

TECHNICAL PROCEDURE

TRAILER SUSPENSION SYSTEMS

SUBJECT: Alignment Procedures

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TOOLS AND EQUIPMENT

The following tools and equipment are necessary to complete the procedures within this publication:

- 50-foot (minimum) tape measure with $\frac{1}{8}$ -inch increments
- 12-foot (minimum) tape measure with $\frac{1}{16}$ -inch increments (or a trammel bar)
- $\frac{1}{2}$ -inch breaker bar or ratchet
- Impact wrench capable of 600 ft-lbs torque minimum
- 1-inch drive E20 Torx socket (Hendrickson P/N A-24536 recommended) or $\frac{3}{4}$ -inch drive (Hendrickson P/N A-24303)
- $1\frac{7}{16}$ -inch shallow impact socket
- $1\frac{7}{16}$ -inch combination wrench
- Tire changing equipment (as needed)
- Kingpin hoop

The following tools and equipment are optional. There are many types of alignment equipment available, however Hendrickson does not recommend any particular equipment method. If purchasing alignment equipment, consider its portability, repeatability, training, etc. These tools will simplify doing the procedures and improve the accuracy of the measurements.

- Kingpin extender (or pogo stick)
- Wheel-end (or spindle) extenders
- Tape tensioning device
 - Fish (or engineering) scale
 - Clamp
 - Laces or string
- Level

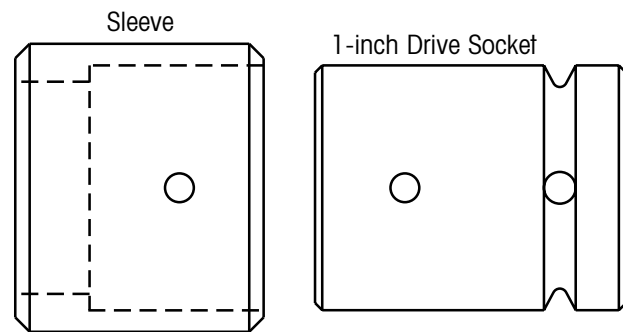
DRIVE SOCKET

The 1-inch drive socket (Hendrickson P/N A-24536) or a vendor equivalent (Camcar TX-8120 or Strong Tools E-20 T.S.) are available for the new pivot-connection hardware. To avoid damaging the torx head on the shear bolt, the drive socket must fully engage it.

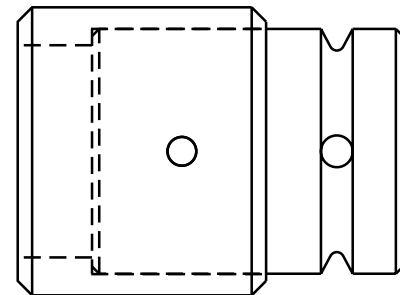
IMPORTANT: While a $\frac{3}{4}$ -inch drive socket is available, Hendrickson Trailer does not recommend its use with the pivot-connection, shear-type bolt. The $\frac{3}{4}$ -inch drive socket can back off the torx-head splines during the shearing process and may strip the torx-head splines. When damage occurs to the torx-head splines, the proper torque and clamp load cannot be achieved.

In higher-volume trailer production environments, a sleeve can be installed onto the socket (Figure 1). The sleeve supports the tooling by riding over the torx head of the shear-type bolt and flash material. A local fabrication shop can make the sleeve by using the dimensioning information (Figure 2).

If you have questions about this product, please contact your Hendrickson representative for further information

