Hollister-Whitney

A VANTAGE Company

Bulletin #1187-1
GT-Series Geared Traction Machine
Service Manual

*Rope Gripper® not included

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10/11/2022

WARNING

This service manual is intended for the use of qualified and authorized elevator personnel ONLY. For your safety and the safety of others, do not attempt ANY procedure that you are not qualified and authorized to perform. Recommended procedures must be done in accordance with the applicable rules of the latest edition of the National Electrical Code; the latest edition of ASME A17.1; and all governing local codes. Every attempt has been made to ensure that this guide is accurate and up to date. Hollister-Whitney Elevator Co. LLC assumes no liability for consequences resulting from any error or omission. Please notify Hollister-Whitney Elevator Co. LLC regarding any difficulties with this manual.

Contents

Section 1

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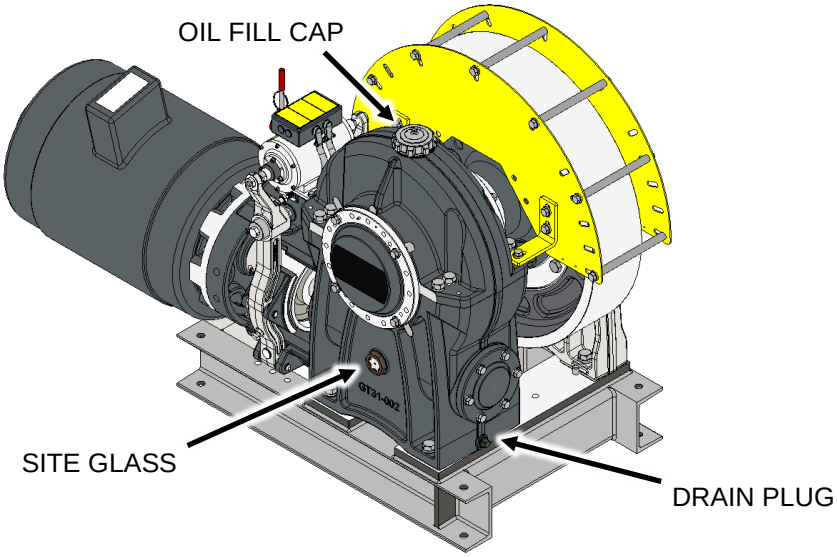
- Take all proper precautions to remove the elevator from service prior to working on the traction machine.
- It is very important to make sure the elevator ***CANNOT*** run and is in a state where it ***CANNOT*** move.
- Ensure that mechanic has the tools listed in the required tools list.
- Be sure to follow these instructions step-by-step to ensure the retrofit is completed correctly.
- Confirm the machine power is off.
- Please go to the Hollister-Whitney YouTube Channel for video instructions on many service procedures detailed in this service manual. Scan the following QR code for direct access to the video:

1 Oil Change

The GT-Series machines use either 1.5 or 2 gallons (9.5L) of oil to lubricate the worm and gear transmission. HWEC recommends Mobil SHC 636 (or equivalent). Oil should be clean and translucent. The GT11 series use 1.5 gallons and the GT31 series use 2 gallons.

When the gear oil needs to be changed depends on the cleanliness and age.

Check the oil color, smell, and cleanliness to confirm whether oil needs to be changed. If oil turns black and smells foul, it should be changed.



1. Remove oil fill cap.
2. Place funnel and oil pan under to the oil drain plug.
3. Remove oil plug, drain the old oil into oil pan.
4. When the oil has ceased running out of the geared box, hand tighten oil plug to make sure it is not cross-threaded and tighten the rest of the way with the adjustable wrench. Wipe dry.
5. Pour in Mobil SHC 636 into the oil fill opening at gear box top cover.

6. Check oil level in site glass. Do not over fill.
7. Replace oil fill cap.
8. Following all applicable code requirements and safety protocols, return the machine to service
9. Run the car and check the machine gear box for any signs of heat or smoke, while verifying the proper disbursement of oil over the ring gear.
10. Check drain plug for leaking.

Section

2

2 Motor Replacement

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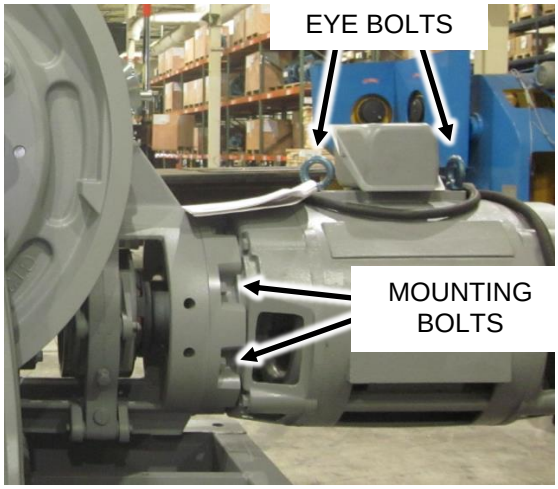
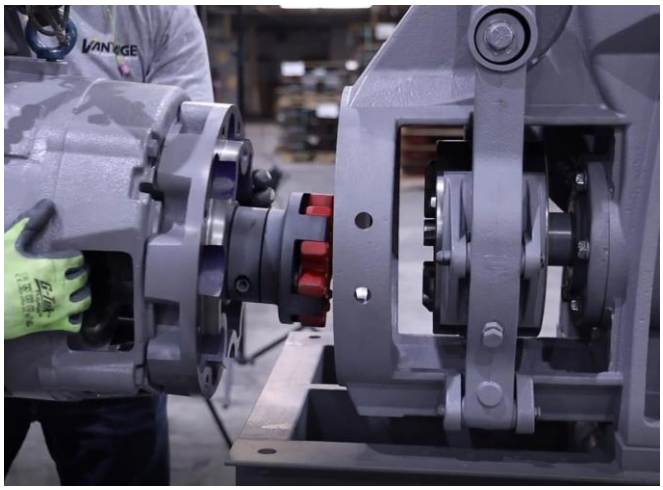
2.1 Motor Removal

Remove power to machine. Disconnect encoder and control cables.

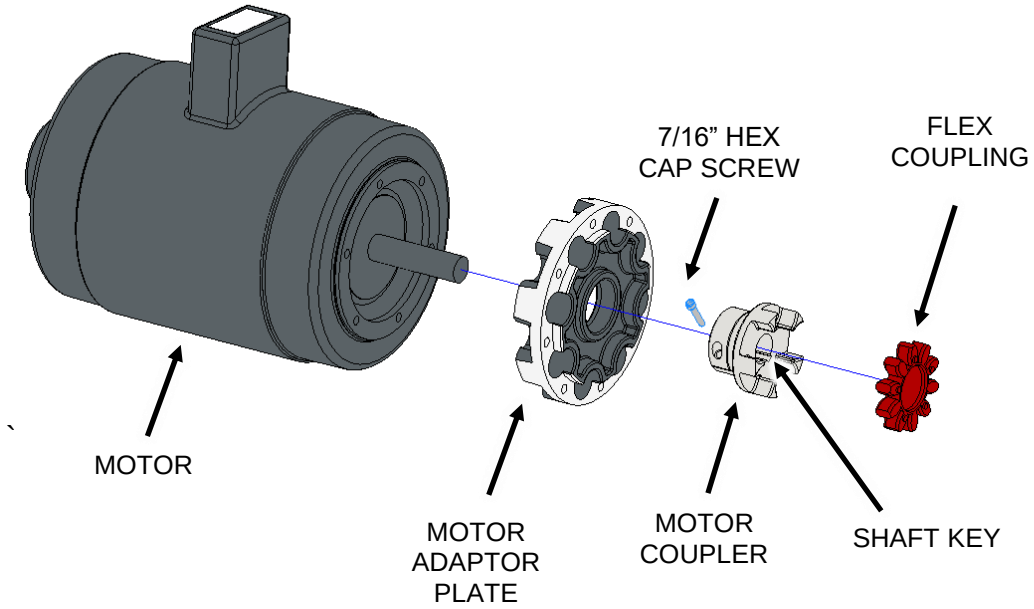
Support the motor using (2) eye bolts next to the motor control box



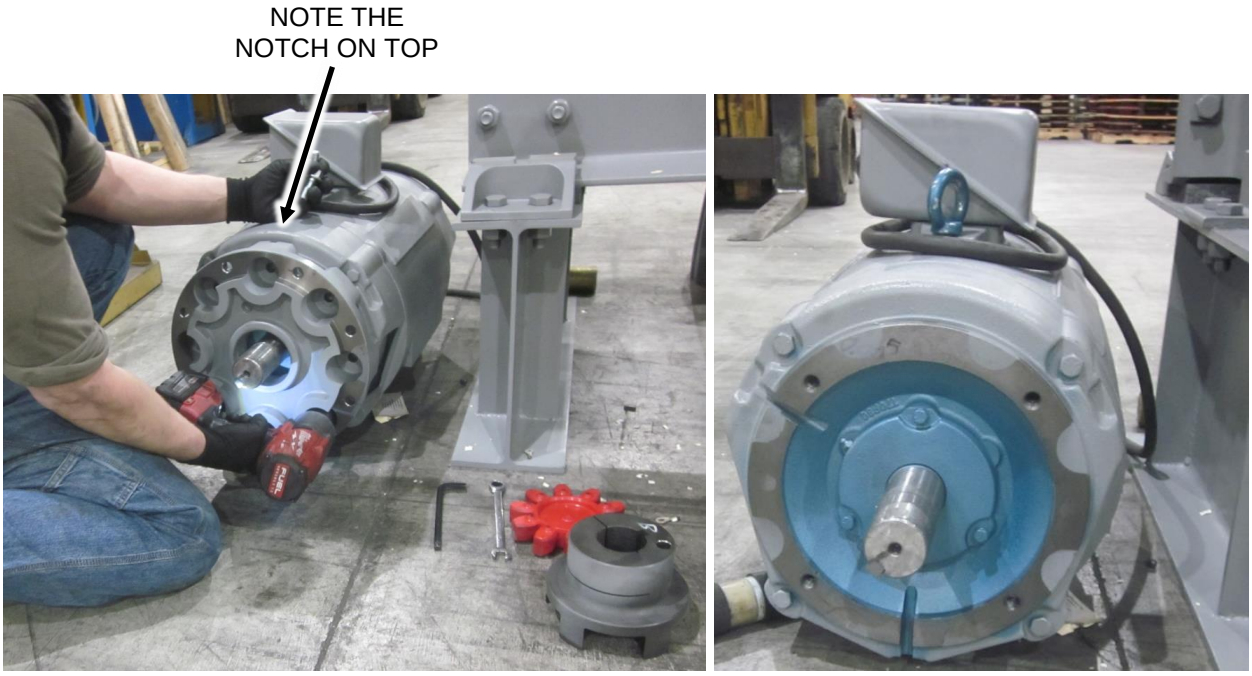
Remove (8) 1/ 2”-13UNC 1.50” bolts that mount the motor adaptor plate to the lower housing. Start removing the bolts on the bottom, leaving the top bolts to be removed last.



Slide motor out of the drum brake coupler.



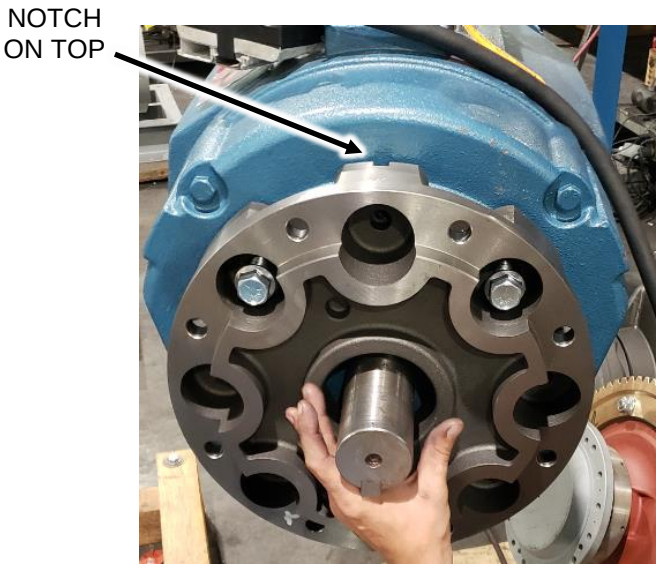
Loosen the 7/16” 14UNC x 2.25” hex head cap screw.Slide the motor coupler, with shaft key, off the motor shaft.

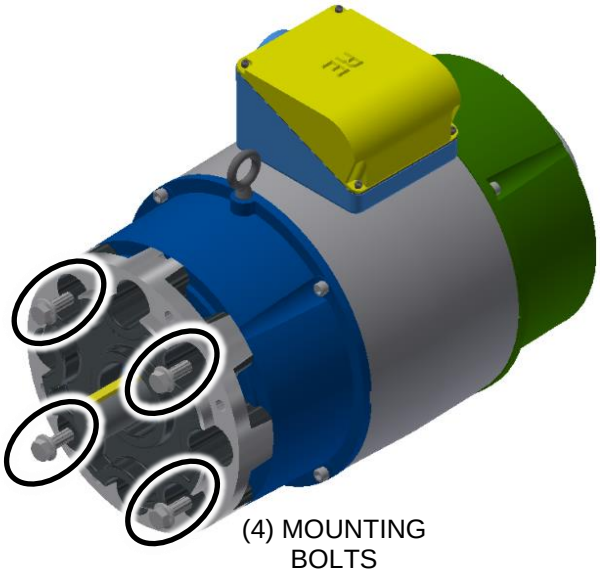


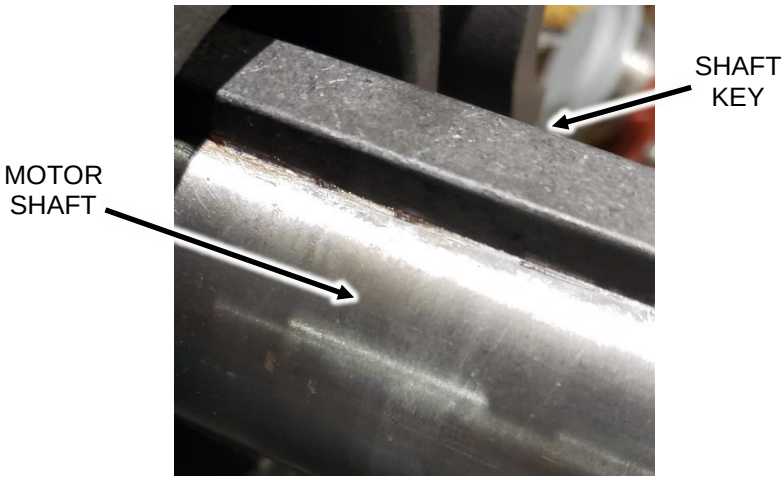
Remove (4) 5/8” 11UNC x 1.50” bolts to remove the motor adaptor plate from the motor.

2.2 Motor Installation

Mount the motor adaptor plate, with the notch on top for correct orientation, to the new motor with the (4) 5/8” 11UNC x 1.50” bolts



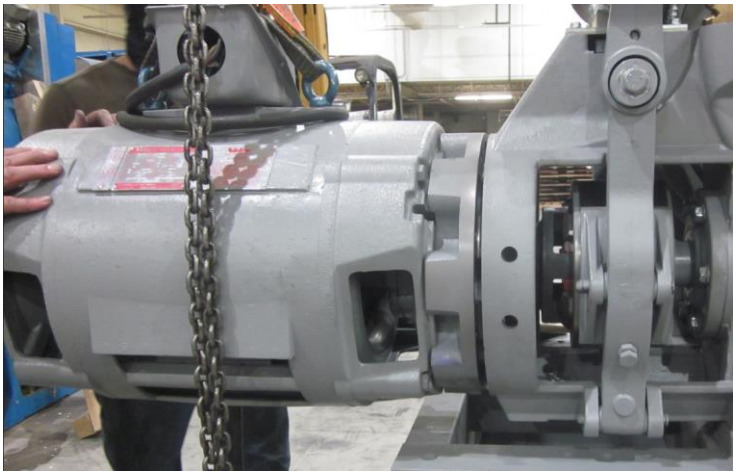




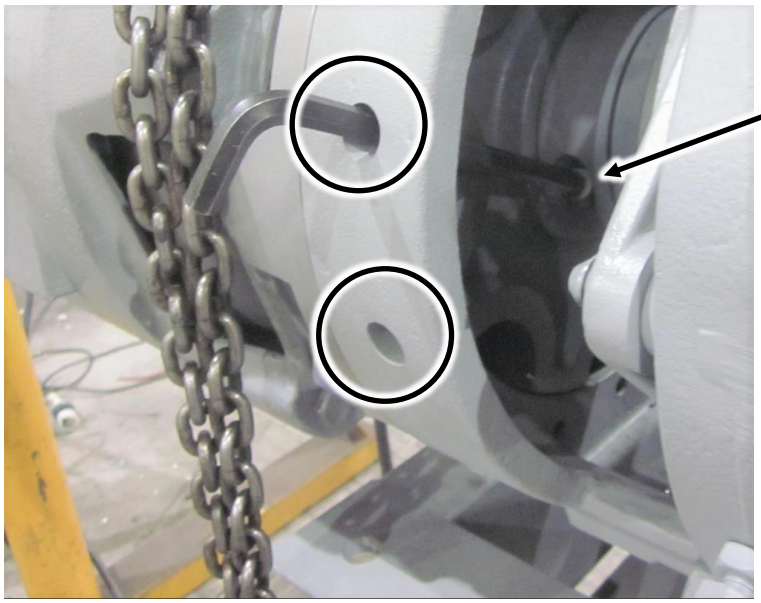
Place the shaft key into the slot on the motor shaft.

Align the motor coupler with the shaft key and shaft and slide it on to the shaft.

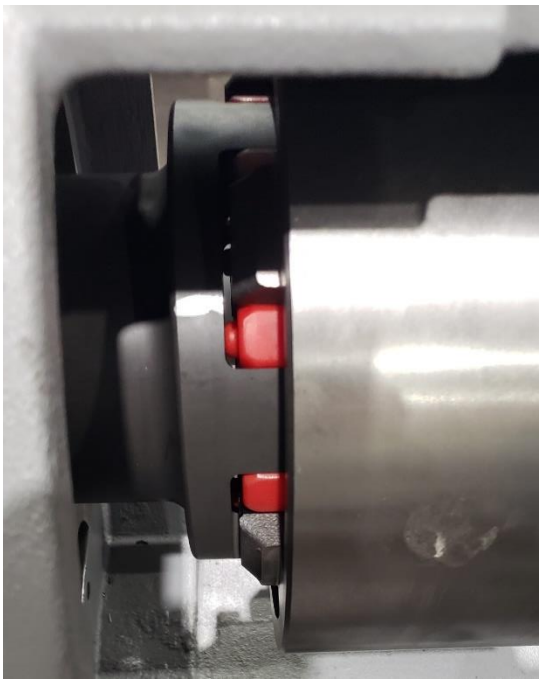
Using a brush, apply a light film of motor assembly grease to the outer diameter of each lobe of the flex coupling, then install the flex coupling into the brake drum.



Using a hoist, with the motor coupler on the motor shaft, assemble the motor to the lower housing by aligning the coupler with the brake drum/flex coupling and inserting until the adapter plate is against the mating surface of the lower housing. Fasten the adaptor plate to the motor mount with (8) 1/2" - 13 UNC - 1.5" hex head flange screws.



Slide the motor coupler against the flex coupler and brake drum. Insert the 7/16" - 14 UNC - 2.25" socket head cap screw coupler clamp bolt. Using a long 3/8" Allen wrench, tighten the motor coupler clamp bolt thru one of the holes in the lower housing flange.



Close up illustration of motor coupler slid against flex coupler.

