SAWING SYSTEMS INC.
2918 Cherry Arcade Street, Knoxville, TN 37917-6150
(865) 525-0600 • Telefax (865) 525-2320

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TSB-10T02
SAW MAINTENANCE SUMMARY

1. **BLADE ALIGNMENT**
   a. There are two blade alignments to check on a saw: vertical (plumb) and horizontal (toe-in/out). Plumb is typically not an issue. If your cuts aren't parallel (one end wider than other) or if the blade kicks to the side and takes a corner from one side and leaves a corner on the opposite side or if it "sings" as it exits the cut, the problem is likely toe-in/toe-out. With excess toe-in/toe-out the blade wants to pull to the side but the saw rail tries to keep the carriage moving straight ahead. The blade may bend and distort and it is the relaxation as it leaves the cut that causes the blade to sing and take out a corner.
   b. To measure Toe-In/Toe-Out refer to TSB-04T19- Blade Dial Indication. You will need a dial indicator and magnetic base. They are about $55 and $109 respectively from a local Granger industrial supply house. The indicator is Granger PN 5C707. The base is Granger PN 4LB12.
   c. **TOE-IN**: The maximum tolerable horizontal toe-in/out is .0005" per inch of blade diameter. For example the tolerance on a 60" blade must be better than (+/-)60"/2000= (+/-).030" (.000" = perfect). For a 14" blade, (+/-) 14"/2000 = +/-.007", etc.
      i. If the horizontal alignment must be adjusted, change out the flat washers under the bolt heads that secure the Spindle Housing to the Raise-Lower Slides. The old flat washers have probably taken a "set" and will tend to pull the spindle back to the old position.
      ii. Although you may try to adjust the horizontal alignment to +/-.000", you will likely not get it perfect and it is preferable to err 15-30% toward a "toe-in" condition (15-30% of .030" = .005-.010") (15-30% of .007" = .001-.002").
      iii. A toe-in condition is defined as follows: The leading edge of the blade is closer to the main saw rail than the trailing edge. Under the load of cutting, the blade will be forced back, which will tend to create a more toe-out condition. By starting with a slight toe-in condition, the deflection under load will tend to cancel out the initial toe-in.
      iv. For a toe-in condition and with the large needle of the dial indicator set to 0.000 at the leading edge of the blade, then as the blade is moved forward (in the direction of cutting), the indicator will read more positive at the tail end of the blade.

   d. **PLUMB**
      i. The tolerance on the vertical plumb is whatever your process or customers will allow. Out-of-plumb will not affect saw performance or the blade. The best way to measure the out-of-plumb or vertical error is by making a slow cut through the thickest material possible for the given blade size. Place one edge of a square vertically across the cut face and the other edge of the square across the reference face (typically the reference face is the bottom of the stone which is laying on the table when the stone is cut. You can set the 2nd edge across the top face if you are sure the top is parallel to the bottom.) If there is daylight between the edge of the square at either the top or bottom of the cut, there is error. If you want to know the exact amount of error, use feeler gauges to measure the gap. The measurement divided by the distance between the top and bottom of the cut (the thickness of the material) is the "error per inch". An error less than .0005"/inch is probably as good as you can get. Alternately, you can set a long straight edge against the side of the

blade from top to bottom and then use a large carpenter square to check the square of the straight edge with the top of the cutting surface (table).

ii. If the blade is not "perfectly" plumb, it is better to err with the bottom of the blade slightly closer to the saw rail than the top of the blade. Under the load of cutting, the blade will tend to be lifted, which will tend to kick the bottom of the blade out and cancel the no-load error.

iii. If adjustment of the plumb is required, a good mechanic will be required to understand and think his way through the work. He will have to evaluate and perform the best of several options: 1a) Adjust the tram rollers (if adjustable) to roll the truck ends and consequently the saw rail. 1b) Adjust the saw rail on the truck ends. 2) Adjust the timing of the raise/lower screws (if saw is equipped with raise/lower screws). 3) Shim between the spindle housing and one of the raise-lower slides (or screws on older machines) to which the housing is bolted. The best component to adjust is the one that is causing the error.

