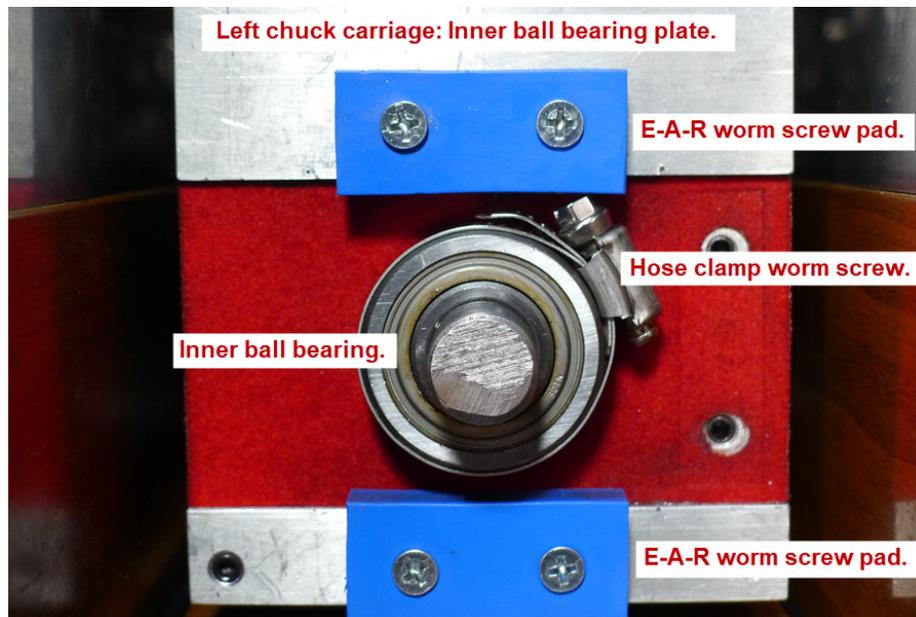


String Winder Manual #2

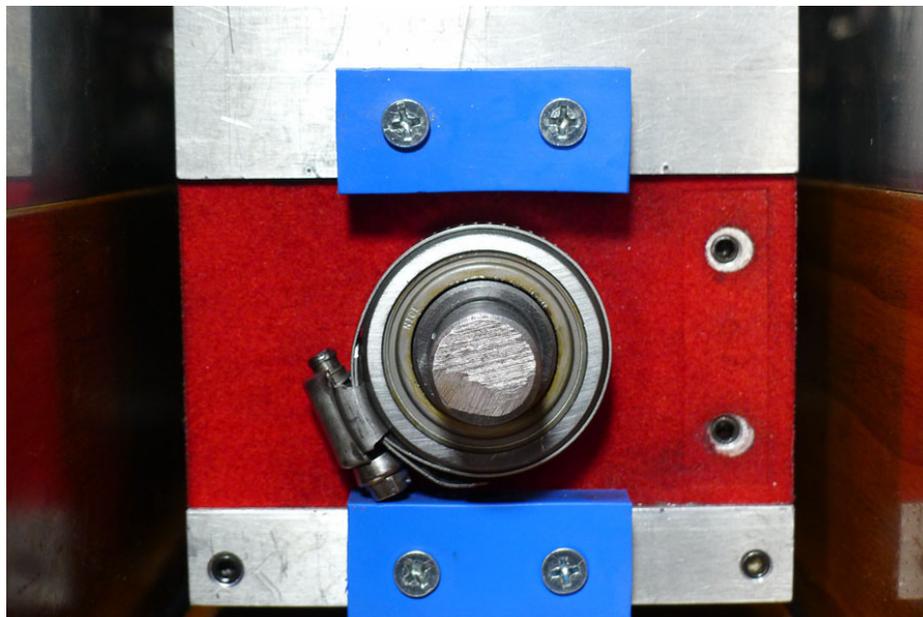
Ball-Thrust Bearings Installation

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The String Winder has four green timing pulleys and two green timing belts. Two pulleys are installed on the drive shaft, and two on the chuck shafts. On the left and right sides of the shaft pulleys, I installed ball bearings — with extended inner races that can accommodate light thrust loads — so that when one moves the chuck carriages back and forth, the shaft pulleys stay vertically aligned with the chuck pulleys. I installed the ball bearings so that they “float” near the ends of the 8-foot-long drive shaft. This causes the *outer races* of the bearings (1) to slowly rotate on the