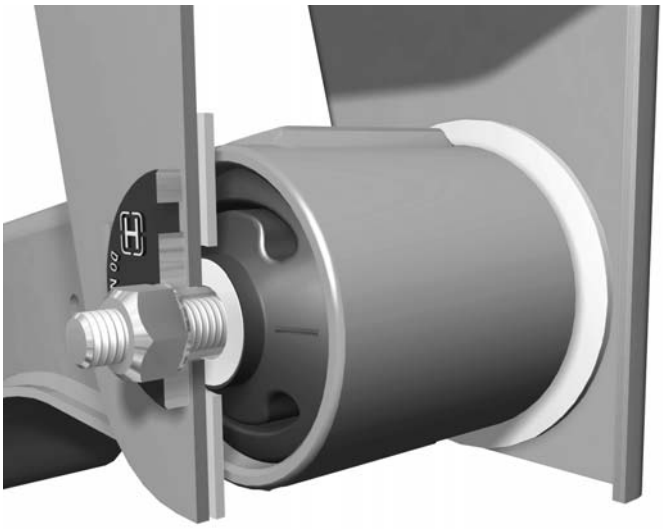
TECHNICAL PROCEDURE

TRI-FUNCTIONAL® BUSHINGS

SUBJECT: Bushing Tube Spacer
Inspection / Replacement Procedure

LIT NO: L750

DATE: August 2005 **REVISION:** A



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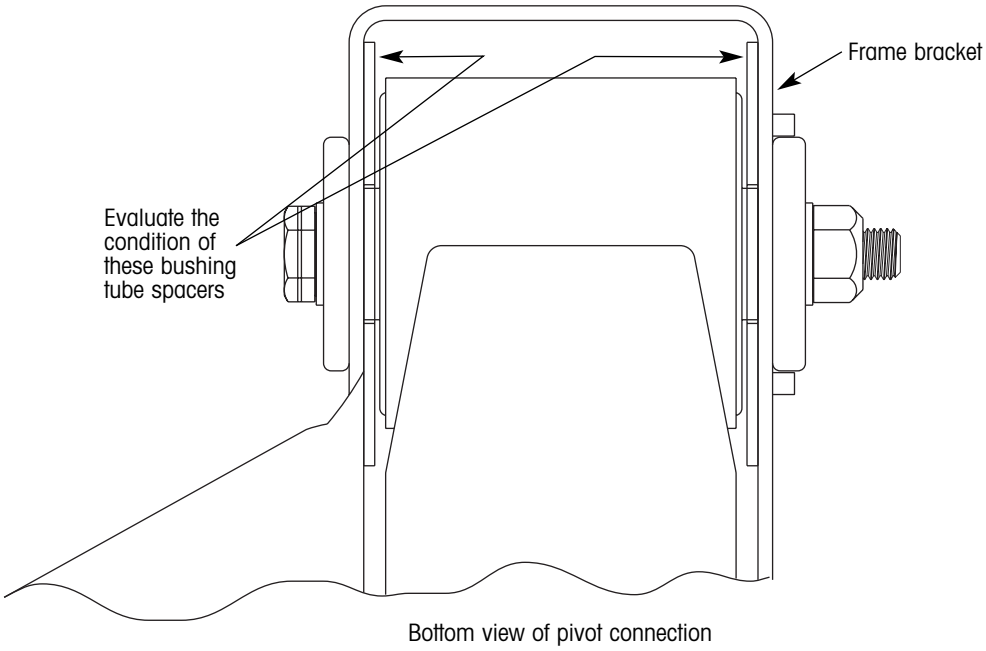
For The Road Ahead™

