PARTS. A COMPONENT DAMAGED IN THIS MANNER CAN RESULT IN THE LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

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



### CAUTION

#### PROCEDURES AND TOOLS

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

 **WARNING****SPRING LEAF ASSEMBLY**

A SPRING ASSEMBLY THAT HAS A MISSING, CRACKED OR DAMAGED LEAF OR SPRING CLIP, WILL REQUIRE COMPLETE SPRING ASSEMBLY REPLACEMENT AND A THOROUGH INSPECTION OF THE ENTIRE SUSPENSION MUST BE PERFORMED. IF ANY COMPONENT APPEARS DAMAGED, REPLACEMENT IS REQUIRED. FAILURE TO REPLACE ANY DAMAGED COMPONENTS CAN CAUSE LOSS OF VEHICLE CONTROL, POSSIBLE PERSONAL INJURY, DEATH, OR PROPERTY DAMAGE AND WILL VOID ANY APPLICABLE WARRANTIES.

 **WARNING****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.

 **WARNING****SUPPORT THE VEHICLE PRIOR TO SERVICING**

PLACE THE VEHICLE ON A LEVEL FLOOR AND CHOCK THE WHEELS TO HELP PREVENT THE VEHICLE FROM MOVING. NEVER WORK UNDER A RAISED VEHICLE SUPPORTED BY ONLY A FLOOR JACK. ALWAYS SUPPORT A RAISED VEHICLE WITH SAFETY STANDS. BLOCK THE WHEELS AND MAKE SURE THE UNIT WILL NOT ROLL BEFORE RELEASING BRAKES. A JACK CAN SLIP OR FALL OVER. SERIOUS PERSONAL INJURY CAN RESULT.

 **CAUTION**

FAILURE TO INSTALL THE HTS LONGITUDINAL TORQUE ROD SHIMS IN THE SAME ORIENTATION AND LOCATION WILL REQUIRE A VEHICLE ALIGNMENT. IMPROPER VEHICLE ALIGNMENT CAN INCREASE TIRE WEAR.

 **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.

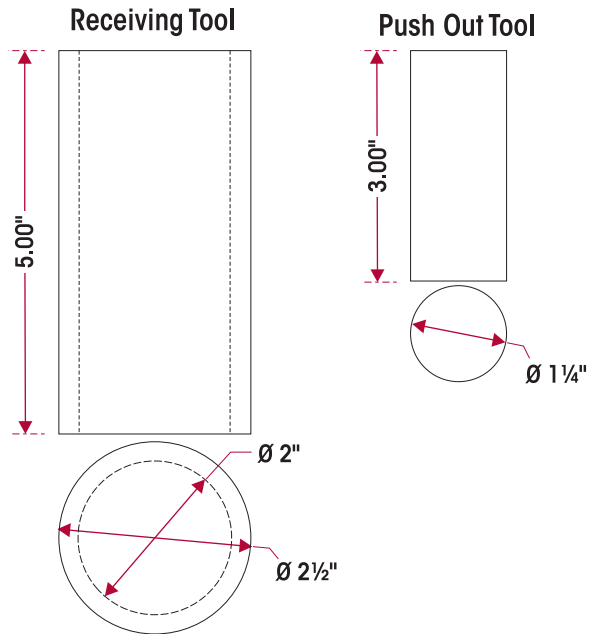


## SECTION 4 Special Tools

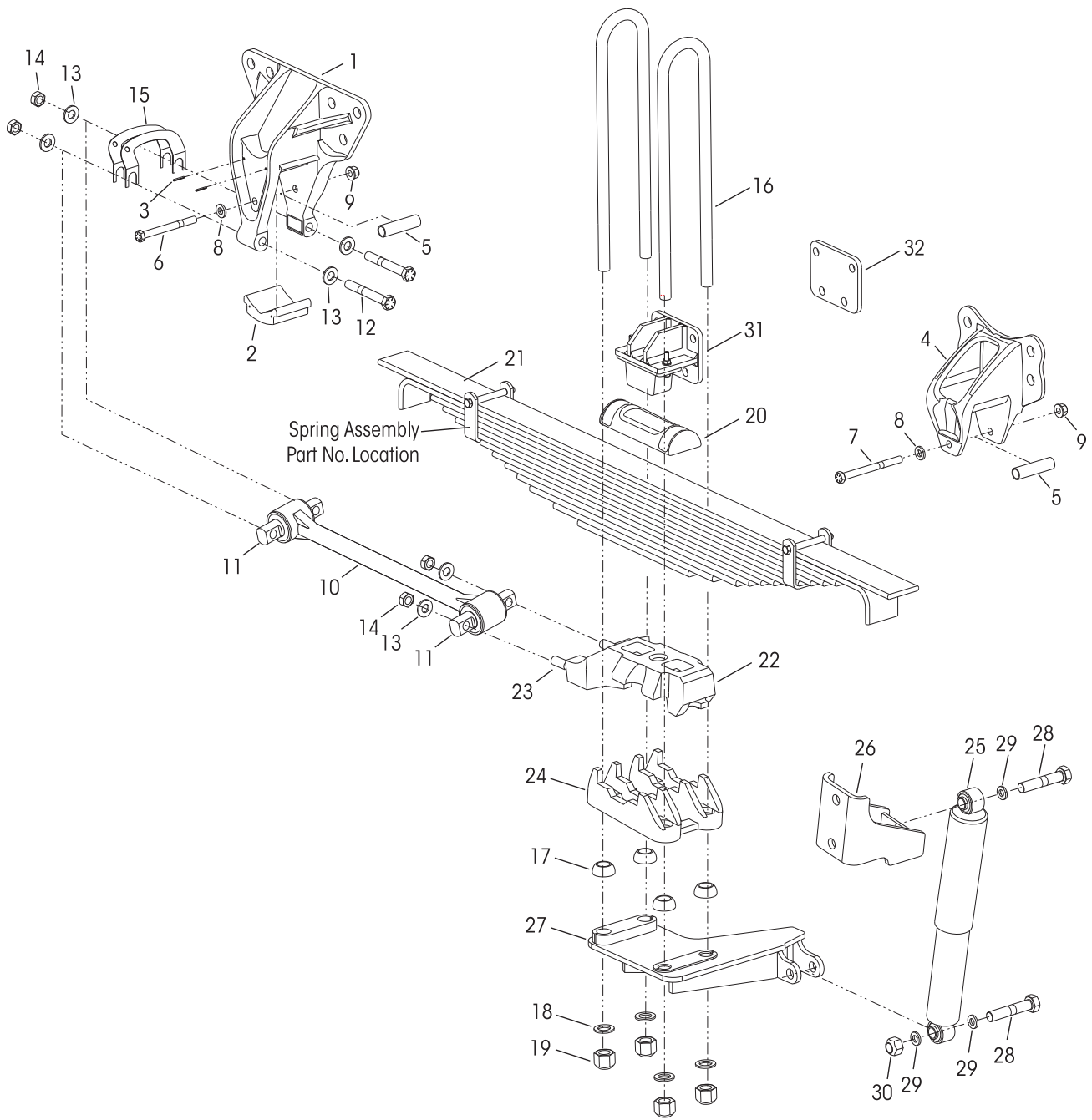
These shop made tools are designed for servicing bushings. Bushing tools are made from cold rolled steel or equivalent. Drawing is for reference only, Hendrickson does not supply this tool.

