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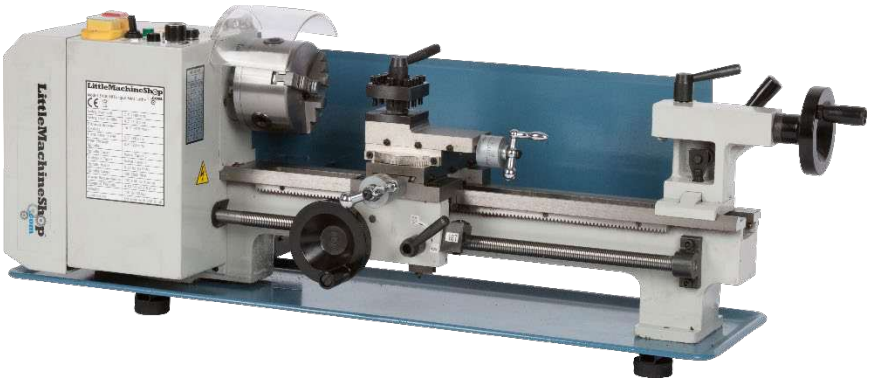

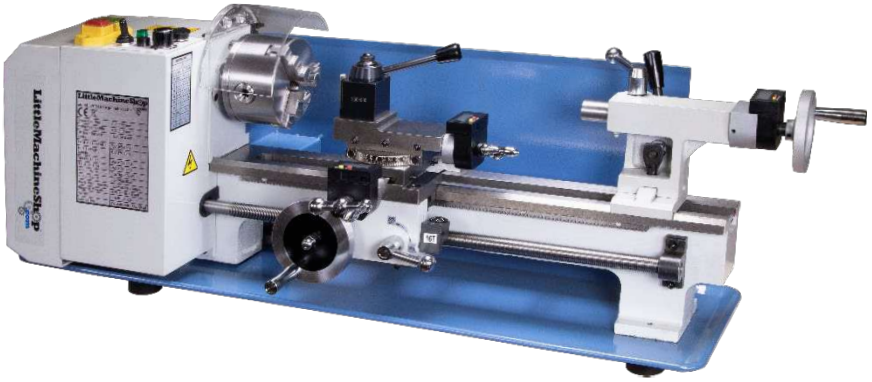

# *HiTorque™* 7x16 Mini Lathe Users Guide

Model 5100 • Model 7350 Deluxe • Model 7450 Deluxe, Mirror Display

from LittleMachineShop.com®

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## Introduction

This user's guide covers the care and operation of the LittleMachineShop.com HiTorque 7x16 Mini Lathe. Be sure to read and understand the safety guidelines presented in this book before using your HiTorque Mini Lathe.

The HiTorque 7x16 Mini Lathe is available in three models:

- Model 5100 is the standard version.
- Model 7350 is the deluxe version. It includes all the features of Model 5100 and adds:
  - Digital position readouts (DRO) on compound rest, cross slide, and tailstock
  - Metal hand wheels and chrome levers.
  - Quick change tool post (QCTP) set with five tool holders.
- Model 7450 is the enhanced deluxe version. It includes all the features of Model 7350 and adds:
  - Factory installed digital position readout (DRO) on carriage and cross slide sending readings via Bluetooth to a tablet display.
  - LED Control panel with mirror finish and illuminated buttons.
  - Easy-to-read LED spindle speed display.

## Specifications

| | |
|---|---|
| Swing over bed | 7.1" (180 mm) |
| Swing over saddle | 4.3" (110 mm) |
| Between centers | 16.1" (410 mm) |
| Spindle taper | Morse taper 3 |
| Tailstock taper | Morse taper 2 |
| Spindle bore | 0.8" (20 mm) |
| Cross slide travel | 2.6" (65 mm) |

| | |
|---|---|
| Compound rest travel | 2.2" (55 mm) |
| Spindle speed | 100–2500 RPM |
| Automatic feed rate | 0.004" (0.1 mm)/ revolution |
| Range of threads | 4-80 TPI (0.3-8 mm) |
| Power requirements | 120 V 60 Hz 8 Amps |
| Spindle motor output | 0.67 hp (500 Watts) |

Chris' Tip: You can upgrade your Model 5100 lathe with the following kits available from LittleMachineShop.com:

Part number 5675: Digital Position Readout, 2-Axis Mini Lathe

Part number 5879: Digital Position Readout, Mini Lathe Tailstock

Part number 3937: Knob and Hand Wheel Kit

Part number 3112: Quick Change Tool Post Set, 0XA, Mini Lathe

Installation of all four kits creates a machine that is functionally identical to a Model 7350 deluxe lathe.


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## Safety Considerations

Always use common sense when using a power tool. Besides the general safety rules for any power tool, the following are specific considerations for the mini lathe.

### *General Safety*

- Use common sense. Think through the results of your actions before you act.
- Understand the operation of the machine. Do not operate the machine if you do not know what is going to happen.
- Learn, don't experiment. Study, understand, and do things where you have a clear expectation of the outcome. Don't "see what will happen."
- You are responsible for your own actions. LittleMachineShop.com cannot be held responsible for your actions when you use the machine.

### *Lathe Safety*

- Your mini lathe is just that, a *mini*, or small lathe. Don't attempt jobs that are beyond its capacity.
- Check the workpiece after you place it in the chuck or other work holding device. Be sure it is secure before turning on the lathe.
- Don't wear loose clothing or jewelry when operating the lathe.
- Stop the spindle and make sure the machine is in a safe condition before:
    - Opening or removing safety shields
    - Reaching into work area
    - Changing or adjusting tools
    - Changing or adjusting workpieces
    - Changing speed ranges
    - Clearing chips or coolant
- Inspect cutting tools for sharpness, chips, and cracks before each use. Replace dull, chipped, or cracked cutting tools immediately.
- Handle cutting tools with care. Cutting edges are very sharp and can cause lacerations.
- Do not use unbalanced workpieces or fixtures in the spindle.
- Remove all tools (wrenches, chuck keys, locking pins, and so on) from the spindle immediately after using them.

### *Electrical Safety*

- Plug the machine into a grounded receptacle. Ensure that all components are properly grounded. The easiest way to ensure this is to plug your machines and devices into grounded outlets that you have tested.
- Use caution when using liquids and electricity. Ensure that coolants and lubricants are kept away from high voltage electrical components.
- Disconnect all components from the power receptacle before servicing.


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- In the event of a power outage, turn off all components to ensure that the machine does not restart unexpectedly.

## *Machine Safety*

- Keep bystanders, children, and visitors a safe distance away while operating any power tool.
- Read the manual. Know the operation of every control before you attempt any operation of the machine.
- Make sure that all guards are in place and functioning before operating the machine.
- Check for damage and abnormal wear before operating the machine.
- Always wear safety glasses (side shields are recommended) that are ANSI Z87.1-2003 compliant.
- Wear hearing protection (ear plugs or earmuffs) when operating loud machines.
- Wear appropriate clothing, no rings, gloves, neckties, jewelry, or loose-fitting garments. Bind long hair or wear a hat.
- Do not use compressed air for cleaning machines. A shop vacuum works well and is much safer.
- Don’t operate machinery while under the influence of drugs or alcohol.
- Ensure that your machines are well lit. Ensure that your shop is well lit and utilize additional task lighting where appropriate.
- Maintain a clean and uncluttered work area.
- Avoid pinch points.
- Never leave a running machine unattended.
- Do not force or overload machinery.
- Use appropriate cutting tools with appropriate feeds and speed.
- Cutting tools get hot during use and can cause burns if handled inappropriately.
- Do not attempt to use workpieces that are too large or too heavy for the machine.
- Maintain your machine. Ensure that it is well-adjusted and in a safe state.
- Clear chips with a brush or other tool, never with your hands or with compressed air.
- Make sure the machine is on a flat, level surface that can support the weight of the machine plus fixtures, vise, and workpiece.
- Clamp work securely. Cutting forces are significant and can turn unsecured workpieces into projectiles.
- Be aware that chips and dust from some materials (magnesium, for example) are flammable. Understand the materials you are using.


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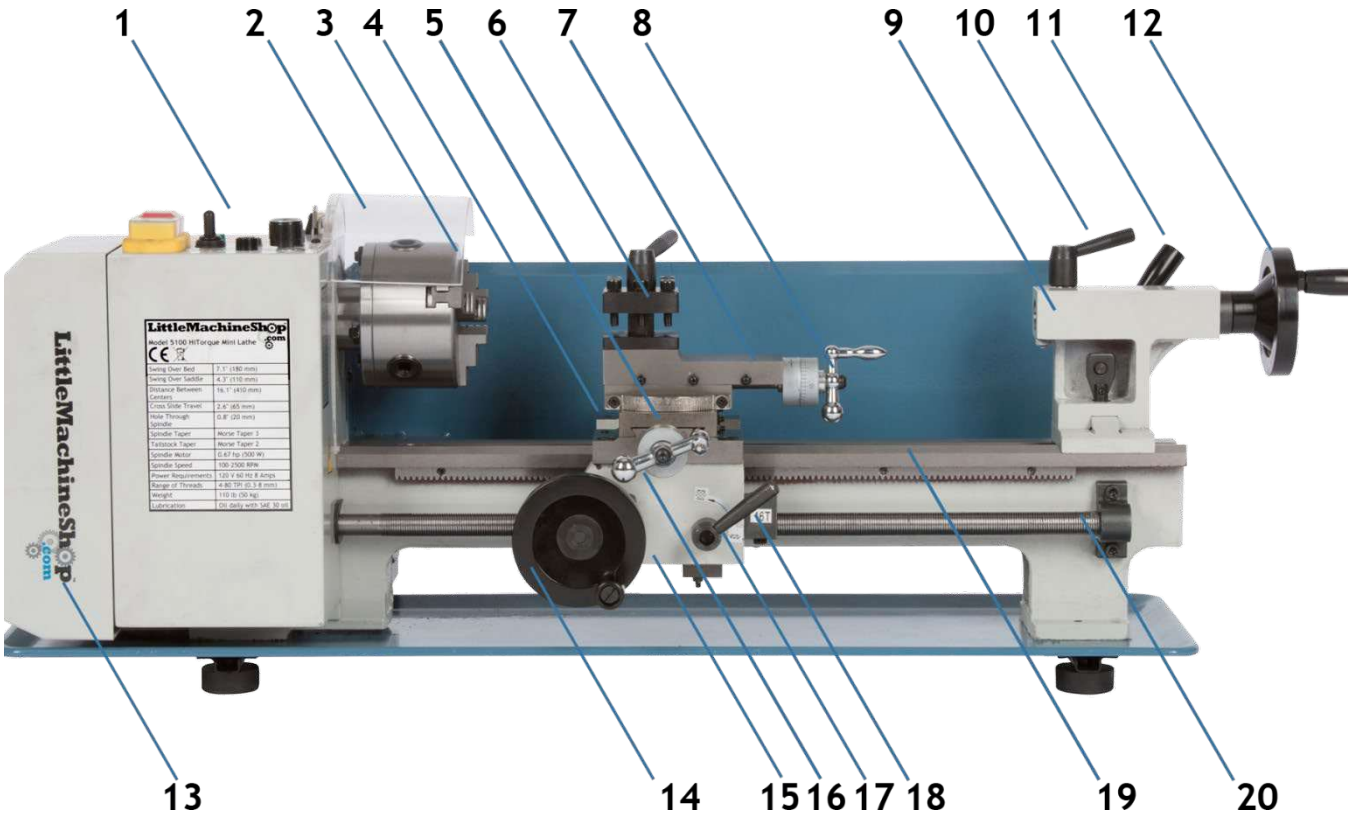
# Features

## *Front View 5100*




1. Motor controls
2. Headstock
3. 3-jaw chuck
4. Carriage
5. Cross slide
6. Tool post
7. Compound rest
8. Compound rest feed handle
9. Tailstock quill
10. Tailstock quill locking lever
11. Tailstock locking lever
12. Tailstock quill hand wheel
13. Change gear cover
14. Carriage hand wheel
15. Apron
16. Cross slide feed handle
17. Power feed lever
18. Threading dial
19. Bed ways
20. Lead screw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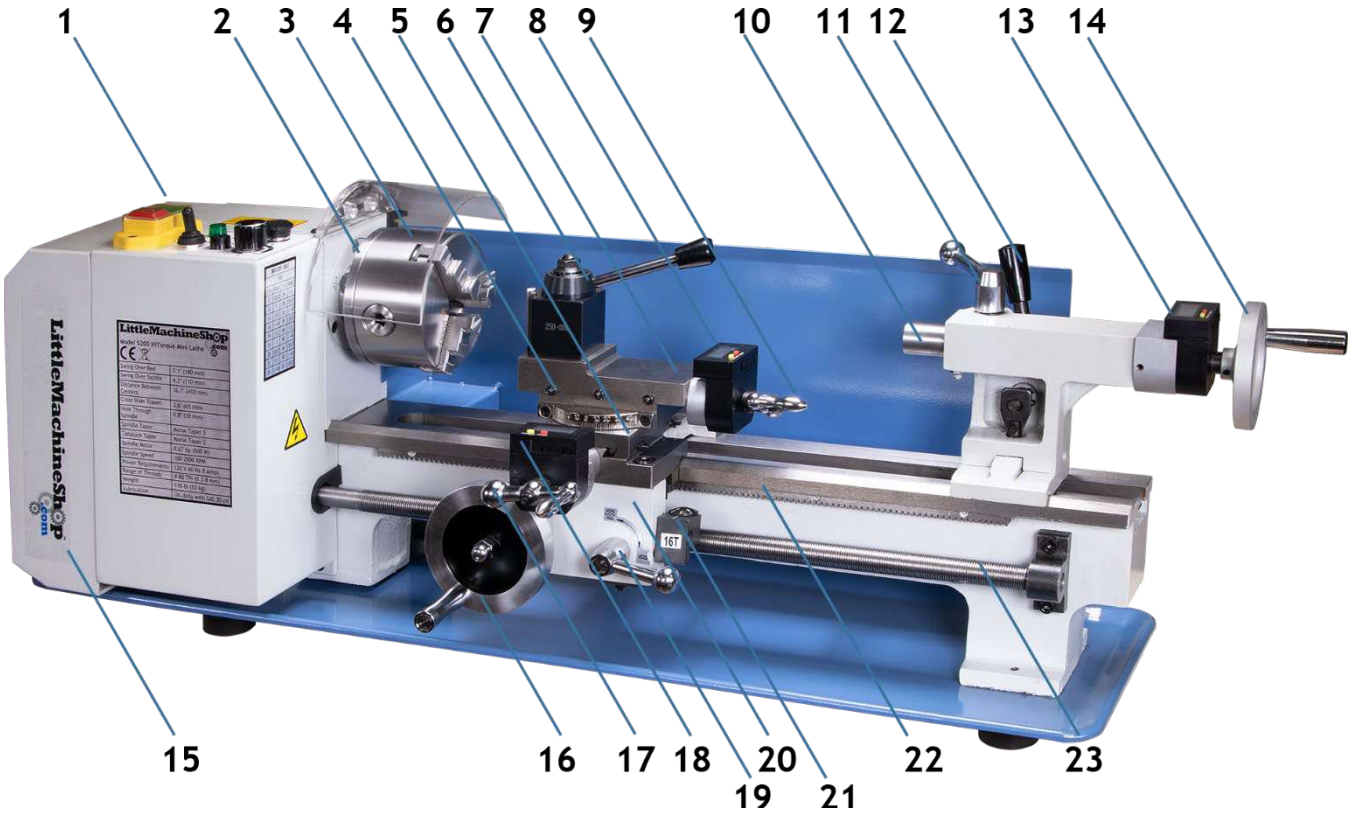
## *Front View 7350*




1. Motor controls
2. Headstock
3. 3-jaw chuck
4. Carriage
5. Cross slide
6. Tool post
7. Compound rest
8. Digital position readout
9. Compound rest feed handle
10. Tailstock quill
11. Tailstock quill locking lever
12. Tailstock locking lever
13. Digital position readout
14. Tailstock quill hand wheel
15. Change gear cover
16. Carriage hand wheel
17. Cross slide feed handle
18. Digital position readout
19. Power feed lever
20. Apron
21. Threading dial
22. Bed ways
23. Lead screw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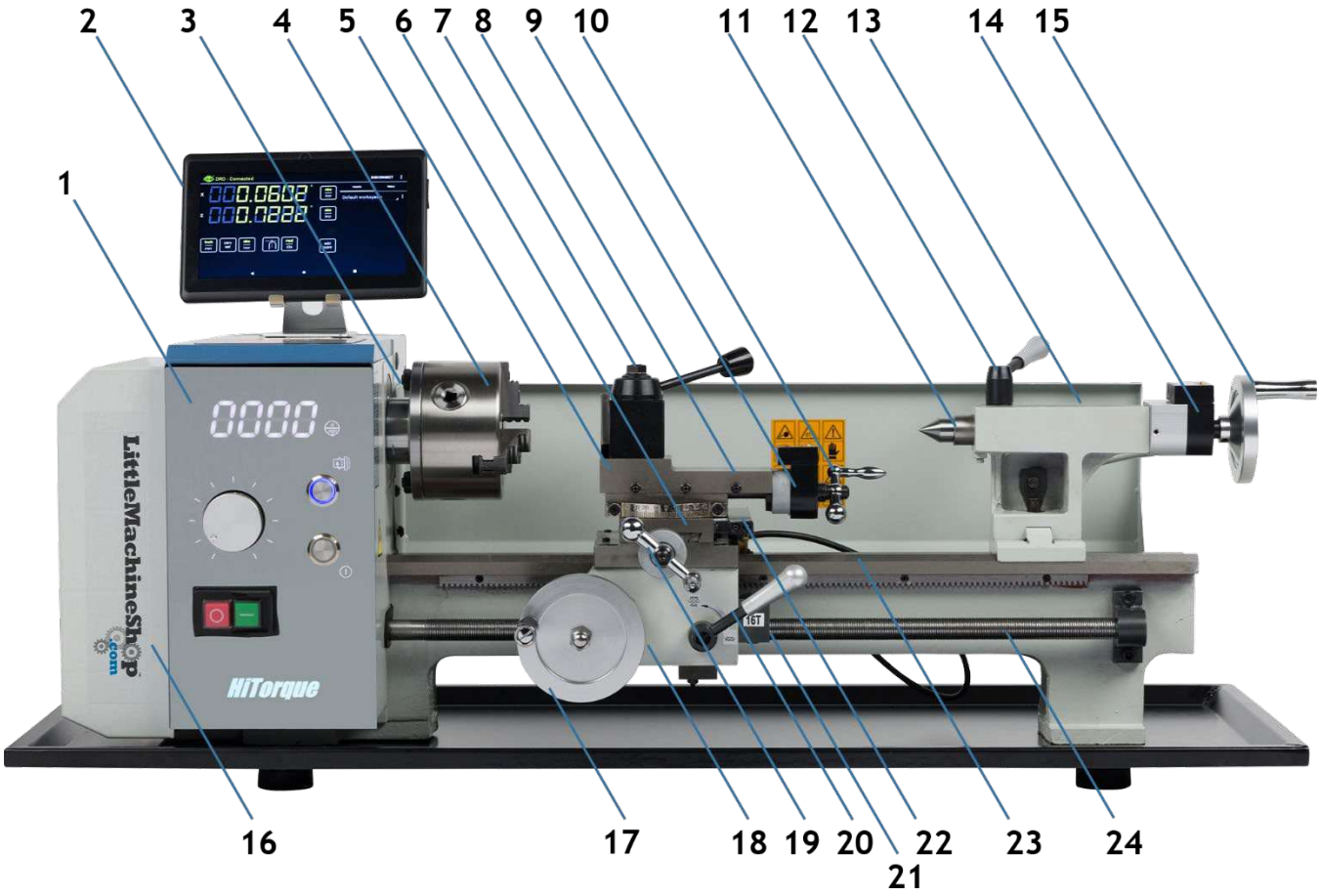
## *Front View 7450*




