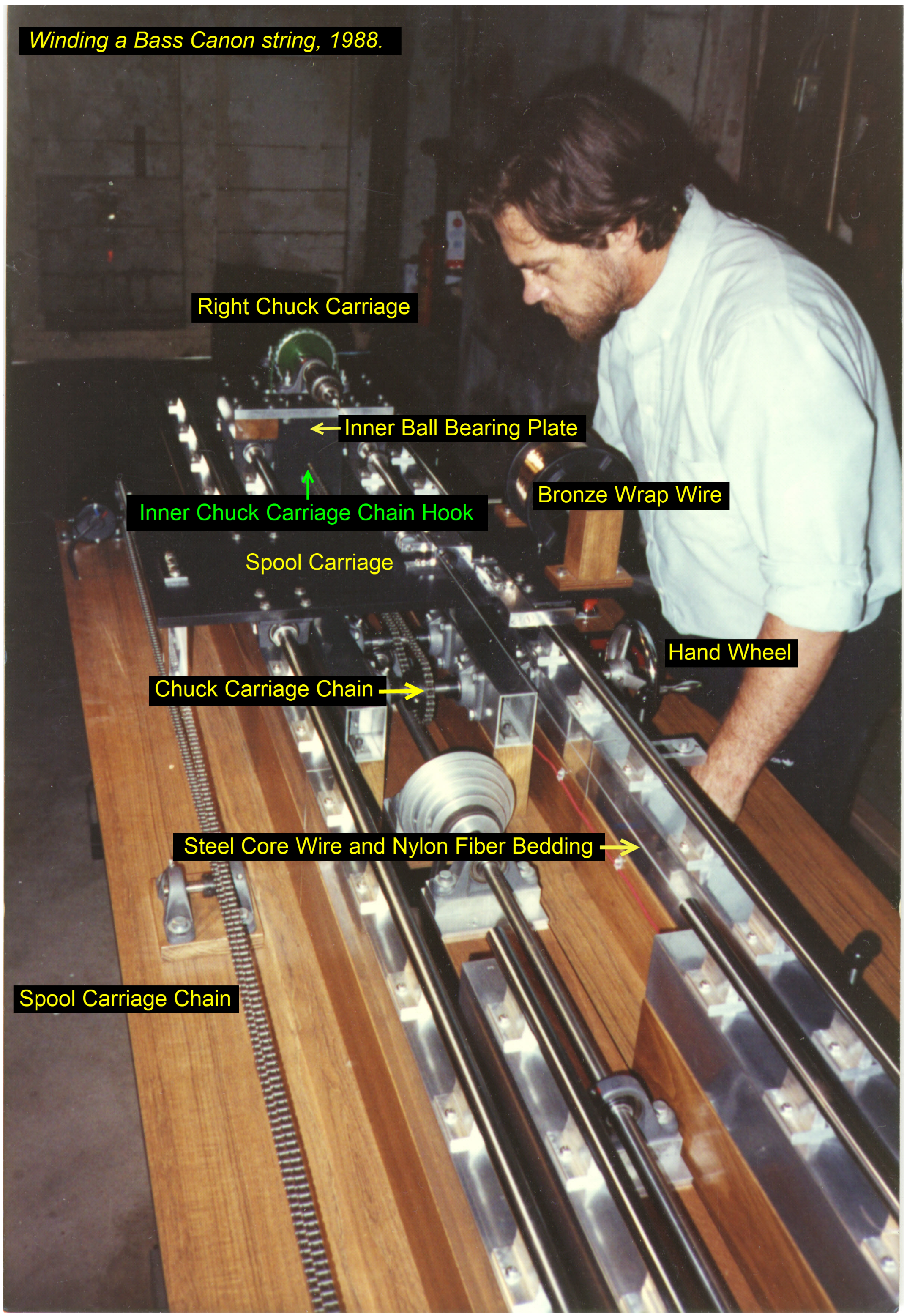
