KNOWLEDGE BASE

Article Type: Instructions

Forks, Indexing Tree Assembly and Rack Indexing for UL18, 20, 22, 26, 34, 37, & 42

Description:

Instructions on "How to" set-up and adjust the UL Loader and Unloader Fork Indexing Tree assemblies, properly adjust the Rack Indexing on the Rack Conveyor.

WARNING

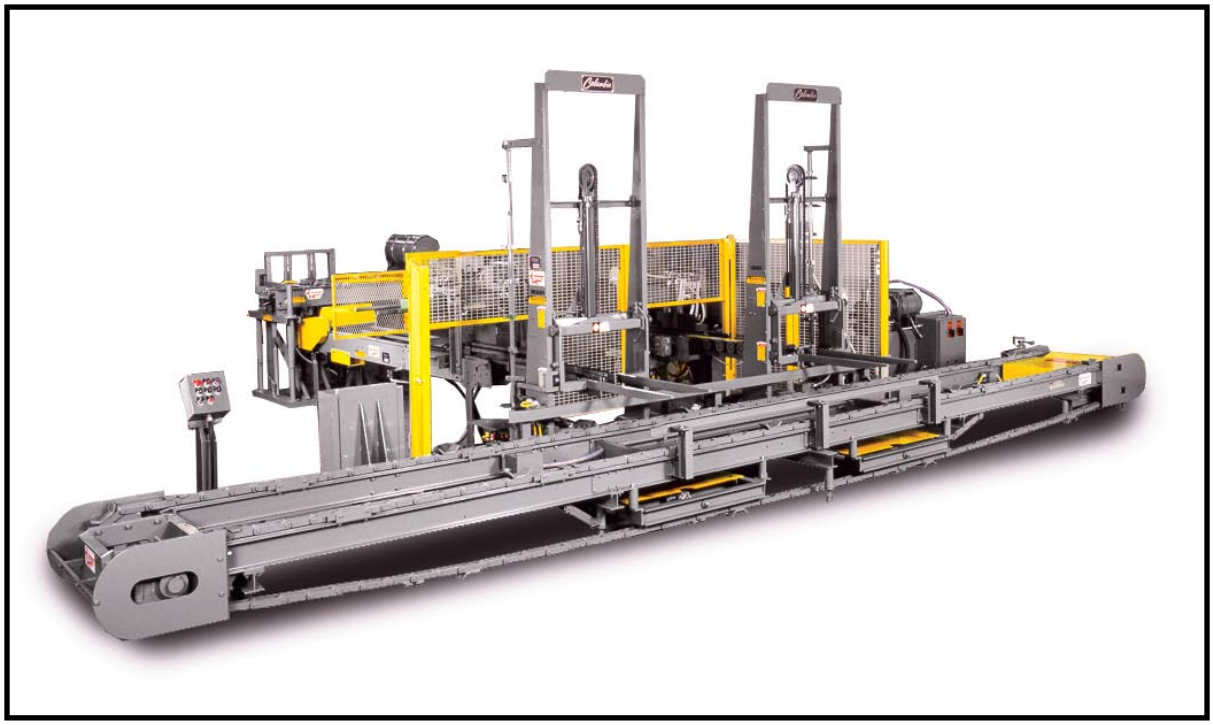
Never work on, clean or service this unit, control panel or any machine or open or remove any protective cover, guard, grate, door, or maintenance panel until the power or energy sources has been turned off, locked out / tagged out, and all moving parts have come to a complete stop and or blocked to prevent movement. Machinery is dangerous – avoid personal injury and or death by following manufacture, Local, and OHSA safety procedures. Contact Columbia Machine for safety decals, guards, horns and beacons.

RACK LOADER & UNLOADER

THE TOTAL SOLUTION

FORKS, INDEXING TREE ASSEMBLY & RACK INDEXING

Columbia Machine, Inc.
Vancouver, Washington



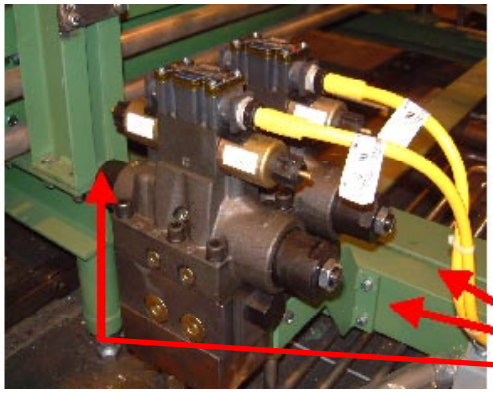
LOADER/UNLOADER

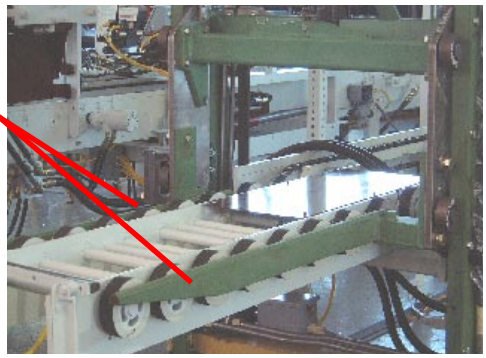
RACK LOADER & UNLOADER

Procedures for adjusting the Loader/Unloader Forks, Indexing Tree Assembly and Rack Indexing

Before starting this procedure make sure the forks lift chains have been adjusted so the forks are no more then 3/8" green conveyor and ½ " maximum below pallet return chains. It is advisable to adjust spool stops in to slow forks up and down and carriage in and out. Once settings are complete you can adjust for maximum speed.

1. Start with the forks in the down position.

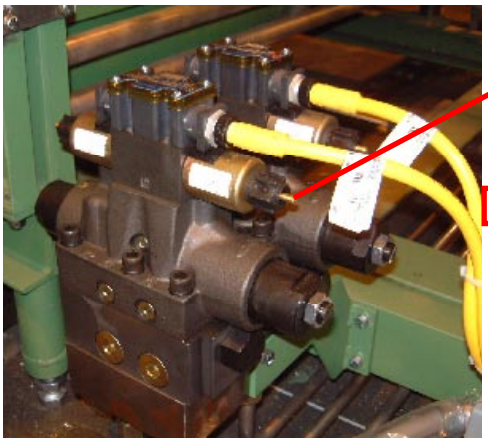




PROCEDURE #1

Spool stops are located at each end of the valve. Loosen lock nuts and turn in to slow down and out to speed up.

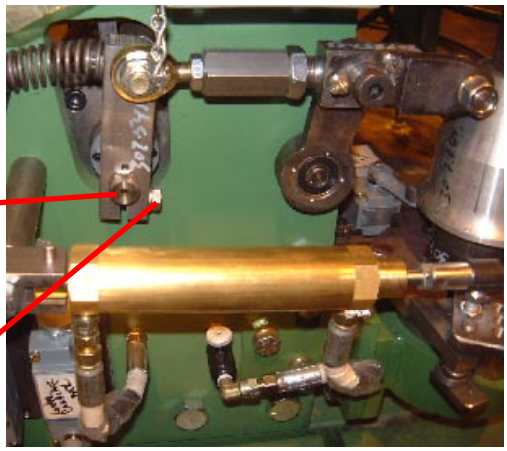
2. Insure that the rotary valve is completely shut off. This is accomplished by manually pushing the detent pin in on the solenoid valve which controls the cylinder up and down to insure that no movement is visible going up or down. The wrench flats on the shaft of the rotary valve should be horizontal.



PROCEDURE #3

PROCEDURE #5

PROCEDURE #4



3. Manually push the forks up pin on the valve and hold the pin in. Be ready to release the pin once the forks start to move up.