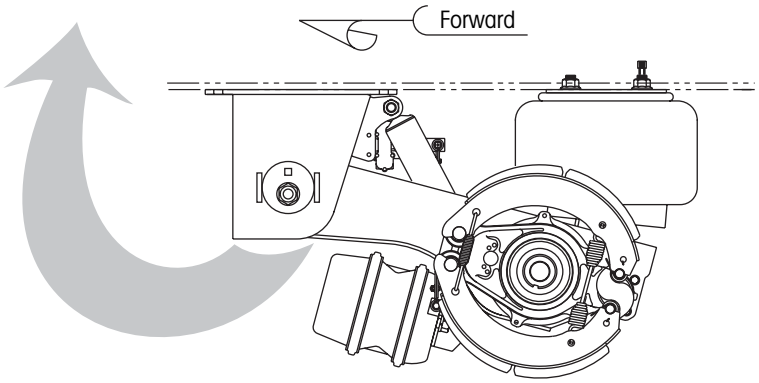
HENDRICKSON®

INSPECTING THE BUSHING TUBE SPACERS

Periodic inspections are an important part of your air suspension maintenance routine. Of particular inspection importance are the bushing tube spacers, which are located inside the frame brackets on each side of the TRI-FUNCTIONAL® BUSHING. A typical inspection should include an evaluation of all bushing tube spacers on the trailer.



Bottom view of pivot connection



During this inspection, you should visually verify that the bushing tube spacers are intact and that they are not missing, cut, worn-through or otherwise deteriorated. Due to the pivoting motion inherent with this connection, some bushing tube spacer wear is expected. Bushing tube spacer "cupping", where the bushing tube spacer forms around the bushing tube and resembles a shallow dish, is also normal. If you see these conditions, then no further inspection is required at this time. Your bushing tube spacers are in serviceable condition.

However bushing tube spacer "wear through", where the bushing tube spacer is completely missing or has been cut or worn-through, is considered abnormal. If an inspection reveals missing, cut or worn-through bushing tube spacers, a closer, more detailed inspection (detailed on the following pages) is required to prevent more serious or costly problems and to prolong the life of the suspension.

The following page illustrates these bushing tube spacer concepts with some typical examples.

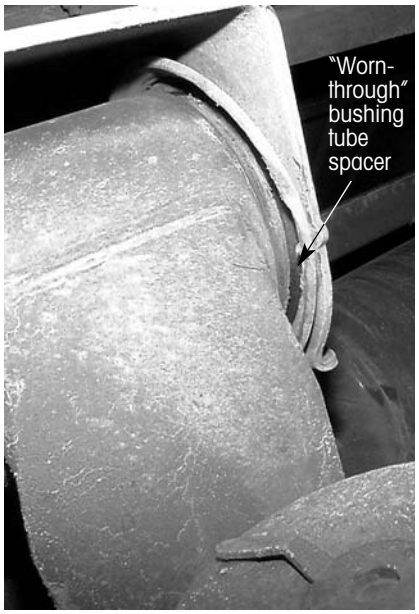
NORMAL

Normal bushing tube spacer

"CUPPED" — ALSO NORMAL

An example of a "cupped" bushing tube spacer. Friction-generated heat causes the spacer to "form" or "cup" around the bushing and bushing tube. This is normal as long as the bushing tube spacer remains intact and does not become cut or worn-through.

"WORN-THROUGH" — ABNORMAL



Examples of "worn-through" bushing tube spacers. The spacer on the right is an example of extreme wear. Its circumference has been completely trimmed by the bushing tube.

This document, along with the following Hendrickson publications, comprise the complete set of bushing, bushing tube and bushing tube spacer inspection, evaluation and replacement information:

L427, Bushing Replacement Procedure
B106, Pivot Bushing Inspection Procedure

However the bushing tube spacer inspection, evaluation and replacement information in this document focuses entirely on the 6¾-inch wide bushing. If your suspension has $3^5/_8$-inch wide bushings, contact the Hendrickson technical service department at 800-455-0043 in the United States or 800-668-5360 in Canada for complete $3^5/_8$-inch wide bushing tube spacer inspection, evaluation and replacement details.