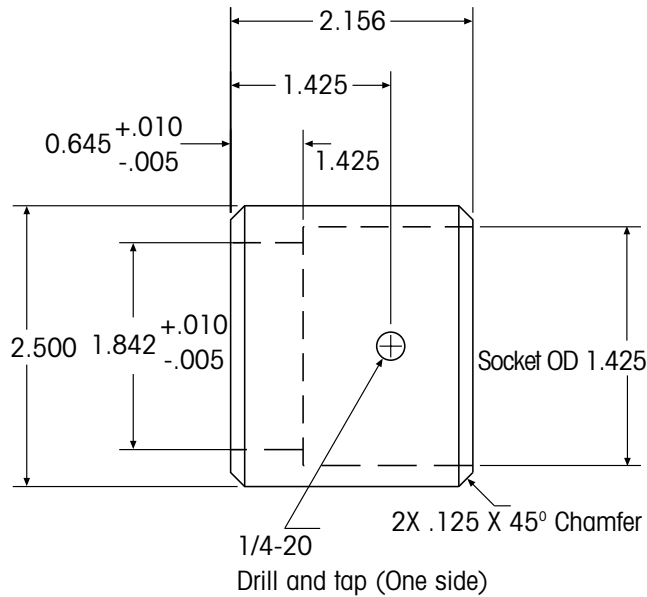


Drive Socket and Sleeve Uninstalled



Drive Socket and Sleeve Installed

Figure 1. 1-inch drive socket and sleeve



Measurements are in inches.

Figure 2. Sleeve dimensions

NOTES:

1. Sleeve undersized by .004; shrink fit socket into sleeve OD.
2. Drill and tap assembly for 1/4-20 x .25 (oval point) standard hex socket set screw.
3. Material: Ø2.500 6150 H.R.S.
4. Heat treatment (sleeve):
 - oil drenched: 1550° F (538° C)
 - tempered: 1000° F (843° C)

ALIGNMENT FEATURES

QUIK-ALIGN® ALIGNMENT COLLARS

The QUIK-ALIGN alignment uses two flanged collars that are inserted into slots on each side of the frame bracket. The outboard flanged collar is eccentric (Figure 3). The eccentric collar adjusts the position of the axle during an alignment. The alignment guides guide it during the process. By rotating the eccentric collar clockwise or counterclockwise, the suspension's axle moves fore and aft (Figure 4). The maximum range of adjustment is +/- 45 degrees from 12:00 o'clock positioning.

A prevailing-torque heavy hex nut, a shear-type plated bolt and hardened washers are also part of the QUIK-ALIGN pivot connection. *Use of this nut and shear-type bolt ensure proper clamping force without a torque wrench.*

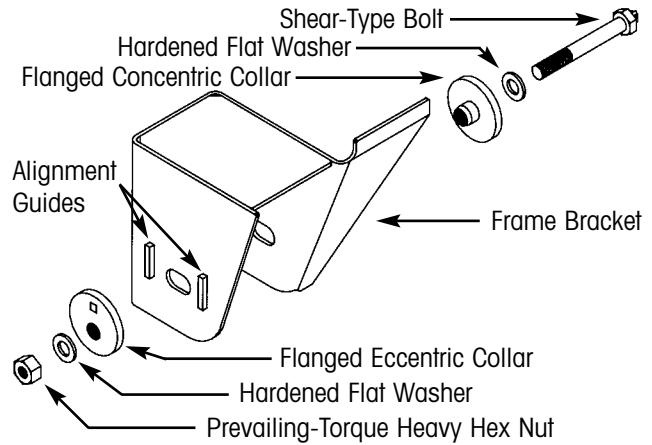
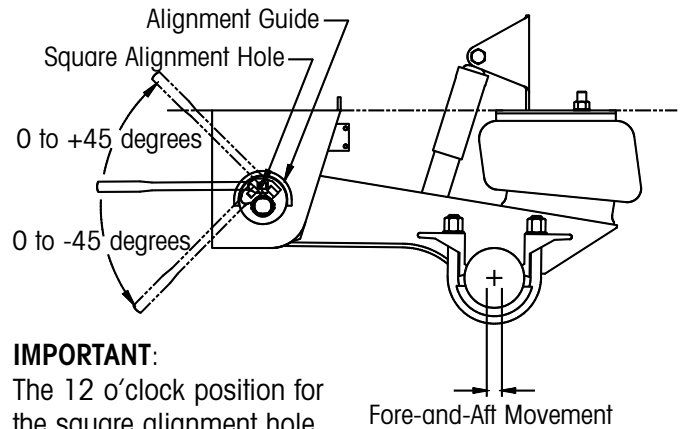


Figure 3. Exploded view of QUIK-ALIGN style frame bracket



IMPORTANT:

The 12 o'clock position for the square alignment hole indicates the midposition of the alignment adjustment.