Section

3

3 Brake Shoe Replacement

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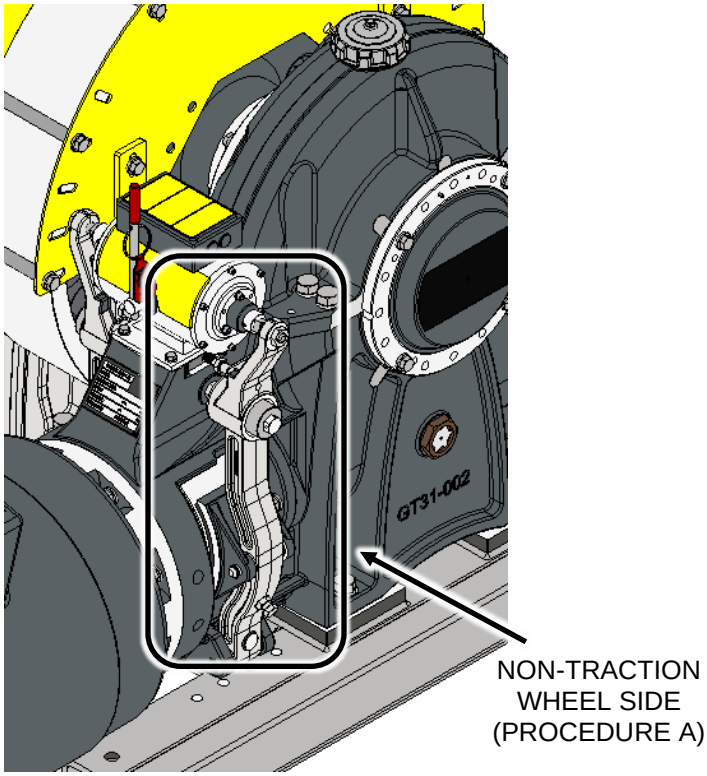
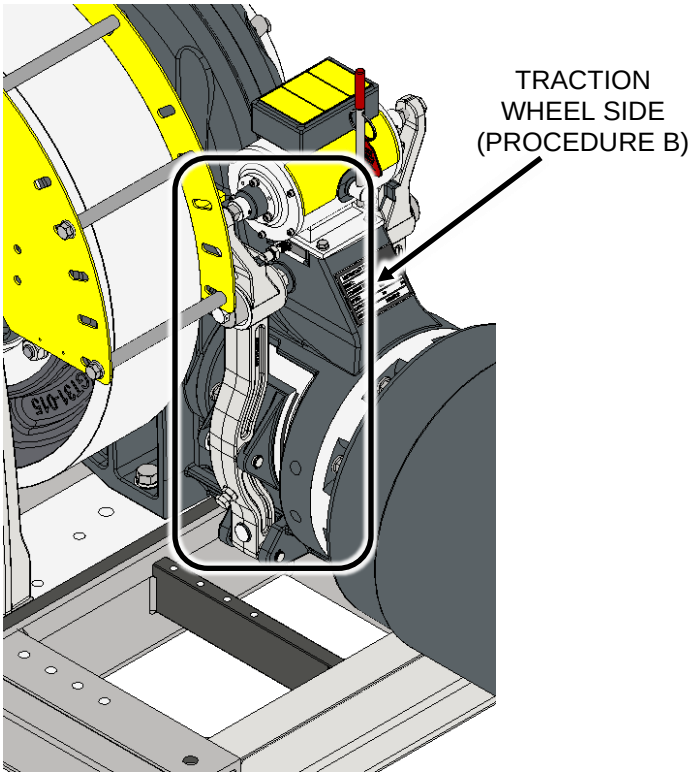
Replacement of GT31 brake shoe and pad assembly (HW part # GT31-316).

Tools required –

Tool	Quantity	Comment
15/16” Open End Wrench	2	Used to “loosen” brake adjustment bolt and jam nut
Small, Straight End, Snap Ring Pliers	1	Used to remove pivot pin external retaining ring
Light Duty Hammer	1	Used to “tap” pivot pin if necessary
Scale	1	Used to measure the depth of the brake spring cup
Thickness Gage	1	Used to measure the brake pad to brake drum air gap
Tamper Evident Paint	As needed	Used to seal the brake jam nut after reassembly





Replace both the pads when replacement is required.

There are two different processes required for this installation. The process varies slightly between the non-traction wheel side (Procedure A) brake arm assembly and the traction wheel side (Procedure B) brake arm assembly.

Once the brake shoe and pad assemblies have been replaced (Procedure A and Procedure B), then additional adjustment, testing, and sealing will be required.

1. Adjustment 1: Brake pad to drum clearance adjustment
2. Test Traction Machine Brake:
    a. Test per ASME A17.1 Section 8.6.4.6.2 and Section 8.6.4.20.4

b. Ensures that the machine brake can hold the rated load per the above code requirements
3. Adjustment 2 (if necessary): Brake holding force adjustment
4. Brake Seal: Required per ASME A17.1 Section 8.6.20.4 using tamper evident paint

3.1 Procedure A: Non-Traction Wheel Side

Step 1A: Measure the depth of the brake spring cup surface to the spring pocket surface and write it in the designated area which follows. The measurement is taken from the flat face of the spring cup to the edge surface of the spring pocket. This measurement will be required later in the reassembly process.

Depth Measurement (inches): _____

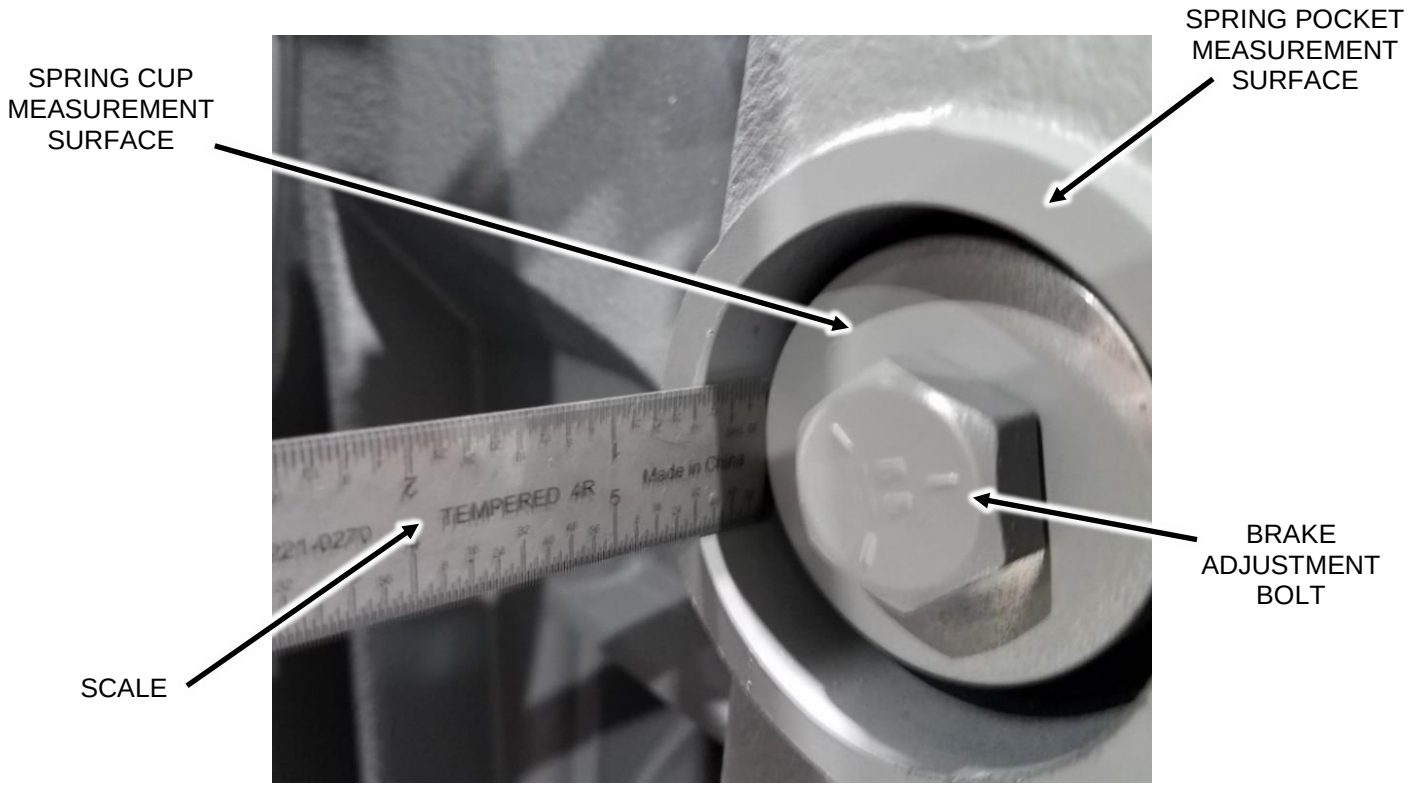
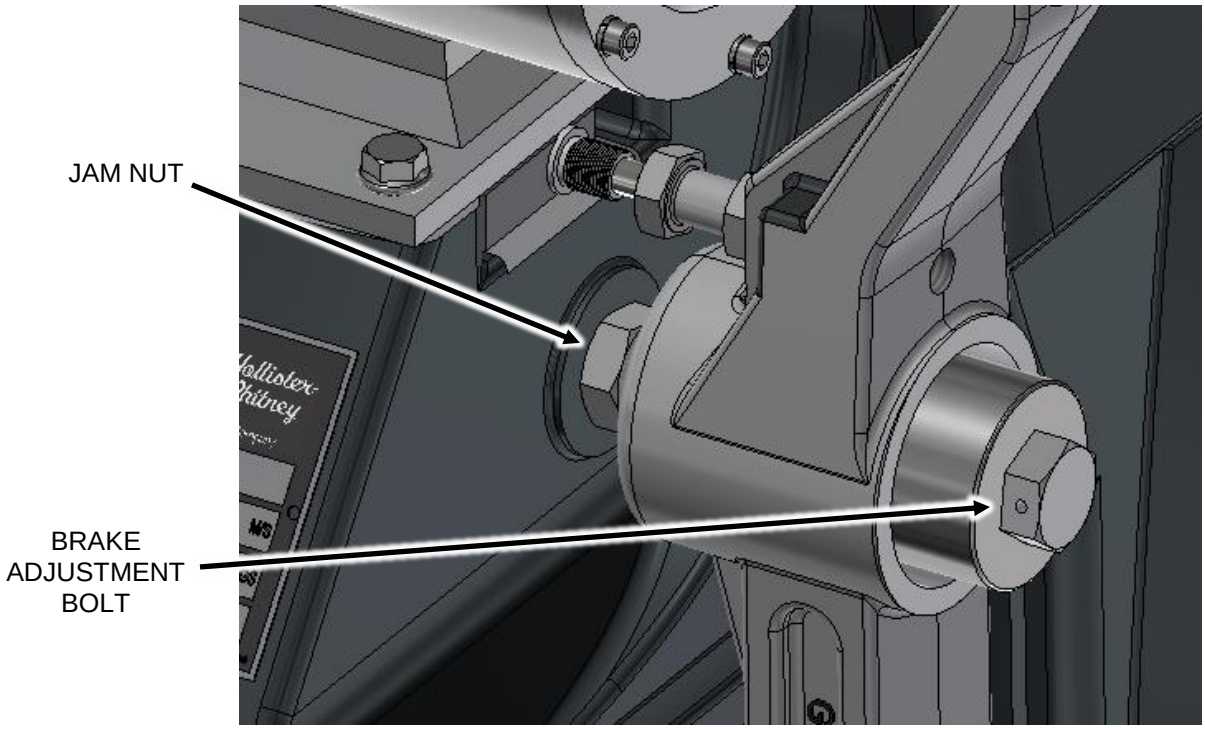


Fig. Step 1A

Step 2A: While using a 15/16” wrench to hold the brake adjustment bolt stationary, use the second 15/16” wrench to rotate the brake adjustment bolt jam nut counterclockwise to release the tension on the jam nut



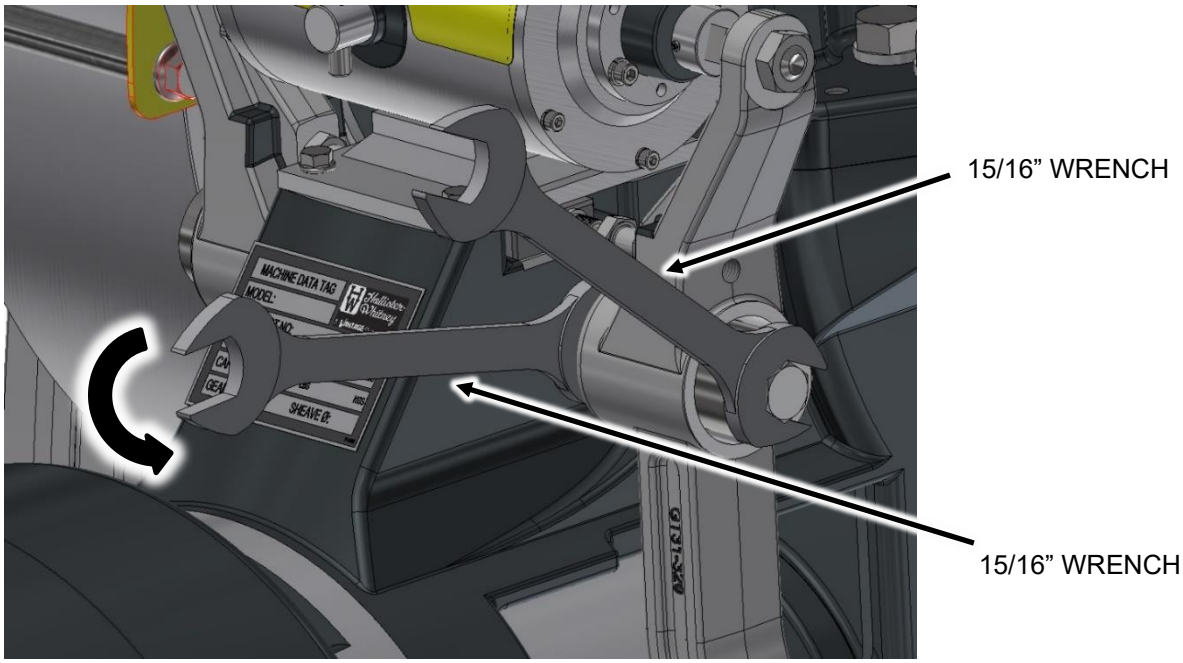


Fig. Step 2A

Step 3A: Rotate the brake adjustment bolt counterclockwise until it is disengaged from the traction machine housing. The brake adjustment bolt and jam nut should remain assembled to the brake arm assembly

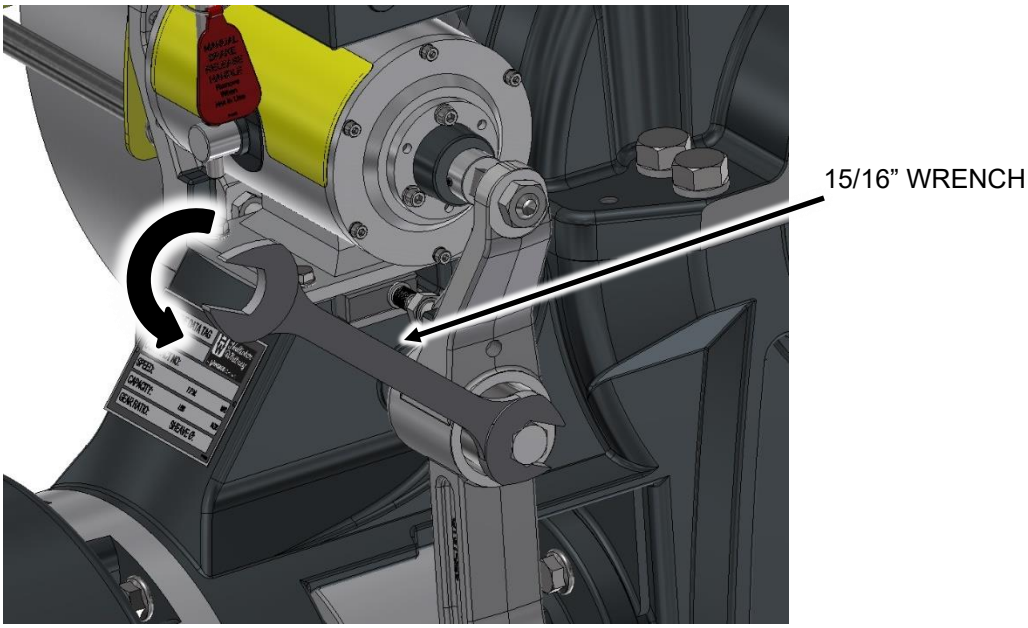


Fig. Step 3A

Step 4A: Allow the brake arm assembly to pivot away from the brake drum to access to the brake shoe and pad assembly

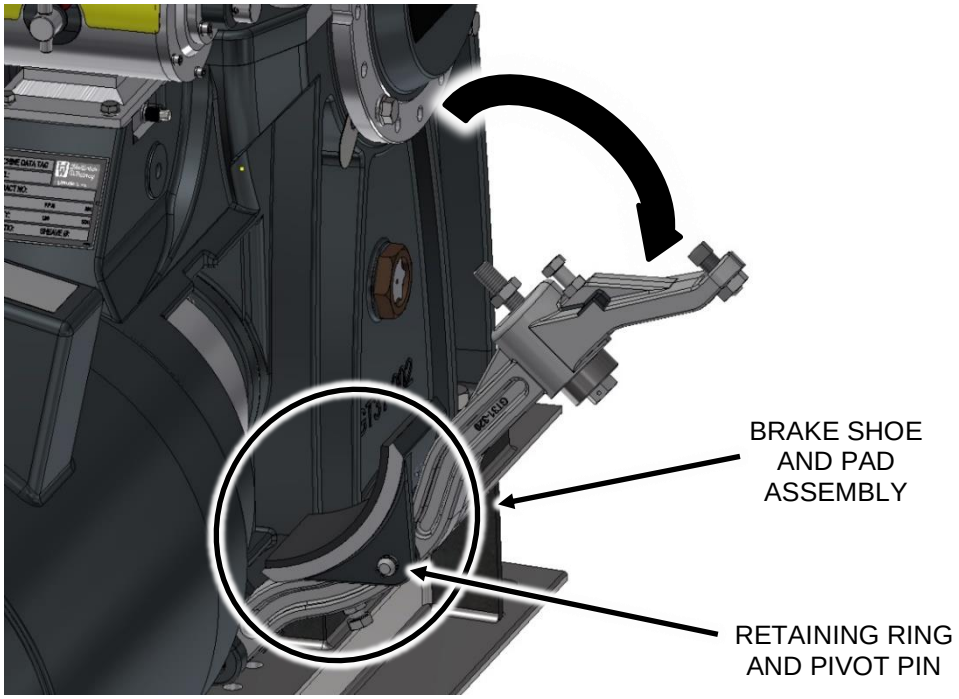


Fig. Step 4A

Step 5A: Remove the external retaining ring on the brake shoe assembly pivot pin using the retaining ring pliers and remove the pivot pin (a light tap with the hammer may be required) to remove the brake shoe and pad assembly

ATTENTION!!!

THERE IS A SPRING BETWEEN THE BRAKE ARM AND BRAKE SHOE. TAKE CARE TO NOT LOSE THE SPRING DURING DISASSEMBLY AND REASSEMBLY

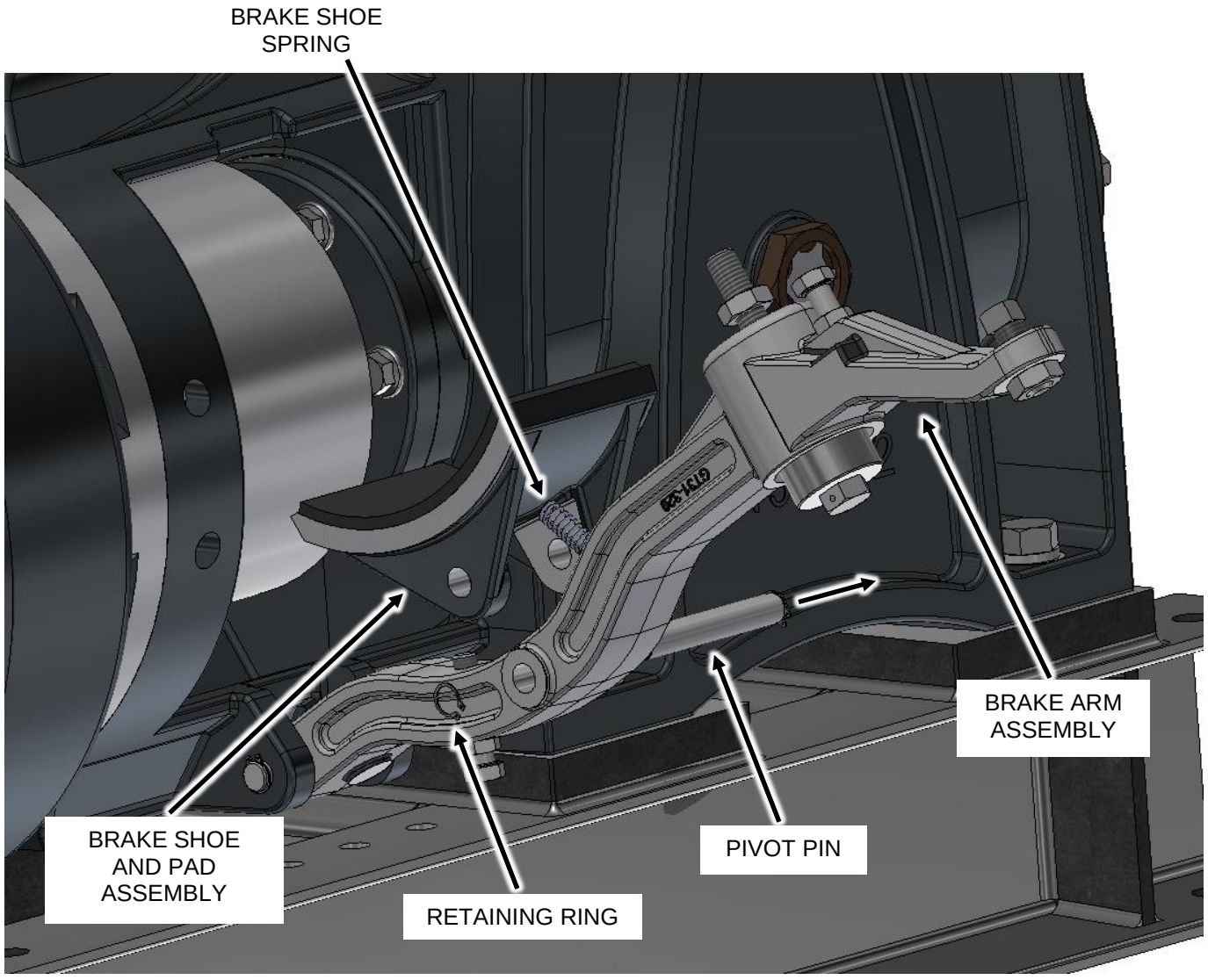


Fig. Step 5A

Step 6A: Return old brake shoe assembly back to Hollister-Whitney for evaluation

Step 7A: Assemble the new brake shoe and pad assembly and brake shoe spring to the brake arm assembly

Step 8A: Re-install the pivot pin back through the brake arm assembly and new brake shoe and pad assembly

Step 9A: Re-install the retaining ring onto the pivot pin using the retaining ring pliers

Step 10A: Rotate the brake arm assembly back into its original position

Step 11A: Using the 15/16” wrench, tighten the brake adjustment bolt down until the brake spring cup depth relative to the cup pocket is at the same depth as recorded previously in Step 1A

Step 12A: Using the 15/16” wrench, tighten the jam nut firmly against the machined housing surface while using the other 15/16” wrench to hold the brake adjustment bolt stationary

3.2 Procedure B: Traction Wheel Side

Step 1B: Measure the depth of the brake spring cup surface to the spring pocket surface and write it in the designated area which follows. The measurement is taken from the flat face of the spring cup to the edge surface of the spring pocket. This measurement will be required later in the reassembly process.

