CARVEWRIGHT™ **Service Documentation**

Replacing the Sandpaper Belts with Rubber Belts

To replace the sandpaper belt you will need to gather the following tools:

- 4mm long handle Allen wrench
- #2 Phillips screwdriver (magnetic tip preferred)
- 1.5 mm Allen wrench
- 10mm Socket and ratchet wrench
- Thread cement
- Machine vice
- Two dimes (to use as a spacer)
- Allen wrench (needed only in certain cases)

The rubber belts will be packaged with the following:

- 4” long assembly pins (2x)
- 1/2” OD flat washer (2x)
- 0.30” OD flat washer
- 0.23” OD split ring washer (2x)

Remove the Side Panel

1. **Ready the machine.** Unplug it from the power outlet and place it on a stable work platform.

2. **Remove the cable protector for the cables routed from the base to the movable head along the inside of the left side panel assembly.** Remove the single screw as shown in Figure 1 with a #2 Phillips screwdriver. Use a magnetic tipped screwdriver if possible to avoid dropping the screws into the machine. Remove plastic cable protector from the machine.

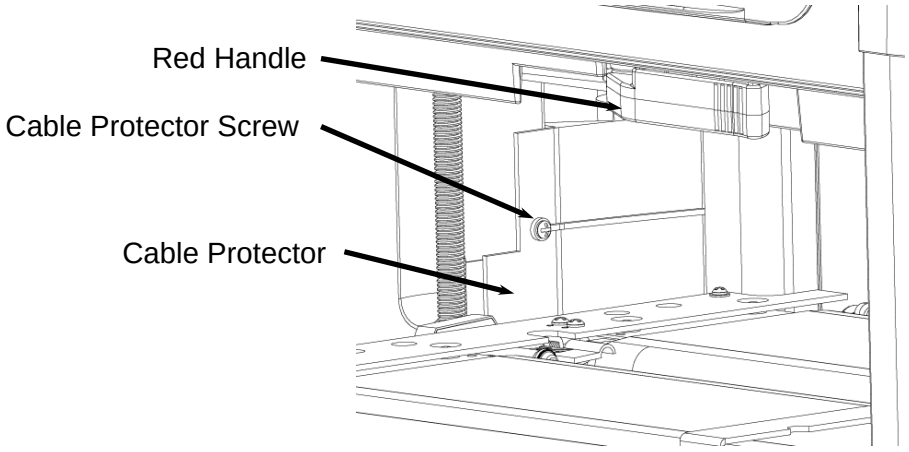


FIGURE 1: LOCATION OF THE HEAD CABLE PROTECTOR (LOOKING INTO THE MACHINE FROM THE FRONT)

3. **Unplug the LCD cable.** Grasp and pull the LCD cable connector straight out. Lay the cable end to the side of the panel.

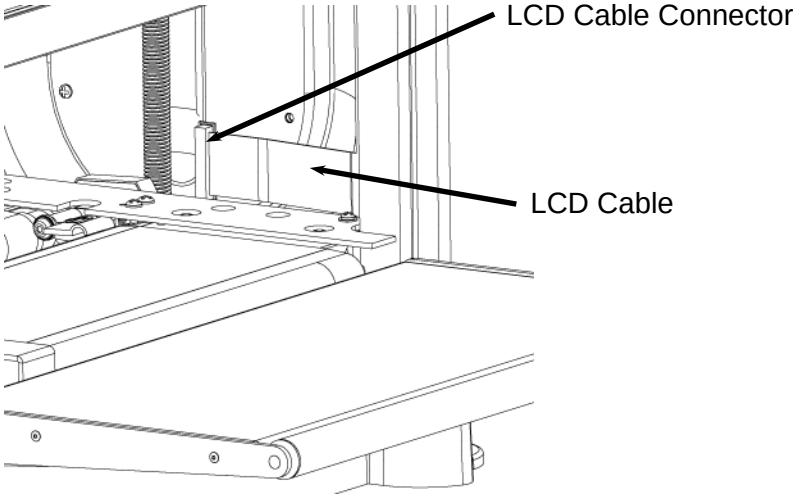


FIGURE 2: LOCATION OF THE LCD CABLE
(LOOKING INTO THE MACHINE FROM THE BACK)

4. **Remove the left side panel assembly.** Using the 10mm socket, remove the two hex head bolts (and washers) from the top of the assembly. Remove the two Phillips head screws from the base of the side panel with the screwdriver. Lift off the side panel. Make sure to look for any washers that might be on top of the corner posts for spacing of the side panel. There are typically two thin washers per side and they may be stuck to the underside of the removed panel.

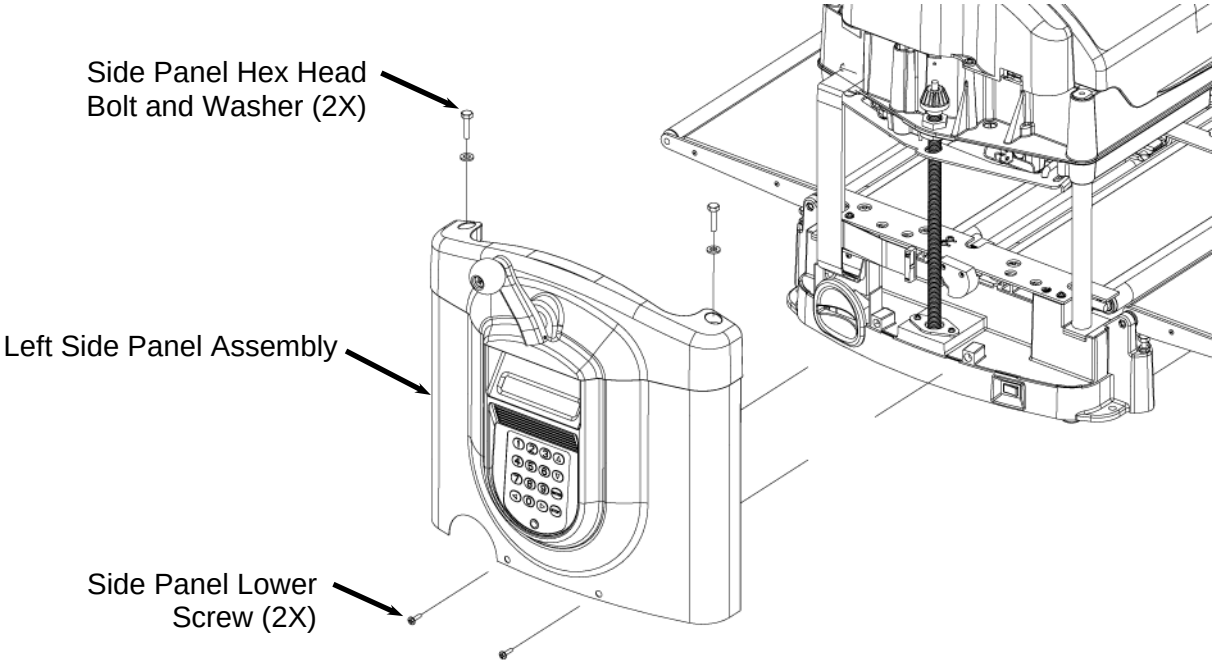


FIGURE 3: EXPLODED VIEW OF THE LEFT SIDE PANEL FASTENERS

5. **Clean the machine.** Make sure to remove all dust behind and around the base of the panel. This will assure a smooth reassembly, and that no dust will get into the open connectors.