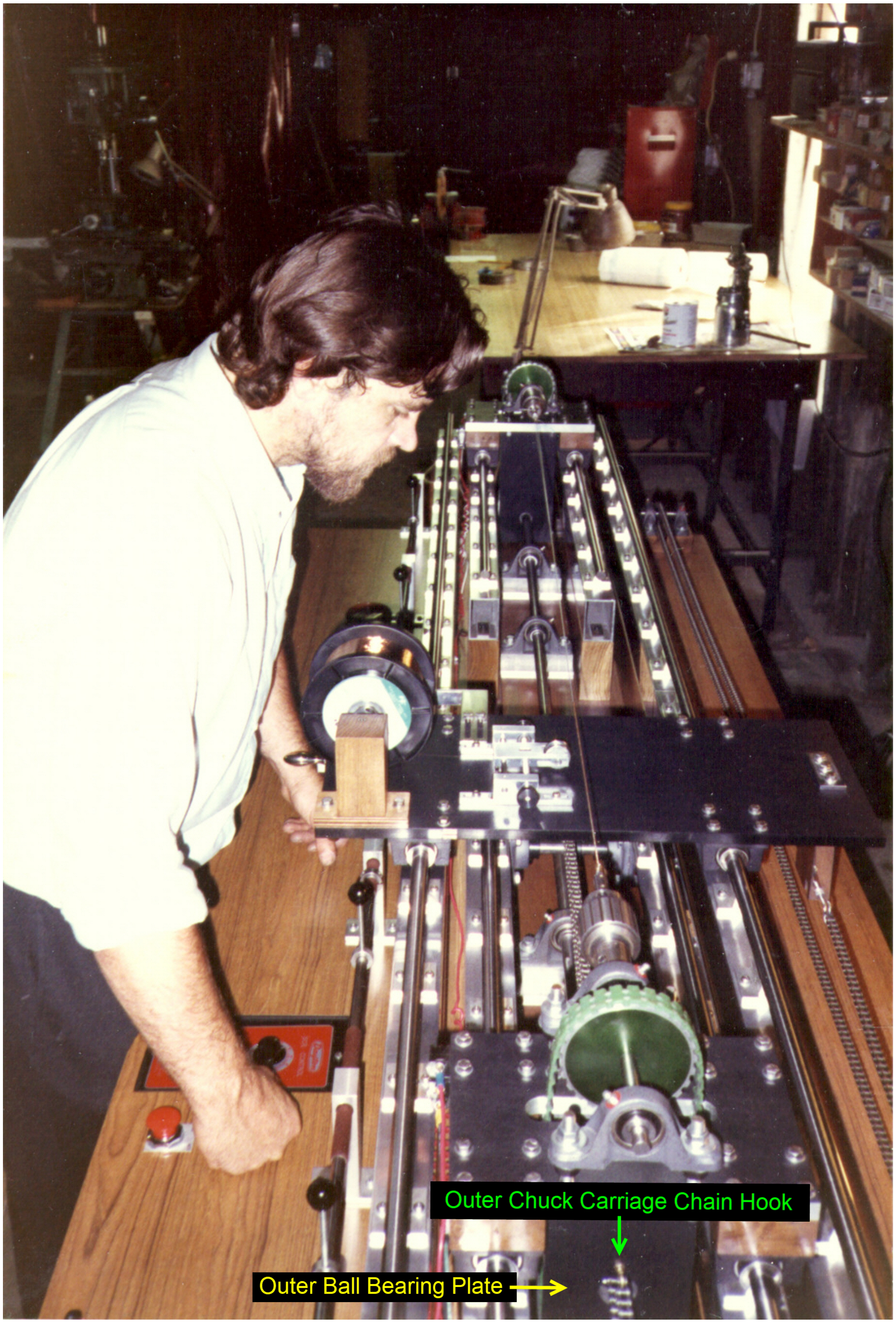
String Winder Manual #3