Depth Measurement (inches): _____

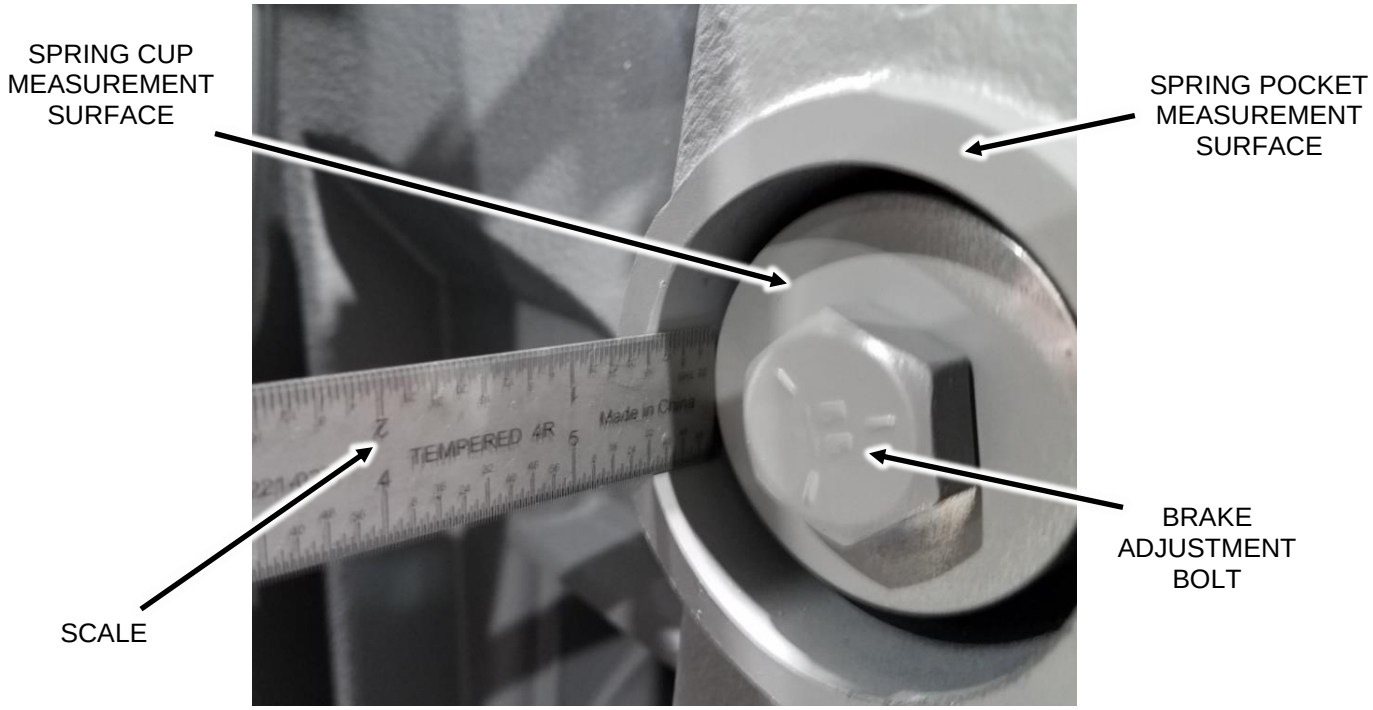
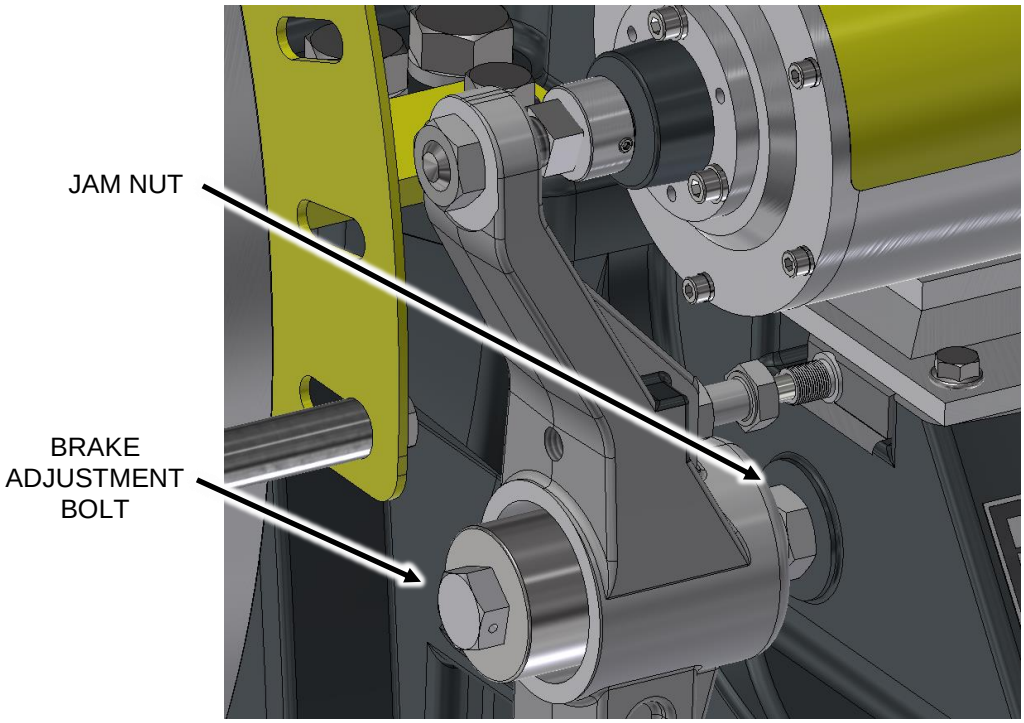


Fig Step 1B

Step 2B: While using a 15/16” wrench to hold the brake adjustment bolt stationary, use the second 15/16” wrench to rotate the brake adjustment bolt jam nut counterclockwise to release the tension on the jam nut.



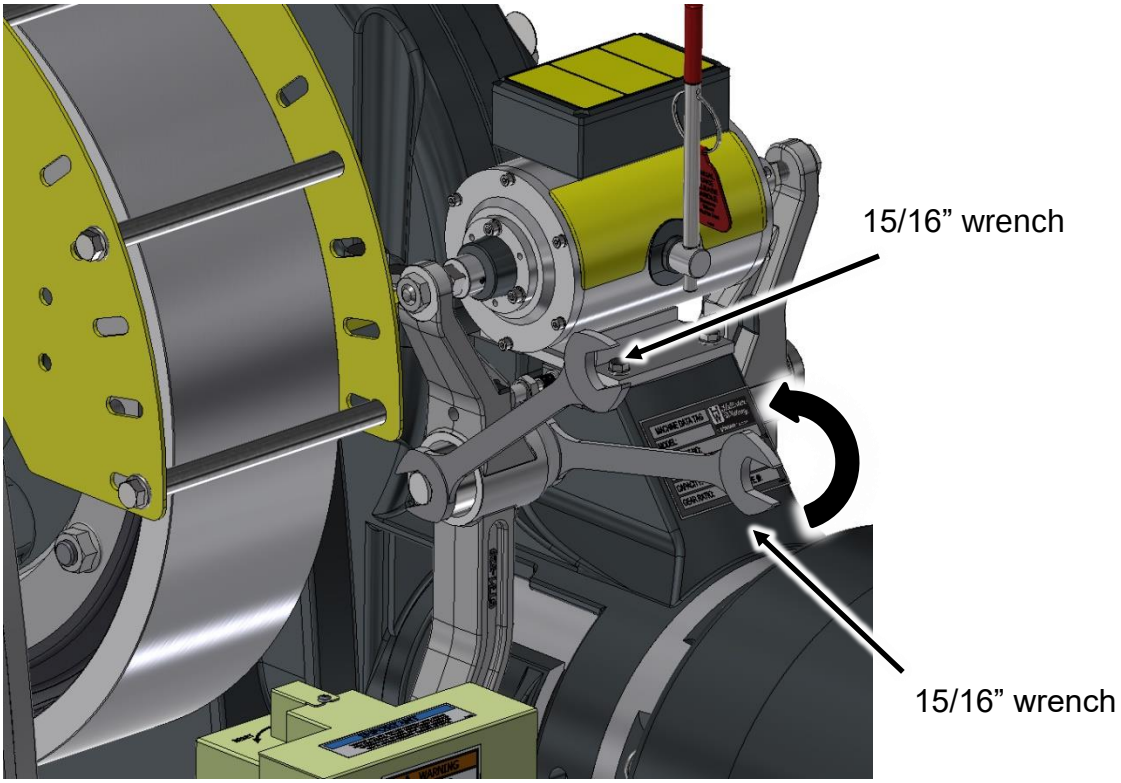


Fig Step 2B

Step 3B: Rotate the brake adjustment bolt counterclockwise until it is disengaged from the traction machine housing. The brake adjustment bolt and jam nut should remain assembled to the brake arm assembly. The brake arm assembly is now only attached to the housing with the lower pivot pin.

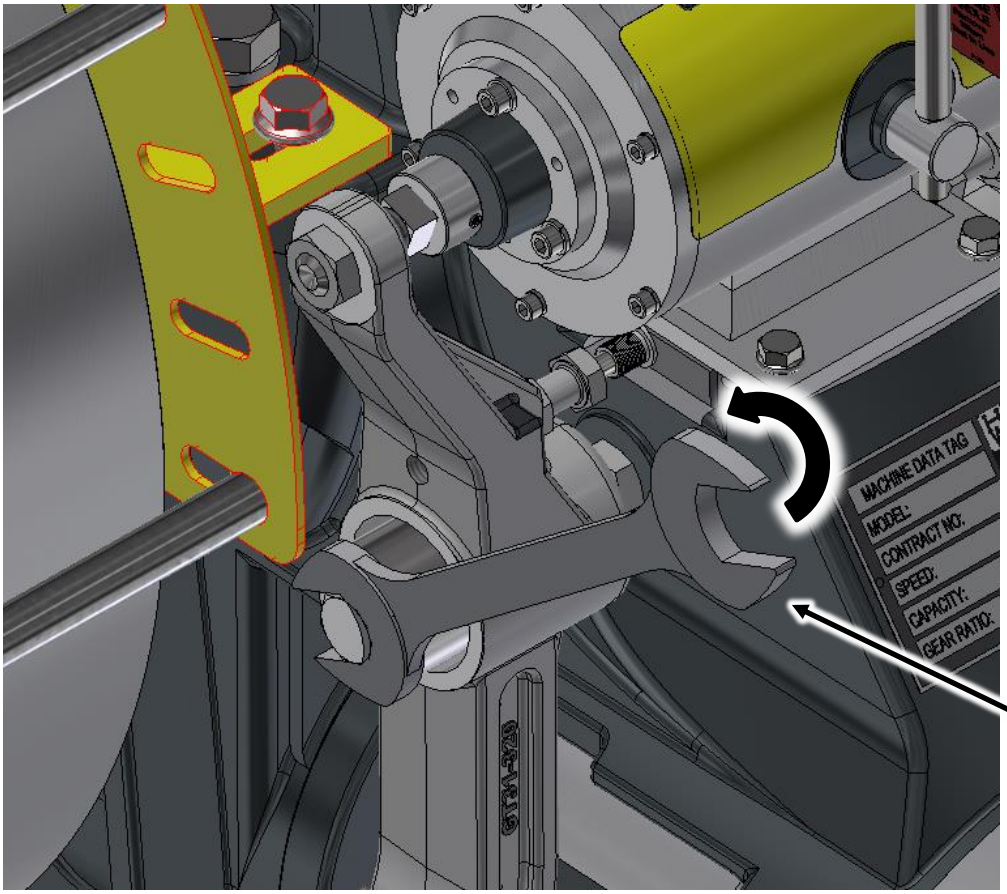


Fig Step 3B

Step 4B: Remove the ***LOWER*** external retaining ring on the brake arm assembly pivot pin using the retaining ring pliers and remove the lower pivot pin (a light tap with the hammer may be required) to remove the entire brake arm assembly.

NOTE:

THIS OPERATION WILL BE SOMEWHAT DIFFICULT DUE TO THE LIMITED WORKING SPACE AVAILABLE.

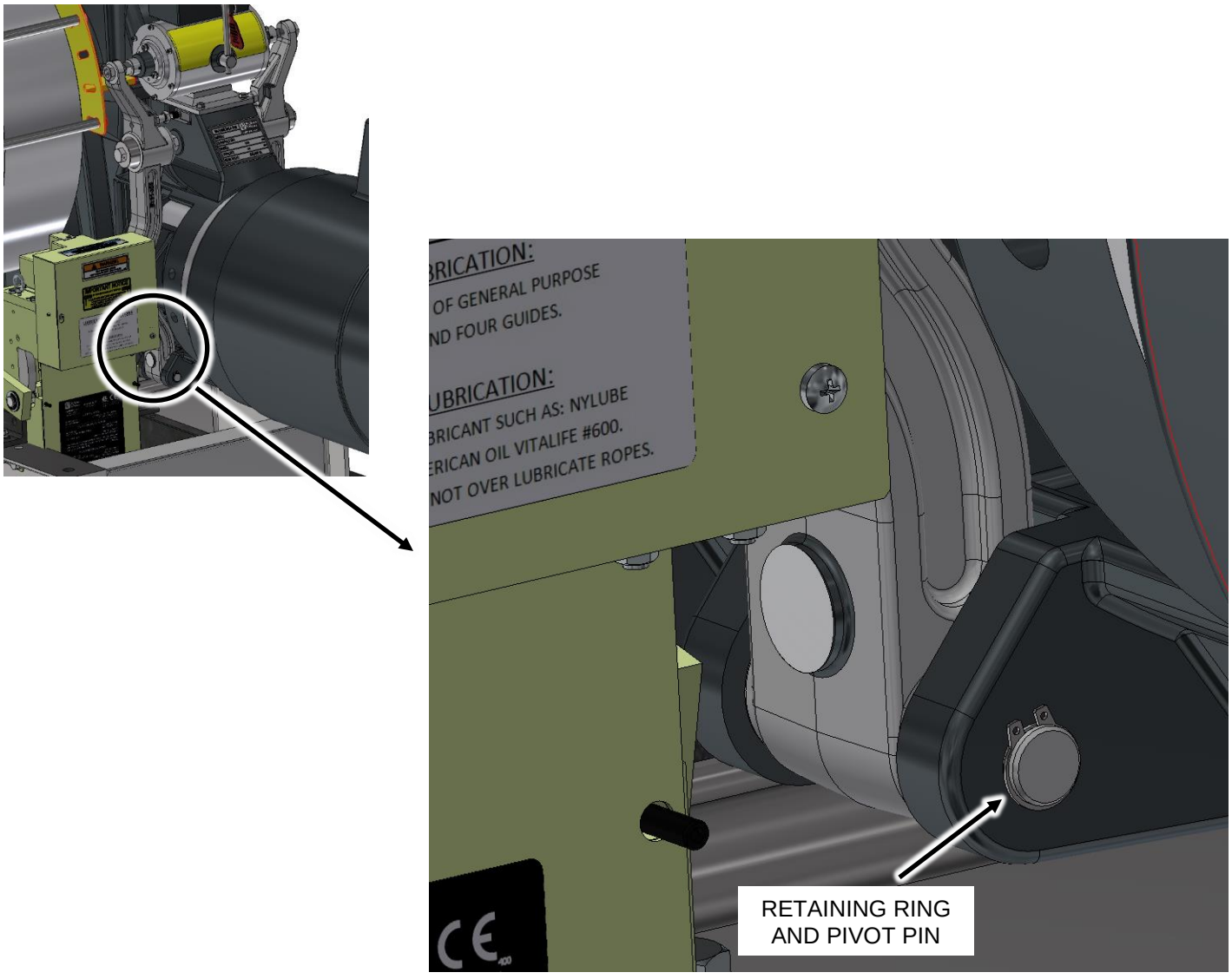


Fig Step 4B

Step 5B: Lift the entire brake arm assembly away from the machine

NOTE:

THE TRACTION WHEEL GUARD MAY NEED TO BE REMOVED TO GAIN ENOUGH CLEARANCE

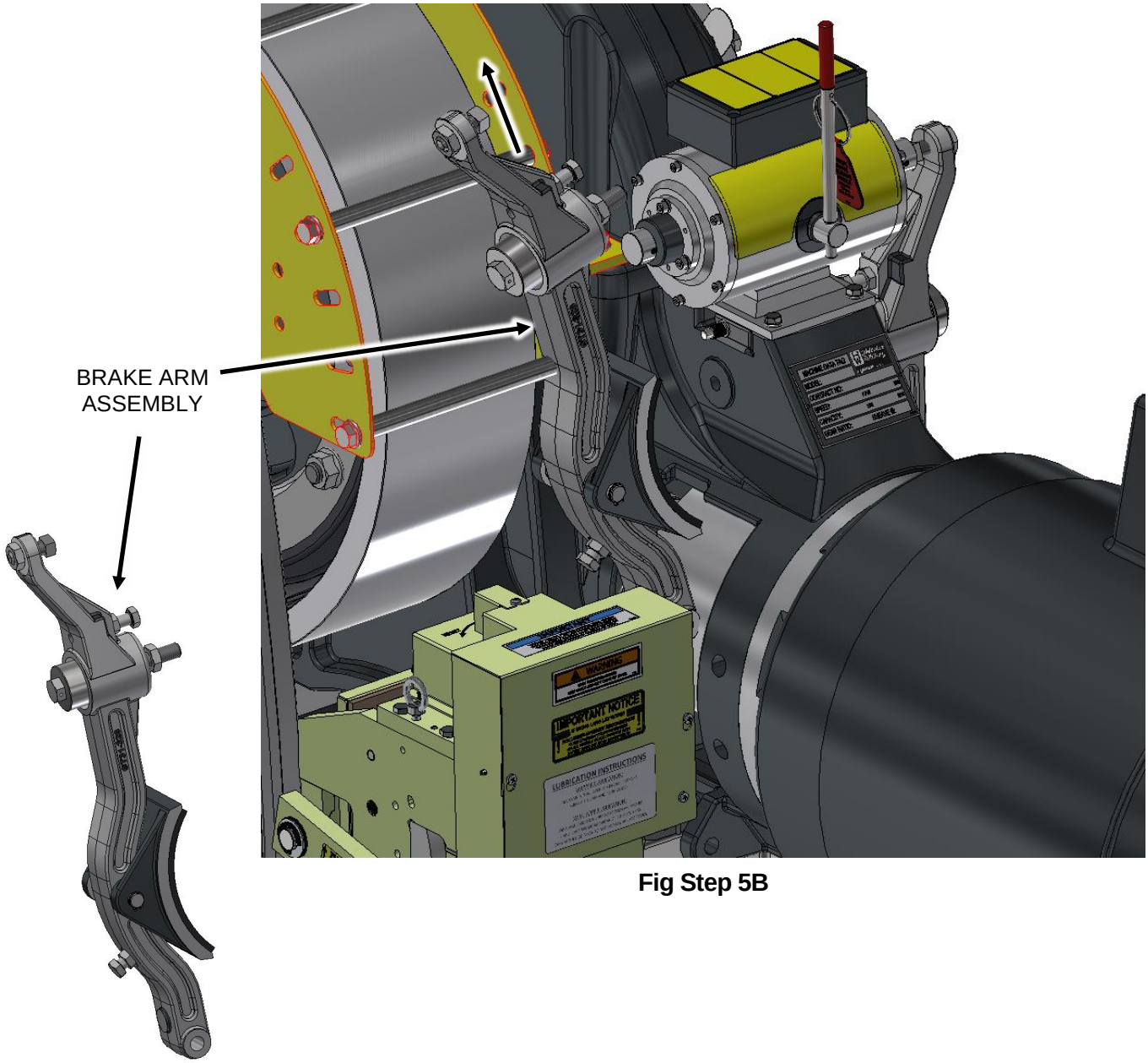


Fig Step 5B

Step 6B: Remove the external retaining ring on the brake shoe assembly pivot pin using the retaining ring pliers and remove the pivot pin (a light tap with the hammer may be required) to remove the brake shoe and pad assembly

