TECHNICAL PROCEDURE

TRAILER SUSPENSION SYSTEMS

SUBJECT: Bushing Replacement Procedure

LIT NO: L427
DATE: August 2023 **REVISION:** J

TRI-FUNCTIONAL® II
Wide Bushing

TRI-FUNCTIONAL® III
Narrow Bushing

QUADRA-FUNCTIONAL™ I
Narrow Bushing

Wide
bushing tool

Narrow
bushing tool

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IMPORTANT SAFETY NOTICES

Hendrickson literature number **T12007** *Technical Procedure General Safety Precautions and Information*, available at www.Hendrickson-intl.com/TrailerLit, **includes important preparation, precautionary and safety information** pertaining to the procedures included in this document.

To help prevent personal injury and equipment damage; warnings, cautions and other relative statements included in Hendrickson literature number T12007 are to be read carefully and applied during the performance of the procedures included in this document.

Improper maintenance, service or repair can cause damage to the vehicle and other property, personal injury, unsafe operating conditions and potentially void the manufacturer's warranty.

CONVENTIONS APPLIED IN THIS DOCUMENT

Various techniques are used in this document to convey important information, express safety issues, provide methods for CONTACTING HENDRICKSON and how to identify and apply HYPERLINKS.

EXPLANATION OF SIGNAL WORDS

Hazard signal words (such as DANGER, WARNING or CAUTION) appear in various locations throughout this publication. Information accented by one of these signal words must be observed at all times. Additional notes are utilized to emphasize areas of procedural importance and provide suggestions for ease of repair. The following definitions comply with ANSI Z535.6 and indicate the use of safety signal words as they appear throughout the publication.

⚠DANGER Indicates a hazardous situation that, if not avoided, will result in death or serious injury.

⚠WARNING Indicates a hazardous situation that, if not avoided, could result in death or serious injury.

⚠CAUTION Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

NOTICE Indicates information considered important, but not hazard-related (e.g. messages relating to property damage).

IMPORTANT: An operating procedure, practice or condition that is essential to emphasize.

⚠ Safety alert symbol used to indicate a condition exists that may result in personal injury or harm to individuals. It must be applied to DANGER, WARNING and CAUTION statements, which emphasize severity.

HYPERLINKS

Hyperlinks are identified by a dark grey line under the linked text. Internal links allow the reader to jump to a heading, step or page in this document. External links open the website or document referenced. While viewing electronically, activate the hyperlink by clicking on the underlined text.

CONTACTING HENDRICKSON

Contact Hendrickson Trailer Technical Services for technical assistance as needed. To do so, several options are available. Technical Services must be contacted before performing any warranty related service.

NOTE: DO NOT service a suspension or any component that is under warranty without first contacting Hendrickson Technical Services.

Prior to contacting Technical Services, it is best to have the following information about the vehicle and Hendrickson suspension available (all that apply):

- **Hendrickson suspension** information, (refer to L977 *Suspension and Axle Identification*) –
  - Suspension model number
  - Suspension serial number
  - Approximate number of suspension miles
- **Trailer information** (located on VIN plate) -
  - Type (van, reefer, flat bed, etc.)
  - Manufacturer
  - VIN (vehicle identification number)
  - In-service date [1]
  - Fleet/owner name
  - Unit #

[1] If the in-service date is unknown or not available, the vehicle date of manufacture will be substituted.

- **Failure information**
  - Description of the system problem, the part number and/or the part description of the reported non-functioning part.
  - **Date of failure**.
  - Where applicable, **location of problem** on suspension / trailer (e.g., road side, front axle, rear axle, curb side rear, etc.).
- **Digital photos** of suspension and damaged areas.
- **Special application** approval documentation (if applicable).

PHONE

Contact **H**endrickson **T**railer **T**echnical **S**ervices directly in the United States and Canada at **866**-RIDEAIR (**743-3247**). From the menu, select:

- **Technical Services**/Warranty for technical information.
- Other selections include:
  - **Aftermarket Sales** for replacement parts information and ordering.
  - **Original Equipment Sales** for parts inquiries and ordering for trailer manufacturers.

EMAIL

HTTS@Hendrickson-intl.com

Contact Hendrickson for additional details regarding specifications, applications, capacities, and operation, service and maintenance instructions.

All applications must comply with applicable Hendrickson specifications and must be approved by the respective vehicle manufacturer with the vehicle in its original, as-built configuration.

RELATED LITERATURE

If you suspect your version of this or any other Hendrickson manual is not "up-to-date", the most current version is free online at:

www.Hendrickson-intl.com/TrailerLit

Available Hendrickson documentation can be viewed or downloaded from this site.

All Hendrickson online documentation is in PDF format that requires PDF reader software to open. A free application is downloadable from Adobe at http://get.adobe.com/reader/.

Other related literature may include:

NAME	DESCRIPTION
B106	*Pivot Bushing Inspection Procedure*
L54	*T Series Bushing Replacement Procedure*
L466	*Bushing Tool Instructions Poster*
L578	*Preventive Maintenance Guide*
L579	*Alignment Procedure*
L583	*Comprehensive Warranty Statement*
L589	*TRI-FUNCTIONAL® Bushing Replacement Tool Parts List*
L750	*Bushing Tube Spacer Inspection/Replacement Procedure*
L893	*Replacement Bushing Tube Spacer Orientation*
T82001	*TRI-FUNCTIONAL® Bushing Tool Information*
SDS	www.Hendrickson-intl.com/TrailerLit

Table 1: Related Literature

Hendrickson reserves the right to make changes and improvements to its products and publications at any time. Consult the Hendrickson website

www.Hendrickson-intl.com/TrailerLit

for the latest version of this manual.

PREPARING TRAILER FOR MAINTENANCE SERVICE

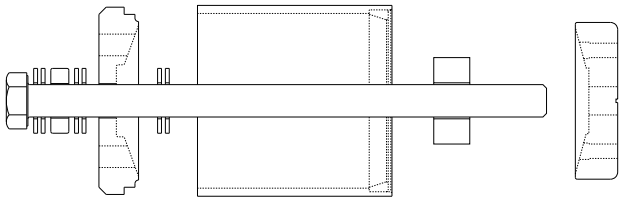
Information for trailer preparation, safety and precautionary statements, refer to Hendrickson literature number T12007, available at www.Hendrickson-intl.com/TrailerLit.

NOTE: **DO NOT** service a suspension or any components that is under warranty without first contacting Hendrickson Technical Services. Refer to CONTACTING HENDRICKSON for details.

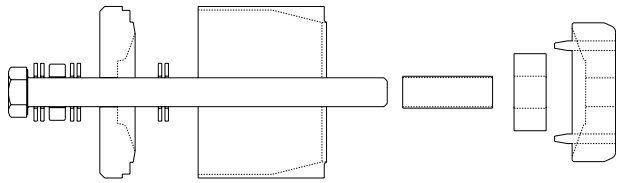
⚠WARNING Do not work under a trailer supported only by jacks. Jacks can slip or fall over, resulting in serious personal injury. Always use safety stands to support a raised trailer.

PIVOT CONNECTION BUSHING REPLACEMENT TOOLS

NOTE: The bushing replacement tool is not required for replacing the bushing assembly on an HT Y-beam suspension. For this suspension type, begin with PIVOT BUSHING INSPECTION on page 5 for pivot connection disassembly and HT™ SERIES Y-BEAM BUSHING REPLACEMENT on page 22 for bushing replacement and reassembly.



Wide bushing tool for use with 6¾-inch wide bushings



Narrow bushing tool for use with 3⅝-inch wide bushings

Figure 1: Hendrickson TRI-FUNCTIONAL bushing tools

Hendrickson offers two pivot connection bushing tools (Figure 1 and shown on front cover): one for TRI-FUNCTIONAL 6¾-inch wide bushing and one for TRI-FUNCTIONAL and QUADRA-FUNCTIONAL 3⅝-inch narrow bushings. The correct tool to use is easily determined by the bushing length or frame bracket width.

NOTICE The tools and components cannot be used interchangeably. The proper tool must be used for its applicable bushing type.

Replacement parts are listed in Hendrickson literature number L589 *TRI-FUNCTIONAL® Bushing Replacement Tool Parts List*

The bushing replacement procedure described in this document applies to both bushing tools. Enough similarity exists between use of the two tools so that a single procedure can be used to describe the bushing replacement process with differences presented where applicable.

WIDE BUSHING TOOL

The wide bushing tool (Figure 1 also shown on front cover) is used to remove and replace pivot bushings on all T, HT™ Series[2], INTRAAX® and VANTRAAX® wide-bushing suspension systems. The 6¾-inch wide bushings on these suspensions are commonly referred to as wide bushing. The TRI-FUNCTIONAL® wide bushing (abbreviated TF II, is shown in Figure 2 and on the front cover). It has been produced since May 2003.

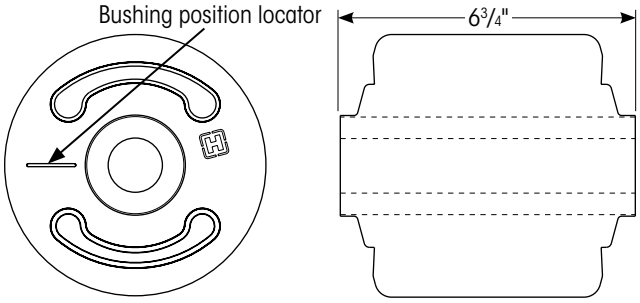


Figure 2: TRI-FUNCTIONAL (TF II) wide bushing

NARROW BUSHING TOOL

The narrow bushing tool (Figure 1, shown on front cover) is used to remove and replace pivot bushings on INTRAAX, VANTRAAX and all ULTRAA-K® suspension systems. The 3⅝-inch TRI-FUNCTIONAL narrow bushing (Figure 3, also shown on front cover) is abbreviated as TF III and commonly referred to as narrow bushing.

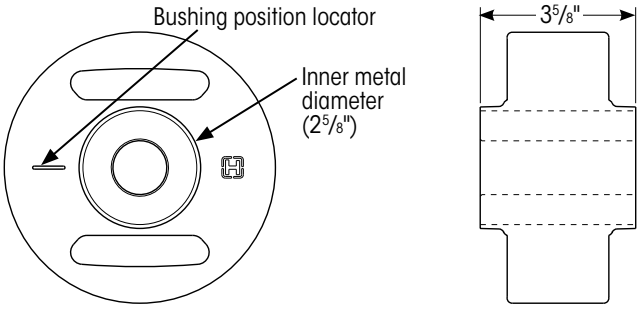


Figure 3: TRI-FUNCTIONAL (TF III) narrow bushing

For more bushing tool drive plate replacement information, refer to Hendrickson literature number L589 TRI-FUNCTIONAL Bushing Replacement Tool Parts List.

[2] If HT Y-beam suspension (both welded collar and QUIK-ALIGN® style pivot connections), the entire bushing assembly gets replaced, without the need for a replacement tool. Refer to SUSPENSION REASSEMBLY on page 21.

QUADRA-FUNCTIONAL™ I NARROW BUSHING

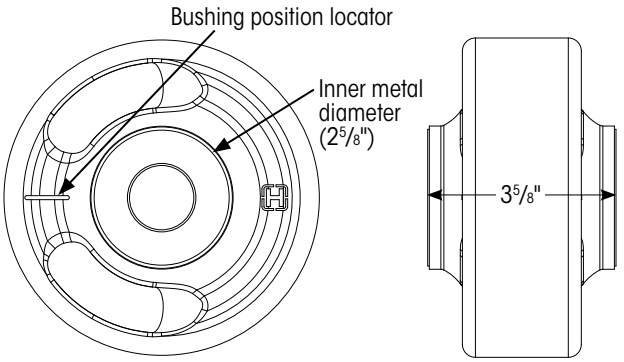


Figure 4: QUADRA-FUNCTIONAL™ narrow bushing

The 3 5/8-inch QUADRA-FUNCTIONAL narrow bushing (Figure 4, also shown on front cover) is abbreviated as QF I narrow bushing.

PIVOT BUSHING INSPECTION

Prior to pivot connection disassembly, bushings and spacers can be quickly inspected according to Hendrickson literature numbers B106 and L750 respectively.

