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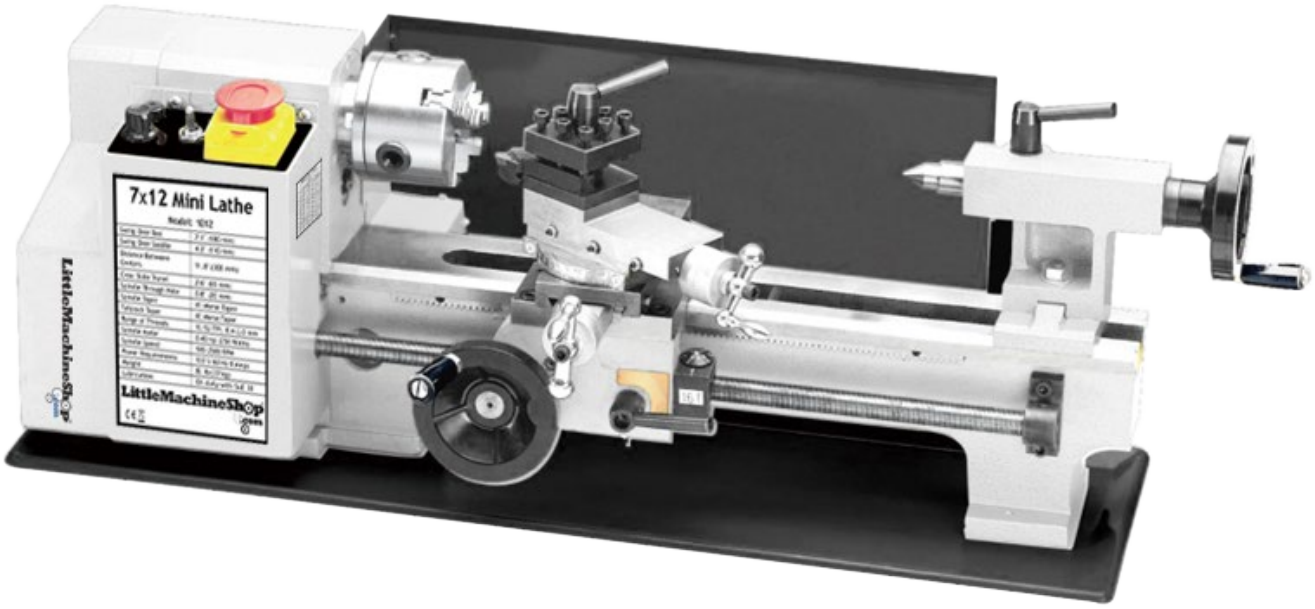
The premier source of tooling, parts,
and accessories for bench top machinists.



Mini Lathe Users Guide

Model 1012 (7" x 12") • Model 1014 (7" x 14")

from LittleMachineShop.com®

Written by LittleMachineShop.com®

The mini lathe users guide in intended to present the general operation of your new machine. It is not intended to be complete reference on machinist's best practices, machine shop safety or as a technical reference. For more comprehensive guides on numerous related topics, visit www.littlemachineshop.com.

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Contents

Mini Lathe Specifications

The following specifications apply to both the 7" x 12" lathe (model #1012) and the 7" x 14" lathe (model #1014). Naturally the distance between centers and weights are model specific.

Swing over bed	7.1" (180 mm)
Swing over saddle	4.3" (110 mm)
Between centers	
Model: #1012	11.81" (300 mm)
Model: #1014	13.78" (350 mm)
Spindle taper	Morse taper 3
Tailstock taper	Morse taper 2
Spindle bore	0.79" (20 mm)
Cross slide travel	2.56" (65 mm)
Compound rest travel	2.17" (55 mm)
Spindle speed	100-2500 RPM
Low	100-1100 RPM (±10%)
High	100-2500 RPM (±10%)
Lead Screw Pitch	16 TPI
Feed rate	0.004" (0.1 mm) / revolution
Dial Graduations	1.0 mm
Range of threads	12-52 TPI (0.3-8 mm)
Power requirements	120 V 60 Hz 5 Amps
Spindle motor output	0.34 hp (250 Watts)
Machine Weight	
Model: #1012	80 lbs (36 kg)
Model: #1014	86 lbs (39 kg)
Crated Weight	
Model: #1012	110 lbs (50 kg)
Model: #1014	119 lbs (54 kg)

Safety Considerations

Always use common sense when using a power tool. Besides the general safety rules for any power tool, following also 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 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, etc.) from the spindle immediately after using them.