1. Motor controls
2. DRO Tablet
3. Headstock
4. 3-jaw chuck
5. Carriage
6. Cross slide
7. Tool post
8. Compound rest
9. Digital position readout
10. Compound rest feed handle
11. Tailstock quill
12. Tailstock quill locking lever
13. Tailstock locking lever
14. Digital position readout
15. Tailstock quill hand wheel
16. Change gear cover
17. Carriage hand wheel
18. Apron
19. Cross slide feed handle
20. Power feed lever
21. Threading dial
22. DRO Reader
23. Bed ways
24. Lead screw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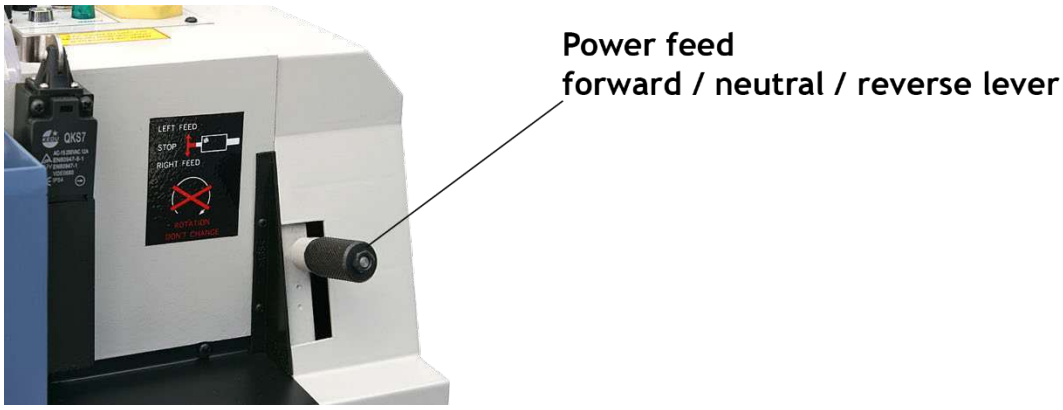
### *Rear View*




## Accessories

### *5100*

The following accessories come with the 5100 HiTorque Mini Lathe

- Chuck key for the 3-jaw chuck
- Outside jaws for the 3-jaw chuck
- Change gears: 21, 30, 35, 40 (2), 45, 50, 55, 57, 60, and 65 teeth.
- Hex wrenches: 3, 4, 5, and 6 mm
- Open end wrenches: 8 x 10 mm and 14 x 17 mm
- #2 Morse taper dead center.
- Oil can (plastic)

### *7350/7450*

The deluxe models of the HiTorque mini lathes come equipped with a quick change tool post. Therefore, the accessories also include a OXA quick change tool post and five tool holders.

- 1 pc 250-000 Tool post
- 1 pc 250-001 Turning and facing
- 1 pc 250-002 Turning and boring
- 1 pc 250-004 Boring
- 1 pc 250-007T Cut-off horizontal
- 1 pc 250-010 Knurling and turning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## Cleaning

Your lathe will arrive coated with grease to protect it from corrosion during shipment. Follow this procedure to remove the grease:

1. Wipe most of the grease off with rags or paper towels.
2. Clean the surfaces with mineral spirits (paint thinner).
3. Coat the surfaces with oil.

See “Lubrication” on page 29 for specific recommendations for lubricants.

## Assembly

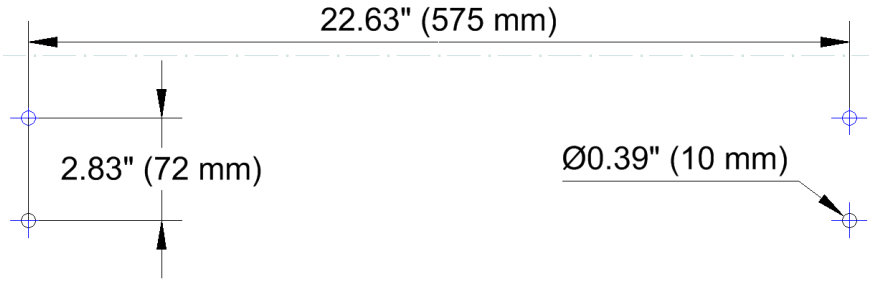
There are two things to do to assemble your lathe.

1. Reverse the chrome crank handle on the cross slide.
2. Install the mounting feet and spreader bars on the lathe. Use the M6 socket head cap screws that are furnished. Instead of installing the mounting feet, you may wish to mount your lathe to a bench as described in the next section.

## Mounting Your Lathe

The HiTorque Mini Lathe comes with rubber feet and spreader bars that attach to the same holes used to secure the lathe for shipping. If you want your lathe to be portable, simply install these spreader bars and feet.

You can also bolt your lathe to your workbench. The following diagram shows the holes required.





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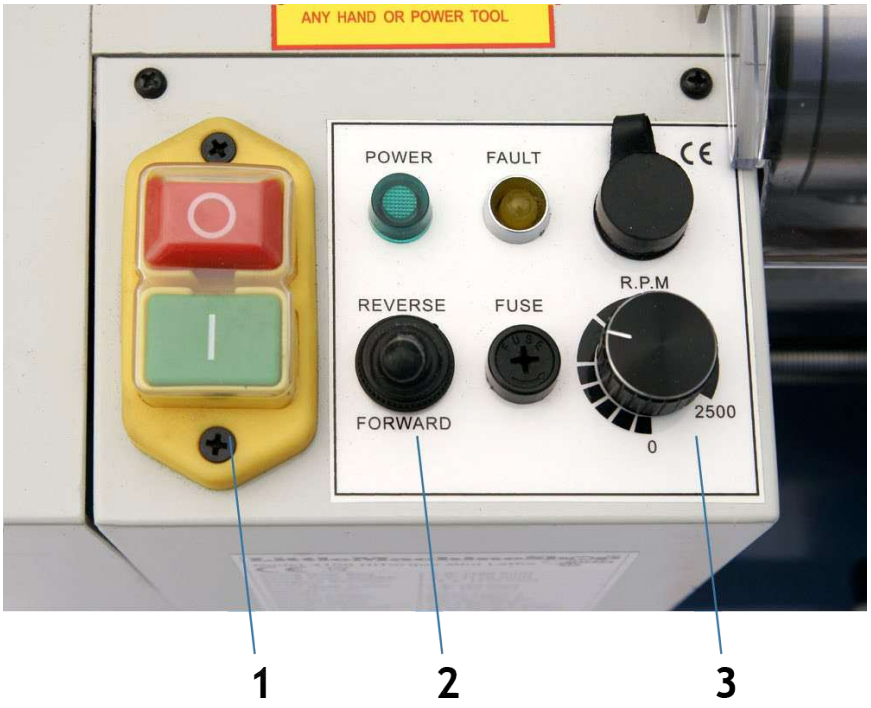
Mount the lathe to the workbench with M6 bolts. The bolts should be about 0.4" (10 mm) longer than the thickness of the workbench. Use fender washers on the underside of wooden benches to prevent the bolt heads from pulling through.

## Lathe Controls

There are several controls used to operate the lathe. Become familiar with them before you use the lathe.

### *Motor Controls*

#### 5100 / 7350 Controls




1. Power and emergency stop (E-stop) switch
2. Forward/reverse switch
3. Speed control knob

##### *Power Switch and Emergency Stop (E-stop) Switch*

The green power switch enables input power to the speed control circuit board. The red E-stop switch disconnects the power.

Turn the power off when you are not using the lathe.

##### *Forward/Reverse Switch*

The forward/reverse switch switches the polarity of the speed control circuit board output power between the speed control circuit board and the motor.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### *Speed Control Knob*

You control the motor speed by adjusting a potentiometer that provides the speed setting value to the speed control circuit board.

You can change the motor direction at any time and at any speed that safety allows. The motor will make a controlled stop or a controlled change of direction.

## 7450 Controls

1. Power switch
2. Emergency stop (E-stop) switch
3. Speed control knob
4. Spindle direction button
5. Start/stop button
6. Spindle speed readout

### *Power Switch and Emergency Stop (E-stop) Switch*

The green power switch enables input power to the speed control circuit board. The red E-stop switch disconnects the power.

Turn the power off when you are not using the lathe.

### *Speed Control Knob*

The speed control knob adjusts the spindle speed.


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### *Spindle Direction Button*

The spindle direction button controls the direction the spindle turns. After turning on the power and pressing start, the spindle turns in the forward direction - the direction used for normal turning. Press the button to toggle between forward and reverse directions. The button illuminates to indicate reverse direction.

You can change the motor direction at any time and at any speed that safety allows. The motor will make a controlled change of direction.

### *Start/Stop Button*

The Start/Stop button illuminates and starts the spindle when pressed while the power is on. The spindle runs at the last set speed. Press the button again to stop the spindle. Use this button for normal operation of the lathe.

### *Spindle Speed Readout*

The spindle speed readout shows the speed of the spindle in revolutions per minute (RPM). It also indicates the direction of turning, forward or reverse.

## Using the Motor Controls

Use the motor controls to turn the spindle.

## Models 5100 & 7350

### *To power up the lathe:*

1. Turn the speed control to the minimum speed position.
2. Place the forward/reverse switch in the off position.
3. Turn on the power switch by pressing the green button.

### *To start the lathe:*

1. Ensure that the speed control is set to the minimum speed position.
2. Move the forward/reverse switch to the appropriate position.
3. Advance the speed control to the desired speed.

### *To stop the lathe:*

1. Turn the speed control to the minimum speed position.
2. Move the forward/reverse switch to the off position.
3. If you want to power down the lathe, press the red switch to turn off the power.


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### Model 7450

*To power up and start the lathe:*

1. Turn on the power switch by pressing the green button. The control panel LED displays will illuminate.
2. If you do not remember your previous turning speed or want to begin turning at the minimum speed, turn the speed dial counterclockwise to the lowest RPM.
3. Press the start/stop button to begin the spindle turning. The spindle will begin rotating at the last speed set on the speed dial when the lathe was turned off or the start/stop button was disengaged. The start/stop button will illuminate when engaged.
4. Adjust the spindle speed dial to the desired RPM.
5. If you wish to change the spindle direction, press the spindle direction button. The spindle will briefly stop its rotation and then change direction at the same speed it was spinning before the direction change. The spindle direction button will illuminate when engaged.
6. Adjust the speed control as necessary.

*To stop the lathe:*

1. If you do not wish your next operation to begin at the current spindle speed, turn the speed control down to the minimum speed.
2. If the spindle is in the reverse rotation press the spindle direction button. The spindle will momentarily stop and begin spinning in the forward rotation.
3. Press the start/stop button. The spindle will stop rotating.
4. If you want to power down the lathe, press the red button to turn off the power. The LED control illumination will turn off.

## *Carriage and Cross Feed Controls*

The carriage and cross feed controls are the centerpiece of lathe operations. From these controls you can manually move the carriage along the ways, engage the power feed, move the cross slide toward or away from your workpiece and move the compound rest for fine tool control.


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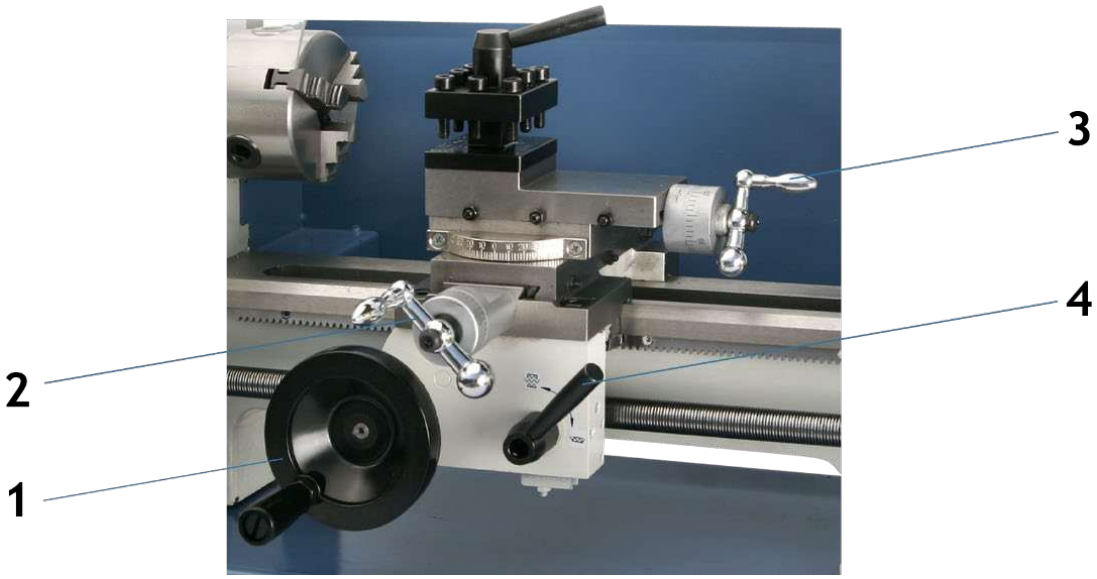


1. Carriage hand wheel
2. Cross slide feed handle
3. Compound rest feed handle
4. Power feed lever

## Carriage Hand Wheel

The carriage hand wheel moves the carriage toward or away from the headstock, depending on which way it is turned.

Use this hand wheel to position the carriage. Because this hand wheel moves the carriage quickly it is not easy to use this hand wheel to move the carriage while you are turning.

You cannot turn this hand wheel when the automatic feed is engaged.

## Cross Slide Feed Handle

The cross slide feed handle moves the cross slide in and out across the ways. Use this handle to advance the tool into the work and for facing cuts.

The dial on this handle indicates the relative position of the cross slide. The graduated dial can be repositioned for convenience.

40 divisions. Each turn of the handle advances the cross slide 1 mm or approximately 0.040".

> Chris' Tip: The distance (1 mm) is 0.03937" or approximately 0.040", an error of a little less than 2%. Therefore, with four complete turns of the dial, you advance 4 mm (0.15748"). This calculation may be important in some advanced operations. If you have questions, please contact our technical support.

The model 7350 has a digital position readout on the cross slide (see next section).

The model 7450 has a 40 division graduated dial on the cross slide as well as a factory installed DRO scale which sends data via Bluetooth to a tablet.


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## Compound Rest Feed Handle

The compound rest feed handle advances or retracts the compound rest. Use this handle to advance the tool into the work.

The dial on this handle indicates the relative position of the compound rest. The graduated dial can be repositioned for convenience.

40 divisions. Each turn of the handle advances the cross slide 1 mm or approximately 0.040".

The models 7350 and 7450 have a digital position readout on the compound rest (see next section).

## Digital Position Readout (Models 7350 & 7450)

The HiTorque 7×16 Deluxe Mini Lathes 7350 and 7450 have digital readouts as follows:

- 7350 - Tailstock, compound rest, cross slide
- 7450 - Tailstock, compound rest (the carriage and cross slide use DRO via Bluetooth to tablet)

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### *To use the digital readouts:*

The readouts are easy to use. There are two buttons: ON/OFF and mm/inch.

| Button | Function |
|---|---|
| ON/OFF | Press to turn on the display.<br>While the display is on, press to set the display to zero at the current position.<br>Press and hold to turn off the display. Doing so extends battery life. (The display shuts off automatically after about 30 minutes of nonuse.) |
| mm/inch | Switches the display between millimeters and inches. |

> Chris' Tip: These digital readouts do not account for backlash in the feed screw. Always take your readings when you are turning the screw in the same direction. This is not a problem on a lathe, because a single cut will only be made in one direction—in for turning, and out for boring.

### *To replace the battery:*

Each DRO uses a single CR2032 lithium battery (LittleMachineShop.com part number 4292).

1. On the bottom of the display unit, squeeze together the two tabs and then pull out the battery drawer.
2. Replace the battery and then slide the drawer in until it snaps shut.

## Compound Rest Rotation

The compound rest rotates on the cross slide and you can position it at any angle.

Position the compound rest so it moves parallel to the ways to make precise facing cuts.

Position the compound rest at 29.5 degrees for cutting standard threads.

### *To change the angle of the compound rest:*

1. Using the compound rest feed handle, retract the compound rest until the locking socket head cap screws are exposed.
2. Loosen the two socket head cap screws.
3. Turn the compound rest to the desired angle.
4. Tighten the two socket head cap screws.

> Chris' Tip: For accurate work, use a protractor between the compound rest and the cross slide. Don't depend on the die cast or plastic markings on the side of the compound rest.


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### Power Feed Lever

The power feed lever locks the half nuts around the lead screw, which engages the power feed.