PIVOT CONNECTION DISASSEMBLY

Prior to disassembly, perform PREPARING TRAILER FOR MAINTENANCE SERVICE on page 3.

IMPORTANT: If one bushing is bad on an axle, it is recommended that both bushings be replaced.

For HT™ Series Y-Beam pivot connection disassembly, refer to HT™ SERIES Y-BEAM BUSHING REPLACEMENT on page 22.

Hendrickson suspensions are equipped with either QUIK-ALIGN® or WELDED COLLAR style pivot connection hardware. To disassemble, refer to the below applicable procedure.

⚠CAUTION Failure to follow these pivot connection assembly procedures and to properly torque the pivot connection fasteners could result in a failed pivot connection and damage to the axle, suspension or trailer.

QUIK-ALIGN

This pivot connection style (Figure 5) can be found on INTRAAX®, VANTRAAX®, ULTRAA-K®, HT™ Series and HT Y-beam suspensions.

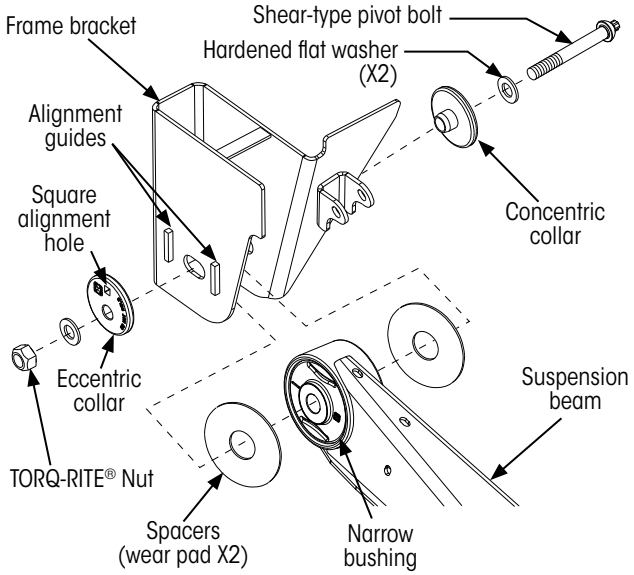


Figure 5: QUIK-ALIGN style pivot connection hardware (narrow bushing shown)

NOTE: Refer to Figure 48 on page 22 for an exploded view of the HT Y-beam QUIK-ALIGN pivot connection.

1. **Remove** the TORQ-RITE® nut from the pivot bolt.
2. **Remove** the pivot bolt from the frame bracket.
3. **Carefully remove** the concentric and eccentric alignment collars.

NOTE: If in good condition, they can be potentially cleaned and reused when the pivot connection is reassembled with the new bushing. Otherwise, replace with new.

4. **Discard** the pivot bolt, TORQ-RITE nut and hardened flat washers.

IMPORTANT: Whenever the QUIK-ALIGN style pivot connection is disassembled or loosened for any reason, the pivot bolt and TORQ-RITE nut must be removed and discarded. **A new shear-type pivot bolt and TORQ-RITE nut must be used** for pivot connection reassembly.

WELDED COLLAR

This pivot connection style (Figure 6 and Figure 7) can be found on T and HT Series suspensions with the pivot fastener attaching the suspension beams to a frame bracket.

NOTE: Welded collars must be removed for HT Y-beam suspension bushing assembly replacement. Refer to Y-BEAM PIVOT CONNECTION DISASSEMBLY on page 23.

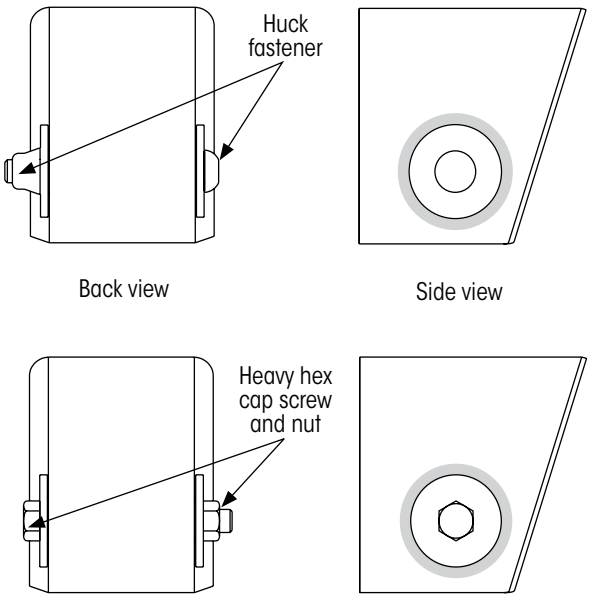


Figure 6: Welded collar style pivot connection types

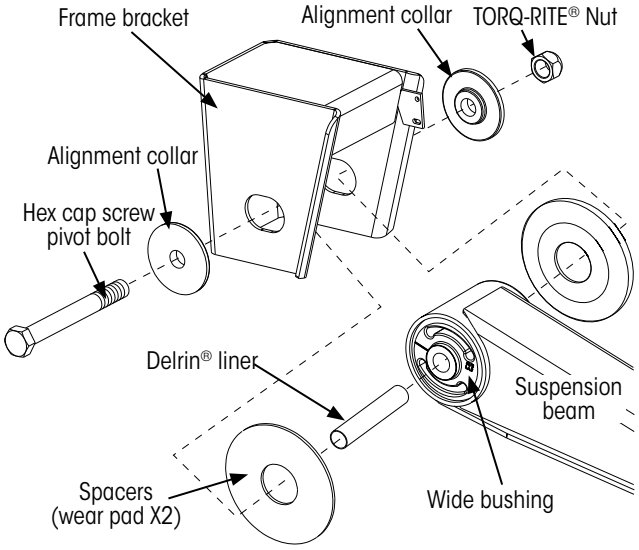


Figure 7: Welded collar style pivot connection hardware

The welded collar style pivot connection is either clamped together with a Huck fastener or torqued and tack welded together with a $1^{1}/_{8}$-inch heavy hex cap screw and nut.

1. **Carefully cut or grind** the Huck fastener from the Huck bolt (or the nut from the cap screw) and remove the Huck bolt (or hex cap screw) from the frame bracket.

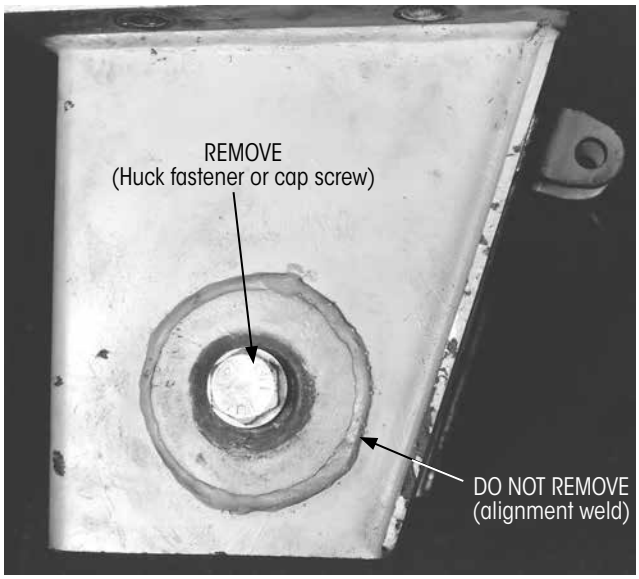


Figure 8: Removing welded collar pivot bolt

IMPORTANT: **DO NOT** remove the alignment weld (Figure 8). On a frame bracket with the welded collar style pivot connection, the bushing can be replaced without affecting axle alignment.

2. **Discard** the Huck fastener (or the cap screw and nut).

SEPARATING BEAM FROM FRAME BRACKET

1. Using the jack, **carefully lower** the suspension beam assembly out of the frame bracket to expose the bushings. Bushing tube spacers should fall out as the beam is lowered.

2. **Inspect** bushing tube spacers. If worn through, check for possible damage to frame bracket according to procedures in L750 *Bushing Tube Spacer Inspection/Replacement Procedure*.

3. **Discard** the bushing tube spacers.

IMPORTANT: **If within the warranty time period,** The following is recommended at this time as defined in Hendrickson literature number L583 *Comprehensive Warranty Statement*:

- **CONTACTING** HENDRICKSON **prior to service**.
- **SEND** photos to HTTS@hendrickson-intl.com for evaluation.

NOTE: If within warranty, the **original bushings must be returned** to Hendrickson for further warranty consideration.

4. **Inspect** bushing tube condition. Some wear (polished metal) on the edge of the bushing tube is considered normal (Figure 9 on page 8) due to the pivoting motion inherent with this connection. Missing metal where the bushing tube's radius edge has been worn away is considered abnormal. If this type of wear is present, determine how much wear has occurred according to specifications in Table 2.

   The amount of bushing tube wear can be determined by measuring the width of the worn bushing tube (Figure 10 on page 8) and subtracting this measured dimension from the new tube width.

IF THE BUSHING TUBE MEASURES:		THEN:
Wide Bushing	**Narrow Bushing**	
$5^{7}/_{8}$" or Greater (No wear on the bushing tube)	$3^{3}/_{32}$" or Greater (No wear on the bushing tube)[4]	Replace both bushing tube spacers and realign the axle.[1,2]
Less than $3^{3}/_{32}$" AND Not worn into the weld		1. Remove existing bushing (BUSHING REMOVAL on page 9) and dress the radius on the bushing tube edge refer to *BUSHING TUBE EDGE WEAR on page 13*. 2. Install new bushings per axle[4], refer to *BUSHING INSTALLATION on page 14*. 3. Replace all bushing tube spacers on the same axle and realign the axle.[1]
Less than $5^{7}/_{8}$" AND Not worn into the weld		1. Remove existing bushing (BUSHING REMOVAL on page 9) and dress the radius on the bushing tube edge refer to *BUSHING TUBE EDGE WEAR on page 13*. 2. Install new bushings per axle[4], refer to *BUSHING INSTALLATION on page 14*. 3. Replace all bushing tube spacers on the same axle and realign the axle.[1,2]
Worn into the weld[3]	Worn into the weld[3]	1. Replace the HALFTRAAX™ or the beam assembly. Refer to L533 HALFTRAAX™ *Axle and Beam Removal/Replacement Procedure* for complete HALFTRAAX replacement instructions for complete beam replacement instructions. 2. Replace all bushing tube spacers on the same axle and realign the axle.[1,2]
Uneven wall thickness[4] (parent material loss)	Uneven wall thickness[4] (parent material loss)	

1 Refer to Hendrickson literature number L579 *Alignment Procedure* for complete axle alignment instructions.

2 **Wide bushing only**: Refer to L750 REPLACEMENT BUSHINGS TUBE SPACER, WIDE BUSHING on page 8, for complete details.

3 Any bushing tube wear into the weld (Figure 10 on page 8) is not acceptable. In this case, the axle/beam weldment (HALFTRAAX) will need to be replaced.

4 Wall thickness should be checked after BUSHING REMOVAL and prior to BUSHING TUBE EDGE WEAR on page 13. Any component that contains an area where corrosion removal or material wear has reduced the material thickness should be replaced. Components, where the accumulated material removal may be compromising the aggregate material thickness, should be replaced. However, cleaning of bushing tube edge, within specifications, is allowed as defined in page 8.

Table 2: Bushing tube measurement evaluation

EVALUATING BUSHING TUBE WEAR

Some wear (polished metal) on the edge of the bushing tube is considered normal (Figure 9) due to the pivoting motion inherent with this connection. Missing metal where the bushing tube's radius edge has been worn away is considered abnormal. If this type of wear is present, refer to Table 2 on page 7.