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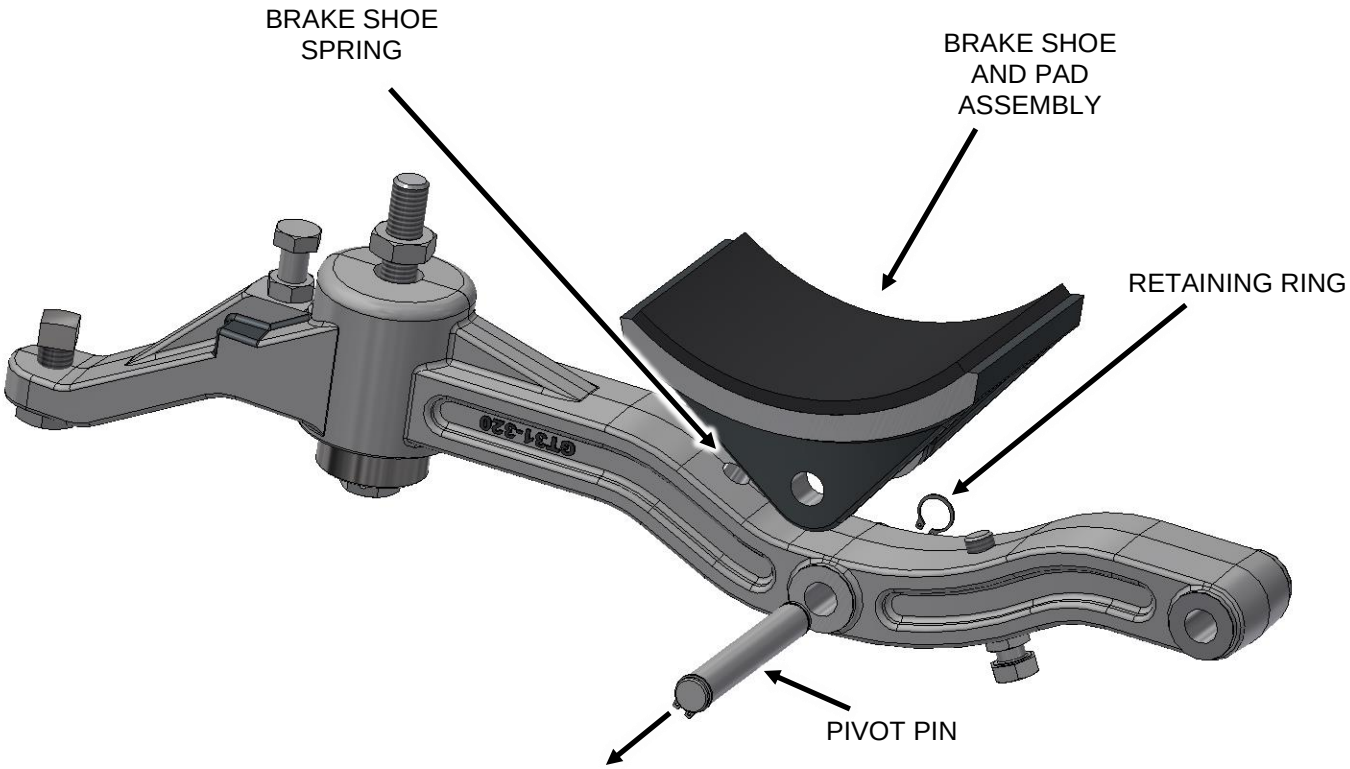


Fig Step 6B

Step 7B: Return old brake shoe assembly back to Hollister-Whitney for evaluation

Step 8B: Assemble the new brake shoe and pad assembly and brake shoe spring to the brake arm assembly

Step 9B: Re-install the pivot pin back through the brake arm assembly and new brake shoe and pad assembly

Step 10B: Re-install the retaining ring onto the pivot pin using the retaining ring pliers

Step 11B: Re-install the brake arm assembly to the machine

Step 12B: Re-install the lower pivot pin back through the brake arm assembly

Step 13B: Re-install the retaining ring onto the lower pivot pin using the retaining ring pliers

Step 14B: Rotate the brake arm assembly back into its original position

Step 15B: Using the 15/16” wrench, tighten the brake adjustment bolt down until the brake spring cup depth relative to the cup pocket is at the same depth as recorded previously in Step 1B

Step 16B: Using the 15/16” wrench, tighten the jam nut firmly against the machined housing surface while using the other 15/16” wrench to hold the brake adjustment bolt stationary

Procedure A and Procedure B are now complete

3.3 Procedure C Brake Adjustment

Ensures that the brake pad to drum clearance (brake gap) is correct

Steps 17 through Step 21 apply to the adjustment for BOTH the left and right brake arm assemblies

Step 17: Use the manual brake release handle to disengage the brake shoe from the brake drum. The handle can be rotated either clockwise or counterclockwise.

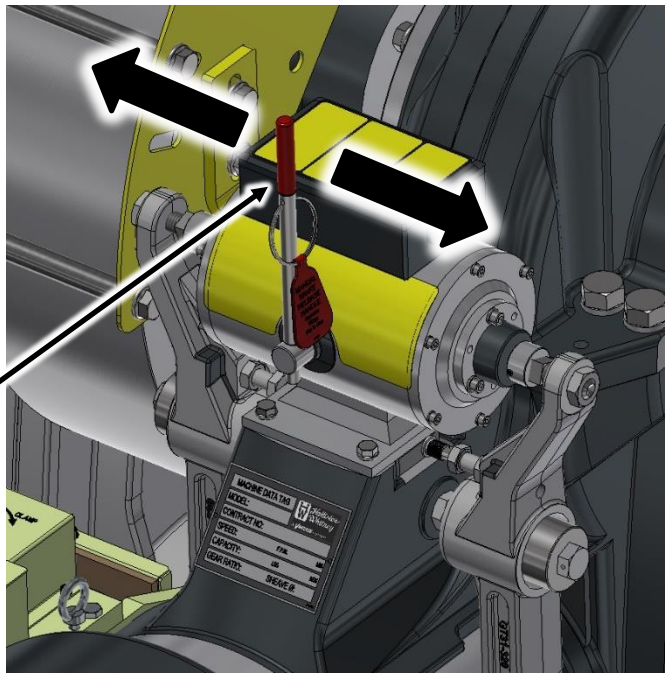


Figure 1

Step 18: Place a thickness gage between the brake drum and brake pad while using the manual brake release to disengage the brakes. There should be a gap of 0.002” to 0.007” between the brake drum and brake pad all along the braking surface.

Figure 2

Step 19: If there is an unequal gap at the top and bottom or no gap between the brake drum and brake pad, with manual brake release disengaging the brakes adjust the brake shoe adjustment bolt to set the gap properly.

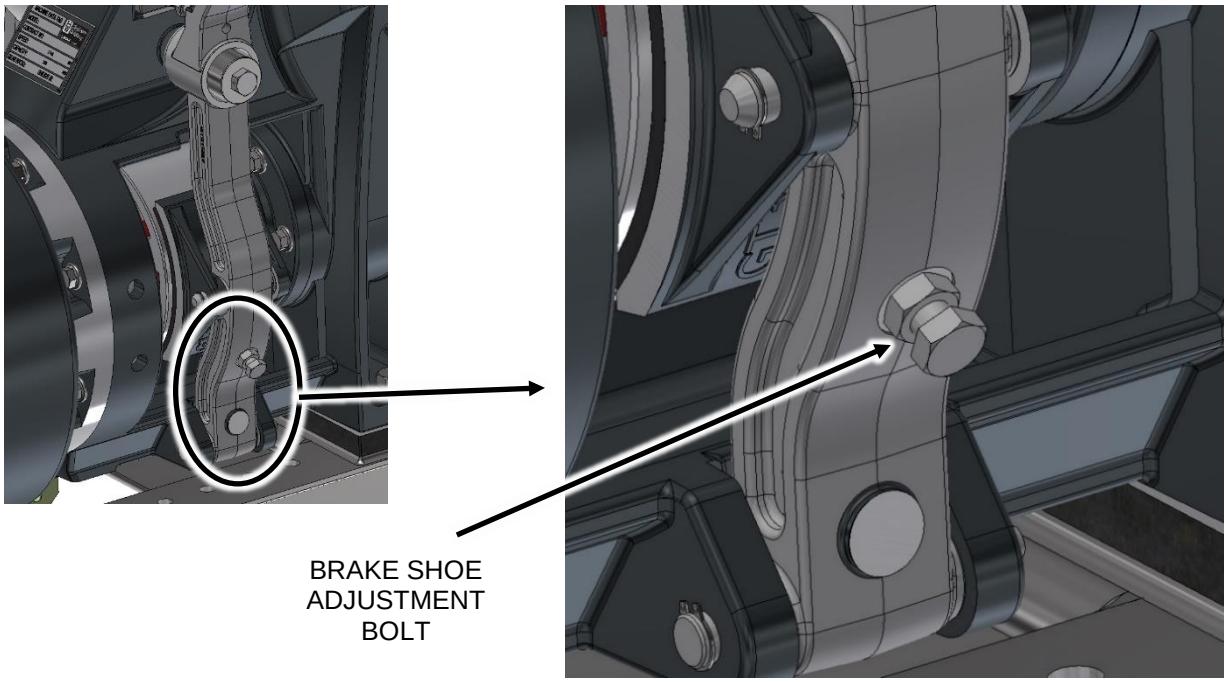


Figure 3

Step 20: Perform Traction Machine Brake test per ASME A17.1 Section 8.6.4.6.2 and Section 8.6.4.20.4

CAUTION!!!:

FOLLOW ALL APPROPRIATE AND REQUIRED SAFTY PROCEDURES WHEN PERFORMING THIS TEST. THE SAME PROCEDURE SHOULD BE USED AS WAS USED FOR INITIAL ACCEPTANCE TEST.

A. IF THE MACHINE *DOES NOT* MEET THE BRAKING REQUIREMENT, GO TO STEP 21

B. IF THE MACHINE *DOES* MEET THE BRAKING REQUIREMENT, GO TO STEP 22

Step 21: If the machine brake holding force does not meet the braking requirements per ASME A17.1 Section 8.6.4.20.4, then an increased brake holding force will be required. The following steps will need to be taken to increase the brake holding force. Follow this process for both the left and right brake arm assemblies.

Step 21.1: Using a 15/16” wrench, loosen the brake adjustment bolt jam nut

Step 21.2: Using a 15/16” wrench, rotate the brake adjustment bolt one full turn clockwise (both the left and right brake adjustment bolts)

Step 21.3: Using a 15/16” wrench and the second 15/16” wrench, re-tighten the brake adjustment bolt jam nut

Step 21.4: Retest the traction machine brake

Step 21.5: If the brake holding force does not meet the requirements, then repeat step 21.1 through 21.4

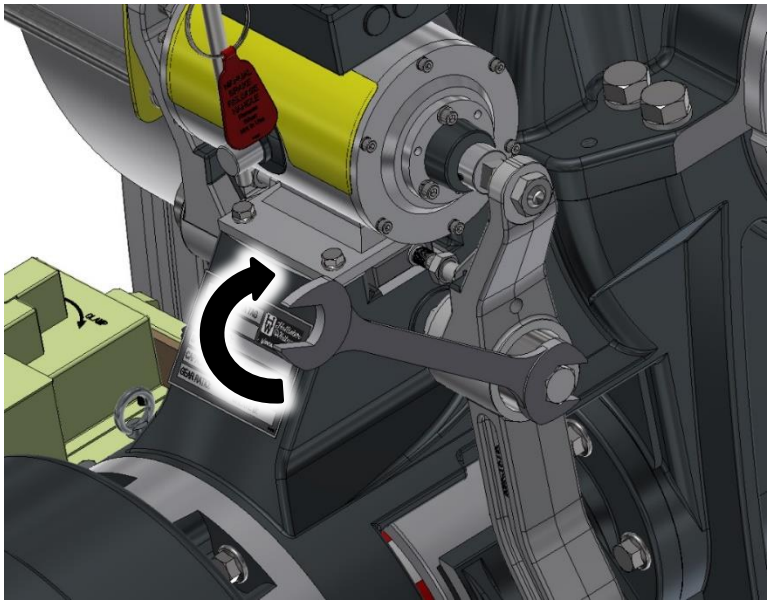


Figure 4

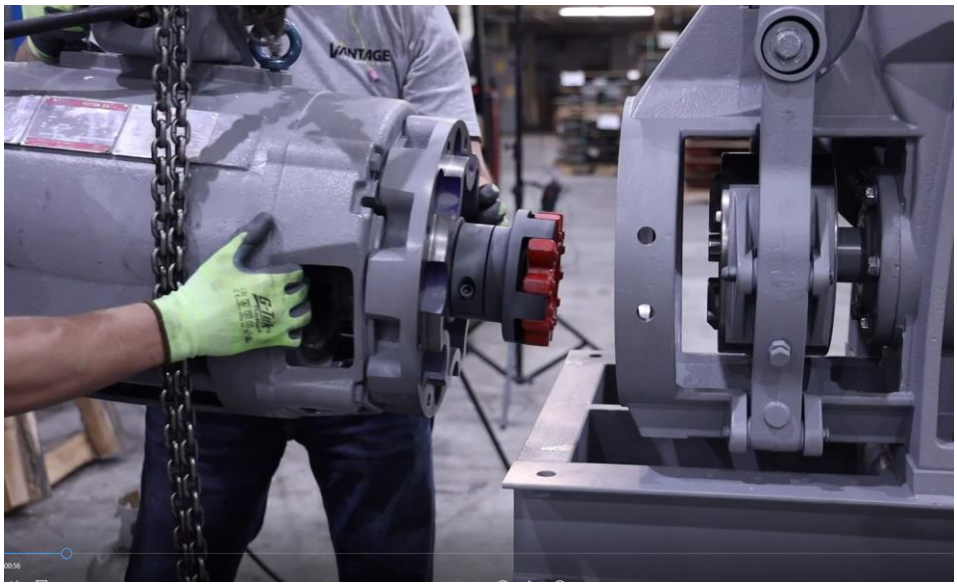
Step 22: Seal the brakes per ASME A17.1 Section 8.6.20.4 using tamper evident paint

Figure 5

Step 23: Following all applicable code requirements and safety protocols, return the machine to service.

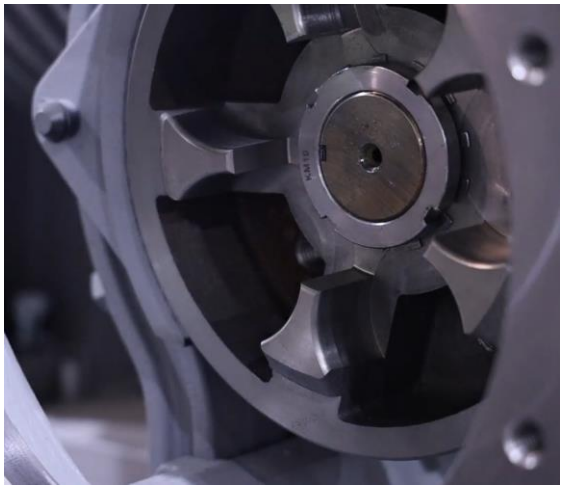
End of Brake Shoe Replacement

3.4 Brake Drum Removal



Remove motor per section 2.1 Motor Removal.

Locate locking tab and bend it straight to allow lock nut to be removed.

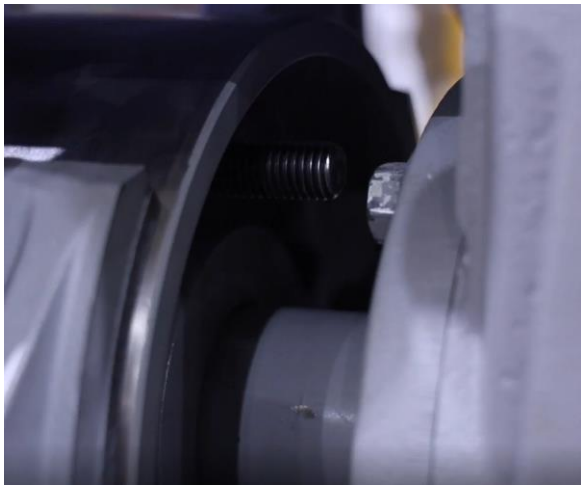


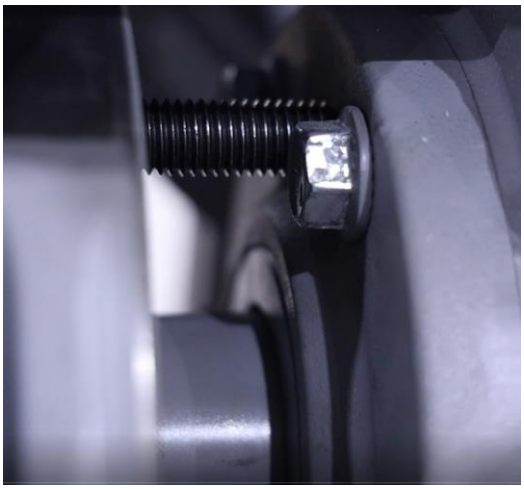
Remove the KM10 lock nut with a socket.

Remove lock washer.

There are (5) threaded holes in the rim of the brake drum.

Insert (2) 5/8” 11UNC bolts 12” long into two of the holes to aid in pulling off the brake drum.





Bolts will thread through the brake drum rim and rest on the bearing housing behind it. Avoid contact with bearing housing hardware.

Using the manual brake release handle, release the brake shoe pads.

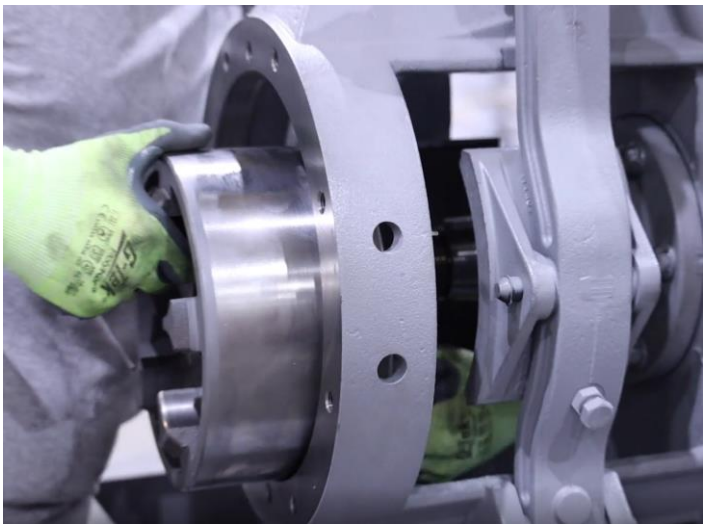
Thread the bolts in alternately, until the brake drum releases from the worm gear shaft.

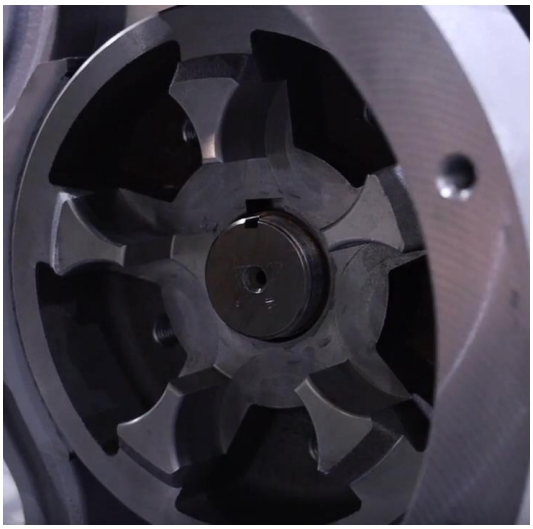
Remove brake drum from worm gear shaft 40 lbs. (18 kg).

Drum brake has a shaft key.

3.5 Brake Drum Installation

Insert shaft key on the worm gear shaft. Open brake pads.

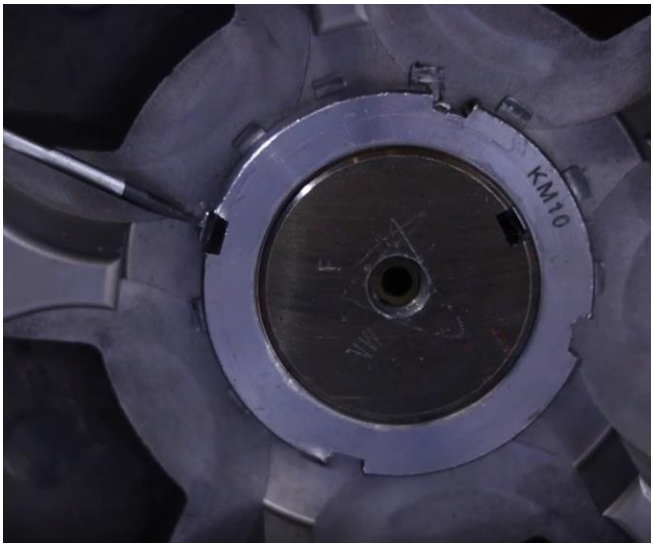




While aligning the shaft key with the mating slot, slide the brake drum onto the worm gear shaft, pushing it far enough back to expose the locking nut threads.

The manual brake release handle can now be relaxed to hold the brake drum.

Install the lock washer aligning the interior center tab with the slot in the worm gear.
Tread the locking nut on the end of the worm gear shaft.



