



LIT NO: 97117-135

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REVISION: F

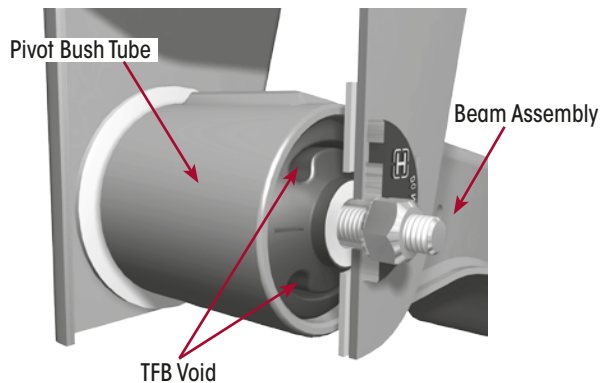


Figure 1: Pivot Bush Assembly

The TRI-FUNCTIONAL™ Bush (TFB™) is a key factor in both ride quality and roll stability of Hendrickson INTRAAX® and HT™ suspensions. The bush voids allow articulation that provides exceptional control during turning and roll events. The design of the bush and the void contours enhance the axle's ability to act as a torsion bar resisting trailer roll forces. Refer [Figure 1](#).

NOTICE: Under no circumstances should a shaker table or extended iron pry bar be used as a method to determine the functionality or serviceability of a TRI-FUNCTIONAL Bush. Shaker tables merely demonstrate the ability of the TFB to absorb the primary road forces, whilst an iron bar compresses the TFB at the void area.

Depending on the age of the suspension, the used bush may experience various states of fatigue that could include surface cracks or cracks forming between voids. However, the pivot bush may still have many years of service life remaining. Therefore, functionality and serviceability of the Hendrickson TFB must be determined through the inspection procedures detailed in this publication.

When inspecting the TRI-FUNCTIONAL pivot bushes it is important not to neglect checking the pivot spacer washers. These spacers are designed to reduce bush movement under lateral loads, which therefore minimises compliance steer and is essential for good ride performance.

INSPECTION

Periodic inspections are an important part of your air suspension maintenance routine. Of particular importance is the pivot bush, which is housed within the beam assembly's bush tube. All such inspections should include an evaluation of all pivot bushes on the trailer.

Refer to Hendrickson trailer suspension maintenance manual [97117-161](#) for detailed trailer suspension maintenance intervals and processes. TRI-FUNCTIONAL Bush replacement procedures are detailed in manual [L427](#).

Hendrickson does not recommend disassembling the pivot connection for general pivot bush inspection. The recommended procedure is to make measurements of the relationship between the beam tube and the frame bracket.

On an unloaded trailer, measure from the bottom of the beam assembly to the bottom of the frame bracket. As shown in [Figure 2](#).

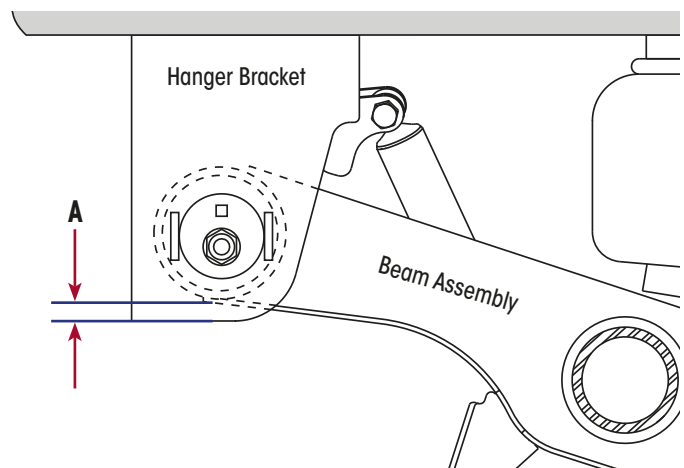


Figure 2: Pivot Bush Inspection

- If the measurement at A is less than or equal to the 19 mm, then the bush is OK.
- If A is greater than 19 mm, then the pivot connection must be disassembled and the beam assembly lowered to more closely inspect the bush.

It is important to take the measurement at the correct position, to get an accurate reading. Place a straight edge or steel ruler across the frame bracket, underneath the pivot bolt, just past where the beam assembly is welded onto the bush tube. (Refer [Figure 3](#)). A measurement should then be taken between the straight edge and beam assembly.