The power feed is engaged when this lever is down and disengaged when this lever is up.

## *Tailstock Controls*

Use the tailstock for turning between centers.

### Tailstock Locking Lever

The tailstock is locked into position on the ways by the tailstock locking lever on the back of the tailstock. Raise the lever towards the vertical to tighten the tailstock lock.

### Tailstock Quill Hand Wheel

The tailstock quill hand wheel moves the tailstock quill in and out. Graduations on the top of the quill show how far it is extended.

Retract the tailstock quill all the way to remove tools from the taper in the tailstock quill.

### Tailstock Quill Digital Position Readout (Models 7350 & 7450)

The HiTorque 7×16 Deluxe Mini Lathes have a digital readout on the tailstock that displays the quill position more precisely than the graduated markings on the standard model. The operation of the tailstock readout is the same as those for the compound rest and cross slide. See “Digital Position Readout (Models 7350 & 7450)” on page 17.

### Tailstock Quill Locking Lever

The tailstock quill locking lever keeps the tailstock quill from moving. Use the tailstock quill locking lever to lock the tailstock quill in position when you are turning between centers. Turn the lever clockwise to lock the tailstock quill, and counterclockwise to unlock the tailstock quill.


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## Bluetooth DRO (Model 7450 only)

The Android tablet included with your DRO has the SIEG DRO app preinstalled. To begin using it, you must pair the tablet to the DRO scales, and you must configure the app, as described in the following sections.

> Chris' Tip: The table comes with a protective film on the screen. This film is sometimes hard to see but it can be removed to enhance visibility. If you are fine with the display with the film on, it can be left on to protect the device and does not impair operation.

### *To pair the devices*

1. Be sure the lathe is plugged in so that the Bluetooth transceiver in the lathe has power.
2. Use the furnished USB cable to plug the tablet into the back of the lathe. (This connection is only for power, so if it's more convenient to plug the tablet into another USB port or power receptacle, that's fine.)

**Then, on the Android tablet:**

1. Turn on the power and swipe up to unlock it.
2. Open Settings. (If you don't see a Settings icon near the center of the screen, open the app drawer—the middle icon of the quick launch bar on the bottom or right edge of the screen.)
3. In Settings, tap **Bluetooth** under Wireless & Networks.
4. Tap **Search For Devices** in the upper right corner of the screen.
5. Tap **HC-06** when it appears under Available Devices.
6. Enter the PIN 1234 and tap **OK**.

**The devices are now paired.**

> Chris' Tip: If you're using a single display device for multiple DROs, you can change the name from HC-06 to give each machine a unique name. Tap a name under Paired Devices, edit the name, and tap **OK**.

### *To configure the app:*

1. Start the SIEG DRO app.
2. If it appears in the upper-right corner of the screen, tap **Connect** to select the correct Bluetooth device. Tap **HC-06** to select the lathe.
3. The vertical ellipsis in the upper right corner of the screen is a menu. Tap it and select **Settings**.
4. Here is where you tell the app about your machine. Verify the following settings.
   - Machine type: Lathe
   - Under X Axis
     - Axis CPI: 5080
     - Invert Readout: check
   - Under Y Axis
     - Enable Y Axis: remove check


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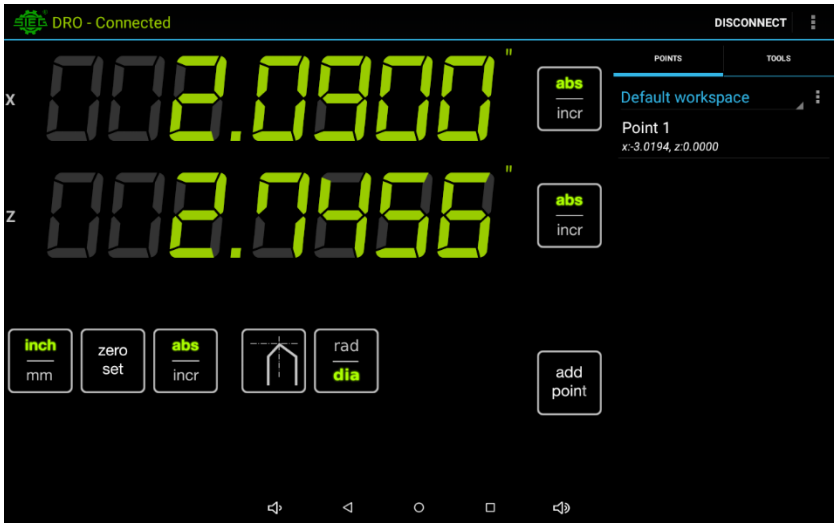
- Under Z Axis
  - Axis CPI: 5080
- Under W Axis
  - Enable W Axis: remove check

5. Tap the Back button at the bottom of the screen when you have made the settings.

## *Using the app*

Your DRO should now be working. Turn a hand wheel and watch the numbers change. *By convention, the axis parallel to the spindle (that is, the axis on which the carriage moves) is the Z axis, and the cross slide moves along the X axis.*




The axis readouts appear at the left top of the screen.

The buttons across the bottom affect all axes.

The abs/incr button to the right of each axis readout affects only that axis.

The right side of the screen has a list of saved points and a list of saved tools.

| | |
|---|---|
| inch / mm | Chooses inch or mm display |
| zero set | Sets the workspace origin to the current position of the machine |
| abs / incr | Selects Absolute coordinates or Incremental coordinates for all axes |
| | Sets tool offsets |
| rad / dia | For the X-axis, switches between measuring radius or diameter |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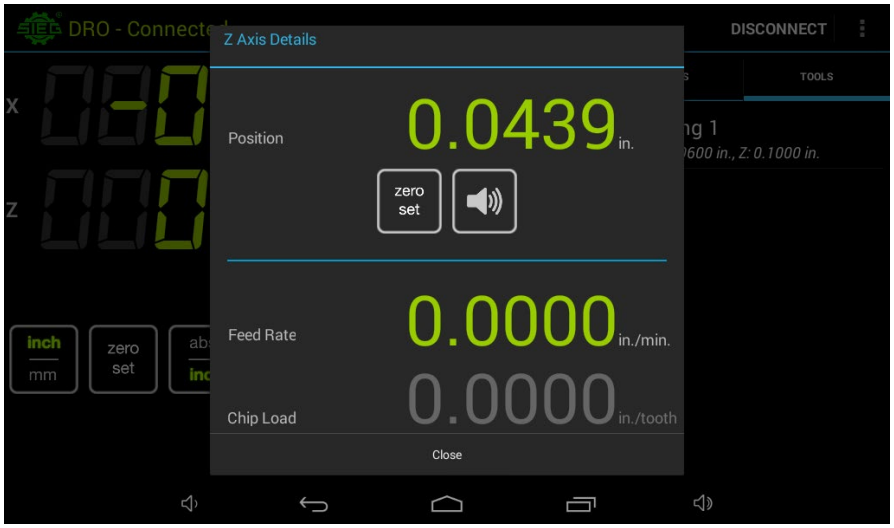
## *Axis detail settings*

Tap one of the axis position values to see the Axis Details.




Tap the Position value to enter the current position value.

| | |
|---|---|
| zero set | Tap to set the incremental value to zero.<br>Hold to set both the absolute value and the incremental value to zero. |
| | Turns on an audible warning that you are approaching a defined point. |

## *Absolute vs incremental coordinates*

The DRO keeps track of two coordinate systems: absolute and incremental.

Absolute coordinates are the overall coordinates of your work piece. Select an edge of the workpiece and set the axes to 0.000.

Incremental coordinates are used when you want to work on a feature, such as a groove, that exists on your work piece. You can, for example, set an incremental 0 position at one edge of the groove, and then use incremental values to machine the groove.

## *Tools*

The DRO can keep track of your tool dimensions. This is useful if your tools maintain their X-axis position between uses, such as when you use a quick change tool post to hold your turning tools. Replacing a tool like this will return it to the same X-axis position.

You can enter the values for the current tool using the Tool Offsets button. Enter the values and tap **Set Tool Offset**. While a tool offset is in effect, the position readouts are shown in red to alert you to this fact.

To clear the current tool offset, press and hold the Tool Offset button.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### Predefined tools

*To add a tool:*

1. Tap the vertical ellipsis menu in the upper right corner. Select **Add Tool**.
2. Name your tool and add the values for that tool.
3. Tap **Save** to add the tool to the list of tools.

*To select a tool:*

1. To choose a tool and use the predefined offset, simply tap the tool in the list of predefined tools. (Tap Tools on the right side of the screen to see the list.) The Tool Offset window appears. You can adjust any values you need for this job and tap Set Tool Offset. These changes are not saved with the tool.
2. Alternatively, tap the Tool Offsets button and select the tool from the Tools list. Then tap Set Tool Offset.

*To modify or delete a tool:*

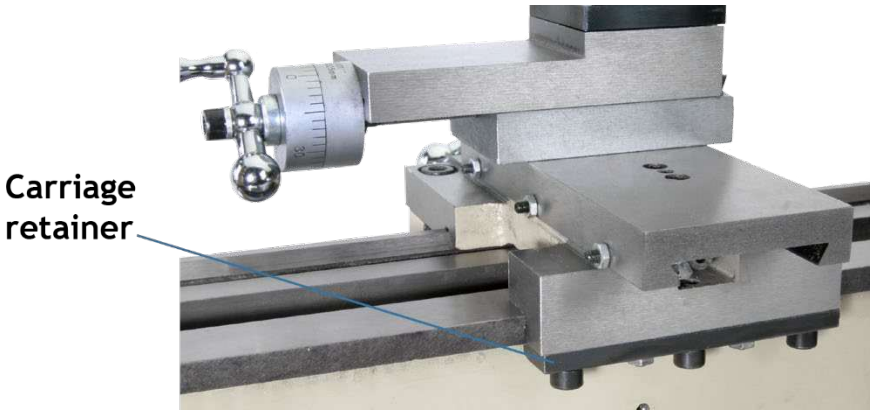
Tap and hold the tool's name in the list of predefined tools. Then tap **Edit Tool** or **Delete Tool**.

## Adjustments

Keeping your lathe in adjustment is an ongoing process. You should check all the following adjustments when you set up your lathe and then periodically as you use your lathe. Looseness in the carriage retaining plates or the gibs can cause chatter when you are using the lathe. If you experience chatter, check all these adjustments.

### *Carriage*

The carriage is held on the ways by two adjustable retaining plates that are bolted to the bottom of the carriage.




There are several fasteners in the carriage retainers. The socket head cap screws adjust the position of the retainers. The set screws and lock nuts lock the adjustments in place.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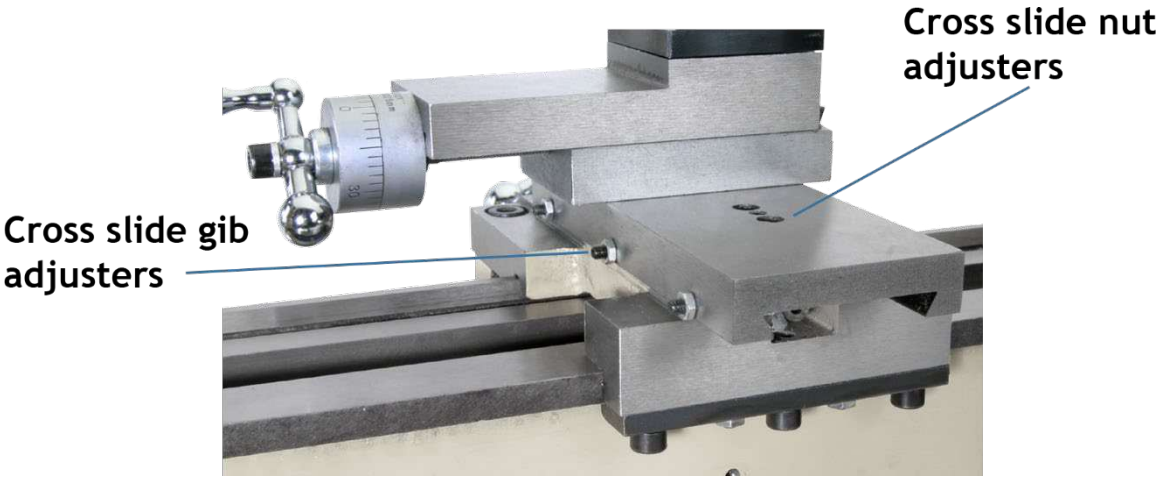
*To adjust the carriage retainers:*

1. Remove the right lead screw mounting bracket.
2. Disconnect the apron by removing the two socket head cap screws through the front of the carriage.
3. Slide the apron to the right and off the lead screw.
4. Loosen all the fasteners on both retainers.
5. Snug the socket head cap screws so the carriage can move, but without play.
6. Snug the setscrews. Do not over tighten or you might break the retainers.
7. While holding the setscrews from turning, tighten the lock nuts.
8. Replace the apron.
9. Replace the right lead screw mounting bracket.

## *Cross Slide Gibs*

A gib is a strip of metal placed between the bearing surface of two machine parts to ensure a precision fit and provide adjustment for wear. The mini lathe has gibs in several places, including the cross slide.




*To adjust the cross slide gibs:*

1. Loosen the three lock nuts on the side of the cross slide.
2. Slightly loosen all three setscrews on the side of the cross slide.
3. Snug each setscrew equally. This will lock the cross slide in position.
4. Loosen each setscrew 1/8 turn to allow the cross slide to move.
5. While holding the setscrews from turning, tighten the lock nuts.
6. Test by turning the handle. Loosen or tighten all the setscrews the same amount until the cross slide moves freely, but without play in the dovetail.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## Cross Slide Nut

The cross slide nut is adjustable to remove free play from the cross slide feed handle.

The three screws in the top of the cross slide adjust the cross slide nut.

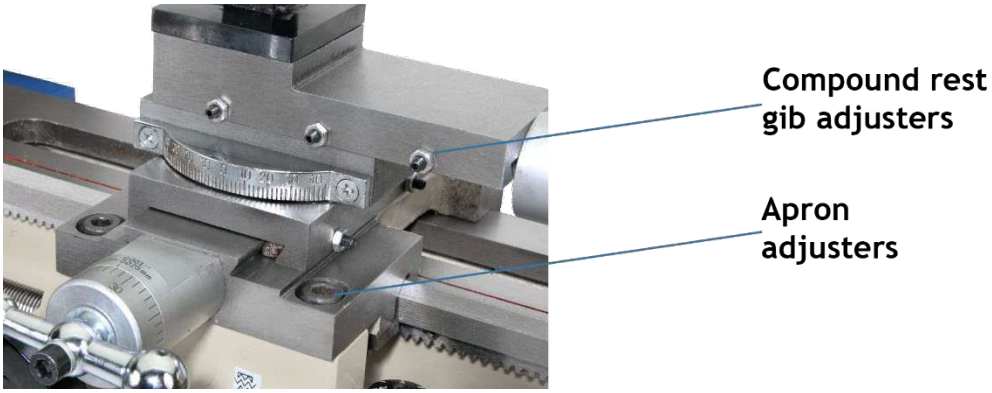
The two outer screws tip the nut off horizontal to reduce the endplay in the threads. The center screw locks the adjustment in place.

### *To adjust the cross slide nut:*

1. Loosen all three screws.
2. Tighten the outside setscrews until you just start to feel resistance turning the set screw.
3. Loosen the near set screw and tightened the center screw until you just start to feel resistance turning the cap crew. At this point the bottom threads of the nut should be touching the lead screw at the far end, and the top threads of the nut should be touching the lead screw at the near end.
4. Tighten the front set screw.
5. Check the adjustment.
    - If the feed screw is too hard to turn, loosen the front set screw a little and then tighten the center cap screw.
    - If the feed screw is too easy to turn and you have excessive backlash, loosen the center cap screw a little and then tighten the front set screw.

## Compound Rest Gibs

The compound rest also incorporates a gib for adjustment.




### *To adjust the compound rest gibs:*

1. Loosen the three lock nuts on the side of the compound rest.
2. Slightly loosen all three setscrews on the side of the compound rest.
3. Snug each setscrew equally. This will lock the compound rest in position.
4. Loosen each setscrew 1/8 turn to allow the compound rest to move.
5. While holding the setscrews from turning, tighten the lock nuts.
6. Test by turning the handle. Loosen or tighten all the setscrews the same amount until the compound rest moves freely, but without play in the dovetail.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## Apron Position

The apron is adjustable to center the half nuts horizontally on the lead screw.

*To adjust the apron position:*

1. Loosen the two socket head cap screws that secure the apron to the carriage. They are at the front edge of the carriage.
2. Engage the half nuts on the lead screw.
3. Tighten the two socket head cap screws.

## Tailstock Position

The tailstock is adjustable from front to rear so you can align it with the spindle.

*To adjust the tailstock position:*

1. Remove the 3-jaw chuck from the lathe spindle.
2. Put a 3 Morse taper dead center in the spindle.
3. Remove the tailstock from the lathe.
4. Loosen the tailstock adjustment cap screw.
5. Place the tailstock back on the ways.
6. Put a 2 Morse taper dead center in the tailstock quill.
7. Move the tailstock toward the spindle until the two centers almost touch.
8. Loosen the tailstock adjustment setscrews.
9. Move the upper part of the tailstock casting until the centers are aligned.
10. Place a steel rule between the two centers. The length of the rule should be horizontal and the width vertical. Bring the centers together to hold the rule in place.
11. Adjust the upper part of the tailstock casting until the steel rule is perpendicular to the axis of the lathe. If the near end of the rule angles toward the headstock, move the tailstock back.
12. When the tailstock is in the correct position, tighten the tailstock adjustment setscrews.
13. Gently remove the tailstock from the lathe and tighten the tailstock adjustment cap screw.
14. Replace the tailstock on the ways and check the adjustment.


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## Half Nuts

There are two adjustments for the half nuts. The half nut gibs take the play out of the half nuts. The half nut closing limit stops the half nuts from closing too tightly on the lead screw.

*To adjust the half nut gibs:*

- Tighten the three setscrews in the back edge of the apron to remove play from the half nuts.

*To adjust the half nut limit:*

1. Loosen the lock nut on the bottom of the half nuts.
2. Adjust the setscrew until the half nuts close without binding on the lead screw.
3. While holding the setscrew from turning, tighten the lock nut.