### TORQUE ROD BUSHING TOOLS

#### Torque Rod Bushing Tools



# SECTION 5 Parts Lists







# HTS™ 210 for Spartan Chassis, Inc. – Designed for Type C School Bus Application

KEY NO.	PART NO.	DESCRIPTION	NO.REQ.	KEY NO.	PART NO.	DESCRIPTION	NO.REQ.
1	58425-001	Front Spring Hanger Assembly, Includes Key Nos. 2-3	2	18	22962-002	7/8" Flat Washer	8
2	56929-000	Slipper Pad	2	19	50765-000	7/8"-14 UNF-2B Nut	8
3	58287-001	Retainer Lock Pin	4	20	48797-000	Top Pad	2
4	50028-001	Rear Spring Hanger	2	21		Spring Assembly	2
5	58631-000	Rebound Roller	4		53191-000	HTS 190	
6	24531-015	1/2"-11 UNC-2B X 5.5" Hex Bolt	2		53192-000	HTS 210	
7	24531-014	1/2"-11 UNC-2B X 5.0" Hex Bolt	2	22	50970-002	Spring Seat Assembly, Includes Key Nos. 13-14, 23	2
8	22962-014	1/2" Flat Washer	4	23	50918-000	5/8"-11 UNC Stud	4
9	60819-000	1/2"-11 UNC-2B Flange Nut	4	24	50216-000	Axle Bottom Cap	2
10	62044-495	Longitudinal Torque Rod Assembly, Includes Key No. 11	2	25	60665-025	Shock Absorber	2
11	47691-000L	Torque Rod Bushing	4	26	67530-000	Upper Shock Bracket	2
12	32043-005	5/8"-11 UNC X 4.5" Hex Bolt	4	27		Lower Shock Bracket	
13	22962-004	5/8" Flat Washer	12		67556-003	Left Hand	1
14	47764-000	5/8"-11 UNC Locknut	8		67556-004	Right Hand	1
15	49689-000	Torque Rod Shim	As Req.	28	50764-004	3/4"-10 UNC X 3.75" Hex Bolt	4
	48718-149	<b>U-bolt Fastener Service Kit, Axle Set,</b> Includes Key Nos. 16-19		29	22962-001	3/4" Washer	6
16	47417-010	7/8"-14 UNF- 2A U-Bolt 19.0"	4	30	49842-000	3/4"-10 UNC Nut	2
17	48574-000	7/8" Spherical Washer	8	31	69883-000	Bump Stop Assembly	2
				32	69887-001	Backing Plate	2



## SECTION 6

# Preventive Maintenance

Following the appropriate inspection procedures is important to help ensure the proper maintenance and operation of the HTS™ 210 for Spartan Bus rear suspension system and component parts function to their highest efficiency. Hendrickson recommends the HTS rear suspension be inspected at vehicle pre-delivery, the first 1,000 miles, and at the regular preventive maintenance intervals, every 50,000 miles or twelve (12) months, whichever comes first, with the exception of the clamp group fasteners, see U-bolt Locknuts in this Section.

### NOTE

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

### SAFETY REMINDER

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

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



### WARNING

OVERLOADED SUSPENSIONS CAN CAUSE COMPONENT FAILURE, LOSS OF VEHICLE CONTROL, SEVERE PERSONAL INJURY OR PROPERTY DAMAGE.

- DO NOT EXCEED SUSPENSION CAPACITY RATINGS.

## INSPECTION AND PREVENTIVE MAINTENANCE INTERVALS

### PRE-DELIVERY INSPECTION

1. Visually inspect the suspension for proper assembly.
2. Check all fasteners for proper torque, see Torque Specifications Section of this publication, with special attention to the clamp group (U-bolts) connection, see U-bolt Locknuts in this section.
3. Verify the alignment of the drive axle is within the vehicle manufacturer's tolerances, see Alignment & Adjustments Section of this publication. Contact the vehicle manufacturer for the correct alignment tolerances and instructions.

### INSPECTION AT THE FIRST 1,000 MILES

1. Visually inspect suspension components. Check for all of the following and replace components as necessary:
  - Proper suspension function
  - Any signs of unusual movement, loose or missing components
  - Any signs of abrasive or adverse contact with other components
  - Any damaged, bent or cracked parts
2. Check all fasteners for proper torque, see Torque Specifications Section of this publication, with special attention to the clamp group (U-bolts) connection, see U-bolt Locknuts in this section.



## PREVENTIVE MAINTENANCE

1. **Clamp group fasteners (U-bolts)** – Check fasteners for proper torque at regular intervals as experience dictates, but **not to exceed 20,000 miles intervals**.

### SERVICE HINT

Maintaining correct U-bolt torque is important to help ensure proper suspension component performance after the first 1,000 mile inspection or U-bolt service. A fleet may determine its own torque inspection interval by inspecting U-bolt torque on a more frequent basis (for example at 5,000 miles, or 10,000 miles). If during the torque inspection U-bolt torque is found below torque specifications, correct the U-bolt torque and decrease the interval of the torque inspections. If U-bolt torque is found within torque specifications, inspection intervals may be increased. **DO NOT exceed 20,000 miles between U-bolt torque inspection intervals.**

2. Visually inspect suspension components. Check for all of the following and replace components as necessary:
  - Proper suspension function
  - Any signs of unusual movement, loose or missing components
  - Any signs of abrasive or adverse contact with other components
  - Any damaged, bent or cracked parts
  - Spring Assembly - Missing, cracked, or damaged spring leaf(s)
3. Check all fasteners for proper torque, see Torque Specifications Section of this publication, with special attention to the clamp group (U-bolts) connection, see U-bolt Locknuts in this section.
4. Verify the alignment of the drive axle is within the vehicle manufacturer's tolerances, see Alignment & Adjustments Section of this publication. Contact the vehicle manufacturer for the correct alignment tolerances and instructions.

## COMPONENT INSPECTION

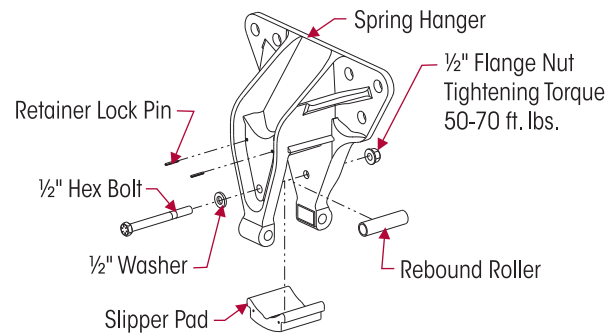
- **Clamp group** — Visually inspect for any loose or damaged fasteners. Verify the U-bolt locknuts have the proper torque values maintained, see the U-bolt Locknuts in this section.
- **Fasteners** — Visually inspect for any loose or damaged fasteners on the entire suspension. Make sure all fasteners are tightened to a torque value within the specified torque range. See Torque Specification Section in this publication for recommended torque requirements. Use a calibrated torque wrench to check torque in a tightening direction. As soon as the fastener starts to move, record the torque and correct the torque if necessary.
- **Frame hanger** — Visually inspect for any signs of loose fasteners, movement, damage or excessive wear on the inside of frame hanger legs. Verify the frame attaching fasteners have the proper torque values maintained. See the vehicle manufacturer for proper torque specifications.
- **Longitudinal torque rods** — All torque rods must be inspected for looseness, torn or shredded rubber, bushing walk-out, and for proper fastener torque. 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.
- **Spring assembly** — Visually inspect for any signs for cracked or broken leaves. Replace if cracked, damaged or more than 50% of the first leaf is worn. See Component Replacement Section of this publication for replacement procedure.
- **Tire wear** — Visually inspect the tires for wear patterns that may indicate suspension damage or misalignment.
- **Wear and damage** — Visually inspect all parts of the suspension for wear and damage. Look for bent or cracked parts.

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

## FRONT FRAME HANGER SLIPPER PADS

FIGURE 6-1

The operation of the HTS suspension will result in some wear between the spring assembly and the frame hanger slipper pads, see Figure 6-1. In normal use the slipper pads will function satisfactorily even though they may show some wear. If the slipper pads require replacement, follow instructions in the Component Replacement Section of this publication.



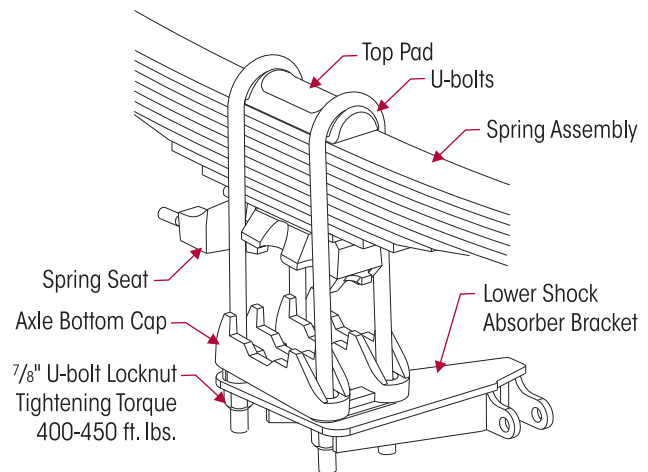
## U-BOLT CONNECTION

### NOTE

Hendrickson recommends the use of phosphate and oil coated Grade 8 bolts, hardened washers and Grade C locknuts for the U-bolt connection. All threads should be lubricated with SAE 20 oil before assembly to obtain the correct relationship of torque and fastener tension.

Maintaining correct U-bolt torque is important to help ensure proper suspension component performance.