Figure 4. Alignment of the flanged eccentric washer on the QUIK-ALIGN style frame bracket

⚠ CAUTION: DO NOT USE Never-Seize or equivalent material that will act as an lubricant on the pivot-connection hardware. It will effect the clamp load of the pivot-connection fastener and can damage the hardware.

⚠ CAUTION: DO NOT APPLY undercoating to the suspension and frame bracket until after completing the alignment. Undercoating will effect the clamp load of the pivot-connection fastener and can damage the hardware.

WELDED ALIGNMENT COLLARS

The welded alignment collars are clamped together by either a huck fastener or a 1 $\frac{1}{8}$ -inch heavy hex cap screw. After completing the alignment, weld both collars to the frame bracket, and the nut to the 1 $\frac{1}{8}$ -inch heavy hex cap screw, when using it. To realign, the collar welds must be removed to move the pivot joint.

AXLE ALIGNMENT

AXLE ALIGNMENT AREA

The location for doing the axle alignment should be flat, level and free of debris.

TRAILER POSITIONING

Trailer position is important during an alignment. The trailer must be as close as possible to its forward operational state to prevent pre-loading the TRI-FUNCTIONAL BUSHING when moving the trailer. If the suspension is on a slider assembly, place the slider in the rear most position of the trailer with the locking pins fully extended. Remove the slack in the locking pins to match the slider as closely as possible to its forward operational state.

IMPORTANT: Pivot-bushing preloading may result in false alignment readings that complicate trailer axle alignment. Also, pivot-bushing compression may cause tracking and/or premature tire wear problems. To avoid this condition, do the proper pivot bushing positioning procedure.

PROPER PIVOT BUSHING POSITIONING

1. Lightly apply the tractor brakes.
2. Position the trailer, so it is as close as possible to its forward operational state by doing the appropriate step (a or b):
 - a. Pull the trailer straight into a drive-through maintenance bay.

— or —
 - b. Back the trailer into a maintenance bay as straight as possible, then gently pull it forward ten feet or more.
3. Engage the tractor parking brake only; **DO NOT SET** the trailer parking brake.

AXLE ALIGNMENT

IMPORTANT: Keep trailer parking brakes disengaged. This allows wheel rotation to occur while positioning the suspension fore and aft.

DESIGNED KINGPIN HEIGHT

Before beginning axle alignment, set the kingpin to its designed height.

1. Check the ID tag on the trailer's front bulkhead or contact the trailer manufacturer for the designed kingpin height.
2. Determine the trailer's actual kingpin height by using either method (a or b):
 - a. When the trailer and a tractor are connected, the tractor's fifth wheel height must equal the designed kingpin height. If not, disconnect the trailer and use the method below.

— or —
 - b. Measure from the ground to the kingpin mounting plate with a tape measure (Figure 5).



Figure 5. Measure the actual kingpin height

3. For the unconnected trailer, adjust the landing gear to place the trailer at the designed kingpin height.
4. Verify the kingpin height by measuring the mounting plate on the other side of the kingpin.

TIRES

1. Proper tire inflation
 - a. Check the tires for proper inflation according to the tire manufacturers' recommendations.
 - b. Inflate or deflate the tires to match the recommended tire pressure.

2. Tire size in dual wheel sets
 - a. Match the tire of each dual wheel set to either a maximum tire radius of $\frac{1}{8}$ inch.
— or —
 - b. Match the tire to a maximum variation in tire circumference of $\frac{3}{4}$ inch.

DESIGNED SUSPENSION RIDE HEIGHT

1. To determine the ride height and set it to the designed ride height (Figure 6) as shown on the suspension data plate and the suspension assembly drawing, read *L459 Checking Trailer Ride Height*.

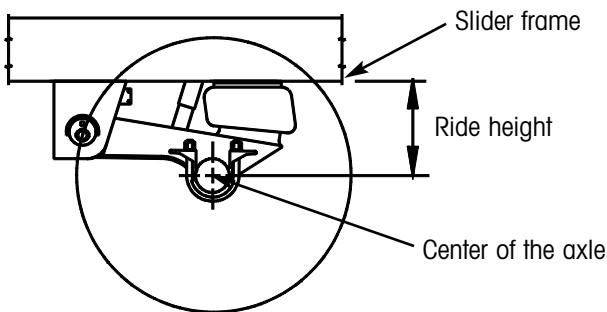


Figure 6. Description of ride height

AXLE ALIGNMENT

1. Check the initial alignment by measuring from the trailer's kingpin (or kingpin extender) to both spindle ends (or spindle extenders) of the front axle. The "B" measurement should equal the "A" measurement (Figure 7).