Electrical Safety

- Plug the machine into a grounded receptacle. Note that the machine does *not* work properly on a ground fault circuit interrupter (GFCI) 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.
- 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 have 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 machines. 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 workpieces that are not secured into projectiles.
- Be aware that chips and dust from some materials (magnesium, for example) are flammable. Understand the materials you are using.

Unpacking & Preparing for Use

Upon receipt, carefully unpack the lathe and inspect to ensure that no damage was suffered in transit and to account for all parts. Should any damage be apparent, or parts are missing, please contact LittleMachineShop.com immediately (800) 981-9663.

The following accessories come with the mini lathe.

1. Change gears: 30,35,40(2),45,50,55,57,60 and 65 teeth
2. Outside jaws for the 3-Jaw chuck
3. Chuck key for the 3-Jaw chuck
4. MT2 dead center
5. Oil can (plastic)
6. Hex wrenches: 3, 4, 5 and 6 mm
7. Open end wrenches: 8 x 10 mm and 14 x 17 mm
8. 8x8 mm Cutter (DIN4980R)
9. 6 mm drill
10. SANOU drill chuck, 1/2" with 2MT shaft arbor
11. Spare fuse (not shown)
12. 4 rubber feet (not shown)

Initial 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) or denatured alcohol.
3. Coat the surfaces with oil.

See 'Lubrication' for specific recommendations for lubricants.

Mini Lathe Assembly

You will notice that, for transit purposes, the cross slide feed handle (#16) has been mounted in reverse. Remove it, by unscrewing the hex socket head screw securing it, and mount it the correct way round. Then turn all feed handles to ensure they move freely, evenly, and smoothly.

Attach the handles to the rims of the manual feed and tailstock feed hand wheels respectively, ensuring the bolts is tighten and the handle sleeve can free rotating.

The carriage/saddle, cross slide and compound rest adjustments are all factory set to ensure smooth movement in both directions. However, if the adjustments have been upset during transit (indicated by stiff or erratic movement), refer to 'Settings and Adjustments' for the methods of adjustment.

All hex keys and wrench necessary to carry out the various adjustments are supplied together with a chuck key for the 3-Jaw chuck and a spare fuse. The fuse holder is located on the main control panel.

The four rubber feet should be attached to the underside of the bed, using the four M6 head screws, in the tapped holes provided. These screws are also used to secure the chip tray. We strongly recommend that, to provide maximum stability and additional safety, you secure the lathe to a firm foundation as described under 'Mounting the lathe'.

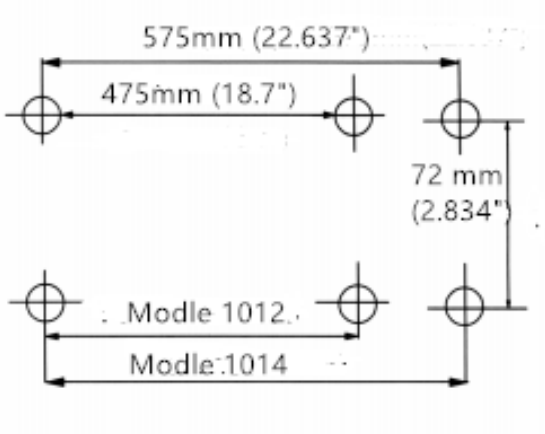
The three external jaws for the 3-Jaw self-centering chuck, extend the capacity of the chuck, and are discussed in greater detail under 'Accessories'.

Mounting the Lathe

The lathe should be mounted on a sturdy workbench of sufficient height so that you do not need to bend your back to perform normal operations. The ***lathe is very heavy***. With an assistant, lift it onto a sturdy surface or workbench. Remove all traces of preservative with a good quality solvent. then lightly oil all machined surfaces.

Provide adequate overhead lighting so that you will not be working in your own shadow.