FIGURE 6-2



1. Inspect U-bolts for proper seating of components, i.e. no gaps, etc., see Figure 6-2.
2. U-bolt locknuts must be torqued as specified in the Torque Specification Section of this publication. **DO NOT** exceed specified torque on U-bolt locknuts. U-bolt locknuts **MUST** be torqued:
  - at pre-delivery and at any U-bolt service
  - next 1,000 miles
  - thereafter, follow the inspection and re-torque intervals, every 20,000 miles



### WARNING

IT IS IMPORTANT THAT THE U-BOLT CONNECTION BE PROPERLY ALIGNED AND HAVE THE PROPER TORQUE VALUES MAINTAINED. METAL SURFACES CAN WORK AND WEAR THE SPRING SEATS, AXLE BOTTOM CAPS AND POSSIBLY OTHER COMPONENTS RELATED IN THE TOTAL ASSEMBLY. PROPERLY TIGHTENED U-BOLT LOCKNUTS WILL ELIMINATE COSTLY REPAIR, DOWNTIME AND POSSIBLE SEPARATION OF COMPONENTS AND LOSS OF VEHICLE CONTROL, PROPERTY DAMAGE OR PERSONAL INJURY.

### EXAMPLE

A fleet may determine its own torque inspection interval by inspecting U-bolt torque on a more frequent basis (for example at 5,000 miles, or 10,000 miles). If during the torque inspection U-bolt torque is found below torque specifications, correct the U-bolt torque and decrease the interval of the torque inspections. If U-bolt torque is found within torque specifications, inspection intervals may be increased. **DO NOT exceed 20,000 miles between U-bolt torque inspection intervals.**




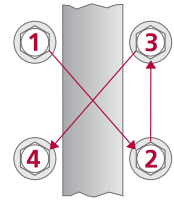
3. Tighten the U-bolt locknuts evenly in 50 foot pounds increments to  400-450 foot pounds torque in the proper pattern to achieve uniform bolt tension, see Figure 6-3.

FIGURE 6-3



## SPRING ASSEMBLY



### WARNING

A SPRING ASSEMBLY THAT HAS A MISSING, CRACKED OR DAMAGED LEAF OR SPRING CLIP, WILL REQUIRE COMPLETE SPRING ASSEMBLY REPLACEMENT AND A THOROUGH INSPECTION OF THE ENTIRE SUSPENSION MUST BE PERFORMED. IF ANY COMPONENT APPEARS DAMAGED, REPLACEMENT IS REQUIRED. FAILURE TO REPLACE ANY DAMAGED COMPONENTS CAN CAUSE LOSS OF VEHICLE CONTROL, POSSIBLE PERSONAL INJURY, DEATH, OR PROPERTY DAMAGE AND WILL VOID ANY APPLICABLE WARRANTIES.

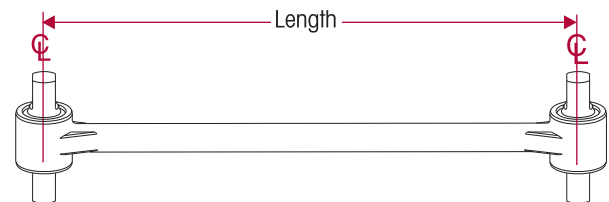
## INSPECTION

1. Inspect the spring assembly for cracked or broken leaves.
2. Inspect mating components (top pad, spring seat, and slipper pad) for signs of looseness or wear.
3. The entire spring assembly requires replacement if any leaf or spring clip is damaged, cracked or missing regardless of mileage.

## LONGITUDINAL TORQUE RODS

All torque rods need to be inspected for looseness. With the vehicle shut down, a lever check can be made with a long pry bar placed under each rod end and pressure applied.

FIGURE 6-4



Visually inspect torque rod bushings for torn or shredded rubber, inspect for bent, cracked, or broken torque rods, and for end hubs with an elongated "oval" shape. Any of these conditions will require component replacement, see Figure 6-4.

The longitudinal torque rods along with the axle seat maintain the control of acceleration and brake forces.


Torque rod bushings can be replaced by pressing out the worn end, and installing a replacement bushing. See Component Replacement Section of this publication.

## NOTE

Hendrickson recommends the use of Grade 8 bolts and Grade C locknuts for all straddle mount torque rod attachments.

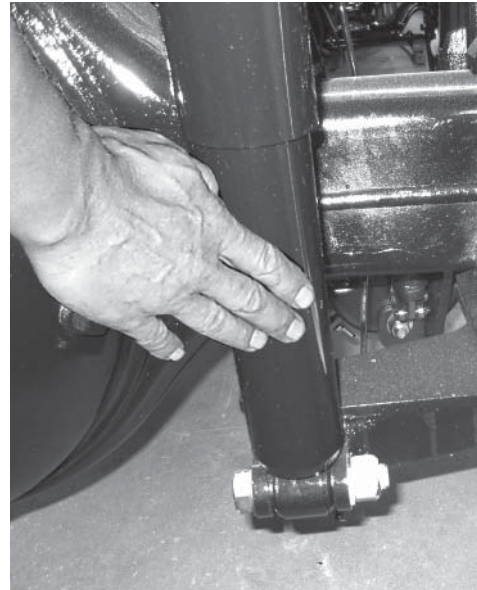


## SHOCK ABSORBER INSPECTION

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

Inspection of the shock absorber can be performed by doing a heat test, and a visual inspection. 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.

FIGURE 6-5



### 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 6-5.
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.

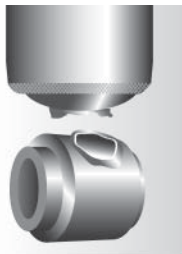


### WARNING

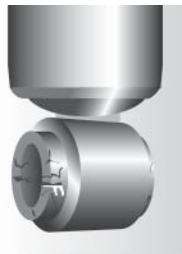
### VISUAL INSPECTION

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

FIGURE 6-6



Damaged upper or lower mount



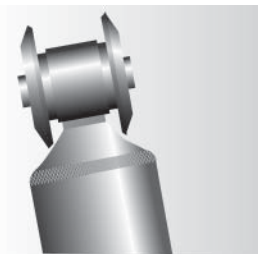
Damaged upper or lower bushing



Damaged dust cover and / or shock body



Bent or dented shock



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



### LEAKING VS. MISTING SHOCK VISUAL INSPECTION

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

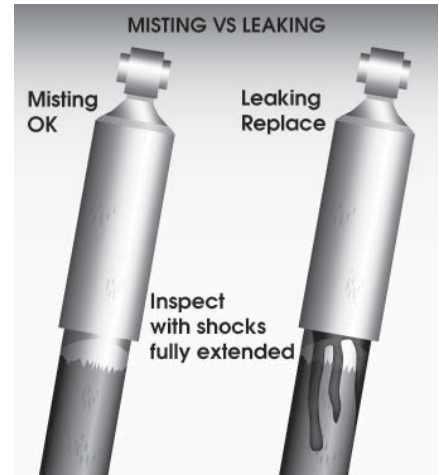
A shock that is truly leaking and needs to be replaced will show signs of fluid leaking in streams from the upper seal. These streams can easily be seen when the shock is fully extended, underneath the main body (dust cover) of the shock. Look for these potential problems when doing a visual inspection.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

#### NOTE

The HTS suspension system 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 new shock absorber as detailed in the Component Replacement Section of this publication.

FIGURE 6-7







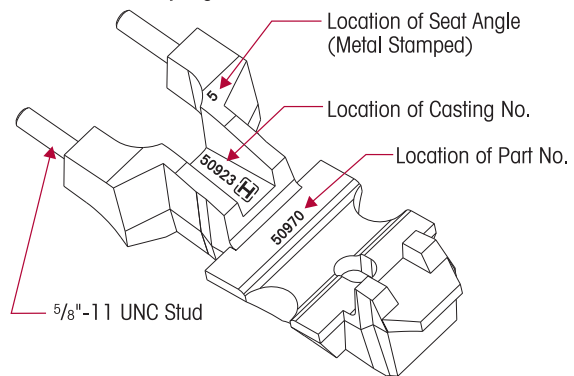
## SECTION 7

## Alignment &amp; Adjustments

## AXLE PINION ANGLE

Pinion angle is set by the spring seat assembly. Pinion angle should be checked in the loaded condition, and is set by the vehicle manufacturer. If new spring seats are required, the seat angle as shown in Figure 7-1 must be specified when ordering, see Parts Lists Section of this publication.

**FIGURE 7-1**  
Bottom View of Spring Seat



## DRIVE AXLE ALIGNMENT

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.