IMPORTANT: A maximum side-to-side tolerance of $\frac{1}{8}$ inch is typically considered acceptable.

2. After aligning the forward axle, align all additional axles to the forward axle. The "D" measurement should equal the "C" measurement (Figure 7).

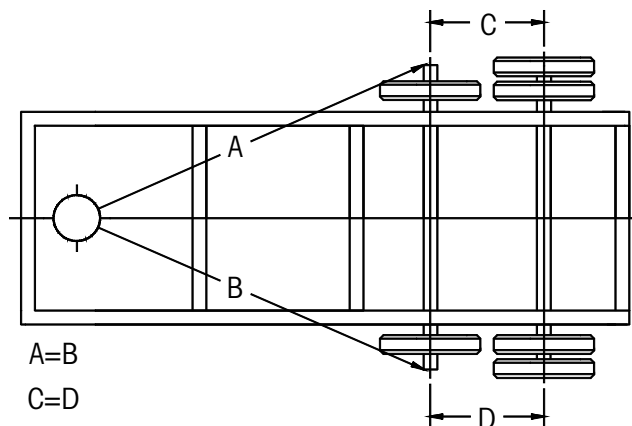


Figure 7. Measurements for proper alignment

IMPORTANT: A maximum alignment tolerance of $\frac{1}{16}$ inch is typically considered acceptable on additional axle(s).

AXLE ADJUSTMENT QUIK-ALIGN ALIGNMENT COLLARS

IMPORTANT: Hendrickson will not be held liable for damage and/or injury that may result from an improper reinstallation of the pivot connection.

An OEM, a dealer, or a repair facility that assembles, or loosens and reassembles, the pivot connection will assume all responsibility for pivot-connection reliability. To ensure proper performance and clamp load, assemble properly and tighten the pivot connection to a torque of 550 ft-lbs (± 45 ft-lbs). Failure to reach the required torque can result in a loose pivot connection and potentially damage the suspension and other components.

1. Replace pivot-connection hardware from the axle pivot connection being adjusted.

IMPORTANT: The QUIK-ALIGN pivot-connection hardware can be reused one time prior to putting the trailer into service. If future realignment becomes necessary, use new pivot-connection hardware. To reuse the shear-type bolt, grind or chisel off the flash (the excess metal around the sides of the hex head) from the bolt's hex head.

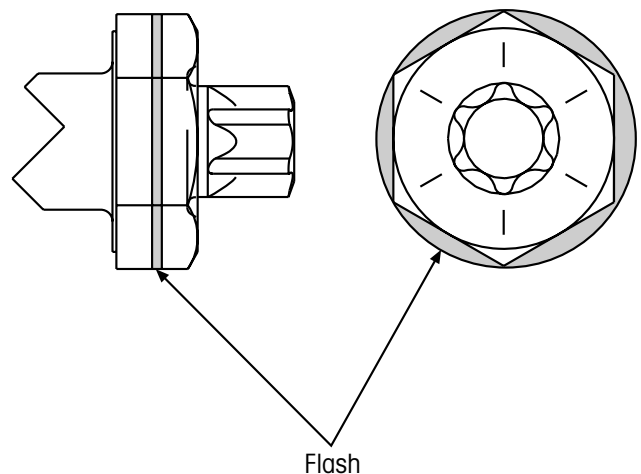


Figure 8. Flash on the new pivot-connection bolt



- Adjust the nuts on both pivot bolts that hold the flanged eccentric collars in place against the adjustment guide. The nuts must be loose enough to permit the bolts to be rotated by hand, not free spinning, with a minimum side-to-side movement (Figure 9a).