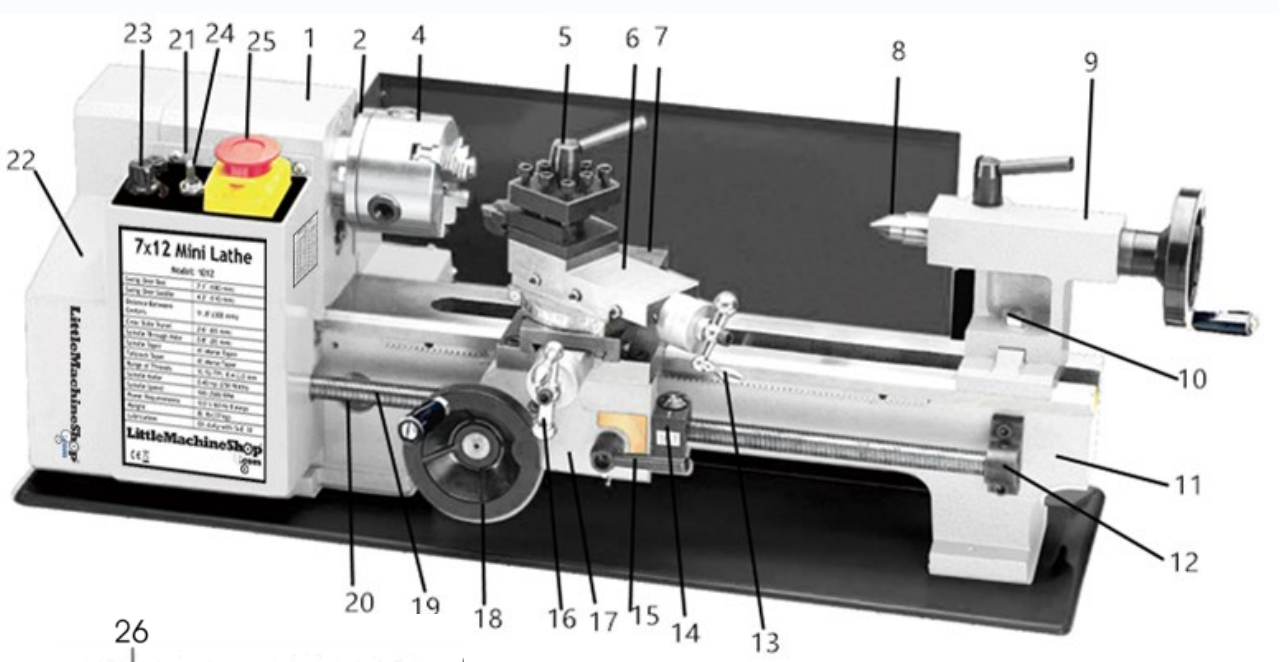
We strongly recommend that the machine be firmly bolted to a sturdy workbench using the tapped holes used to secure the feet to the lathe. This is to provide added stability and consequently, safety.

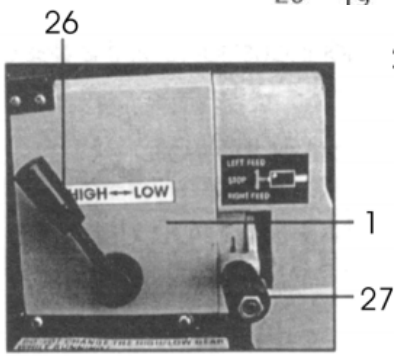


To do this, remove the four M6 screws which secure the machine (if already fitted) and discard the feet. Drill fo bench top at the dimensions shown in the diagram at rig M6 bolts or screws with flat washers (not supplied), secu ensuring the chip tray is in place.

If you do not wish to permanently mount your lathe to y is to secure the lathe to a 18 mm thick plywood board w dimension of 800x400 mm, the mounting holes being cer lathe is in use, the board should be clamped to workbench using C-clamps.