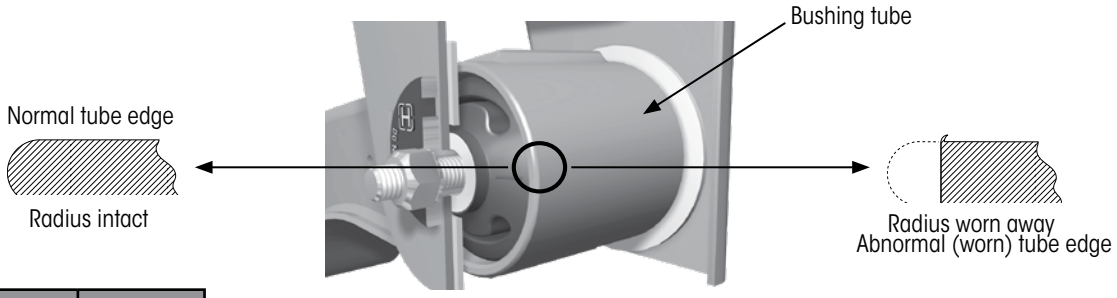


Figure 9: Bushing tube edge wear

BUSHING TYPE	NEW TUBE WIDTH
Wide	A=6″
Narrow	A=3 1/8″

See Table 2 on page 7 for specifications

NOTE: A reduction in bushing\tube width will effect the use of centering washers during bushing installation. Refer to Figure 33, Figure 34 and Figure 35 on page 16.

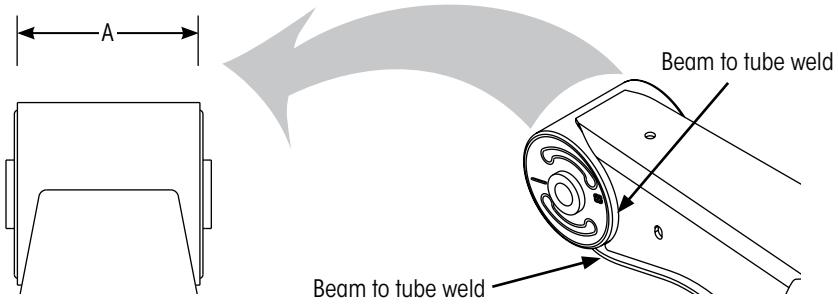


Figure 10: Bushing tube width and beam to tube weld

BUSHING POSITION WITHIN THE BUSHING TUBE

NOTE: This procedure is not required if replacing the beam (HT™ Series suspensions) or HALFTRAAX™.

For evaluation purposes, the pivot bushing is considered either centered or off-center with respect to the bushing tube (Figure 11). The pivot bushing is considered off-center when a portion of the rubber extends outside of the bushing tube on one side and not on the other.

The key to identifying an off-center bushing is the bushing tube spacers. If the bushing tube spacers are in serviceable condition (not missing, cut, worn-through or otherwise deteriorated), the bushing cannot be off-center (Figure 11).

If the bushing is off-center, but the bushing tube width is acceptable, replace the bushing.

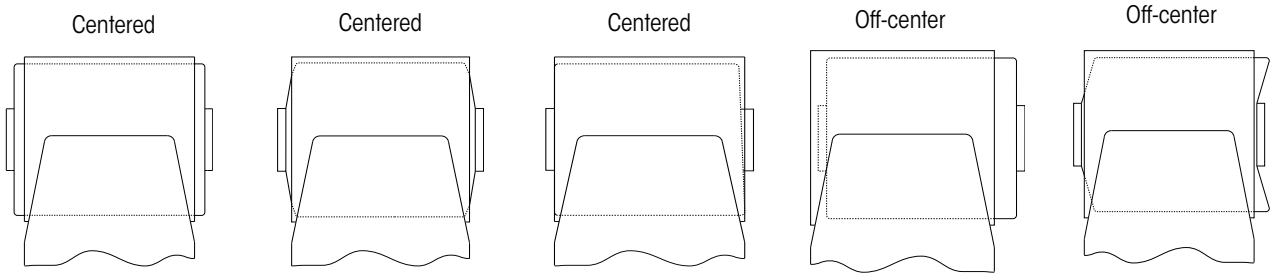


Figure 11: Bushing position relative to the bushing tube (not representative of every possible case)

BUSHING REMOVAL

With the bushing tube and bushing exposed, the bushing can now be removed with the applicable bushing tool.

NOTE: If installing QF I bushing, start with step 3. Adding locating marks is not necessary.

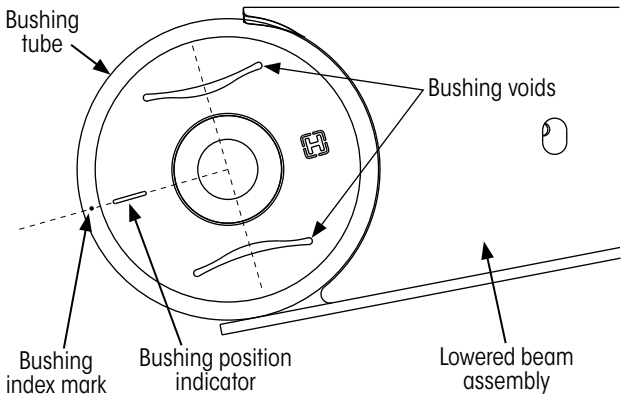


Figure 12: Bushing orientation within the bushing tube

1. With the beam assembly lowered, **locate** the bushing index mark on the bushing tube (Figure 12).

   The **bushing index mark** is a small dimple or indent in the side of the **bushing tube** and is used along with the **bushing position locator** to properly align the bushing within the bushing tube. When installed, the **bushing voids must be vertically centered when the suspension is at ride height**. By aligning the bushing position locator with the bushing index mark, proper bushing orientation is achieved.

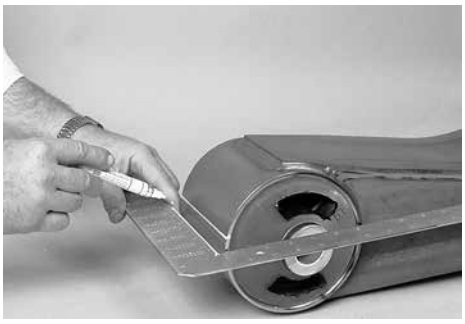


Figure 13: Marking bushing orientation on the bushing tube

2. Using a square and the bushing index mark as a reference point, **scribe or draw** a line on the outside of the bushing tube (Figure 13). This line marks the orientation of the existing bushing within the bushing tube and will be used to properly orient the replacement bushing during installation.

   If the index mark is not visible on the bushing tube, use the bushing position locator as a reference for drawing the bushing orientation line.

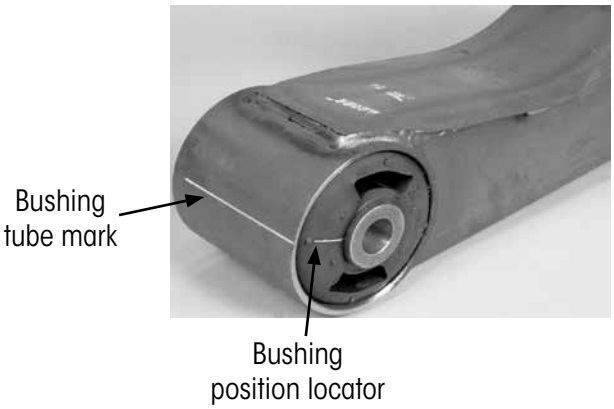


Figure 14: Properly marked bushing orientation

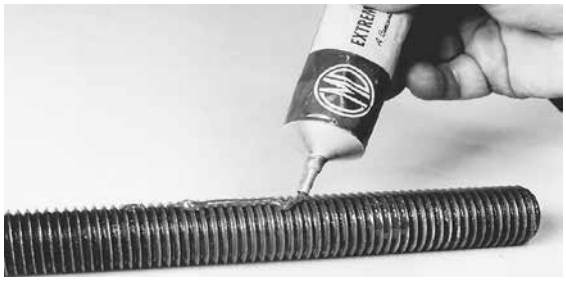


Figure 15: Applying lube to the hex head bolt

3. **Apply** extreme-pressure lube (provided with tool) to the threads of the hex head bolt (Figure 15).

Figure 16: Applying lube to the thrust bearing

4. **Apply** extreme-pressure lube to the internal parts of the thrust bearing (Figure 16).

NOTICE Do not use extreme-pressure lube on the bushing. It is intended only for use on the hex head bolt, thrust bearing and thrust washers.

5. With the transition tube empty, **assemble** the bushing replacement tool as shown in Figure 17.

IMPORTANT: For bushing removal, ensure the tool is assembled so that the end of the transition tube with the bearing cup (wide tool) or taper (narrow tool) can be placed against the bushing tube as shown in Figure 17.

IMPORTANT: There must be two lubricated thrust washers on each side of the thrust bearing as shown in Figure 17.

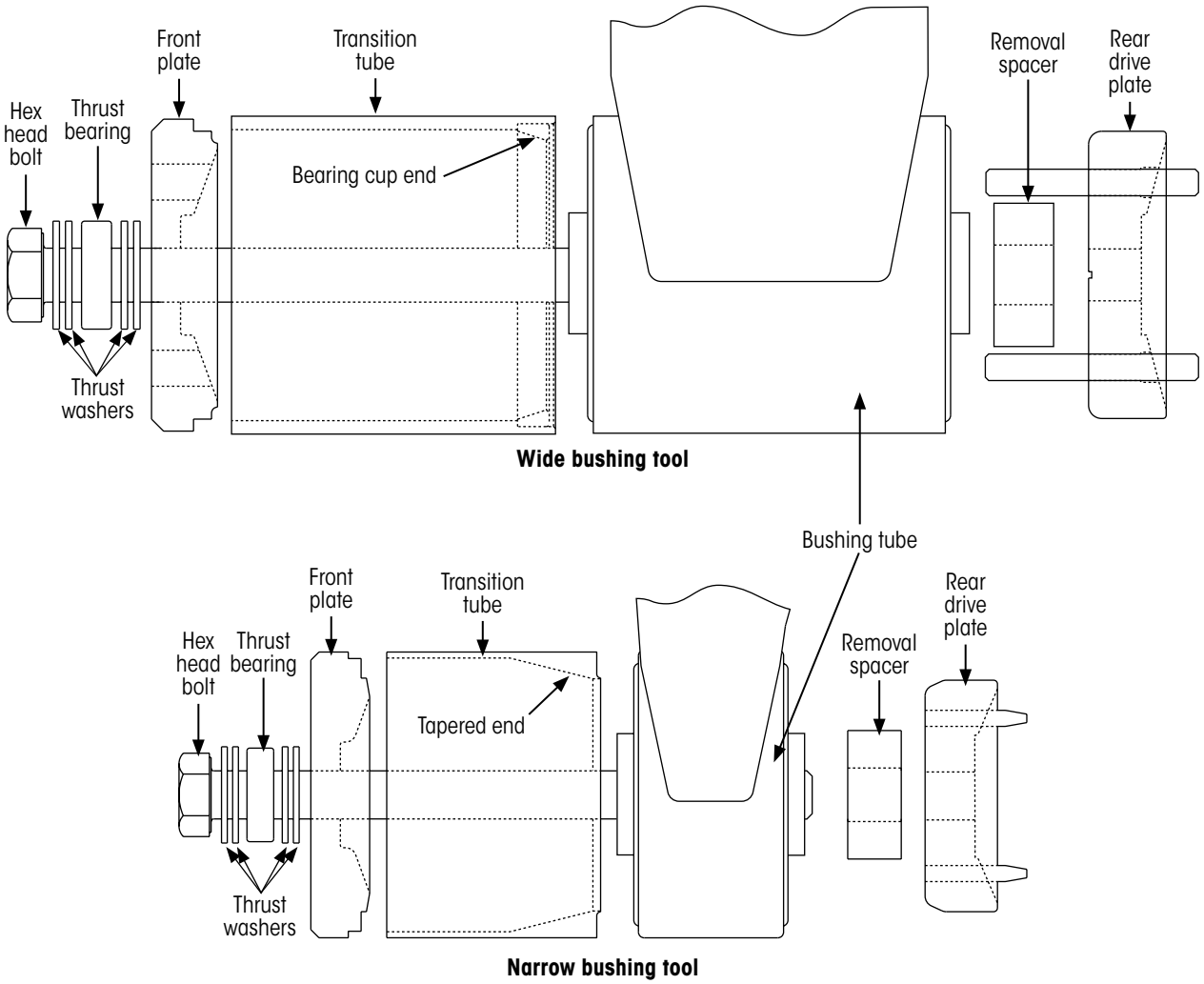


Figure 17: Assembling bushing tool for removal

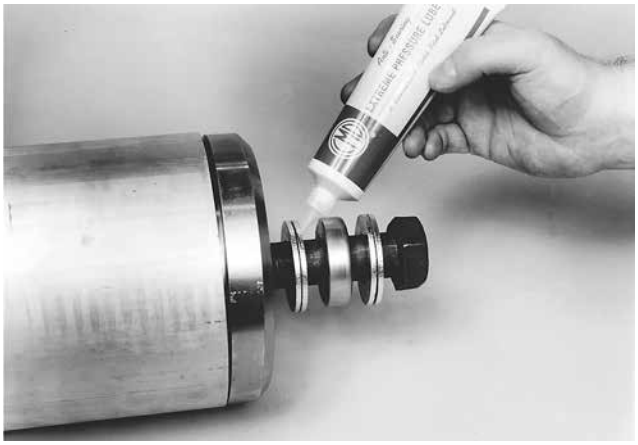


Figure 18: Applying lube to thrust washers

6. **Apply** extreme-pressure lube to external surfaces of the thrust washers (Figure 18).