drive shaft, and (2) to compress the red buffer felt of the inner and outer ball bearing plates. (Piano understringing felt is a highly durable material that I cannot tear with my hands.) To minimize the rotation, I installed hose clamps around the outer races, and two blue E-A-R ISODAMP C-1002 thermoplastic brake pads per bearing. As the outer races begin to slowly rotate, the hose clamp worm screws — used to tighten the clamps — engage the E-A-R brake pads, which in turn stop the rotation of the outer races. The worm screws may be placed in either the front or the back spaces between the E-A-R pads. The photo below shows the inner ball bearing worm screw in the *front* space.

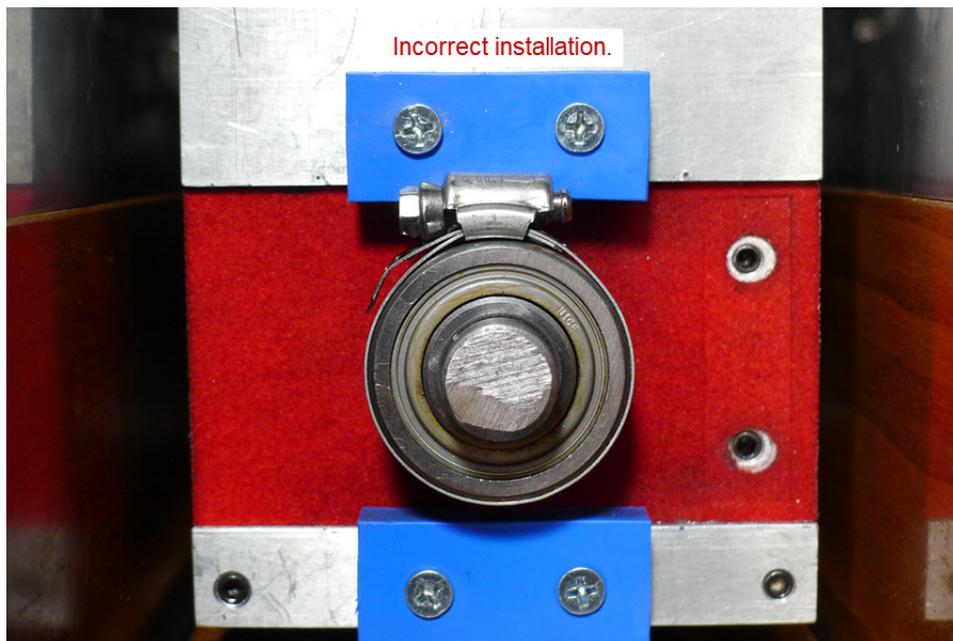


The photo below shows the worm screw in the *back* space.