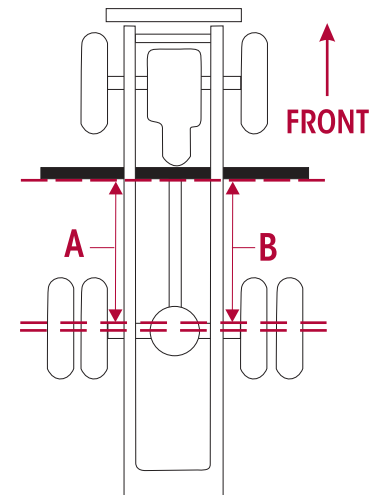
## NOTE

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.

## ALIGNMENT INSPECTION

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 and maintain the air system at full operating pressure.
5. Verify all suspension components are in good condition. Repair or replace any worn or damaged suspension components before proceeding with the alignment process.
6. Ensure all drive axle tires are the same size, and inflated to the proper PSI.
7. Securely clamp a six-foot piece of STRAIGHT bar stock or angle iron across the lower frame flange as shown in Figure 7-2. Select a location for the bar stock or angle iron as far forward of the drive axle as possible where components will not interfere.
8. Accurately square the bar stock or angle iron to the frame using a carpenter's square.
9. 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 7-2, **A** and **B**.
10. Calculate the difference between measurements **A** and **B**.

**FIGURE 7-2**







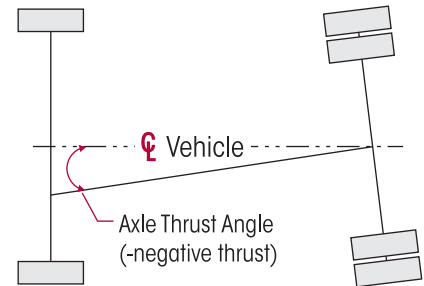
- a. The drive axle is aligned if within vehicle manufacturer's specifications.
- b. If alignment of the drive axle **IS NOT** within the vehicle manufacturer's specifications, then the alignment of this axle **MUST** be corrected. Correct the alignment of this axle by following the alignment instructions in this section.

### ALIGNMENT ADJUSTMENT

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

1. Determine the direction of axle thrust angle. Figure 7-3 illustrates the drive axle with a thrust angle to the left (-negative thrust).
2. To determine where to adjust shim thickness use measurement **A** and **B**, see Figure 7-2.

FIGURE 7-3

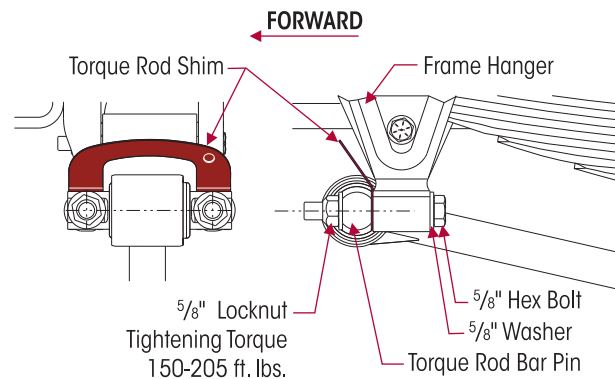


#### NOTE

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.
5. Loosen the longitudinal torque rod fasteners from the frame hanger.
6. Adjust shim thickness to move the axle in the desired direction, see Figure 7-4.

FIGURE 7-4



#### SERVICE HINT

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.

#### EXAMPLE:

The alignment equipment shows the front drive axle to have a 0.40° thrust angle to the left. This will require a 1/4" shim thickness increase to the front side of the left front equalizing beam end bushing. If there is less than 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 1/8" shim thickness increase at the front side of the left front bar pin AND a 1/8" shim thickness increase at the rear side of the right front bar pin will correct the 0.40° thrust angle.

7. Remove the frame supports and re-measure dimension **A** and **B**.
8. If more adjustment is needed, up to 4 shims may be installed at the longitudinal torque rod ends.
9. Once the vehicle is aligned, tighten the longitudinal torque rod fasteners to 150-205 foot pounds torque.
10. Remove wheel chocks.



## 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.

### SPRING SEATS / SPRING SEAT STUD

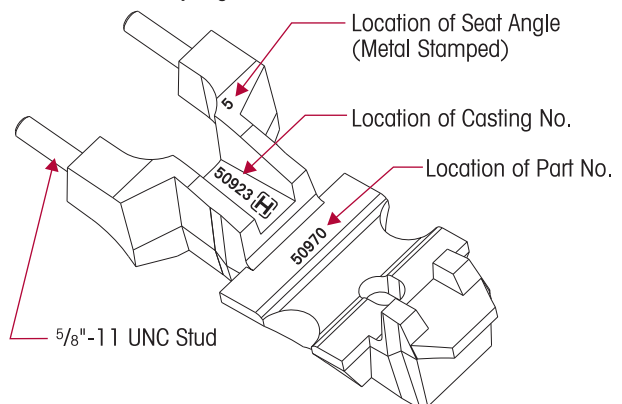
The following instructions apply if the spring seat or mounting bolts for the torque rod attachment require replacement. Figure 8-1 shows a view of the spring seat and the serrated shank studs that are used to connect the torque rod to the spring seat.

#### NOTE

If a new spring seat is required, the seat angle must be specified when ordering, see Figure 8-1.

**FIGURE 8-1**

**Bottom View of Spring Seat**



### ■ SPRING SEAT

#### DISASSEMBLY

1. Chock the wheels.
2. Raise the frame to remove the load from the suspension. Support the frame.
3. Raise and support the axle.
4. Remove the tires.
5. Loosen the rebound bolt flange nut in the front spring hanger.

#### NOTE

It might be necessary to raise or lower the frame in order to remove the torque rod fasteners.

#### SERVICE HINT

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

6. Remove the longitudinal torque rod to frame hanger fasteners and alignment shims.
7. Remove the longitudinal torque rod to spring seat stud fasteners and discard.
8. Remove the longitudinal torque rod.
9. Remove the lower shock absorber fasteners and discard.
10. Remove the U-bolt fasteners and discard.
11. Remove the bottom cap, spherical washers, and lower shock bracket.
12. Remove and discard U-bolts.
13. Lower the axle enough to allow clearance to remove the spring seat.



### INSPECTION

#### WARNING

FAILURE OF THE SPRING ASSEMBLY BETWEEN THE U-BOLTS WILL REQUIRE THE REPLACEMENT OF ALL CLAMP GROUP COMPONENTS. FAILURE TO DO SO CAN RESULT IN PREMATURE SPRING ASSEMBLY OR CLAMP GROUP FAILURE, WHICH MAY RESULT IN LOSS OF VEHICLE CONTROL, PROPERTY DAMAGE AND/OR PERSONAL INJURY.

1. Inspect the spring assembly for cracks, broken or missing leaves, or damage, see Preventive Maintenance Section of this publication. Replace as necessary.
2. Inspect the spring seat and axle bottom cap for excessive wear and cracks. Replace as necessary.
3. Inspect the axle housing for any cracks or wear. Repair or replace as necessary per vehicle manufacturer's specifications.

### ASSEMBLY

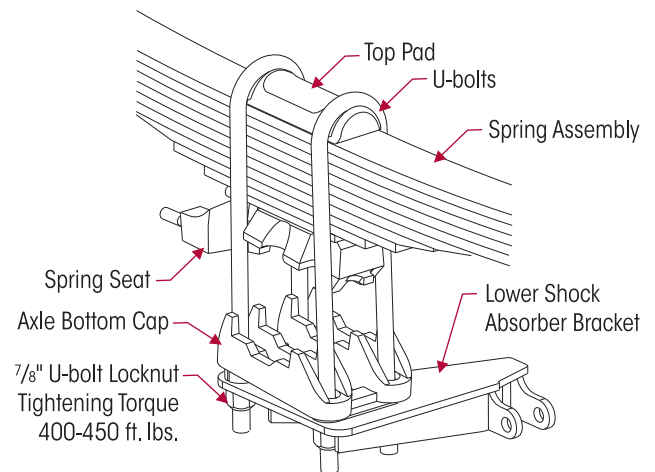
1. Install the spring seat with the studs mounted forward. Ensure the spring seat is engaged on the axle dowel pin.
2. Raise the axle and center the spring assembly through the legs of the front and rear spring hangers with the spring center bolt piloting into the hole in the spring seat.