Remove the belt tray assemblies:

6. **Remove the sliding plate**. Remove the two Philips head screws securing the sliding plate and lift it out being careful not to snag the belts.

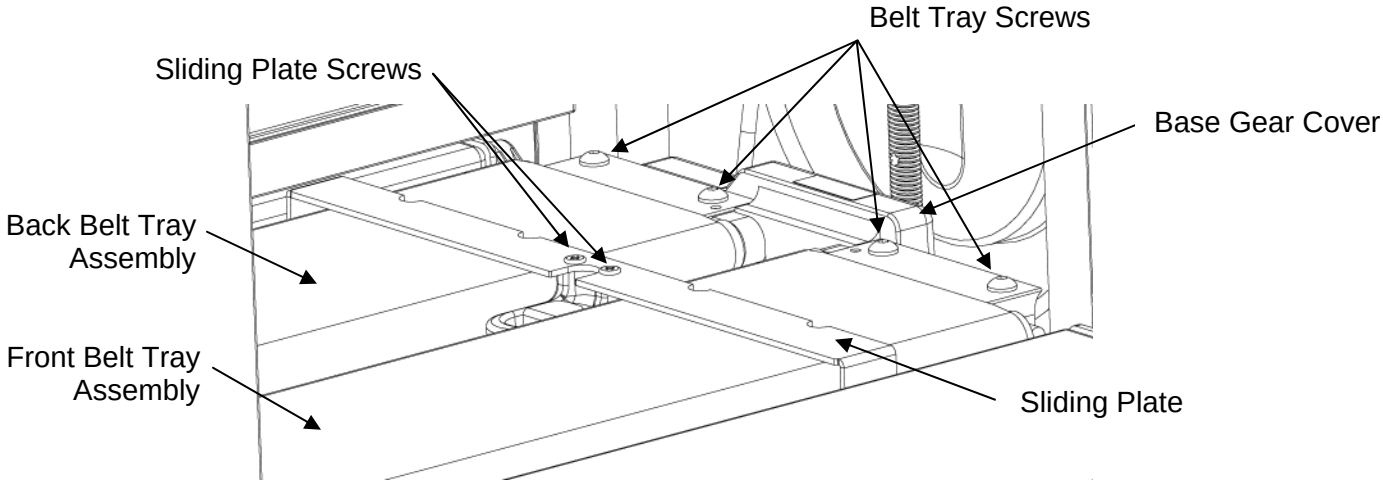


FIGURE 4: VIEW OF THE SLIDING PLATE AND BELT TRAY SCREWS (RIGHT SIDE)

7. **Remove the base gear cover.** Gently squeeze the base gear cover shown in Figure 4, and pull straight up to remove. The base gear cover has been caulked around its edge with silicone to keep dust out. This caulking will pull away from the base when the cover is removed.

8. **Remove the belt tray screws.** Use the 4mm Allen wrench to remove the eight screws holding the front and back belt trays in place (See Figures 4 & 5).

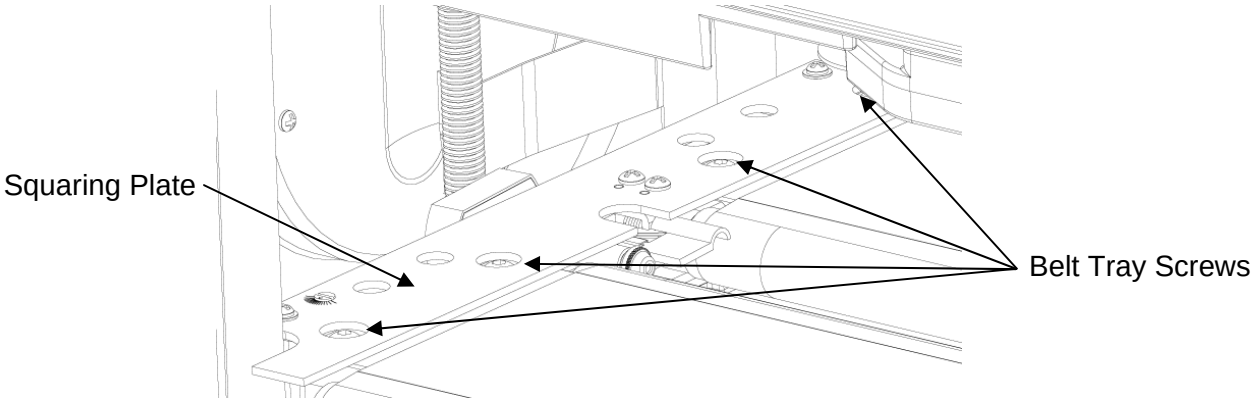


FIGURE 5: VIEW OF THE BELT TRAYS AND SQUARING PLATE (LEFT SIDE)

9. **Remove the belt trays.** Lift up on the right end of each belt tray and slide it to the right and out from under the squaring plate. Angle the belt tray slightly to remove from the machine. Be careful not to put any pressure on the squaring plate while removing the tray.

10. **Familiarize yourself with the tensioning mechanism**. The belt tensioning mechanism is shown below. The springs on both sides push on the spring pins pressed into holes in the slide rods. The slide rods are connected to the roller that tensions the traction belts.

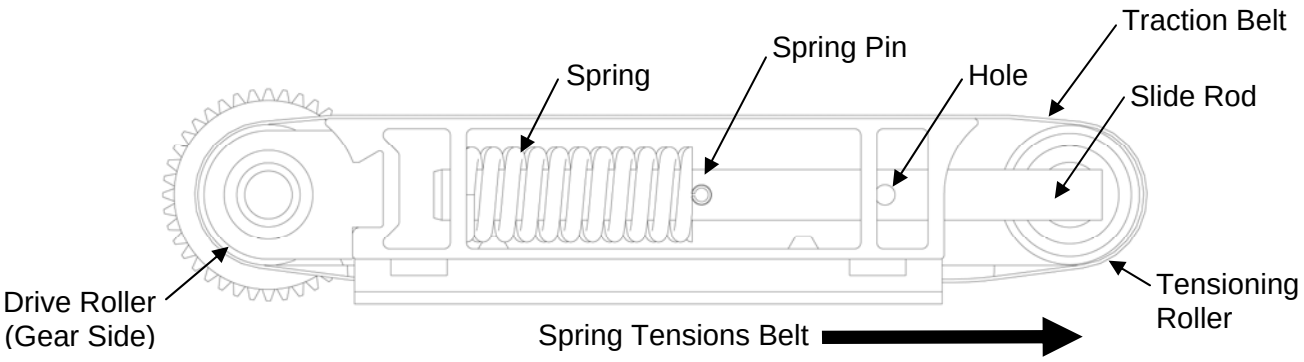


FIGURE 6: SIDE VIEW OF THE BELT TRAY TENSIONING MECHANISM

11. **Compress the belt tray**. In order to remove the sandpaper belt, you will need to remove the tension provided by the springs by compressing the ends of the tensioning roller with a vice. Place the belt tray into the vice such that pressure is applied only at the ends of the roller over the slide rods. **Do not press in the center of the roller. Pressing on or near the center of the roller can damage the roller. The machine will not work properly with a damaged roller.** Only press on one end at a time and insert the pin (as described in Step 12) before repeating on the opposite side.