Mini Lathe Components





Rear view of headstock

Legend

1. Headstock
2. Spindle
4. 3-Jaw Chuck
5. Tool Post
6. Cross Slide
7. Compound Rest
8. Tail-stock Center
9. Tail-stock
10. Tail-stock Securing Nut
11. Ways (bed or rail)
12. Right leadscrew bracket
13. Compound Rest Feed Handle
14. Threading Dial Indicator
15. Automatic Feed Lever
16. Cross Slide Feed Handle
17. Apron
18. Manual (Saddle) Feed Handle
19. Leadscrew
20. Motor Brush Cap
21. Fuse Box
22. Running Gear Cover
23. Variable Speed Control Knob
24. Forward/Off/Reverse Switch
25. Emergency Stop Switch
26. High/Low Speed Range Lever
27. Leadscrew Forward/Neutral/Reverse Lever

Headstock

The motor provides a direct drive to the spindle via an internal tooth type belt. Spindle speed is variable and is regulated by the speed control knob (23). Located on the main control panel.

The spindle is provided with an internal No. 3 Morse taper to accommodate a center for use with a face plate or turning clamp.

The 3-jaw self-centering chuck (4) is mounted on the spindle flange. The standard size is 80 mm. Visit LittleMachineShop.com to view 4-jaw lathe chucks and other accessories.

To remove the chuck, simply remove the three securing nuts to the rear of the flange allowing it to be pulled free together with the three mounting studs.

Three external jaws are also supplied which extend the capacity of the chuck. Their uses and method of assembly is described in 'Using A Lathe Chuck'.

The spindle has 6 holes drilled in its flange to accommodate a range of fixtures such as a face plate, 4-jaw chuck etc. (See 'Optional Accessories').

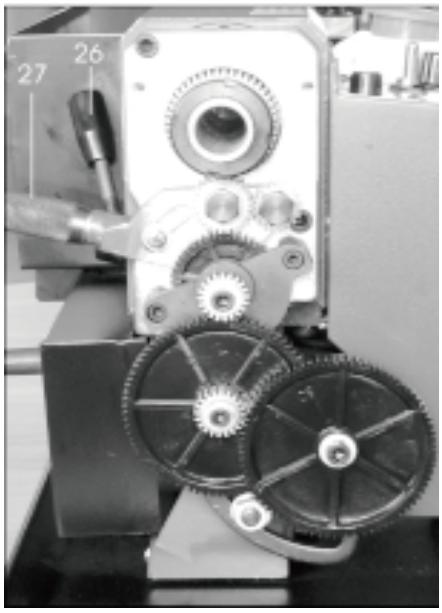
Gear Drive

The drive and change gears are protected by a cover (22), which is removed by unscrewing the two securing hex screws.

The change gears, shown in Fig. 2. drive the lead screw. The lead screw acts as a worm and by operating the auto feed lever (15), which engages a nut with the lead screw, drive is transmitted to the carriage/saddle and consequently the cutting tool; thereby providing a power feed for thread cutting or general turning operations. The rotational speed of the lead screw, and hence the rate of feed of the cutting tool, is determined by the gear configuration. This is explained in greater detail under 'Changing Gears for Cutting Threads'.

The drive to the lead screw may be disconnected by operating the forward/neutral/reverse lever (27). And the same lever is used to drive the lead screw in a forward or reverse direction.

Fig.2



Tailstock

The tailstock (9) uses a nut (10) and bolt to tighten on the tailstock on the ways (11). Loosening the nut will allow the tailstock to be moved laterally along the ways.

The tailstock quill has an internal No. 2 Morse taper for use with the center provided. Revolving live centers and drill chucks are also available from LittleMachineShop.com (See 'Optional Accessories').

Carriage/Saddle

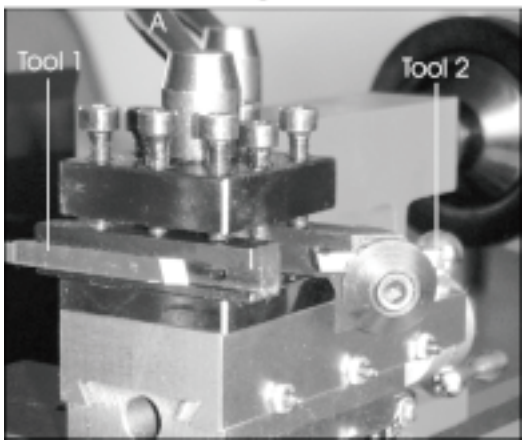
The saddle carries the cross slide (6) onto which is mounted the compound rest (7) with tool post (5), allowing precise operations to be performed. It may be driven by the lead screw, via a driver nut, to provide automatic feeding when the auto feed lever (15), mounted on the apron (17), is operated.