## Lead Screw Mounting

The brackets that mount the lead screw can move slightly to ensure that the lead screw does not bind in the half nuts.

*To adjust the right lead screw mounting bracket:*

1. Remove the tailstock by sliding it off the end of the ways.
2. Loosen the two mounting socket head cap screws on the right bracket.
3. Move the carriage as far to the right as possible.
4. Engage the half nuts on the lead screw.
5. Tighten the bracket mounting socket head cap screws.
6. Replace the tailstock.

*To adjust the left lead screw mounting bracket:*

1. Remove the change gear cover.
2. Loosen the locking nut on the change gear adjuster.
3. Loosen the two mounting socket head cap screws on the left lead screw bracket.
4. Move the carriage as far to the left as possible.
5. Engage the half nuts on the lead screw.
6. Tighten the bracket mounting socket head cap screws.
7. Tighten the locking nut on the change gear adjuster.
8. Replace the change gear cover.


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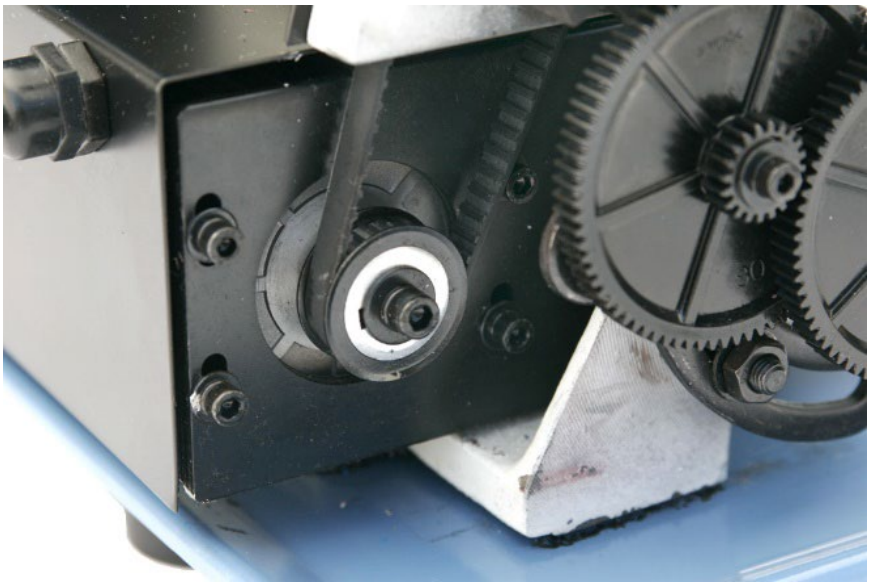
### *Drive Belt*

The drive belt is a timing belt and should rarely need adjustment.



*To adjust the drive belt:*

1. Unplug the power cord.
2. Remove the change gear cover.
3. Loosen the four motor mounting socket head cap screws.
4. While you push down on the motor pulley with your left thumb, tighten one socket head cap screw on each side of the motor.
5. Tighten the other two socket head cap screw.
6. Replace the change gear cover.

## Maintenance

Maintenance of the mini lathe is simple, but important. Regular maintenance will keep your mini lathe working like new for many years.

### *Cleaning*

The maintenance you perform most often is cleaning. Keeping swarf (chips, shavings, and debris) off of wearing surfaces is the most important thing you can do to prolong the life of your mini lathe.

- Use a 1" paintbrush to remove swarf from the ways as you work.
- Clean the lead screw before each use.
- Clean swarf from the lathe, from top down after each use.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## *Lubrication*

We recommend the use of two lubricants on your mill.

- Where oil is required, we recommend Mobil Vactra Oil No. 2, an oil especially designed for machine tool way lubrication and bearing lubrication.

> Chris' Tip: Mobil Vactra Oil No. 2 is available from LittleMachineShop.com (part number 4120). If you prefer to purchase locally, get Mobil 1 synthetic motor oil, any viscosity, available at most auto parts stores.

- Where grease is required, we recommend Lubriplate 630-AA Lithium-Based Grease. Lubriplate 630-AA is an NLGI No. 1 lubricant. Lithium grease is a plastic-friendly general use grease that is easy to find and easy to use.

> Chris' Tip: Lubriplate 630-AA grease is available from LittleMachineShop.com (part number 3984), but you might have trouble finding it locally. Don't worry about the brand name. Get white lithium grease. Every auto parts store and most hardware stores have it.

The following points on your lathe require lubrication.

| Location | Lubricant | Frequency | Notes |
|---|---|---|---|
| Lathe ways | Oil | Daily | Apply oil to both the front and back ways on both sides of the carriage. Move the carriage back and forth to spread the oil. |
| Lead screw threads | Oil | Daily | Clean swarf (chips, shavings, and debris) daily. |
| Compound rest dovetail | Oil | Daily | Advance the compound rest to the extent of its normal travel. Apply oil to the end of the gib and the ends of the dovetails. Retract the compound rest. |
| Cross slide dovetail | Oil | Daily | Advance the cross slide to the extent of its travel. Apply oil to the end of the gib and the ends of the dovetails. Retract the cross slide. |
| Lead screw bushings | Oil | Weekly | There is an oil fitting on the top of each one. Remove the change gear cover to lubricate the left bushing. |
| Other machined surfaces | Oil | Weekly | Oil lubricates and prevents corrosion. |
| Chuck | Oil | Monthly | Disassemble, clean and lubricate. Wrap with a paper towel, secure with an elastic band, and run lathe to sling out excess oil. |
| Cross slide feed screw | Grease | Yearly | |
| Compound rest feed screw | Grease | Yearly | |
| Lead screw drive gears and bushings | Grease | Yearly | Also lube change gears as you use them. |
| Carriage hand wheel drive gears | Grease | Yearly | |
| Tailstock quill and screw | Grease | Yearly | |

The spindle and countershaft bearings are deep groove ball bearings that are shielded and do not require additional lubrication.


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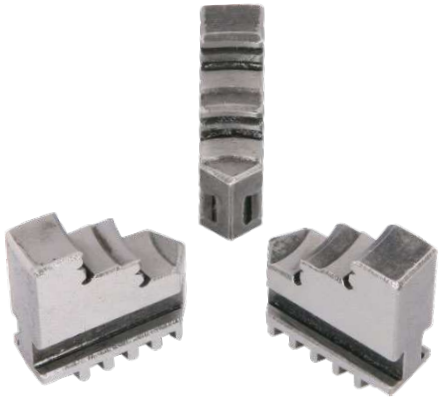
# Chuck

## *Changing Chuck Jaws*

3-jaw lathe chucks come with two sets of jaws.

The “normal” set is called the inside jaws, because the stepped side is designed to fit inside of hollow workpieces and hold by an outward force. In many cases, however, these jaws are used to clamp on the outside of smaller objects using the long straight side.

The second set of jaws is called the outside jaws because the stepped side of these jaws is designed to clamp on the outside of larger objects.



Because of the construction of a 3-jaw chuck, each of the three jaws in a set is different. You will find a number in the groove in the side of each jaw that identifies its position in the set.

*To remove a set of chuck jaws:*

1. Place a piece of wood on the ways to protect them in case you drop something.
2. Place your right hand around the chuck to prevent the jaws from falling out.
3. With your left hand, turn the lathe chuck key counterclockwise to open the jaws.
4. The jaws will come loose from the chuck, one at a time, when about half the length is exposed beyond the diameter of the chuck.

*To install a set of chuck jaws:*

1. Place the three jaws in numeric order on the bench.
2. Slide jaw number 1 into the slot in the chuck that has the serial number stamped in it.
3. Press the jaw into the slot with one hand, and with the other hand, turn the chuck key to open the chuck.
4. You will feel the jaw move out in the slot as you turn. Stop turning right after the jaw clicks inward in the slot.
5. Turn the chuck key to close the chuck about ¼ turn to engage jaw 1.
6. Slide jaw 2 into the next slot counterclockwise from jaw 1 when you are looking toward the headstock.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7. Slide jaw 3 into the open slot.
8. While pressing jaws 2 and 3 into the slots, turn the chuck key to close the chuck.

### *Mounting Work in a 3-Jaw Chuck*

Three jaw lathe chucks are good for most lathe operations. All three jaws move together as you turn the chuck key. But, because of the way they are made, 3-jaw chucks have limited accuracy. They will center work to within about 0.003" runout. If you need better concentricity, use an independent 4-jaw chuck or a collet.

If you chuck a workpiece, create a part, and then part it off, the lack of concentricity will not cause a problem. The only time it is a problem is when you try to re-chuck a workpiece.

Place your workpiece between the jaws of the lathe chuck and turn the chuck key clockwise to close the jaws. Tighten firmly. To get the jaws as tight as possible, tighten all three locations with the chuck key.

## Tool Bits

When you purchase a new lathe tool bit, it might have an angle on the end, but it is not properly sharpened for turning. Grinding lathe tool bits is a bit of an art. It takes some practice to get good at it.

You need to create a cutting edge that is sharp, extends out so that the cutting edge and not the side of the tool contacts the work, but that still has enough support to maintain sufficient strength to cut metal.

Before diving in, there are some terms you need to understand. The illustration below shows these terms.

First, notice that there are two cutting edges on the tool bit. There is a cutting edge on the end of the tool bit called the front cutting edge. There is also a cutting edge on the side of the tool. Between these cutting edges is a rounded section of cutting edge called the nose.


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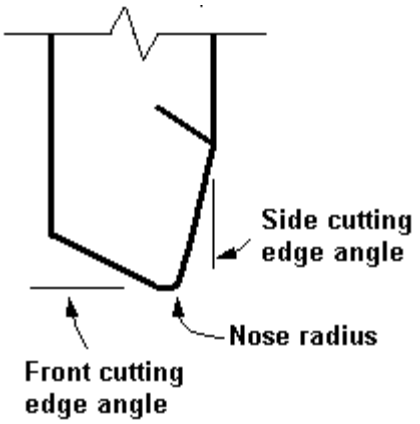

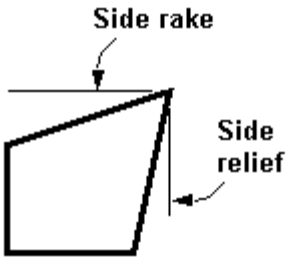


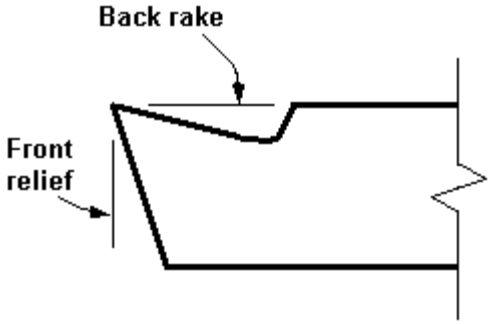


| | |
|---|---|
| Side cutting edge | The side cutting edge does most of the cutting. As the tool bit moves along the workpiece the side cutting edge removes most of the material. |
| Front cutting edge | The front cutting edge cuts when the tool is advanced into the work. |
| Nose | The nose is a critical part of the cutting edge, because it produces the surface finish of the workpiece. |
| Side rake | The side rake produces the side cutting edge that cuts into the workpiece. |
| Side relief | Side relief provides clearance for the side cutting edge. Without side relief, the side of the tool bit would hit the workpiece and not allow the cutting edge to penetrate the workpiece. |
| Back rake | The back rake produces the front cutting edge that cuts into the workpiece. |
| Front relief | Front relief provides clearance for the front cutting edge. Without front relief, the front of the tool bit would hit the workpiece and not allow the cutting edge to penetrate the workpiece. |


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## *Grinding Tool Bits*

Use a bench grinder to sharpen your tool bits. Even an inexpensive bench grinder can do a good job grinding lathe tool bits. In some cases, you might want to purchase a higher quality fine grit wheel.

Keep a small cup of water near your grinder. Grinding generates heat, which can cause two problems. The tool bit will become too hot to hold. Overheating can also affect the heat treatment of the tool bit, leaving the cutting edge soft.

Use a protractor to measure the angles. They are not super-critical, but you should try to stay within one degree of the recommendations.

### Grind the Front Relief

The first step in creating a tool bit is to grind the front relief. For most work, a relief angle of 10° works well.

While you are grinding the front relief, you are also creating the front cutting edge angle. Make this angle about 10° also, so that the corner formed by the front cutting edge and the side cutting edge is less than 90°.

### Grind the Left Side Relief

Form the left side relief next. Again, create about a 10° angle. You don't need to form a side cutting angle. The side cutting edge can be parallel to the side of the tool blank.

### Grind the Top Rake

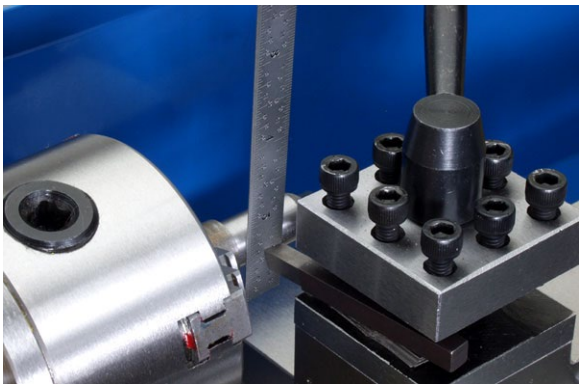
The top of the tool bit is ground at an angle that combines the back rake and the side rake. The side rake is most important, because the side cutting edge does most of the work. For cutting steel and aluminum, the side rake should be about 12° and the back rake should be about 8°. For cutting brass, the rake angles should be much less, or even 0°.

### Round the Nose

A small nose radius allows you to turn tight corners. A large nose radius produces better surface finishes. Create a nose radius that is appropriate for the tool bit you are creating.

## *Adjusting Tool Bit Height*

The cutting edge of the tool bit should almost always be set to the center height of the lathe spindle.

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There are several methods for checking the height of the tool bit. Perhaps the simplest way is to place a thin strip of metal, such as a steel rule or feeler gage, between the workpiece and the point of the tool bit. If the height is correct, the strip of metal will be held vertical. If the top is leaning toward you, the tool bit is too low. If the top is leaning away from you, the tool bit is too high.

Using the standard tool post, you adjust the tool bit height using shims under the tool bit. You can get an economical set of shims, about the right size, at any auto parts store. Purchase a set of feeler gages and remove the pivot pin.

> Chris' Tip: The easy way to adjust the tool bit height is to get a quick change tool post. Virtually all quick change tool posts incorporate a mechanism for easily adjusting the tool bit height.

## Turning

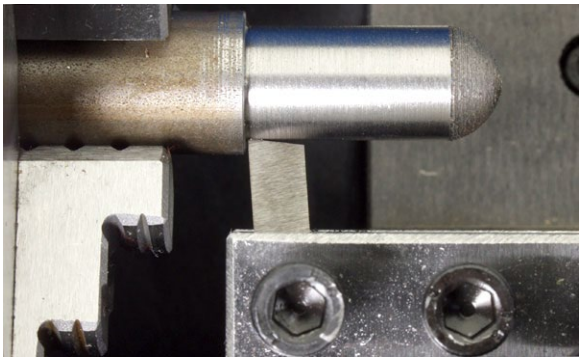
The most common use of a lathe is turning down the diameter of a workpiece.

### *Manual Turning*

Follow these steps to turn the outside diameter of a workpiece.

*To turn manually:*

1. Put a tool bit in the tool holder and adjust the cutting edge to center height.
2. Angle the tool so that the front cutting edge forms an acute angle with the axis of the workpiece, as shown in the illustration below.



3. Move the carriage so that the tool bit is near the right end of the workpiece.
4. Turn the lathe on. Adjust the speed to an appropriate speed for the material and diameter you are working on. The LittleMachineShop.com website has a calculator to help you determine appropriate cutting speeds at https://littlemachineshop.com/speeds.
5. Using the cross slide feed handle, slowly advance the tool bit into the work until it just touches the surface of the workpiece.
6. Move the carriage to the right so that the tool bit is past the end of the workpiece.
7. Using the cross slide feed handle, advance the tool bit about 0.010".
8. Using the carriage hand wheel, move the carriage slowly to the left. As the tool bit meets the workpiece, it starts cutting.

## *Turning with Power Feed*

The mini lathe incorporates a power carriage feed that can move the carriage either direction. This same power feed is used for turning and threading.

For turning, the change gear train is configured with 20 tooth gears in positions A and C, and 80 tooth gears in positions B and D. This is the way the lathe comes from the factory and is how you should reset it after threading. If you haven't changed the gearing, this is the way your lathe is configured.

### *To turn with power feed:*

1. Put a tool bit in the tool holder and adjust the cutting edge to center height.
2. Angle the tool so that the front cutting edge forms an acute angle with the axis of the workpiece, as shown in the illustration above.
3. Move the carriage so that the tool bit is near the right end of the workpiece.
4. Move the power feed forward/reverse lever to the forward position.
5. Turn the lathe on. Adjust the speed to an appropriate speed for the material and diameter you are working on. The LittleMachineShop.com website has a calculator to help you determine appropriate cutting speeds at https://littlemachineshop.com/speeds.
6. Using the cross slide feed handle, slowly advance the tool bit into the work until it just touches the surface of the workpiece.
7. Move the carriage to the right so that the tool bit is past the end of the workpiece.
8. Using the cross slide feed handle, advance the tool bit about 0.010".
9. Push down on the power feed lever until the half nuts engage. As the tool bit meets the workpiece, it starts cutting.
10. When the carriage has moved as far as you want, raise the power feed lever to disengage the half nuts. The carriage stops.

> Chris' Tip: Be sure to move the power feed forward/reverse lever to the neutral position when you have completed the turning operation.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## Facing

Facing is cutting on the end (or face) of the workpiece.

*To face a workpiece:*

1. Put a tool bit in the tool holder and adjust the cutting edge to center height.
2. Angle the tool so that the side cutting edge forms an acute angle with the face of the workpiece.
3. Move the carriage to the right so that the tool bit is past the right end of the workpiece.
4. Ensure that the power feed forward/neutral/reverse lever is in the neutral position.
5. Push down on the power feed lever until the half nuts engage. You might have to move the carriage slightly so the half nuts will engage.
6. Turn the lathe on. Adjust the speed to an appropriate speed for the material and diameter you are working on. The LittleMachineShop.com website has a calculator to help you determine appropriate cutting speeds at https://littlemachineshop.com/speeds.
7. Using the compound rest feed handle, slowly advance the tool bit into the work until it just touches the surface of the workpiece.
8. Move the cross slide back so that the tool bit is clear of the diameter of the workpiece.
9. Using the compound rest feed handle, advance the tool bit about 0.005".
10. Using the cross slide feed handle, advance the cross slide slowly. As the tool bit meets the workpiece, it starts cutting.
11. Continue advancing the cross slide until the tool bit reaches the center.

