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NICOL SCALES & MEASUREMENT

AN ISO/IEC 17025:2017
ACCREDITED CALIBRATION COMPANY

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NICOL SCALES & MEASUREMENT IS AN ISO ACCREDITED CALIBRATION COMPANY THAT HAS PROVIDED CALIBRATION, REPAIR AND SALES OF ALL TYPES OF WEIGHING AND MEASUREMENT PRODUCTS SINCE 1931.

iCP - Intelligent Carriage Plate
(Class II and III)

RAVAS
creating intelligence



Technical Manual

TABLE OF CONTENTS

WARRANTY POLICY 1

CONTACT INFORMATION 2

OWNER STATISTICS 3

TECHNICAL BULLETINS 4

Loss of Lifting Capacity 4
Safety Plate Retaining Bolts technical bulletin 5
Safety Bolts Technical Bulletin 6

INSTALLATION 7

Unpacking 7
Scale Base Installation 8
Indicator Installation 10
Side Shift Bracket Installation 12

ADJUSTMENT, SERVICE, AND REPAIR OF THE SCALE BASE 14

Flexure Replacement and Adjustment 14
Load Cell Removal 17
Load Cell Replacement Re-assembly 18
Setting the Pre-Load on the Load Cell 19
Adjusting Heal-to-Toe Shift 20
10 Point Weight Distribution Test 21
Installing Shims 23
Scale Shimming Worksheet 24

WARRANTY POLICY

RAVAS USA, INC.

WARRANTY POLICY

RAVAS USA, INC. warrants the equipment that we manufacture-for a period of twelve (12) months from the date of shipment against manufacturer's defects in materials and/or workmanship. The warranty applies only to the original owner of the equipment. RAVAS's obligation under this warranty is limited to the repair or replacement of defective parts, and the associated labor and travel costs for the repair. Replacement or repair of parts or products is at the sole discretion of RAVAS. This warranty does not cover shipping and handling charges.

For electronic products, manufactured by other companies and, sold by RAVAS USA, the warranty is limited to that offfered by the electronic product's original manufacturer. Typical examples of such products include, but are not limited to, computers, printers, scanners and specialty indicators.

This warrany specifically excludes any repairs not necessitated by a manufacturer's defect. This includes, but is not limited to, failure to install, calibrate, and/or operate the product in accordance with the manufacturer's installaiton and/or technical manual. It also does not include intentional misuse of the product.

All warranty work must be pre-authorized by RAVAS USA and performed by RAVAS USA or a certified scale tecnician dispatched by RAVAS USA at its sole discretion. *RAVAS USA reserves the right to modify this warranty policy at any time.*

RAVAS USA MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY, AND/OR FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. IN NO EVENT WILL RAVAS USA BE LIABLE FOR PUNITIVE, SPECIAL OR CONSEQUENTIAL DAMAGES, OR FOR AN AMOUNT IN EXCESS OF THE PURCHASE PRICE OF THE DEFECTIVE RAVAS USA PRODUCT OR PRODUCTS.

CONTACT INFORMATION

Parts, RMA and Service:	Call: Toll Free 844-425-0544 x219 or Direct 330-425-0561 Email: parts-usa@ravas.com service-usa@ravas.com
Technical Support:	Call: Toll Free 844-425-0544 x502 or Direct 330-425-0575 Email: service@ravas.com

More information can be found at:www.ravas.com

-Click on “Knowledge Base” link at bottom of any page (no login required).

-Then click on “Knowledge Base” tab.

-Search based on keyword or use the drop-down menus by product (“Topic”) or document

(Keyword search).

OWNER STATISTICS



Please enter the appropriate base and indicator serial numbers prior to installation.
Please refer to the numbers below for information, orders or service.

Indicator Model #	Indicator Serial #

Base Model #	Base Serial #

Capacity x Grad.	

	Part Number	Quantity
Top Flexure		
Bottom Flexure		

TECHNICAL BULLETINS

Loss of Lifting Capacity

	Lost Load Center	Horizontal Center of Gravity	Vertical Center of Gravity	Weight
Class II				
3,000-6,000 Lbs. capacity				
16" x 36"				
Hang On Type (LTEF16, LTEF16N)	4 3/4"	2 3/8"	9"	350 Lbs.
Integrated Type (LTEF162, LTEF16N2)	4 3/4"	2 3/8"	9"	395 Lbs.
Class III				
6,000-10,000 Lbs. capacity				
20" x 42"	5 1/4"	2 5/8"	11"	570 Lbs.
10,000 Lbs. capacity				
20" x 48"	5 1/4"	2 5/8"	11"	670 Lbs.
15,000 Lbs. capacity				
20" x 48"	5 3/4"	2 7/8"	11"	735 Lbs.
Class IV				
10,000-12,000 Lbs. capacity				
25" x 48"	5 3/4"	2 7/8"	13 1/2"	950 Lbs.
15,000-20,000 Lbs. capacity				
25" x 48"	6 1/2"	3 1/4"	13 1/2"	1150 Lbs.

Important: Truck Manufacturer must calculate lifting capacity using the above figures.

Safety Plate Retaining Bolts technical bulletin

Subject: Safety Plate Retaining Bolts & Flexure Bolts Torque Value

When installing or servicing a RAVAS Scale it is critical that the ***safety plate retaining bolts*** are torqued properly. The correct torque value for these bolts is ***130 ft.- Lbs.***

When replacing or servicing the ***flexures*** on a RAVAS Scale it is critical that the bolts are torqued properly. The correct torque value for these bolts is ***130 ft.-Lbs.***

WARNING:

Failure to properly torque the Safety Plate Retaining Bolts may result in Bodily Harm or Damage to the Equipment.

Failure to properly torque the flexure bolts can result in premature flexure failure.

Safety Bolts Technical Bulletin

IMPORTANT: Safety Bolts Will Appear Loose. *DO NOT TIGHTEN THEM!*





The Safety Bolts are in place to maintain the structural integrity of the scale base in case of catastrophic failure, or removal, of the flexures.

Normally the head of the safety bolts are about 1/16” inside the back plate (see pictures above) and do not directly touch any part of the back plate or bore hole. It will appear that the heads are almost flush with the back plate.

The bolt threads will NOT be all of the way in on the front plate side. Do NOT try to tighten the bolt to have more of the shaft of the bolt in to the threads.

Note that to keep the scale balanced, the gap of 2 ¼” along all edges between the front and back plate must be maintained.

If you overtighten the safety bolts the scale will not function properly.