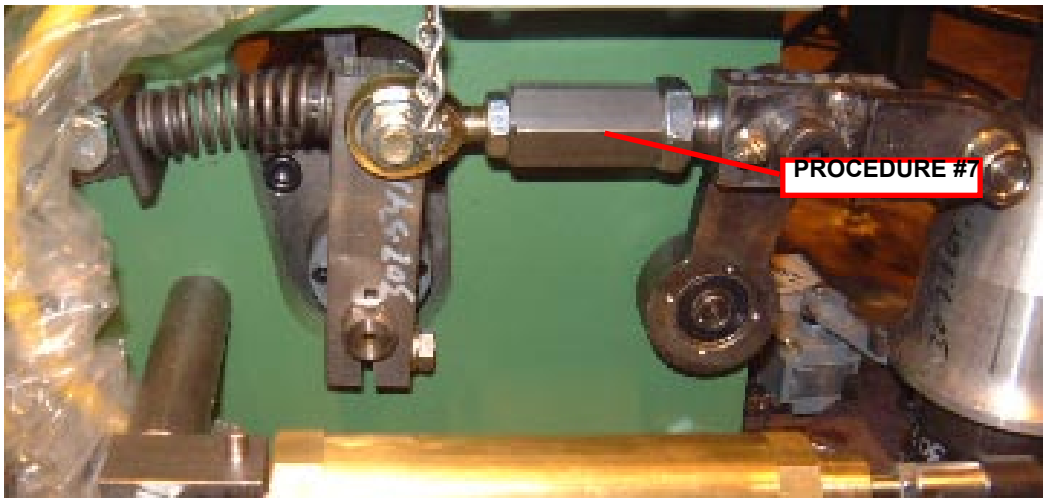
4. Loosen the clamp bolt on the shaft of the rotary valve only enough so that it is still snug but the shaft is able to turn.

5. Slowly start turning the rotary valve shaft clockwise (towards the bell assembly) opening the flow of oil. Once the forks start to move up, release the de-tent pin on the solenoid valve quickly as you only want the rotary valve to open enough to start the flow of oil moving the fork assembly slowly up.

RACK LOADER & UNLOADER

6. After you have release the de-tent pin on the solenoid valve you can tighten the clamp bolt.

7. By turning the adjusting nut on the leakage assembly adjust the cam follower to within ¼" of the bell cam. Final adjustment will be completed in step 11.



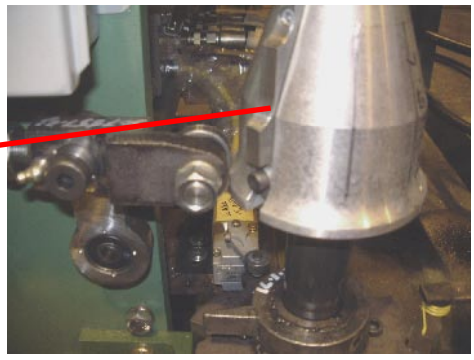
8. Grasp the indexing tree and rotate it so the 4th level stop is inline with the trip bar.

9. Push the de-tent pin on the valve to move the forks up. As the forks are moving up, grasp the up limit actuator disk and lift it up by hand. At this time you are not allowing the trip bar to contact the lift stop. By doing this the forks should stop due to the cam follower coming in contact with the top portion of the bell, which will insure that the hydraulics will shut off and stop the forks from moving up. Now when the trip bar lifts the level stop we know that the hydraulic will shut off.

10. Continue moving the forks up. As the trip bar connects with the level stop and begins to pick the level stop up the linkage assembly moves forward and the cam follower contacts the top area of the bell about ¼ of the way down the bell cam. The forks should now be stopped even though you still have the de-tent pin pushed in on the valve.

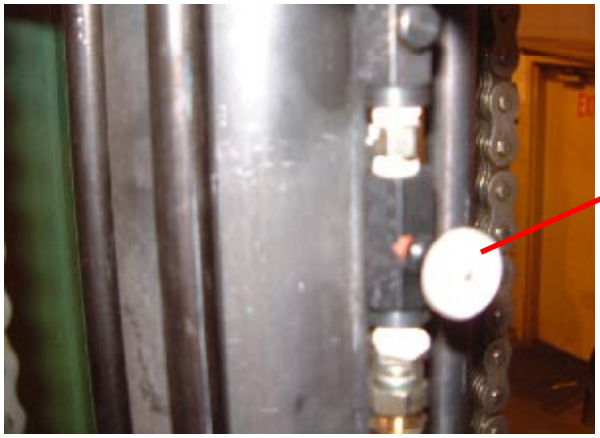
11. With the detent pin still pushed in start turning the adjusting nut which will allow the forks to continue up until the cam follower gets to the bottom of the bell and has about 1/16" clearance (See detail on print.) This should be the shut off point.

With forks energized up trip bar is in contact with level stop forks should stop going up see arrow. At this point begin to adjust nut allowing slow movement up. Once you have reached the bottom of the bell allow 1/16" clearance between cam follower and bell. Cam follower will slightly move away as it reaches the bottom flare of the bell.