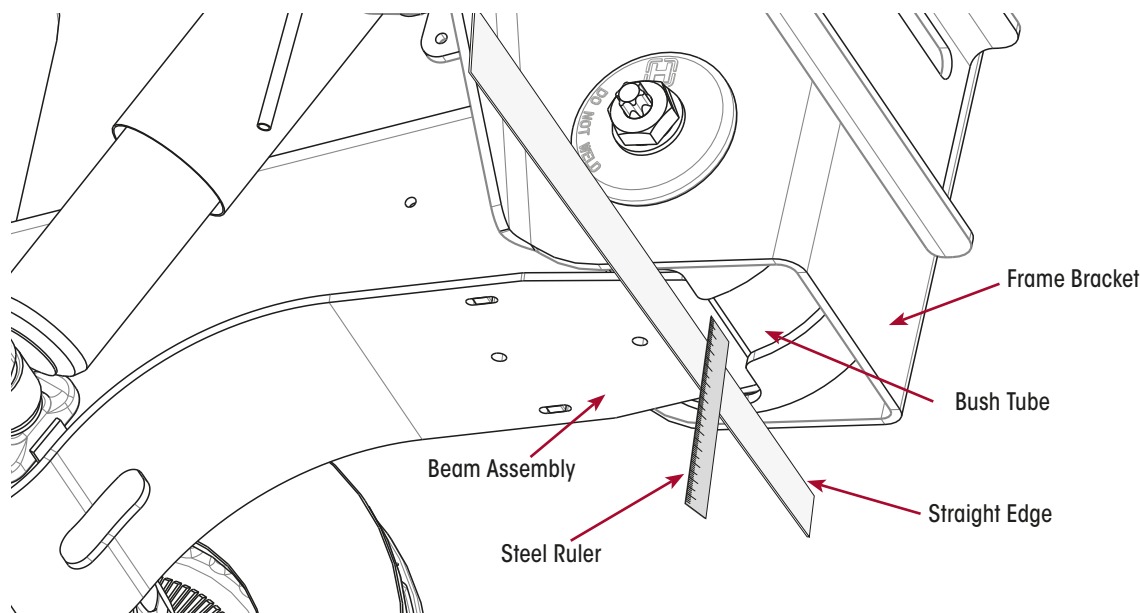


Figure 3: Measuring Pivot Bush

The pivot bush can be inspected from underneath the trailer without disassembling the pivot connection. With the trailer wheels chocked and the trailer properly supported, look up at the bush tube and inspect the side of the tube that offers more access, or in other words, has the larger gap between the bush tube and the frame bracket. Use a screwdriver to push the bush tube spacer against the frame bracket and out of the way so a portion of the pivot bush can be seen. Use a torch to illuminate and inspect the end of the pivot bush. Refer [Figure 4](#).

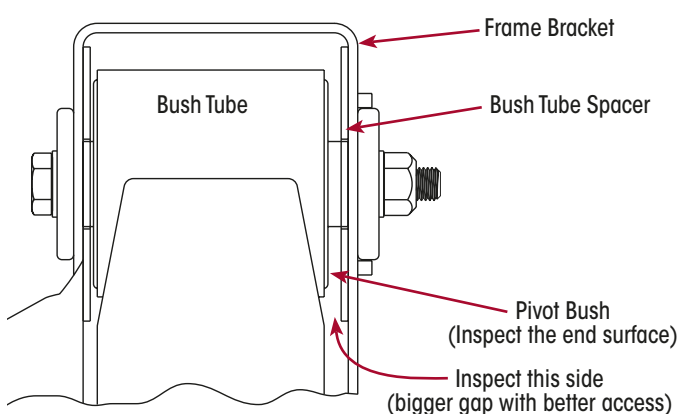


Figure 4: Pivot Bush Visual Inspection

During this inspection, look specifically at the bush voids (the “cavities” or “holes” in the end of the rubber bush material). In most cases, it will not be possible to clearly see both top and bottom voids, but enough of the bush can be seen to make an evaluation. By design, the bush voids will be at the 12-o’clock and 6-o’clock positions (± 5 degrees) when the suspension is at the designed ride height.

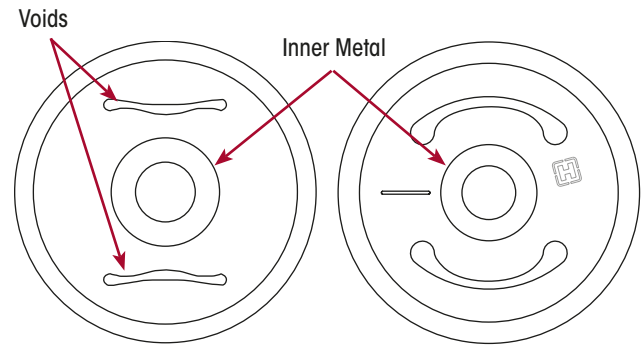
NOTES:

- Trailer Must Be Unloaded before Measuring.
- Checking the bush for movement with a large metal bar is not a true gauge of bush serviceability, because the TRI-FUNCTIONAL™ bush is designed to ‘give’ in service.
- Mechanical testing devices, such as shaker tables, cannot be used to check TRI-FUNCTIONAL bushes due to their inherent elasticity.