#### WARNING

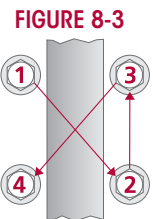
U-BOLTS THAT ARE FOUND TO BE LOOSE WILL REQUIRE THAT THE MATING COMPONENTS BE INSPECTED FOR SIGNS OF WEAR. ANY COMPONENTS WORN MUST BE REPLACED. FAILURE TO DO SO CAN CAUSE PREMATURE CLAMP GROUP FAILURE, COMPONENT DAMAGE, LOSS OF VEHICLE CONTROL, PROPERTY DAMAGE, OR SEVERE PERSONAL INJURY. MAINTAIN CORRECT TORQUE VALUE AT ALL TIMES. CHECK TORQUE VALUES ON A REGULAR BASIS AS SPECIFIED.

FIGURE 8-2

3. Install the U-bolts, top pad, spring seat, axle bottom cap, lower shock absorber bracket, washers, and locknuts as shown in Figure 8-2. **DO NOT** tighten the U-bolt locknuts at this time.
4. Continue to raise the axle so the front and rear spring hangers engage the spring.
  - a. Tighten the U-bolt locknuts evenly in 50 foot pounds increments in the proper pattern, see Figure 8-3, to achieve uniform bolt tension to 400-450 foot pounds.



5. Rap the top of the U-bolts with a dead blow mallet, and retighten to 400-450 foot pounds. **DO NOT** exceed specified torque on U-bolt locknuts.
6. Install the longitudinal torque rod.



#### NOTE

U-bolt locknuts must be retightened to 400-450 foot pounds torque after the first 1,000 miles of service and at regular intervals thereafter as experience dictates, not to exceed 20,000 miles. **DO NOT** exceed specified torque on U-bolt locknuts.



**CAUTION**

FAILURE TO INSTALL THE HTS LONGITUDINAL TORQUE ROD SHIMS IN THE SAME ORIENTATION AND LOCATION WILL REQUIRE A VEHICLE ALIGNMENT. IMPROPER VEHICLE ALIGNMENT CAN INCREASE TIRE WEAR.

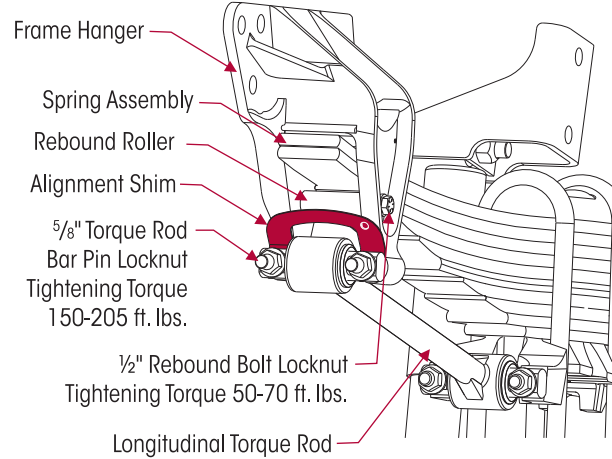
**NOTE**

It is required that the HTS longitudinal torque rod shims be installed in the same orientation and location as removed to preserve the existing alignment.

7. Install the mounting fasteners and any alignment shims that were removed, see Figure 8-4.

**FIGURE 8-4**

8. Tighten the torque rod fasteners to 150-205 foot pounds torque, see Figure 8-4.
9. Install the lower shock absorber into lower shock bracket and tighten the lower shock fasteners to 50-70 foot pounds torque.
10. Tighten rebound roller flange nut to 50-70 foot pounds torque.
11. Install the tires.
12. Remove the frame support.



**NOTE**

Axle alignment is necessary anytime the spring assembly is serviced, which includes removal of the U-bolts.

13. Verify axle alignment, see the Alignment & Adjustments Section of this publication.
14. Remove wheel chocks.

**■ SPRING SEAT STUD**

**NOTE**

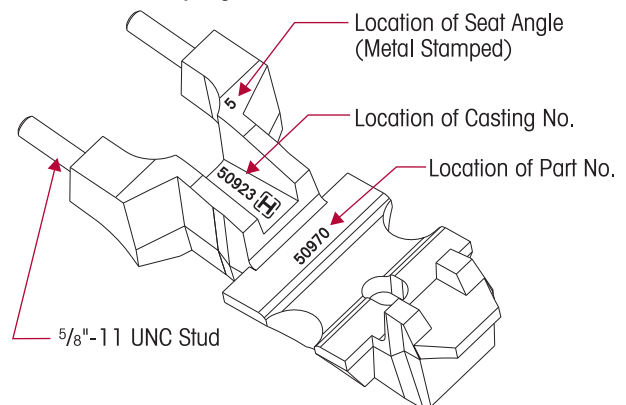
The clamp group does not have to be disassembled while replacing torque rod mounting stud.

**DISASSEMBLY**

1. Chock the front wheels of the vehicle.
2. Support the frame rails.
3. Loosen rebound bolt flange nut in the front spring hanger.

**FIGURE 8-5**

**Bottom View of Spring Seat**



**NOTE**

It might be necessary to raise or lower the frame in order to remove the torque rod fasteners.

**SERVICE HINT**

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

4. Remove the longitudinal torque rod to frame hanger fasteners and alignment shims.
5. Remove the longitudinal torque rod to spring seat stud fasteners and discard.



6. Remove the longitudinal torque rod.
7. Using a stud puller, remove the torque rod mounting stud.

### ASSEMBLY

1. Install the dog-point end (tap end) of the new stud into the spring seat until it bottoms out in the spring seat, see Figure 8-5. Using a stud driver, tighten the stud to 60-70 foot pounds torque.
2. Install the longitudinal torque rod.



### CAUTION

FAILURE TO INSTALL THE HTS LONGITUDINAL TORQUE ROD SHIMS IN THE SAME ORIENTATION AND LOCATION WILL REQUIRE A VEHICLE ALIGNMENT. IMPROPER VEHICLE ALIGNMENT CAN INCREASE TIRE WEAR.

### NOTE

It is required that the HTS longitudinal torque rod shims be installed in the same orientation and location as removed to preserve the existing alignment.

3. Install the mounting fasteners and any alignment shims that were removed, see Figure 8-4.
4. Tighten the torque rod fasteners to 150-205 foot pounds torque, see Figure 8-4.
5. Tighten rebound roller flange nut to 50-70 foot pounds torque.
6. Remove the frame supports and wheel chocks.

### SPRING ASSEMBLY



### WARNING

A SPRING ASSEMBLY THAT HAS A MISSING, CRACKED OR DAMAGED LEAF OR SPRING CLIP, WILL REQUIRE COMPLETE SPRING ASSEMBLY REPLACEMENT AND A THOROUGH INSPECTION OF THE ENTIRE SUSPENSION MUST BE PERFORMED. IF ANY COMPONENT APPEARS DAMAGED, REPLACEMENT IS REQUIRED. FAILURE TO REPLACE ANY DAMAGED COMPONENTS CAN CAUSE LOSS OF VEHICLE CONTROL, POSSIBLE PERSONAL INJURY, DEATH, OR PROPERTY DAMAGE AND WILL VOID ANY APPLICABLE WARRANTIES.

### DISASSEMBLY

1. Chock the wheels.
2. Raise the frame to remove the load from the suspension. Support the frame.
3. Raise and support the axle.
4. Remove the tires.
5. Remove the rebound bolt fasteners, and roller from both front and rear spring hangers.

### NOTE

It might be necessary to raise or lower the frame in order to remove the torque rod fasteners.

### SERVICE HINT

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

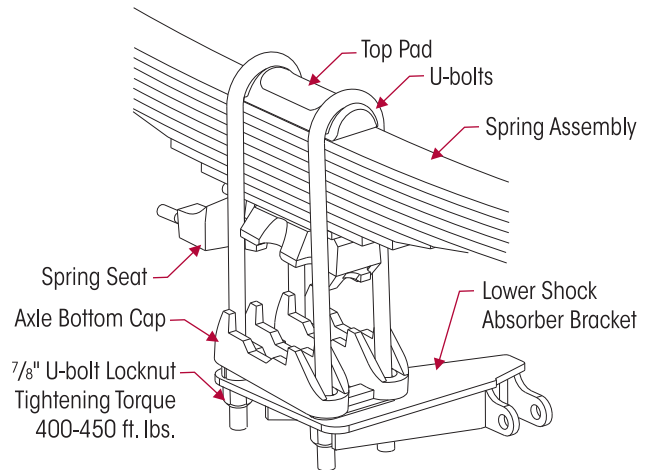
6. Remove the longitudinal torque rod to frame hanger fasteners and alignment shims.
7. Remove the longitudinal torque rod to spring seat stud fasteners and discard.
8. Remove the longitudinal torque rod.
9. Remove the lower shock absorber fasteners and discard.
10. Remove the U-bolt fasteners and discard.
11. Remove the bottom cap, spherical washers, and lower shock bracket.
12. Remove and discard U-bolts.
13. Lower the axle enough to allow clearance to remove the spring.
14. Remove the spring assembly.