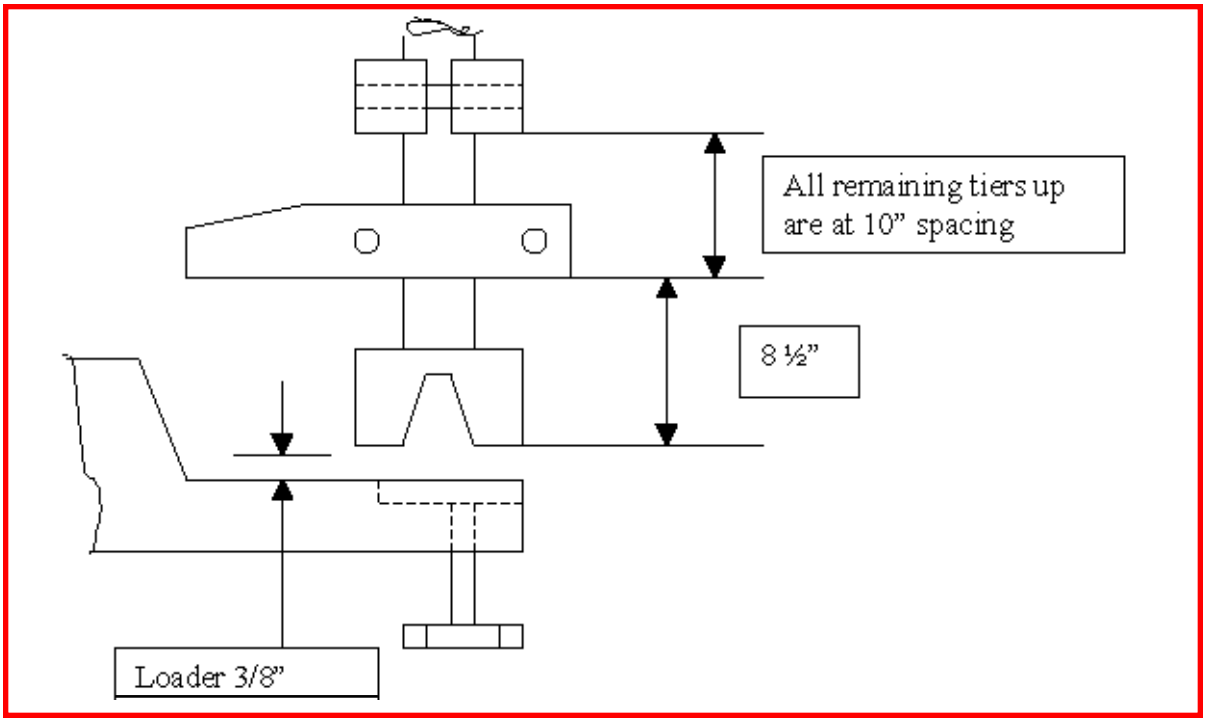


RACK LOADER & UNLOADER

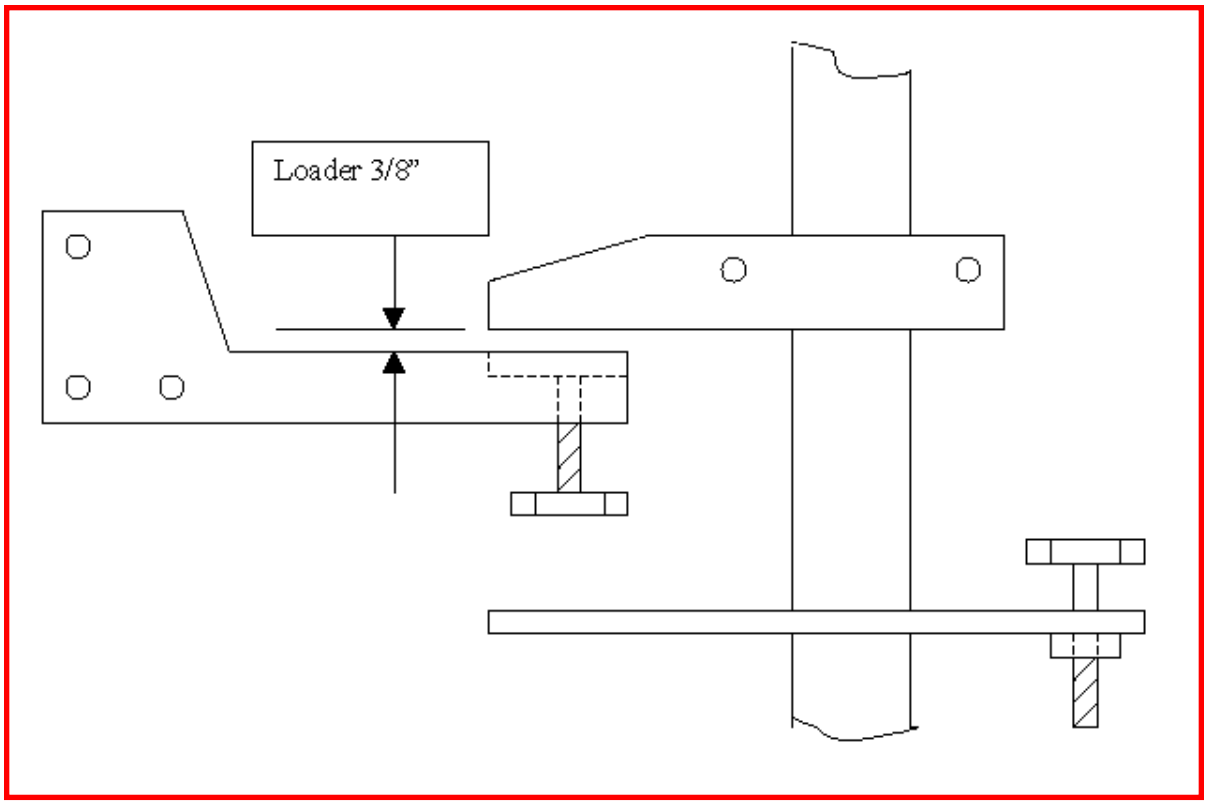
12. The forklift cylinder has a bypass line on it. If the forks do not come down when you push the valve de-tent pin in on the opposite side for down you should turn the valve all the way in then open it 1 to 1 ½ turns. Make sure you have greased the top and bottom of the tree. The forks may start bouncing when the forks start down you may need to either open the valve more or close the valve off a little to stop the forks from bouncing.



13. You are now ready to set each stop on the tree assembly. Starting with the Loader tree you will want to start with the bell key in position for the last tier to be loaded as the loader loads from the top down. With the bell key in position set the stop assembly part # 307.1.83 at 3/8" to 7/16"maximum above trip bar Part # 307.148.27 or 307.148.62 Using a tape measure from the bottom of the stop to the bottom of the next stop set the distance at 8 ½" remember you will need to pull the pawl assemblies out and rotate the tree counter clockwise for setting each of the stops. After you have set the second stop from the bottom up all other spacing is set at 10". See sketch below.



RACK LOADER & UNLOADER



Detail above has the distance between the stop bar and the lift stop clamp set at no more then 3/8” gap for both green side and cured side. As the fork start up and contact the lift stop it is still in the cushion and contacting the green product pallet. This allows the pallet to be picked up without damaging the green product. On the pallet return side the product is picked up in the rack and as the carriage returns to the back position the forks start down and as the wheel assembly makes contact with the cam the rotary valve is closing and allowing for smooth cushioning as the forks return to the down position. Final adjustments for cushioning should be adjusted moving the cam up or down on the cam bar located on the inside of the main frame.

NOTE

Should the fork lift fail to stop at the proper level on the loader or unloader, the first thing to do is to turn off the automatic switch and bring the forks down and back out of the rack. This can be done by the hand control on the side of the loader or unloader or by pushing the de-tent pins in on the valve. Check the indexing tree for over or under travel, regulate with the valve as shown in sketch # 12. Turn the indexing tree clockwise to the level of the rack that you want to load. By using the hand control or de-tent pins, raise the forks up and in. If everything works all right, and you have loaded pallets into the right bay of the rack, turn on the automatic switch, and it will continue to operate automatically until the bay is full. The indexing tree on the loader turns as the carriage comes out of the rack. The unloader operates the tree as it goes into the rack.

RACK LOADER & UNLOADER

Check the rack and fork alignment before operating the loader and unloader in automatic. To do so, proceed as follows:

- Start loader and unloader pump if not already running; allow oil and machinery to come up to temperature. Place and empty rack on the rack transfer as if it were waiting to be unloaded.

- Leave the off-automatic switch on the loader and unloader panel in the “Off” position.

- See that the loader and unloader carriages are in their back position with switch (5) and (9) held closed, forks down, and both loader and unloader indexing tree in the transfer position, that is, switch (6) and (10) held closed.

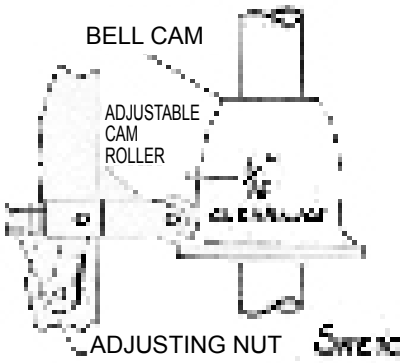
- Now, turn the off-automatic switch into automatic. The rack should begin to transfer at once, traveling the distance of one bay. As soon as it stops, the unloader carriage will start forwards. The control is now turned out of automatic. The carriage will then continue forward until it reaches the end of its stroke and stop, the forks should be completely into the rack with the fork tines in the center of the bay and below the pallet holding angles.

- Measure from each side of the bay to forktines to see that they are centered. If the rack has not traveled far enough, or has traveled too far, the operating cams that control this travel will have to be readjusted. There are tow parts to this control. One is electrical and the other is mechanical hydraulic.