The position of the tool is affected by turning the cross slide feed handle (16), which moves it across the lathe, and the carriage/saddle or manual feed handle (18), which moves it longitudinally. Additionally, the compound rest feed handle (18) may be used to move the tool by small amounts at right angles to the cross slide. The slide may be set at an angle to the cross slide so that short tapers or bevels may be cut. This is described in greater detail under 'Bevel Cutting'.

The cross slide and compound rest feeds are provided with a scale. These are used to move the tool by precise amounts, one division being equivalent to 0.001" (0.025 mm). As the feed handle is turned, the scale also rotates. The scale on the cross slide feed may also be held stationary while the handle is turned. Allowing the scale to be 'zeroed'. The way this is used is discussed in greater detail under 'Turning Setup'.

The tool post carries 8 hex socket head screws which are used to secure a cutting tool in any desired position. Four tool bits may be mounted for quick and easy changes. Two are shown mounted.

Fig.3



The tool post is rotated by slackening the lever (A) on its top enough so the post can be lifted slightly and then turned to the desired position.

ALWAYS ensure the post, and hence the tool, is secured by tightening the lever firmly before attempting to cut.

Motor

The lathe comes with a 250 Watt 0.34 hp motor. It is not recommended that you disassemble the motor. Brushes may be replaced as described under 'Maintenance'. For all other servicing and repairs, please contact LittleMachineShop.com.

Lathe Operations and Maintenance

Starting Procedure

1 Set Forward/Off/Reverse switch to off. (C)

2 Stop button open. (B)

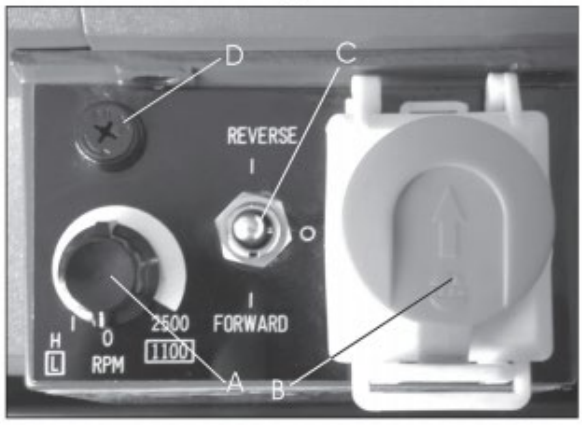
3 Speed knob fully counter-clockwise (A)

4 Now switch the Forward/Off/Reverse (F/O/R) switch to the desires position. (C)

5 Turn the speed control for the speed required. (A)

6 If at any time the yellow led light is on, the Machine will not run. This is a (Fault Condition). The lathe will remember this fault until the F/O/R is switched OFF. (C)

Fig.5



- If you overload the lathe, or stop the lathe with the emergency stop button, you will cause a (fault condition), you will then have to set the F/O/R switch to the position for a couple of seconds to reset the fault light to get it to operate again.
- If you always use the F/O/R switch to stop and start the lathe you will not cause a fault condition and it will be quicker to use.
- **CAUTION**: Always turn the speed control to the minimum speed position before starting the lathe with the speed control set to a higher speed can damage the speed control circuit board.
- Run for a total of 5 minutes during which time gradually increase spindle speed to its Maximum. Run for at least 2 minutes at this speed before stopping the machine and Disconnecting from the main supply.
- Check that all components are still secure and working freely and correctly. Check also to ensure the mountings are secure.
- Should any adjustments be necessary, refer to the appropriate section under 'Settings and Adjustments'.