⚠ CAUTION: **DO NOT ALLOW any type of lubricant or contamination to contact the threads of pivot-connection fasteners. Lubricant will reduce friction between the threads of the pivot fastener and nut that can cause overtightening. Pivot-connection fastener failure may occur.**

IMPORTANT: The eccentric collar must remain flat against the frame bracket throughout the alignment procedure. If too loose, the eccentric collar may raise up on the alignment guide and result in an improper alignment (Figure 9c). If this condition occurs during alignment, refer to the raised eccentric collar information in the troubleshooting section.

- Adjust the eccentric collar to the 12:00 position.
- With both square alignment holes in the 12:00 position, check the front-axle alignment to the trailer kingpin. If necessary, insert a 1/2-inch breaker into the square adjustment hole on one of the eccentric collars; adjust the axle position by rotating the collar in a fore-and-aft movement.
- While adjusting the axle position, check the alignment of the axle to the kingpin.
- Tap on the flanged concentric collar (inboard side of the frame bracket) with a rubber mallet during the adjustment.

IMPORTANT: The tapping allows the concentric and eccentric collars to move in unison. If the collars do not move together, the concentric collar may wedge against the frame bracket during the alignment.

The “wedged” collar (Figure 9b) will result in an inaccurate alignment, and the connection will loosen. If this situation occurs during alignment, refer

to the “wedged” collar information in the troubleshooting section.

- If the flanged eccentric collar reaches 45 degrees (Figure 4) with no alignment being achieved, go to the suspension’s other frame bracket and rotate the flanged eccentric collar; repeat step 4.

IMPORTANT: Beyond 45 degrees in either the fore or aft directions of the flanged eccentric collar, there is no change in adjustment.

- After the adjustment, verify correct alignment.

IMPORTANT: A maximum side-to-side tolerance of 1/8 inch is typically considered acceptable.

⚠ CAUTION: **Always wear eye protection when operating pneumatic tooling.**

⚠ CAUTION: **Always pin the socket to the pneumatic tooling.**

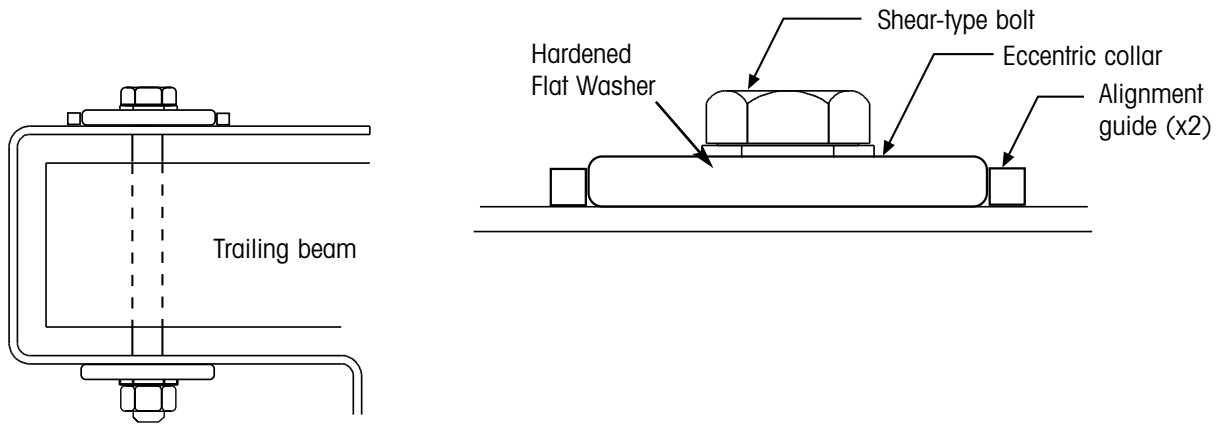
- Tighten the shear-type bolt with a Hendrickson socket (A-24303 for the 3/4-inch drive socket and A-24536 for 1-inch drive socket) until the torx head shears off.

NOTE: Hendrickson recommends using the A-24536 1-inch drive E20 socket.