**ASSEMBLY**

1. Install new spring assembly on the spring seat.
2. Raise the axle and center the spring through the legs of the spring hangers with the spring center bolt piloting into the hole in the spring seat or spacer, if equipped.

**FIGURE 8-6**



3. Install the U-bolts, top pad, bottom cap, spherical washers, lower shock bracket, washers, and locknuts as shown in Figure 8-6. Snug **DO NOT** tighten the U-bolt locknuts at this time.
4. Continue to raise the axle so the front and rear spring hangers engage the spring.

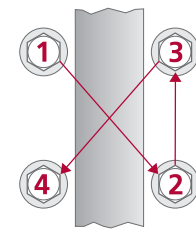
U-BOLTS THAT ARE FOUND TO BE LOOSE REQUIRE THAT MATING COMPONENTS BE INSPECTED FOR SIGNS OF WEAR. ANY COMPONENTS WORN MUST BE REPLACED. FAILURE TO DO SO CAN CAUSE PREMATURE CLAMP GROUP FAILURE, COMPONENT DAMAGE, LOSS OF VEHICLE CONTROL, PROPERTY DAMAGE, OR SEVERE PERSONAL INJURY. MAINTAIN CORRECT TORQUE VALUE AT ALL TIMES. CHECK TORQUE VALUES ON A REGULAR BASIS AS SPECIFIED.



**WARNING**

5. Tighten the U-bolt locknuts evenly in 50 foot pounds increments in the proper pattern, see Figure 8-7, to achieve uniform bolt tension to 400-450 foot pounds.
6. Rap the top of the U-bolts with a dead blow mallet, and retighten to 400-450 foot pounds. **DO NOT** exceed specified torque on U-bolt locknuts.

**FIGURE 8-7**



**NOTE**

U-bolt locknuts must be retightened to 400-450 foot pounds torque after the first 1,000 miles of service and at regular intervals thereafter as experience dictates, not to exceed 20,000 miles. **DO NOT** exceed specified torque on U-bolt locknuts.

7. Install the longitudinal torque rod.



**CAUTION**

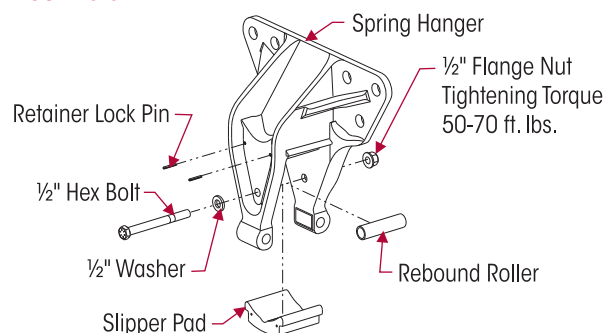
FAILURE TO INSTALL THE HTS LONGITUDINAL TORQUE ROD SHIMS IN THE SAME ORIENTATION AND LOCATION WILL REQUIRE A VEHICLE ALIGNMENT. IMPROPER VEHICLE ALIGNMENT CAN INCREASE TIRE WEAR.

**NOTE**

It is required that the HTS longitudinal torque rod shims be installed in the same orientation and location as removed to preserve the existing alignment.

8. Install the torque rod fasteners and any alignment shims that were removed.
9. Tighten the torque rod fasteners to 150-205 foot pounds torque.

**FIGURE 8-8**





10. Install the lower shock absorber into lower shock bracket and tighten to 50-70 foot pounds torque.
11. Install the rebound bolt, rebound roller, washer and flange nut on the spring hangers shown in Figure 8-8 and tighten to 50-70 foot pounds torque.
12. Install the tires.

**NOTE**

Alignment is necessary anytime the spring assembly is serviced, which includes removal of the U-bolts.

13. Remove the frame supports. Verify the axle alignment, see Alignment & Adjustments Section of this publication.
14. Remove the wheel chocks.

**LONGITUDINAL TORQUE RODS**

Hendrickson offers fixed length torque rods and the drop-in alignment shims for HTS 210.

**DISASSEMBLY**

1. Chock wheels of drive axle.
2. Loosen rebound bolt flange nut in the front spring hanger.

**NOTE**

It might be necessary to raise or lower the frame in order to remove the torque rod fasteners.

**SERVICE HINT**

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

3. Remove the longitudinal torque rod to frame hanger fasteners and alignment shims.
4. Remove the longitudinal torque rod to spring seat stud fasteners and discard.
5. Remove the longitudinal torque rod.
6. Inspect the mounting surfaces for any wear or damage, replace if necessary.
7. To replace bushings, refer to Torque Rod Bushing in this section.

**ASSEMBLY**

1. Position the new or re-bushed torque rod on the spring seat and install fasteners. Hand tighten locknuts. **DO NOT** tighten at this time.
2. Position the longitudinal torque rod on the forward face of the spring hanger legs.

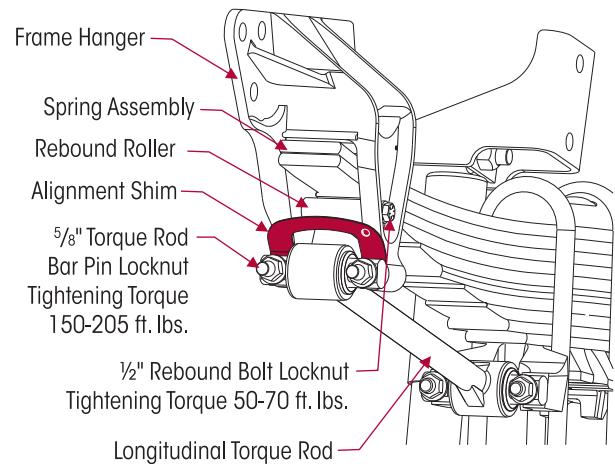
**CAUTION**

FAILURE TO INSTALL THE HTS LONGITUDINAL TORQUE ROD SHIMS IN THE SAME ORIENTATION AND LOCATION WILL REQUIRE A VEHICLE ALIGNMENT. IMPROPER VEHICLE ALIGNMENT CAN INCREASE TIRE WEAR.

**NOTE**

It is required that the HTS longitudinal torque rod shims be installed in the same orientation and location as removed to preserve the existing alignment.

**FIGURE 8-9**







3. Install torque rod to frame hanger fasteners, and any alignment shims that were removed.
4. Tighten torque rod locknuts to 150-205 foot pounds torque as shown in Figure 8-9.
5. Tighten the rebound bolt flange nuts to 50-70 foot pounds torque as shown in Figure 8-9.
6. Verify the axle alignment, see Alignment & Adjustments Section of this publication.
7. Remove the wheel chocks.

## TORQUE ROD BUSHING

### 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 longitudinal torque rods as detailed in Longitudinal Torque Rod Disassembly instructions in this section.

### CAUTION

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, POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE AND VOID WARRANTY.

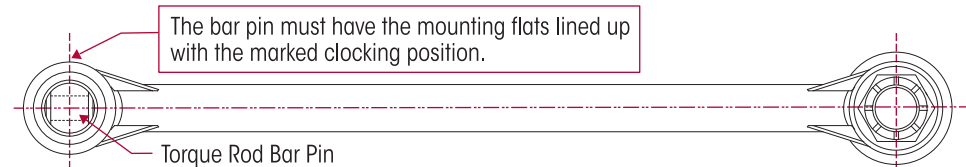
## BUSHING REMOVAL

### CAUTION

BE SURE THE TORQUE ROD IS SQUARELY SUPPORTED ON THE PRESS BED FOR SAFETY.

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 until the top of the pin is level with the top of torque rod end hub. Place the push out tool directly on top of the bar pin and press until the bushing clears the torque rod end hub.
3. Using a marker, mark the clocking position of the bushing assembly's bar pin flats with a paint stick on the torque rod end hub prior to disassembly, see Figure 8-10.

**FIGURE 8-10**



## BUSHING INSTALLATION

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

**FIGURE 8-11**



### 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. Use **ONLY** a light **Naphthenic base oil**, such as 60 SUS at 100°F.

2. Lubricate the inner diameter of the torque rod end tubes and the new rubber bushings with a light Naphthenic base oil, such as 60 SUS at 100°F, see Figure 8-11.