## Turning Angles

There are several methods of turning angles or tapers.

- For large angles of short length, such as a chamfer, turn the compound rest to the angle you want. Advance the tool across the work with the compound rest and advance the tool into the work with the cross slide or the carriage.
- You can use the same method for small angles (usually called tapers) of a length less than the compound rest travel.
- For longer tapers, the work is usually placed between centers with the tail center offset from the centerline of the lathe.


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## Threading

Much of the mechanism of your lathe is provided to allow you to cut threads. Your lathe can cut a broad range of thread pitches. In fact, with the standard change gears, you can cut many more thread pitches than those shown on the table on the lathe.

### *Change Gears*

The series of gears that drive the lead screw are called change gears because you change them to turn different thread pitches.

There are 4 positions for the change gears, commonly called A, B, C and D.

| | |
|---|---|
| A | This is the top change gear position. When you received your lathe it had a 20 tooth metal gear in this position. |
| B | Gear positions B and C are on the same shaft, between positions A and D. Position B is the inside gear on this shaft. When you received your lathe it had an 80 tooth plastic gear in this position. |
| C | Gear positions B and C are on the same shaft; between positions A and C. Position C is the outside gear on this shaft. When you received your lathe it had a 20 tooth metal gear in this position. |
| D | Position D is the end of the lead screw. When you received your lathe it had an 80 tooth plastic gear in this position. |


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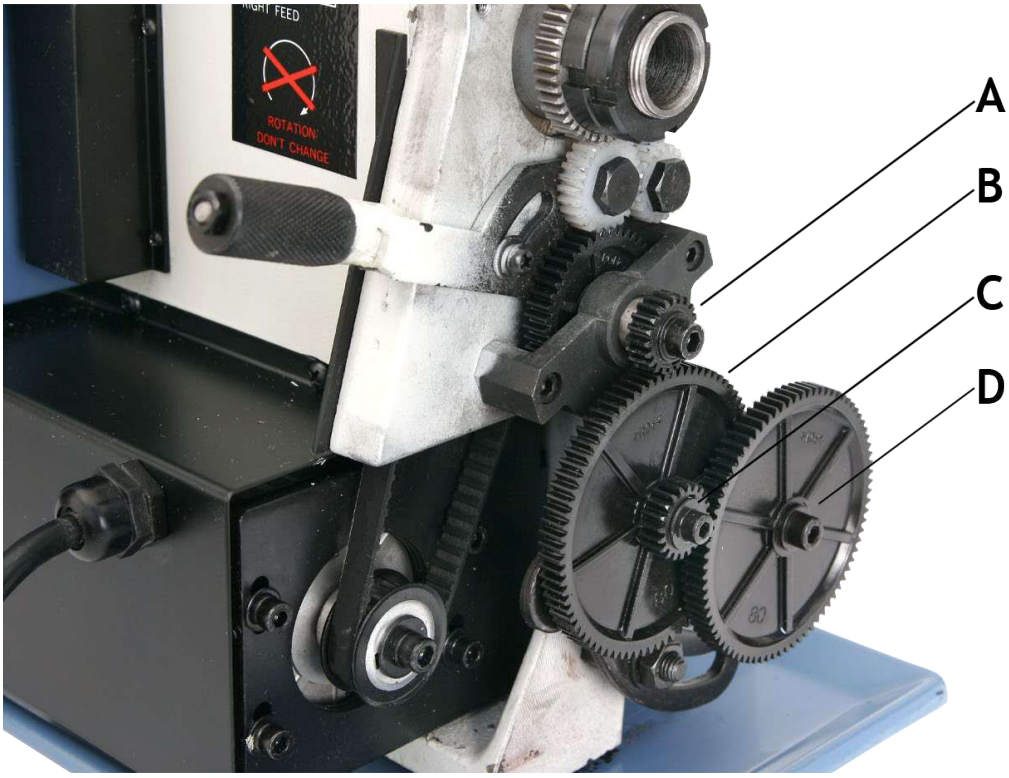


Changing these gears varies the speed that the lead screw turns in relation to the speed that the spindle turns. This allows you to cut threads with different numbers of threads per inch. The following tables show the gears to use for various common threads.

## American Standard Unified Inch Screw Threads

| Threads per inch | A | B | C | D |
|---|---|---|---|---|
| 4 | 80 | Any gear | | 20 |
| 4.5 | 80 | 40 | 80 | 45 |
| 5 | 80 | 20 | 40 | 50 |
| 6 | 80 | 20 | 40 | 60 |
| 7 | 80 | Any gear | | 35 |
| 8 | 40 | Any gear | | 20 |
| 9 | 80 | Any gear | | 45 |
| 10 | 80 | Any gear | | 50 |
| 11 | 80 | Any gear | | 55 |
| 11.5 | 45 | 35 | 65 | 60 |
| 12 | 60 | Any gear | | 45 |
| 13 | 80 | Any gear | | 65 |
| 14 | 40 | Any gear | | 35 |
| 16 | 40 | Any gear | | 40 |
| 18 | 40 | Any gear | | 45 |
| 20 | 40 | Any gear | | 50 |
| 24 | 65 | 60 | 40 | 65 |
| 27 | 40 | 45 | 40 | 60 |
| 28 | 20 | Any gear | | 35 |
| 32 | 20 | Any gear | | 40 |
| 36 | 20 | Any gear | | 45 |
| 40 | 20 | Any gear | | 50 |
| 44 | 20 | Any gear | | 55 |
| 48 | 40 | 60 | 40 | 80 |
| 56 | 40 | 35 | 20 | 80 |
| 64 | 20 | Any gear | | 80 |
| 72 | 40 | 45 | 20 | 80 |
| 80 | 20 | 80 | 40 | 50 |


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## American Standard Metric Threads

| Pitch (mm) | A | B | C | D |
|---|---|---|---|---|
| 0.3 | 20 | 57 | 35 | 65 |
| 0.35 | 20 | 80 | 50 | 57 |
| 0.4 | 20 | 55 | 45 | 65 |
| 0.45 | 20 | 60 | 55 | 65 |
| 0.5 | 21 | 50 | 45 | 60 |
| 0.6 | 21 | 50 | 45 | 50 |
| 0.7 | 35 | 55 | 45 | 65 |
| 0.75 | 35 | 65 | 50 | 57 |
| 0.8 | 40 | 65 | 45 | 55 |
| 1 | 21 | 50 | 60 | 40 |
| 1.25 | 35 | 40 | 45 | 50 |
| 1.5 | 40 | 50 | 65 | 55 |
| 1.75 | 40 | 35 | 55 | 57 |
| 2 | 40 | 50 | 55 | 35 |
| 2.5 | 60 | 55 | 65 | 45 |
| 3 | 65 | 55 | 80 | 50 |
| 3.5 | 65 | 21 | 57 | 80 |
| 4 | 55 | 50 | 80 | 35 |
| 4.5 | 55 | 21 | 65 | 60 |
| 5 | 55 | 35 | 80 | 40 |
| 5.5 | 50 | 55 | 80 | 21 |
| 6 | 55 | 21 | 65 | 45 |
| 8 | 57 | 21 | 65 | 35 |

The LittleMachineShop.com website has a change gear calculator to help you select the correct gears at https://littlemachineshop.com/ChangeGearCalc.

For normal turning, use the following gears.

| A | B | C | D |
|---|---|---|---|
| 20 | 80 | 20 | 80 |

The change gears are commonly tight on the shaft when new. You might need to use a screwdriver behind them to pry them off.

Gear positions B and C are on a hollow shaft that comes off easily when the retaining socket head cap screw is removed. Then you can use an arbor press to remove the gears from the hollow shaft. Be careful that you do not lose the key.

Gear position D has a spacer behind the gear. When you only use three gears, put the spacer on outside the gear so the gear will align with the gear in position B.

In the change gear chart, many of the combinations have “Any” in column B. This means that you can use a gear with any number of teeth in position B. It is an idler and does not affect the overall gear ratio. Use a gear that makes it easy to properly engage the gears. For these combinations, you can use any gear for position C; this gear acts only as a spacer and does not engage the other gears.


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*To change the gears:*

1. Using a 4 mm hex wrench, remove the change gear cover.
2. Using 4 mm and 5 mm hex wrenches, remove all three retaining socket head cap screws from the ends of the shafts.
3. Use a 10 mm end wrench to loosen the nut that is on the back end of the shaft in position B-C. This allows the B-C shaft to move in the adjustment slot.
4. Use a 14 mm end wrench to loosen the nut on the arc below and behind the gear in position D. This allows the entire bracket on which the B-C shaft mounts to swing down.
5. Remove all the gears.
6. If you will be using three gears, remove the spacer behind the D position gear from the end of the lead screw. Be careful that you do not lose the key.
7. Replace the gears with the gears shown in the chart for the threads per inch that you want to cut.
8. If you will be using three gears, replace the spacer outside the D position gear on the end of the lead screw. Be sure to insert the key.
9. If you are using three gears, place any gear in position C to act as a spacer.
10. Replace the three retaining socket head cap screws from the ends of the shafts. Snug, but do not tighten, until the gear train is adjusted.
11. Move the B-C shaft until all the gears are properly engaged.
12. Use a 14 mm end wrench to tighten the nut on the arc below and behind the gear in position D.
13. Use a 10 mm end wrench to tighten the nut that is on the back end of the shaft in position B-C.
14. Using 4 mm and 5 mm hex wrenches, tighten the three retaining socket head cap screws on the ends of the shafts.
15. Using a 4 mm hex wrench, replace the change gear cover.

## *Threading Dial*

When cutting screw threads on a lathe, you must make multiple cutting passes to cut the threads to full depth. The threading dial helps you align the cutting tool with the emerging thread before you start a cutting pass.

The gear on the bottom of the threading dial's shaft engages the lead screw. The dial turns when the half nuts are not engaged with the lead screw. When the half nuts are engaged, the carriage moves and the threading dial stops turning.


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The gear on the threading dial has 16 teeth, and the lead screw has 16 threads per inch, so each revolution of the threading dial represents one inch of motion of the carriage. Each of the eight divisions on the dial represents 1/8" of motion.

> Chris' Tip: You simply can not use the threading dial when cutting metric threads. Leave the lead screw engaged all the time. When you are done with a pass, note the position of the cross slide dial. Back the cross slide out about two turns. Then run the lathe in reverse until you are back at the starting point.

If you are cutting 16 threads per inch, you can engage the half nuts when the threading dial is on any line. Since a line represents 1/8" of travel, it will always align with a thread groove.

If you are cutting 13 threads per inch, you must only engage the half nuts when the threading dial is at 1. Since 13 and 16 have no common factors but 1, you must only engage the half nuts at even inch increments of motion.

The following table shows where you can engage the half nuts for various threads per inch.

| Threads per inch | Dial divisions |
|---|---|
| 12 | 1, 3, 5, 7 |
| 13 | 1 |
| 14 | 1, 5 |
| 16 | Any |
| 18 | 1, 5 |
| 19 | 1 |
| 20 | 1, 3, 5, 7 |
| 22 | 1, 5 |
| 24 | Any |

| Threads per inch | Dial divisions |
|---|---|
| 26 | 1, 5 |
| 28 | 1, 3, 5, 7 |
| 32 | Any |
| 36 | 1, 3, 5, 7 |
| 38 | 1, 5 |
| 40 | Any |
| 44 | 1, 3, 5, 7 |
| 48 | Any |
| 52 | 1, 3, 5, 7 |


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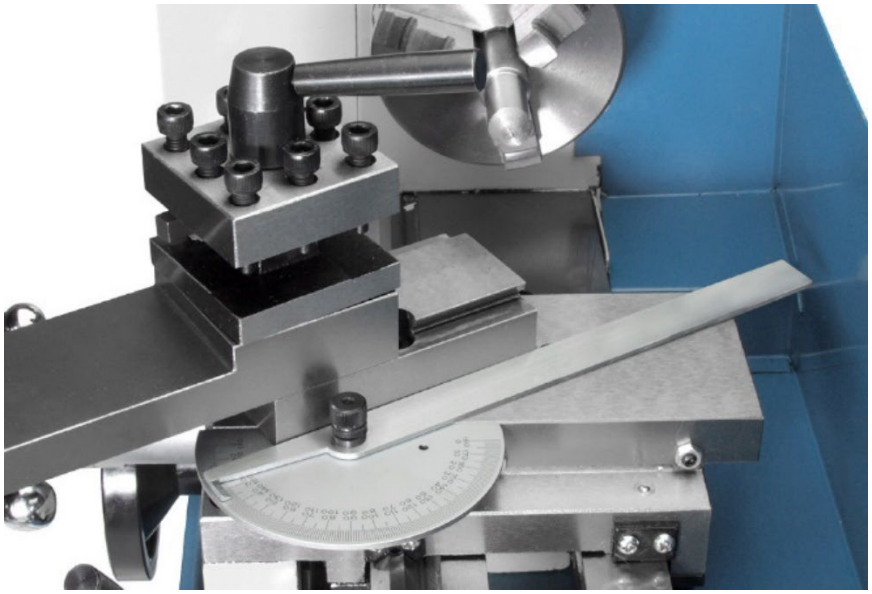
## *Tool Bit*

For threading, the tool bit is ground to the profile of the thread. For most threads, this is a point with a 60° included angle. The front of the tool should have about 10° of relief. No back rake is used. The left side should have about 8° of relief, and the right side should have about 10° of relief. The tip of the tool should have a flat that is 1/8 of the thread pitch.

## *Compound Angle*

Set the compound rest at a 29.5° angle from a line perpendicular to the axis of the lathe. This allows you to advance the tool with the compound rest. At this angle the tool cuts only on the left side of the thread form. This helps prevent chatter that might result from cutting the entire V form of the thread at once.

Chris' Tip: Use an accurate protractor when setting the compound rest. The protractor on the lathe is not accurate enough.

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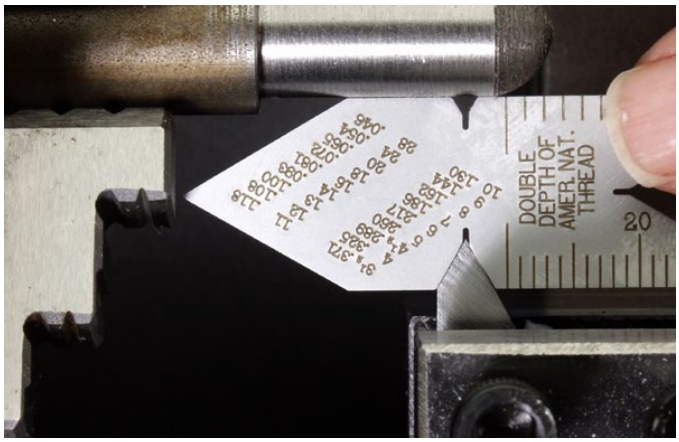
## Setting the Cutting Tool

Even though the compound rest is set at an angle to the workpiece, the thread cutting tool must be set square to the workpiece. A center gage makes this setting possible. A center gage has several V-shaped cutouts. They can be used to check the tool bit as you grind it, and to check the angle of the tool with respect to the workpiece.

### *To align the tool bit to the work:*

1. Ensure that the point of the tool bit is set at the center height of the lathe.
2. Place the center gage between the point of the tool bit and the workpiece. Leave enough room so that the center gage can be moved back and forth so you can check each side of the tool bit separately.




3. Align the tool bit to the sides of the V-shaped cutout in the side of the center gage.
4. Secure the tool bit in position.
5. Advance the tool bit until the point just makes contact with the workpiece.
6. Zero the cross slide dial. Hold the cross slide feed handle and rotate the graduated dial.

## Threading Process

It takes several passes to cut a thread to full depth. You must follow the correct procedure during each pass to ensure the thread is cut correctly.

Use the power feed forward/neutral/reverse lever to engage the lead screw drive. The carriage should move from right to left (toward the head stock) to cut right-hand threads, or from left to right (away from the head stock) to cut left-hand threads.

### *For each pass in cutting threads:*

1. Move the carriage to the beginning of the cut.
2. Advance the cross slide to the initial position. For the first pass, you are already there. For additional passes, advance it 2 complete turns to the 0 mark.
3. Advance the compound rest to move the tool bit into the work. For the first pass, this should be only 0.001". For additional passes, it should be 0.005 to 0.010".
4. Start the lathe. Run it at the lowest speed that develops sufficient torque to make the cut.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5. When the threading dial reaches an appropriate mark, engage the half nuts. Note that you must be right on the mark. The half nuts will also engage halfway between each mark, but this will ruin your thread.
6. When the tool reaches the end of the thread, disengage the half nuts.
7. Back off the cross slide exactly 2 turns.

After you have made the first pass, which should leave just a spiral mark on the workpiece, use a thread gage to check that you are cutting the correct number of threads per inch.

Use a nut or the matching part to tell when you are done cutting the thread.

## Common Accessories

You will soon find that the purchase of a lathe is just an initial step. There are many tools and accessories that you will need to get full use from your lathe. LittleMachineShop.com carries a full selection of accessories. Following are some common accessories used with the mini lathe, a small sampling of the complete LittleMachineShop.com line.

### *Cut-Off Tool Holder*

Cutting-off, or parting, is a common procedure on a lathe. Once you have turned a piece on the end of a rod, you use a cut-off tool to part the work from the rod. Cut-off tools come in various widths, from about 0.040" wide, to much wider than can be used with a mini lathe. Most cut-off blades are 1/2" tall, which means they will not fit in the tool post that comes with the mini lathe.

The cut-off tool holder shown below fits in the standard tool post and holds a 1/2" tall cut-off blade.

LittleMachineShop.com part number 1551. This cut-off tool holder fits in the standard 4-way tool post (and most other tool posts) and holds 1/2" tall cut-off blades.