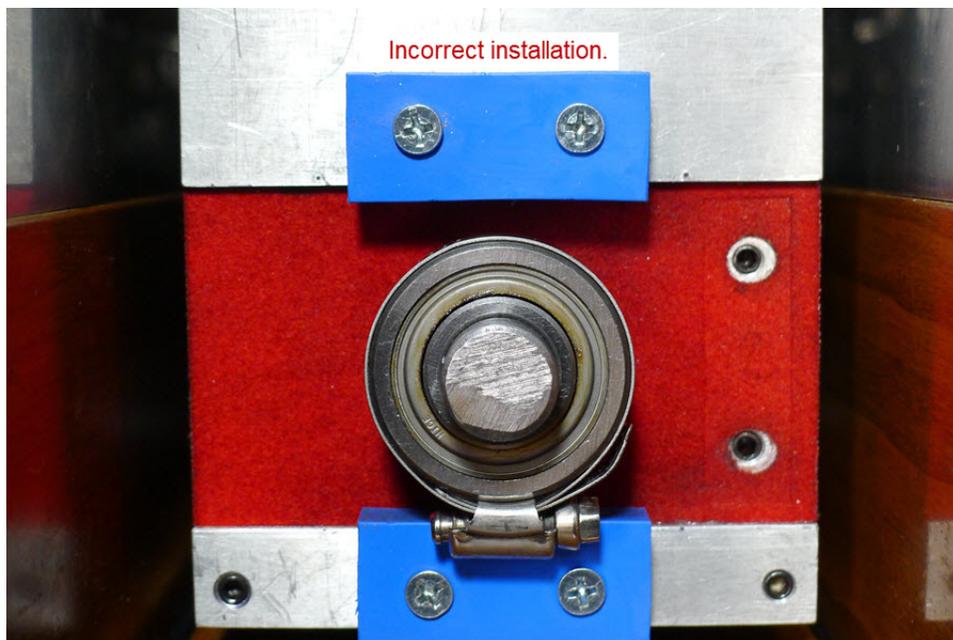


It is important to install the worm screws in the spaces *between* the pads. Incorrect installations *against* the pads will damage the bearings and timing pulleys.

The photo below shows the *incorrect installation* of a worm screw against the upper E-A-R pad.

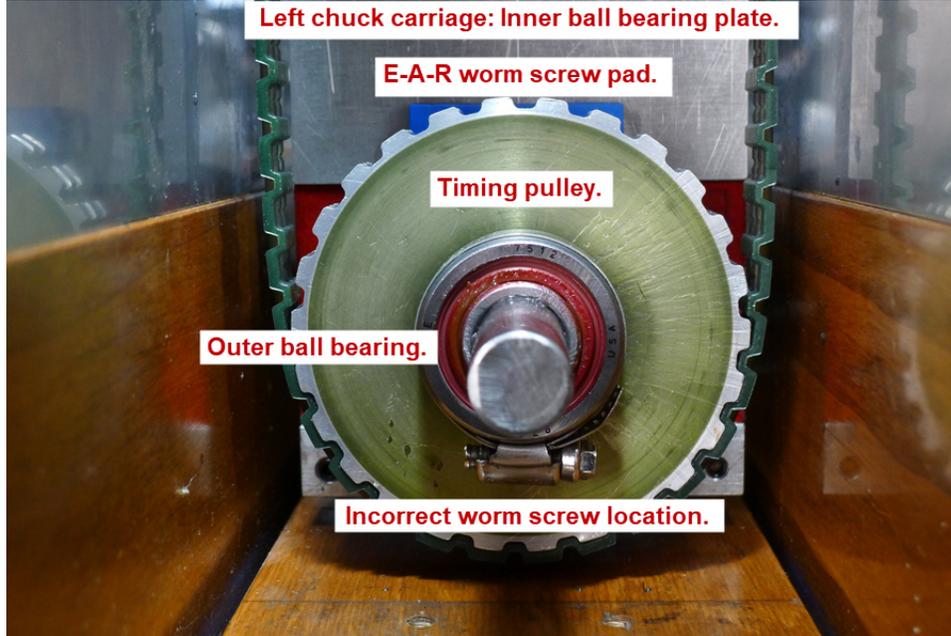


The photo below shows the *incorrect installation* of a worm screw against the lower E-A-R pad.