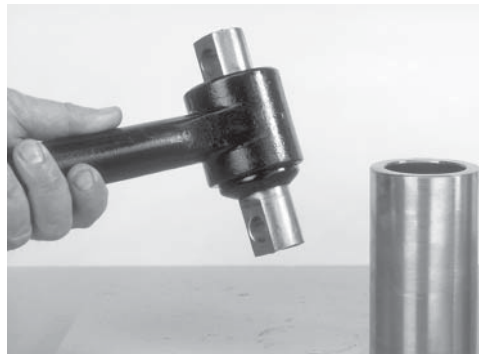


**SERVICE HINT**

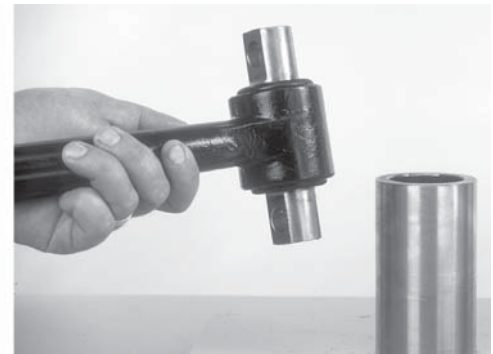
When replacing a straddle mount bar pin type bushing assembly, verify the correct clocking position of the straddle mount bar pin flats prior to installing the bushing assembly in the torque rod hub.

3. Center the new bushing on the torque rod end hub. Align with the marked clocking position, see Figure 8-10.
4. Support the torque rod end hub centered on the receiving tool. Be sure the torque rod is squarely supported on the press bed for safety.
5. 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 8-12.
  - Push the bushing again from the opposite side to center the bar pin within the end tube, see Figure 8-13.

**FIGURE 8-12**



**FIGURE 8-13**



6. Wipe off excess lubricant. Allow the lubricant four (4) hours to dissipate before operating the vehicle.



**CAUTION**

IF THE TORQUE ROD ASSEMBLY IS NOT ALLOWED THE FOUR (4) HOURS FOR THE LUBRICANT TO DISSIPATE BEFORE OPERATING THE VEHICLE, THE BUSHING MAY SLIDE FROM THE TORQUE ROD END TUBE. THE BUSHING WILL THEN NEED TO BE REMOVED AND REQUIRE A NEW BUSHING BE INSTALLED.

7. Install torque rod assembly as detailed in the Longitudinal Torque Rod Assembly in this section.

**FRONT FRAME HANGERS**

**NOTE**

Follow the vehicle manufacturer's specifications for hanger to frame fastener tightening torque values.

**DISASSEMBLY**

1. Chock the wheels.
2. Remove the rebound fastener, spacer and roller from the hanger, see Figure 8-14.

**NOTE**

It might be necessary to raise or lower the frame in order to remove the torque rod fasteners.

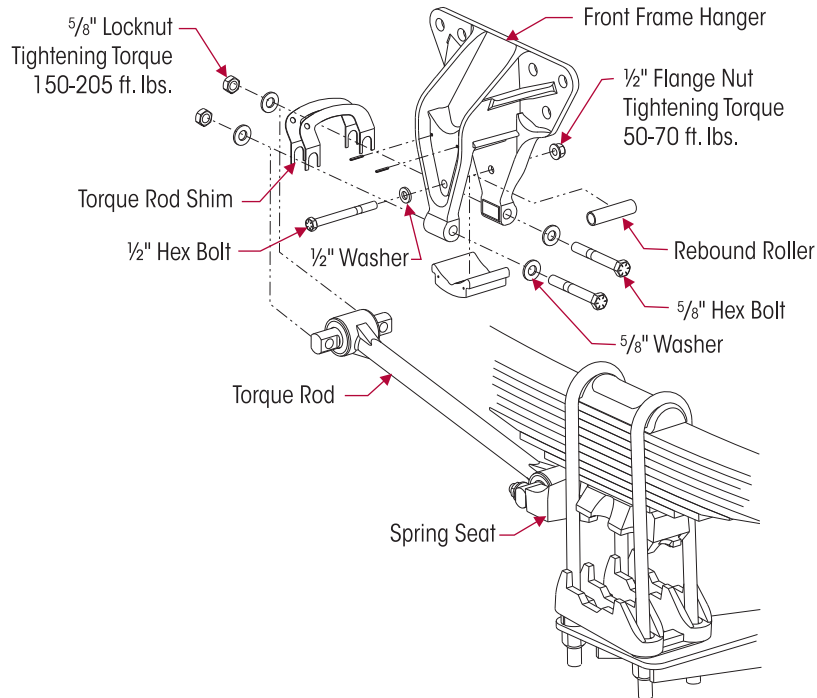
**SERVICE HINT**

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

3. Remove the longitudinal torque rod to frame hanger fasteners and alignment shims.
4. Remove the longitudinal torque rod to spring seat stud fasteners and discard.
5. Remove the longitudinal torque rod.



6. Raise the frame of the vehicle high enough to remove the load from the spring assembly.
7. Remove the front frame hanger to frame fasteners per vehicle manufacturer's specifications.
8. Remove the front frame hanger.

**FIGURE 8-14****ASSEMBLY**

1. Position the front frame hanger over the spring assembly.
2. Install new frame fasteners in the frame hanger and tighten to vehicle manufacturer's specifications.
3. Lower the frame.
4. Install the longitudinal torque rod on the forward face of the spring hanger legs.

**CAUTION**

FAILURE TO INSTALL THE HTS LONGITUDINAL TORQUE ROD SHIMS IN THE SAME ORIENTATION AND LOCATION WILL REQUIRE A VEHICLE ALIGNMENT. IMPROPER VEHICLE ALIGNMENT CAN INCREASE TIRE WEAR.

**NOTE**

It is required that the HTS longitudinal torque rod shims be installed in the same orientation and location as removed to preserve the existing alignment.

5. Install the mounting fasteners and any alignment shims that were removed.
6. Tighten the torque rod fasteners to 150-205 foot pounds torque.
7. Install the rebound roller and fasteners in frame hanger and tighten to 50-70 foot pounds torque, see Figure 8-14.
8. Verify axle alignment, see Alignment & Adjustments Section of this publication.
9. Remove wheel chocks.

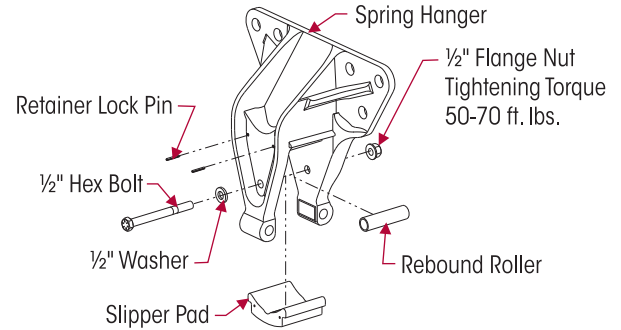


## FRONT FRAME HANGER SLIPPER PAD

### DISASSEMBLY

1. Chock the wheels.
2. Remove the rebound fastener and roller.
3. With a blunt end 1/8" punch drive in current lock pins until it has passed through the hanger.
4. Raise the frame just high enough to access the slipper pad.
5. Remove slipper pad with a screwdriver.

FIGURE 8-15



### ASSEMBLY

1. Insert new slipper pad.
2. Lower the frame to secure the slipper pad in place against the spring assembly.
3. Drive new retainer lock pins in place with punch until flush with front of frame hanger., see Figure 8-15.
4. Install the rebound fastener and roller and tighten to 50-70 foot pounds torque, see Figure 8-15.
5. Remove wheel chocks.

## REAR FRAME HANGERS

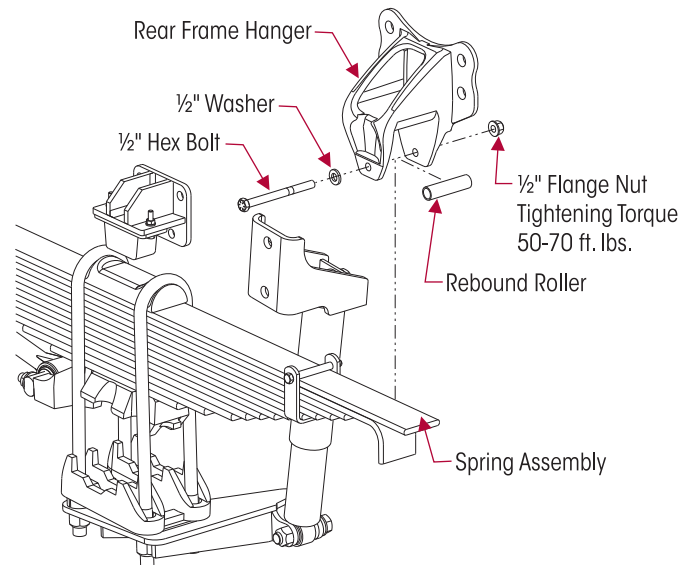
### NOTE

Follow the vehicle manufacturer's specifications for hanger to frame fastener tightening torque values.