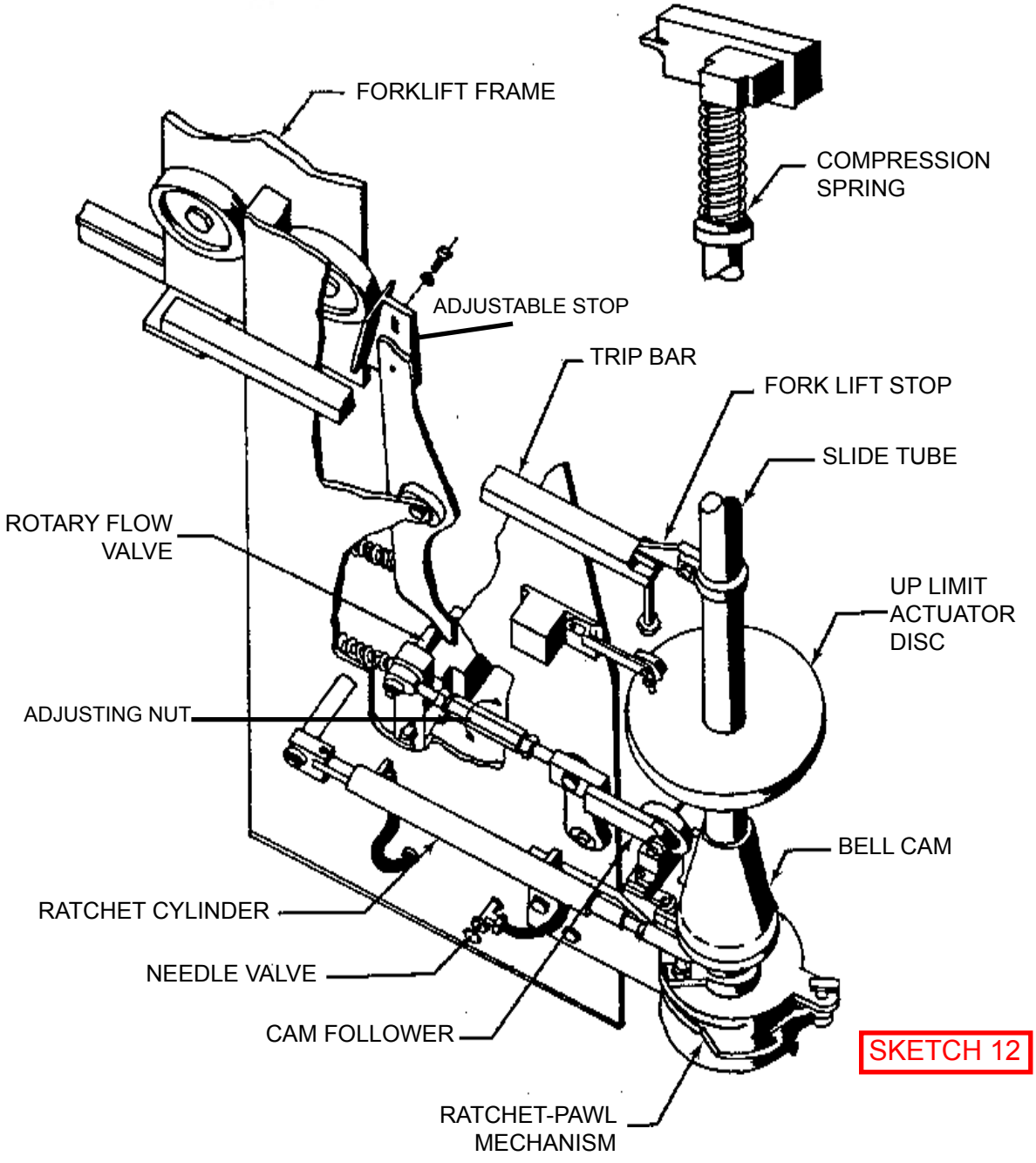
- The start and stop of the transfer is accomplished by switch (11) which actuates a solenoid controlled, pilot operated hydraulic valve. The other part of the control is a mechanically operated cam and rotary hydraulic valve, which starts the rack transfer slowly, then speed it up, slowing it down again just before it comes to a complete stop. This is done to prevent jarring and possible cracking of the green blocks.

- The cams (or lobes) that do the work are clamped to two circular discs mounted on the same shaft. This shaft is turned and timed through a chain driven by the main drive shaft of the rack transfer. Note: Should this chain require replacement, make sure the timing is correct before starting the loader and unloader in automatic. See indexing pictures next page.

RACK LOADER & UNLOADER



SKETCH 11



SKETCH 12

Index Tree Control Components

RACK LOADER & UNLOADER

As the forks set down adjustment to the cam can be made to increase cushion or decrease amount of cushion when picking up on the green conveyor or setting down on the cured conveyor.

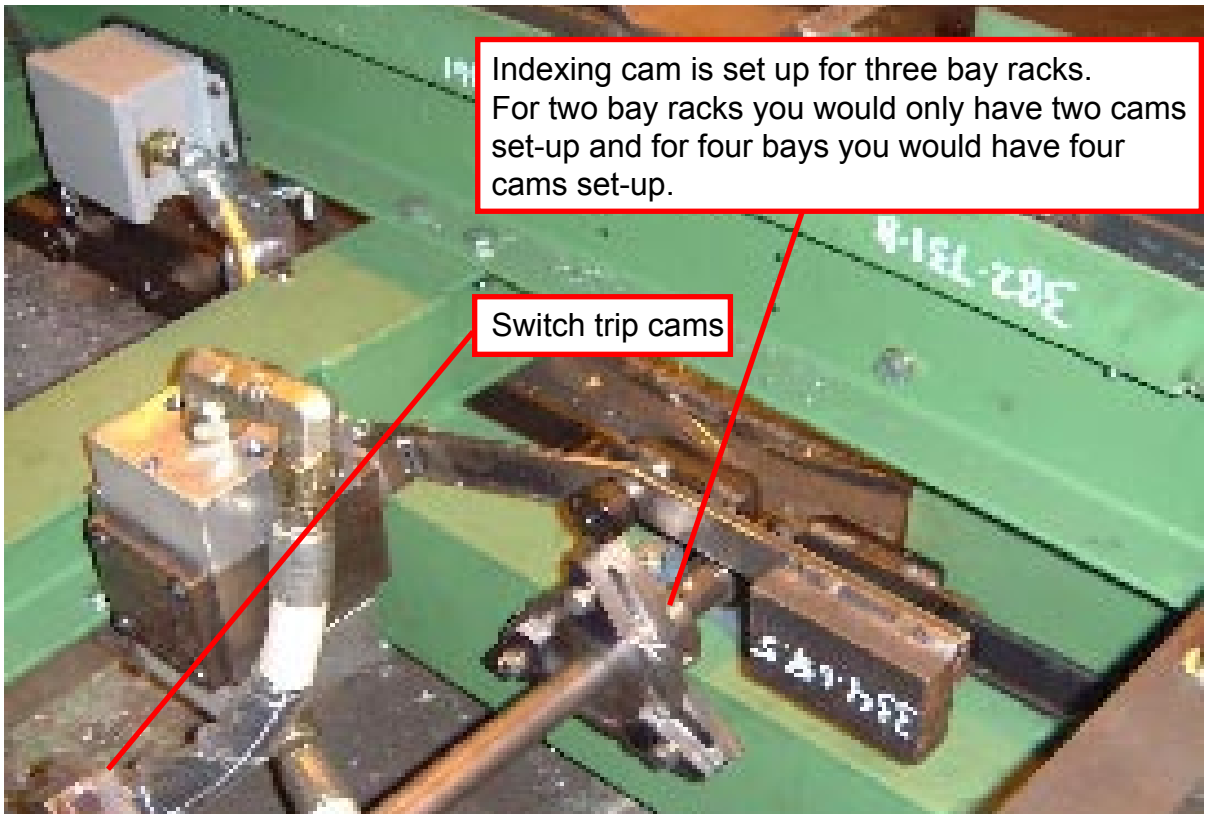
The speed at which the pallets are lifted off the conveyor & elevator section is adjusted by a movable shoe. The shoe contacts the bottom back guide roller of the fork lift, as shown above. Adjust this shoe so that the forks start up slowly but speed up shortly after the forktines contact the bottom of the pallets. The same applies to the unloader but is slowed as the pallet sets down on the pallet return chains.

Remember the slowing and stopping of the fork lift as it raises to the level for inserting the pallet s into the rack is adjusted by the cam roller. When the operating arm attached to the back of the fork lift assembly contacts the fork lift stop, located on the indexing tree, the bell cam is raised, operating the cam roller and the rotary valve, slowing the oil flow and finally shutting it off. The one-sixteenth inch (1/16”) clearance should be the shut-off point.