INSTALLATION

Unpacking

The RAVAS Lift Truck Scale is shipped on a pallet. A standard system will include the following components:

1. One (1) scale carriage assembly with safety plates
2. One (1) load cell cable assembly with mounting bracket
3. One (1) power cable for indicator (not included if base only is purchased)
4. One (1) electronic indicator with mounting hardware (if purchased)
5. One (1) Operator / Installation manual
6. If ordered, one (1) Side Shift Bracket assembly

Upon receipt of shipment, inspect to make sure the above listed parts are present.

Scale Base Installation

- Remove safety plates (Fig. 1 & 2) from bottom of scale carriage assembly. Place the scale in a vertical position on the edge of the shipping pallet, with the rear side (side with cleats) facing outward. Examine the back plate of the scale base at this time to locate the carriage alignment bolts (Fig. 1). The head of the bolt that protrudes from the rear of the scale is known as the fixed carriage alignment bolt. There are also several adjustable carriage alignment bolts protruding from the rear of the scale. These adjustable bolts have a **lock nut** located between the two plates. These bolts will be adjusted in step #4.
- **Note: If the lift truck has a take-up-reel device ensure that the Load Cell Cable Mounting Bracket is located on the opposite side of the lift truck. Relocate the longer mounting bolt to the correct side of the base prior to installing the base.**

Warning: ***To avoid bodily harm exercise care while handling the scale base prior to applying the safety plates.***

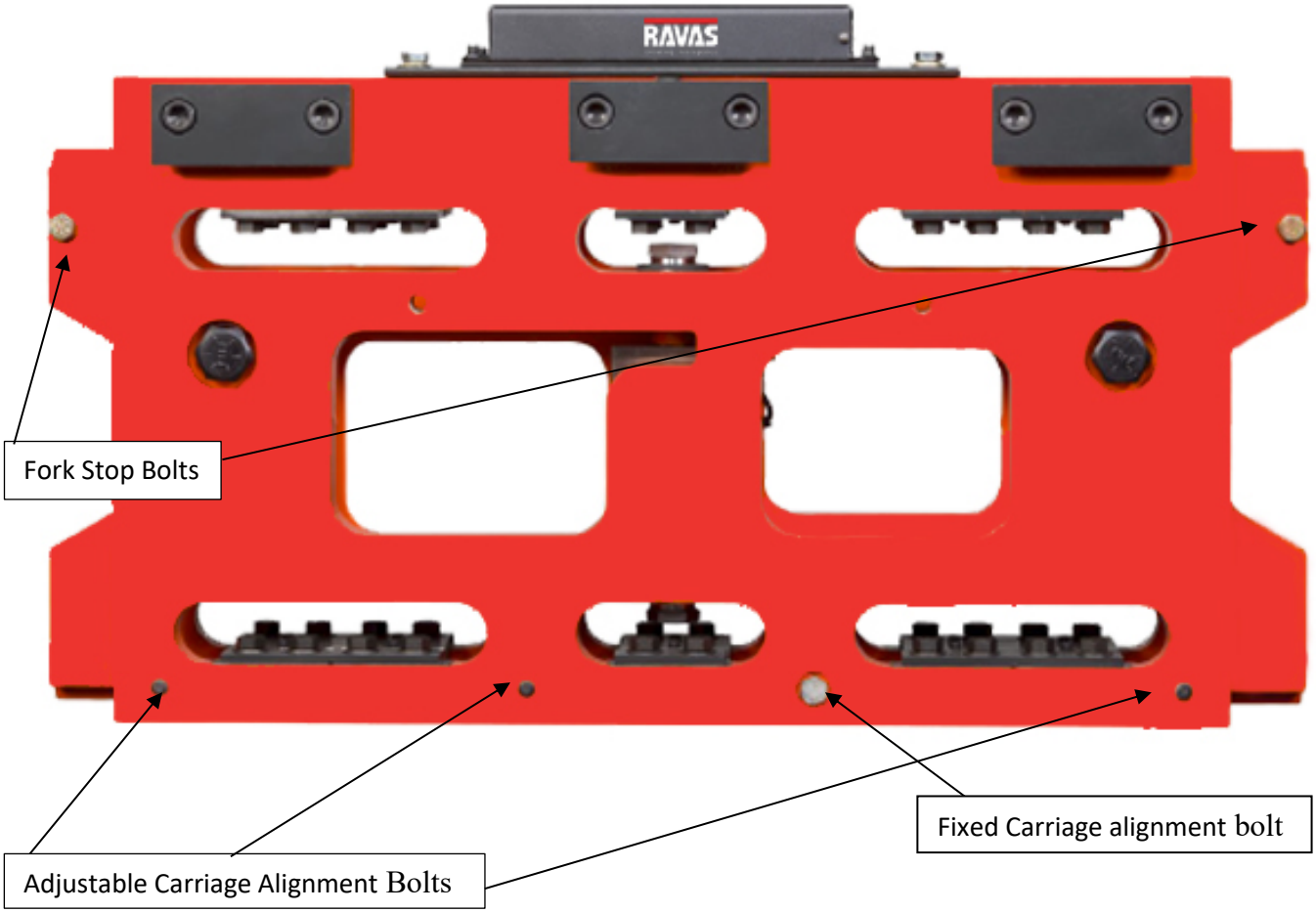


Figure 1: Safety Plate and Carriage Alignment Bolts

- Remove forks from the lift truck, and position the truck behind the scale assembly.
- Raise or lower the lift truck carriage and tilt the mast forward to a position that aligns the anti-shift pin (Fig. 3) on the scale assembly with the center notch on the lift truck carriage. Tilt the mast back to catch the scale assembly and carefully raise the carriage to a comfortable working position. Reattach the safety plates to the bottom of the scale assembly, so that the lip of the safety plate is behind the original carriage (Fig. 2).

Torque the Safety Plate Retaining Bolts to *130 ft-lbs.*

Warning: **Failure to properly torque the Safety Plate Retaining Bolts may result in Bodily Harm or Damage to the equipment!**

Note: The Center Cleat with Anti-Shift Pin should be centered with the middle notch of the truck carriage. Verify that the Anti-Shift Pin is adjusted so that the pin is located well within the center notch area of the carriage. DO NOT OVERADJUST. The Anti-Shift Pin should not touch the bottom of the notch on the original carriage; this will cause side to side tilting of the scale. To properly adjust the Anti-Shift Pin, tighten the pin down until it bottoms out then back the Pin off 1/8 of a turn.