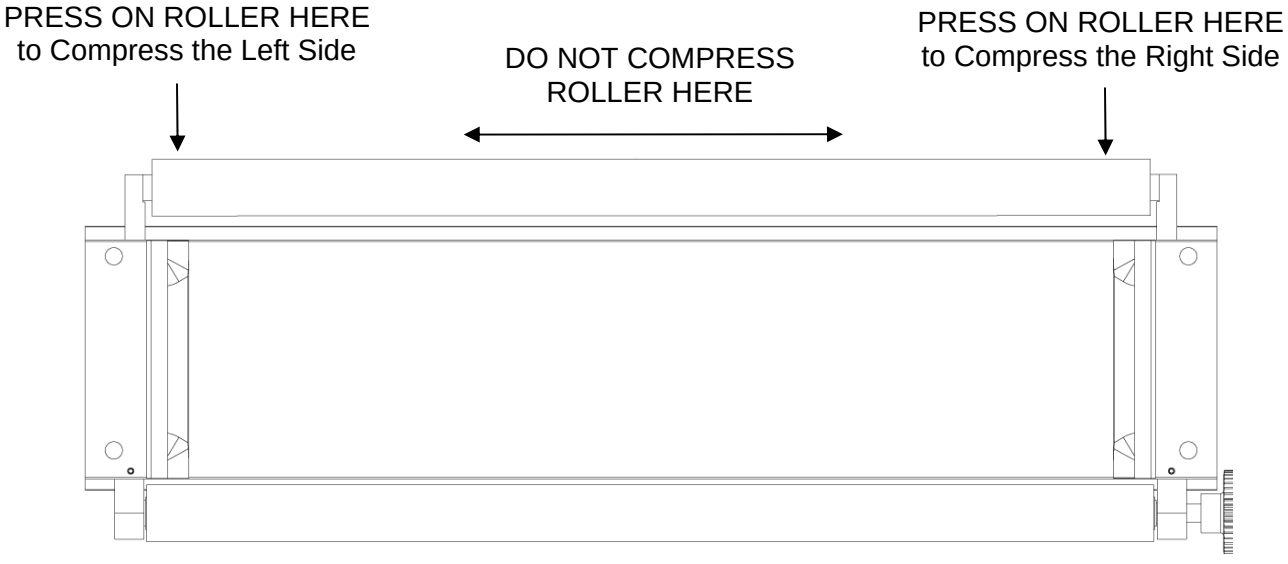


FIGURE 7: CORRECT LOCATIONS FOR COMPRESSING THE ROLLERS

Compress the belt tray using the vise until the open holes in the slide rods have moved inside the inner wall as shown below.

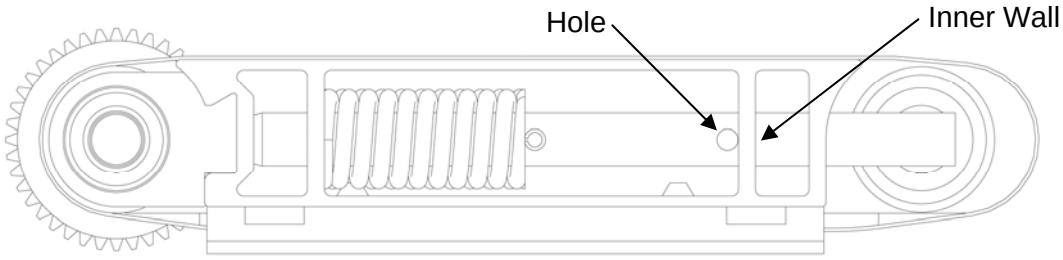


FIGURE 8: SIDE VIEW OF THE BELT TRAY TENSIONING MECHANISM

12. **Insert pins.** Insert a retaining pin (supplied with the replacement belts) into this open hole to hold the roller in the compressed position. Remove tray from the vice and repeat on the opposite side. Once both pins are in place, remove the belt tray from the vise. The rollers will remain compressed.

13. **Remove the belt.** With the belt tray compressed, slip the belt off the side opposite the gear.

14. **Check the screws holding the rubber drive roller for looseness.** From time to time the setscrews holding the rubber drive roller can loosen and shift the position of the drive gear relative to the gears it meshes with. We want to assure that the spacing of this gear is correct as well as the tightness of the securing screws.