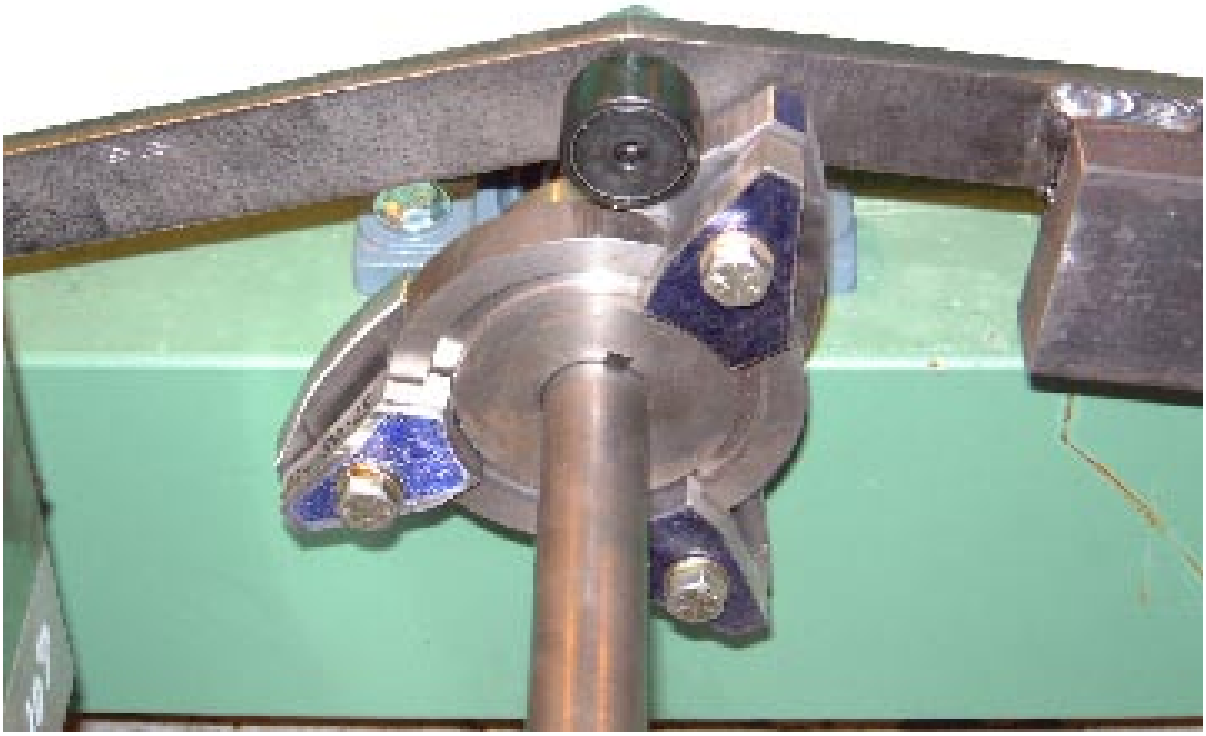
RACK LOADER & UNLOADER

Rack Indexing

When setting your rack indexing it is advisable to start with a rack in the at the unloader first bay and check to make sure that indexing trip switch is also set at this time. Manually run unloader into rack and measure distance on each side of forks to rack angle. This is to insure that rack is at it centered position at unloader. Lock down cam for rotary valve indexing for bay one. Next return unloader to back position out of rack and manually index rack to next bay. Again manually run unloader in and check clearances from side to side. When bay is centered the cam follower on the cam arm should be at top dead center of cam. Lock cam into position and trip switch cam. If you have a two bay rack you can now return the unloader to the back position and index manually to the loader tower. Once in position you should be at the top of the cam. Check to make sure you are centered before moving the loader into the rack. Once loader is in the rack again check from outside of forks to rack angle which should be equal on both sides. Check to make sure that the trip switch has also been made. Send loader to back position and index rack to next bay. Follow the same procedures. Once you have indexed the rack through both the loader and unloader set empty rack in position and set both trees up for indexing to next bay. Put the system in auto but do not run pallets at this time. Let the loader and unloader run through three to four indexing cycles to insure rack indexes to each bay and is centered at the loader and unloader. Once you have completed the indexing of the rack through both the loader and unloader let the rack continue down line until you reach the over travel area to set the over travel rotary valve shut off. Make sure that the rotary valve arm has spring attached so it will shut the valve off. See details below.