- To assure firm and level mounting, the head of the fixed carriage alignment bolt should be resting on the carriage of the lift truck. To attain a secure mounting, first loosen the lock nuts on the three
  (3) adjustable carriage alignment bolts, then back these alignment bolts off until only the fixed carriage alignment bolt is resting against the lift truck carriage. Next, adjust the adjustable carriage alignment bolts so that they are just touching the carriage of the lift truck, and then tighten the lock nuts (Ref. Figure 1).

- Reattach the lift truck forks to the scale assembly.

- Position the load cell cable assembly (Cable with 7-pin connector) to either the right or left side of the scale assembly. Select the side opposite any hose or reel-type take-up device. Secure the load cell cable assembly to the longest mounting bolt. This bolt can be moved to either side of the scale (Note: A special load cell-mounting bracket is mounted at the factory for NTEP applications).

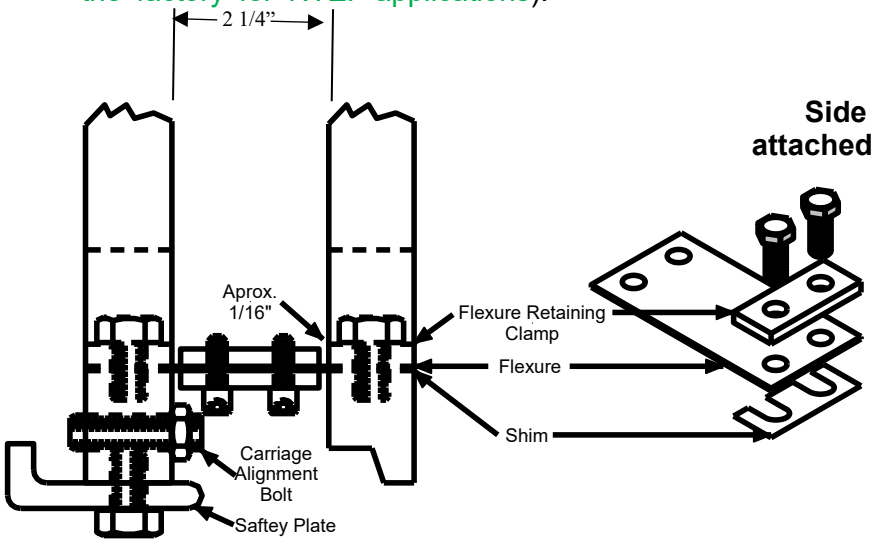


Figure 2:
Side view of Safety Plate attached to scale base and shim assembly

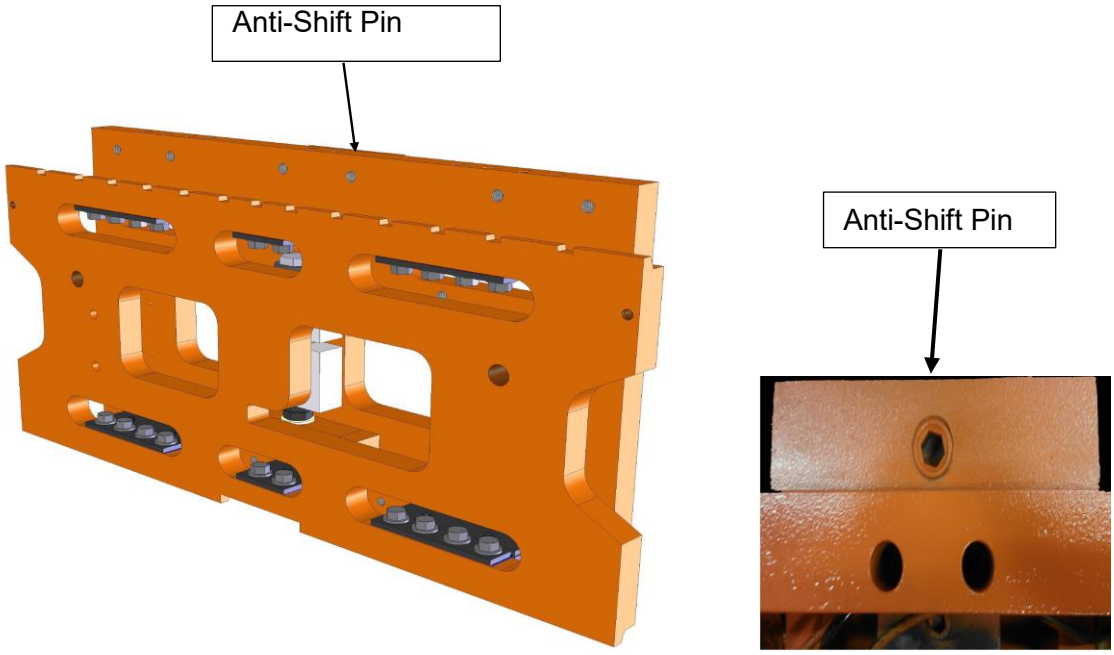


Figure 3: Anti-Shift Pin

Indicator Installation

- Location of indicators is a matter of preference. Run the load cell cable (Cable with 7-pin connector) from scale assembly to the indicator placing cable ties where necessary, but ***DO NOT*** plug connector into back of scale until power hook-up is completed. For most installations the load cell cable is secured with cable ties at the roll cage and at the top of the mast, however, each installation must be reviewed to determine the best method of securing the load cell cable. Slowly and carefully raise and lower the carriage and watch load cell cable for possible pinch points. For Hang On scales: Tilt the mast full forward then raise and lower the carriage again. Also shift full left if applicable. Make sure there is enough slack in load cell cable if mast is fully extended. If scale has side shifter see installation instructions for installing side shift bracket
- **Note: Lift trucks that are equipped with side-shift require an extra bracket.**
- Hook up power to the system. The power hook up procedure depends upon the type of lift truck, gas/propane or electric. Follow the respective steps:
- **Note: To avoid damage to the indicator it is necessary to ensure that the indicator is setup for the corresponding lift truck voltage. This input voltage is preset at the factory per the customer supplied voltage specification.**
- **Gas/Propane Truck**. Run the power cable (two-conductor) from the indicator to the battery power supply of the truck. When routing the power cable avoid all contact with any moving or hot parts of the lift truck. The power cable is normally routed behind the dashboard or under the floor of the cab. Use wire ties to secure it in a safe position. Make sure all electrical connections match the polarity and voltage of the battery posts. Power cable inputs are white (+) and black (-). Ensure power cable is routed away from distributor cap, spark plug coil and spark plug wires. Failure to route cable away from these noise sources could cause intermittent operation or damage the indicator.