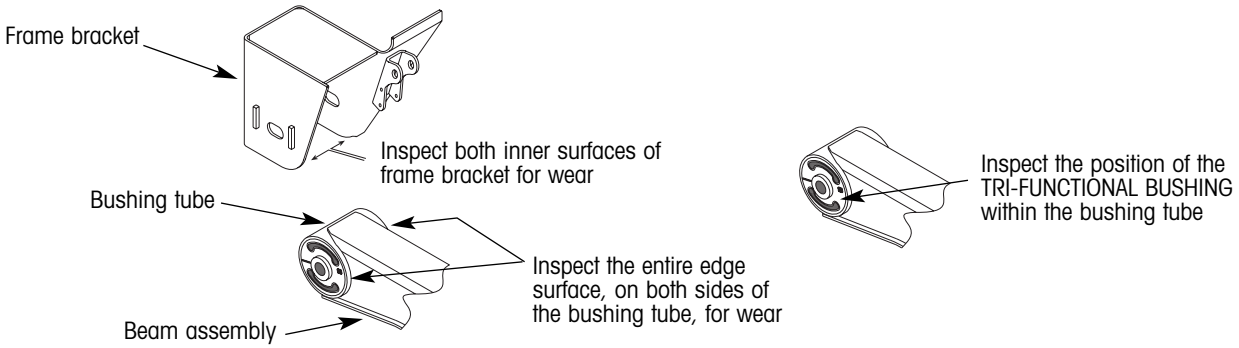
These Hendrickson publications, and any others that may be referenced on the following pages, are available as free downloads from www.hendrickson-intl.com.

IF BUSHING TUBE SPACER "WEAR THROUGH" IS FOUND

If a missing, cut or otherwise worn-through bushing tube spacer is discovered, the suspension pivot connection must be disassembled and the beam assembly lowered to check for potential beam and/or frame bracket wear. Refer to L427, *Bushing Replacement Procedure* for complete pivot connection disassembly instructions.

⚠ WARNING: CHOCK THE TRAILER WHEELS AND APPLY THE TRAILER PARKING BRAKES SO THAT IT CANNOT MOVE DURING DISASSEMBLY.

With the beam assembly lowered, inspect the inner surfaces of the frame bracket and the edges of the bushing tube for wear. Also inspect the position of the TRI-FUNCTIONAL® BUSHING within the bushing tube. The condition of these three areas will dictate the repair requirements or the necessity to replace any parts as instructed in the table on page six.

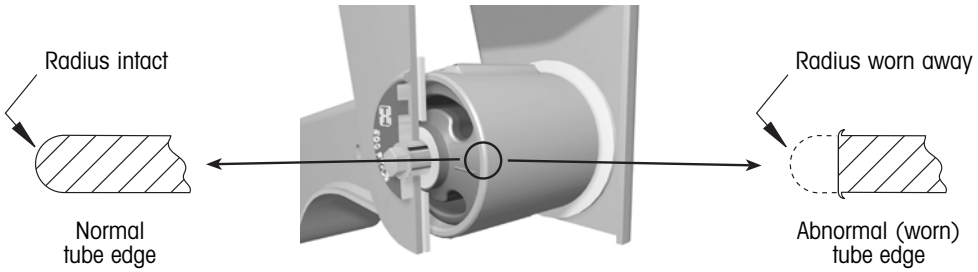


EVALUATING FRAME BRACKET WEAR

Some wear (polished metal) on the inner surface of the frame bracket is considered normal, due to the pivoting motion inherent with this connection. Gouges or grooves worn into the frame bracket are abnormal. If any gouges, grooves or missing metal is found, the frame bracket must be replaced. Refer to L341, *INTRAAX® Installation Procedures*, for complete frame bracket replacement instructions on INTRAAX and VANTRAAX® suspensions or L577, *HT/HS/HK Installation Procedures*, for frame bracket replacement instructions on HT, HS or HK suspensions. After the frame bracket evaluation is complete, the next step is to evaluate bushing tube wear.