Other Considerations Each Time You Start the Lathe

1. Take all necessary precautions noted previously and ensure the work piece can rotate fully without obstruction.
2. Always have the speed range set to its lowest possible RPM before switching machine on.
3. Set the F/O/R switch on the main control panel, to the FORWARD position.
4. Engage or ensure the auto feed lever is disengaged, depending upon whether automatic feed is required. *IMPORTANT: This should ALWAYS be a deliberate, conscious action.*

NOTE: If Auto feed is required, the lead screw forward/neutral/reverse lever should be set to FORWARD. If auto feed is not required, the lever may be set to Neutral. To do this, grasp the knurled handle and pull out against spring pressure. Holding the handle in this position, move the lever until the point end is in the middle pit mark in the casing.

5. Proceed to start the machine as described previously.
6. If you are done working, or if the machine is to be left unattended, turn the F/O/R switch to the OFF position then disconnect from the wall outlet.

ATTENTION: The power supply system has an automatic overload protective device. If the machine is overloaded, the motor will automatically shut down, and the yellow light will bel light it means meet some problem like overloaded happen. To restart, turn the F/O/R switch to OFF clear any trouble from the machine before attempting restart, check machine speed rang and set to minimum speed. When ready to operate again place directional switch set position. adjust speed as required.

Maintenance

For maximum performance, it is essential that the lathe be properly maintained.

Before Use

Always inspect before use. Any damage should be repaired, and maladjustments rectified. Damage to machined surfaces should be repaired with an oil stone. Test by hand to ensure smooth operation of all parts before use.

Apply a few drops of oil to the oil ways at both lead screw bearings (at each end bracket) and add more once or twice during the day if used continuously. It will be necessary to remove the gear train cover to oil the left-hand bearing.

Apply a few drops also to the compound rest oil way, located on the slides' top surface, between the two socket head screws.

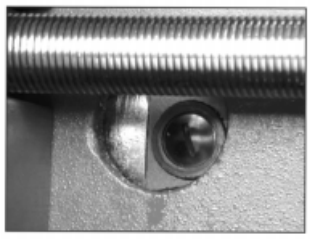
After Use

Remove all chips and debris from the machine and thoroughly clean all surfaces. If coolant had been used, ensure it has completely drained from the tray. Components should be dry, and all machined surfaces should be lightly oiled. Always remove cutting tools and store them in a safe place.

Motor Brushes

The motor brushes may be changed by unscrewing the caps, visible at the front and rear of the machine, beneath the headstock, as shown in Fig 11.

Fig.11



Cleaning

The maintenance you perform most often is cleaning. Keeping swarf (chips, shavings, and debris) from 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.

Lubrication

We recommend the use of two lubricants on your lathe.

- Where oil is required, we recommend Mobil 1 synthetic motor oil. Mobil 1 far exceeds the lubrication needs of the mini lathe and maintains a good surface film between applications.
- Where grease is required, we recommend Lubriplate 630-AA lithium (white) grease. Lithium grease is a plastic-friendly grease that is easy to find and easy to use.

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	

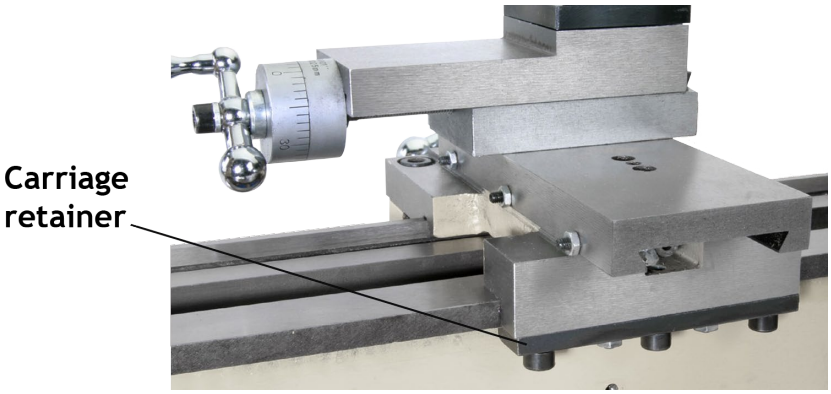
The spindle and countershaft bearings are deep groove ball bearings that are shielded and do not require additional lubrication.

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.