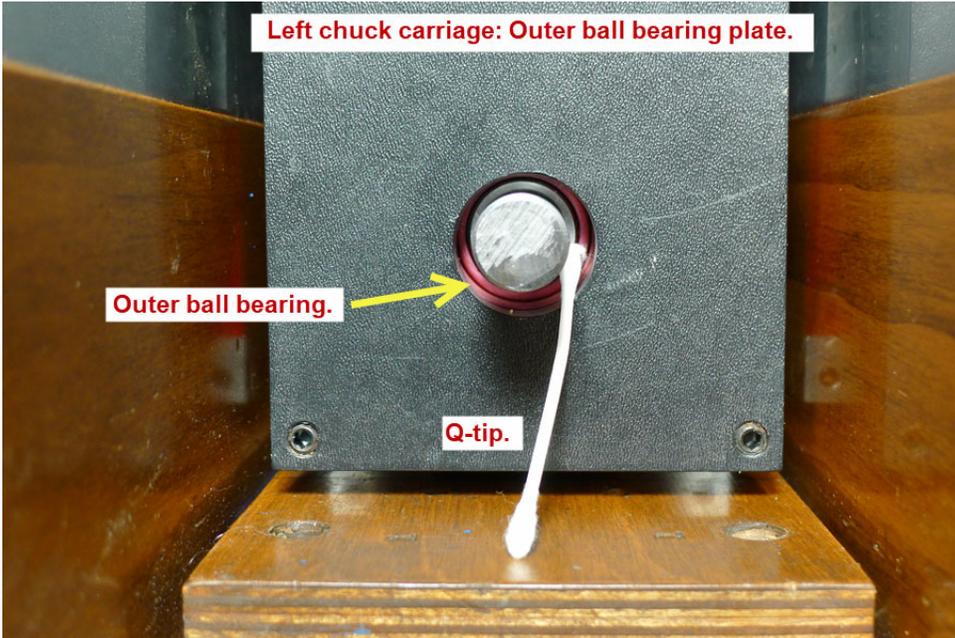
For information about the E-A-R material, see:
[Glassdance_Components_Manual-1.pdf](#), p.2.

Because the inner ball bearing is in plain sight and easily accessible, it is easy to place the worm screw between the E-A-R pads. However, after installing the timing pulley, the outer ball bearing worm screw — under the force of gravity — has a tendency to rotate downward to the incorrect location.