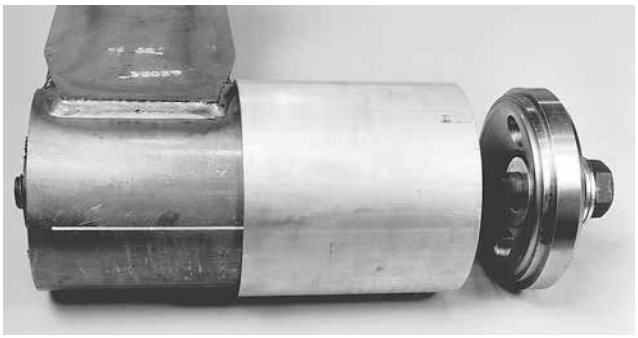


Figure 19: Mounting tool on bushing tube

7. **Insert** the hex head bolt of the tool through the bushing until the transition tube rests squarely on the bushing tube (Figure 19).

Figure 20: Installing removal spacer

8. **Slide** the removal spacer over the exposed hex head bolt threads on the opposite side of the bushing tube (Figure 20).

9. **Rear Drive Plate:**

   Wide Bushing Tool:

   A. **Configure** set screws in the rear drive plate as shown in Figure 21.

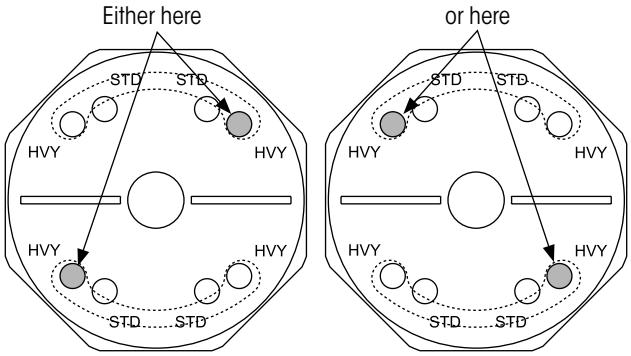


Figure 21: Set screw installation for TF II wide bushing drive plate

NOTE: Diagonal placement of the set screws is to prevent drive plate rotation during bushing removal as shown in Figure 26 on page 13.

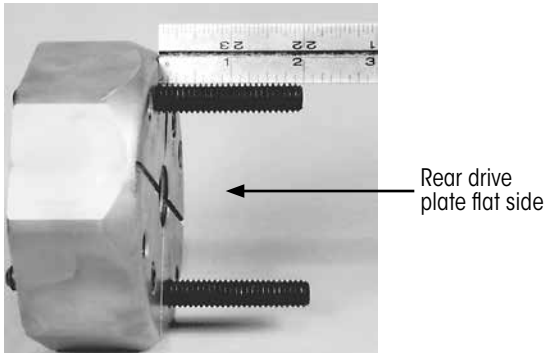


Figure 22: Checking set screw depth (wide bushing)

   B. **Thread** two 4-inch long set screws into opposite holes per Figure 20 in the rear of the drive plate (shown in Figure 22, "HVY" holes only).

      i. At least two inches of each set screw must be left exposed on the flat side of the rear drive plate as shown in Figure 22. If necessary, use 1/4-inch Alllen wrench to turn screws.

   C. **If set screws present, ensure** the two 2-inch long set screws (used during installation) are screwed into unused HVY holes in the rear drive plate until they are flush with or below the flat (non-concaved) surface of the rear drive plate. These will be used later for wide bushing installation.

   D. **Insert th**e removal spacer onto the hex head bolt (Figure 20).

E. **Thread** the rear drive plate putting the set screws into the bushing voids (open areas in bushing) to prevent the rear drive plate from turning (Figure 23).

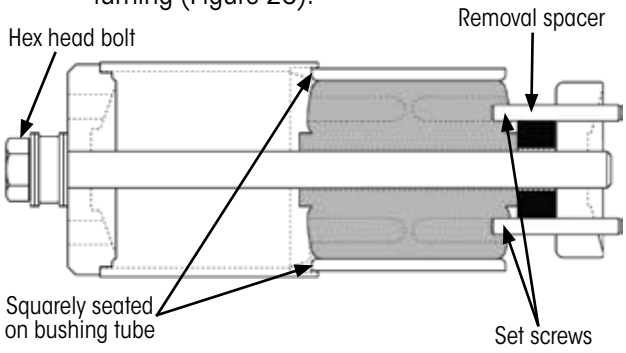


Figure 23: Wide Bushing removal

Narrow Bushing Tool:

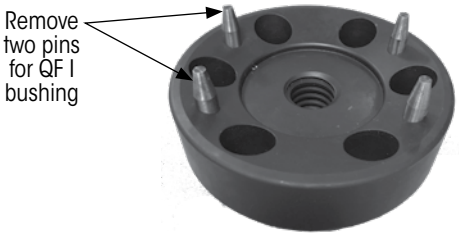


Figure 24: Narrow bushing rear drive plate

NOTE: Narrow bushing tool alignment pins in the rear drive plate (Figure 24) are fixed. However, if present, two of the four pins must be removed for QF I bushing removal and installation, Refer to Hendrickson literature number T89009 Narrow Bushing Tool Modification Procedure.

10. **Hand tighten** the hex head bolt until snug.

11. **Ensure** tool rests squarely on the bushing tube (Figure 25).

Figure 25: Ensure thrust bearing is free to turn

NOTICE The thrust bearing needs to be free to turn to prevent binding or damage to the threads of the hex head bolt during the removal process (Figure 25).

12. Using a $^{3}/_{4}$-inch impact wrench and a $1^{11}/_{16}$-inch heavy-duty (six-point) impact socket, **remove** the bushing by turning the hex head bolt **clockwise**. Normal removal time should be four minutes or less.

IMPORTANT: Ensure the transition tube remains seated against the bushing tube during the entire bushing removal procedure. If the hex head bolt stops turning during the removal process:

A. **Reverse** the impact wrench and loosen the tool assembly.

B. **Check** the tool for damage and proper lubrication.

C. **Reset** the rear drive plate and try again.

As a last resort, a small amount of heat may be required to break the bushing loose (Figure 27 on page 13). **DO NOT OVERHEAT THE BUSHING TUBE**. Allow the bushing tube to cool before installing the new bushing.

NOTICE **The use of a one-inch impact wrench is not recommended. Damage to the threads of the hex head bolt could result**.

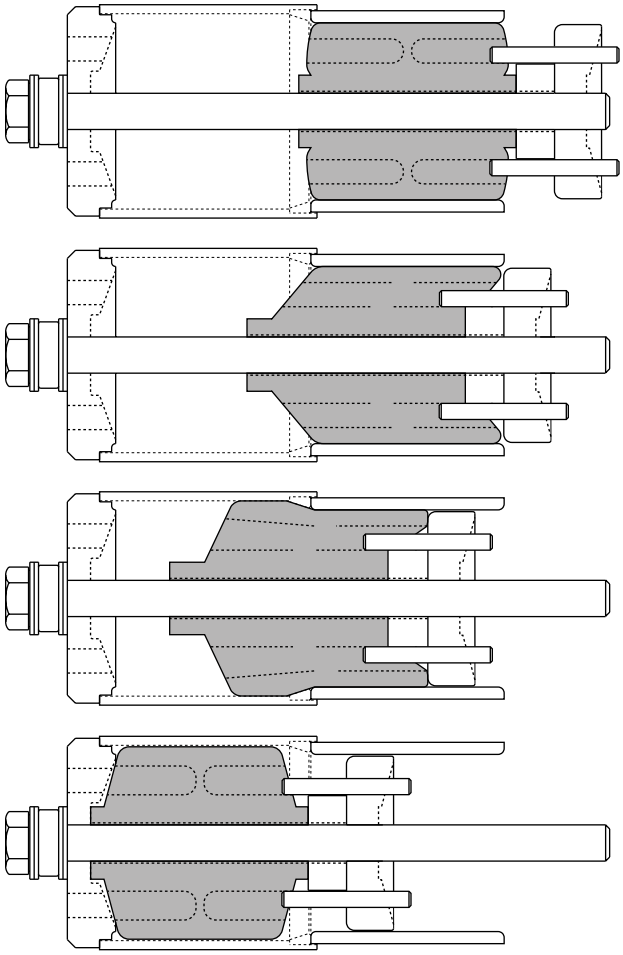


Figure 26: Typical bushing removal progression as hex head bolt is turned clockwise

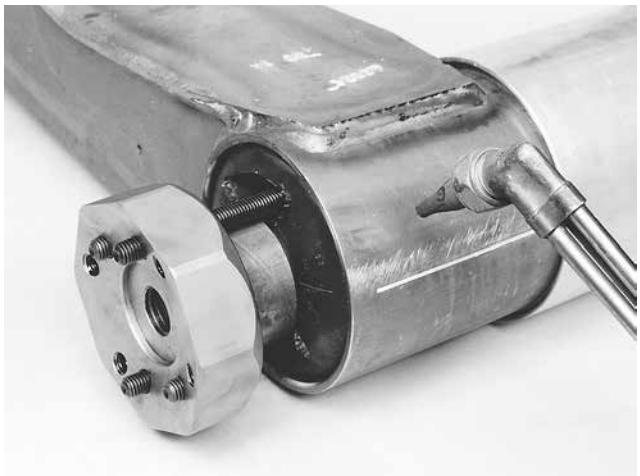


Figure 27: As a last resort, apply heat to the bushing tube

13. After bushing removal, **reverse** the impact wrench to disassemble the tool.

BUSHING TUBE EDGE WEAR

With the beam assembly lowered and the bushing removed from the previous procedure, inspect the edges of the bushing tube.

NOTE: If not already done so, refer to Table 2 on page 7 to measure and check bushing tube length.

As described in Table 2 on page 7, it is acceptable to reuse the bushing tube if within the specifications listed in the table.

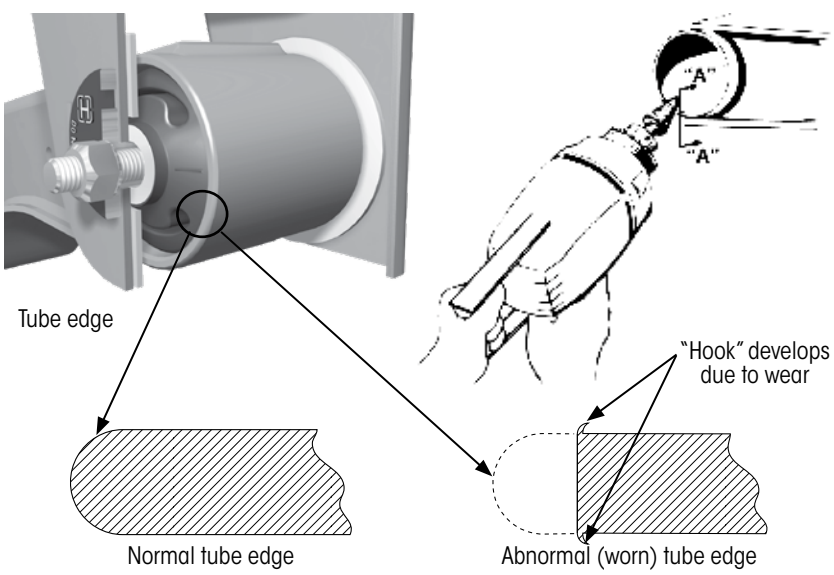
When the bushing tube wears, a slight "hook" or "tooth" of metal may develop on both inside and outside diameters of the tube (Figure 28 on page 14). As the vehicle turns, the unique design of the TRI-FUNCTIONAL® Bushing allows it to elongate sightly to absorb the forces associated with road surface, load, etc. When the turn is complete and those particular forces are no longer present, the TRI-FUNCTIONAL Bushing returns to its original position. If the "hook" or "tooth" on the bushing tube is not removed, it can "bite" into the rubber TRI-FUNCTIONAL Bushing when elongated and hold or prevent it from returning to its original position, which is unacceptable. As this is repeated, the TRI-FUNCTIONAL Bushing can eventually be pulled out of the bushing tube. The rubber TRI-FUNCTIONAL Bushing may also become damaged by these irregular edges.