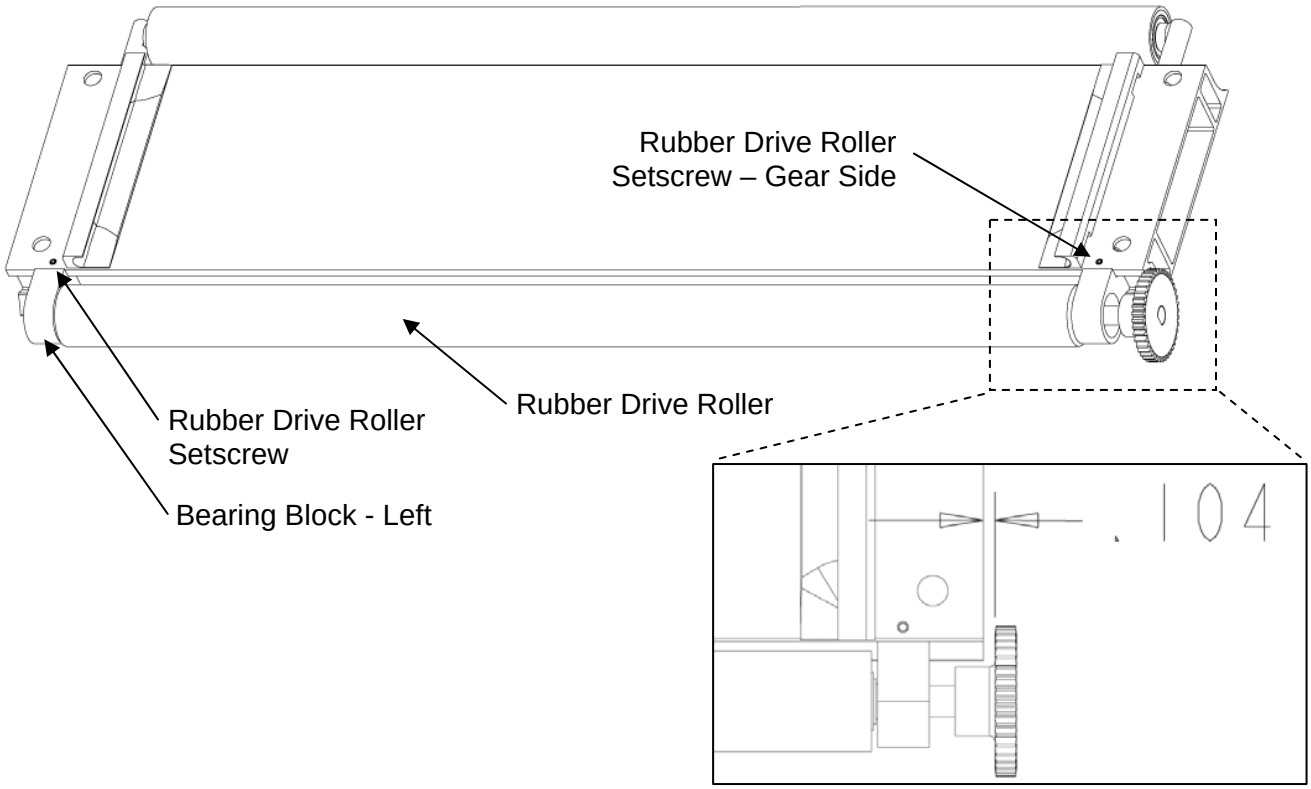


FIGURE 9: CHECKING THE SPACING OF THE DRIVE GEAR

15. **Check for slop in the drive roller.** Grab the rubber drive roller and attempt to move it side to side (in the length direction of the roller). If there is any movement at all you will have to reset this roller. If there is no movement in the roller quickly check the spacing between the inside of the drive gear and the end of the belt plate as shown in Figure 9 by inserting the two stacked dimes. The gap can be slightly larger than the thickness of the two dimes but no less. If the roller is tight and the spacing is correct proceed to Step 17.

16. **Reset the drive roller.** With an Allen wrench, loosen and remove both of the rubber drive roller setscrews (see Figure 9). They have thread cement on them so apply a small amount of heat to them if they will not break free. Set the stack of two dimes against the end of the belt tray and push the roller assembly over until the gear touches them. Add thread cement to and insert the setscrew closest to the drive gear. Tighten firmly. Press the left bearing block toward the drive gear so that there is no side to side slop in the roller and insert the thread cemented setscrew (see Figure 9). Tighten firmly. Verify that the spacing is still correct and that there is no side to side slop in the roller.

17. **Assemble the new rubber belt.** Slide the new belt over the tray from the end opposite the drive gear. The belt needs to be placed between the two belt keepers as shown in Figure 10. Remove the retaining pins from the slide rods by applying a small amount of force to the tensioning roller and pulling them out or by reinserting the tray into the vise.

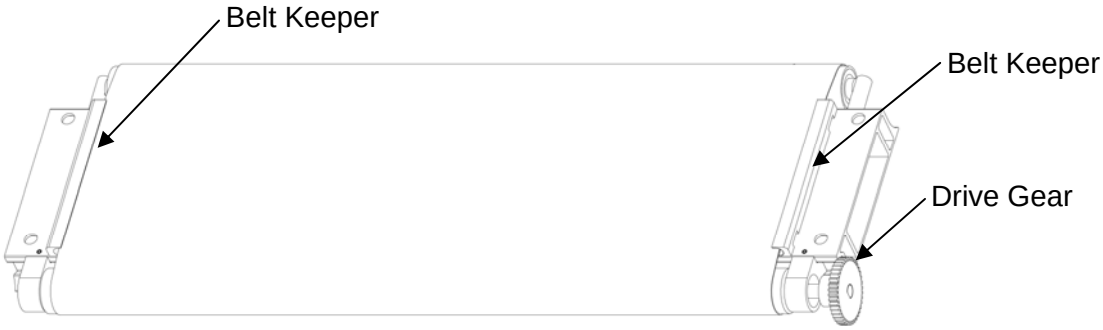


FIGURE 10: BOTTOM VIEW OF THE FRONT BELT TRAY SHOWING THE BELT KEEPERS

18. **Reinstall the belt tray.** Reinstall the belt tray by reversing Steps 6-9.

19. **Reinstall the gear cover.** Make sure that the gear cover is pressed all the way down and that it snaps back in place. Add a bead of caulking around the perimeter of the cover to keep dust out of the gears and avoid possible problems. This is especially true across the gap between the belt trays on top. The new rubber belts are slightly thicker than the original sandpaper belts so the squaring plate (and board tracking sensor) will need to be elevated with spacers.

20. **Note the squaring plate adjustment pin setting and tape pin in place.** During factory calibration the squaring plate is set perpendicular to the travel of the cutting head. This adjustment needs to be maintained as the squaring plate is removed and adjusted upwards to accommodate the new thicker belt.
    Note: Carefully observe the position of the arrow on the squaring plate adjustment screw with respect to the series of notches on the squaring plate.