Long Chain Tension Nut

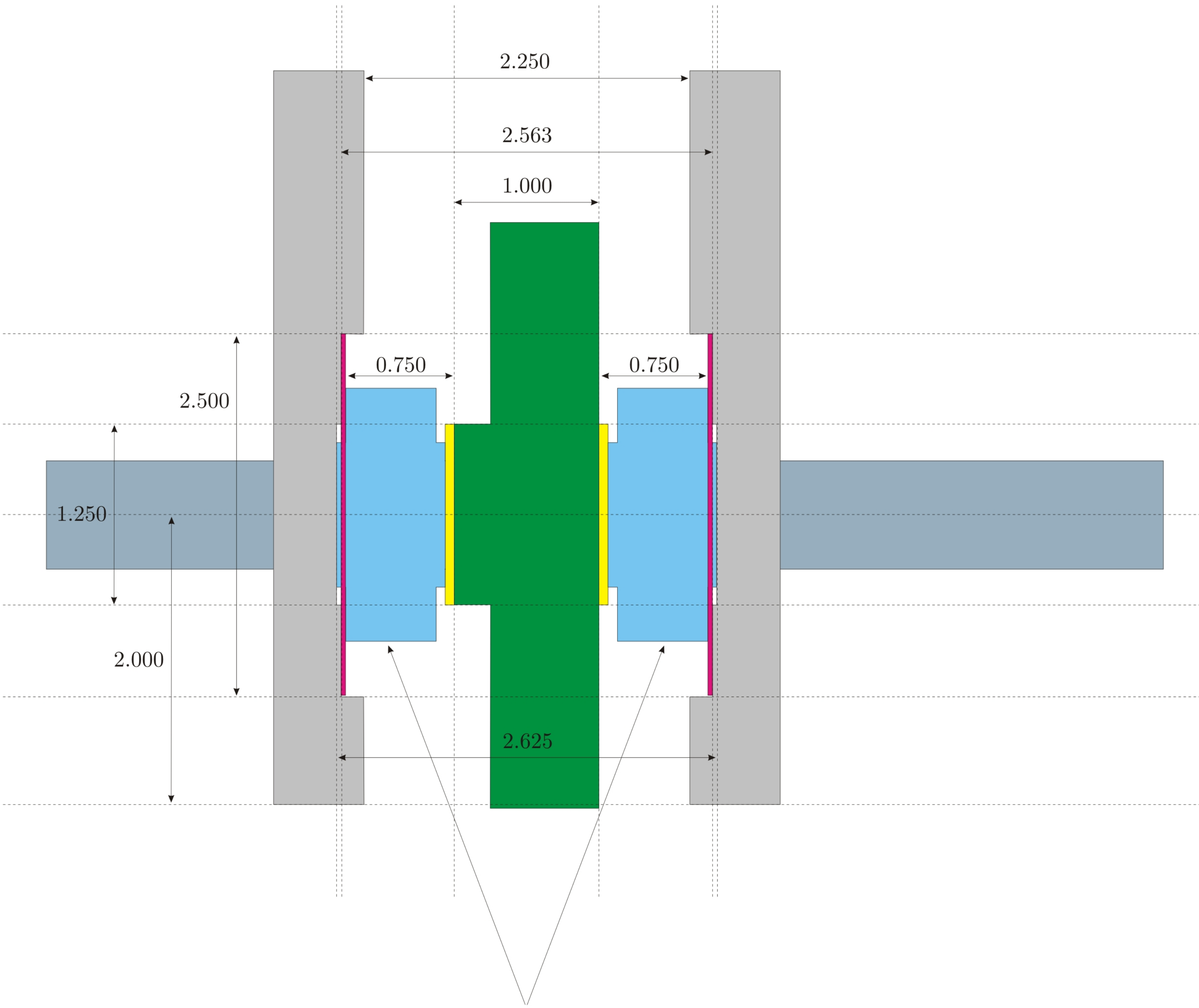
The Bass Canon has wound strings that consist of a steel core wire, a nylon fiber bedding, and a bronze wrap wire. During the winding operation, the core wire must be under tension for three reasons. (1) A tensioned core wire provides a linear surface for the wrap wire. (2) A wire under tension also produces resistance to deflection from the downward pull of the wrap wire as it unwinds from the spool. (3) Tension causes the steel string to stretch. By winding the wrap wire over a tensioned core wire, the individual coils of the winding wrap as closely as possible around the stretched diameter of the steel string. Because this condition simulates the state of the wound string on a musical instrument, the wrap wire will remain tightly wound around the core wire once the string is mounted on an instrument.





For mounting a steel core wire, the String Winder has a left chuck carriage equipped with a chuck and stringing hook; and a right chuck carriage equipped with a chuck and stringing hook. Both carriages move on linear bearings. Depending on the length of a wound string, I lock the left chuck carriage in place. The right chuck carriage remains movable for tensioning the string. To move the carriage, I attached one end of the chuck carriage chain to the inner chuck carriage hook on the inner ball bearing plate, and the other end, to the outer chuck carriage hook on the outer ball bearing plate. On p. 3, I colored the ball bearing plates in gray. The installation of this chain required drilling two parallel holes through the plates. To keep the chain aligned in these two holes, and for the chain to work in a loop path, small and large sprockets support the chain on the left side of the right chuck carriage (see p. 1), and on the right side of the right chuck carriage (see p. 6).