Secure the lock nut with an impact wrench and KM10 lock nut socket
Bend a tab on the locking washer into the slot in the lock nut.

Motor can now be reinstalled per section 2.2 Motor Installation

Section

4

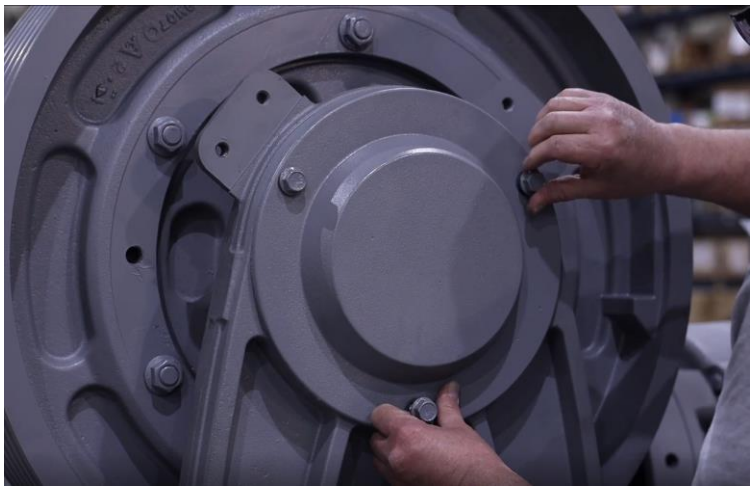
4 Traction Sheave & Hub

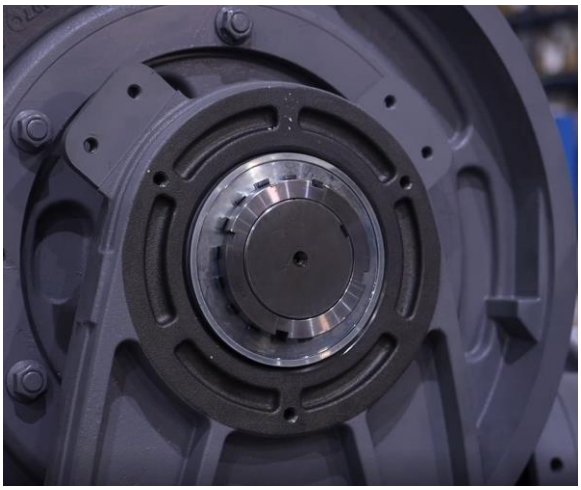
WARNING

- This instruction is intended for the use of qualified and authorized elevator personnel **ONLY**. For your safety and the safety of others, do not attempt ANY procedure that you are not qualified and authorized to perform. Follow standard elevator industry and governing safety requirements as well as your company's safety policies and procedures.
- Take all proper precautions to remove the elevator from service prior to working on the traction machine.
- It is very important to make sure the elevator ***CANNOT*** run and is in a state where it ***CANNOT*** move.
- Ensure that mechanic has the tools listed in the required tools list.
- Be sure to follow these instructions step-by-step to ensure the retrofit is completed correctly.
- Confirm the machine power is off.

4.1 Traction Sheave Removal

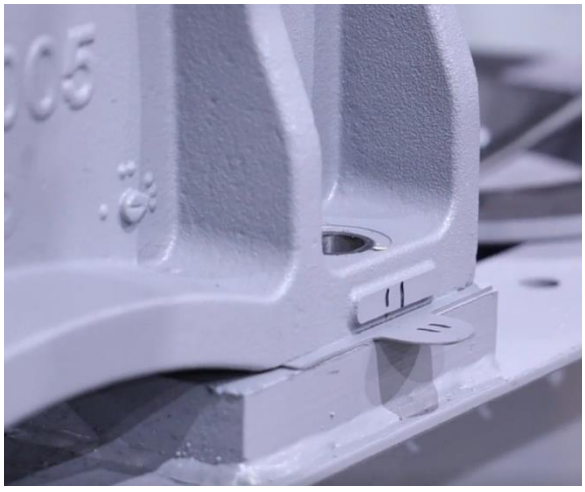
4.1.1 Outboard Stand Removal





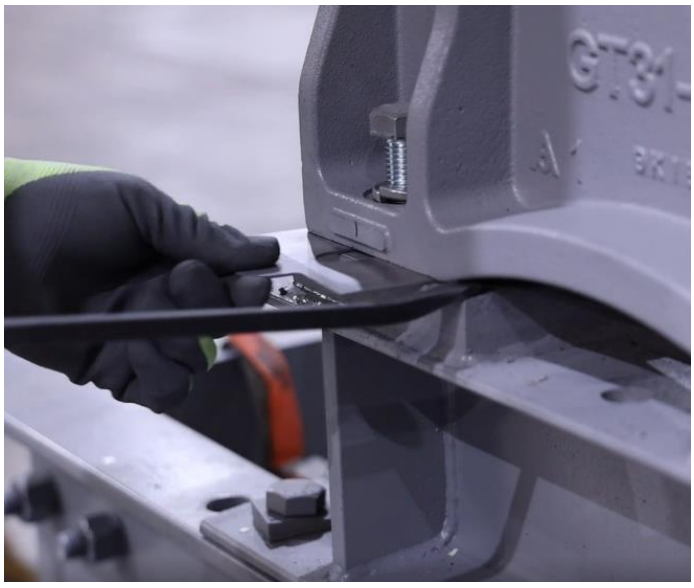
Remove the (3) 1/2”-13UNC x 1.50” bolts, then remove the cover from the outboard stand. Set aside placing the bolts into the cover.

Remove (2) 3/4”-10UNC x 2.50” bolts at the inside base of the outboard stand, one on each side (left and right).

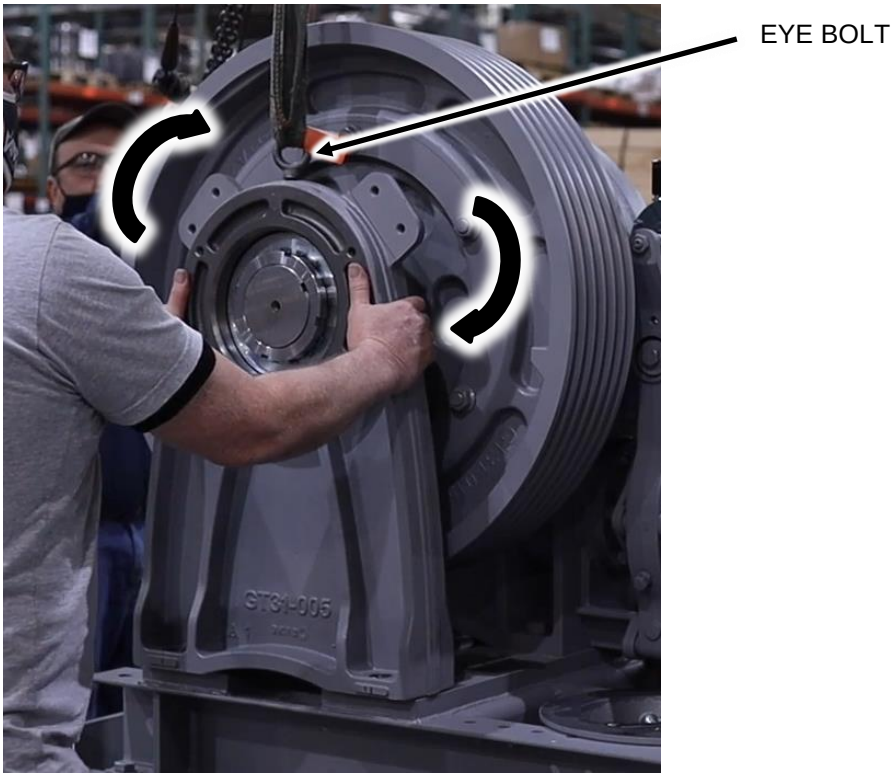


Mark the location of the shims and note the number of shims at each location. They will need to be re-installed in the same locations.

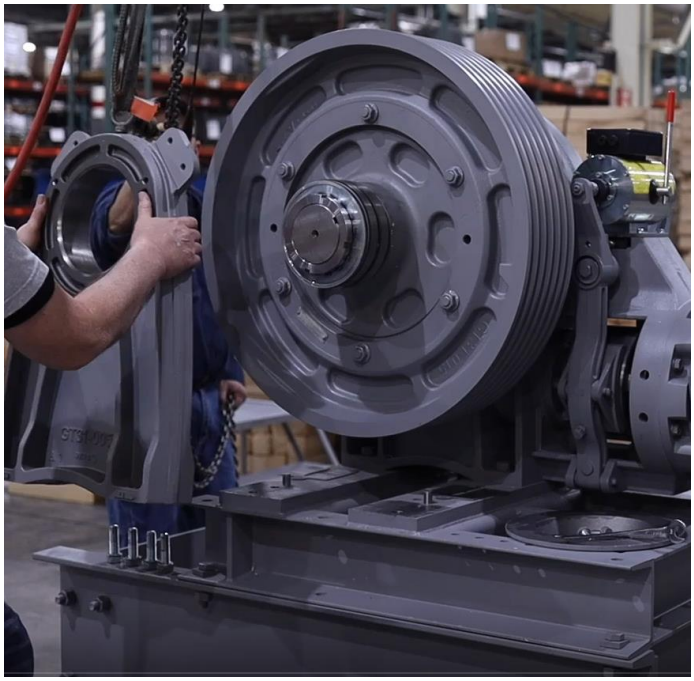
Remove the (2) 3/4”-10UNC x 2.50” bolts of the front side base of the outboard stand.



Remove the shims.



Support the outboard stands weight of 150 lbs. (68 kg) using an eye bolt placed in the 1/ 2”-13 UNC threaded hole. Remove the outboard stand by moving it back and forth off the shaft bearing.

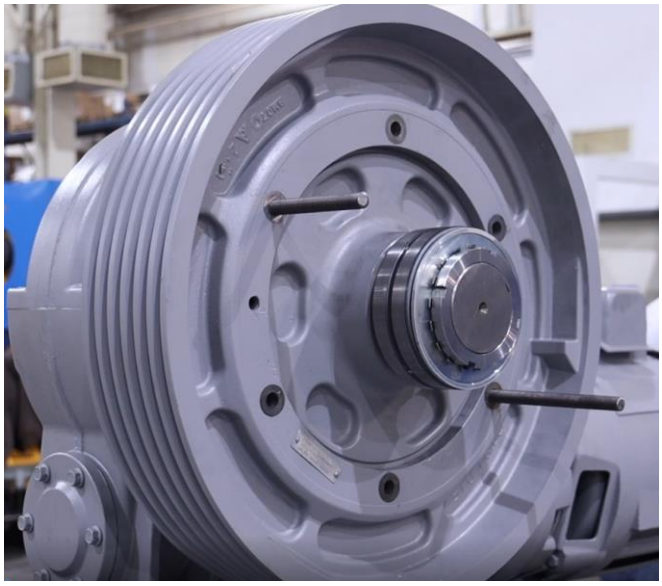


This removes the outboard stand.

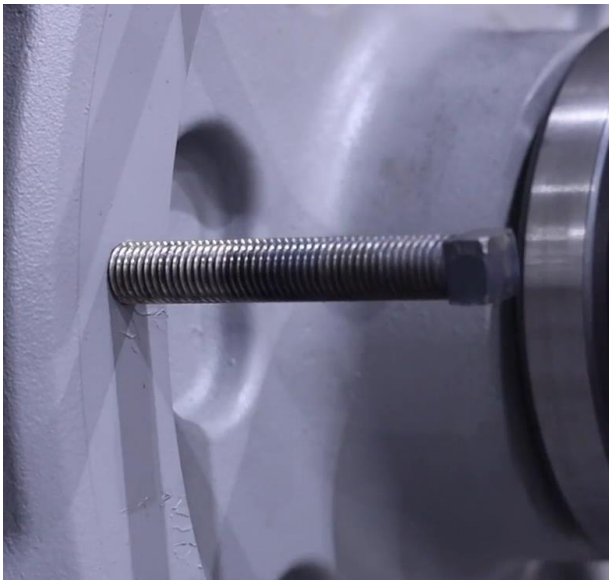
4.1.2 Traction Sheave Removal

Remove the (6) 3/4”-10UNC nuts that mount the sheave to the hub.

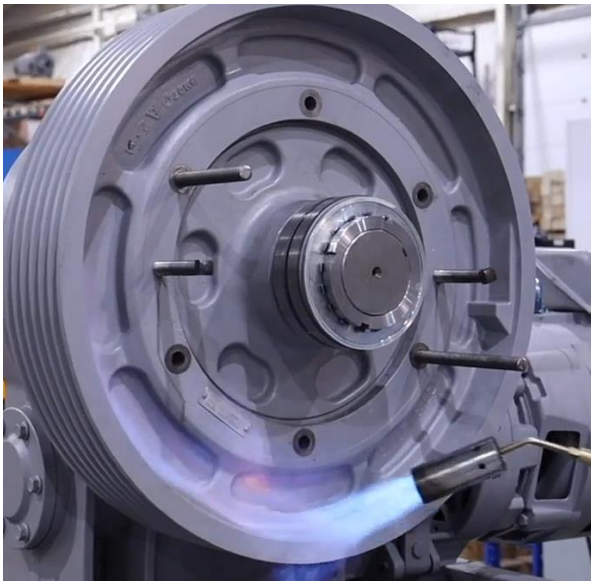
The traction sheave is mounted with close tolerance hardware. Tap the bolts to aid in removal.



Install (2) pieces of 1/2” all-thread, with a nut on the back side, through two of the mounting holes. These rods will support the weight 150 lbs. (68 kg) of the sheave when it is released from the hub.



Oil the tip of (2) 3/ 4”-10UNC jack bolts. Install them into the (2) threaded holes on the traction sheave. DO NOT ENGAGE! The traction sheave is mounted with shrink-fit tolerances. To remove the traction sheave, some form of heat, preferably an acetylene torch with a large heating tip (rosebud) which is used for heating only.



Apply heat to the traction sheave until just past "hand-touch" temperature.

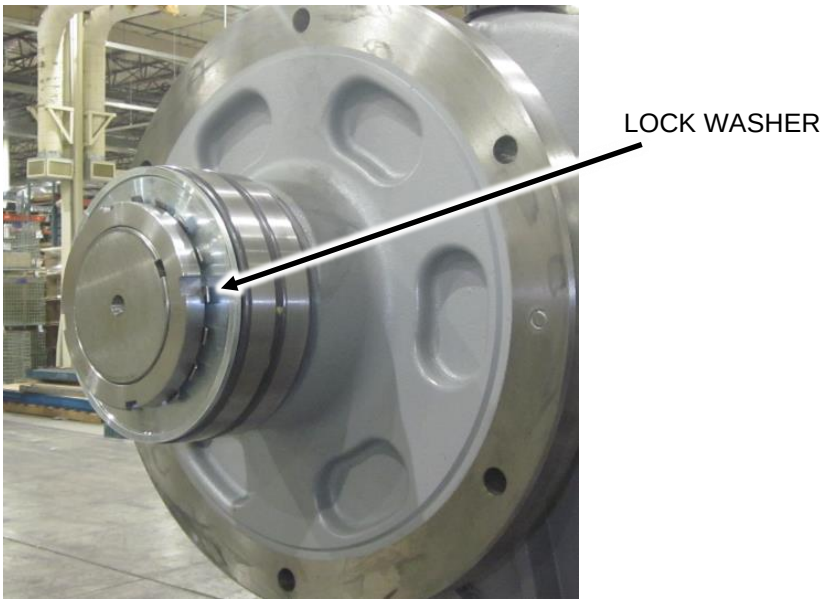
While heating, use an impact wrench to "walk-off" the sheave one bolt at a time. If there is resistance, apply additional heat.

As the traction sheave releases from the hub, guide it to rest on the all thread rods. Attach hoisting straps to lift off the traction sheave 350 lbs. (159kg).

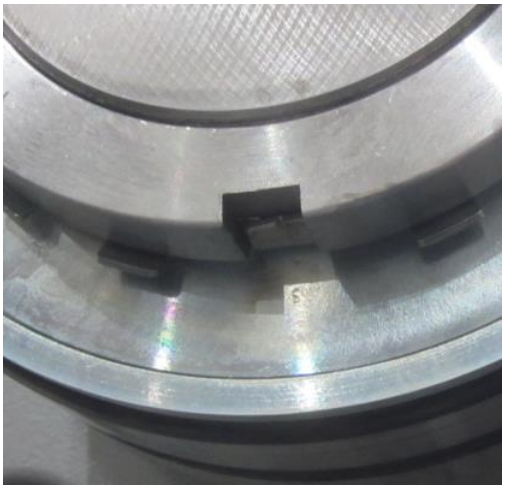
If only replacing the traction sheave proceed to section 4.4 Traction Sheave Installation.

If changing the hub for the traction sheave, continue.

4.2 Traction Sheave Hub Removal

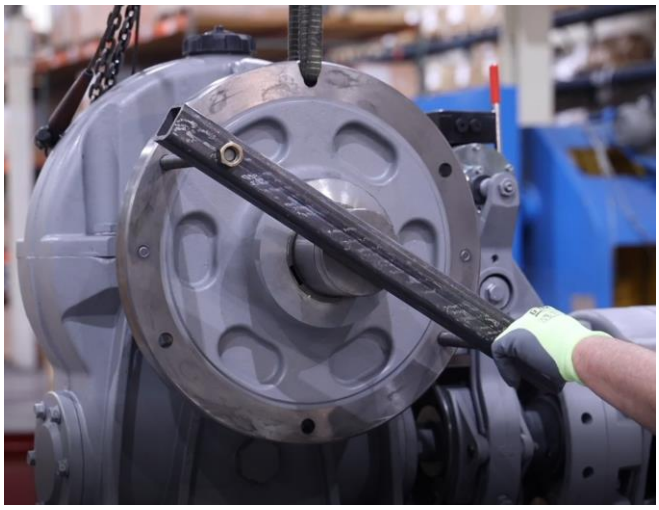


Locate the slot that the lock washer tab is bent into, and bend it flat to allow the lock nut to be removed.



Using a lock nut wrench to loosen the lock nut.

Remove the locking nut, lock washer, retention plate and the spherical bearing.

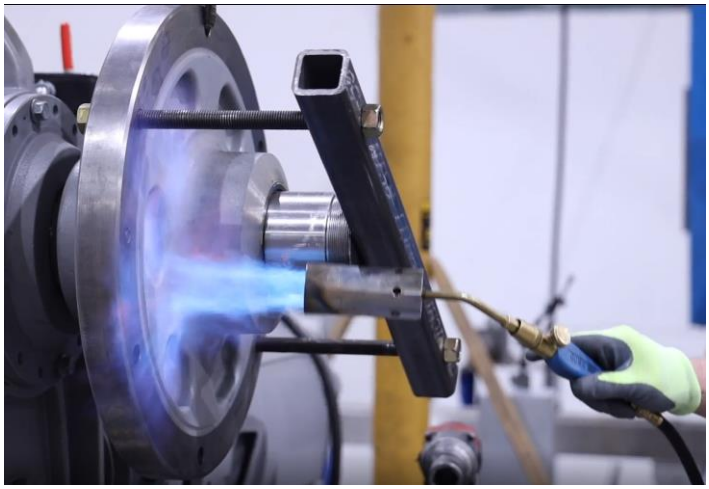


Support the hub with strapping sized for the approximate 180 lbs. (82 kg).

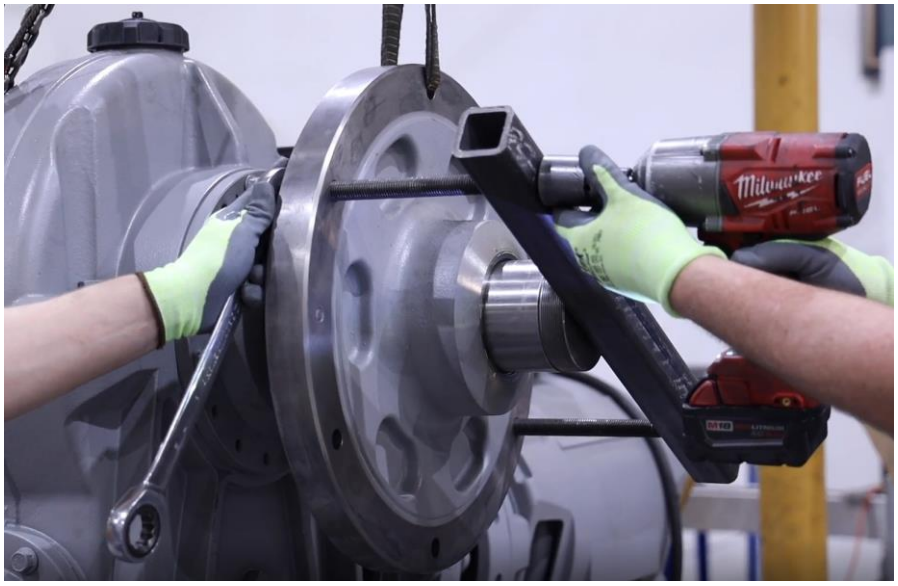
Place (2) 1/2” all thread rods (with flat washers and nuts) through two opposite clearance holes

Then place tube steel on the shaft and over the all- thread

Place a 1/ 2” nut on each all-thread to create a wheel puller.