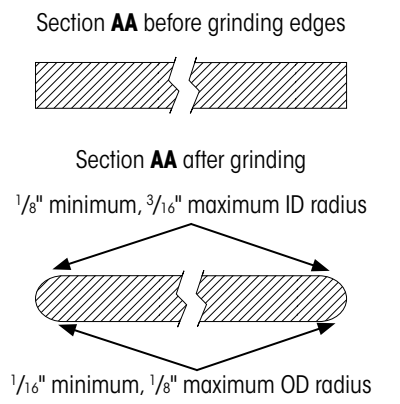
Also, if not repaired:

- The new bushing could bind and/or be damaged during installation.
- New bushing tube spacers will wear more rapidly than normal.

Before attempting to install a new bushing, the worn bushing tube edge must be dressed. Use a grinder to re-establish a radius on the edge of the bushing tube as shown in Figure 28 on page 14 and using the following procedure.

NOTE: For HT™ Series Y-beam suspensions, the bushing tube is part of the bushing assembly (Figure 53 on page 24) and is replaced with a new bushing.





NOTE: ID radius must be smooth for bushing installation, ID & OD radius must be smooth for bushing tube spacer.

Figure 28: Bushing tube edge dressing

1. **Clean** the bushing tube on the trailer suspension beam. All rust, rubber, scale and other buildup must be removed from the inside surface of the bushing tube before the replacement bushing can be installed. The bushing tube must also be cool to the touch.

IMPORTANT: Any component that contains an area where corrosion removal or material wear has reduced the material thickness should be replaced. Components, where the accumulated material removal may be compromising the aggregate material thickness, should be replaced. Refer to CONTACTING HENDRICKSON on page 2 for guidance. Refer to Table 2 on page 7.

2. **Check** the edges of the bushing tube for burrs or sharp edges. If OK, skip next step.

3. **Remove** any burrs or sharp edges with a grinding tool (Figure 28).

4. **Refer** to Table 2 on page 7 to **re-measure and check** bushing tube length.

   If bushing edges are smooth, with no sharp edges, and bushing tube length remains within specification; continue with new bushing installation. Otherwise, repeat the previous step as needed.

BUSHING INSTALLATION

Bushing installation is similar for all bushing types. Differences is explained where applicable.

PREPARATION

NOTICE If preparation is not performed as required the tool can be damaged or not perform as expected.

NOTE: If installing QF I bushing, skip step 1.

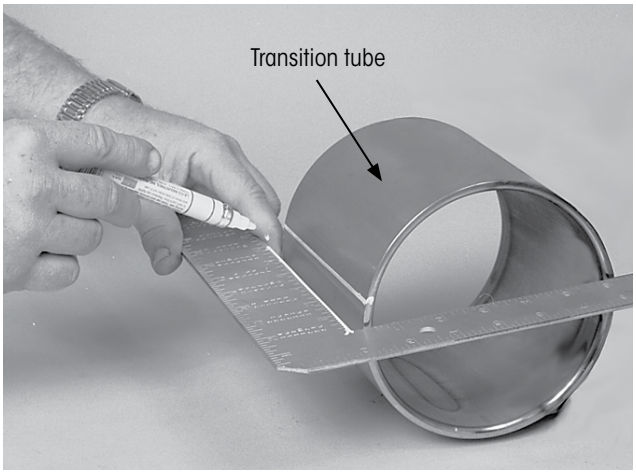


Figure 29: Drawing an orientation line on transition tube

1. Using a square, **scribe or draw** a line on the transition tube (Figure 29). This line will be used to properly orient the bushing during installation.

2. **Liberally apply** Type "M" lubricant[3] to the inside of the bushing tube, transition tube and to the outside diameter of the replacement bushing.

NOTICE Insufficient or wrong lubricant type can cause higher friction, incomplete bushing insertion (binding) and damage to the tool.

NOTICE **DO NOT** substitute lubricants. The only lubricant that should be used on the bushing, bushing tube and transition tube is Type "M" included in the pivot bushing replacement kit.

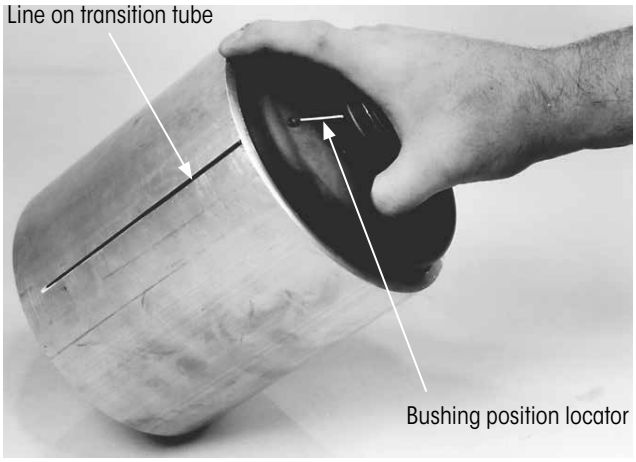


Figure 30: Inserting replacement bushing into transition tube

3. **Insert** the bushing into the transition tube (Figure 30).

4. (Does not apply to QF I bushing) **Align** the position locator on the bushing with the line drawn on the transition tube as shown in Figure 30.

Figure 31: Applying lube to hex head bolt

[3] Seagull Type "M" Code lubricant is manufactured by Clark Oil Company and is supplied with the pivot bushing replacement kit. Most or all must be applied for this procedure.

5. **Liberally apply** extreme-pressure lube to the threads of the hex head bolt (Figure 31).

NOTICE Do not use Type "M" lubricant on the threads of the hex head bolt, thrust bearing or washers. This may result in binding of the tool and/or damage to hex head bolt threads shown in Figure 31.

Figure 32: Applying lube to thrust bearing

6. **Apply** extreme-pressure lube to the internal parts of the thrust bearing (Figure 32).

NOTICE Do not use extreme-pressure lube on the bushing. It is intended only for use on the hex head bolt, thrust bearing and thrust washers.

7. **Assemble** the hex head bolt, thrust washers, thrust bearing and front plate as shown on the previous page.

NOTE: A reduction in bushing tube width will decrease the required number of centering washers during bushing installation.

A. **Wide Bushing Tool**:

Position **one centering washer** under the front plate (Figure 33). If required, two washers can be used.

B. **Narrow Bushing Tool**:

ii. TF III bushing (Figure 34) - Position **two centering washers** under the front plate.

iii. QF I bushing (Figure 35) - Position **one centering washer** under the front plate and the QF I bushing spacer washer with the rear drive plate.