- **Note: Do not use instrument gauges for hook up. Due to internal impedance, this could cause indicator problems or failure.**

- ***Warning: Lift trucks with ignition systems (gas/propane) require carbon noise suppressed spark plug wires, and resistor-type spark plugs. Failure to have all parts installed correctly will damage the scale indicator.***

- **Electric Lift Truck**. Be sure the indicator is equipped for the proper voltage. Run the power cable (two-conductor) from the indicator to the battery of the truck. The power cable is normally run down inside the cage near the lights or routed behind the dashboard then under the floor of the cab. When routing the power cable avoid all contact with any moving or hot parts of the lift truck. Use wire ties to secure it in a safe position. Make sure all electrical connections match the polarity and voltage of the battery posts. Power cable inputs are white (+) and black (-).

- **Important: Connect the power cable inputs to the first two lugs coming off of the battery power supply. This will ensure that you are hooked up to a clean power supply and avoid damaging the equipment.**

- ***Warning: Electric lift trucks do not have a chassis ground. A connection using the chassis as a ground will damage the scale indicator.***

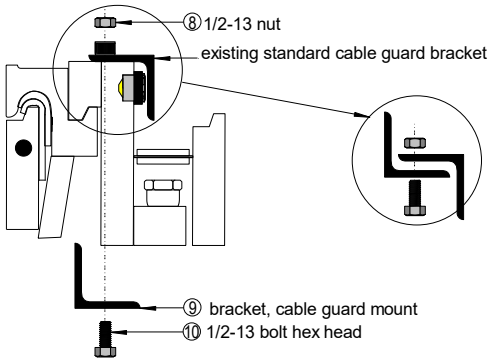
- Plug in the power cable and load cell cable into the back of the indicator. **Re-check the safety plates and fork stop bolts to be sure they are properly secured**. Turn the indicator ON and lift the forks off the ground. Carefully raise the forks to their highest position and then lower them. Check the load cell cable to be sure it does not catch on anything. Repeat this process for mast tilt and fork shift functions if installed. Use wire ties to secure the load cell cable in a clear position. Press "**ZERO**" key on the indicator. The indicator should zero and be ready for use. Forks must be in a level position to ensure accurate readings.

Do not make any calibration adjustments until the scale has been exercised several times, with a load of at least 50% of capacity. **After exercising the scale, check adjustment of the carriage alignment bolts and readjust if necessary.**

The scale can be calibrated at this time using Indicator Manufacturer's Instructions.

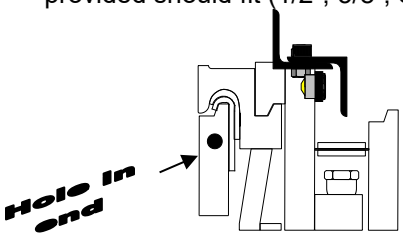
Side Shift Bracket Installation

Locate #9 (cable guard mounting bracket), to the bottom of the existing cable guard bracket using one of the two extra holes on the end of the existing load cell bracket. The cable guard bracket #9 must be mounted under the existing standard cable guard to keep the bracket from rotating.



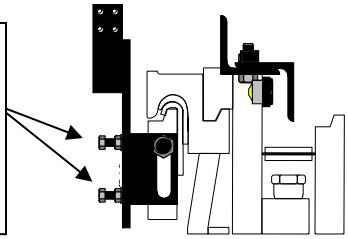
Inspect the rear carriage for pre-drilled and tapped holes on rear carriage.

- If there is a hole on the end of the carriage then use #5 (bracket, side shift angle). One of the #7 bolts provided should fit (1/2", 5/8", or 14mm).

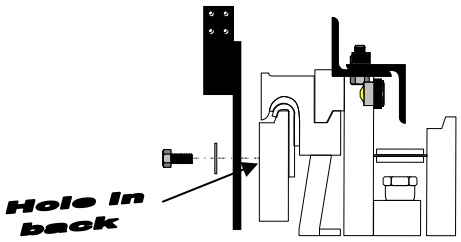


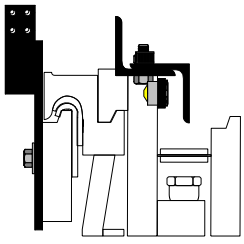
Run bolts all the way in until they hit the back plate and the bracket is vertically straight, then tighten the jam nuts.

Caution: if bracket #5 is mounted too high, side sifter will bend bracket as it goes past end of rear carriage.

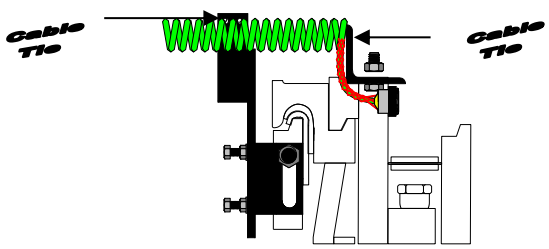


- If there is a hole on the back of the carriage then discard #5 (bracket, side shift angle) and attach bracket #1 (bracket, side shift) directly to the rear carriage using one of the #7 bolts provided (1/2", 5/8", or 14mm).