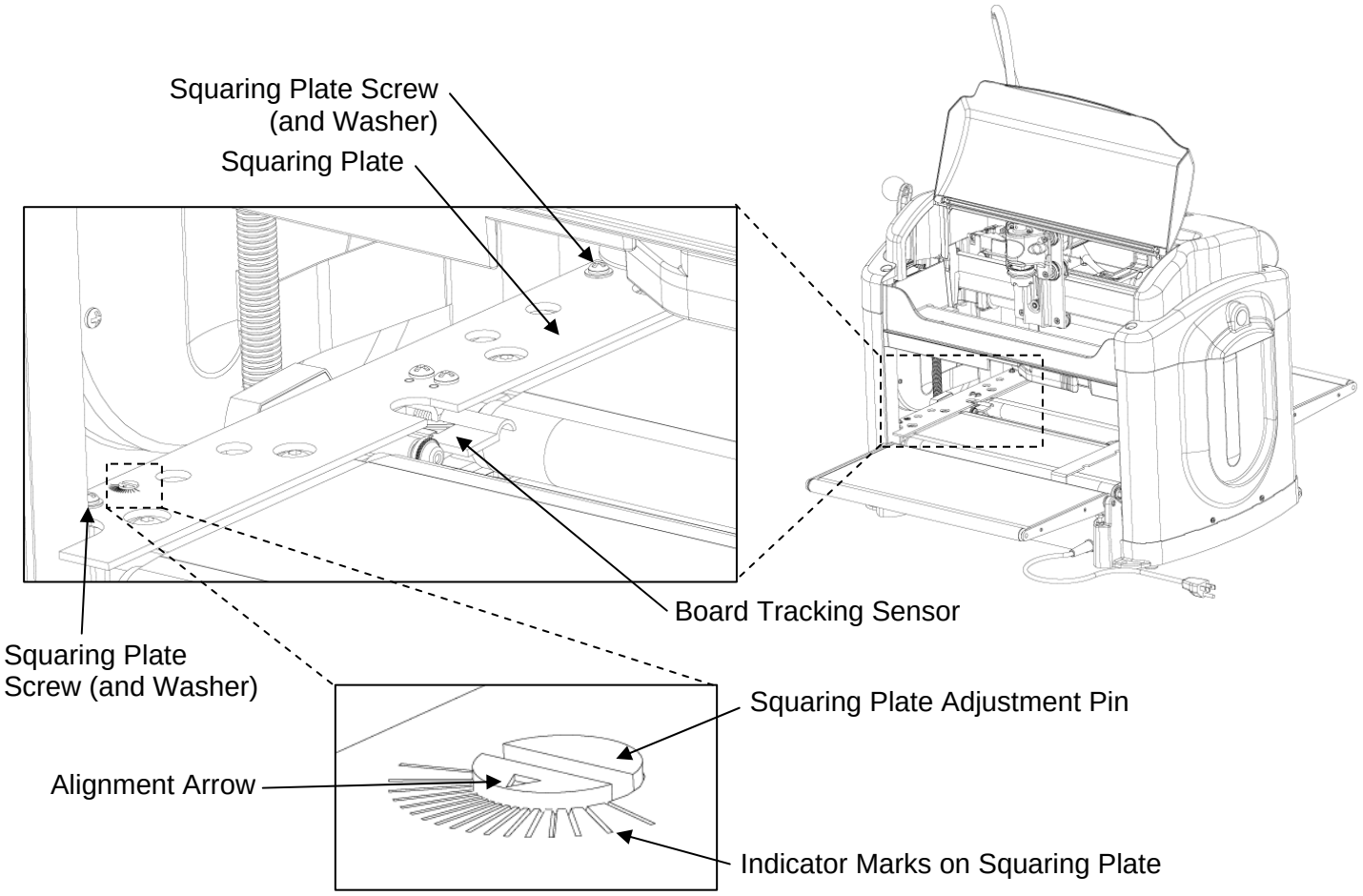


FIGURE 11: DETAILED VIEW OF THE SQUARING PLATE ATTACHMENT

Once you have noted and/or marked the position of the arrow on the squaring plate relative to the indicator marks on the squaring plate, place a large piece of tape over the adjustment pin to hold it in place as the squaring plate is being removed.

21. **Free the squaring plate from the base.** Remove the two screws and washers (see Figure 11) holding the squaring plate in place.

22. **Unplug cable.** Unplug the 8-pin connector from the back of the board tracking sensor body. Lift the unplugged squaring plate (and board tracking sensor) out of the machine.

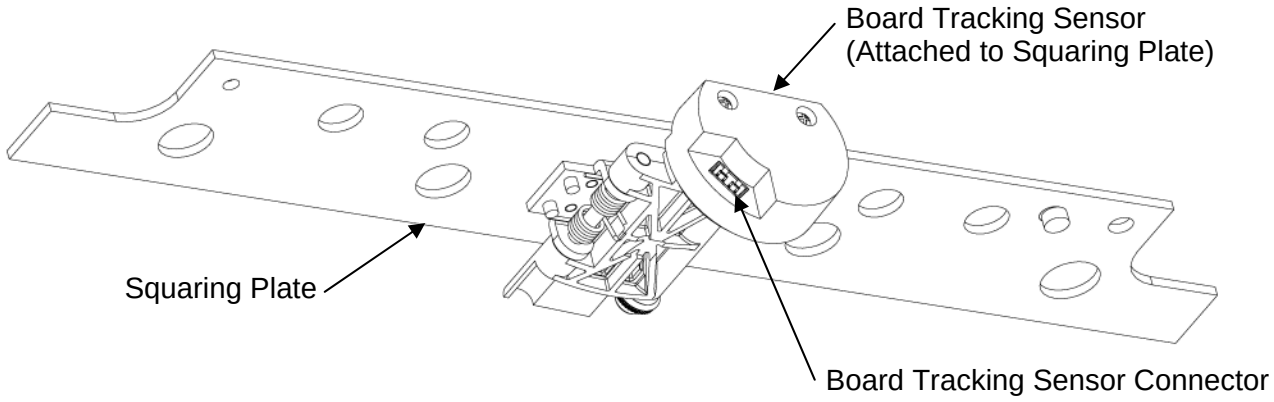


FIGURE 12: SQUARING PLATE ASSEMBLY (UNDERNEATH VIEW)

23. **Remove the board tracking sensor assembly from the squaring plate.** Unscrew the two board tracking sensor screws and remove the board tracking sensor assembly.

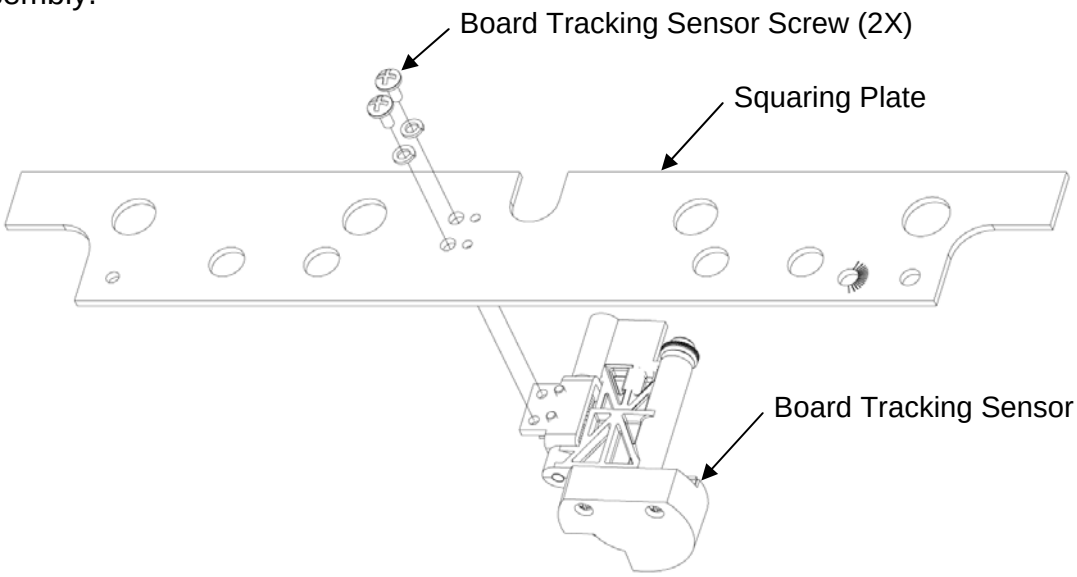


FIGURE 13: SQUARING PLATE ASSEMBLY

24. **Replace the board tracking sensor o-ring (if needed).** If the o-ring is missing torn or hard you will want to replace it. Slip the existing rubber o-ring off the brass wheel and replace it with a new o-ring (See Figure 14). It is extremely important to have this new o-ring in place in order for the new belts to track correctly.