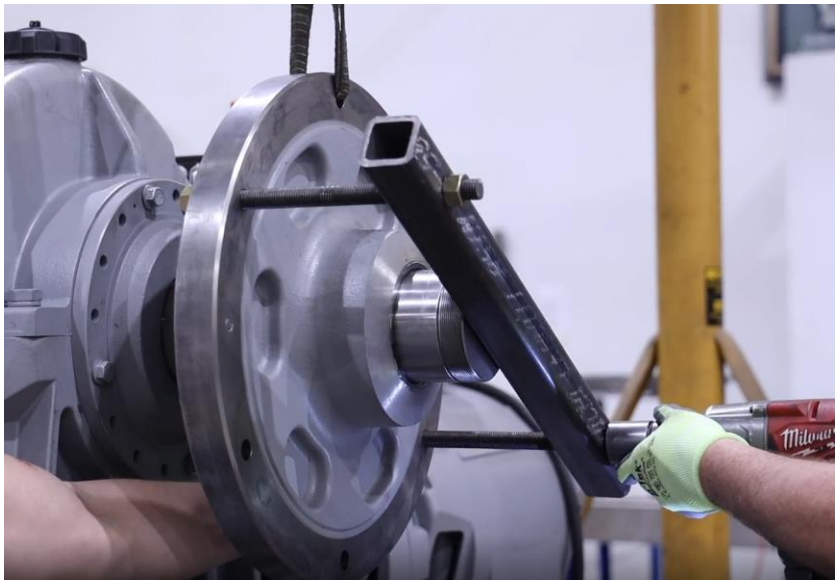


Apply heat to the flange of the hub.

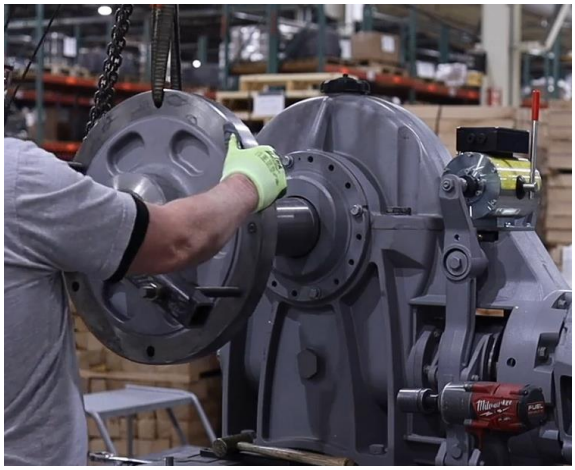


Secure the nut behind the hub with a wrench

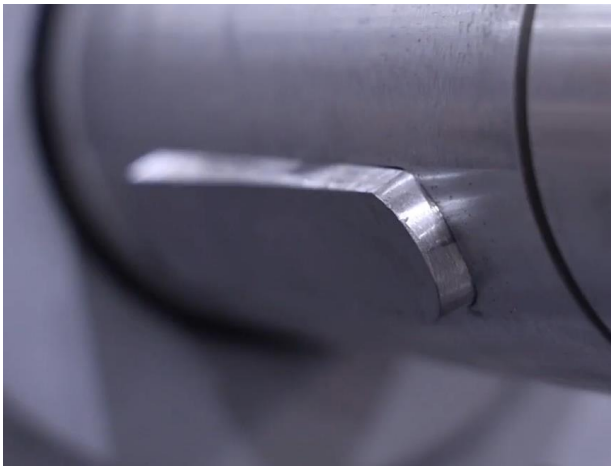
Tighten the nut on the steel bar.



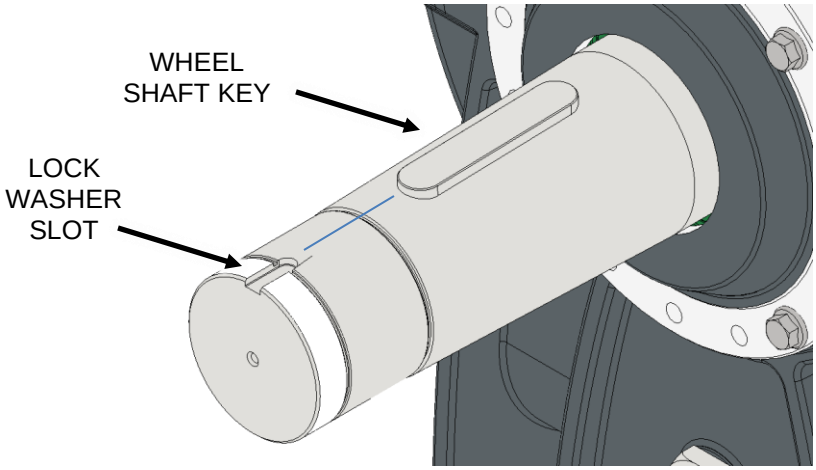
Alternating with the opposite all-thread rod.



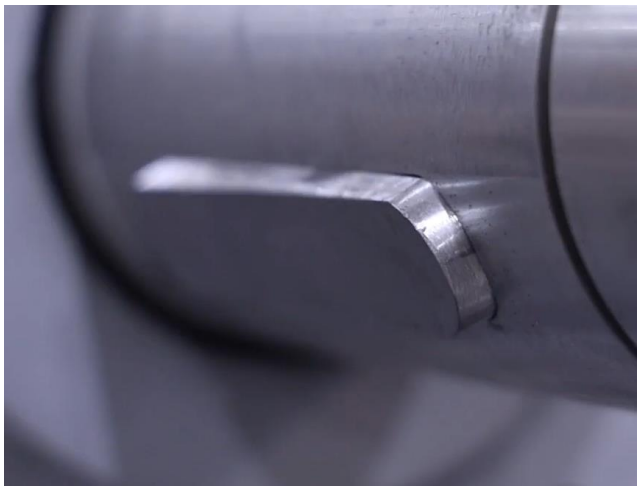
As the hub is removed, be aware of the wheel shaft key and secure it so it does not fall.

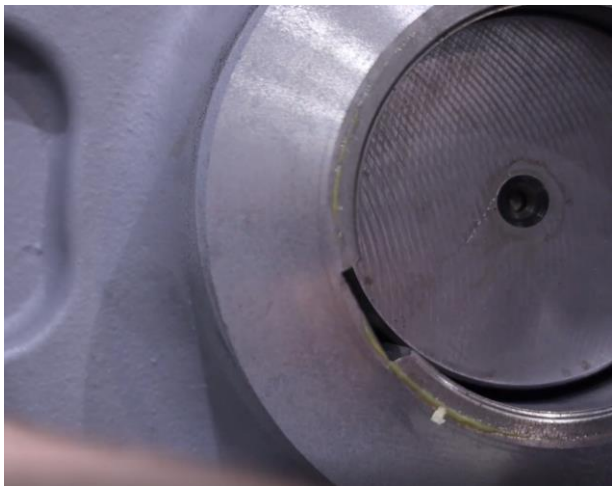


The wheel shaft key is directly behind the slot for the lock washer.



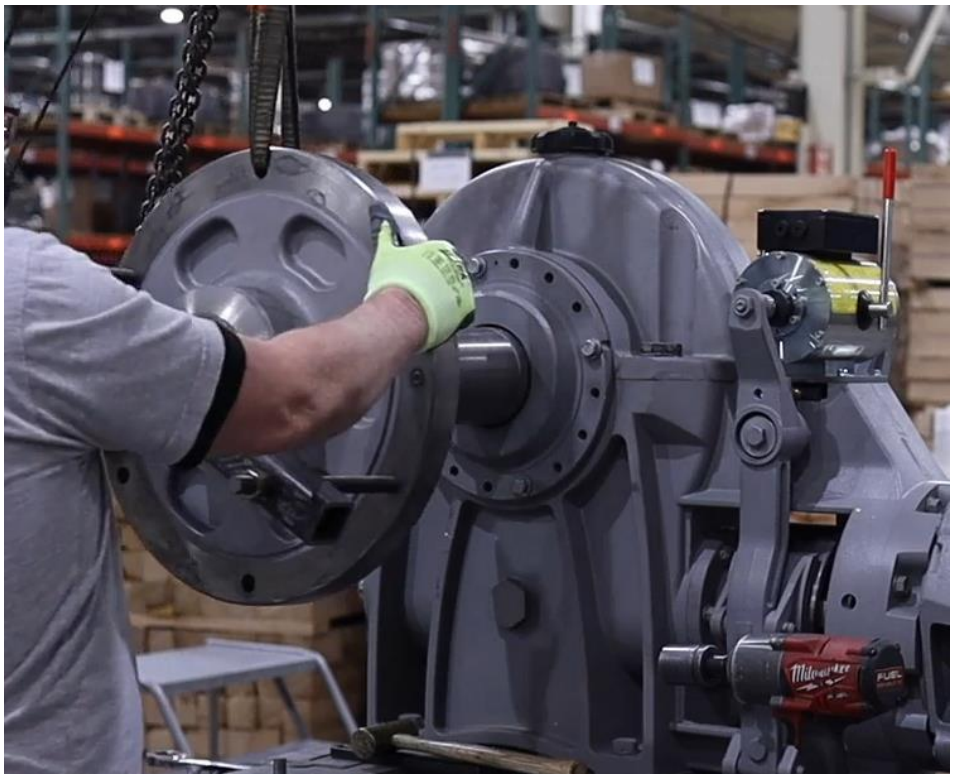
4.3 Traction Wheel Hub Installation

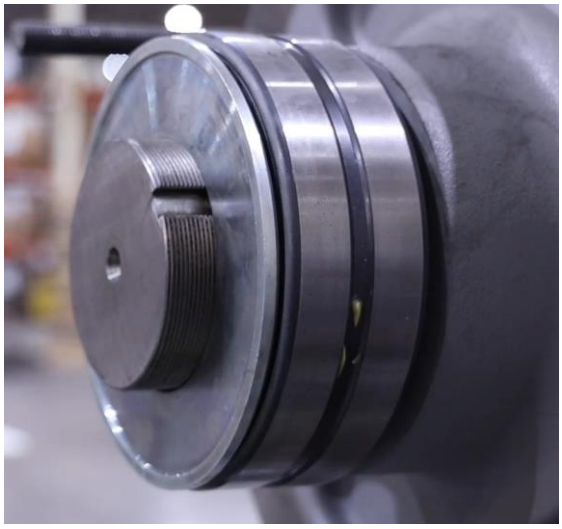




Place the wheel shaft key in the slot in the shaft.

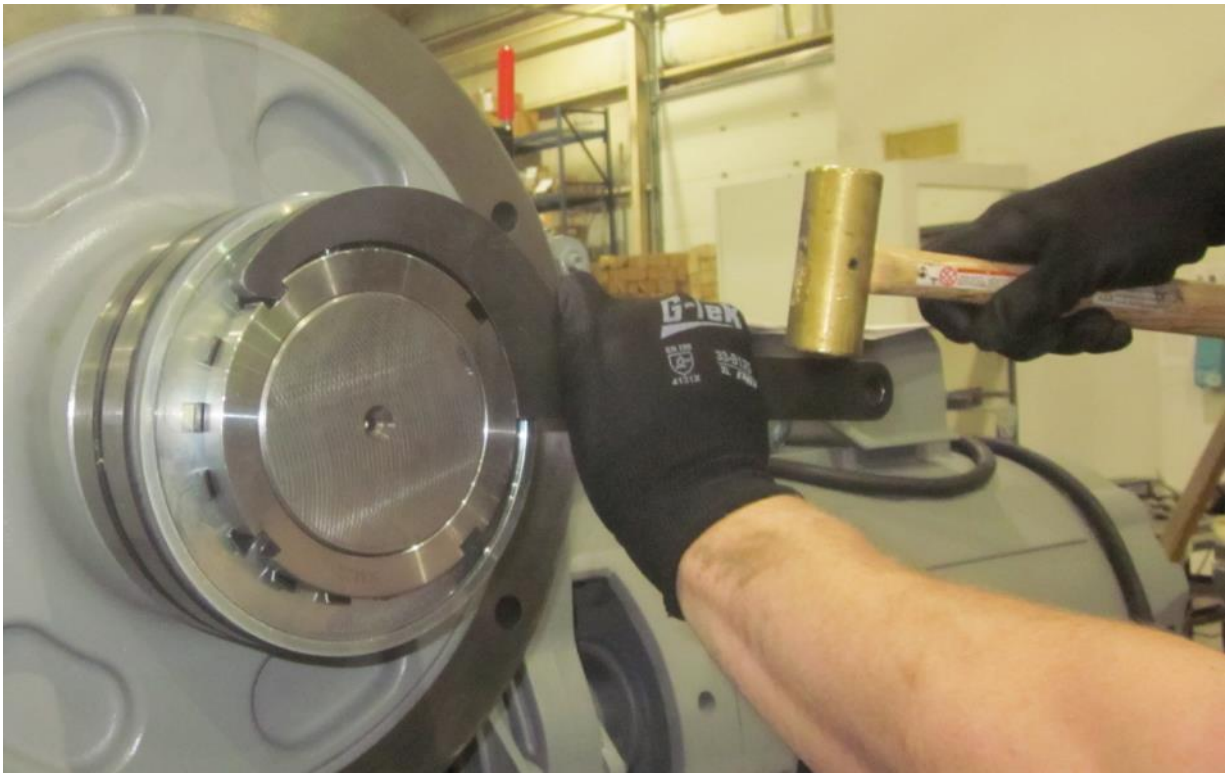
Align the slot in the hub with the wheel shaft key and push the hub onto the shaft.



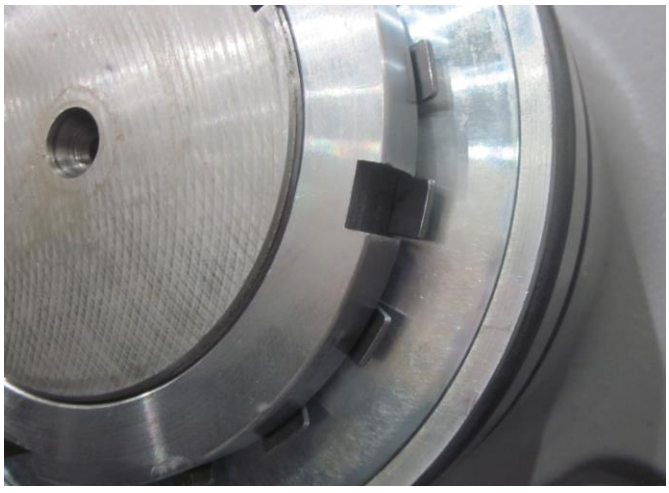


Place the spherical bearing onto the shaft, followed by the retention plate.

Place the lock washer on the shaft and thread the locking nut.



Tap the lock nut wrench with a hammer to snug the lock nut onto the shaft.

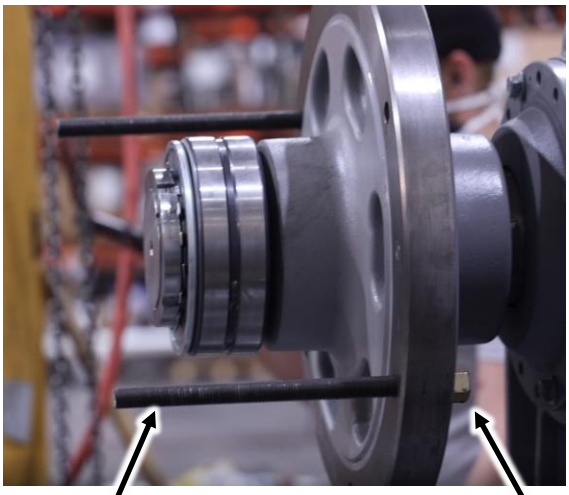


Align a lock washer tab with the slot in the lock nut and bend the tab into the slot.

4.4 Traction Sheave Installation

It is recommended to replace the hoist ropes when replacing the traction sheave.

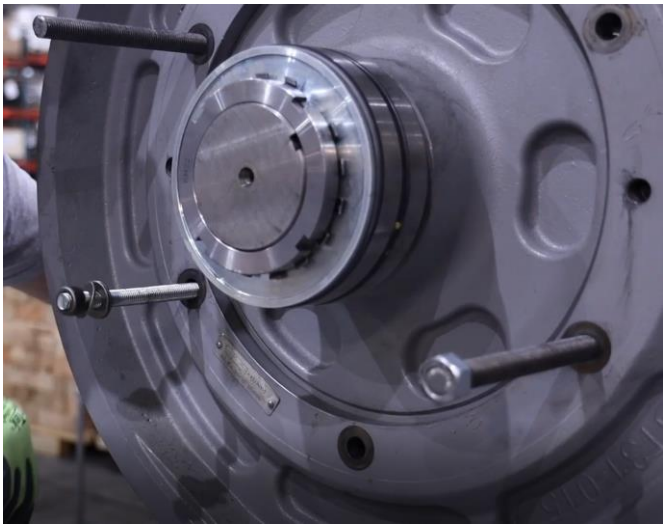
Clean the flat mounting surface of the hub with a file and wipe clean



Insert (2) 1/2” all thread rods, into opposite sheave mounting holes. Placing a nut on the end of the rod behind the hub. This will help align and support the traction sheave as it is heated

Apply heat to the traction sheave until just past "hand-touch" temperature.

Using a mallet tap the perimeter of traction sheave until it is fully seated on the hub.



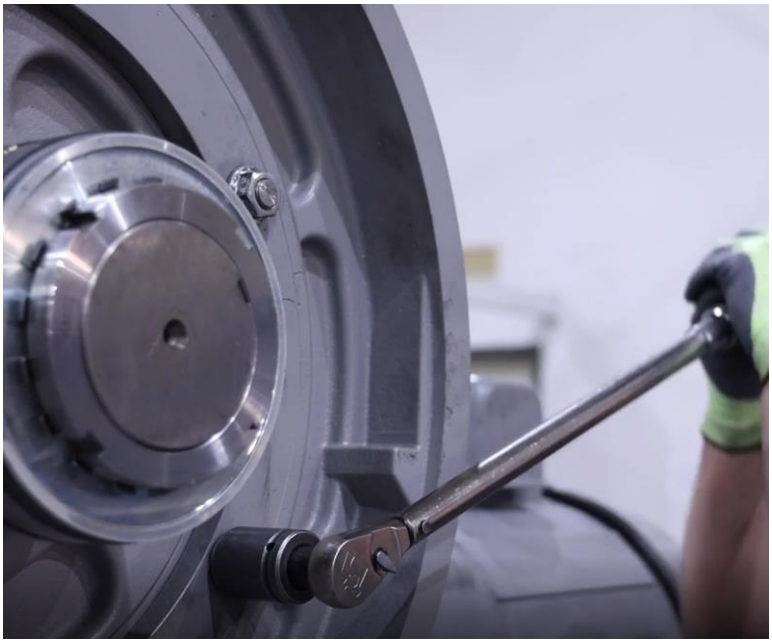
Place a temporary bolt through the back of the hub and tighten a flat washer and nut in (2) opposite mounting holes. (These will be replaced after the next step

Remove the (2) all thread rods.

Ream the (4) open mounting holes.

Insert (4) 3/4”-10UNC x 3.750 body bolts from the back side of the hub. Secure the 3/4” flange nut on the bolt.

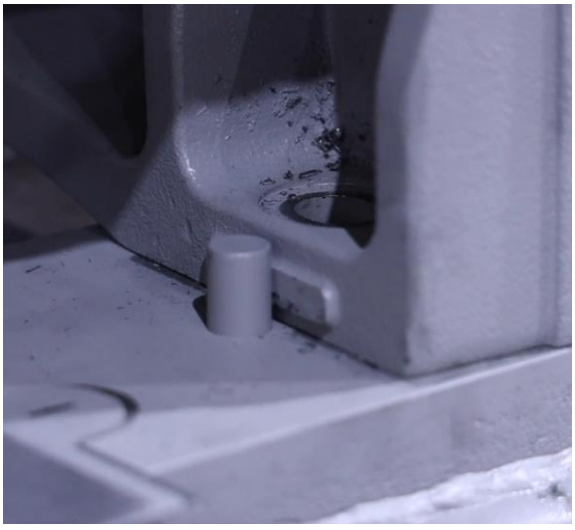
Remove the (2) temporary bolts, ream holes, and insert body bolts and secure with flange nuts.



Torque each nut to ___ ft lbs.

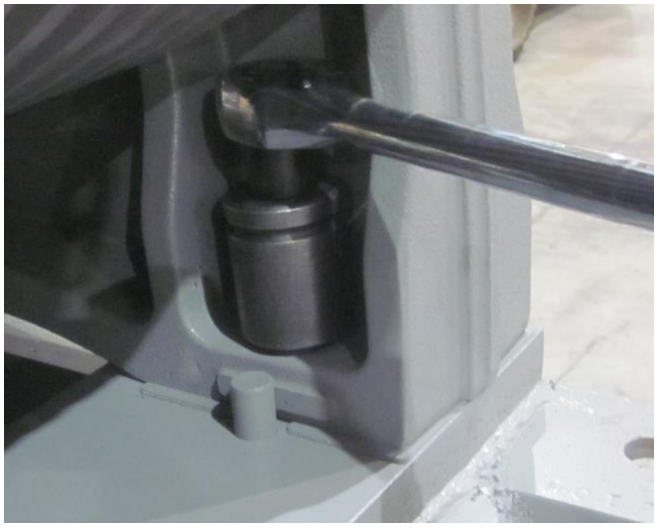
4.4.1 Outboard Stand Installation

Install the outboard stand by pushing it back and forth on the shaft bearing.