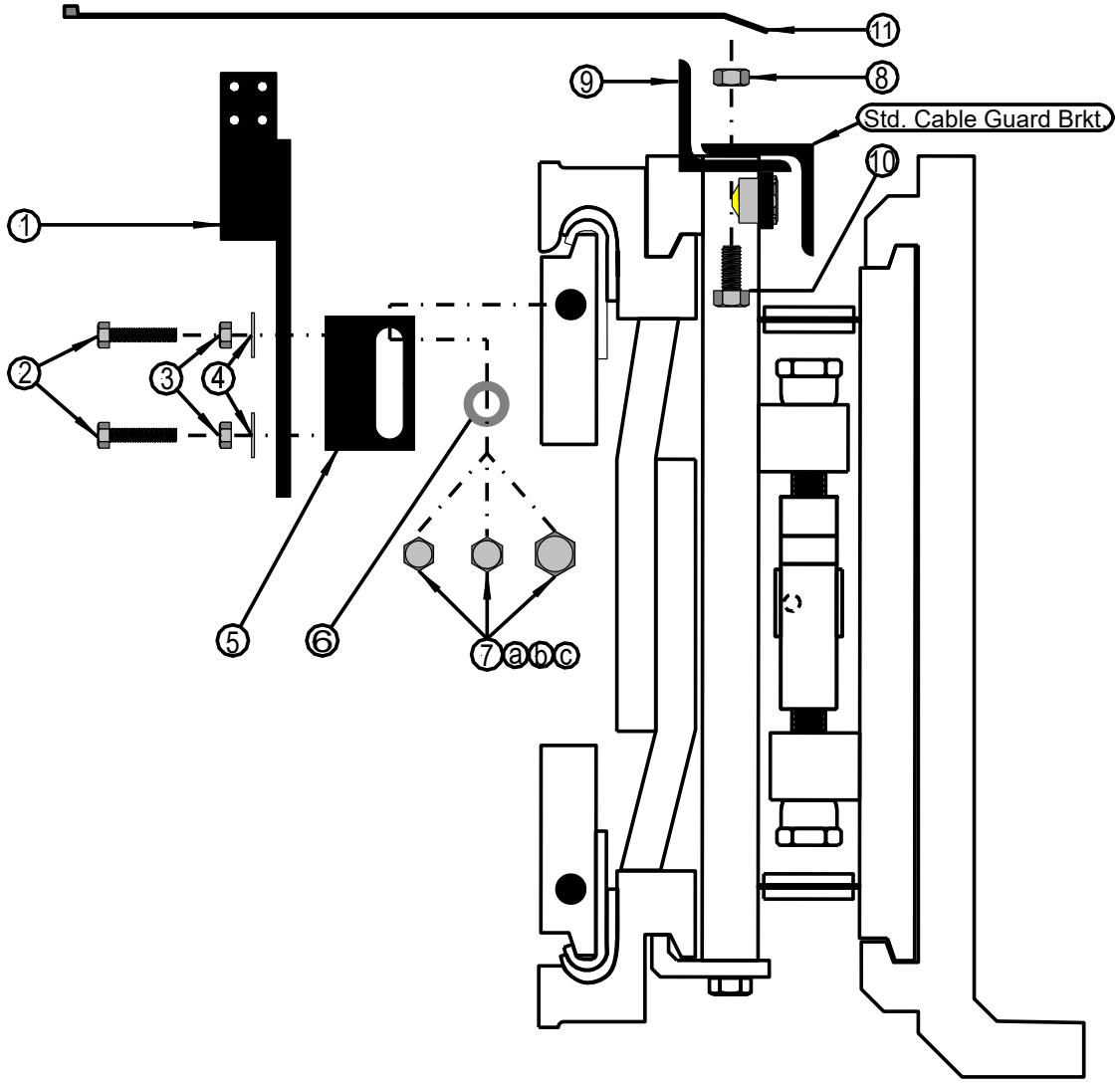


- Use the cable ties provided to secure the load cell cable to the front and rear bracket. Operate side shifter all the way to the left and right and make sure there is enough cable slack left between brackets.



Caution: ***Operate side shifter slowly in both directions and up and down. Check clearance from moving parts. Make sure to leave enough slack in the load cell cable between brackets.***

Side Shift Bracket KOP – P.N. 3100 LT-K



Side Shift Bracket KOP – Part Number: 3100 LT-K			
Symbol	QTY	Part Number	Description
1	1	3100LT-2	Bracket, side shift
2	2	3082LT	5/16-18 x 1-1/2 bolt, hex head
3	2	3043LT	5/16 nut, hex head
4	2	3033LT	5/16 washer, flat
5	1	3100LT-1	Bracket, side shift angle
6	1	3048LT	5/8 washer, flat
7 A	1	3053LT	½ -13 x 1 bolt, hex head
B	1	3054LT	5/8 x 1-1/4 bolt, hex head
C	1	3081LT	M14-1.5 x 25 bolt, metric, hex head
8	1	3065LT	½-13 nut
9	1	3100LT-3	Bracket, cable guard mount
10	1	3053LT	½-13 x 1 bolt, hex head
11	3	DN08428	Nylon cable tie

ADJUSTMENT, SERVICE, AND REPAIR OF THE SCALE BASE

Flexure Replacement and Adjustment

RAVAS Scale recommends that the flexure retaining bracket bolts that fasten the flexure assembly to the scale base front and back plate be relaced when flexures are replaced. Use RAVAS part number 3144LT-050-K for Class II (16”) scales and 3146LT-K for Class III (20”) scales, which will have the necessary bolts and washers to replace the existing hardware.

Figure 4: Flexure Assembly Details

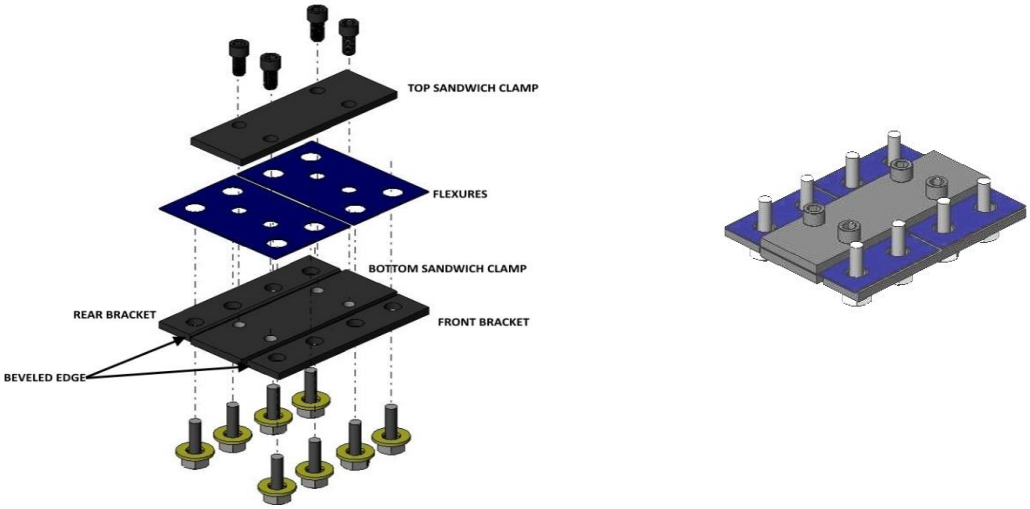
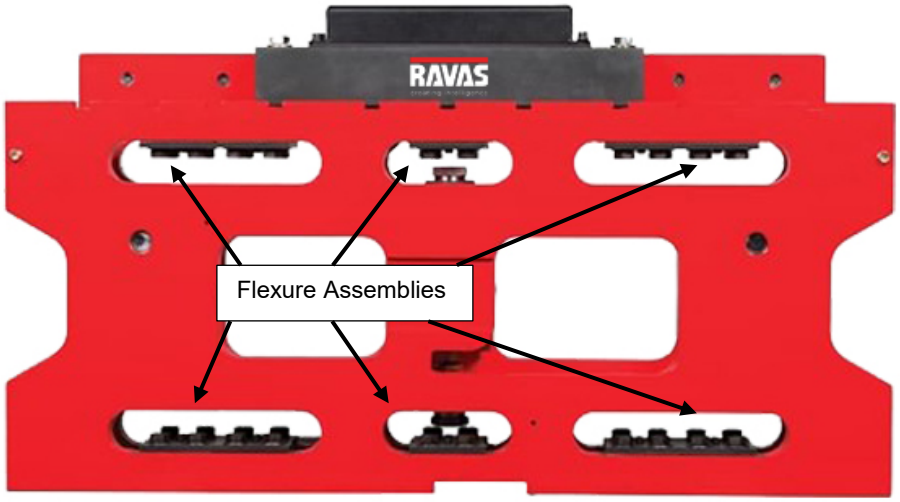