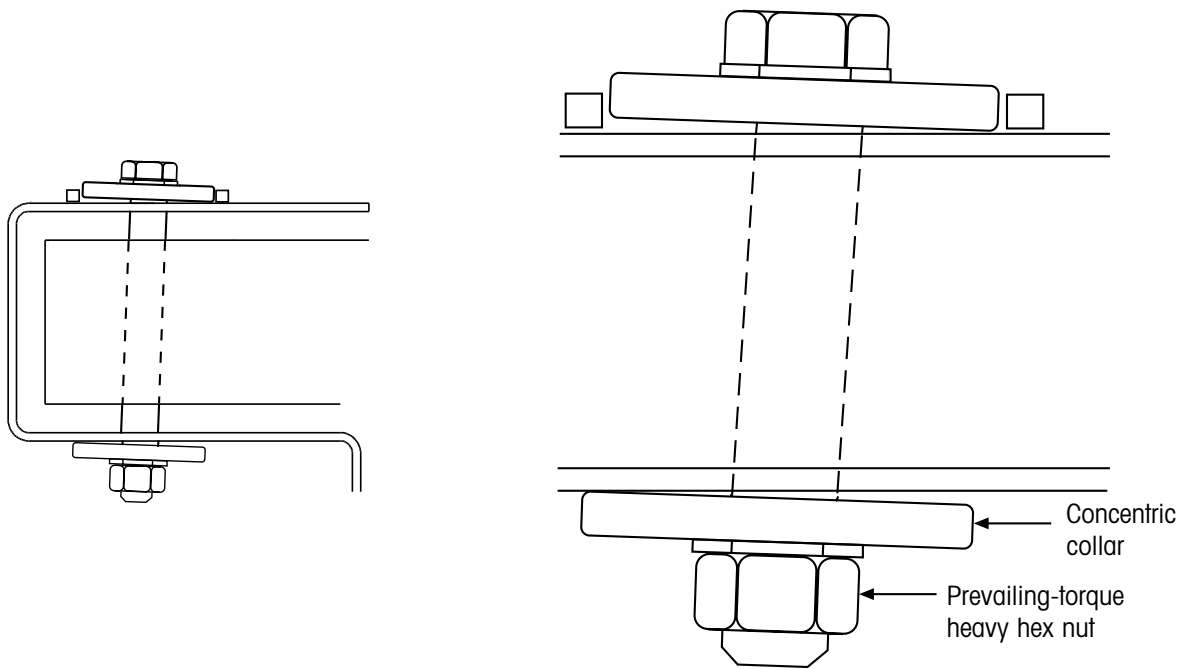
IMPORTANT: Hendrickson will not be held liable for damage and/or injury that may result from an improper reinstallation of the pivot connection.

- Align additional axles to the forward axle by rotating their flanged eccentric collars until both ends of the axle are equal distance from the front axle; repeat steps 1 through 5.

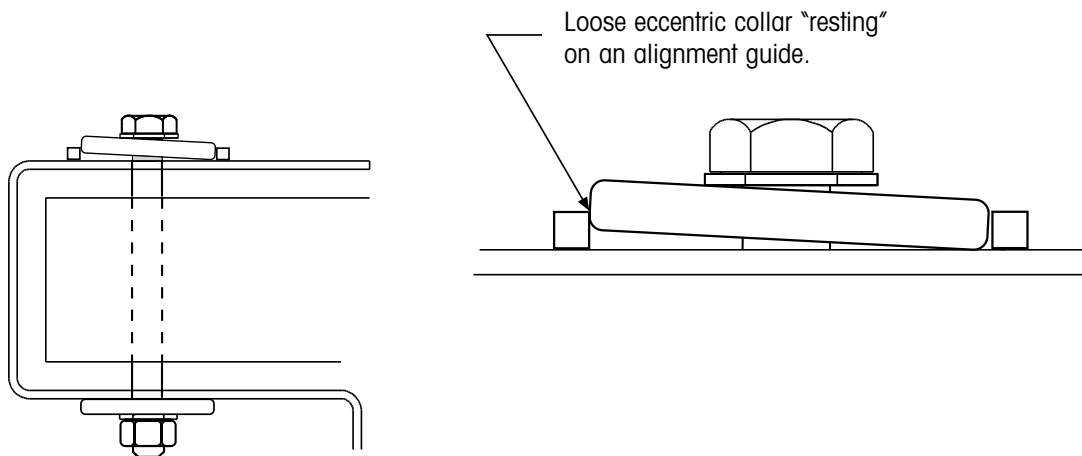
IMPORTANT: A maximum alignment tolerance of 1/16 inch is typically considered acceptable on additional axle(s).