EVALUATING BUSHING TUBE WEAR

Some wear (polished metal) on the edge of the bushing tube is considered normal, due to the pivoting motion inherent with this connection. Missing metal, where the bushing tube's radius edge has been worn away, is

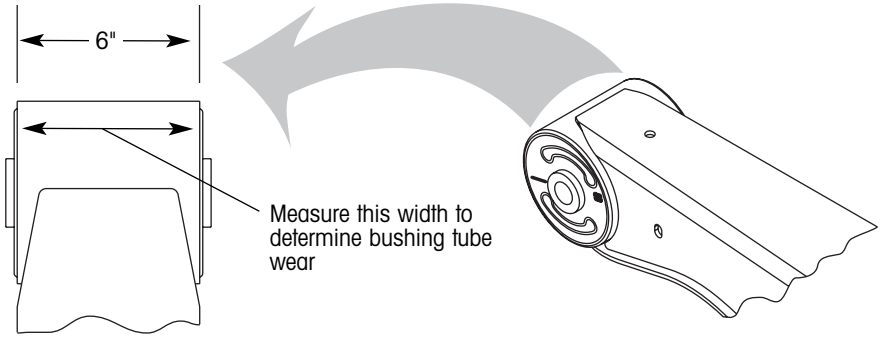


considered abnormal. If you see this kind of wear, the next step is to determine how much wear has occurred and whether the edge can be repaired or whether the beam assembly (or HALF-TRAAX) must be replaced.

The wide bushing tube, when new, has a nominal width of six inches. The amount of bushing tube wear can be determined by measuring the width of the worn bushing tube and subtracting this measured dimension from the new tube width. For example, suppose your inspection reveals extensive bushing tube wear and the

New (unworn) wide bushing tubes have a nominal width of 6"

New (unworn) narrow bushing tubes have a nominal width of $3^{1}/_{8}$". Contact the Hendrickson technical service department at 800-455-0043 in the United States or 800-668-5360 in Canada for complete details on determining narrow bushing tube wear.



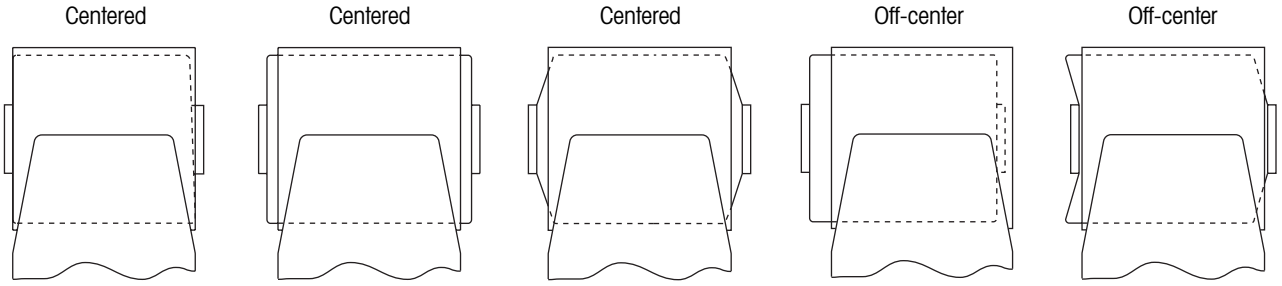
bushing tube measures five and fifteen-sixteenths inches. Subtracting five and fifteen-sixteenths from six reveals the amount of bushing tube material that has worn away, in this case one-sixteenth of an inch.

$$6" - 5^{15}/_{16}" = {}^{1}/_{16}"$$

After the amount of bushing tube wear has been determined, the next step is to evaluate the bushing position within the bushing tube.

EVALUATING BUSHING POSITION WITHIN THE BUSHING TUBE

For evaluation purposes, the TRI-FUNCTIONAL® BUSHING is considered either centered or off-center with respect to the bushing tube. The TRI-FUNCTIONAL BUSHING is considered off-center when a portion of it extends outside of the bushing tube on one side and not on the other. Some typical examples are shown below.



Typical examples of bushing position relative to the bushing tube (not representative of every possible case).

The TRI-FUNCTIONAL BUSHINGS will flex and elongate within the bushing tube to control the forces generated by braking, accelerating, irregular road surfaces, etc. Because of this, it may be difficult at times to tell the difference between normal bushing operation and an off-center bushing. 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. However, if a bushing tube spacer is worn-through, the potential exists for an off-center condition (as described above).