Figure 5: Flexure Locations on the Scale

Note: There are two flexures in each outer flexure pocket and one in each center flexure



IMPORTANT: Read this entire procedure BEFORE proceeding to ensure familiarity with it.

Flexures may be replaced with the scale mounted on the truck or removed from the truck. It is up to the scale technician to determine the safest way based on available equipment, resources and personnel. If the scale is to be removed prior to replacing the flexures, perform the following steps:

- Make sure the indicator is turned off. [**APPLIES EVEN IF SCALE IS LEFT ON THE TRUCK**]
- Remove the forks from the scale assembly.
- Disconnect the home run cable from the Clino Box or load cell cable.
- Remove the safety plates from the bottom of the scale and truck carriage.
- Position the lift truck so that the scale assembly can be lowered onto a sturdy work surface. (A heavy gauge-shipping pallet works well.) Back the lift truck away from the work surface, leaving the scale assembly on the pallet in a vertical position. Secure the scale so that it does not fall.

The following instructions apply whether the scale is mounted on the truck or removed.

- If it is necessary to replace more than one flexure on the scale it is **IMPORTANT to remove and replace only one flexure at a time**. Loosening the bolts on more than one flexure at a time may cause the front and back plates to lose their uniform gap. Replacing one flexure at a time prevents the plates from moving.
- Shims may be installed at the factory on any set of flexures. When replacing a flexure, it is important to return all flexure retaining brackets and any shims to their **original position**.
- Assemble the replacement flexure according to the Flexure Assembly Drawing (Fig. 4)
- When assembling, the beveled edge of the flexure retaining brackets (front and back) goes towards the center of the scale and the beveled edge goes against the flexure. This prevents excessive point forces against the flexure.
- It is possible, for scale bases subjected to post-manufacture welding operations or mechanical stresses, for one of the plates to warp slightly. As a result, it may be necessary to ream out the bolt holes in the replacement flexures to prevent bolts in the flexure retaining bracket from binding.
- Replacement of bottom flexures is more complex than the top flexures in that most shims used for achieving heel-to-toe balancing are located in the bottom row of flexures. Carefully remove flexures (one at a time) from the bottom row and look for shims beneath. Shims must be returned to their original position between flexure and scale. (Fig. 2, pg. 9)
- After the flexure is replaced and shims are in their proper locations, check to ensure that all flexure retaining brackets are flush with the front plate and all shims are located completely beneath the brackets. Do not allow the brackets to extend beyond the surface of the front plate.

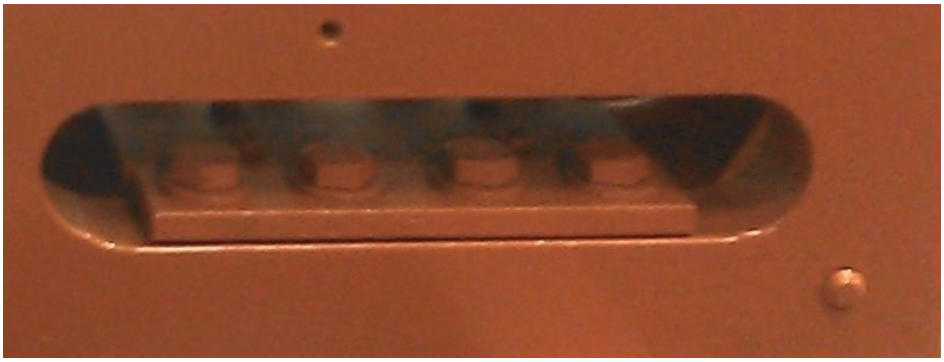


Figure 6: Properly Fitting Flexure Assembly

- Torque all bolts on the flexure retaining brackets to 130 ft-lbs
- After all flexure retaining bracket bolts have been tightened, inspect the flexure sandwich clamps to determine that a gap of approximately 1/16-inch is maintained between both ends of the sandwich clamp and the inside of the plate assemblies. It may be necessary to reposition the sandwich clamp to ensure the 1/16-inch gap.
- Inspect again to ensure that no flexures are extending beyond the surface of the front or rear plate. If a flexure extends beyond a plate surface, grind off until surface is flush.
- If the scale was removed, reinstall scale on lift truck (refer back to the installation procedure).
- Perform the steps in the Adjusting Heal-to-Toe Shift section of this document.

The scale can be calibrated at this time using Indicator Manufacturer's Instructions.

Load Cell Removal

IMPORTANT: If more than one load cell must be replaced then replace ONE AT A TIME. NEVER loosen more than one flexure at a time.

Tools required.

A. Digital Voltmeter (capable of reading millivolts)
B. ¾" box Wrenches
C. ¾", 1-1/16", 1-3/8" open end wrenches
D. 3/16" Allen wrench

