

## Mini Mill Metric kit Instructions

The Mini Mill Metric kit changes the feed on the X- and Y-axis from 1/16" per turn of the handwheel to 1.5 mm per turn. It changes the graduations on the Z-axis from inches to mm.

To install the LittleMachineShop.com Mini Mill Metric kit you disassemble your mill and reassemble it with the new parts.



The Mini Mill Metric kit includes the following parts:

- One X-axis feed screw
- One Y-axis feed screw
- One X-axis feed nut
- One Y-axis feed nut
- Two 50 division graduated dials
- Two dial springs
- Two keys
- One Z-axis feed knob
- One X-axis scale
- One Z-axis scale

- Four escutcheon pins

Expect to spend between one and two hours on this project.

## *Tools*

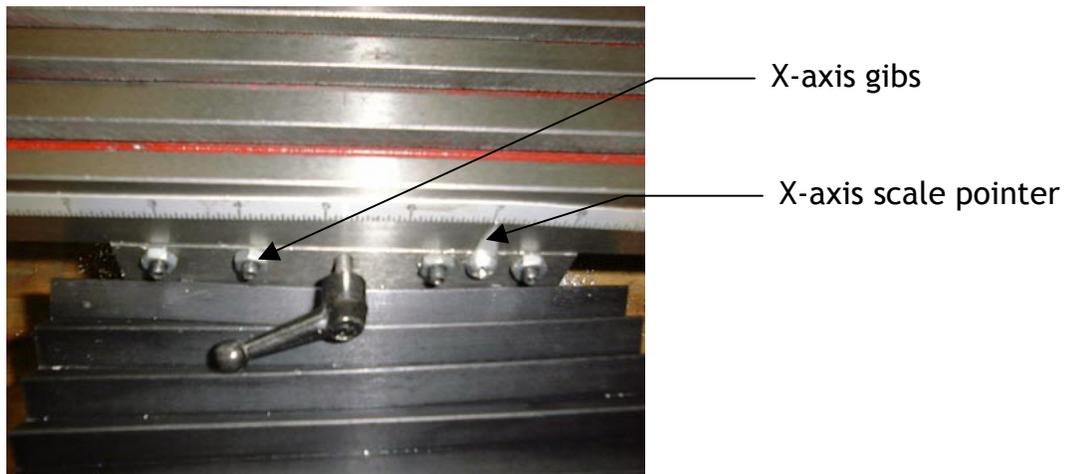
You will need the following tools:

- The hex (Allen) wrenches that came with your mill (3 and 5 mm)
- The open end wrenches that came with your mill (10 and 14 mm)
- A #2 Phillips screw driver
- A small straight blade screwdriver
- Diagonal cutting pliers
- A soft-faced hammer
- A small ball pien hammer
- A small knife or thin putty knife
- A 14 mm socket wrench is helpful, but not necessary

## *Installation*

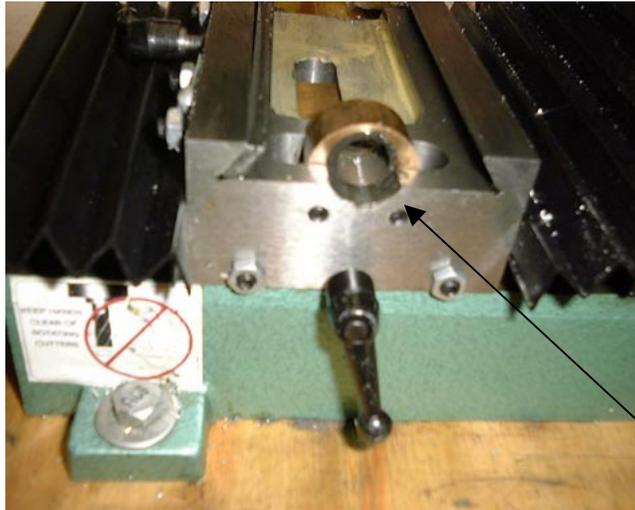
Follow this procedure to install the Mini Mill Metric kit.