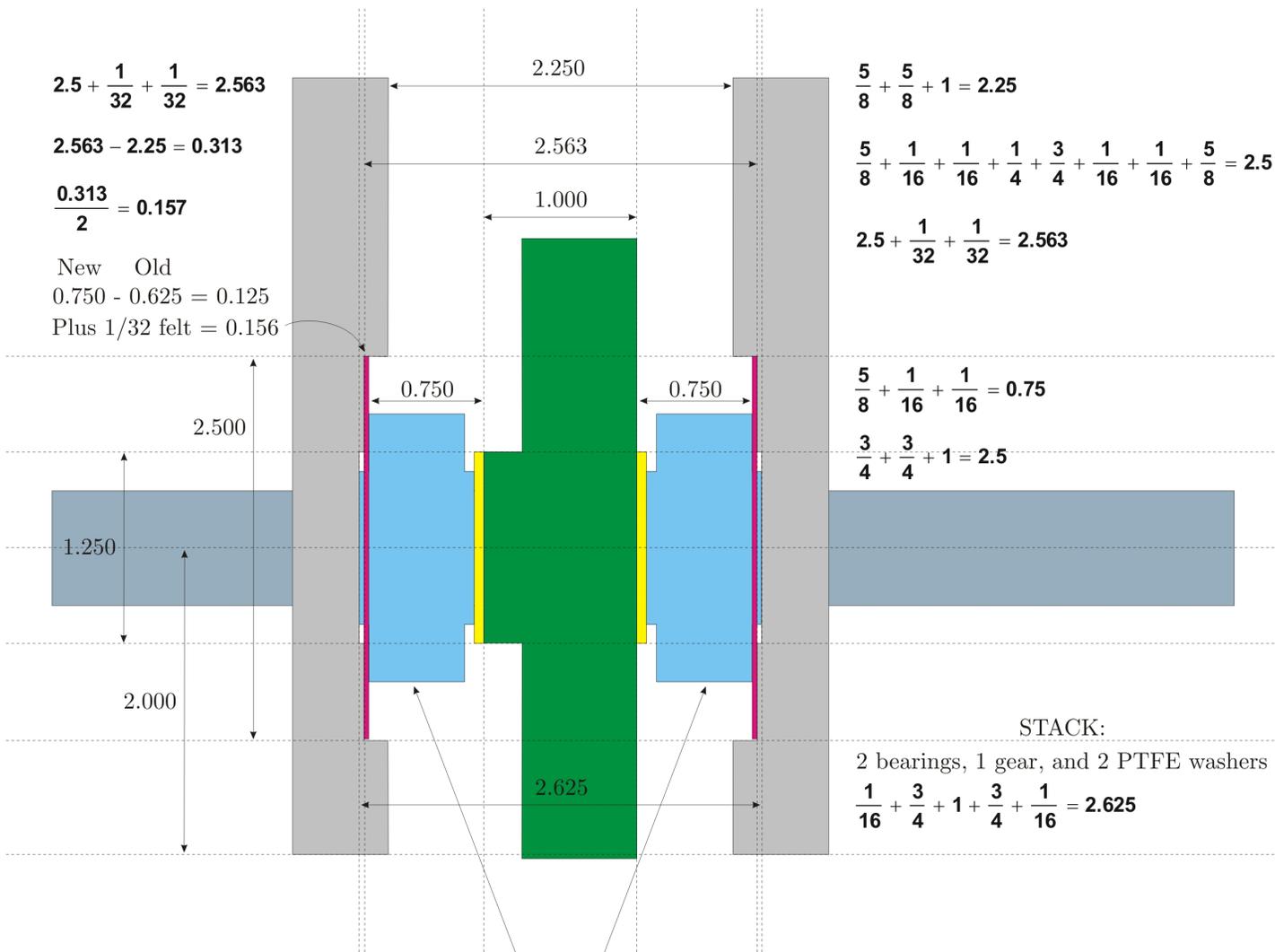
For now, leave the worm screw in the incorrect location. When one begins to install the outer ball bearing plate, the plate contacts the outer bearing several times causing the worm screw to stay in the downward position. After *loosely* installing two of four $\frac{1}{4}$ -20 hex bolts that fasten the bearing plate to the chuck carriage, inspect the location of the worm screw by shining a flashlight through the timing belt opening of the chuck carriage. If the worm screw is not in the correction location, take a Q-tip or a small soft wood stick and insert it in the space between the drive shaft and the plate. *Gently* rotate the seal of the ball bearing until the worm screw is in the correct position. Note: the seal and the outer race are mechanically connected and rotate as a single unit. Lightly tighten the two $\frac{1}{4}$ -20 hex bolts to hold the worm screw in place. Finally, install the other two $\frac{1}{4}$ -20 hex bolts, and then tighten all four bolts to the chuck carriage.

The graphics above and below show that I colored the outer seal with a red felt pen. Do not rotate the seal with a metallic or sharp object. This could dent or deform the seal and cause it to scrape or bind against the inner race or the balls of the bearing. In either case, this would ruin the bearing.



Note: In the CorelDraw illustration below, two yellow PTFE (Teflon) washers act as thrust washers to minimize wear between the blue steel ball bearings and the green aluminum timing pulley. Also, this illustration does *not* show the bearings and pulley of the left carriage as photographed and described in the text above. Instead, it shows the bearings and pulley of the right chuck carriage. For both carriages, the hubs of the timing pulleys face the inner bearings.

StringWinderThrustBearings.cdr
22 September 2016



Nice Bearing: #7512.

These are Nice radial bearings with extended inner races used as thrust bearings that have minimal contact on the left and right sides of the green timing sprockets on the drive shaft.