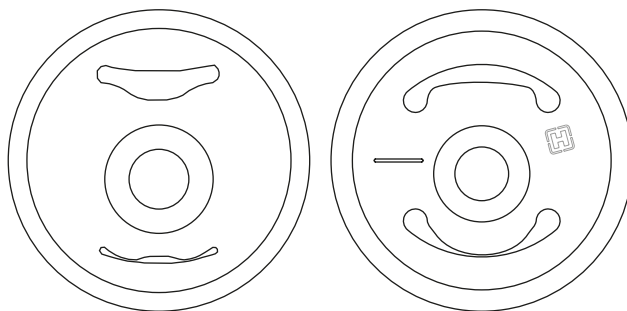
The pivot bushes will typically “settle” in the vertical direction upon suspension installation. It is normal for the voids to have this “settled” appearance (**Figures B & C**) due to cargo and the weight of the trailer loading the bush.

However, cracks in the rubber extending between the void and the bush’s inner metal or an excessive amount of vertical movement (**Figures D and E**) can indicate that the bush may need to be replaced.

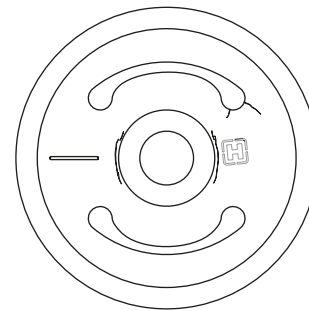
If you do not see an excessive amount of vertical movement (based upon your normal application and experience) or



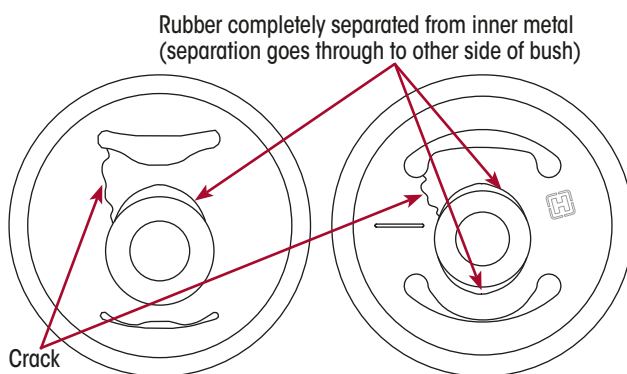
A. Newly Installed Bush



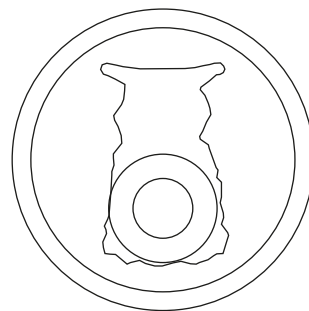
B. Normal appearance of an in-service bush



C. Serviceable used bush



D. Bush in need of replacement (cracks)



E. Bush in need of replacement (inner metal separation)

cracks in the rubber extending between the void and the bush’s inner metal, then no further inspection is required at this time. The bushes are in a serviceable condition.

The appearance of smeared blackened rubber or hanging strands of rubber around the bush tube edges or bush tube spacers is a sign the bush is heating up and melting. The source is likely to be continuous rapid vibration induced into the bush through the beam. It is usually caused by an imbalanced wheel-end on the same side as the affected bush. A wheel-end can be out of balance due to a number of reasons that will require further inspections for diagnosis. These reasons may include issues with the tyre(s), improper assembly, dropped or out-of-round drum, mud or debris collected on the rim and non-functioning shock absorber.

SPACER INSPECTION



Periodic inspections of the TRI-FUNCTIONAL™ bush tube spacers are an important part of your air suspension maintenance routine. A typical inspection should include an evaluation of all bush tube spacers on the trailer.

Visually verify that the bush 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 bush tube spacer wear is expected. Bush tube spacer “cupping”, where the bush tube spacer forms around the bush tube and resembles a shallow dish, is also normal. If you see these conditions, then no further inspection is required at this time. Your bush tube spacers are in serviceable condition. Refer [Figure 5](#).





However bush tube spacer “wear through”, where the bush tube spacer is completely missing or has been cut or worn-through, is considered abnormal. If these conditions exist, a closer, more detailed inspection is required to prevent more serious or costly problems and to prolong the life of the suspension.

NORMAL
Serviceable





An example of a normal bush tube spacer in a good and serviceable condition.

CUPPED
Serviceable



An example of a cupped bush tube spacer. Friction-generated heat causes the spacer to form or cup around the bush and tube. This is normal and serviceable provided that the bush tube spacer remains intact and does not become cut or worn-through.

WORN THOUGH
Unserviceable



Examples of worn-through bush tube spacers. This spacer is an example of extreme wear. Its circumference has been completely trimmed by the bush tube. The spacer is not in serviceable condition.

Figure 5: Spacer Inspection

Revisions Table

DATE	REV	PAGE	DESCRIPTION
Mar-2023	F	All	Rationalise document.

Actual product performance may vary depending upon vehicle configuration, operation, service and other factors.
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.
Contact Hendrickson for additional details regarding specifications, applications, capacities, and operation, service and maintenance instructions.

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