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## *Quick Change Tool Post*

The standard mini lathe tool post has positions for up to four tools. While this is useful, the standard mini lathe tool post does not have the capability to hold boring bars or cut-off tools without an adapter of some sort.

Quick-change tool posts provide several advantages. They provide an easy way to adjust the height of the tool bit. They provide a quick way to change from one tool to the other. They provide a way to hold several different kinds of tools, usually including turning tools, cut-off blades, and boring bars. And they are indexable, meaning that you can remove a tool, and when you replace it, it returns to the same position, with no adjustment necessary.

LittleMachineShop.com part number 3112. This is a very high quality quick-change tool post for the HiTorque Mini Lathe.

It holds tools up to 3/8" shank.
The set includes:

- Tool post
- Turning & facing tool holder
- Boring, turning & facing tool holder
- Heavy duty boring tool holder
- Universal parting blade holder
- Knurling, facing & turning tool holder

Chris' Tip: This quick change tool post set is included with Models 7350 & 7450.

## *Indexable Turning Tools*

Indexable turning tools usually come in a set of five tools, providing a range of cutting angles. These tools use indexable inserts, usually made from carbide, but sometimes from high-speed steel. They are called indexable because you can change an insert and the new insert will take the exact position of the insert it replaces. You can resume work with no further adjustments. Indexable inserts are pre-sharpened.

LittleMachineShop.com part number 1669. This set of indexable turning tools includes 5 tools (AR, AL, BR, BL, TE), wrenches, and extra screws. It comes in a fitted case. (The letters designate the angles of the cutting edge.)


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## *4-Jaw Chuck*

The 3-jaw scroll chuck that comes with the mini lathe provides a quick way to clamp round and hexagonal work fairly accurately.

A 4-jaw independent chuck provides several advantages over a 3-jaw scroll chuck. It can hold square or rectangular work, as well as round. Work can be centered more accurately because you adjust each jaw independently. It can hold larger work than the same size 3-jaw chuck. You can offset work in a 4-jaw chuck by clamping it off center.

LittleMachineShop.com part number 1588. 4" 4-jaw chuck. Each jaw is independently adjustable and reversible.

This set includes a chuck key and reversible jaws. The through bore of this chuck is 0.98". The chuck can hold work up to 100 mm (3.94") in diameter.

LittleMachineShop.com part number 2338. 5" 4-jaw chuck. This chuck has a through bore of 1.18" and can hold work up to 125 mm (4.92") in diameter. To mount a 5" chuck on the HiTorque Mini Lathe, you'll need an adapter (LittleMachineShop.com part number 2961).

## *Faceplate*

A faceplate allows you to mount work that can't be held in a chuck. You can bolt odd-shaped workpieces to the faceplate.

LittleMachineShop.com part number 5123. Faceplate for the HiTorque Mini Lathe. The faceplate is 6.29" (160 mm) in diameter and has 8 slots for mounting work.

LittleMachineShop.com part number 2644. Clamping kit for faceplate. This kit includes clamping bars and fasteners to attach work to the faceplate.


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## *Centers and Dogs*

A live center goes in the tailstock and is used to support the end of a long workpiece; it rotates with the workpiece. A dead center goes in the spindle and supports work being turned between two centers. A lathe dog is used to drive work being turned between centers.

The live center is LittleMachineShop.com part number 1189. It has a 2 Morse taper shank. This center fits the tailstock of the mini lathe.

The dead center is LittleMachineShop.com part number 1188. It has a 3 Morse taper shank. This center fits the headstock of the mini lathe. The center has a 60 degree included point angle.

The lathe dog set is LittleMachineShop.com part number 4464. This lathe dog set can handle work up to 1.5" (40 mm).


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## *Steady Rest and Follower Rest*

Steady and follower rests support small diameter work that would otherwise flex too much. A steady rest mounts in a fixed position on the ways of the lathe. A follower rest mounts on the carriage and moves with the cutting tool, providing support where it is needed.

The steady rest is LittleMachineShop.com part number 1197, which can support work up to 1" in diameter. LittleMachineShop.com part number 4673 has a capacity of 2".

The follower rest is LittleMachineShop.com part number 1198.


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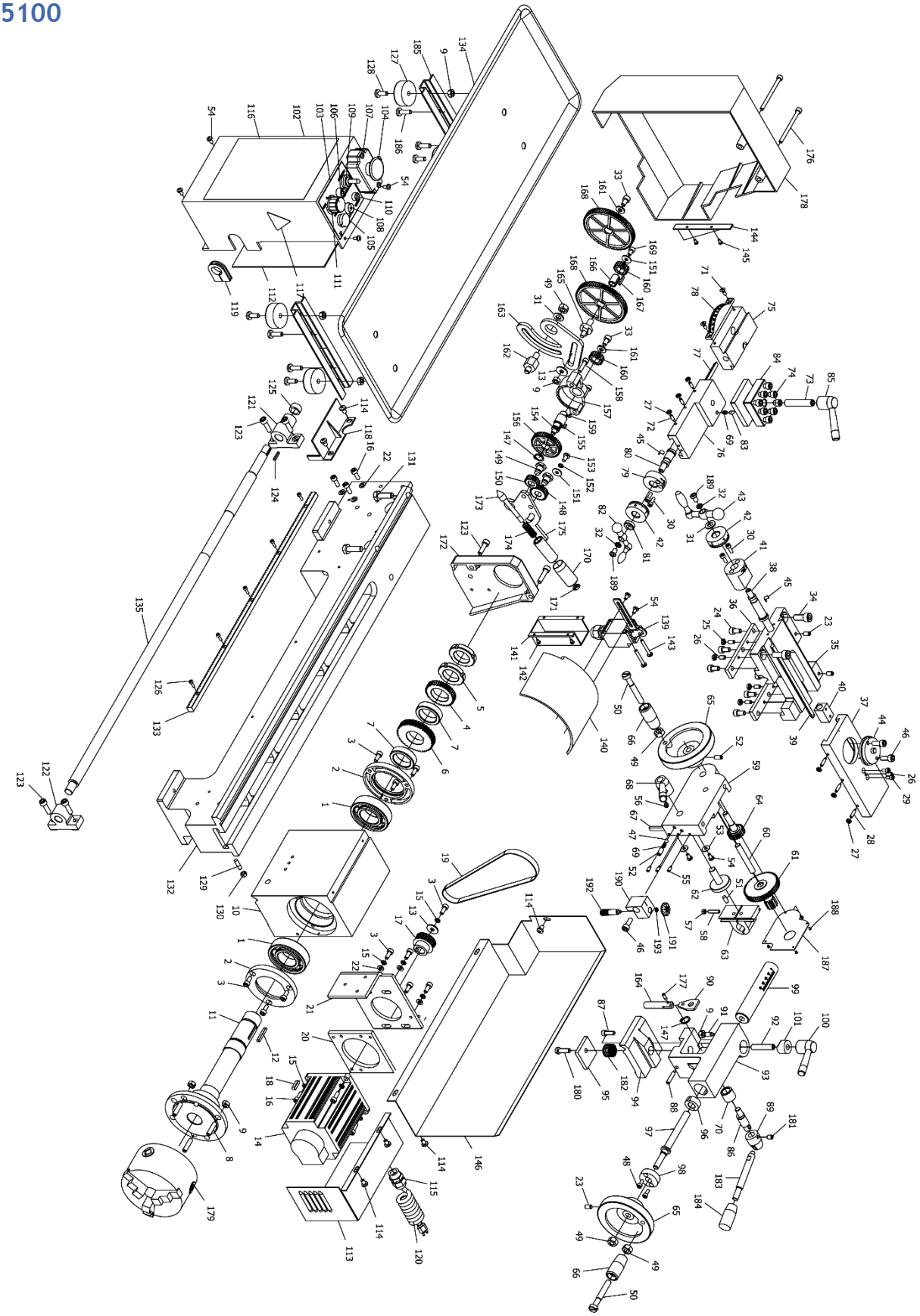
# Parts Diagrams

## Model 5100

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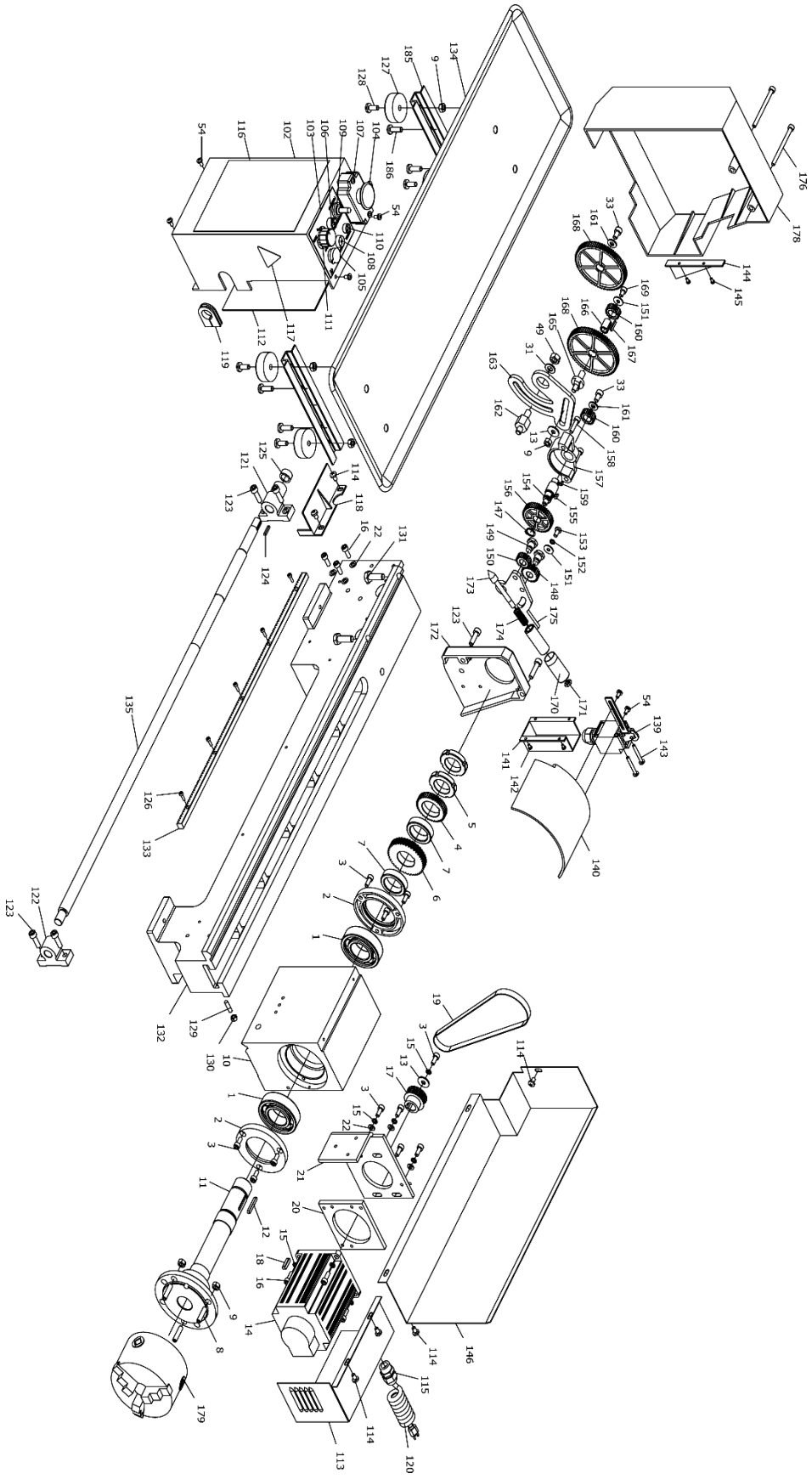
## Model 7350 (1 of 2)

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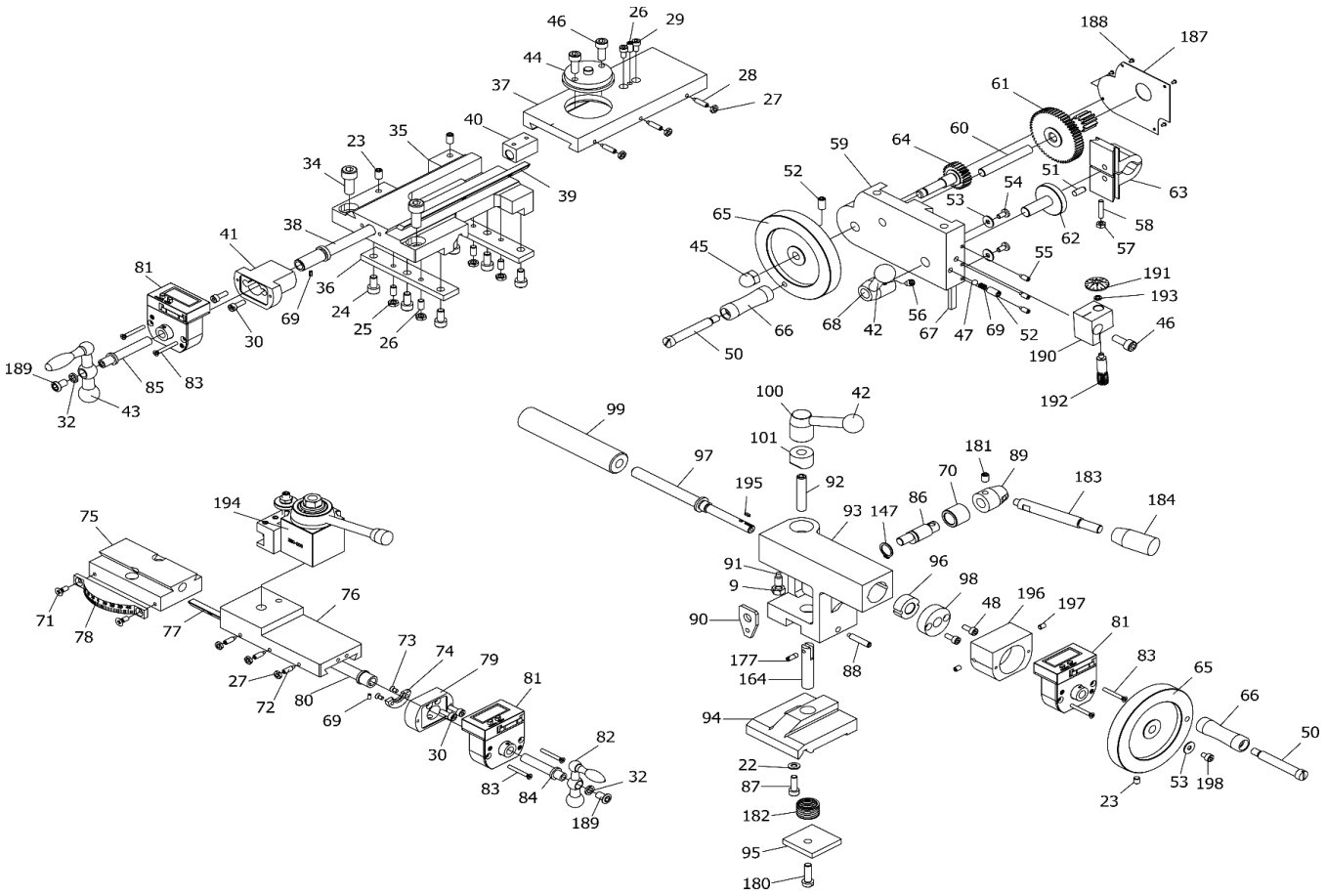
## Model 7350 (2 of 2)





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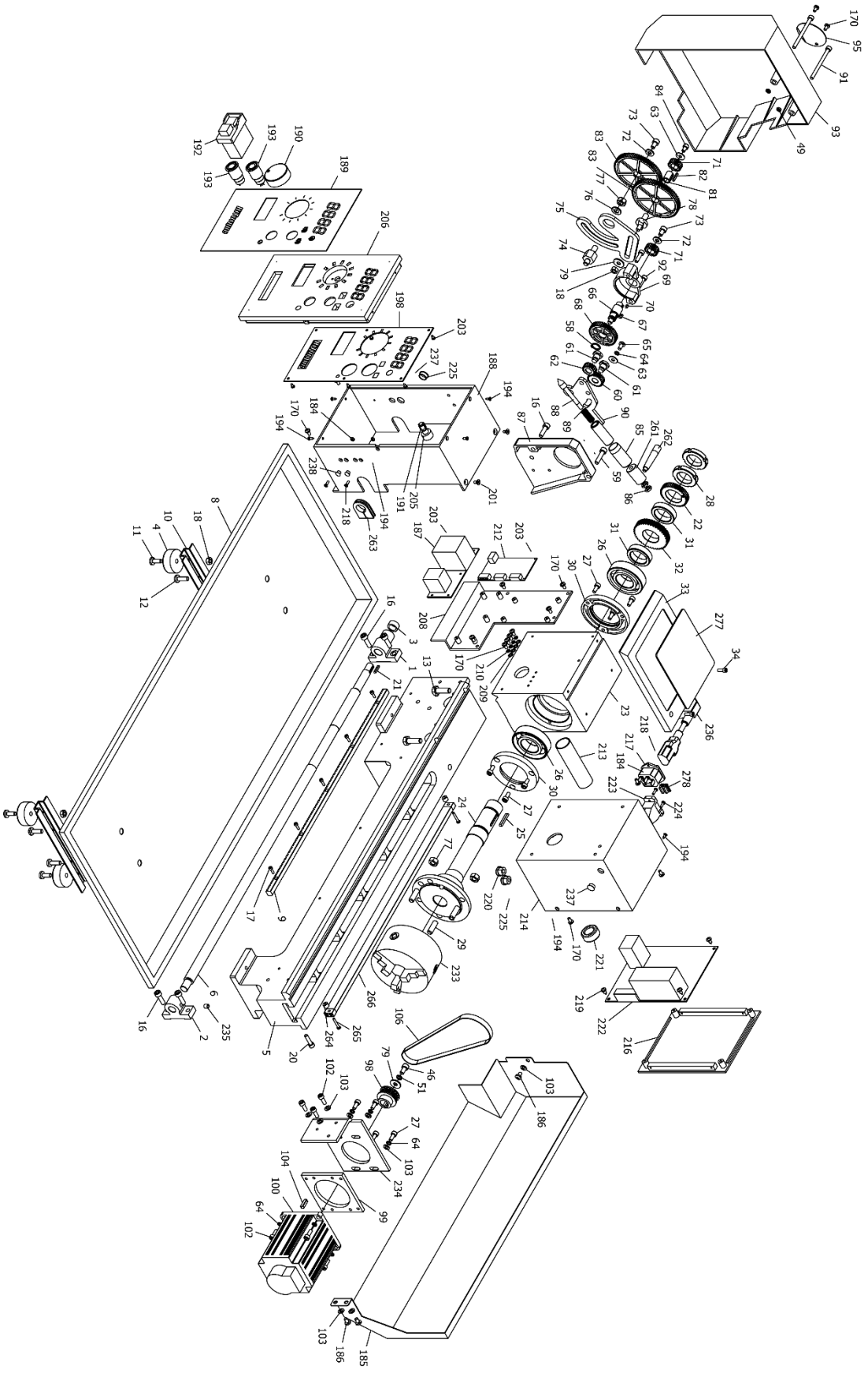
## Model 7450 (1 of 2)