StringWinder_Left-and-Right_BallBearingPlates_InGray.cdr

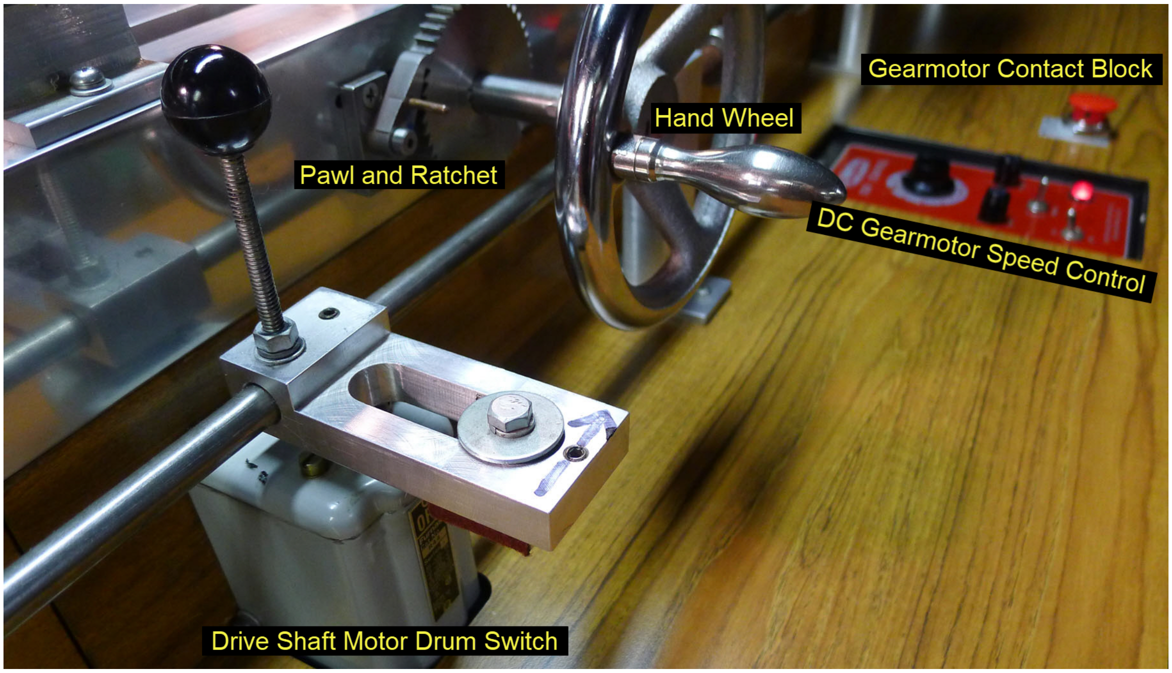


Nice Bearing: #7512.

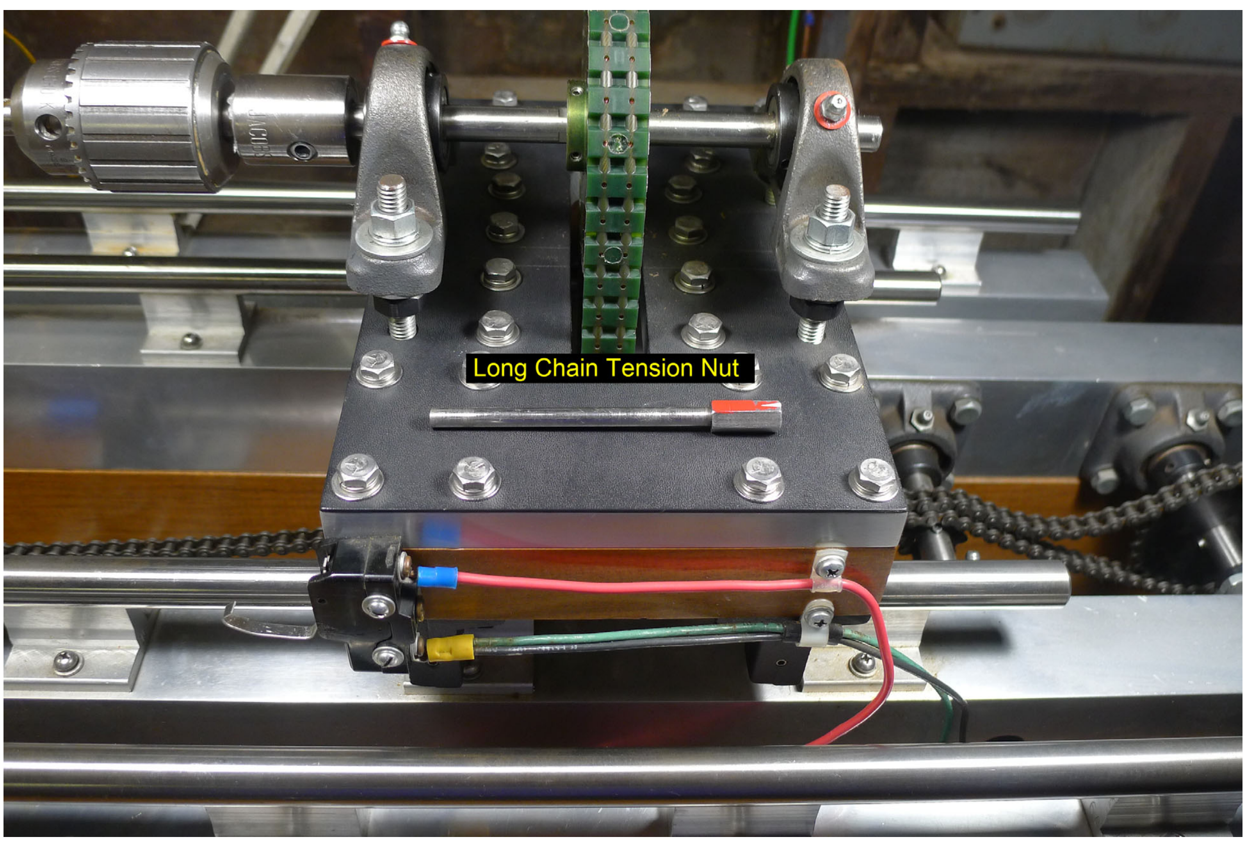
These are Nice radial bearings with extended inner races used as thrust bearings that have minimal contact on the left and right sides of the green timing sprockets on the drive shaft.