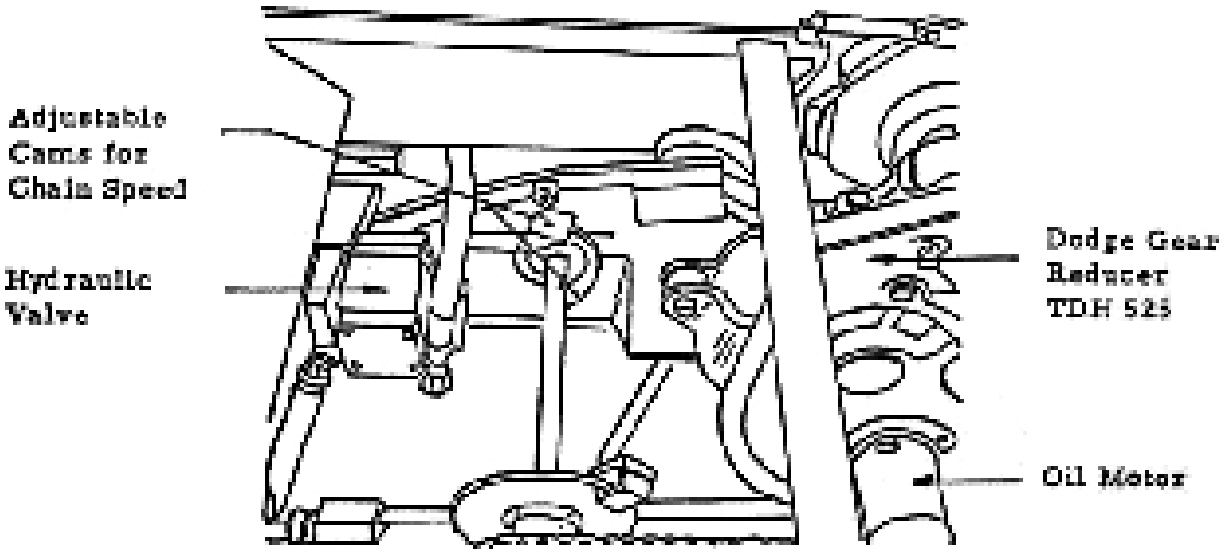
RACK LOADER & UNLOADER

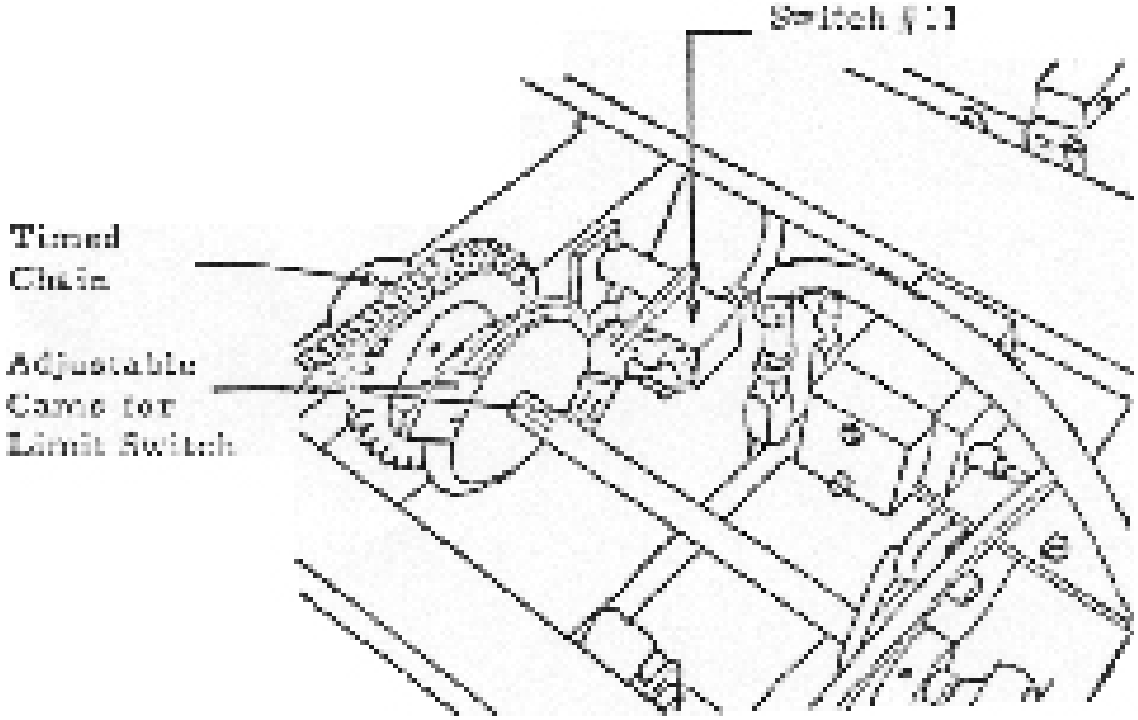


Cams are adjustable. Rack indexing. When rack is in position cam roller will be at top of cam.

Rack indexing electrical trip switch cams. These are position to trip the electrical switch arm once the rack has indexed to the next position or bay. Adjust cam to trip switch at the same time hydraulic indexing cam is at the top of cam and rack is center at loader / unloader.

RACK LOADER & UNLOADER

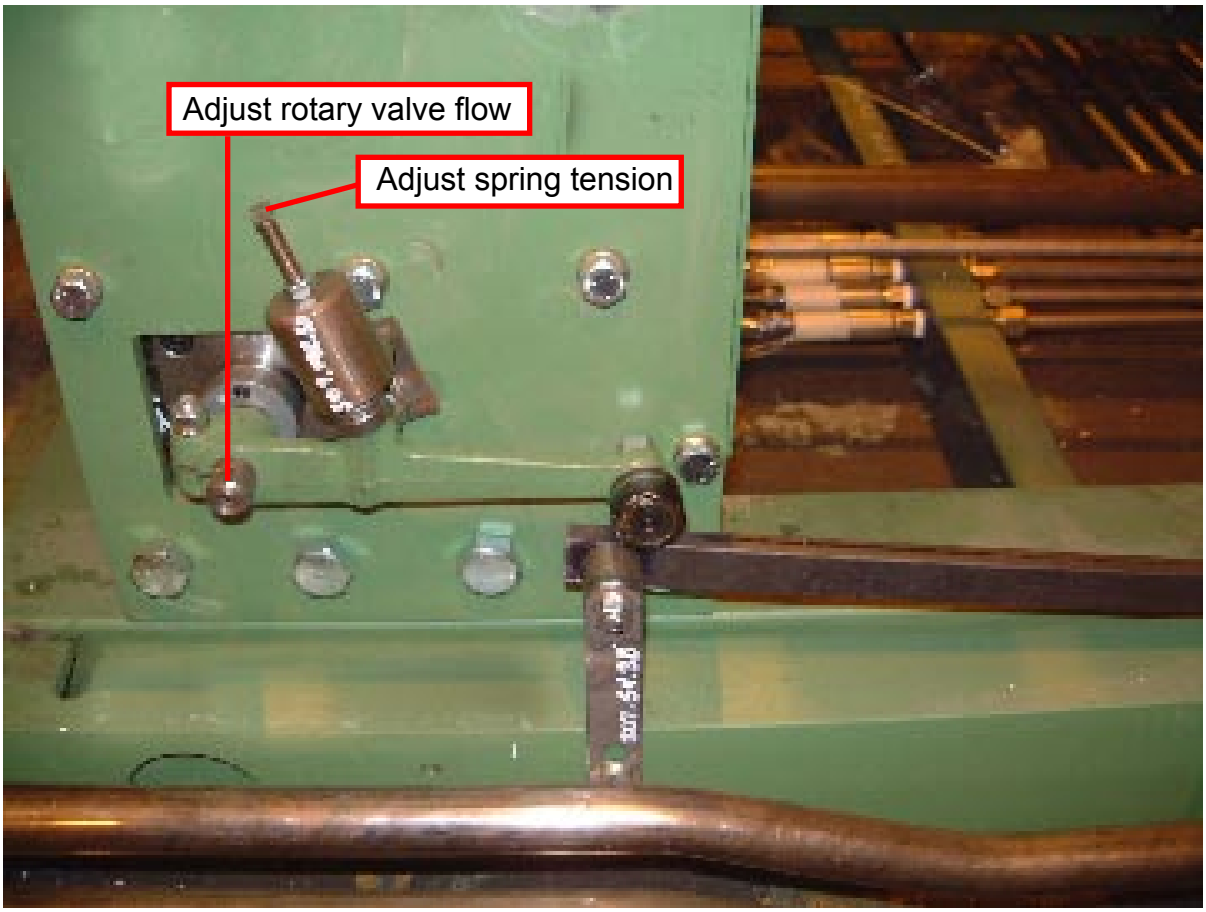




RACK LOADER & UNLOADER

Carriage Rotary Valve Adjustment

On the left or right side of the loader or unloader carriage frame is a mounted speed control cam. The cam controls the rotary valve that meters the flow of oil into the carriage cylinders. The arm of the valve rides on the cam as it closes, at each end of the cylinder stroke, it brings the carriage to a slow smooth stop. To adjust cushion speed, loosen the arm and turn the core of the valve counter-clockwise to slow the travel. Turn clockwise to speed it up. Move only a little each time and try for smooth acceleration and deceleration. See picture below.



RACK LOADER & UNLOADER

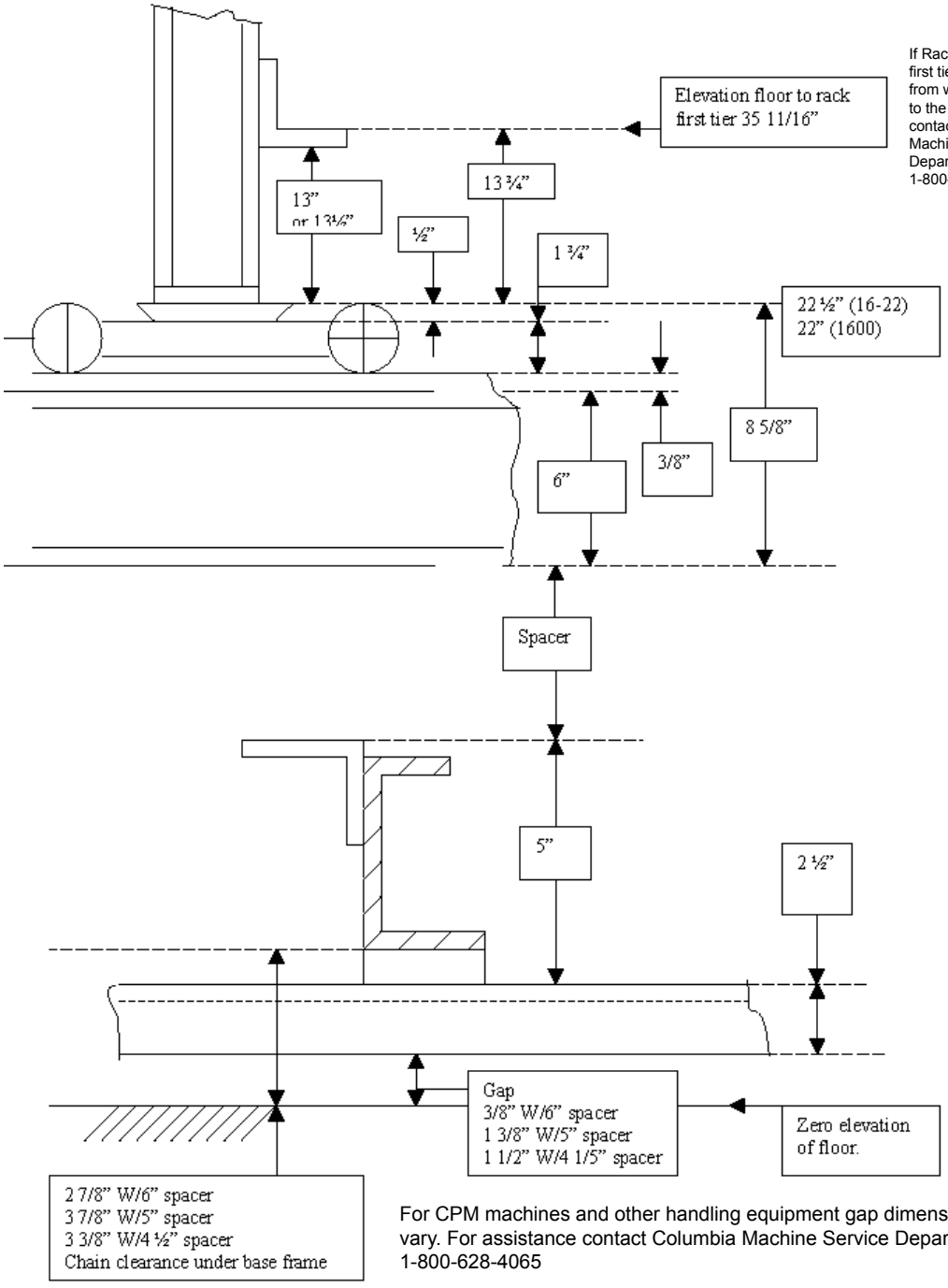
Adjustable cam bars.
You can move the adjustable cam bars up or down to increase/decrease cushion