iv. First check that the saw rail is level: Place two precision blocks on the two top machined surfaces and place a precision machinist's level across the blocks. If the rail is not level and the end trucks are equally out of level you might try adjusting the end trucks by adjusting the height of the tram rollers. Take care that you end up with each of the four tram rollers bearing roughly equal weight. You also want to take care that the engagement of the tram gear in the gear rack is correct- See section on Tram Gear Maintenance. With the rail level, check the level of the Raise/Lower Slides (or raise/lower screws on older Tysaman machines). The bottom faces of the slides or screws (or the tops of the two mounting faces of the spindle where they connect to the two raise/lower slides) should be level to each other. If not, re-time the screws to make the spindle level. Screws can get out of time if a drive sprocket skips a tooth or if one brass raise/lower nut wears significantly more than another. Both nuts should be replaced at the same time to prevent this. Properly timed screws with evenly worn nuts will carry approximately equal weight. If re-timing the screws is not sufficient to plumb the blade, then shim between the bottom of the slide (or screw) and the one face of the spindle housing that is high or which needs to come down to plumb the blade. To estimate the amount of shim required, measure the horizontal distance between the the bolts that hold the spindle to the two slides. Multiply this distance by the vertical "error per inch" of the blade as measured above. Alternately and for example, if the top of a 60" blade is .050" off from the bottom, and the distance between the slides is 12" then the amount of shim required is 12"/60" x .050" = .010". Put this thickness of shim between the bottom of the raise and lower slide (or screw) and the mounting face of the spindle that is high. Tighten the bolts and recheck and add or delete shim as required to fine-tune.

2. MAINTENANCE & SCHEDULE

a. Weekly

i. Scrape the bare metal guiding surfaces of the tram and main saw rails. Brush out the gear racks. Wash down the painted and bare surfaces. Sparingly spray all surfaces with dilute phosphoric acid to kill any rust and passivate the steel and retard rust formation. Phosphoric acid is available in paint stores and some automotive stores. Follow the

label safety instructions. Cut it with water down to the 5-10% concentration. Phosphorous is a pollutant and encourages algae formation so if you are re-circulating and treating water, consult your water system installer or chemical supplies vendor. If you are dumping to sewer, consult your municipality. If the acid is a problem you might use it just once to kill the initial rust. Let it soak in for a half hour then wipe it off with rags then rinse with water to minimize pollution. Once the rust is killed, a regular treatment of the dilute machinist's oil (see below) should keep rust from reforming.

ii. Next spray the surfaces with dilute machinist's cutting oil such as Hangsterfer's Veggie Cool. This is an environmentally friendly vegetable-based oil with corrosion inhibitors. It mixes with water and should be cut 1-3 parts water to 1 part oil. Spray it on the bare steel guiding surfaces to lubricate them and retard rust formation. It can also be applied to the painted surfaces if rust is blooming through.

b. Every month

i. Grease any fast turning bearings such as the 515C spindle bearings with one shot of grease. Don't over grease or the seals might blow out which would allow dirt in.

ii. The 541C or Thunderhead machines with standard 1" spindles have sealed and greased-for-life bearings and don't require lubrication.

iii. For larger spindles with 1-1/4" and larger arbor shafts, the spindle is lubricated with light oil. The oil level should be checked.

iv. Hydraulic Tilting Turntable: Check the hydraulic oil level in the power unit. The oil should be visible somewhere in the sight glass on the side of the tank. Top off with clean ISO 46 or 68 weight hydraulic oil. Be sure to clean all around the fill cap before removing the cap.

c. Every 6 months

i. Grease slow turning bearings (such as on tram rails and 515 Saddles) with one shot of grease. Don't over grease or the seals might blow out which would allow dirt in. Slow turning bearings require little or no grease.

ii. On the 541 Thunderhead: Spray the bare steel guiding surfaces of the raise and lower slides with WD-40 and run the slides up and down a couple times to cut the old grease and grime. Re-grease the raise/lower slides with white Lubriplate grease or automotive chassis lube. On the 541C or CA and machines with a chain drive raise/lower system, lubricate the chain. If the chain sags more than ¼" between sprockets, tighten the chain my moving the gearbox on its mount.

iii. Check that the saddle runs snug on the saw rail. It should not "yaw" (turn left or right) or "pitch" (nose/tail move up down). Grab the side of the carriage and try to twist it side to side or lift it to rock it up/down. If loose, snug the guide rollers. Make your roller adjustments with the carriage at one end of the saw rail or the other. Older saw rails will be worn more in the center. If the rail is worn excessively in the center and won't hold the carriage snug, then the rail will need to be re-machined at SSI or replaced.

iv. 515C: Has 4 top rollers and 4 bottom rollers. Loosen the set screws which hold the roller to the shaft and pry the roller to the rail. Roll the roller on the shaft so the set screw does not fall back into the old detent. Snug the set screw.