9a. Properly positioned eccentric collar



9b. "Wedged" pivot-connection hardware



9c. "Raised" eccentric collars

Figure 9. Positioning of the pivot-connection hardware



WELDED ALIGNMENT COLLARS

1. When minor adjustments are necessary, the collars on one frame bracket may only need adjusting; follow these steps:
 - a. Determine the side to adjust by looking inside the frame bracket at the elongated slots that allow the collars to move fore and aft.
 - b. Adjust the side with the maximum available adjustment (Figure 10).

IMPORTANT: The alignment slot will appear on the beam side plate of the Y-beam style underslung suspension.

2. On the selected frame bracket, carefully grind or cut the welds securing the alignment collars to the frame bracket.

IMPORTANT: DO NOT REMOVE suspension pivot bolt or huck fastener. Suspension realignment does not require pivot joint disassembly.

3. Measure the distance from the trailer kingpin to the ends of the forward axle. Move the suspension fore and aft until both ends of the axle are equal in distance from the kingpin (Figure 7, dimensions A and B).

IMPORTANT: A maximum side-to-side tolerance of $\frac{1}{8}$ inch is typically considered acceptable.

4. Remove all equipment used to reposition the axle.
5. Tack weld the alignment collars in place.
6. Verify correct alignment.
7. Weld around the inboard and outboard collars with a $\frac{1}{4}$ -inch fillet weld (Figure 11).
8. Verify the weld is a $\frac{1}{4}$ -inch fillet weld that goes around the collars.
9. When using $1\frac{1}{8}$ -inch heavy hex cap screw, weld the nut to the cap screw.
10. If aligning additional axles, recheck the distance between the ends of the additional axles and the ends of the forward axle, and adjust as necessary.

IMPORTANT: A maximum tolerance of $\frac{1}{16}$ inch is typically considered acceptable.

IMPORTANT: If the measurements exceed the acceptable tolerances, repeat this WELDED ALIGNMENT COLLARS procedure until the measurements are acceptable.