The slowing or cushion at each end of the carriage travel is adjusted by raising or lowering the ends of the cam support bars.

If you need additional information or have question regarding this information please give us a call at 1-800-628-4065 ext. 367 Service.

RACK LOADER & UNLOADER

Rack conveyor spacing to loader / unloader base frames is critical for proper elevations and set up of your UL system. The layout and dimensions should be used to verify that your elevations to the green conveyor and pallet return are set correctly. Standard elevation is set at 35½" (CPM 39½") from the floor to the chains or rollers. If your equipment has been set up with floor spacers under the leg assemblies your specific elevations may be different. If this is the case please call Columbia Machine Service with your specific rack handling part number and we will confirm your height dimension from the floor to the rack conveyor rack pads, green conveyor and pallet return. The following dimensions are shown from the floor to base frame spacers used for your given UL and conveyor height and to first tier of rack.



If Rack elevation to first tier is different from what's shown to the left, please contact Columbia Machine Service Department at 1-800-628-4065

For CPM machines and other handling equipment gap dimension will vary. For assistance contact Columbia Machine Service Department at 1-800-628-4065

RACK LOADER & UNLOADER

The following dimensions will give you the needed spacer required between base frame of loader / unloader and rack conveyor.

Example:

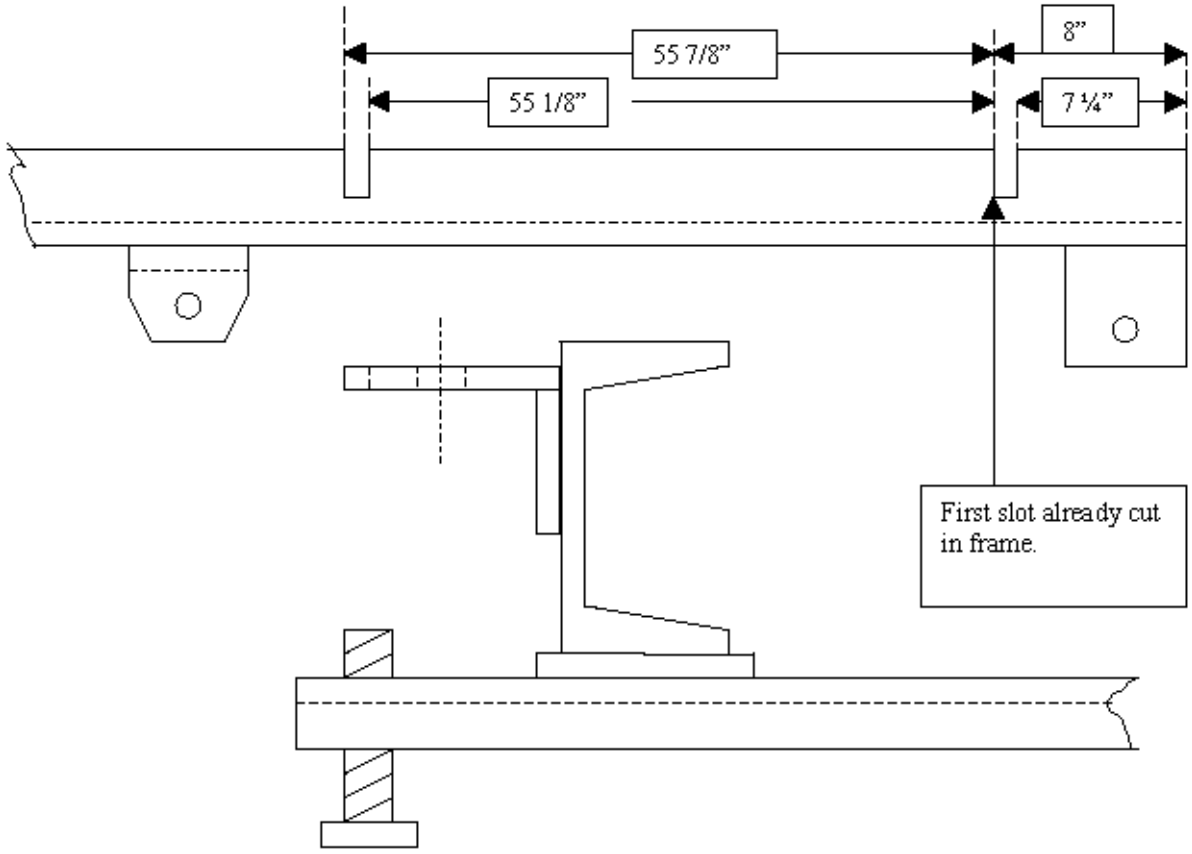
13 ½"
½"
1 ¾"
3/8"
6"
5"
2 ½"
1 3/8"
31

35.5" Top of chains or roller and first rack tier.
-31"
4.5" spacer required. Part # 334.35.69

For removal of the front wheel scrappers it is necessary that you remove the pallet return or green conveyor. Remove the nut from the rod end of the carriage cylinder and trailing hoses so you can move the carriages out of the base frames far enough to access the front wheel scrapers.

For maintenance repairs where you are replacing the carriage wheels and wear strips you should always make sure that the scrappers are in good working condition and free to move up and down. If you need to replace the wheel scrapers a modification to add a cutout for access to the front scraper without removing the carriage assembly please see sketch detail below. Again always check with Columbia Machine Service before making this modification due to the many types of UL base frames.

RACK LOADER & UNLOADER



The modification on the base frame is to allow access to forward scrapers and replacing the scrapers without removing the carriage assembly.

NOTE

Before making any modifications, call Columbia Machine Service with your model number. Our service department will check out your specific frame and either send additional information or agree that these changes can be made using the existing layout.