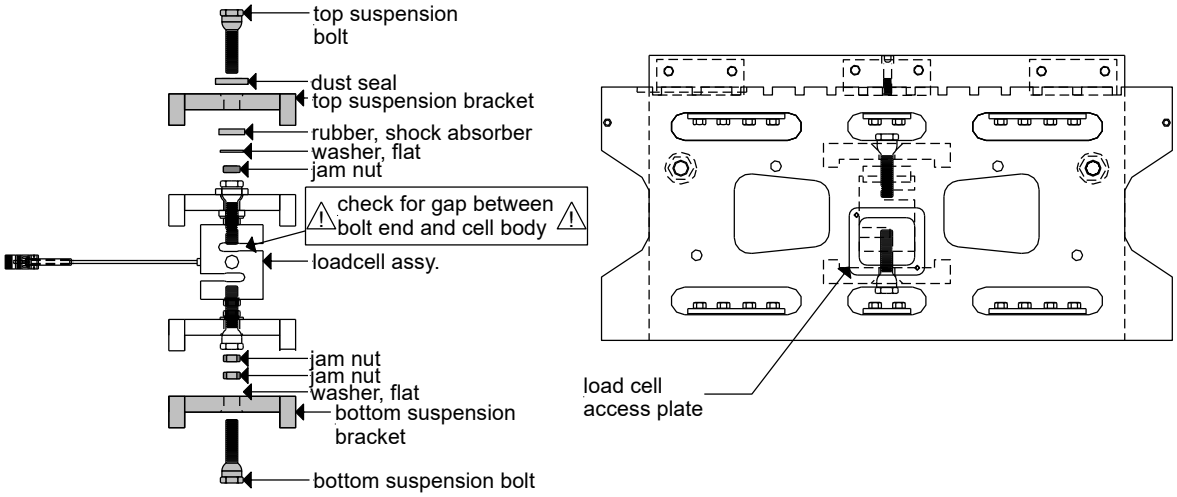


Figure 7: Load Cell – Exploded

10.1. Turn indicator power OFF.
10.2. Disconnect load cell cable at indicator and the base.
10.3. Remove forks.
10.4. Remove load cell cover plate (for Class III scales only).
10.5. Loosen Jam nuts at the bottom of load cell, 2 or 3 jam nuts depending on type of scale. Hold load cell from turning and damaging load cell cable.
10.6. Remove Safety plate(s) on bottom of scale.
10.7. Remove scale from forklift.
10.8. Loosen jam nuts at the top of the load cell, 1 or 2 jam nuts depending on type of scale. Use the access slot in the back of the scale to hold load cell from turning.
10.9. Remove the flexure below the load cell. Observe mounting brackets, flexure and shim locations.
10.10. Remove Bottom Suspension Bolt. Observe location off all nuts and washer.
10.11. Remove Top Suspension Bolt. Observe load cell height and location of all nuts and washer.
10.12. Remove load cell with cable. Note direction of load cell and cable. Dead-end of load cell to the top of the scale.

Load Cell Replacement Re-assembly

11.1. Install new load cell.

11.2. Install top suspension bolt and hardware. Make sure top suspension bolt does not bottom out against the load cell center.

CAUTION: Bottoming out suspension bolt can damage load cell.

11.3. Install bottom suspension bolt with hardware finger tight.

11.4. Tighten jam nut on top suspension bolt against load cell. Hold cell from turning.

11.5. Install bottom center flexure and hardware. Make sure shims are returned to same location and position as were removed.

11.6. Install scale base back on forklift.

11.6.1. Anti-Shift Pin should be centered with the middle notch of the truck carriage.

11.6.2. Install safety plates which keeps scale from falling off. Tighten bolts to 130 ft.-Lbs.

11.6.3. Adjust alignment bolts per scale installation directions.

11.7. Connect load cell cable at base end.

Setting the Pre-Load on the Load Cell

- Power "**ON**" the voltmeter on your stand and put it on "**mV**" (milli-volt) setting
- Power up the indicator.
- Testing load cell signal (pre load): Pin B (+) signal Pin C (-) signal
- Slide a ¼" metal plate between Load cell and front plate (to prevent turning).
- Tighten the bottom jam`` nuts of the bottom load cell suspension bolt using 1-3/8 torque wrench. Insert the load cell suspension bolt into the load cell and make sure it does not bottom out against the load cell center, then:
    - **CAUTION: Bottoming out suspension bolt can damage load cell.**
    - Tighten the upper jam nut against the bottom of the load cell to 1.5 to 1.6 mV reading.
    - Tighten the lower jam nut against the washer and the load cell bracket and tighten the in the other direction to 1.4 mV. **This should be the final dead load reading**.
    - Tighten middle jam nut against the bottom jam nut (on Class III scales only).

- Straighten the load cell by rotating the upper jam nut of bottom suspension bolt of load cell and remove the steel plate.
- Install load cell cover plate (on Class III scales only).
- If signal wires were disconnected in a previous step power down indicator and reconnect signal leads.
- Install forks and fork stop bolts (bolts that keep forks from sliding off the end).
- Perform the steps in the Adjusting Heal-to-Toe Shift section of this document.

The scale can be calibrated at this time using Indicator Manufacturer's Instructions.

Adjusting Heal-to-Toe Shift

Exercise the Scale

- Load and unload at least 1,000 lbs. weight, but preferably 50% of the scale capacity, on the forks. Load it for 2-3 seconds and then unload it. Repeat this for 4 times. (It might show overload on the indicator, but ignore it.)
- Check adjustment of the carriage alignment bolts and readjust if necessary.
- Press “Scale Zero” on the indicator and repeat loading/unloading for another 3 times. Ensure when unloaded, that the indicator shows “0 Lbs.”
- Position the weight back to its storage location.

Scale Balancing

- Heel-to-toe or shift in weighing may be adjusted by adding or removing shims between the lower flexures and front plate.
- If weight on heel of the fork is higher than the weight on the toe (tip) of the fork, remove shims (if any) from the lower flexure on the front plate.
- If the weight on heel of the fork is lower than the weight on the toe (tip) of the fork, add shims to the lower flexure on the front plate.
- Heel and toe adjustments can be performed at all three flexure pockets on the front plate by moving the forks on top of the flexure being tested (left, center and right).
- If you add or remove shims, exercise the scale and reset the carriage alignment bolts.

See the “Installing Shims” and/or “10 Point Weight Distribution Test” sections below for assistance with the shimming process.

The scale can be calibrated at this time using Indicator Manufacturer’s Instructions.

10 Point Weight Distribution Test

NOTE: This process checks that the front plate of the scale moves uniformly with respect to the back plate regardless of where the weight is placed on the forks. To do this a known weight needs to be placed on the heel and the toe of the forks and repeated with the weight over each of the two outside flexures and center flexures. There are two flexures in each of the outside pockets both top and bottom and one in the center pocket both top and bottom. This makes a total of ten flexures overall.

