

## Troubleshooting Missing Steps on the Sherline DRO

### Problems Associated with the DRO Missing Steps at Low Speeds Lack of Readout Repeatability

The scope of this note is to help with troubleshooting issues with a DRO axis lacking repeatability, i.e., coming back to a known position and providing erroneous results. The repeatability of any axis returning to the same position should be the maximum resolution of the DRO, either .0005", .01 mm, or .02 mm for the 20 TPI, 1 mm, or 2 mm leadscrews, respectively. Several problems can produce these kinds of errors. Below is a list in the order of most likely to least likely. These problems are usually due to encoder issues. You can quickly rule out the readout box by swapping inputs and trying the problem encoder on a different input.

1. Improper encoder installation is the most common problem that can cause a readout issue. The encoder is not symmetrical in its installation. One side has a groove that engages with the axis collar, and the other is a clearance hole for the handwheel. The [Mill or Lathe DRO instructions](#) can give you further guidance. It's also possible to get the bottom of the encoder engaged with the groove, but the top is backward. Inspect these items carefully.

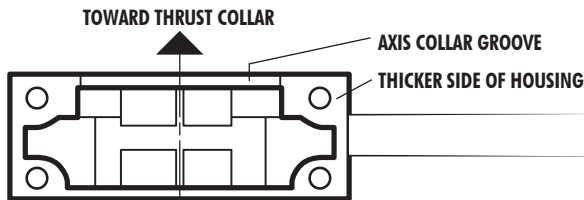


FIGURE 1—Detail of the encoder housing body showing the direction of installation.

2. The second most likely culprit is movement of the encoder body as the axis is turned.

Verify that the encoder doesn't rub on the handwheel or move as the handwheel is turned. If the encoders are not tight enough on the collars of the mill or lathe, you can lightly sand the mating surfaces of the clamshell assembly, or the sides of the encoder

housing, depending on where there is interference. The encoders need to be snug on the axis collars to prevent any movement. This is a precise fit but might require a little bit of fitting for your machine.

The screws on the encoders are small and can't produce a lot of clamping force to make up for gaps. The encoder can also be distorted by excessive clamping force on the screws—some precision is required. A small drop of cyanoacrylate ("crazy glue") might help in stubborn cases to fix the encoder and keep it stationary. Use a small amount in the collar groove and keep it away from the internals of the encoder.

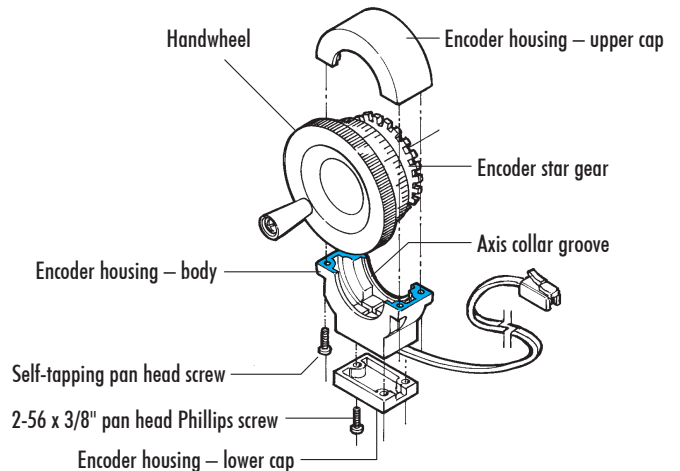


FIGURE 2—The highlighted areas in light blue show the mating surfaces of the encoder housing. Make sure to check the surfaces on both the housing body and the upper cap.

3. Loose optical encoders in the encoder housing can also cause these types of problems, though this is less common. Remove the lower cap on the encoder housing and inspect the wired side to ensure that the encoders are well seated and don't move inside the housing. The encoders are held in the housing with friction and tautness of the solder connections the four conductor cables to the readout unit. The encoders should be firmly seated and shouldn't

move around inside the housing. Any movement can cause inconsistent readings. Again, judicious use of cyanoacrylate adhesive might help. Use it very sparingly.

4. Defects in the molding of the encoder star gears inside the encoder are a bit less likely but should be considered (see Figure 3). Remove the housing and make sure that the encoder star gear fits snugly on the handwheel and turns with it freely\*, isn't warped, doesn't have any molding flash in the slots, and has no debris trapped inside. The slots in the wheel should be sharp, square, and free of any wobble or runout as the axis rotates. If the wheel has minor defects or flash, it might be simple enough to deburr it with a small hobby knife or a jeweler's file. If the encoder star gear has excessive runout, e.g., wobble as it rotates, this could cause inconsistent readings. Contact Sherline for a replacement part.

**NOTE:** Sherline puts a drop of adhesive on each star wheel when we assemble them. If the star gear should come loose, add a drop of cyanoacrylate adhesive and reassemble it.

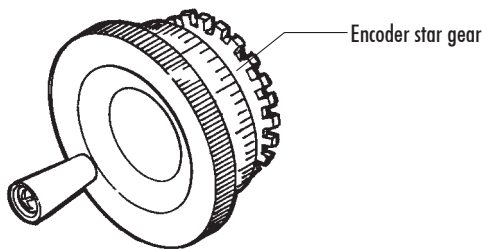


FIGURE 3—Check the encoder star gears for any molding imperfections.

5. Wiring or soldering issues are possible but less likely (see Figure 4). Inspect the solder joints to the encoders, the wiring into the phone jack plug, and the insulation of the wires for any defects.

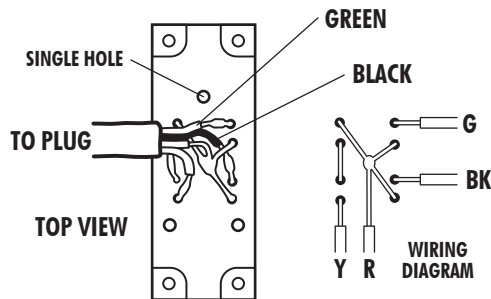


Figure 4—The drawing on the left shows the encoder housing and wires coming from the plug. The diagram to the right shows a schematic of where each wire is connected.

6. If none of these tips work and you're still having problems with missing steps, contact us. It's possible that the encoder needs replacement.

Thank you,  
Sherline Products Inc.