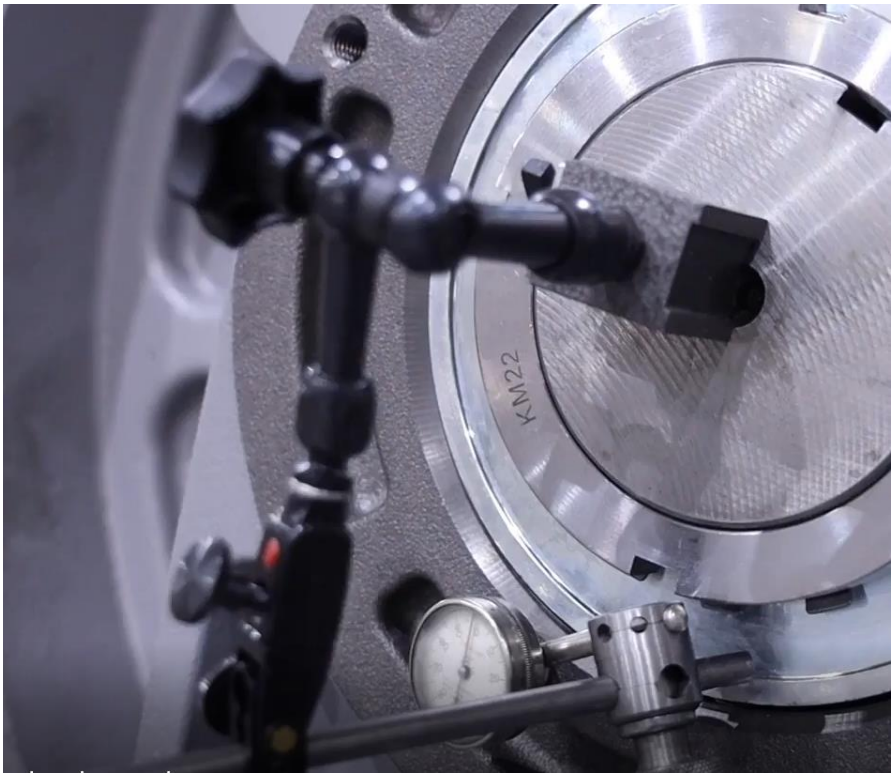


Make sure each leg of the outboard stand is pushed back to the alignment pins.

Use pry bar to lift outboard stand and placed marked shims into their proper locations.



Firmly seat the (4) 3/4”-10UNC x 2.50” bolts.



Use a dial caliper to measure the alignment of the outboard stand,

Install the bearing cover.

End

Section

5

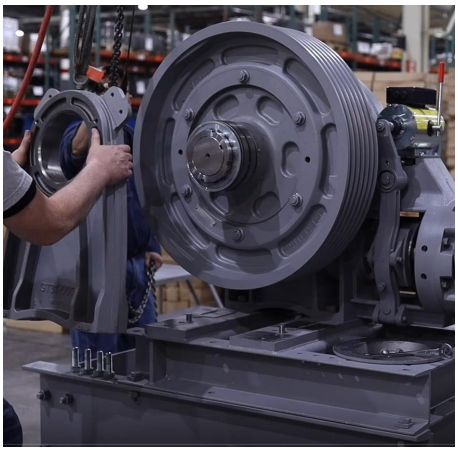
5 Gear Replacement

WARNING

- This instruction is intended for the use of qualified and authorized elevator personnel **ONLY**. For your safety and the safety of others, do not attempt ANY procedure that you are not qualified and authorized to perform. Follow standard elevator industry and governing safety requirements as well as your company's safety policies and procedures.
- Take all proper precautions to remove the elevator from service prior to working on the traction machine.
- It is very important to make sure the elevator ***CANNOT*** run and is in a state where it ***CANNOT*** move.
- Ensure that mechanic has the tools listed in the required tools list.
- Be sure to follow these instructions step-by-step to ensure the retrofit is completed correctly.
- Confirm the machine power is off.

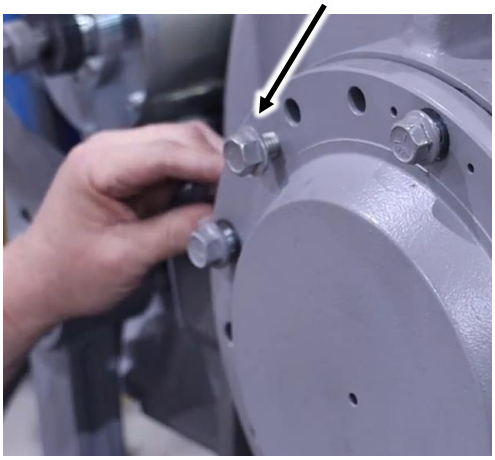
5.1 Ring Gear Removal

Remove the outboard stand following the steps described in section 4.1.1 Outboard Stand Removal



Mark the eccentric (cover) for re-assembly.

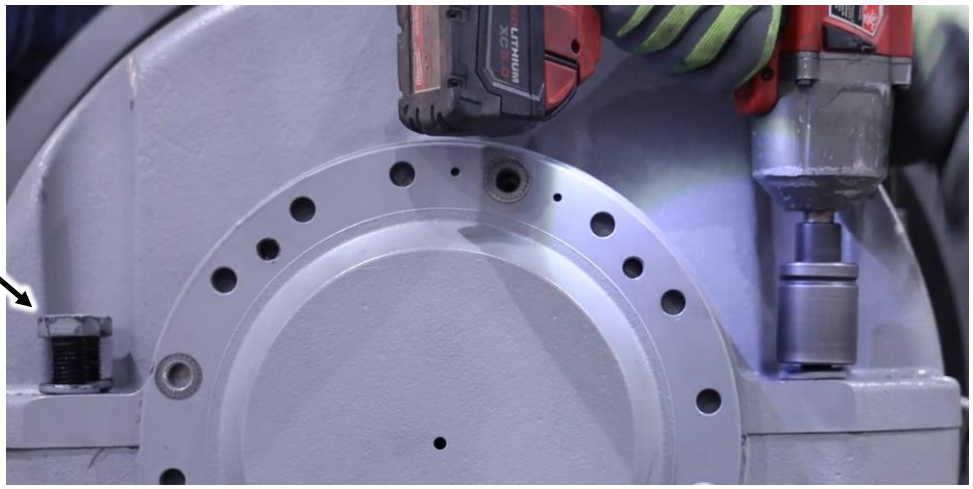
Loosen, do not remove, the (4) 1/2” 13UNC x 1.50” bolts.



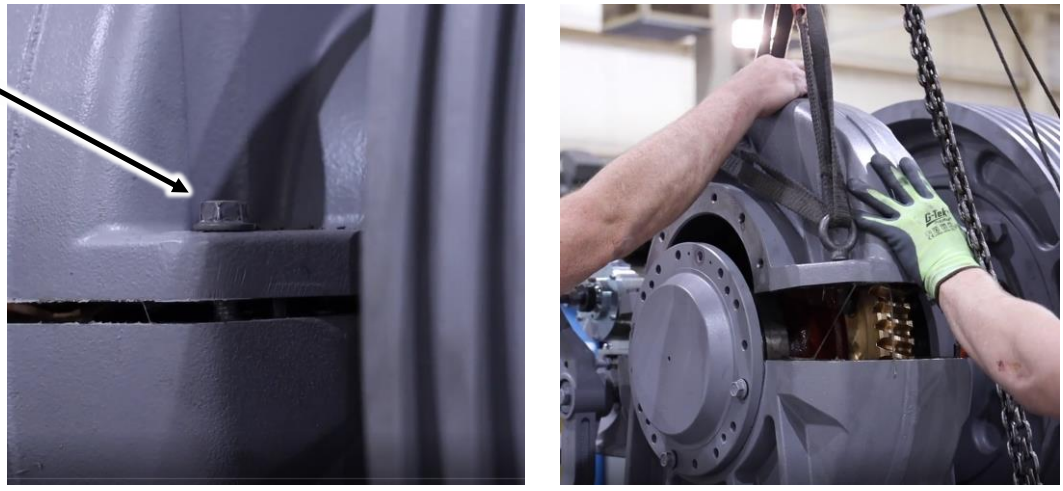
Shims are located at each bolt. Note the quantity and location at each location. To expose the shims, a jack bolt can be used to separate the eccentric from the housing.

After noting shim quantity and locations, remove top (2) the shims and bolts from the eccentric.

On the traction wheel side eccentric, remove (4) 1/2” 13UNC X 1.50” bolts. There are no shims on this side.



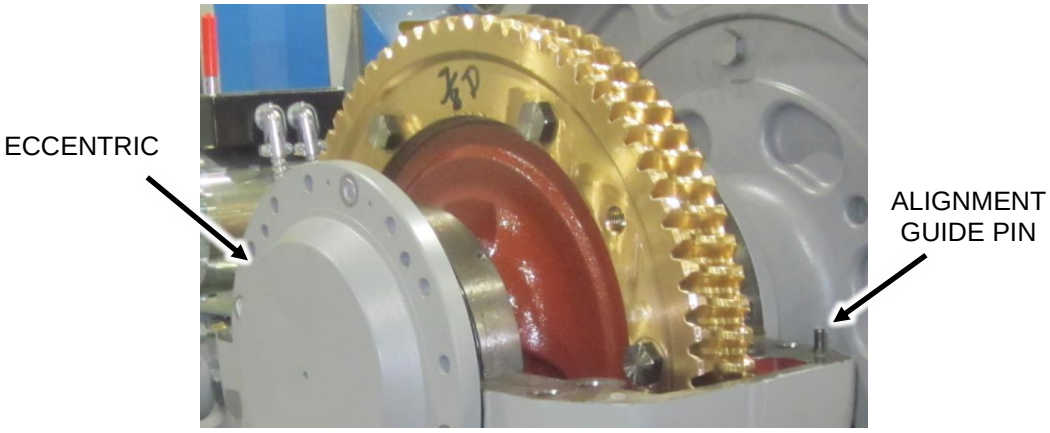
Remove the (8) 3/4” 10UNC x 2.50 bolts that mounts the upper housing to the lower housing.

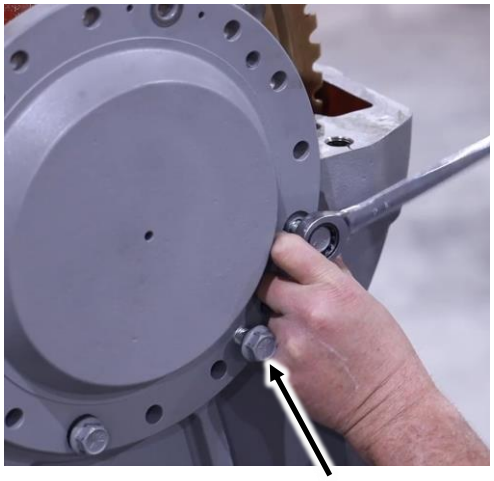


A jack bolts can be used to separate the upper housing from the lower housing.

Attach eye bolts on opposite corners to strap and lift the upper housing 133 lbs. (60.3kg)

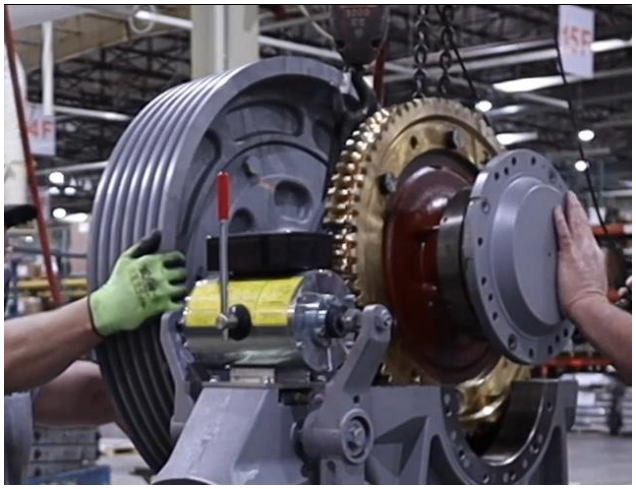
Be sure to lift the upper housing straight up. There are (2) alignment guide pins in the lower housing and the upper housing cannot damage the still bolted eccentric.





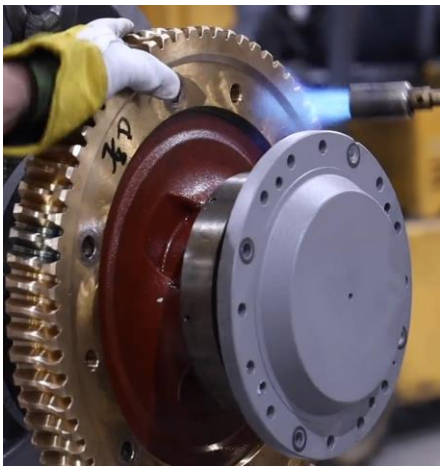
Attach hoisting straps to the center of the shaft between the traction sheave and the traction side eccentric. Lift slightly to support the weight.

Remove the remaining (2) 1/2” 13UNC X 1.50” bolts and shims from the eccentric.



Lift traction sheave shaft assembly out of the lower housing and place it where the maximum access to the ring gear is afforded.



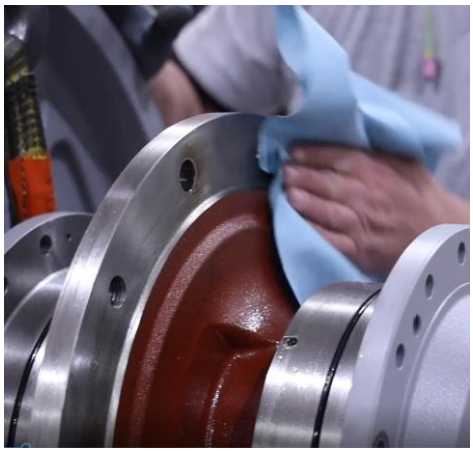


Remove the (6) 3/4” 10UNC body bolts. Apply heat to entire ring gear until it spins freely on the hub


Tap the ring gear around the circumference of the gear using a mallet and a section of wooden 2 x 4.

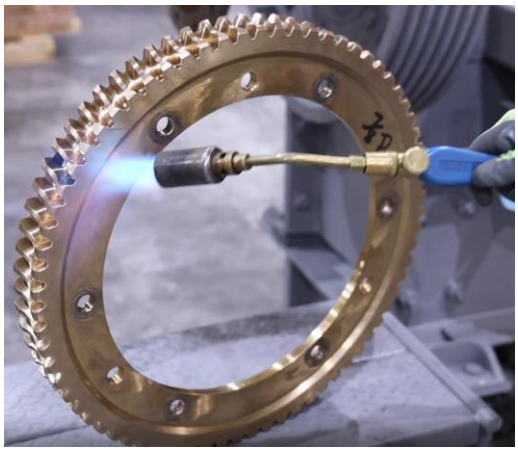
Lift off old ring gear.

5.2 Ring Gear Installation

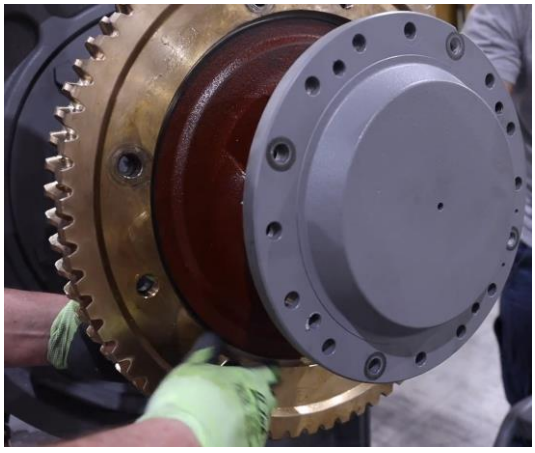
Use a flat file to clean and rust or any debris from the mounting surface of the hub. Follow with wiping the surface with a clean shop towel.

Wipe clean the mounting surface or the replacement ring gear.

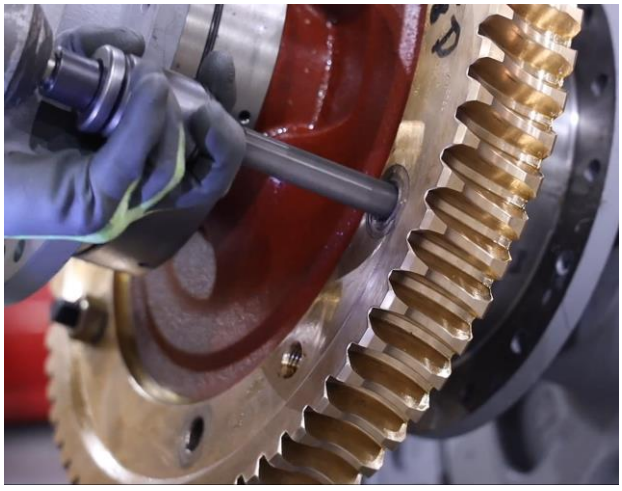



Heat the webbing of the replacement ring gear

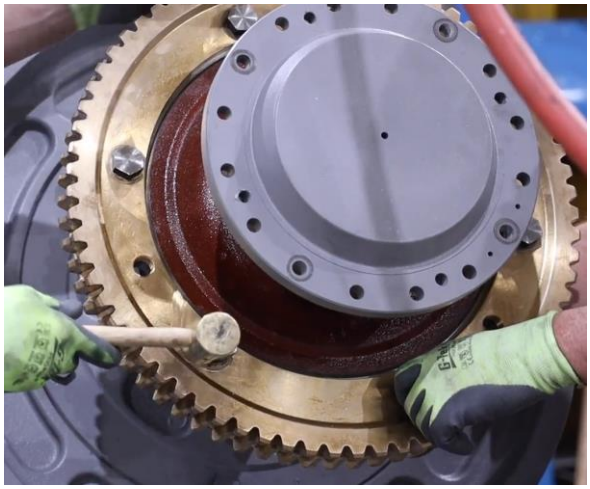
Place the ring gear on the hub aligning the bolt holes. Using a mallet and wooden 2 x 4 tap the ring gear until fully seated.



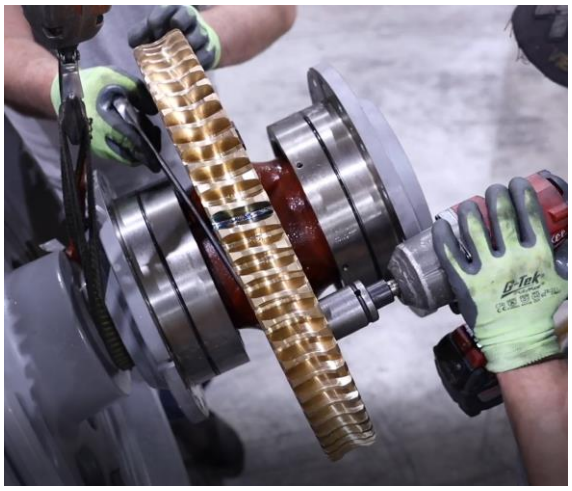
Temporarily bolt the ring gear to the hub in two opposite holes



Ream each of the (6) holes used to mount the ring gear to the hub.

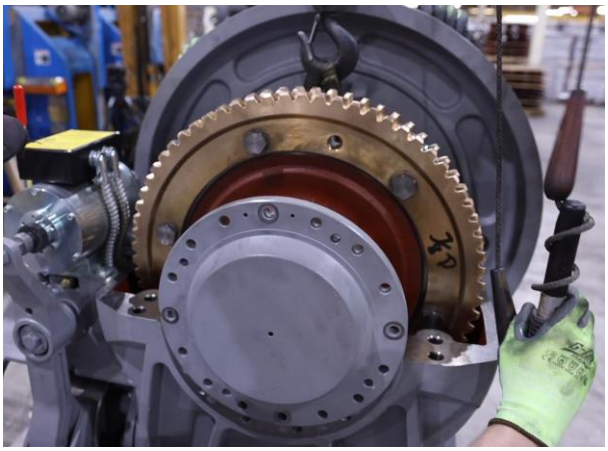


Replace the (6) 3/4” 10UNC body bolts with the nuts installed toward the traction sheave. Tolerances are close, the bolts may have to be tapped into place using a brass mallet.

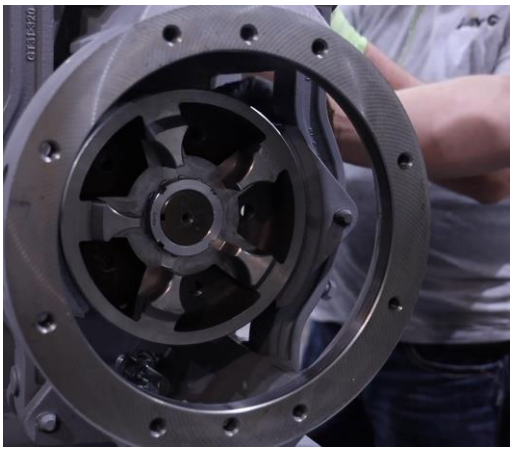


Tighten all (6) mounting bolts. Remove the (2) temporary bolts.

Clean all mounting surfaces of the upper and lower housing.