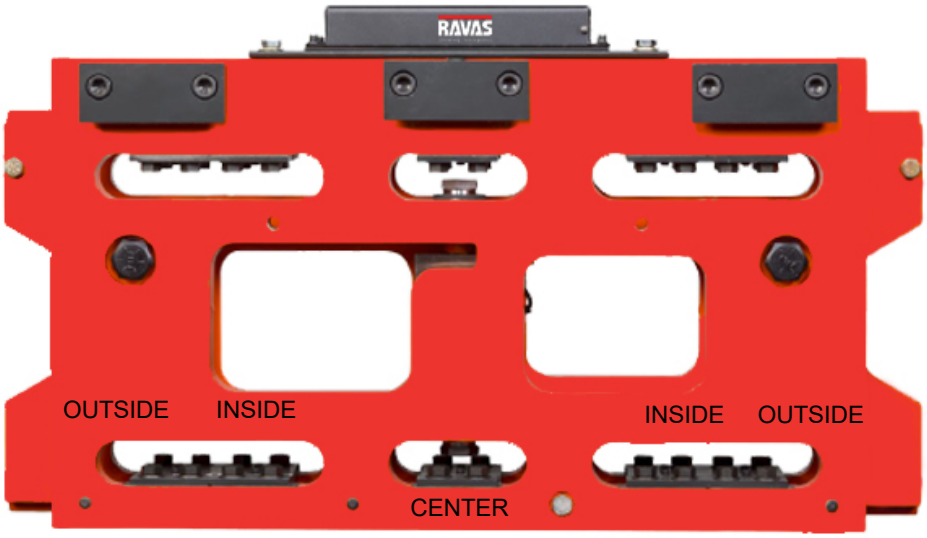


Figure 8: Flexure Locations

- Move the forks so one is centered over the Left-Outside (L-Outside) flexure and the other centered over the Right-Outside (R-Outside) flexure.
- Place approximately 1,000 lbs. on the left fork, 1st at the Heel and then at the Toe. Record the weights as shown in the “Shimming Worksheet” (Fig. 9)
- Repeat this process with the forks centered over the Left and Right Inside flexures and then both forks lined up with the center line of the center flexure.
- Remove the weight
- Calculate the difference between the heel and toe weights at each flexure position and record this on the “Shimming Worksheet” (Fig. 9)
- *If the difference of weights between heel and toe is within 1 Lb. throughout all the flexures, then the scale is properly balanced and no further action is needed.*

- If shimming is required: **Only the shims in the "Front Plate" should be adjusted.** The back plate shims are unchanged for a "new scale" calibration. Remember there are no shims in the top pockets.
- **Add shims to one flexure pocket at a time. NEVER loosen the flexure bolts in all the pockets at one time.**
- **See Figure 9 for an example calculation**

SCALE SHIMMING WORKSHEET					
Weights in Lbs.	**L-OUTSIDE**	**L-INSIDE**	**CENTER**	**R-INSIDE**	**R-OUTSIDE**
TOE	1008	1008	1002	1004	1006
HEEL	994	994	994	993	994
DIFFERENCE	14	14	8	11	12
SHIM SIZE	0.014"	0.014"	0.008"	0.011"	0.012"

Figure 9: Shimming Worksheet

Installing Shims

Tools needed for shimming

- ¾" Wrench
- Small Screw Driver
- Hammer
- Flat Head large Screw Driver
- Breaker Wrench (to loosen bolts)
- Torque wrench (to torque flexure bolts to 130 ft.-Lbs.)

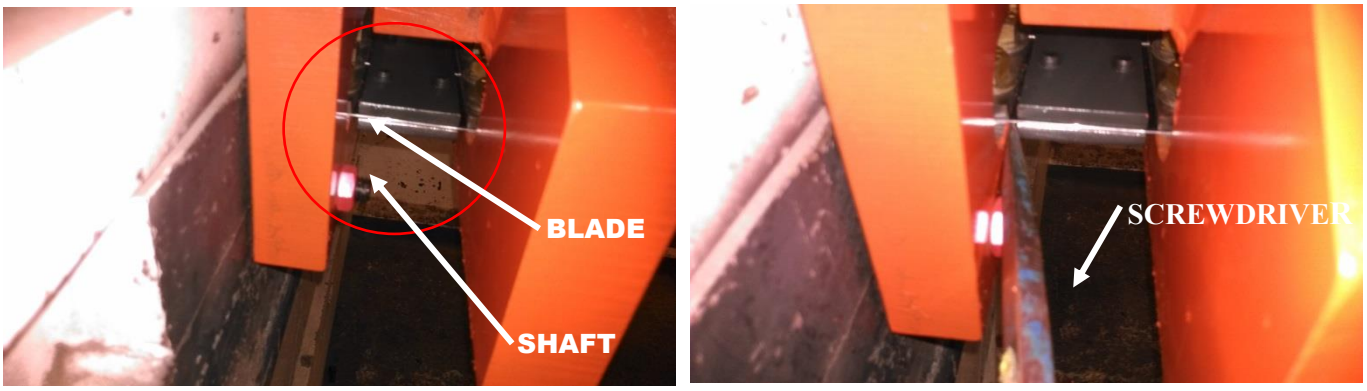


Figure 10: Screw driver hammered between the sandwich clamp and back plate for lifting the flexure assembly for access to shims

- Slide the screwdriver between the sandwich clamp and the back plate so that the shaft is resting on the Carriage Alignment Bolt and the blade is in the space between the sandwich clamp and the back plate and beneath the flexure assembly. Hammer the head of the screwdriver to raise the flexure assembly. Leave the screwdriver in that position until you insert the shims. (See below.)
- Once the shims are selected, place the shims on the back plate just above their respective flexures for ease in changing process.
- If shims are already installed and new shims are being added, insert the new shims above the previous shims, but ***BELOW THE FLEXURE***. Use the small screw driver to position it parallel to other shims. Ensure the shims do not get locked in the threads of bolt.
- Ensure the new shims do not overlap or become entwined with previously installed shims. If they overlap they will not go in easily.
- If shims overlap or intertwine, remove ALL the shims, Stack them together and slide them all in together.
- Remove the screw driver from back and hit the flexure retaining bracket to ensure the flexure is in position.
- Tighten the bolts. Use your hands and then ¾" wrench (or air ratchet) and then torque wrench to ensure the bolts are torqued to 130 ft.-Lbs.
- Once all the pockets have the required shims and all the bolts have been tightened, recheck heel to toe balance over each flexure is no more than 1 lb.

Scale Shimming Worksheet

SCALE SHIMMING WORKSHEET						
	L-OUTSIDE	L-INSIDE		CENTER	R-INSIDE	R-OUTSIDE
TOE						
HEEL						
DIFFERENCE						

SCALE SHIMMING WORKSHEET						
	L-OUTSIDE	L-INSIDE		CENTER	R-INSIDE	R-OUTSIDE
TOE						
HEEL						
DIFFERENCE						

SCALE SHIMMING WORKSHEET						
	L-OUTSIDE	L-INSIDE		CENTER	R-INSIDE	R-OUTSIDE
TOE						
HEEL						
DIFFERENCE						