1. If you adjust the rollers in the center of a worn rail, it might ride up on the rail near the wider ends.
2. If roller will not hold, disassemble rollers and shaft, clean shaft and bore of roller with denatured alcohol and reassemble. Adjust roller and tighten set screw. Test

operation. When adjustment is confirmed, put a drop of wicking Loctite formula 290 to the joint between roller and shaft. Allow to set 24 hours. The Loctite will flow in and lock the roller to the shaft. To remove. Heat the roller with a propane torch to 350F to break down the adhesive bond.

v. 541C Thunderhead: Has 4 side rollers and 4 bottom rollers to adjust (the top rollers do not adjust). If you snug the rollers where the rail is worn, the rollers might break when the saddle gets to the "fatter" ends.

vi. Perform a blade alignment check with a dial indicator. Also perform this check after a saw crash (blade runs up on stone) and after doing any adjustment to the side rollers of the saddle.

d. Annually

i. Gearbox oil: After first 1500 hours and every 5000 hours thereafter, change gearbox oil. Use Mobil SHC634 Synthetic Lubricating Oil. Approx 1 pint required for Boston 700 Series Gearbox.

ii. Hydraulic Tilting Turntable: Change the filter on the tilting turntable. Check the label on the filter and call your local industrial supply house for a replacement.

iii. Spindles with oil-bath lubrication (Applies to 541 HD spindle with 1-1/4" arbor and machines with larger spindles.): Change the oil in the spindle. Use a non-foaming 10W oil.

iv. Tram Gear Maintenance

1. The tram gears should be checked for proper engagement in the gear rack. If the gear rides too high it will be loose and allow the saw bridge to move excessively side to side. If the gear is too tight it will bear the weight of the bridge and wear out prematurely.
2. The correct engagement can be measured with a piece of paper. Oil or grease a 1" x 4-6" long piece of paper. Lay it on the gear rack and roll the gear over it. If too tight, the gear will shear the paper about halfway down the face of the tooth. If just right, the gear will compress the paper and leave a horizontal line about halfway down the face of the tooth. If too loose, the gear won't leave a line.

e. As required, perhaps every 3-5 years:

i. Gearbox Oil: See "Annually" Section.

ii. 541CS or CG with a raise/lower jack.

1. If it makes a clicking noise, the clicking is an overload clutch. If the clicking is at the bottom or top of the stroke it is normal. If it makes this clicking noise at mid stroke and especially going up, then the raise/lower slides may need cleaning if they have already been greased recently. Typically the slides get looser with operation and move more easily. If the slides are rusted or gummed up, they may get harder to move and cause the jack to overload and the clutch to slip. Try spraying the slides with WD-40 then run the spindle all the way down and spray again. Try raising the spindle. If the clutch slips, assist it by prying up on the spindle. If you can't move the slides or if one or two strokes does not free them up, you will need to disassemble and polish the slides with steel wool and navel jelly (phosphoric acid in jelly form). Do one slide at a time to prevent the machine from falling. Follow the chemical safety instructions.
2. To remove a slide, you'll need to first remove the blade guard on one side and the belt guard on the other side. You also want to be careful to mark the pieces to get

them back in the same position. Unbolt the top of the slide from the plate above and the bottom of the slide from the spindle housing below. There is a front side and a back side brass gibb that retain the slide to the saddle. Mark them FS and BS near the top of each gibb. Unbolt these gibbs. (Don't pull the slide just yet) There are shim strips between each side gibb plate and the saddle. Keep these in place on the back of the respective gibb. With the side gibbs removed, you'll see a brass gibb on the forward side of the slide and on the back side of the slide. Mark these F and B near the top. Now pull the slide out. The forward and back gibbs will fall out. Clean the slide and the F and B gibbs then regrease them with white Lubriplate or chassis grease. Put the F and B gibbs back into position and have a second set of hands hold them there while you put the slide back into position. Replace the FS and BS gibbs and shims and snug the bolts. If the machine is several years old and if the side gibbs are too loose against the slide then you can remove one or more shims. There is at least one thin .005" shim and that is probably all that needs to be removed. If you remove too much shim, the slide will be overly tight and the jack clutch will overload and slip. The F and B gibbs have adjustment jack screws. The F and B gibbs should only just kiss the slide or the jack clutch will slip. Some looseness in the forward-back direction does not affect cutting accuracy or performance. Repeat the procedure for the opposite slide. Grease the slides on all sliding surfaces (6 surfaces per slide).

iii. 511, 521, 531, 541C or CA

1. The R/L system on these machines consists of chain-driven screws which are typically powerful enough to overcome high drag in the slides. If too tight or loose, you may need to adjust the shims similarly as for the 541CS above.

iv. 515C Raise/Lower System

1. The brake on the actuator may wear out in 2-3 years. This will allow the spindle to fall when the R/L button is released. There is a brake kit available. Call SSI. Have the model number of the actuator available. It is on the label on the body of the jack (not the jack motor). The number starts with A12 or A22.