(For a detailed description of this graphic see: StringWinder_Ball-Thrust-Bearings_Manual-2.pdf.)

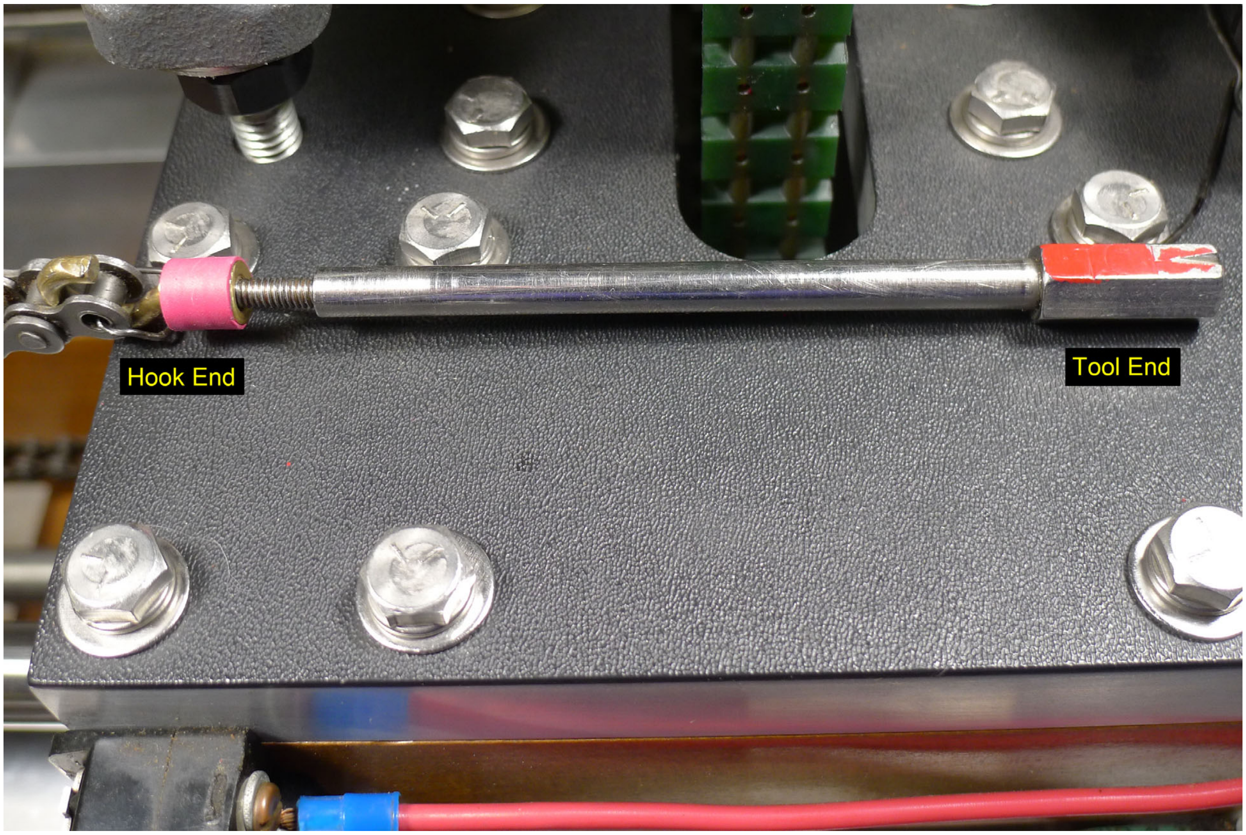
To operate the chuck carriage chain, I wrapped it around the large sprocket on the left side of the right chuck carriage. This sprocket is mounted on a shaft that I turn with a hand wheel. After installing a steel core wire between the two stringing hooks, I turn the hand wheel in a clockwise direction, which moves the right chuck to the right. This motion increases the distance between the two chucks and places the wire under tension. A pawl and ratchet on the hand wheel shaft prevents the chuck carriage from moving back to the left.