25. **Assemble the two split ring washers onto the board tracking sensor.** Place the two small split ring washers (included in the belt package) onto the protruding pins of the board tracking sensor. Reassemble the board tracking sensor to the squaring plate as shown in Figure 13.

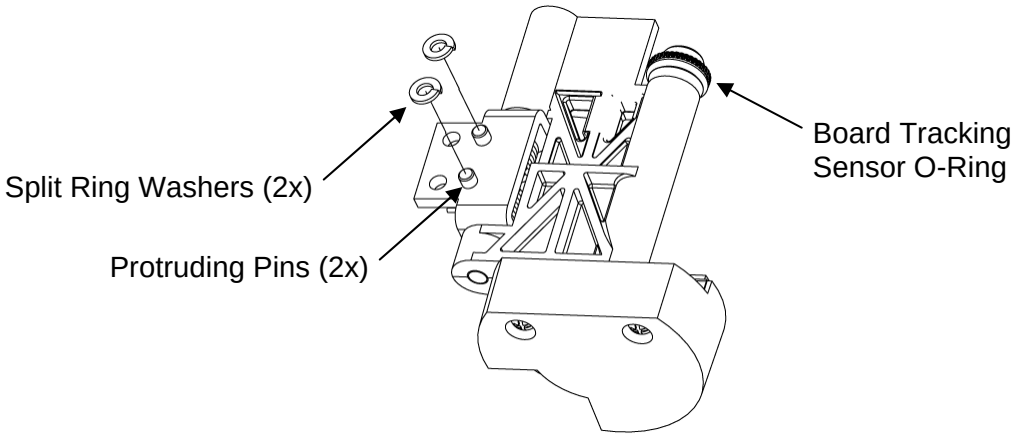


FIGURE 14: REPLACING THE O-RING AND ADDING SPACERS TO THE BOARD TRACKING SENSOR

26. **Insert spacer in under board tracking sensor dampening spring.** Lift off the rubber board tracking damper spring. Remove the screw securing the sliding plate guide rod retainer that is directly underneath the damper spring. Place the 0.30” flat washer underneath the removed screw and replace the screw and damper spring.

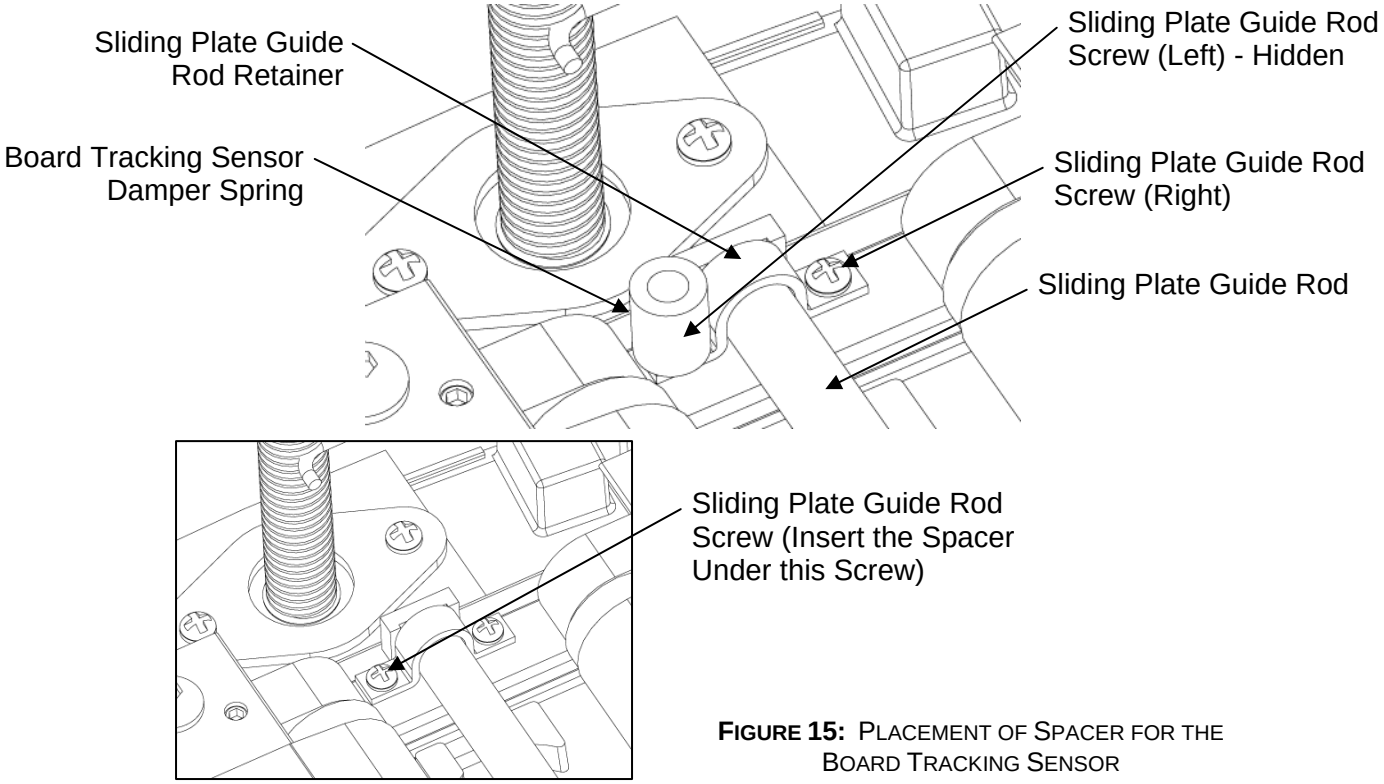


FIGURE 15: PLACEMENT OF SPACER FOR THE BOARD TRACKING SENSOR

27. **Insert spacers to elevate the squaring plate.** Place the 1/2" flat washers onto the base casting centered over the two screw holes used to secure the squaring plate onto the base. These spacers will elevate the squaring plate and board tracking sensor in order to accommodate the thicker rubber belts.
28. **Plug in the board tracking sensor.** Insert the squaring plate with board tracking sensor into the machine. Before attempting to plug in the cable make sure to take note of the position of the orientation slots on the connector and the keys on the plug. Insert the cable into the connector so that the keys go into the slots.