Now that each component has been evaluated, refer to the table on page six for repair recommendations.

REPAIR RECOMMENDATIONS

Now that each pivot connection component has been evaluated (because missing, cut or otherwise worn-through bushing tube spacers were found), use the following table to determine the correct repair action. Do not add more bushing tube spacers than what is recommended in the table. A slight degree of freedom is required by the TRI-FUNCTIONAL® BUSHING within the frame bracket to flex, elongate and otherwise absorb forces generated by braking, accelerating and irregular road surfaces. **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.**

IF THE BUSHING TUBE MEASURES:	AND THE BUSHING IS:	THEN:
6" (NO WEAR ON THE BUSHING TUBE)	Centered [1]	1. Replace both bushing spacers and realign the axle.[2]
	Off-center [1, 3]	1. Install new bushing.[4] Refer to L427, *Bushing Replacement Procedure,* for complete instructions. 2. Replace both bushing spacers and realign the axle.[2]
5 7/8" TO 6" (WEAR UP TO 1/8" ON THE BUSHING TUBE)	—	1. Remove existing bushing and dress the radius on the bushing tube edge according to the instructions in this bulletin. 2. Install new bushing.[4] Refer to L427, *Bushing Replacement Procedure,* for complete instructions. 3. Replace both bushing spacers and realign the axle.[2]
5 3/4" TO 5 7/8" (WEAR OF 1/8" TO 1/4" ON THE BUSHING TUBE)	—	1. Remove existing bushing and dress the radius on the bushing tube edge according to the instructions in this document. 2. Install new bushing.[4] Refer to L427, *Bushing Replacement Procedure,* for complete instructions. 3. Install two new replacement bushing tube spacers, part number S-21099, one on each side of the bushing tube.[5] Realign the axle.[2]
LESS THAN 5 3/4" (MORE THAN 1/4" OF WEAR ON THE BUSHING TUBE)	—	1. Replace the HALF-TRAAX or the beam assembly. Refer to L533, *HALF-TRAAX Axle and Beam Removal/Replacement Procedure,* for complete HALF-TRAAX replacement instructions or L577, *HT/HS/HK Installation Procedure,* for complete beam replacement instructions. 2. Replace both bushing spacers and realign the axle.[2]

[1] Refer to the paragraph titled "EVALUATING BUSHING POSITION WITHIN THE BUSHING TUBE" for centered/off-center bushing definitions.

[2] Refer to L579, *Alignment Procedure,* for complete axle alignment instructions.

[3] DO NOT attempt to center an off-center bushing. There is no acceptable procedure, and any attempt will likely do more harm than good. Simply remove the off-centered bushing and install a new one.

[4] Install the new bushing from the worn side of the bushing tube. Refer to the paragraph titled "INSTALLING THE NEW BUSHING" for complete details.

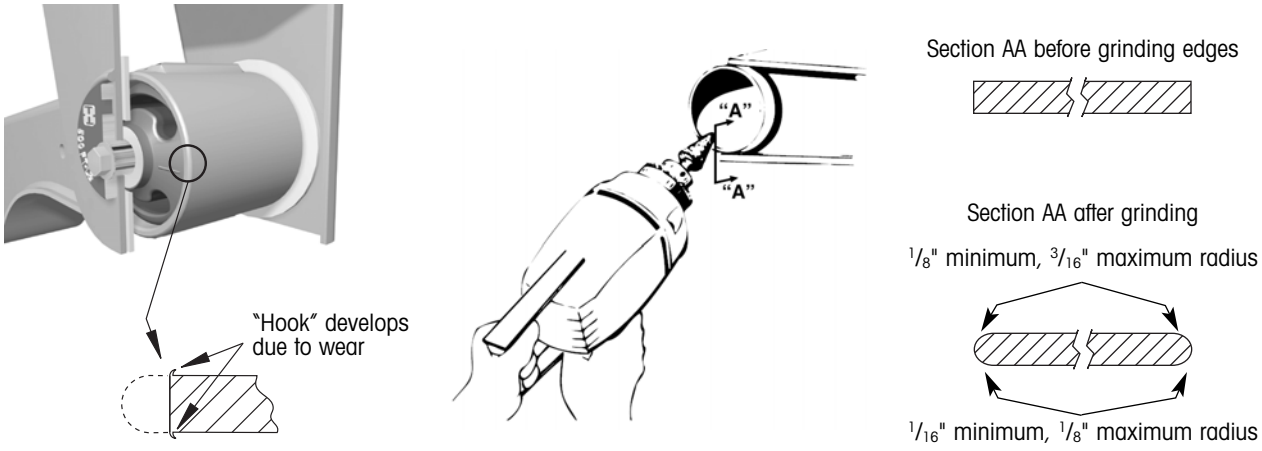
[5] Refer to the paragraph titled "REPLACEMENT BUSHING TUBE SPACER ORIENTATION" on page 8 for installation details.