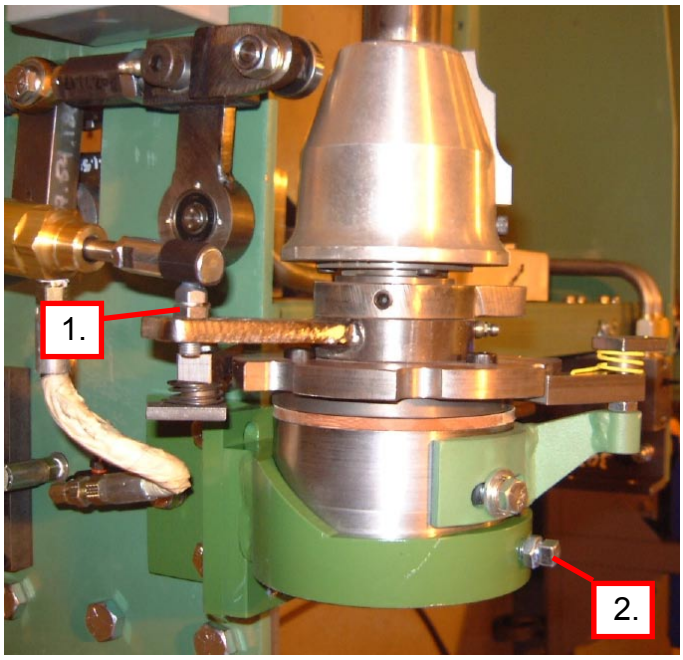
Check dimension from end of base to first slot cut at 7 1/4” and 8” all other dimensions should be checked with carriage in position to remove scrapers. Before cutting forward slot check to make sure that you will be able to remove scrapers at both ends with carriage in position.

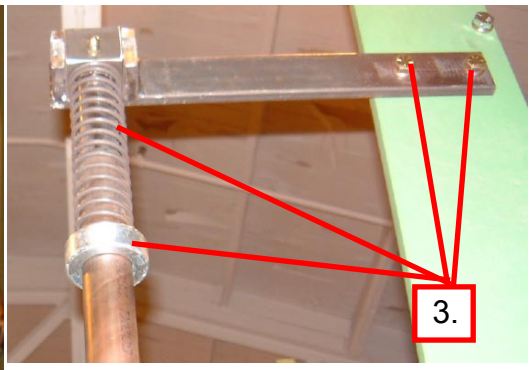
If you need additional information or have question regarding this information please give us a call at 1-800-628-4065 ext. 367 Service.

RACK LOADER & UNLOADER

Procedures for Changing Out the Tree Assembly and Adjustments for Special Height Products

When changing from one tree assembly that may have anywhere from (7) tiers to (9) tiers for standard height product (8 to 9 inches to a tree assembly), the set up for higher product height (10 to 12 inches) will require a different tree assembly. For the taller products you can only use every other tier to accommodate the heigth requirement. In some cases you may only be able to use tiers 1, 3, & 5. The new tree assembly uses a new bell assembly with the required cam, different stops, and a bell assembly with two key inserts rather than one. See pictured on next page. The instructions listed below when changing out to a different tree assembly should not require you to make any hydraulic adjustments if you are currently set up correctly using your standard tree assembly.





1. Remove Cylinder ball joint from operating arm weldment.

2. Back off square head set screw in support assembly.

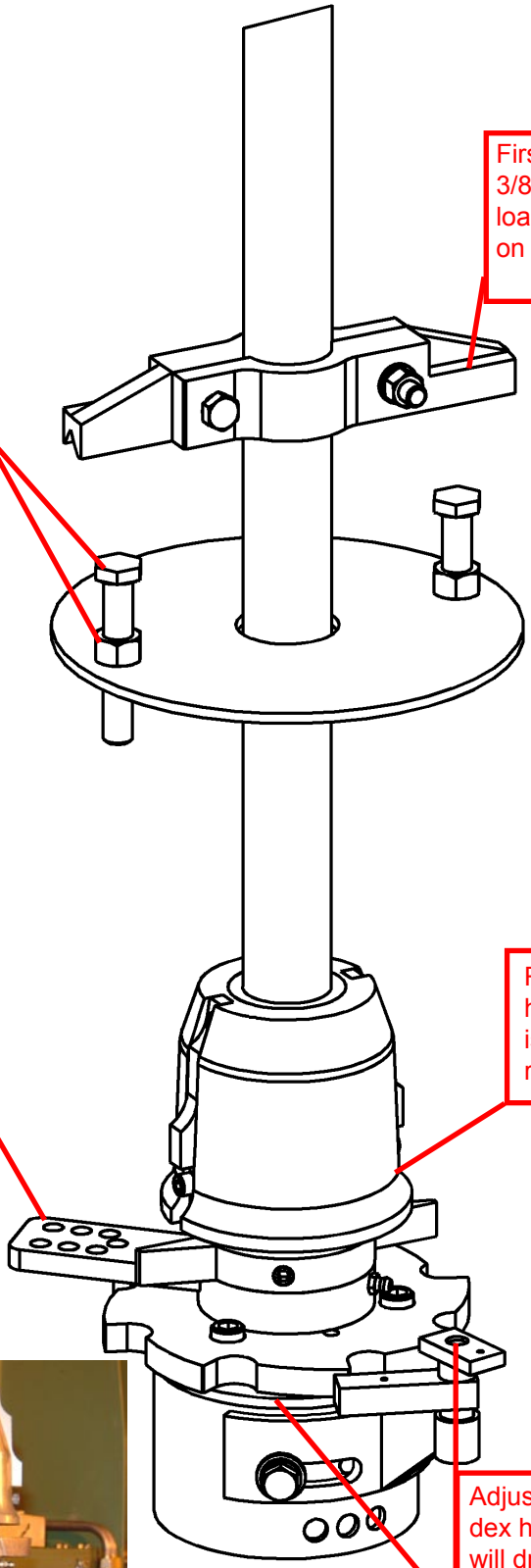
3. Remove bolts from upper brace weldment and remove brace, guide pin, spring and set collar. Reuse these parts on new tree assembly. When removing complete tree assembly support the bottom while removing from base holder. Reinstall new tree assembly in reverse. Make sure you grease all grease fittings once you have installed the new tree assembly.

Concept: ½ rotation of tree / bay,

(2) Cam insert in “Bell” First tier lift position / rotation 360 degrees

(2) Switch trips to increment rack conveyor bays on ½ (180) degrees rotation positions.

RACK LOADER & UNLOADER

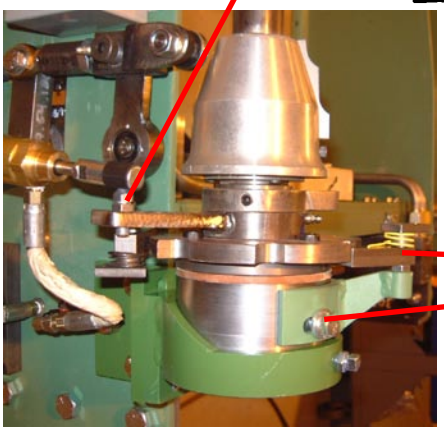


First stop should be set within 3/8 inch from pickup bar on loader and no more than ½ inch on unloader. Refer to page 19

Adjust and set pan and stop bolts for correct positioning to activate limit switch forks up. Remember the two stop bolts should be aligned with the two key inserts on the bell.

Rack indexing trip switch has (2) trips. Make sure trip is set correctly for indexing rack bay.

With tree assembly installed select tapped hole to properly index tree within limits of stroke of indexing cylinder.



Adjust each pawl so that once index has been achieved the pawl will drop into cam slot. You may need to remove bolts ratchet stop bracket and select the appropriate taped holes. Again readjust to allow pawl to correctly drop into cam slot.

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Depending on product height changes, some product heights can be made using your existing tree assembly, but when a special height requires a complete new tree assembly cam, bell, stops, limit switch disc, and limit switch stop, etc. the required steps to change out the tree assembly may differ on set up and assembly due to the type of tree.

The set up procedures below are for using tree assembly 307.148.61.

Setting for odd number stop spacing. (Drawing shown using 12 high product spacing using tears 1, 3 & 5)