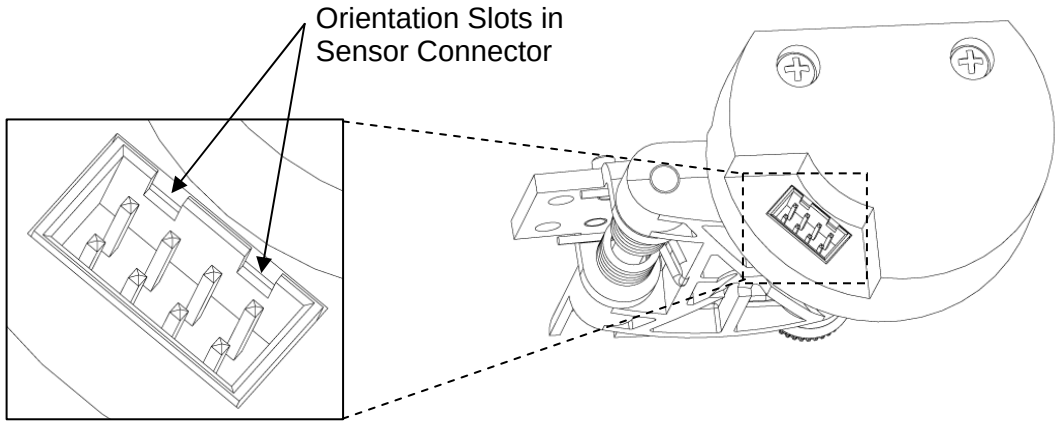


FIGURE 16: BOARD TRACKING SENSOR CONNECTOR ORIENTATION

29. **Reassemble squaring plate.** Lay the squaring plate down onto the spacers and replace the screws. Before tightening make sure that the squaring plate adjustment pin is inserted into its slot. Remove the tape over the adjustment pin and verify that the arrow is still pointing to the same indicator mark as recorded in Step 20.

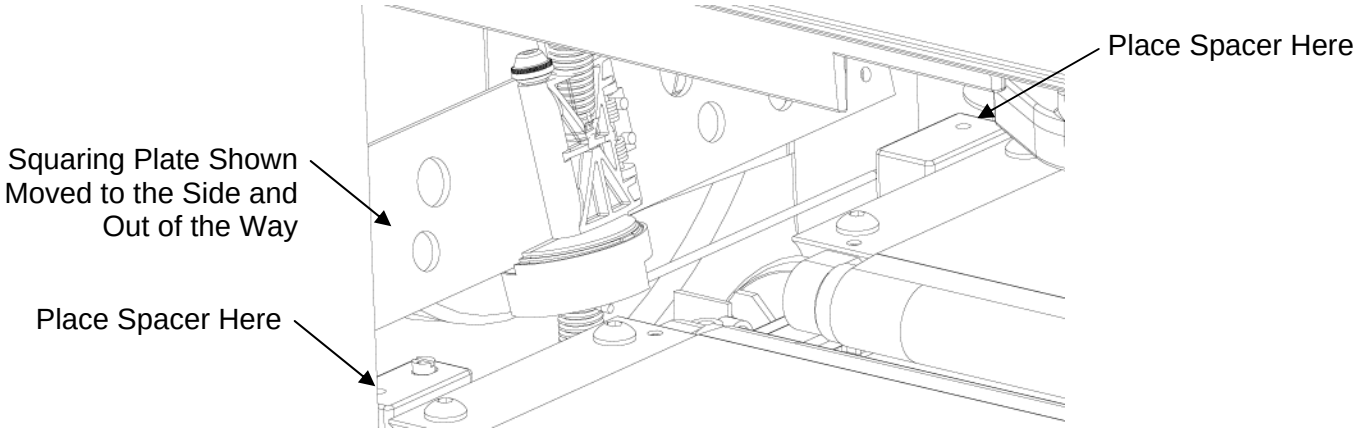


FIGURE 17: PLACEMENT OF SPACERS FOR THE SQUARING PLATE

30. **Check for clearance between the board tracking roller and the new rubber belt.** The new rubber belts are slightly thicker than the previous sandpaper belts. For this reason you added the spacing washers. Additionally you will need to check to see that there is clearance between the new rubber belt and the brass board tracking roller when it is compressed by a board. Crank the head up to within 1" of the top for best viewing. Take a single sheet of paper and slide it between the brass roller and the front rubber belt (Figure 18). Place the 1x3 board on edge up against the squaring plate. Make sure that the board does not pinch the paper between the belt and the board. Press the board down so that it is compressed onto the belts as usual. Withdraw the sheet of paper and see if it is pinched between the roller and belt. If the paper is pinched please contact CarveWright Service for assistance.

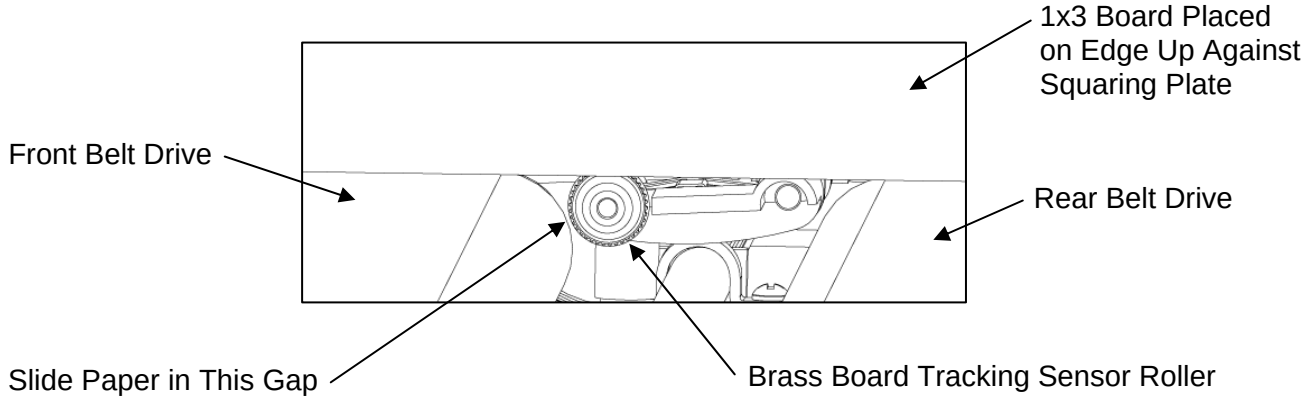


FIGURE 18: CHECKING CLEARANCE OF THE BOARD TRACKING SENSOR

31. **Reassemble the sliding plate.** Replace the sliding plate using the directions in Step 6. Before tightening the screws on the sliding plate insert a board into the machine that has parallel sides up against the squaring plate. Slide the sliding plate up against the board and tighten the screws. This will ensure that the sliding plate is parallel to the squaring plate.