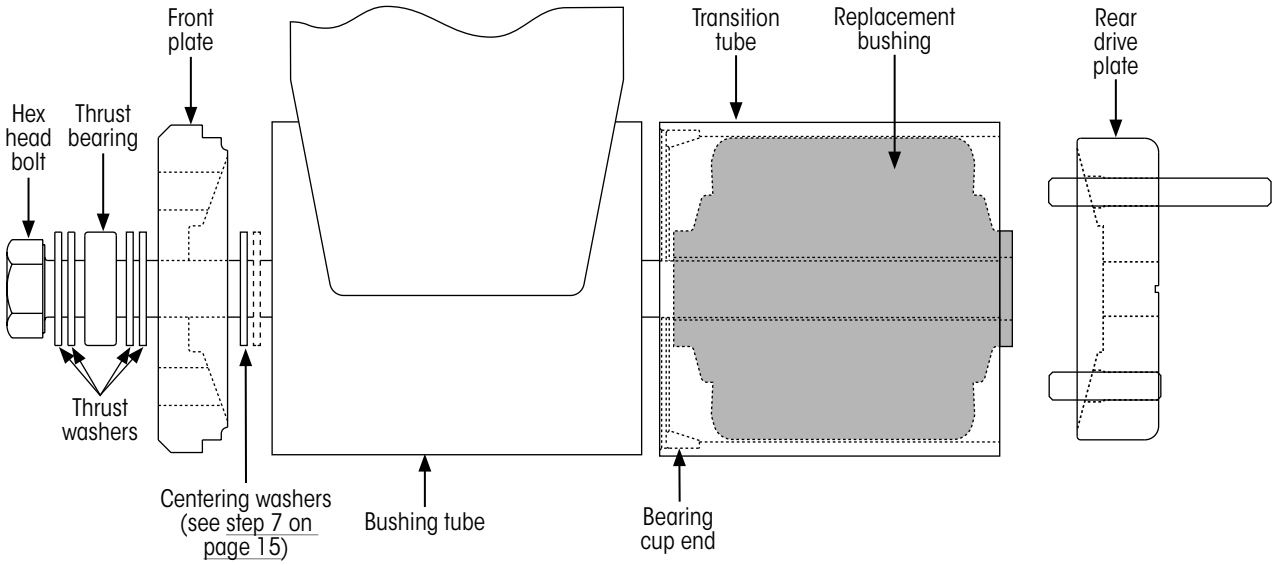


Figure 33: Assembling wide bushing tool for TF II bushing installation

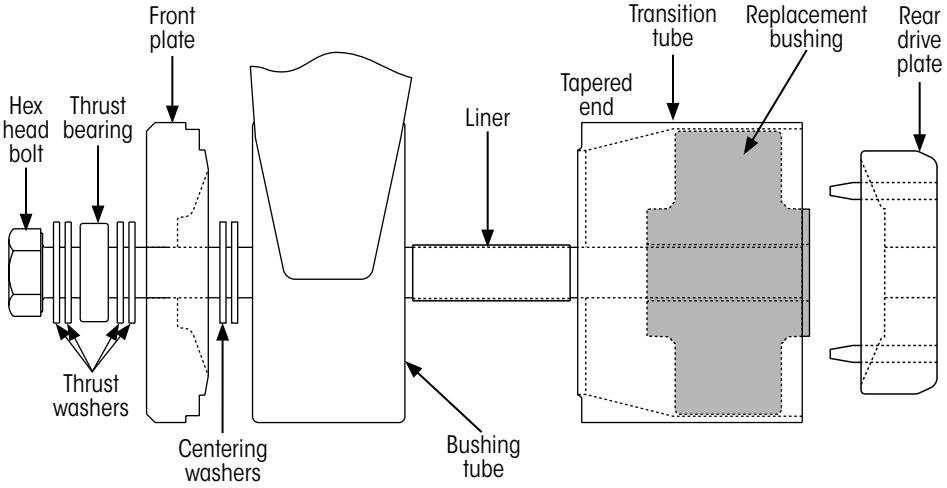


Figure 34: Assembling narrow bushing tool for TF III bushing installation

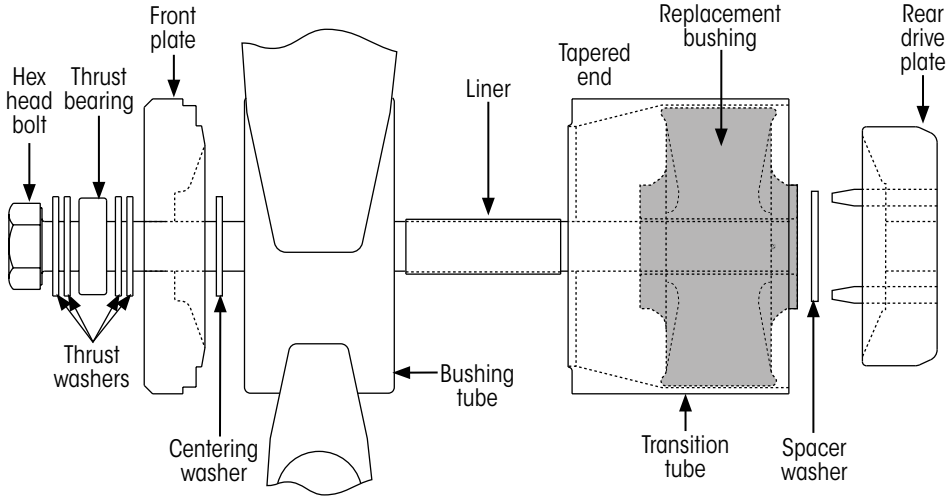


Figure 35: Assembling narrow bushing tool for QF I bushing installation

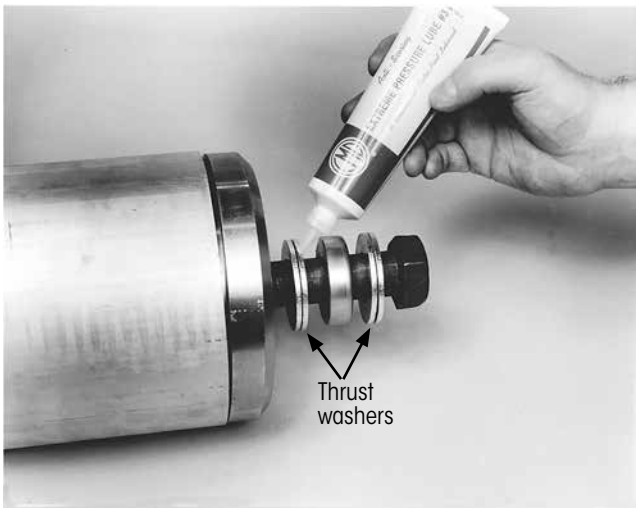


Figure 36: Apply lube to thrust washers

NOTE: **There must be two** lubricated thrust washers on each side of the thrust bearing as shown in Figure 36.

8. **Apply** extreme-pressure lube to external surfaces of the thrust washers (Figure 36).

9. **(Narrow Bushing Tool Only)** If a narrow bushing is being installed, **slide** the plastic liner (Figure 34 and Figure 35 on page 16) onto the hex head bolt. This liner slips inside the bushing and helps maintain the perpendicular relationship between the replacement bushing and the hex head bolt during installation.

INSTALLING BUSHING IN BUSHING TUBE

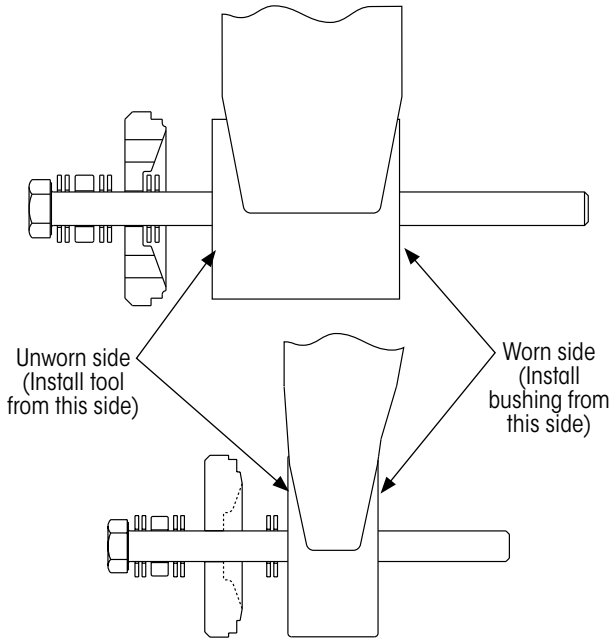


Figure 37: Install bushing from worn (but dressed) side

1. **Insert** the hex head bolt of the partially assembled tool through the bushing tube.

   A. If **no bushing tube wear was detected** in step 2 on page 14, the assembled tool can be inserted into either side of the bushing tube.

   B. If **bushing tube wear was detected** in step 2 on page 14, the assembled tool must be inserted into the unworn side of the bushing tube (Figure 37) so the replacement bushing can be installed from the worn (but dressed) side of the bushing tube.

2. **Orient** the lubricated transition tube as shown on the previous page, with bushing inserted, so the end of the transition tube with the wide tool bearing cup or narrow tool taper is toward the bushing tube.

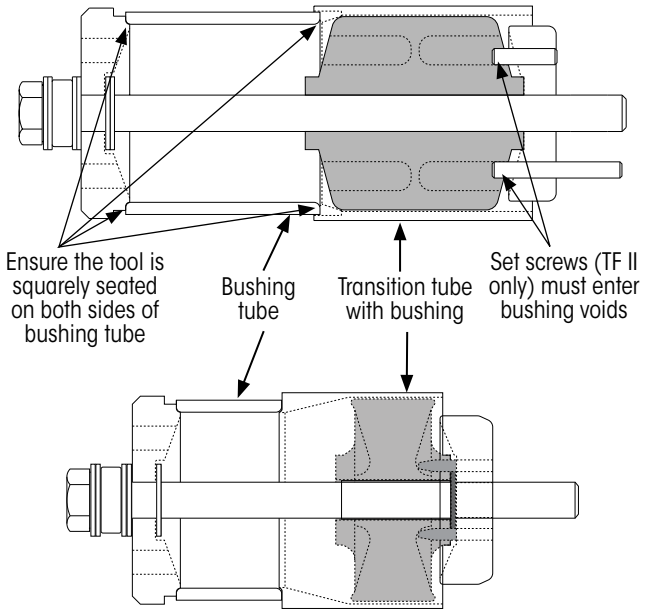


Figure 38: Ensure tool is square on both sides of bushing tube

3. **Slide** the transition tube and bushing assembly onto the hex head bolt and position it to be squarely seated against the bushing tube as shown in Figure 38.

IMPORTANT: The transition tube guides and compresses the bushing as it enters the bushing tube. If the tool and its components are not properly oriented and assembled, the bushing and/or tool will be damaged during installation.

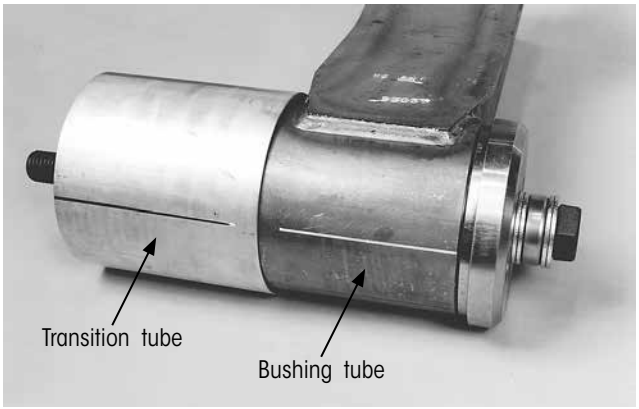


Figure 39: Align lines for proper bushing orientation (TF II bushing tool shown)

For QF I bushing, skip to step 7.

4. **Align** the line drawn on the transition tube (step 1 on page 14) with the line drawn on the bushing tube (step 2 on page 9) as shown in Figure 39.

5. **Ensure** the bushing position locator (Figure 30 on page 15) is aligned with the line on the transition tube and bushing tube (Figure 39).

NOTE: The removal spacer required for bushing removal is not used for bushing installation.

6. **Configure** the set screws in the rear drive plate as follows:

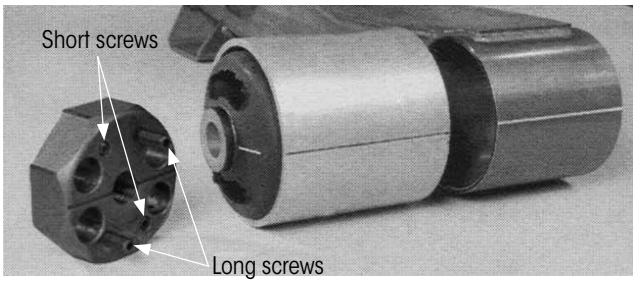


Figure 40: Wide bushing rear drive plate set screws

A. **Wide Bushing Tool**: Thread all four set screws (two and four-inch) into the "HVY" holes in the concave side of the rear drive plate. The **two-inch set screws** should be flush with the flat side of the rear drive plate (Figure 40). The **four-inch set screws** should extend two inches beyond the flat side of the rear drive plate as shown in Figure 22 on page 11.

NOTICE Improperly positioned set screws can jam the tool during bushing installation. Make sure set screws are positioned as stated above.

B. **Narrow Bushing Tool**: The alignment pins in the rear drive plate of the narrow bushing tool (Figure 41) are fixed and cannot be adjusted.

NOTE: **For the QF I bushing**, two pins must be removed from the rear drive plate (Figure 41). This will not effect TF III bushing installation. Refer to Hendrickson literature number T89009 for details.

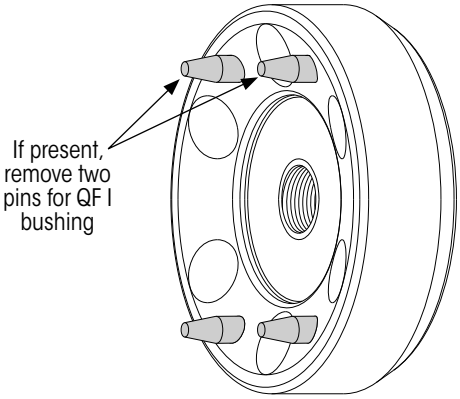


Figure 41: Narrow bushing rear drive plate alignment pins

7. **(QF I only) Slide** the QF I spacer washer (Figure 35 on page 16) onto the hex head bolt.

8. **Thread** the rear drive plate (concave side first) onto the hex head bolt (Figure 3).

IMPORTANT: The set screws (wide bushing tool) or alignment pins (narrow bushing tool) must enter the bushing voids (open areas) to prevent the rear drive plate from turning.

9. **Push** the tool parts together, making sure all components are properly aligned:

A. The front drive plate is squarely seated on one side of the bushing tube.

B. The transition tube is squarely seated on and aligned with the other side of the bushing tube (Figure 39).

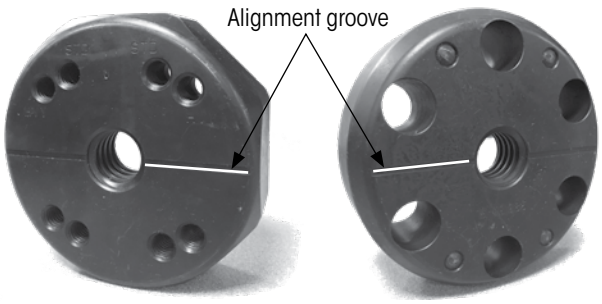


Figure 42: Rear drive plate alignment groove

C. Bushing position locator (Figure 2 and Figure 3 on page 4) aligns with rear drive plate alignment groove.

D. Rear drive plate alignment:

i. Wide and Narrow - Rear drive plate alignment groove (Figure 42) is aligned with lines on the transition tube and bushing tube (Figure 39 on page 18).

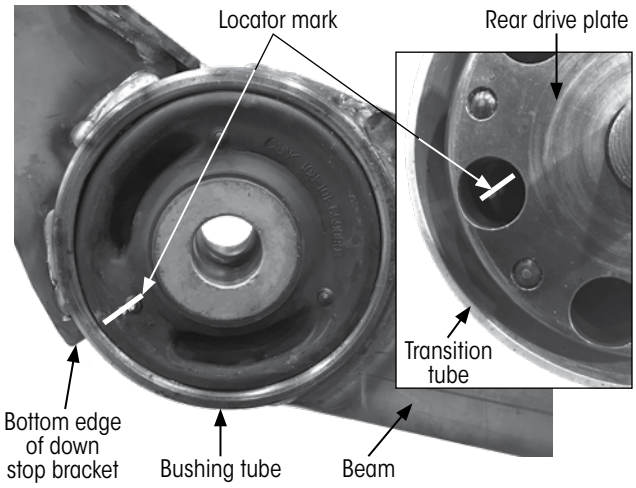


Figure 43: QF I locator mark and orientation

ii. As shown in Figure 43, the QF I bushing is rotated to align the locator mark with the bottom edge of down stop bracket. The locator mark can also be seen through the hole in the rear drive plate while in the transition tube.