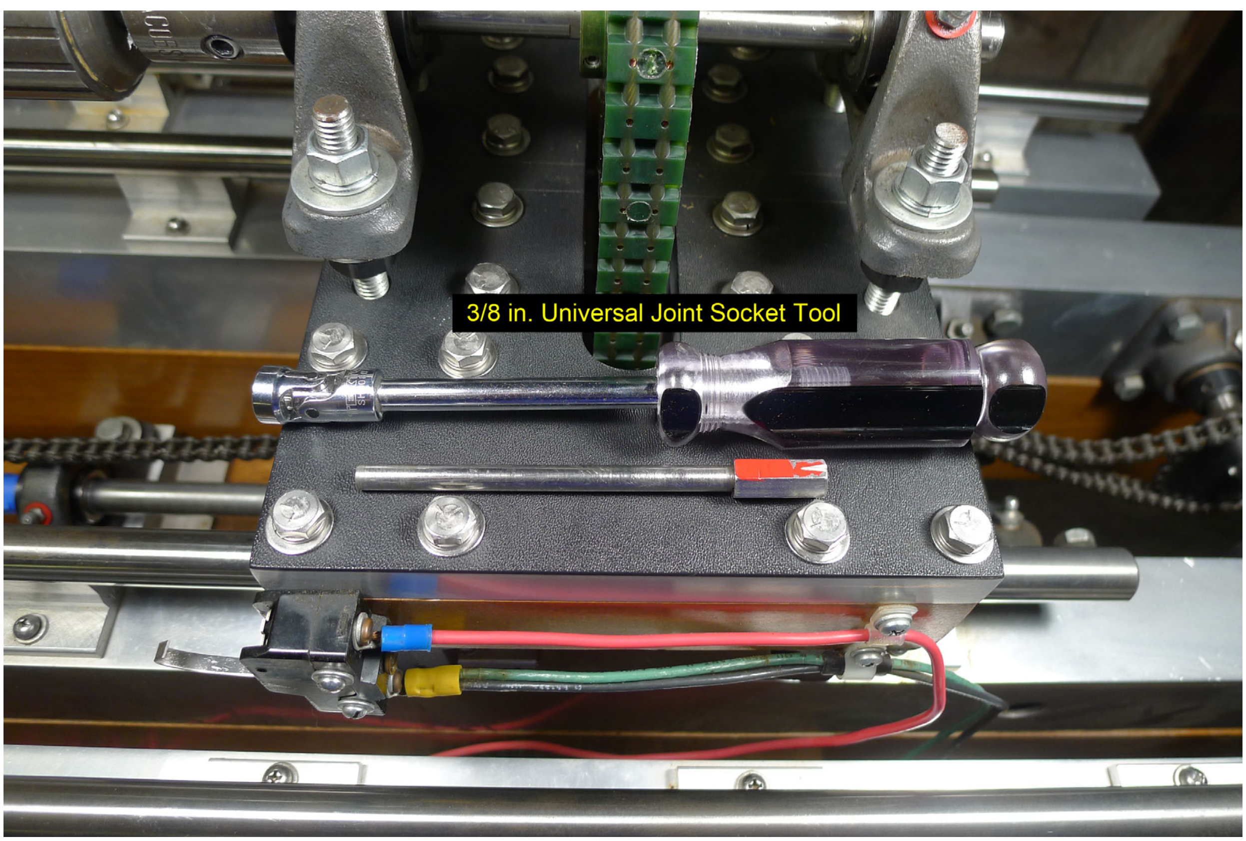


Initially, I tensioned the chain with an awkward tool that had left and right hand threads. I replaced it with a custom machined long chain tension nut. Although this part looks like a bolt, the internal threads at the narrow end define it as a ‘long nut’. The installation of this nut also required drilling two parallel holes through the plates.

