SHERLINE PRODUCTS
INCORPORATED 1974

CNC Lathe Leadscrew Backlash Lock

P/N 4417Z/4417ZM

NOTE: These instructions accompany both the CNC lathe already fitted with the locking system and the retrofit kit for installing the lock on an existing lathe. If you have a lathe already fitted with the system, only the first part of the instructions regarding purpose and use will be applicable.

The purpose of the leadscrew backlash lock

CNC machining operations require precise leadscrew movement to producing a good part. The normal backlash of .003" to .005" can be unacceptable in these situations and a way was needed to reduce backlash to the .001" to .002" range. This solution was developed for the Z-axis on the mill, but it has been adapted here to work on the lathe as well.

Because I designed this lever to lock the column leadscrew a couple of years ago, I never thought of it as an option that could be used to control backlash; however, early one morning I finally realized how to use this lock could be used in this way, and we had a prototype working the next day and were into production within a week. I'm also pleased to report that the anti-backlash system can be added to every Sherline lathe ever built!

By locking this lever against the saddle nut, it keeps the leadscrew from turning once the headstock is positioned at the proper height for the operation. This new lever positioning system will allow you to position the locking lever in a partially locked position, removing as much backlash as you desire, and then it can be locked in that position. As wear occurs, the position of the locking lever can be adjusted.

Using the Z-axis lock on a CNC lathe

The locking arm is clamped in the lock plate for shipping. Loosen the SHCS that holds it and remove the plastic arm. Insert the pin in the end of the plastic lever into the hole in the end of the brass Z-axis locking lever from the bottom side. Align the locking arm with the slot in the lock plate and slip it in. Move the brass locking lever to provide the desired amount of backlash. Tighten the thumbscrew to hold the plastic arm in position. Do not overtighten the thumbscrew. There is not a lot of force trying to move the arm. The arm serves only to hold the locking lever in position once you have adjusted it.

The brass locking lever is adjusted by hand as shown in Figure 1, and then the positioning arm is locked in place. Don't adjust the locking lever by moving the plastic arm directly. You will have much better feel for the amount of pressure needed by adjusting the locking lever itself, and the plastic pin that engages the hole in the locking lever is not designed to exert a lot of pushing/pulling force.

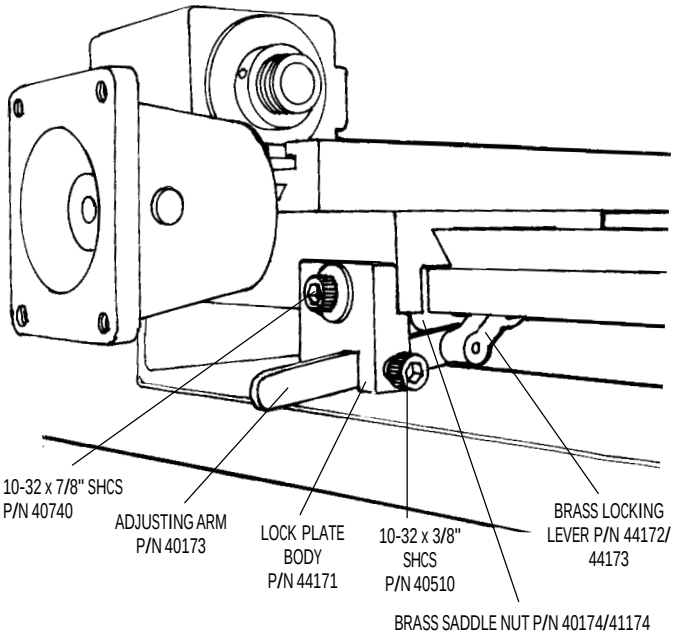

FIGURE 1—Components of the lever locking system as they are now installed on new Sherline CNC lathes.

Installing a new saddle nut and locking lever on a CNC mill not currently fitted with a locking lever

Sherline lathes have never been fitted with locking levers on the leadscrew. This system was developed specifically for use on CNC machines. The new retrofit installation kit includes a new locking lever and a new saddle nut without a spring loaded ball to hold it in the unlocked position. The positive locking arm allows partial locking of the lever to reduce backlash to a minimum. The small detent in the locking lever that was formerly used to engage a spring-loaded ball has been retained to indicate the side of the locking lever that should be facing the saddle nut. (If the locking lever should fail to lock against the saddle nut within the available arc in the back of the mill column, check to see if the lever has been installed backwards.) Install the new saddle nut and lever as follows:

1. Remove the headstock and tailstock from the lathe.

2. Remove the socket head cap screw that attaches the saddle nut to the saddle.

3. Turn the lathe upside down and remove the single cap screw at each end that holds the leadscrew thrusts to the base. Note the number and location of any washers present. They are spacers and will need to be returned to the same position when reassembling. Turn back over and lift off the bed, thrust and leadscrew assembly.