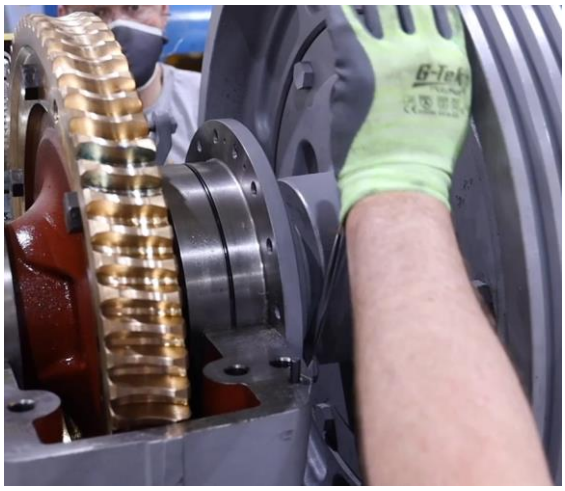
Lower the traction sheave shaft assembly into the lower housing carefully engaging the ring gear teeth with the worm gear teeth.



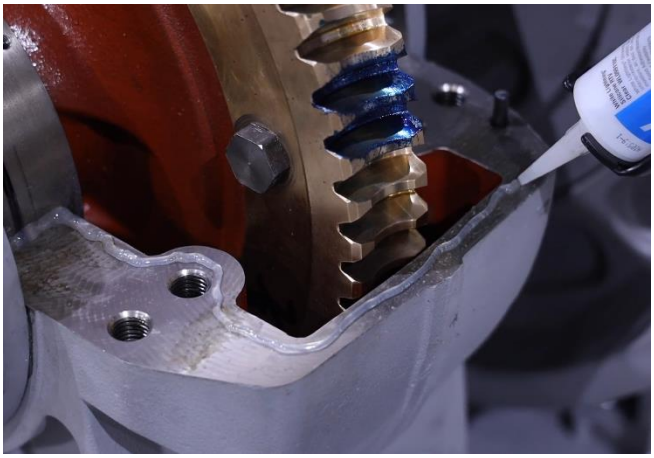
The brake drum can be rotated to aid during this process.

With jack bolts installed in the threaded holes, use a pry bar the align the eccentric with the marked location.

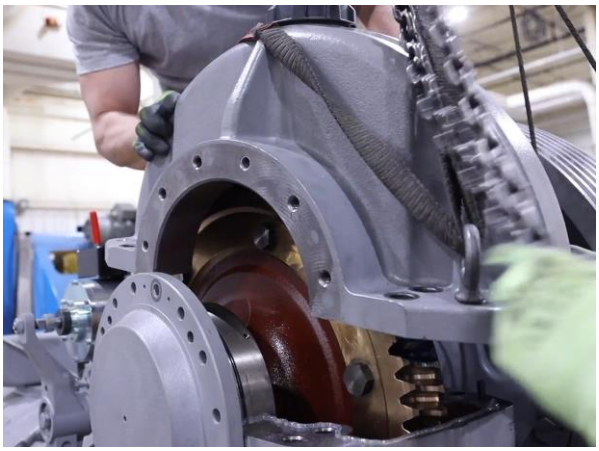
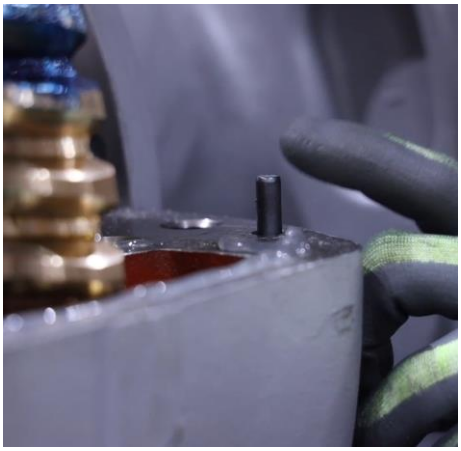
Install (2) 1/2” 13UNC X 1.50” bolts with the shims in the lower housing and firmly tighten bolts to 75 ft. lbs.



Install (2) 1/2” 13UNC X 1.50” bolts into the lower part of the traction eccentric and tighten.

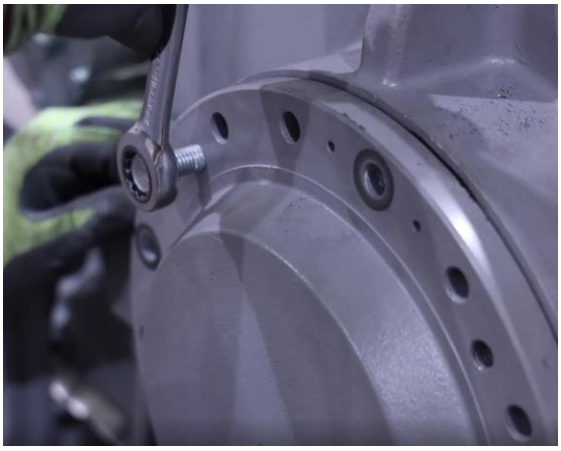


Add a bead of 100% silicone around the inside perimeter of the lower housing on both ends.

Reinstall the upper housing onto the lower housing carefully aligning the locating pin in the lower housing with its matched hole in the upper housing.


Install the (8) 3/4” 10UNC x 2.50 bolts that mounts the two housing together.




Use jack bolt to create gap to install shims with the (2) 1/2” 13UNC X 1.50” bolts in the upper two holes of the eccentric.

The tabs of the shims can be pushed sideways behind the eccentric. Tighten bolts to 75 ft. lbs.

Install and tighten the remaining (2) 1/2” 13UNC X 1.50” bolts located on the traction side eccentric.

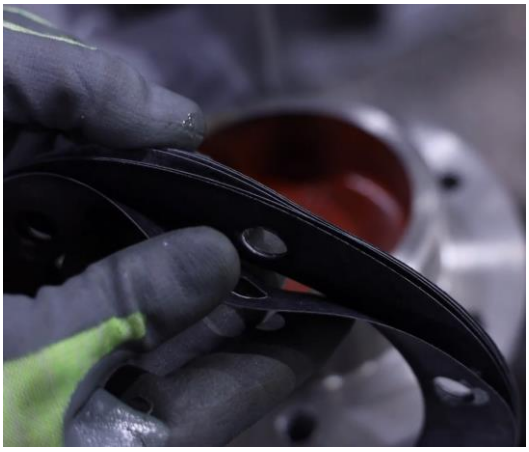
Reinstall the outboard stand per 4.4.1 Outboard Stand Installation

5.3 Worm Gear Removal

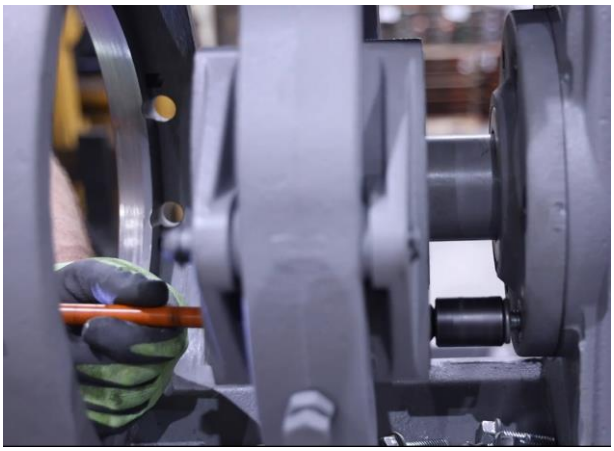
To remove the worm gear remove; the motor per section 2.1 Motor Removal, the drum brake per section 3.4 Brake Drum Removal, and the ring gear per section 5.1 Ring Gear Removal.

Cover the key slot in the worm gear with electrical tape to protect the seals from being cut.

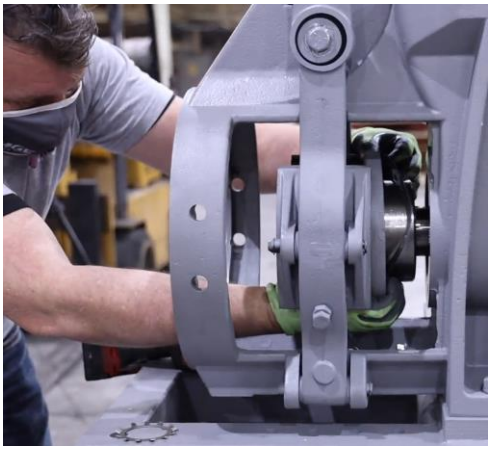
Remove (6) 1/2” 13UNC x 1.50 bolts from the rear end bearing cap. Remove bearing cap.



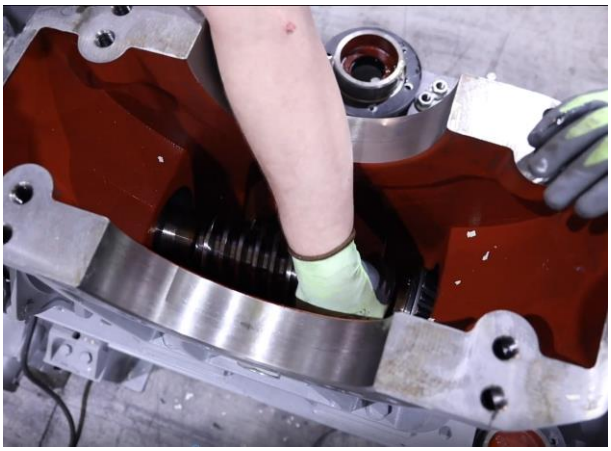
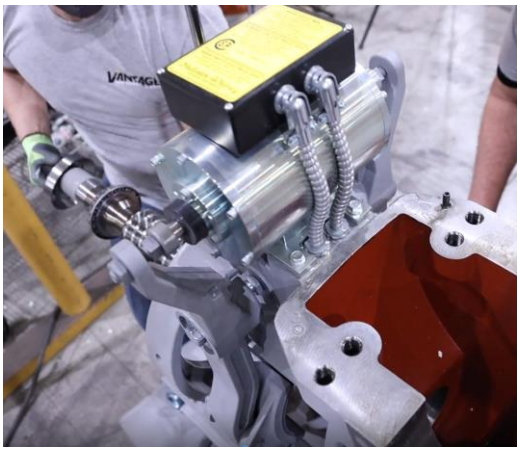
Retain the bearing cap shims

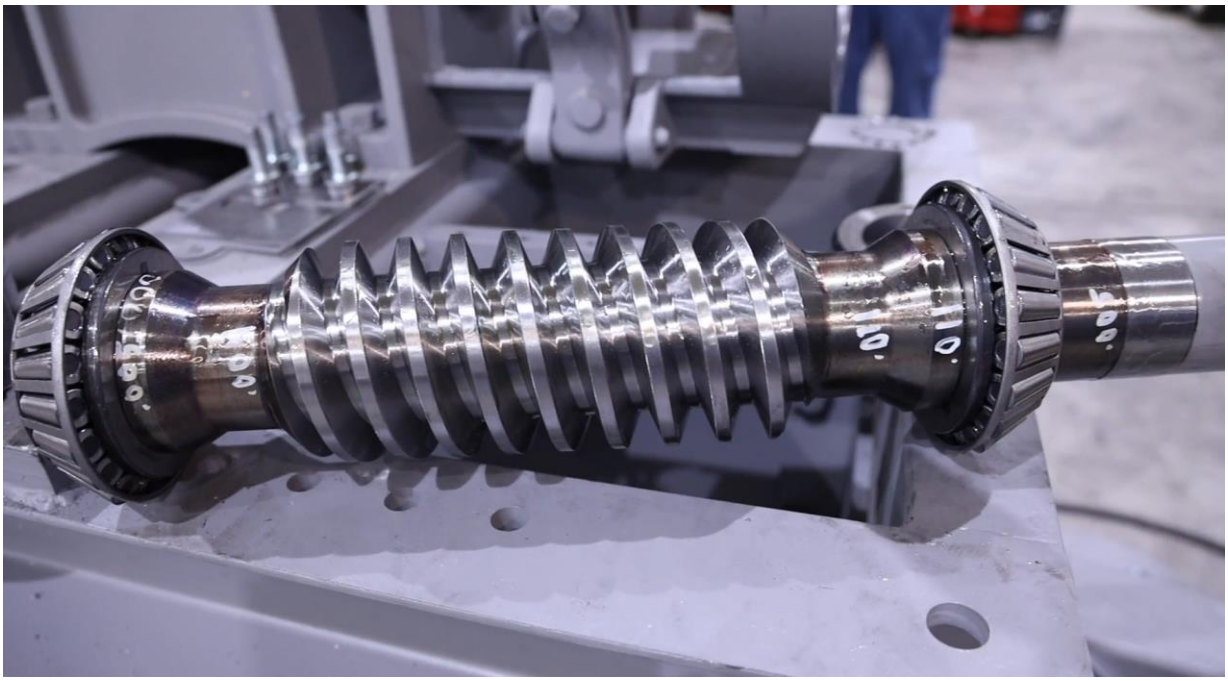
Remove (6) 1/2” 13UNC x 1.50 bolts from the forward end bearing cap.




Remove forward end bearing cap. Note the single bearing cap shim at this location.

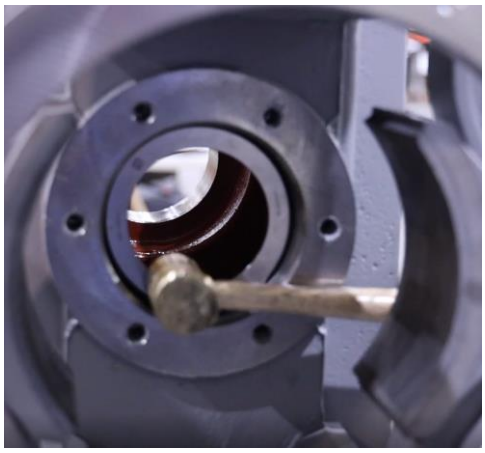



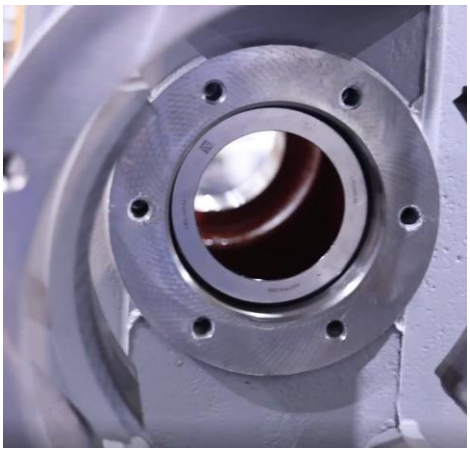
The worm gear can be removed from either end. Above photo it is removed via the brake side.



Removed worm gear with tapered bearings.

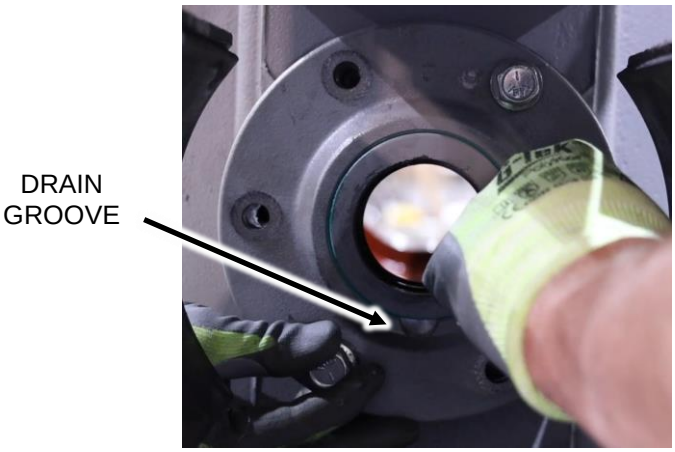
5.4 Worm Gear Installation

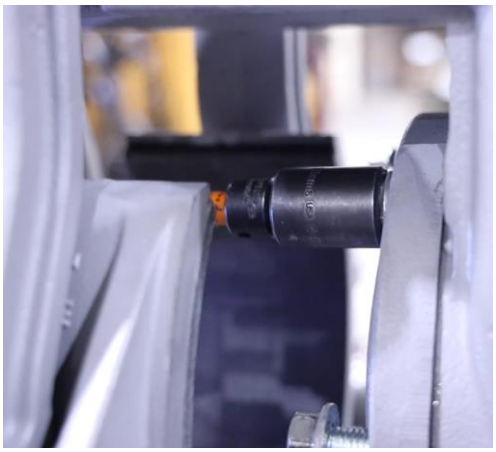




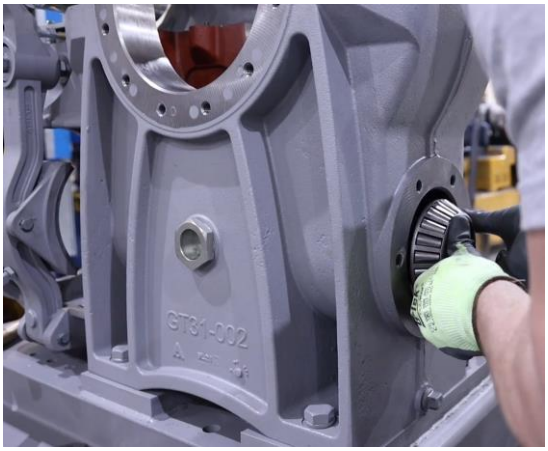
Insert the outer ring, or cup, into the lower housing. Make sure it is fully seated by tapping into place with a mallet.

Install the forward end bearing cap with (1) shim making sure the drain groove points toward the base of the machine.



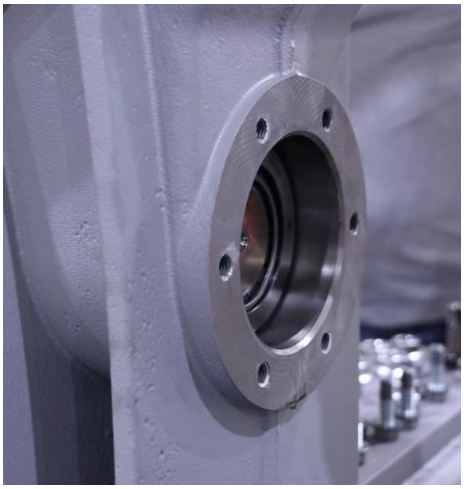


Install and tighten (6) 1/2” 13UNC x 1.50 bolts for the forward end bearing cap.



Insert the worm gear into the rear end cap side, guiding it into the just installed forward end bearing cap.

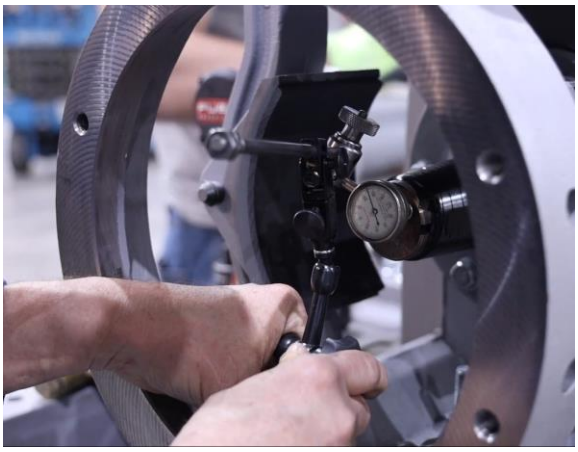
Next install the rear end bearing cap pushing it firmly into place.



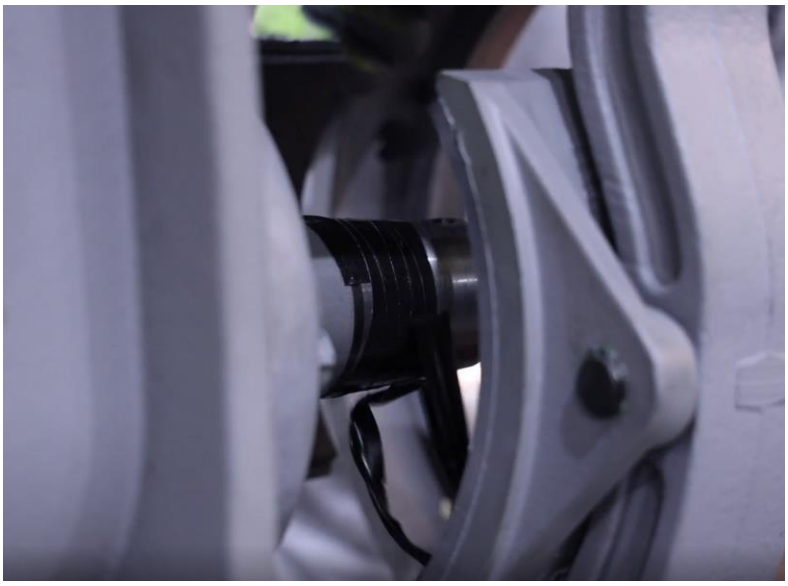

Place 10 shims on the rear end cap and install rear end cap.


Install and tighten (6) 1/2” 13UNC x 1.50 bolts for the rear end bearing cap.

5.5 Set Free Play on the Worm



Check the amount of play of the worm gear with a magnetic based, fine adjustable, SAE dial. If play exceeds _____" remove the rear end cap and remove the appropriate number of shims, 0.010" (0.254mm) each to achieve _____".



Remove the electrical tape from the worm gear key slot.

Reassemble; the drum brake per section 3.5 Brake Drum Installation, the motor per section 2.2 Motor Installation, and the ring gear per section 5.2 Ring Gear Installation.