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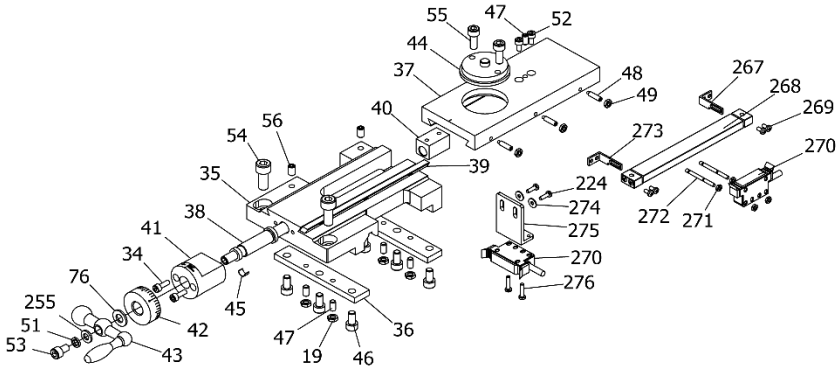
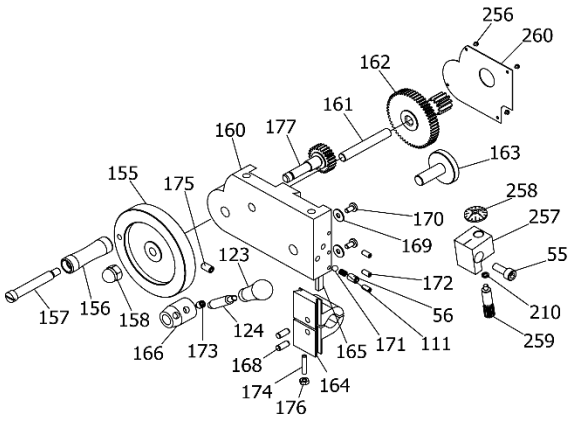
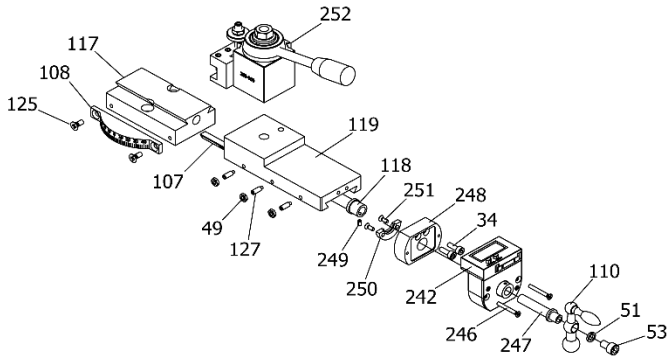
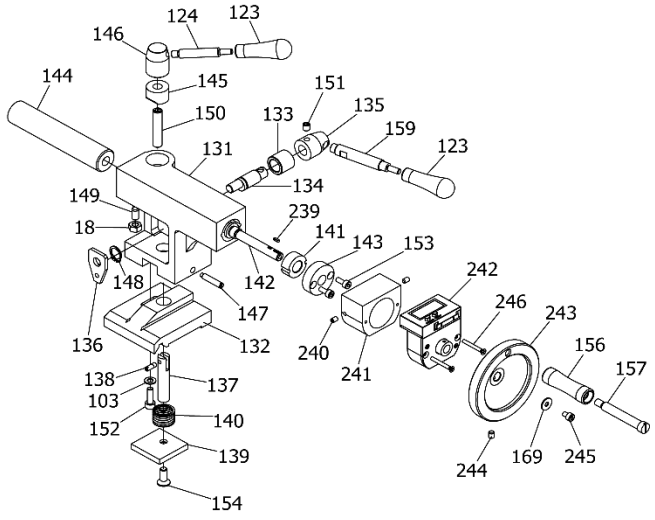
## Model 7450 (2 of 2)





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# Parts List

## Models 5100 and 7350

| Dwg # | Description |
|---|---|
| 1 | Bearing 6206-2RS |
| 2 | Cover, spindle bearing |
| 3 | Cap Screw M5x12 |
| 4 | Spindle gear 45T |
| 5 | Spindle Nut M27x1.5 |
| 6 | Timing pulley |
| 7 | Spacer, 11 mm |
| 8 | Flat Point Screw M6x25 |
| 9 | Nut M6 |
| 10 | Headstock casting |
| 11 | Spindle |
| 12 | Key 4x28 |
| 13 | Washer M6 |
| 14 | Brushless motor 500W |
| 15 | Spring Washer 5 |
| 16 | Cap Screw M5x14 |
| 17 | Timing pulley |
| 18 | Key 5x18 |
| 19 | Timing belt 100T |
| 20 | Motor plate |
| 21 | Motor bracket |
| 22 | Washer M5 |
| 23 | Set Screw M6x10 |
| 24 | Cap Screw M6x12 |
| 25 | Thin nut M5 |
| 26 | Screw M5x10 |
| 27 | Thin nut M4 |
| 28 | Dog point screw M4x16 |
| 29 | Cap screw M4x8 |
| 30 | Cap screw M4x12 |
| 31 | Washer M8 |
| 32 | Lock washer M6 |
| 33 | Cap Screw M6x10 |
| 34 | Cap Screw M8x20 |
| 35 | Saddle |
| 36 | Saddle retainer |
| 37 | Cross slide |
| 38 | Cross slide screw (5100) |
| 38 | Cross slide screw (7350) |
| 39 | Cross slide gib |

| Dwg # | Description |
|---|---|
| 40 | Cross slide nut |
| 41 | Retainer ***(5100)*** |
| 41 | Retainer ***(7350)*** |
| 42 | Dial (40 Div.) (5100) |
| 42 | Handle (7350) |
| 43 | Crank handle |
| 44 | Swivel disk |
| 45 | Spring, dial (5100) |
| 45 | Acorn Nut, M8 (7350) |
| 46 | Cap Screw M6x16 |
| 47 | Ball, 5 mm |
| 48 | Cap Screw M4x10 |
| 49 | Nut M8 |
| 50 | Screw M8x55 (5100) |
| 50 | Handle Bolt (7350) |
| 51 | Pin 5x12 |
| 52 | Set Screw M6x12 |
| 53 | Washer M4 |
| 54 | Screw M4x8 |
| 55 | Set Screw M4x10 |
| 56 | Set screw M6x8 |
| 57 | Nut M4 |
| 58 | Set screw M4x20 |
| 59 | Apron |
| 60 | Saddle Drive Shaft |
| 61 | Gear 11/54 |
| 62 | Half nut cam |
| 63 | Half nuts |
| 64 | Gear Shaft 24T (5100) |
| 64 | Gear Shaft 24T (7350) |
| 65 | Hand wheel (5100) |
| 65 | Hand wheel (7350) |
| 66 | Handle (5100) |
| 66 | Handle (7350) |
| 67 | Gib, half nut |
| 68 | Handle, half nut (5100) |
| 68 | Handle Base (7350) |
| 69 | Spring 5x10 mm (5100) |
| 69A | Pin 2.5x5 (7350) |
| 70 | Bushing, cam lock |

| Dwg # | Description |
|---|---|
| 71 | Screw M4x10 |
| 72 | Dog point screw M4x12 |
| 73 | Stud M10x50 (5100) |
| 73 | Screw M3x8 (7350) |
| 74 | Cap Screw M6x25 (5100) |
| 74 | Retainer (7350) |
| 75 | Compound rest |
| 76 | Compound rest top |
| 77 | Gib, compound rest |
| 78 | Protractor |
| 79 | Retainer (5100) |
| 79 | Retainer, DRO (7350) |
| 80 | Feed screw (5100) |
| 80 | Feed Screw, DRO (7350) |
| 81 | Dial spacer (5100) |
| 81 | DRO Readout (7350) |
| 82 | Crank handle |
| 83 | Pin, Tool Post (5100) |
| 83 | Screw M3x25 (7350) |
| 84 | Tool post (5100) |
| 84 | Shaft, Compound (7350) |
| 85 | Handle, Tool Post (5100) |
| 85 | Shaft, Cross Slide (7350) |
| 86 | Shaft, eccentric |
| 87 | Cap Screw M5x16 |
| 88 | Dog point screw M5x25 |
| 89 | Hub, Cam Lock Tailstock |
| 90 | Connector, Cam Lock |
| 91 | Dog point screw M6x14 |
| 92 | Stud M8x40 |
| 93 | Tailstock casting |
| 94 | Tailstock base |
| 95 | Foot, Cam Lock |
| 96 | Bushing, Tailstock |
| 97 | Tailstock feed screw (5100) |
| 97 | Tailstock feed screw (7350) |
| 98 | Retainer, tailstock |
| 99 | Quill (5100) |
| 99 | Quill (7350) |
| 100 | Handle, quill clamp (5100) |


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| Dwg # | Description |
|---|---|
| 100 | Handle Base (7350) |
| 101 | Quill Clamp |
| 102 | Control box |
| 103 | Switch label |
| 104 | Power switch |
| 105 | Jack, speed readout |
| 106 | Fuse 10A |
| 107 | Machine Screw M4x16 |
| 108 | Yellow lamp |
| 109 | F/R switch |
| 110 | Green lamp |
| 111 | Knob, speed control |
| 111 | Potentiometer |
| 112 | Motor controller |
| 113 | Motor cover |
| 114 | Machine Screw M5x8 |
| 115 | Strain relief, 16 mm |
| 116 | Specification label (5100) |
| 116 | Specification label (7350) |
| 117 | Lightning label |
| 118 | Protector |
| 119 | Chip guard |
| 120 | Power cord |
| 121 | Left screw bracket |
| 122 | Right screw bracket |
| 123 | Cap screw M6x20 |
| 124 | Key 3x16 mm |
| 125 | Spacer, lead screw |
| 126 | Cap Screw M3x10 |
| 127 | Rubber foot |
| 128 | Machine Screw M6x16 |
| 129 | Set Screw M5x20 |
| 130 | Nut M5 |
| 131 | Cap screw M8x25 |
| 132 | Bed way |

| Dwg # | Description |
|---|---|
| 133 | Rack |
| 134 | Chip tray |
| 135 | Lead screw |
| 136 | Lead screw cover |
| 137 | Washer M4 |
| 138 | Machine screw M4x6 |
| 139 | Limit switch |
| 140 | Chuck guard |
| 141 | Switch cover |
| 142 | Machine Screw M3x5 |
| 143 | Machine Screw M4x30 |
| 144 | Motor pulley cover |
| 145 | Screw M3x6 |
| 146 | Splash guard |
| 147 | Retaining ring M12 Ext. |
| 148 | Pinion 25T |
| 149 | Screw, gear mounting |
| 150 | Pinion 20T |
| 151 | Washer M5 |
| 152 | Lock washer M5 |
| 153 | Screw M5x10 |
| 154 | Shaft, A-Gear |
| 155 | Key 3x8 mm |
| 156 | Gear 45T |
| 157 | Gear mount |
| 158 | Cap screw M5x20 |
| 159 | Key 3x6 mm |
| 160 | Gear 20T |
| 161 | Washer M6 |
| 162 | Stud, change gear |
| 163 | Adjustment plate |
| 164 | Shaft, cam lock |
| 165 | Shaft, B & C gears |
| 166 | Bushing and key |
| 167 | Bushing and key |

| Dwg # | Description |
|---|---|
| 168 | Gear 80T |
| 169 | Cap screw M5x8 |
| 170 | Handle, gear shifter |
| 171 | Thin nut M6 |
| 172 | Drive belt cover |
| 173 | Detent rod |
| 174 | Spring 10x33 mm |
| 175 | Pivot |
| 176 | Cap screw M5x65 |
| 177 | Set pin, M4x11 |
| 178 | Change gear cover |
| 179 | Lathe Chuck |
| 180 | Machine screw M6x20 |
| 181 | Dog point screw M6x8 |
| 182 | Spring 17.6 x 20 mm |
| 183 | Handle mount |
| 184 | Knob 8 mm |
| 185 | Chip tray brace |
| 186 | Cap screw M6x20 |
| 187 | Apron shield |
| 188 | Rivet M2x4 |
| 189 | Cap screw M6x10 |
| 190 | Threading dial housing |
| 191 | Indicator, Threading Dial |
| 192 | Shaft, Threading Dial |
| 193 | Locking Washer M4 |
| 194 | QCTP Body (7350) |
| 195 | Key M2x6 (7350) |
| 196 | Retainer, DRO Cross Slide Screw (7350) |
| 197 | Set Screw M4x6, Flat Point (7350) |
| 198 | Cap Screw M4x6 (7350) |


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## Model 7450

| Dwg PN | Description |
|---|---|
| 1 | Left support |
| 2 | Right support |
| 3 | Spacer |
| 4 | Rubber foot |
| 5 | Bed way |
| 6 | Lead screw |
| 8 | Chip tray |
| 9 | Rack |
| 10 | Support of chip tray |
| 11 | Screw M6x16 |
| 12 | Screw M6x20 |
| 13 | Screw M8x25 |
| 16 | Screw M6x20 |
| 17 | Screw M3x10 |
| 18 | Hexagon nut M6 |
| 19 | Hexagon thin nut M5 |
| 20 | Inner hex. screw M5x20 |
| 21 | Key 3x16 mm |
| 22 | Spindle gear 45T |
| 23 | Spindle box body |
| 24 | Spindle |
| 25 | Key 4x28 |
| 26 | Angular bearing 7206AC |
| 27 | Inner hex. screw M5x12 |
| 28 | Small round nut M27x1.5 |
| 29 | Set screw M8x25 |
| 30 | Oil seal cover |
| 31 | Spacer |
| 32 | Timing gear pulley |
| 33 | Box cover |
| 34 | Screw M4x12 |
| 35 | Saddle |
| 36 | Saddle retainer |
| 37 | Cross slide |
| 38 | Feed screw, cross slide |
| 39 | Gib, cross slide |
| 40 | Nut, cross slide |
| 41 | Positioning scale set |
| 42 | Scale ring |
| 43 | Crank handle |
| 44 | Swivel disk |

| Dwg PN | Description |
|---|---|
| 45 | Spring |
| 46 | Screw M6x12 |
| 47 | Screw M5x10 |
| 48 | Screw M4x16 |
| 49 | Hex thin nut M4 |
| 51 | Lock washer M6 |
| 52 | Screw M4x8 |
| 53 | Cap screw M6x10 |
| 54 | Screw M8x20 |
| 55 | Screw M6x16 |
| 1 | Left support |
| 2 | Right support |
| 3 | Spacer |
| 4 | Rubber foot |
| 56 | Screw M6x10 |
| 58 | Retaining ring |
| 59 | Screw M6x25 |
| 60 | Gear 25T |
| 61 | Gear screw |
| 62 | Gear II 20T |
| 63 | Washer M5 |
| 64 | Lock washer M5 |
| 65 | Screw M5x10 |
| 66 | Shaft, A-gear |
| 67 | Key 3x8 mm |
| 68 | Gear 45T |
| 69 | Gear mount |
| 70 | Key 3x6 mm |
| 71 | Gear 20T |
| 72 | Washer M6 |
| 73 | Screw M6x10 |
| 74 | Stud |
| 75 | Adjustment plate |
| 76 | Washer M8 |
| 77 | Nut M8 |
| 78 | Shaft, B & C |
| 79 | Washer M6 |
| 81 | Bushing |
| 82 | Key |
| 83 | Gear 80T |
| 84 | Inner hex. screw M5x8 |

| Dwg PN | Description |
|---|---|
| 85 | Handle |
| 86 | Thin Nut M6 |
| 87 | Drive belt cover |
| 88 | Locating pin |
| 89 | Spring 10x33 mm |
| 90 | Pivot |
| 91 | Screw M5x65 |
| 92 | Screw M5x18 |
| 93 | Cover |
| 95 | Cover |
| 98 | Motor timing pulley |
| 99 | Motor connect plate |
| 100 | Brushless motor 500W |
| 102 | Screw M5x14 |
| 103 | Washer 5 |
| 104 | Key 5x18 |
| 106 | Timing belt 1.5x100x9 |
| 107 | Gib |
| 108 | Protractor |
| 110 | Crank handle, Compound Rest |
| 111 | Set spring |
| 117 | Compound rest |
| 118 | Compound rest feed screw |
| 119 | Compound rest top |
| 123 | Handle sleeve |
| 124 | Handle lever |
| 125 | Screw M4x10 |
| 127 | Screw M4x12 |
| 131 | Tailstock casting |
| 132 | Tailstock base |
| 133 | Bushing |
| 134 | Eccentric brake tight axis |
| 135 | Hub, Cam Lock Tailstock |
| 136 | Connector, Cam Lock |
| 137 | Shaft |
| 138 | Threaded pin |
| 139 | Foot, Cam Lock |
| 140 | Compress spring |
| 141 | Bushing, Tailstock |
| 142 | Tailstock feed screw |
| 143 | Support flange |