4. Crank the handwheel so the saddle nut moves to the end of the leadscrew as far from the handwheel as possible.

5. Remove the countersunk screw in the bed that secures the thrust at the handwheel end. This will allow you to slide the leadscrew out of the other thrust and remove the handwheel/leadscrew assembly from the bed.

6. Unscrew the old saddle nut from the leadscrew. Thread the new locking lever first with the machined side or ball detent side facing away from the handwheel. Then thread the new saddle nut onto the leadscrew. Make sure the saddle nut is installed facing in the same direction as the one you previously removed. Once both locking lever and saddle nut are installed, screw them onto the leadscrew to the approximate position of the old nut and leave them just lightly touching each other but not locked.

6. In the reverse order from how you removed them, reattach the leadscrew and thrust to the bed and then the bed assembly to the base. Remember to reinstall any spacer washers in their original positions. Slide the saddle into position so the hole aligns with the hole in the new saddle nut.

7. Using the new, longer socket head screw and washer provided, feed the screw through the hole in the new locking plate, through the hole in the saddle and into the threaded hole in the saddle nut to reattach it. (See Figure 2.)

8. Insert the pin of the plastic arm into the hole in the end of the brass locking lever as shown in Figure 2. Slide the arm into the slot on the bottom of the locking plate. Adjust it as noted on side one of this sheet and secure it in the desired position using the 10-32 x 3/8" SHCS.

Adjusting the saddle nut alignment

When you reinstalled the new saddle nut in place of the old one, the two adjusting set screws were left in their previous adjustment positions. If binding occurs in the new installation, it will be necessary to readjust the new saddle nut on the leadscrew using the two set screws on either side of the attachment screw. To do this you will first need to remove the locking plate to get access to these set screws. Then, to adjust the saddle it should first be positioned at the end of its travel as close to the handwheel as possible. Remove the lock plate and loosely install the original shorter screw that attached the saddle to the old saddle nut. Bring each set screw into light contact with the new saddle nut and retighten the attaching screw. If binding occurs when you turn the handwheel, readjust the two set screws until the leadscrew moves freely. Then remove the old attachment screw and reinstall the locking plate using the new, longer screw.

We are attempting to adjust the saddle nut so it rides on the leadscrew with the minimum amount of drag. You can check the drag by turning the leadscrew handwheel. If you feel excessive drag, tighten or loosen a single set screw while moving the saddle with the handwheel until the handwheel turns freely, but keep the saddle close to the handwheel. (If you adjust the saddle nut while it is in the center of the leadscrew, it may be slightly off center but will feel free until the saddle gets close to either end of its travel. Here, the leadscrew is supported and cannot deflect so it will bind the most.) If you can't eliminate the binding, tap the saddle nut with a plastic hammer on the leadscrew side while the saddle nut is tightly attached to the saddle and readjust. Don't use the machine with a loose attachment screw, as this will cause excessive wear and backlash.

Joe Martin, President and Owner
Sherline Products Inc.

EXPLODED VIEW AND PARTS LIST

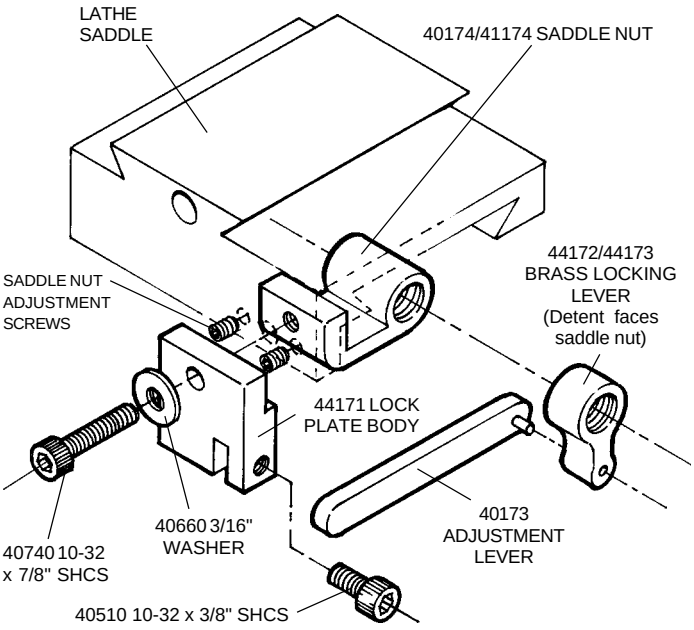

FIGURE 2—Exploded view shows saddle nut and locking plate in relation to lathe saddle. Lever arm goes through slot in lock plate body and is held in position by 3/8" SHCS after adjusting.