BUSHING TUBE EDGE DRESSING

As described in the repair recommendations table, it is acceptable to reuse the bushing tube when ¼-inch of wear or less is observed. **However, the bushing tube edge must be dressed before the new bushing is installed.**

When the bushing tube wears, a slight "hook" or "tooth" of metal may develop on both inside and outside diameters of the tube. As the vehicle turns, the unique design of the TRI-FUNCTIONAL® BUSHING allows it to elongate slightly 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 (unacceptable). As this is repeated, the TRI-FUNCTIONAL BUSHING will eventually be pulled out of the bushing tube. The rubber TRI-FUNCTIONAL BUSHING may also become damaged by these irregular edges.

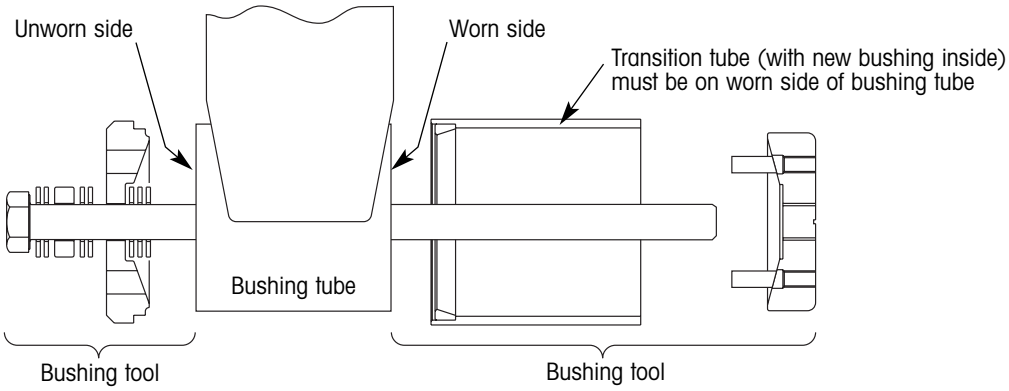
Before attempting to install a new bushing, the worn bushing tube edge must be dressed. Use a grinder to re-establish a radius on the edge of the bushing tube as shown below.



⚠WARNING: AFTER REASSEMBLY, REMOVE WHEEL CHOCKS AND RELEASE THE TRAILER PARKING BRAKES BEFORE MOVING THE TRAILER.