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| Dwg PN | Description |
|---|---|
| 144 | Quill |
| 145 | Stop moving pad |
| 146 | Handle seat |
| 147 | Screw M5x25 |
| 148 | Retaining ring |
| 149 | Screw M6x14 |
| 150 | Screw M8x40 |
| 151 | Set screw M6x8 |
| 152 | Screw M5x16 |
| 153 | Screw M4x10 |
| 154 | Screw M6x16 |
| 155 | Hand wheel |
| 156 | Handle |
| 157 | Handle bolt |
| 158 | Cap nut M8 |
| 159 | Brake handle shaft |
| 160 | Apron |
| 161 | Saddle Drive Shaft |
| 162 | Gear 11/54 |
| 163 | Half nut cam |
| 164 | Half nut |
| 165 | Gib, half nut |
| 166 | Handle |
| 168 | Pin 8x12 |
| 169 | Washer M4 |
| 170 | Screw M4x8 |
| 171 | Ball, 5 mm |
| 172 | Screw M4x10 |
| 173 | Screw M6x8 |
| 174 | Screw M4x20 |
| 175 | Screw M6x12 |
| 176 | Nut M4 |
| 177 | Gear shaft |
| 184 | Hexagon nut M3 |
| 185 | Back cover |
| 186 | Cross head screw M5x8 |
| 187 | DC power supply board |
| 188 | Electrical cover shell |
| 189 | Switch label |
| 190 | Knob cover |
| 191 | Knob block |
| 192 | Solenoid switch |
| 193 | Stop and start button |
| 194 | Screw ST2.9x9.5 |

| Dwg PN | Description |
|---|---|
| 198 | LED light plate |
| 201 | Cross inner screw M4x8 |
| 203 | Screw ST2.9xx6.5 |
| 205 | Potentiometer |
| 206 | Control panel |
| 208 | Base plate |
| 209 | Lock washer 4 |
| 210 | Spring lock washer 4 |
| 212 | Bluetooth Pc board |
| 213 | Hard plastic tube |
| 214 | Back electrical box |
| 216 | Electrical box cover |
| 217 | Socket with fuse box |
| 218 | Cross inner screw M3x10 |
| 219 | Screw ST4.2x9.5 |
| 220 | Line buckle |
| 221 | Magnet ring |
| 222 | PC Board |
| 223 | USB line |
| 224 | Cross head screw M3x10 |
| 225 | Button plug head |
| 233 | K11-100 three-jaw chuck |
| 234 | Motor bracket |
| 235 | Oil cup 6 |
| 236 | Power line |
| 237 | Button plug head |
| 238 | Button plug head |
| 239 | Key M2x6 |
| 240 | Set screw M4x6 |
| 241 | Fixed seat |
| 242 | DRO Readout |
| 243 | Hand wheel |
| 244 | Set screw M5x6 |
| 245 | Inner hex. screw M4x6 |
| 246 | Screw M3x25 |
| 247 | Transitional shaft |
| 248 | Retainer, Compound Rest Screw |
| 249 | Pin, Spring 2.5x5 |
| 250 | Retainer, Compound Rest Screw |
| 251 | Cross inner screw M3x8 |
| 252 | QCTP Body |
| 255 | Flat washer 6 |
| 256 | Signage rivets |
| 257 | Threading dial housing |

| Dwg PN | Description |
|---|---|
| 258 | Indicator, Threading Dial |
| 259 | Button gear |
| 260 | Protect plate |
| 261 | Handle seat |
| 262 | Handle |
| 263 | Protect sleeve |
| 264 | Bracket |
| 265 | Cross head screw M3x20 |
| 266 | X-axis Magnet ruler assembly |
| 267 | Fore-stock (Y-axis) |
| 268 | Y-axis Magnet ruler assembly |
| 269 | Cross head screw M3x6 |
| 270 | Reader |
| 271 | Nut M3 |
| 272 | Double head bolt M3x30 |
| 273 | After-poppet (Y-axis) |
| 274 | Flat washer 3 |
| 275 | X-axis reader fixed seat |
| 276 | Cross head screw M3x14 |
| 277 | Rubber Pad |
| 278 | USB Interface plug |
| 56 | Screw M6x10 |
| 58 | Retaining ring |
| 59 | Screw M6x25 |
| 60 | Gear 25T |
| 61 | Gear screw |
| 62 | Gear II 20T |
| 63 | Washer M5 |
| 64 | Lock washer M5 |
| 65 | Screw M5x10 |
| 66 | Shaft, A-gear |
| 67 | Key 3x8 mm |
| 68 | Gear 45T |
| 69 | Gear mount |
| 70 | Key 3x6 mm |
| 71 | Gear 20T |
| 72 | Washer M6 |
| 73 | Screw M6x10 |
| 74 | Stud |
| 75 | Adjustment plate |
| 76 | Washer M8 |
| 77 | Nut M8 |
| 78 | Shaft, B & C |
| 79 | Washer M6 |


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| Dwg PN | Description |
|---|---|
| 81 | Bushing |
| 82 | Key |
| 83 | Gear 80T |
| 84 | Inner hex. screw M5x8 |
| 85 | Handle |
| 86 | Thin Nut M6 |
| 87 | Drive belt cover |
| 88 | Locating pin |
| 89 | Spring 10x33 mm |
| 90 | Pivot |
| 91 | Screw M5x65 |
| 92 | Screw M5x18 |
| 93 | Cover |
| 95 | Cover |
| 98 | Motor timing pulley |
| 99 | Motor connect plate |
| 100 | Brushless motor 500W |
| 102 | Screw M5x14 |
| 103 | Washer 5 |
| 104 | Key 5x18 |
| 106 | Timing belt 1.5x100x9 |
| 107 | Gib |
| 108 | Protractor |
| 110 | Crank handle, Compound Rest |
| 111 | Set spring |
| 117 | Compound rest |
| 118 | Compound rest feed screw |
| 119 | Compound rest top |
| 123 | Handle sleeve |
| 124 | Handle lever |
| 125 | Screw M4x10 |
| 127 | Screw M4x12 |
| 131 | Tailstock casting |
| 132 | Tailstock base |
| 133 | Bushing |
| 134 | Eccentric brake tight axis |
| 135 | Hub, Cam Lock Tailstock |
| 136 | Connector, Cam Lock |
| 137 | Shaft |
| 138 | Threaded pin |
| 139 | Foot, Cam Lock |
| 140 | Compress spring |
| 141 | Bushing, Tailstock |
| 142 | Tailstock feed screw |

| Dwg PN | Description |
|---|---|
| 143 | Support flange |
| 144 | Quill |
| 145 | Stop moving pad |
| 146 | Handle seat |
| 147 | Screw M5x25 |
| 148 | Retaining ring |
| 149 | Screw M6x14 |
| 150 | Screw M8x40 |
| 151 | Set screw M6x8 |
| 152 | Screw M5x16 |
| 153 | Screw M4x10 |
| 154 | Screw M6x16 |
| 155 | Hand wheel |
| 156 | Handle |
| 157 | Handle bolt |
| 158 | Cap nut M8 |
| 159 | Brake handle shaft |
| 160 | Apron |
| 161 | Saddle Drive Shaft |
| 162 | Gear 11/54 |
| 163 | Half nut cam |
| 164 | Half nut |
| 165 | Gib, half nut |
| 166 | Handle |
| 168 | Pin 8x12 |
| 169 | Washer M4 |
| 170 | Screw M4x8 |
| 171 | Ball, 5 mm |
| 172 | Screw M4x10 |
| 173 | Screw M6x8 |
| 174 | Screw M4x20 |
| 175 | Screw M6x12 |
| 176 | Nut M4 |
| 177 | Gear shaft |
| 184 | Hexagon nut M3 |
| 185 | Back cover |
| 186 | Cross head screw M5x8 |
| 187 | DC power supply board |
| 188 | Electrical cover shell |
| 189 | Switch label |
| 190 | Knob cover |
| 191 | Knob block |
| 192 | Solenoid switch |
| 193 | Stop and start button |

| Dwg PN | Description |
|---|---|
| 194 | Screw ST2.9x9.5 |
| 198 | LED light plate |
| 201 | Cross inner screw M4x8 |
| 203 | Screw ST2.9xx6.5 |
| 205 | Potentiometer |
| 206 | Control panel |
| 208 | Base plate |
| 209 | Lock washer 4 |
| 210 | Spring lock washer 4 |
| 212 | Bluetooth Pc board |
| 213 | Hard plastic tube |
| 214 | Back electrical box |
| 216 | Electrical box cover |
| 217 | Socket with fuse box |
| 218 | Cross inner screw M3x10 |
| 219 | Screw ST4.2x9.5 |
| 220 | Line buckle |
| 221 | Magnet ring |
| 222 | PC Board |
| 223 | USB line |
| 224 | Cross head screw M3x10 |
| 225 | Button plug head |
| 233 | K11-100 three-jaw chuck |
| 234 | Motor bracket |
| 235 | Oil cup 6 |
| 236 | Power line |
| 237 | Button plug head |
| 238 | Button plug head |
| 239 | Key M2x6 |
| 240 | Set screw M4x6 |
| 241 | Fixed seat |
| 242 | DRO Readout |
| 243 | Hand wheel |
| 244 | Set screw M5x6 |
| 245 | Inner hex. screw M4x6 |
| 246 | Screw M3x25 |
| 247 | Transitional shaft |
| 248 | Retainer, Compound Rest Screw |
| 249 | Pin, Spring 2.5x5 |
| 250 | Retainer, Compound Rest Screw |
| 251 | Cross inner screw M3x8 |
| 252 | QCTP Body |
| 255 | Flat washer 6 |
| 256 | Signage rivets |


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| Dwg PN | Description |
|---|---|
| 257 | Threading dial housing |
| 258 | Indicator, Threading Dial |
| 259 | Button gear |
| 260 | Protect plate |
| 261 | Handle seat |
| 262 | Handle |
| 263 | Protect sleeve |
| 264 | Bracket |

| Dwg PN | Description |
|---|---|
| 265 | Cross head screw M3x20 |
| 266 | X-axis Magnet ruler assembly |
| 267 | Fore-stock (Y-axis) |
| 268 | Y-axis Magnet ruler assembly |
| 269 | Cross head screw M3x6 |
| 270 | Reader |
| 271 | Nut M3 |
| 272 | Double head bolt M3x30 |

| Dwg PN | Description |
|---|---|
| 273 | After-poppet (Y-axis) |
| 274 | Flat washer 3 |
| 275 | X-axis reader fixed seat |
| 276 | Cross head screw M3x14 |
| 277 | Rubber Pad |
| 278 | USB Interface plug |


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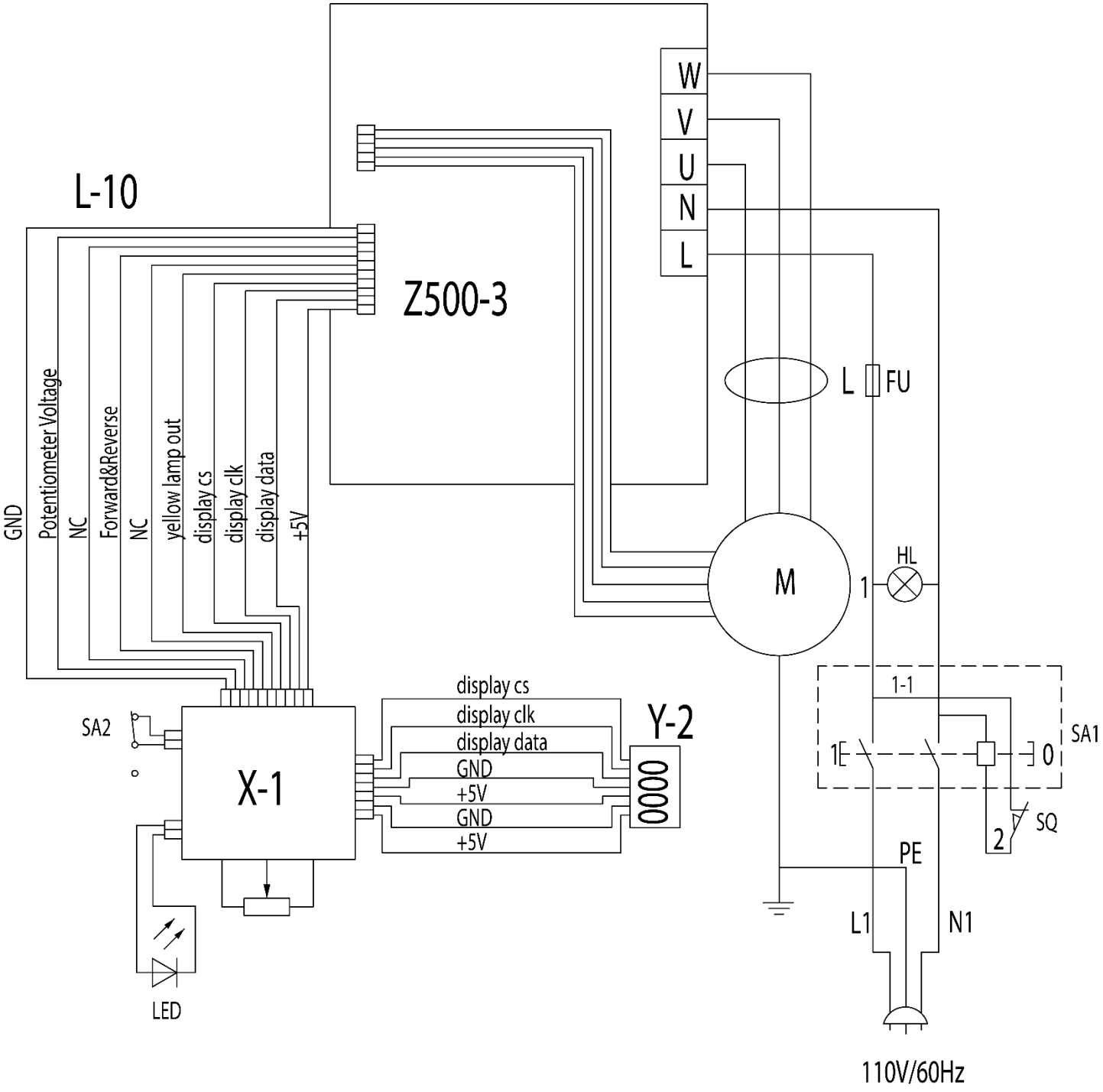
# Wiring Diagrams

## Models 5100/7350 (SC2)





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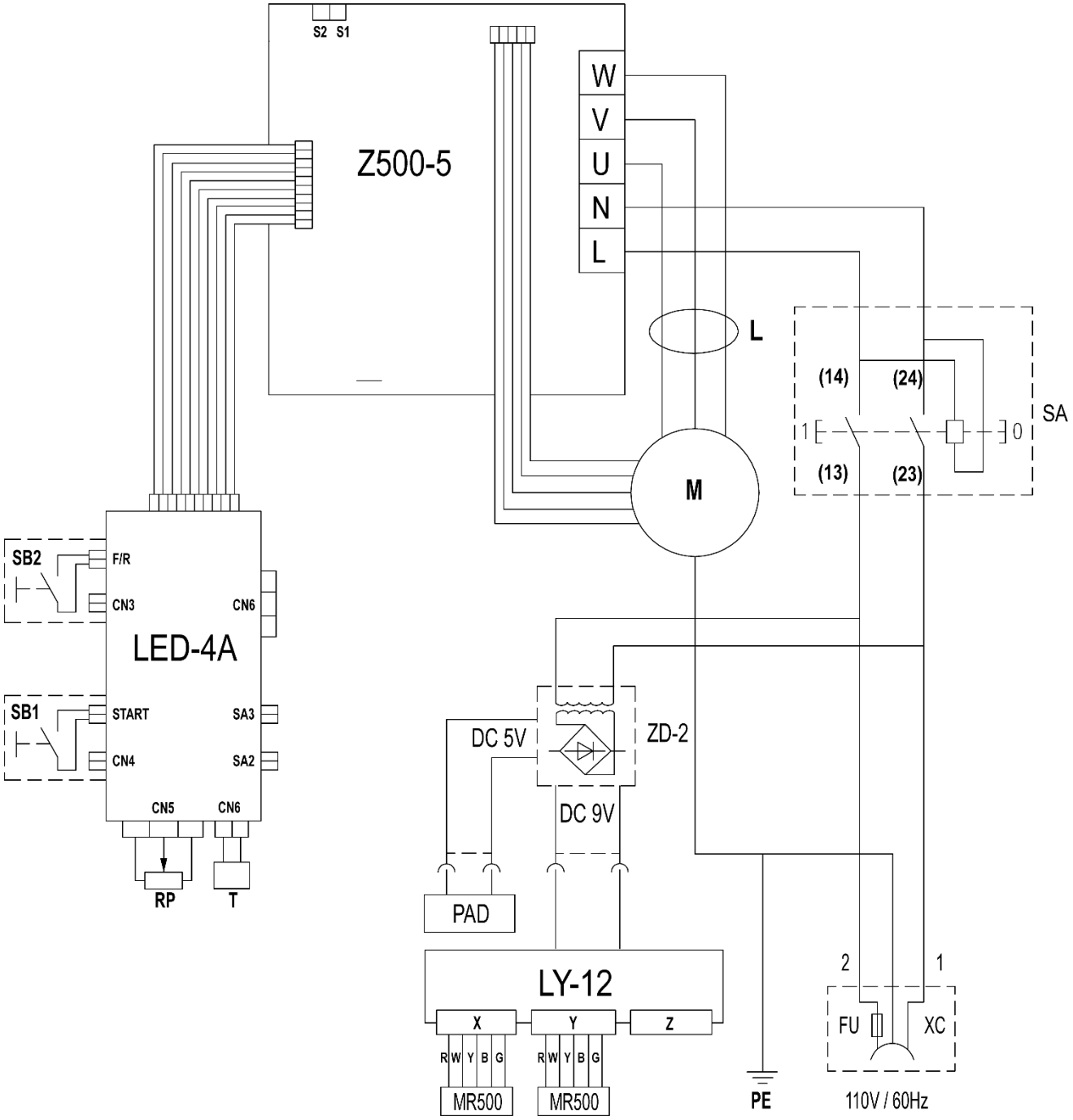
## Model 7450 (SC20)




Z500-5/110V: Main board

LED-4A: LED

SA: Electromagnetic switch

M: Brushless motor

RP: Potentiometer

ZD-2: DC power board

L: Magnet ring

SB2: FWD/REV button

PAD: Tablet

LY-12: Bluetooth board

MR500: Readout unit of MDRO

XC: Socket with fuse

FU: Fuse (10A)

SB1: ON/OFF button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