FIGURE 8-16


### DISASSEMBLY

1. Chock the wheels.
2. Remove the rebound fasteners and roller from the hanger, see Figure 8-16.
3. Raise the frame of the vehicle high enough to remove the load from the spring assembly.
4. Remove the rear frame hanger to frame fasteners per vehicle manufacturer's specifications.
5. Remove the rear frame hanger.





### ASSEMBLY

1. Position the rear frame hanger over the spring assembly, see Figure 8-16.
2. Install new frame fasteners in the frame hanger and tighten to vehicle manufacturer's specifications.
3. Lower the frame.
4. Install the rebound roller and fasteners in frame hanger and tighten to  50-70 foot pounds torque, see Figure 8-16.
5. Remove wheel chocks.



## SECTION 9 Troubleshooting Guide

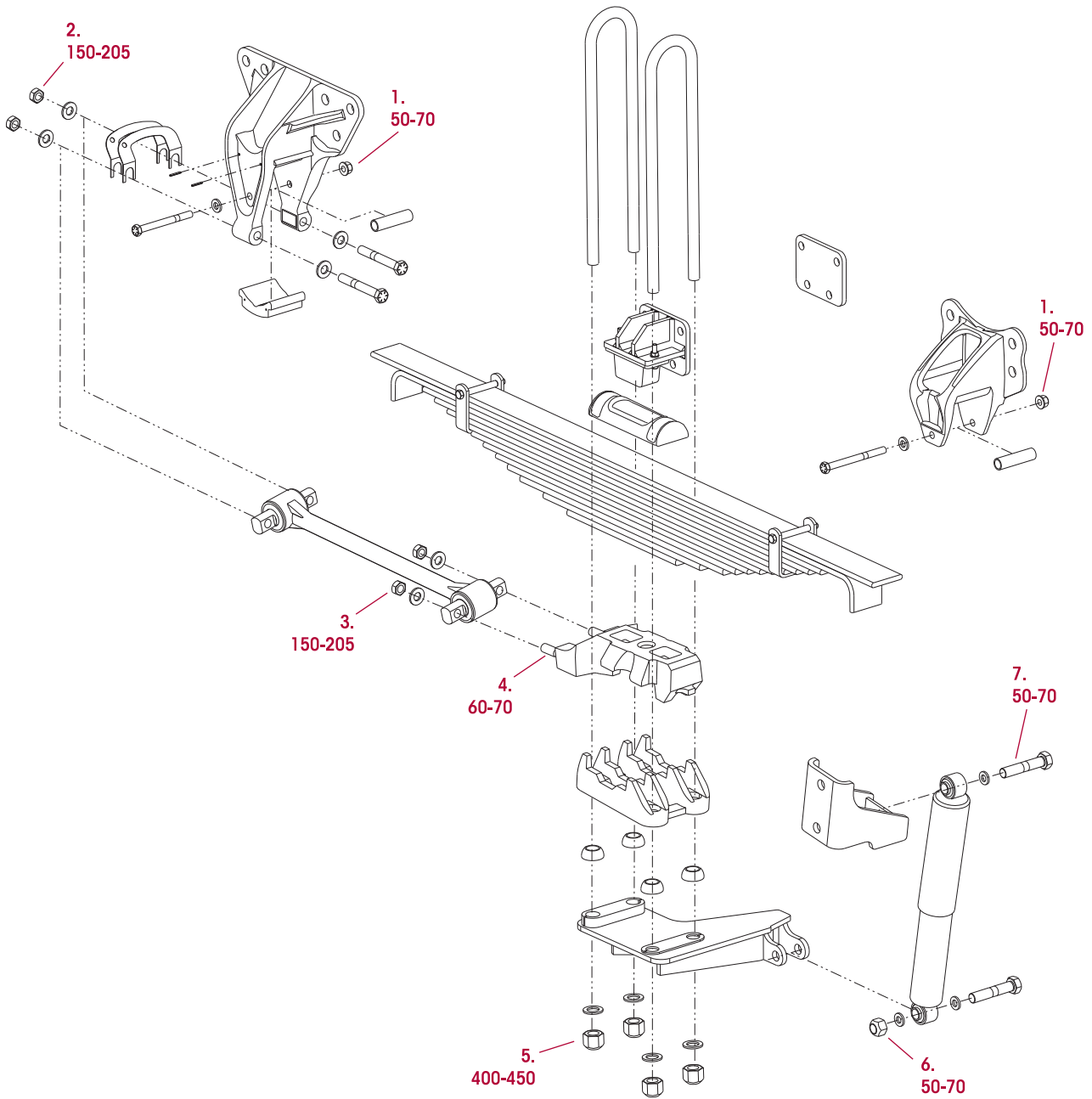
<b>HTS 210 TROUBLESHOOTING GUIDE</b>		
<b>CONDITION</b>	<b>POSSIBLE CAUSE</b>	<b>CORRECTION</b>
Suspension has harsh or bumpy ride	Suspension is overloaded	Redistribute load to correct weight.
	Damaged or leaking shock absorber	Replace shock absorber.
Irregular tire wear	Incorrect tire inflation pressure	Correct tire pressure per vehicle manufacturer's and tire manufacturer's specifications.
	Incorrect alignment	Adjust the alignment, see Alignment & Adjustments Section.
	Worn torque rod bushings	Replace torque rod bushings as necessary.
Excessive driveline vibration	Incorrect pinion angle(s)	Adjust pinion angle(s), refer to the vehicle manufacturer's for specifications.
Suspension is noisy	Loose U-bolts	Tighten U-bolts to specifications, see Preventive Maintenance Section.
	Worn torque rod bushings	Replace torque rod bushings as necessary.
Vehicle leaning	Load not centered	Redistribute the load.
	Frame twisted	Straighten the frame per vehicle manufacturer's guidelines.
	Axle housing bent or broken	Replace axle housing per vehicle manufacturer's guidelines and align vehicle.
	Loose U-bolts	Tighten U-bolts to specifications, see Preventive Maintenance Section.
	Front suspension	Inspect and repair front suspension.
	Broken leaf in spring assembly	Replace spring assembly.
Vehicle bouncing excessively	Damaged or leaking shock absorbers	Replace shock absorbers.
	Incorrect ride height or broken leaf in spring assembly	Replace spring assembly.
Excessive frame slope	Incorrect ride height or broken leaf in spring assembly	Replace spring assembly.
	Suspension overloaded	Redistribute load to correct weight.



# SECTION 10 Torque Specifications

HTS 210 for Spartan Bus Application

HENDRICKSON RECOMMENDED TORQUE VALUES  
PROVIDED IN FOOT POUNDS





## HTS 210 FOR SPARTAN BUS APPLICATION

### HENDRICKSON RECOMMENDED TORQUE SPECIFICATIONS

NO.	COMPONENT	QUANTITY	***SIZE	*TORQUE VALUE in foot pounds
Frame Hanger to Vehicle Frame Fasteners Furnished & Installed by Vehicle Manufacturer				
1	Rebound Roller Fastener	4	½"-11 UNC	50-70
2	Torque Rod Bar Pin to Frame Hanger	4	⅝"-11 UNC	150-205
3	Torque Rod Bar Pin to Spring Seat	4	⅝"-11 UNC	150-205
4	Spring Seat Stud	4	⅝"-11 UNC	60-70
5	U-bolt Locknut	8	7/8"-14 UNF	**400-450
6	Shock Absorber to Lower Shock Bracket	2	¾"-10 UNC	50-70
7	Shock Absorber to Upper Shock Bracket (at bolt head)	2	¾"-10 UNC	50-70
<b>NOTE</b>	<p>* Torque values listed above apply only if Hendrickson supplied fasteners are used. If non-hendrickson fasteners are used, follow torque specification listed in vehicle manufacturer's service manual.</p> <p>** <b>DO NOT</b> exceed torque on U-bolt locknuts.</p> <p>*** All threads must be clean and lubricated with SAE 20 oil before assembly to obtain the correct relationship of torque and fastener tension.</p>			
<b>NOTE</b>	<p>After initial break-in period (up to 1,000 miles) all bolts and nuts should be checked to ensure recommended torque is being maintained. To obtain maximum service life from the suspension system, mounting fasteners should be checked at least once a year and tightened to specified torque.</p>			

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