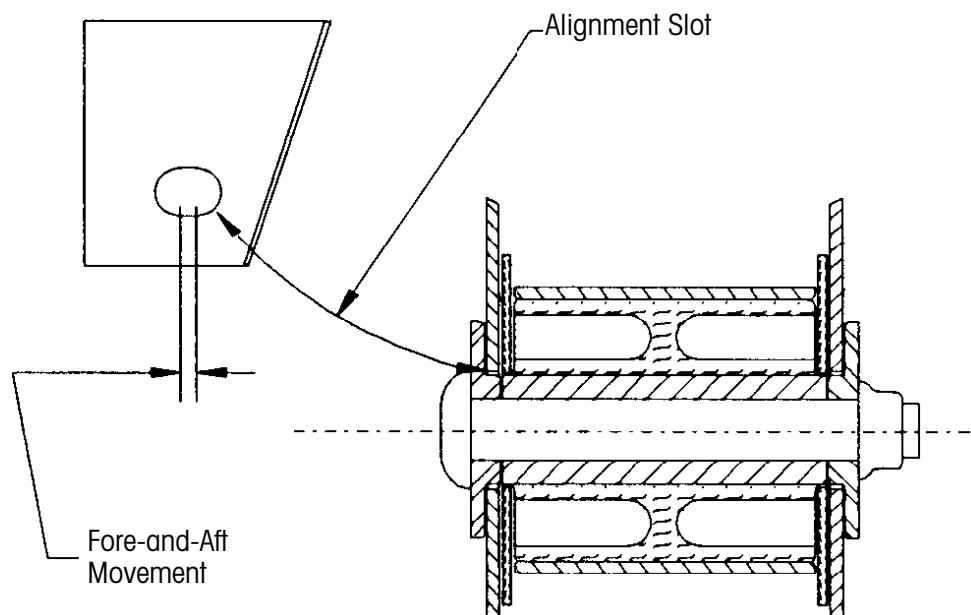


Figure 10. Fore-and-aft movement shown on the welded-collar type frame bracket

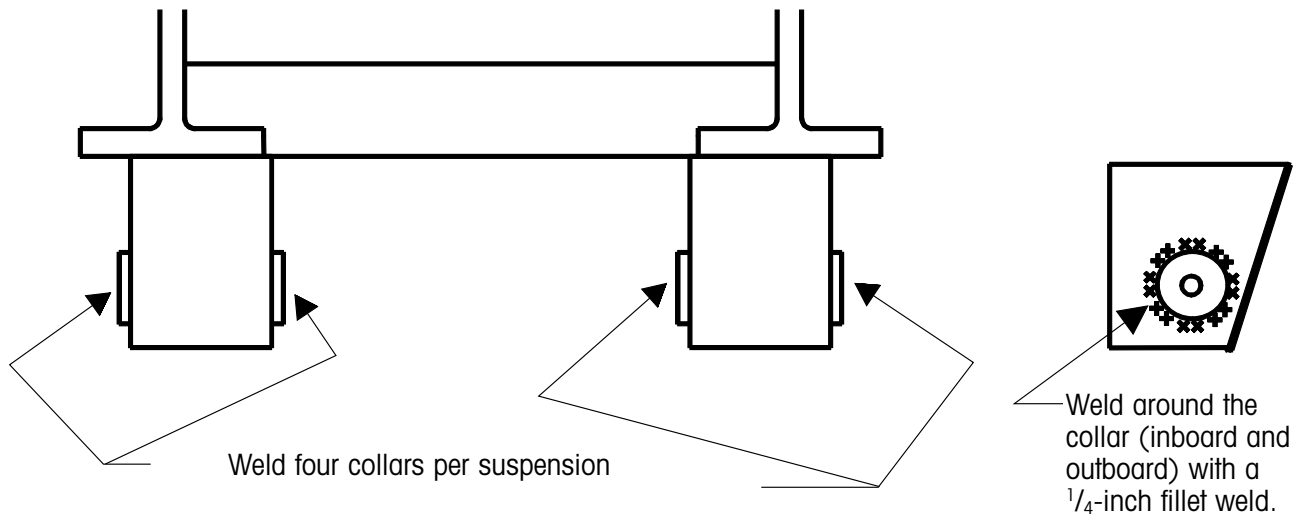


Figure 11. Welding locations on welded collars



TROUBLESHOOTING

WEDGED PIVOT-CONNECTION HARDWARE

APPEARANCE

The pivot-connection hardware (eccentric and concentric collars, hardened washers, shear-type bolt and prevailing-torque heavy hex nut) is not flush against the frame bracket. The hardware is not properly aligned with the outboard hardware offset from the inboard parts (Figure 9b, page 7).

CAUSES

While doing the alignment of the QUIK-ALIGN type suspension, the concentric (or inboard) collar did not move with the eccentric (or outboard) collar.

RESULTS

An inaccurate alignment occurs and may damage the suspension, if it loosens.

SOLUTIONS

Tap on the concentric collar with a rubber mallet while aligning the suspension with the eccentric collar.

Visually inspect the pivot connection after the alignment. If the eccentric and concentric collars are “wedged” against the frame, loosen the pivot connection and redo the alignment procedure for QUIK-ALIGN.

RAISED ECCENTRIC COLLAR

APPEARANCE

The eccentric collar is not flush against the frame bracket; it is raised up and resting on an alignment guide. The shear-type bolt is in proper alignment; the concentric collar is flush against the frame bracket (Figure 9c, page 7).

CAUSES

When putting the torque-prevailing heavy hex nut on the shear-type bolt, the nut was not tightened sufficiently to allow only rotation of the eccentric collar by hand. Therefore, the eccentric collar could move freely and work its way onto an alignment guide.

RESULTS

Initially, the alignment will appear to be accurate. Once the eccentric collar slips off the alignment guide, an inaccurate alignment occurs and may damage the suspension.

SOLUTIONS

Tighten the torque-prevailing heavy hex nut, so the eccentric collar is flush against the frame bracket, to permit the bolt to be rotated by hand, not free spinning, with a minimum side to side movement.

Visually inspect the eccentric collar after the alignment. If the eccentric collar is resting on an alignment guide in the “raised” position, loosen the pivot connection and redo the alignment procedure for QUIK-ALIGN.

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