10. **Hand tighten** the hex head bolt.

11. **Snug** the hex head bolt with a $1^{11}/_{16}$-inch wrench.

12. **Ensure**:

A. The **tool** is squarely seated on each side of the bushing tube

B. **Set screws**/guide pins are in the bushing voids.

C. **Rear drive plate** is squarely seated on the replacement bushing.

D. The **bushing is correctly orientated**.

NOTICE The thrust bearing (Figure 25 on page 12) needs to be free to turn to prevent binding or damage to the hex head bolt threads during the installation process.

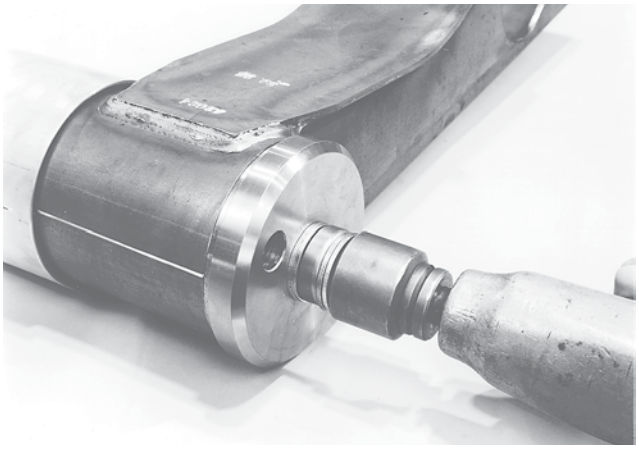


Figure 44: Installing bushing with impact wrench

13. **Using** a $^{3}/_{4}$-inch impact wrench and a $1^{11}/_{16}$-inch heavy-duty (six-point) impact socket, **install** the bushing by turning the hex head bolt clockwise (Figure 44).

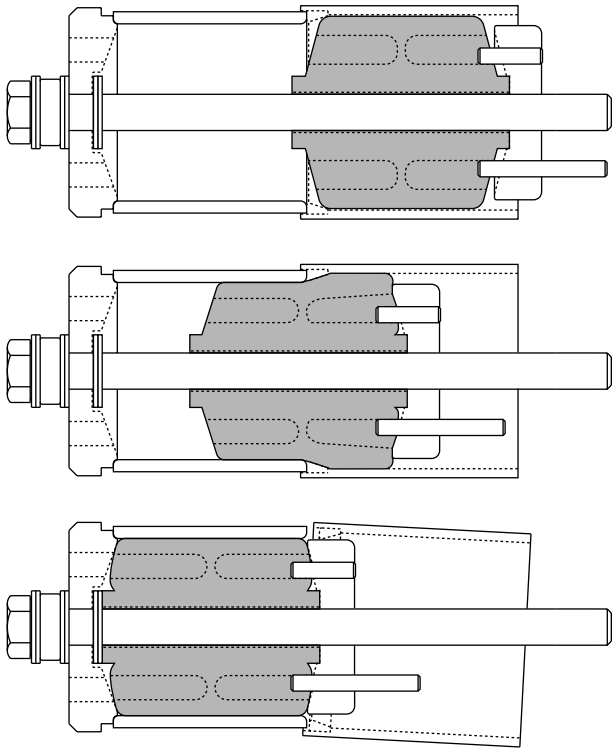


Figure 45: Typical bushing installation progression as hex head bolt is turned

NOTE: When the bushing is approximately halfway in the bushing tube (Figure 45 on page 19), the impact wrench may slow down. After a very short time, the impact wrench will pick up speed again. If all procedures are followed properly, the impact wrench will install the bushing in less than one minute.

NOTICE Do not over torque the hex head bolt. Damage to the hex head bolt, front drive plate or rear drive plate could occur.

IMPORTANT: If the rear drive plate is not sitting squarely on the bushing, rubber will extrude around the sides of the rear drive plate and stop any movement of the bushing. If the impact wrench stops, reverse the impact wrench and squarely reset the rear drive plate on the bushing.

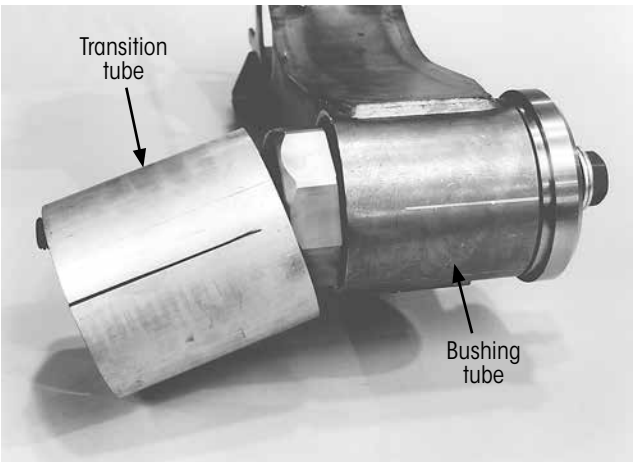


Figure 46: Continue to tighten hex head bolt after transition tube falls away

14. Continue to tighten until the hex head bolt almost stops turning. The transition tube will fall away before the bushing is fully seated in the bushing tube and the hex head bolt stops turning (Figure 46).

⚠CAUTION Do not allow the transition tube to fall to the floor. Transition tube damage or personal injury could result.

15. With the bushing installed, **verify:**
    A. The bushing position locator is aligned with the bushing index mark (Figure 12 on page 9 or with the line drawn on the outside of the bushing tube (Figure 14 on page 9).

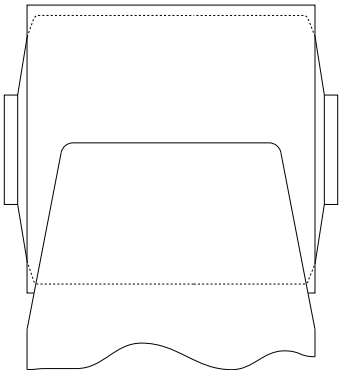


Figure 47: Bushing inner metal centered in bushing tube

    B. The bushing inner metal is centered in the bushing tube.

16. **Disassemble, clean and store** the tool in a clean, dry place.

SUSPENSION REASSEMBLY

After a new bushing is installed, the suspension can be reassembled. Reference Figure 5 and Figure 7 on page 6.

⚠CAUTION Failure to follow these pivot connection assembly procedures and to properly torque the pivot connection fasteners could result in a failed pivot connection and damage to the axle, suspension or trailer.

1. **Place and hold** new bushing tube spacers over the inner metal of the bushing reference Figure 5 on page 5. Refer to Hendrickson literature number L750 *Bushing Tube Spacer Inspection/Replacement Procedure*.

NOTE: Tape can be used to hold spacers in place during beam installation into frame bracket.

NOTICE If more bushing tube spacers than what is recommended are added, the TRI-FUNCTIONAL® Bushing will not have enough room within the frame bracket to function properly and severe damage to the suspension could result.

2. Using a jack, **carefully raise** the suspension beam into place in the frame bracket.

⚠CAUTION DO NOT APPLY anti-seize compound or additional lubricant to pivot connection hardware. A dry lubricant coating has been applied to the threads of the pivot connection bolt and nut. Do not allow undercoating, paint, surface coatings, or any other commonly used compounds to contact the threads of the pivot connection fasteners. These compounds can act like a lubricant, reducing the friction between the threads of the nut and bolt. This can lead to overtightened fasteners, unpredictable pivot connection clamp loads and unreliable axle alignments. Threads should be clean, dry and free of contamination, as supplied by Hendrickson.

⚠CAUTION **DO NOT** apply undercoating, paint or other surface coating to the suspension and frame brackets until after completing the alignment.

IMPORTANT: New pivot connection fasteners must be used for pivot connection reassembly. **DO NOT** tack weld the pivot bolt to the alignment collar.

3. **Reassemble** the pivot connection using one of the following procedures:

   A. **QUIK-ALIGN® Style** Pivot Connection (Figure 5 on page 5): **Reassemble** and align pivot connection as follows:

NOTE: This procedure applies to all QUIK-ALIGN style pivot connections, **except** Y-beam, Y-BEAM PIVOT CONNECTION REASSEMBLY on page 24.

   i. **Place** the concentric alignment collar over the new shear-type pivot bolt.

   ii. **Insert** pivot bolt through inboard side of frame bracket alignment slots, spacers and bushing toward the outboard side till the concentric collar rests squarely against the inboard side of the frame bracket.

   iii. **Slide** the eccentric alignment collar over the threaded end of the pivot bolt on the outboard side.

   iv. **Thread** the nut onto the threaded end of the pivot bolt until snug against the eccentric alignment collar.

IMPORTANT: The above steps are done in preparation for alignment. Be sure the alignment collars pass through the alignment slots and against the frame bracket (Figure 5 on page 5). The pivot bolt will be fully tightened after suspension alignment as part of L579.

   v. **Continue** the QUIK-ALIGN style pivot connection reassembly and alignment as described in Hendrickson literature number L579 *Alignment Procedure*.

   B. **Welded Collar Style Pivot Connection** (Figure 7 on page 6): **Reassemble** the welded collar style pivot connection as follows:

NOTE: For Y-beam welded collar pivot connection installation, refer to Y-BEAM PIVOT CONNECTION REASSEMBLY on page 24.

   i. **Insert** a new $1\frac{1}{8}$-inch heavy hex cap screw from the inboard side of the frame bracket.

ii. **Thread** the nut onto the cap screw and tighten to 800±25 ft. lbs. (1085±30 N·m) of torque [4].

iii. **Tack weld** the nut to the cap screw threads.

4. **Restore** trailer to normal operating condition when complete.

HT™ SERIES Y-BEAM BUSHING REPLACEMENT

HT™ Series Y-beam suspensions differ from other suspension beams because they do not require a frame bracket. The fork or "Y" of the beam connects directly to the trailer frame using the bushing tube sleeve (Figure 48 and Figure 49, item 1).

Removal and installation of the bushing assembly (Figure 48 and Figure 49, item 2) does not require the bushing removal tool.

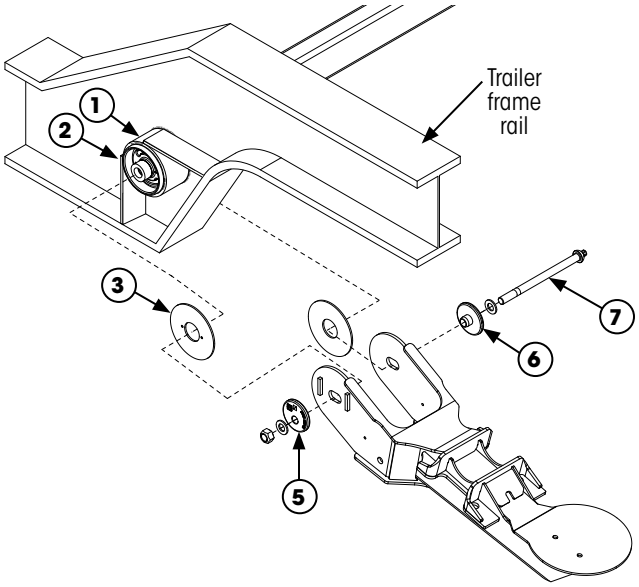


Figure 48: QUIK-ALIGN® pivot connection hardware

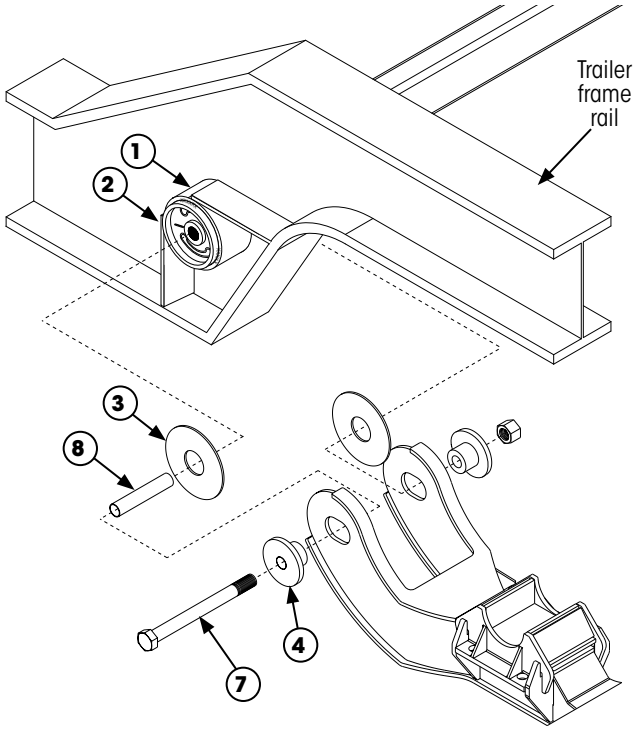


Figure 49: Welded collar pivot connection hardware

ITEM	DESCRIPTION	WELDED	QUIK-ALIGN
1	Bushing tube sleeve	4	4
2	Bushing assembly	4	4
3	Bushing tube spacers (2 ea)	4	4
4	Welded alignment collars (2 ea)	4	
5	Eccentric alignment collar		4
6	Concentric alignment collar		4
7	Hex cap screw (Pivot bolt) and nut	4	4
8	Delrin® liner	4	

Table 3: Y-beam pivot connection hardware list

[4] Refer to Hendrickson literature number B31 Torque Specifications available at www.Hendrickson-intl.com/TrailerLit.