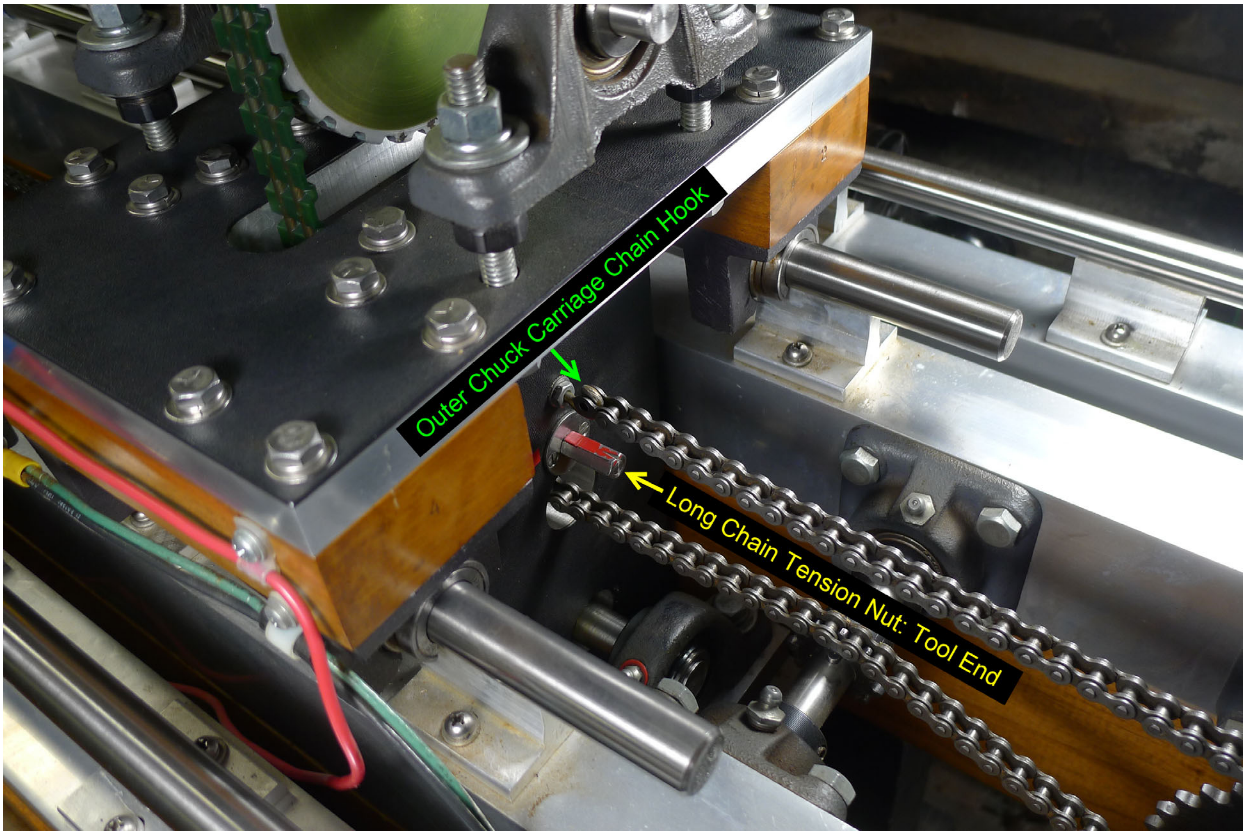


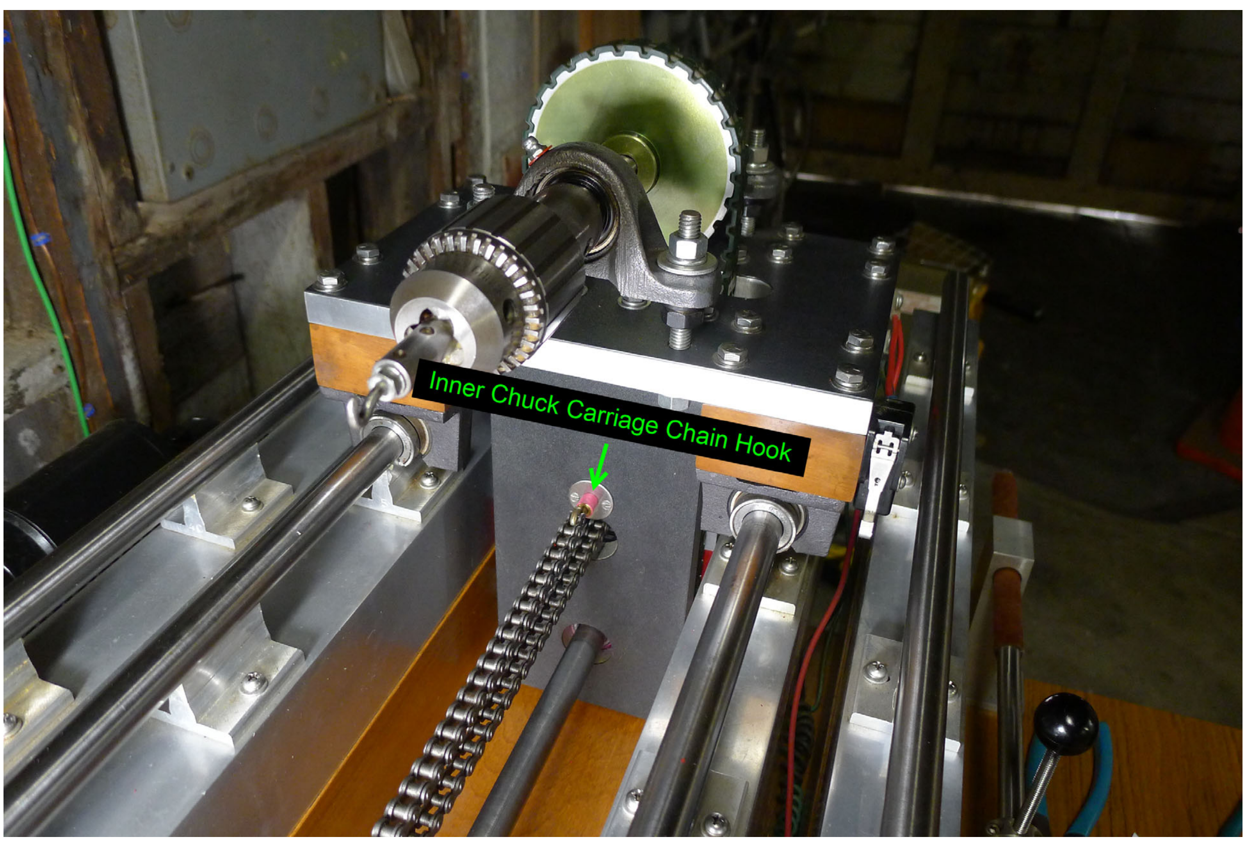
The chain tension nut has a hook end with an 8-32 × ¾ in. internal thread, and a tool end for a ⅜ in. universal joint socket.

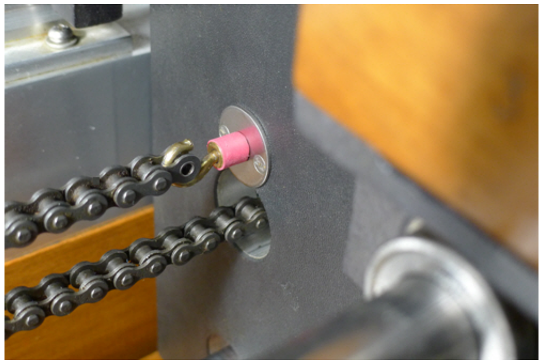




To install the chain tension nut, attach one end of the chain to the outer chuck carriage hook, pass the other end of the chain and the nut through both plates, and with the socket tool, tension the chain by tightening the nut to the inner chuck carriage hook.







This chain tension mechanism presents a significant problem because tightening the nut presses the two plates together. Consequently, on p. 3, the ball bearings experience overloading, which causes them to overheat and wear out prematurely. To solve this problem, I installed a brass spacer tube between the two plates. The long chain tension nut passes *through* this tube. At the end opposite the flange, the tube has a very small clearance of approximately 0.005 in. So, while tensioning the chain, once the tube makes full contact with the inner plate, it is no longer possible to turn the nut. Because it is not possible to overtighten the nut, it is also not possible to overload the bearings.