1. Unplug the power cord.
2. Use the 10 mm end wrench and 3 mm hex wrench to loosen the X-Axis gibs one turn.



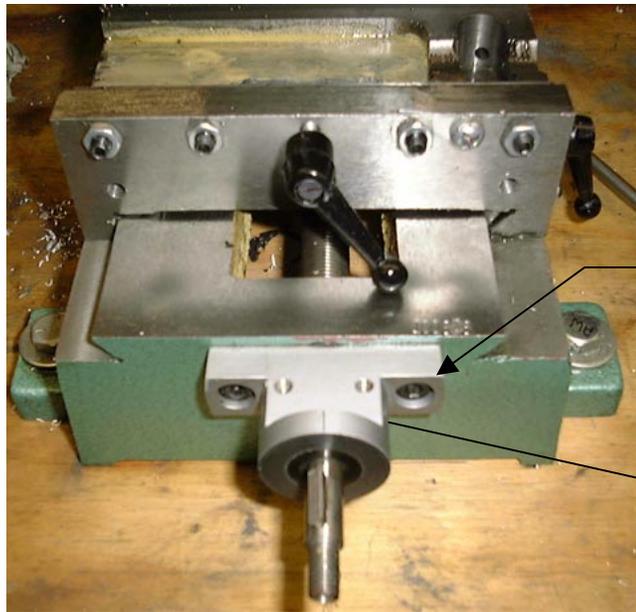
3. Loosen the Phillips head screw holding the X-axis scale pointer so that it falls to the side, out of the way.
4. Remove the end plate from the left end of the mill table.
5. Crank the mill table to the right until the screw disengages.
6. Slide the mill table off to the right. Set it aside for now.

7. Use the 3 mm hex wrench to loosen the setscrews that clamp the X-axis feed nut in place.



X-axis feed nut setscrews

8. Remove the X-axis feed nut.
9. With the saddle about 2/3 of the way back, use the Phillips screwdriver to remove the front bellows. Remove the screws on the saddle first.
10. With the saddle about 1/3 of the way back, use the Phillips screwdriver to remove the rear bellows. Remove the screws on the saddle first.
11. Use the 14 mm socket wrench, or the 14 mm end wrench to remove the Y-axis hand wheel retaining nuts one at a time.
12. Remove the handwheel and the graduated dial as a unit. You might need to tap the handwheel off with a soft-faced hammer.
13. Use diagonal cutters to remove the key from the shaft.
14. Remove the Y-axis feed screw retainer.

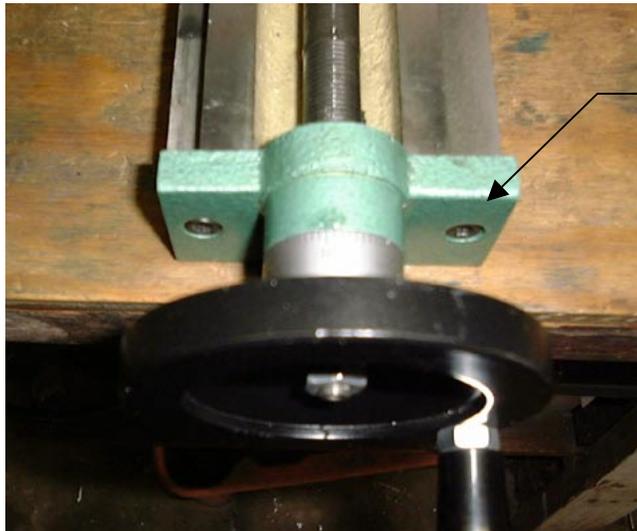


Y-axis feed screw  
retainer

Y-axis feed nut retaining  
screw

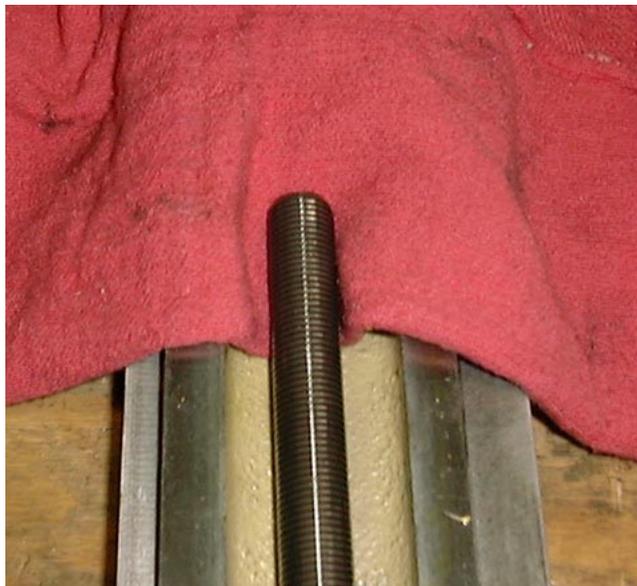
15. Remove the Y-axis feed screw. It has a left-hand thread, so turn it clockwise to remove it.
16. Grasp the Y-axis feed nut and use the 5 mm hex wrench to loosen the clamping bolt. It is below the X-axis locking handle. Remove the Y-axis feed nut
  - Now is a great time to adjust the Y-axis gibs. They should be adjusted so that you can just move the saddle by hand.
17. Lubricate and install the new Y-axis feed nut and Y-axis feed screw. The Y-axis feed nut is the taller of the two feed nuts. The Y-axis feed screw is the shorter of the feed screws.
18. Once the screw is started in the nut, use the 5 mm hex wrench to tighten the feed nut clamping bolt. This makes it easier to run the feed screw in.
19. Run the Y-axis feed screw in until the outer edge of the flange on the screw is flush with the front of the base casting.
20. Use the 5 mm hex wrench to loosen the Y-axis feed nut clamping bolt.
21. Use the 5 mm hex wrench to reinstall the Y-axis feed screw retaining bracket.
22. Use the 5 mm hex wrench to tighten the Y-axis feed nut clamping bolt.
23. Working over a rag, carefully pull the graduated dial off of the Y-axis handwheel. Watch for the small semicircular spring that is inside the graduated dial.
24. Install a new graduated dial on the handwheel, replacing the semicircular spring in the groove in the inside of the dial. If you lost the spring during disassembly, there are new ones in the kit. Make sure the graduations are away from the handwheel.