INSTALLING THE NEW BUSHING

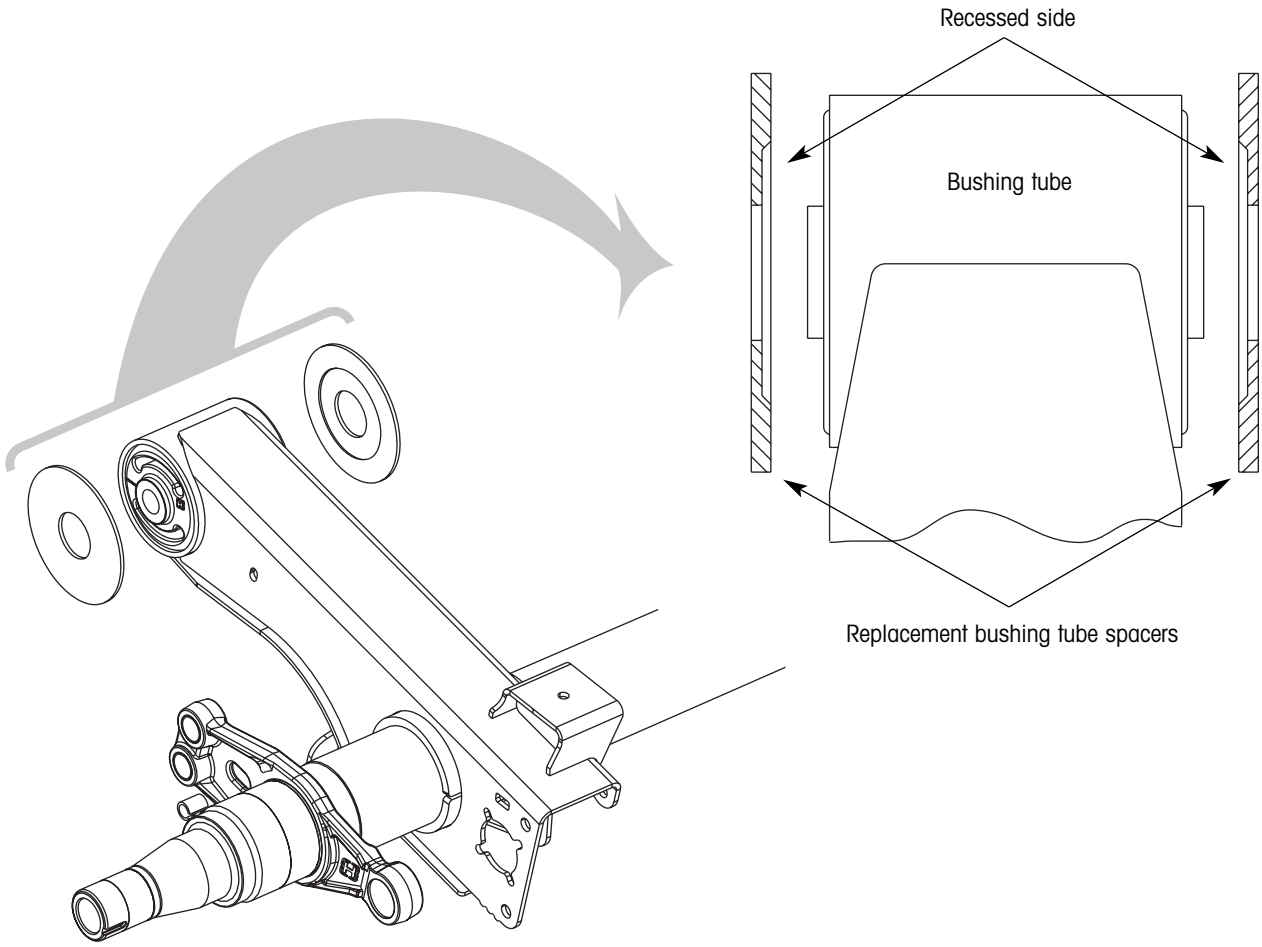
The new bushing must be installed from the worn side of the bushing tube. After the bushing tube edge and inside surface have been properly prepared, assemble the bushing tool as shown below so the new bushing is installed from the worn side of the bushing tube. Refer to L427, *Bushing Replacement Procedure,* for complete bushing tool and bushing replacement details.



Call the Hendrickson technical services department at 800-455-0043 in the United States or 800-668-5360 in Canada for additional technical support.

REPLACEMENT BUSHING TUBE SPACER ORIENTATION

When installing the replacement bushing tube spacers (part number S-21099), make sure the recessed side of each spacer faces the bushing tube as shown below.



Replacement bushing tube spacers

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L750 Rev A 08-05

Printed in United States of America