32. **Replace the right side panel assembly.** Place the side panel assembly back onto the machine making sure that the bottom of the panel sits into the grooves and tabs located on the base casting (Figure 19). Also make sure to replace any spacing washers removed in Step 4 situated on top of the corner posts. Insert the two bottom screws and tighten with a #2 Phillips screwdriver. Insert the top hex head bolts (with washers) and tighten with the 10mm socket.

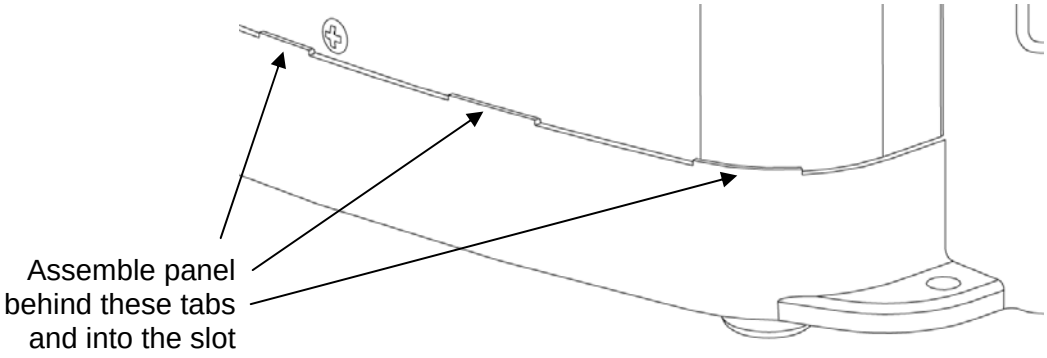


FIGURE 19: ASSEMBLE PANEL BEHIND TABS

33. **Plug in the LCD ribbon cable.** Plug the LCD ribbon cable into its connector located in a cutout on the back of the side panel assembly (see Figure 2).

34. **Re-assemble the cable protector.** While holding the three ribbon cables up against the side panel, slide the plastic cable protector into position over the screw hole in the side panel. Insert and tighten the screw. Verify that the cables are well secured behind the cable protector and that none are bent or pinched.

Calibrating Your Machine X Measurement

After replacing the sandpaper belts with rubber belts, you will need to re-calibrate your machine to account for the changes in the hardware. To do this calibration you will need a board roughly 36" long that is clean and straight. It is very important that the board edge that is placed into the machine up against the squaring plate be very clean and free of defects. This is the edge that the board tracking sensor roller will be running on and measuring.

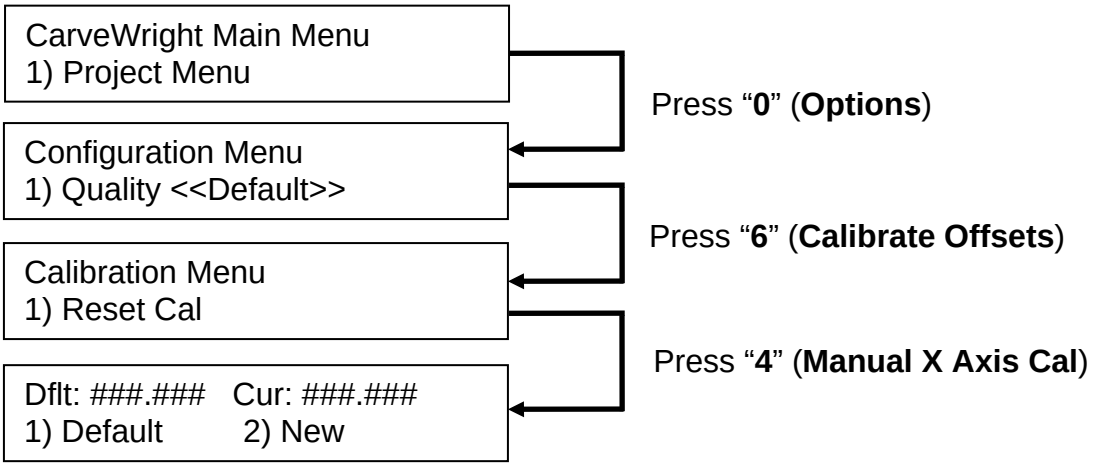
Measure and record your board length with as much accuracy as you can get. Make sure to perform the measurement in the center of the board width, as this is where the machine will also measure (Hand Measured Length - _____inches). Load the board into your machine and measure it using the "Measure Board" function. This can be accessed by pressing the "**7**" (**Measure**) key on the keypad or by using the **up/down arrows** to navigate to the measure function from the *CarveWright Main Menu*. The display will then ask for the direction the user wishes to measure.

Select Dimension 1) Length

Press the "**1**" key on the keypad to measure the Length. Record the number (Machine Measured Length - _____inches) and compare it to the length you measured by hand. At this point you have to decide if the difference in the length measurements warrants recalibrating your machine. If you would like to recalibrate your machine continue reading this document.

Before recalibrating, make sure that you have the latest CarveWright firmware version running on your flash card (version 1.160 or later). Next, navigate to the recalibration menu by following the directions and flow chart below.

1. Turn on your machine and navigate to the *Configurations Menu* from the *CarveWright Main Menu* pressing the "**0**" (**Options**) key on the keypad.
2. Navigate to the *Calibrate Offsets* menu item by using the **up/down arrows** and press **ENTER**, or select item 6 by pressing the "**6**" key.
3. Navigate to the *Manual X Axis Cal* menu item by using the **up/down arrows** and press **ENTER**, or select item 6 by pressing the "**4**" key.



You are now at the screen that shows you the default calibration numbers (factory calibrated) as well as the current calibration setting for the length measurement. You now have two options:

1) Pressing "**1**" (**Default**) will restore the current value to the factory default value.
2) Pressing "**2**" (**New**) will allow you to type in a new value to adjust for the difference in measured lengths. New numbers can be entered with decimal or fractional values. Press ENTER to save once a value is entered.

To calculate the value to enter, first take a look at the difference in the measured lengths. If the hand measured length is **longer** than the machine measured length you will need to **add** units to the displayed current value, and conversely, if the hand measured length is shorter than the machine measured length you will need to subtract units from the current value setting

To find the magnitude of the change to the current value subtract the two numbers (Length difference - _____inches). Although not an exact correlation, you should change the current value setting by 1 unit for every 0.03" (or for every 1/32nd of an inch).

So now you have a direction (add or subtract) to change and a magnitude (number of units). As an example: say you have a board that measures exactly 36" long by your tape measure and the machine measures board at 35.875", adjust the X axis cal number by -4. If the current value was set to 890.000, change it to 894.000. Or if the machine measures 36.125", adjust the X axis cal number +4.

Once the new value is entered you will see it appear as the Current value on the display. Go back and measure the board with the machine again and see how much closer the measured values become. Rerun the calibration routine as many times as necessary to attain the level of accuracy that you desire.