25. Replace the key in the Y-axis feed screw. If you damaged the key when removing it, there are replacements in the kit.
26. Replace the Y-axis handwheel. It is retained with a washer and two nuts. Use the 14 mm socket wrench or 14 mm end wrench to snug the inner nut. Check that the handwheel turns freely. Then tighten the outer lock nut.
27. Place the mill table upside down on a workbench with the handwheel hanging over the edge of the workbench.



X-axis feed screw retainer

28. Place a folded rag between the X-axis feed screw and the mill table.



29. Use the 14 mm socket wrench, or the 14 mm end wrench to remove the X-axis hand wheel retaining nuts one at a time.
30. Remove the handwheel and the graduated dial as a unit. You might need to tap the handwheel off with a soft-faced hammer.

31. Use diagonal cutters to remove the key from the shaft.
32. Remove the X-axis feed screw retainer.
33. Replace one of the handwheel retaining nuts on the end of the X-axis feed screw so it is flush with the end of the shaft.
34. Use an arbor press, or soft-faced hammer to remove the X-axis feed screw from the retainer. There are two thrust bearings on this shaft, each of which is in three pieces. Make sure you don't lose any of these pieces.
35. Clean and examine the thrust bearings. Note that the ID of the races varies. Each bearing has one race with a smaller ID and one with a larger ID.
36. Using the new X-axis feed screw, reassemble the thrust bearings and retainer. The first race on the feed screw should have a smaller ID. The races that are back to back inside the retainer should have a larger ID. The last race on the shaft should have a smaller ID.



37. Install the X-axis feed screw retainer on the mill table. Be sure to put it on the correct end of the table. It goes on the end of the table with the biggest numbers on the scale.
38. Working over a rag, carefully pull the graduated dial off of the X-axis handwheel. Watch for the small semicircular spring that is inside the graduated dial.
39. Install a new graduated dial on the handwheel, replacing the semicircular spring in the groove in the inside of the dial. If you lost the spring during disassembly, there are new ones in the kit. Make sure the graduations are away from the handwheel.
40. Replace the key in the X-axis feed screw. If you damaged the key when removing it, there are replacements in the kit.
41. Replace the X-axis handwheel. It is retained with a washer and two nuts. Use the 14 mm socket wrench or 14 mm end wrench to tighten the inner

nut. Turn the handwheel about 10 turns. Now, loosen the nut until it is a little tighter than snug. Check that the handwheel turns freely. Then tighten the outer lock nut.

42. Drop the X-axis feed nut into the saddle with the rounded end up.
43. Lubricate the X-axis feed screw.
44. Slide the table onto the saddle until the feed screw contacts the feed nut.
45. Use the X-axis handwheel to move the table to the center.
46. Adjust the X-axis gibs.
47. Tighten the setscrews that retain the X-axis feed nut. If you find that the table binds in some spots, slightly loosening these setscrews might fix the problem.
48. Point the X-axis indicator straight up and use the Phillips screwdriver to secure it.
49. With the saddle about 2/3 of the way back, use the Phillips screwdriver to install the front bellows. Replace the screws on the saddle last.
50. With the saddle about 1/3 of the way back, use the Phillips screwdriver to install the rear bellows. Replace the screws on the saddle last.
51. Using the small straight blade screwdriver, replace the Z-axis hand wheel. The new hand wheel has the legend 0.025 mm, which is virtually the same as the 0.001" on the old hand wheel.
52. Use a small knife or thin putty knife blade under the ends of the X-axis scale to remove the escutcheon pins. Peel the scale off.
53. Remove the liner and apply the new X-axis scale, being careful to align the holes for the escutcheon pins. Tap the escutcheon pins into place with a small hammer.
54. Use a small knife or thin putty knife blade under the ends of the Z-axis scale to remove the escutcheon pins. Peel the scale off.
55. Remove the liner and apply the new Z-axis scale, being careful to align the holes for the escutcheon pins. Tap the escutcheon pins into place with a small hammer.