Y-BEAM PIVOT CONNECTION DISASSEMBLY

Removal of the pivot connection hardware for both QUIK-ALIGN® alignment systems is similar to suspensions with frame brackets. For the recommended procedure, refer to QUIK-ALIGN on page 5. Reference Figure 50 and Figure 51.

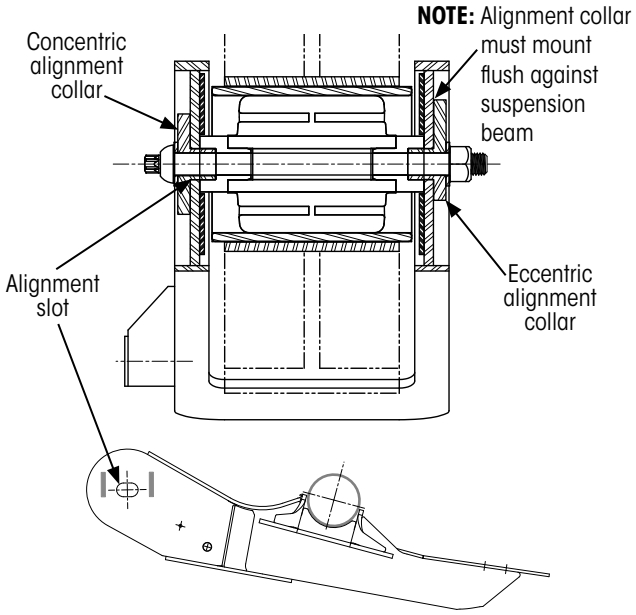


Figure 50: Y-beam QUIK-ALIGN alignment collar pivot connection

However, for welded collar alignment systems, to separate the Y-beam from the trailer frame, the collars must be removed as defined in the following procedure. Reference Figure 50 and Figure 51.

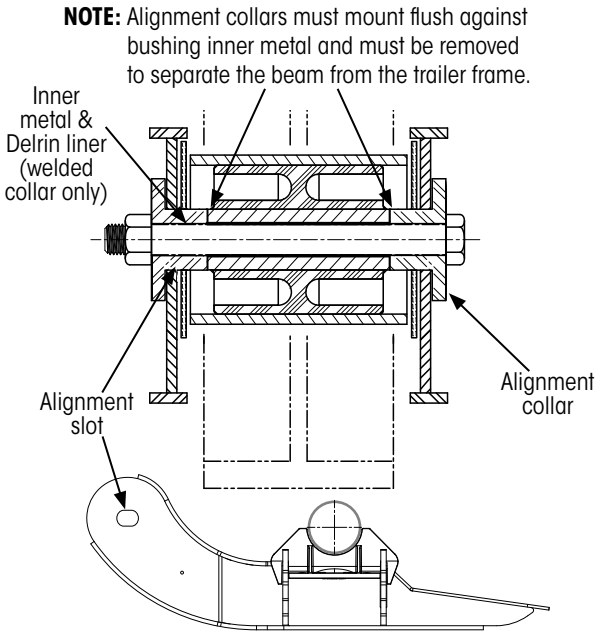


Figure 51: Y-beam Welded alignment collar pivot connection

1. Use a jack or other means to **support** the suspension beam while removing pivot connection hardware.
2. **Cut or grind** the Huck fastener from the Huck bolt (or the nut from the cap screw).
3. **Remove and discard** the bolt and nut.

IMPORTANT: Removal of Y-beam parent material must be avoided.

4. **Carefully grind or cut** the welds securing the inboard and outboard alignment collars to the Y-beam for both bushing assemblies.
5. **Discard** alignment collars.

Y-BEAM BUSHING ASSEMBLY REMOVAL

The bushing assembly should be held in position by four half-inch welds (Figure 53 on page 24) on each end. To remove the bushing assembly:

1. Using the jack, **carefully lower** the suspension beam assembly away from the trailer frame and bushing tube sleeve to expose the bushings.
2. **Discard** the bushing tube spacers.

NOTE: **If within the warranty time period,** The following is recommended at this time as defined in Hendrickson literature number L583 *Comprehensive Warranty Statement*:

- **CONTACTING** HENDRICKSON **prior to service**.
- **SEND photos** to HTTS@hendrickson-intl.com for evaluation.

3. **Grind** away the four welds on each end of the bushing assembly.

NOTE: From a previous bushing replacement, this weld may be 360°. The weld still needs to be removed to replace the bushing assembly.

4. **Slide out and remove** original bushing assembly.

NOTE: If within warranty, **the original bushing assembly must be returned** to Hendrickson for further warranty consideration.

5. **Check** the edge of the bushing tube sleeve.
6. **Clean** as needed prior to installing new bushing assembly.

Y-BEAM BUSHING ASSEMBLY INSTALLATION

This procedure is the same for both QUIK-ALIGN® and welded collar bushing assemblies (Figure 52).

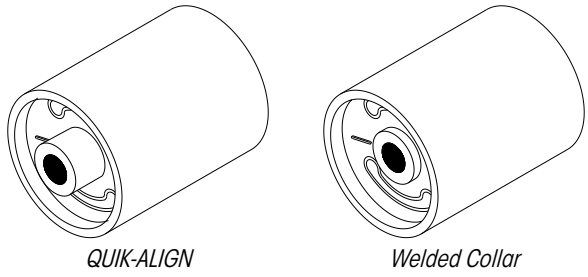


Figure 52: Y-beam bushing assemblies

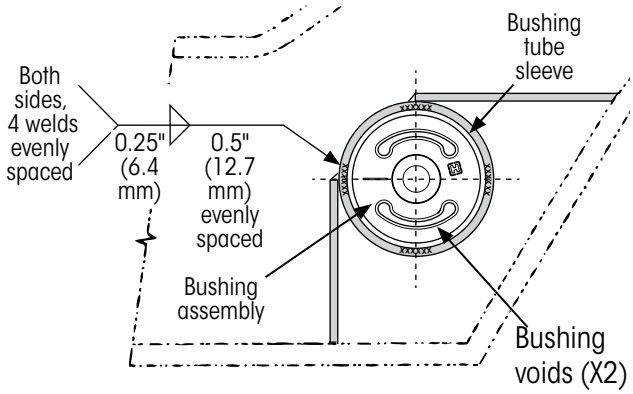


Figure 53: Inserting HT Y-beam bushing assembly

1. **Insert** the new bushing assembly (Figure 52) into the bushing tube sleeve (Figure 53).
2. **Rotate** bushing assemblies so bushing voids are positioned vertically as shown in Figure 53.
3. **Center** bushing assembly in the bushing tube sleeve.
4. **Tack weld** both ends into place.
5. **Weld** the bushing assembly to the bushing tube sleeve, (Figure 53), with four half-inch (12.7 mm) welds. Refer to Hendrickson literature number L64 *Welding Procedures* for weld parameters.

NOTICE Allow adequate cooling between welds to prevent excessive heating of the TRI-FUNCTIONAL® Bushing.

Y-BEAM PIVOT CONNECTION REASSEMBLY

NOTICE Failure to follow these procedures and/or properly torque the pivot bolts at this time can result in a failed pivot connection and a loss of warranty coverage.

1. **Place and hold** new bushing tube spacers over bushing tube sleeves. Refer to Hendrickson literature number L750 *Bushing Tube Spacer Inspection/Replacement Procedure* for details.

NOTE: Tape can be used to hold spacers in place during Y-beam installation into trailer frame.

2. **Lift and position** Y-beam subassembly relative to vehicle frame rail as indicated in Figure 48 or Figure 49.
3. **Reassemble** the pivot connection using one of the following procedures:

⚠CAUTION **DO NOT APPLY** anti-seize compound or additional lubricant to pivot connection hardware. A dry lubricant coating has been applied to the threads of the pivot connection bolt and nut. Do not allow undercoating, paint, surface coatings, or any other commonly used compounds to contact the threads of the pivot connection fasteners. These compounds can act like a lubricant, reducing the friction between the threads of the nut and bolt. This can lead to overtightened fasteners, unpredictable pivot connection clamp loads and unreliable axle alignments. Threads should be clean, dry and free of contamination, as supplied by Hendrickson.

⚠CAUTION **DO NOT** apply undercoating, paint or other surface coating to the suspension and frame brackets until after completing the alignment.

IMPORTANT: New pivot connection fasteners must be used for pivot connection reassembly.

A. **QUIK-ALIGN Style Pivot Connection** (Figure 48 on page 22). **Reassemble** as follows:

i. **Place** the eccentric alignment collar onto the new shear-type pivot bolt.

ii. Working from the outboard side of the trailer, **insert** fastener through Y-beam's alignment slots, spacers and bushing assembly.

iii. **Slide** the concentric alignment collar over the threaded end of the pivot bolt on the inboard side.

iv. **Thread** the nut onto the threaded end of the pivot bolt until snug against the concentric alignment collar.

IMPORTANT: The above steps are done in preparation for alignment. Be sure the alignment collars pass through the alignment slots and against the Y-beam. The pivot bolt will be fully tightened after suspension alignment as part of L579.

B. **Welded Collar Style Pivot Connection**

Welded collars were removed and discarded during pivot connection disassembly. New collars are required for this procedure. Refer to Figure 7 on page 6, Figure 49 on page 22 and Figure 51 on page 23.

i. **Insert** provided Delrin® liner (Table 3 on page 22, item 8) through the alignment slot and bushing inner metal (Figure 49 and Figure 51).

ii. **Place** a new alignment collar onto a new $1^{1}/_{8}$-inch heavy hex cap screw.

iii. Working from the outboard side of the trailer, **insert** fastener, with collar, through the Y-beam's alignment slots, spacers and bushing assembly (toward center of trailer).

iv. **Place** new inner alignment collar onto the threaded end of the cap screw.

v. **Thread** the new $1^{1}/_{8}$-inch lock nut onto the cap screw and tighten to 800±25 ft. lbs. (1085±30 N·m) of torque [5].

vi. **Tack weld** the nut to the cap screw threads.

4. The HT Y-beam suspension/axle is now ready for alignment. Complete the pivot connection assembly according to alignment procedures listed in Hendrickson literature number L579.

5. **Restore** trailer to normal operating condition when complete.

[5] Refer to Hendrickson literature number B31 Torque Specifications available at www.Hendrickson-intl.com/TrailerLit.

NOTES:

NOTES:

Actual product performance may vary depending upon vehicle configuration, operation, service and other factors.

*Call Hendrickson at **866.RIDEAIR (743.3247)** for additional information.*

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L427 Rev J 08-23 CN 041552 Rev H 02-19 ECN 31886 Rev G 10-17 ECN 30561 Rev F 04-16 ECN 24823 Rev E 02-08 ECN 16334

Printed in United States of America