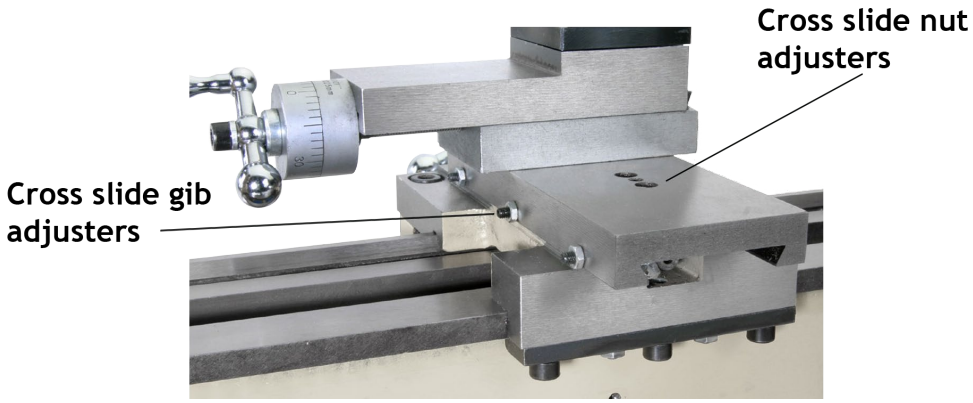
There are several fasteners in the carriage retainers. The socket head cap screws are used to adjust the position of the retainers. The setscrews and lock nuts lock the adjustments in place.

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.
1. Slightly loosen all three setscrews on the side of the cross slide.
2. Snug each setscrew equally. This will lock the cross slide in position.
3. Loosen each setscrew 1/8 turn to allow the cross slide to move.
4. While holding the setscrews from turning, tighten the lock nuts.
5. 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.

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.

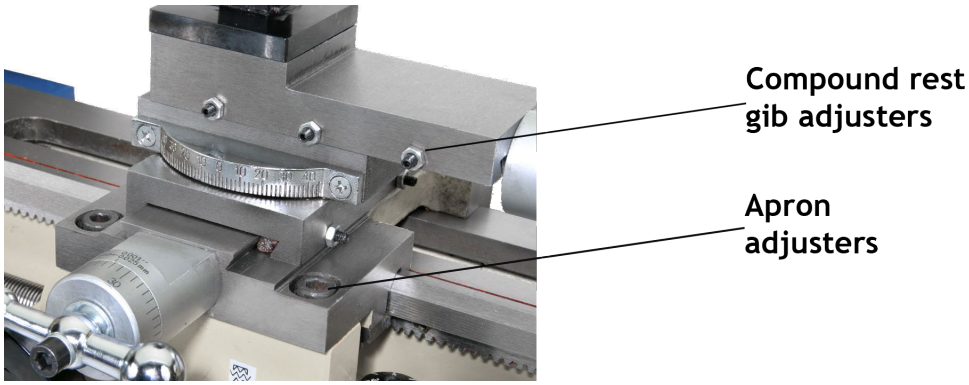
The two outer screws tip the nut off horizontal to reduce the endplay in the threads. The center screw locks the adjustment in place.

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.

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.

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.

Overview of Lathe Operations

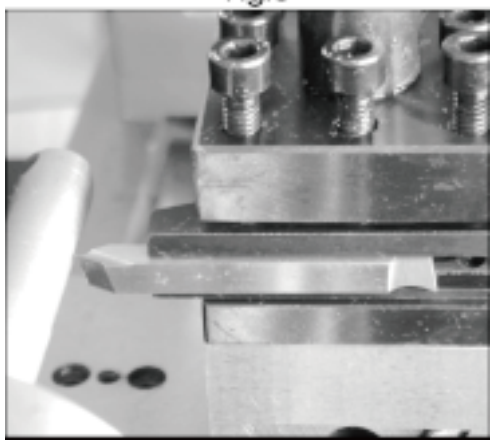
Basic Turning

Before starting the machine as described above, it is check that the setup for the type of work to be carried out is fully checked.

The following notes are guidelines as to how to set up the lathe to carry out a simple turning operation.

Always plan your work. Have drawings or a plan on hand, together with any measuring instruments you may require, such as micrometers, calipers etc.

Fig.6



Turning Setup

Select a cutting tool that will produce the desired cut and mount it in the tool rest with as little overhang as possible. Securing it with the three socket head cap screws in the manner shown in Fig. 6. (Ideally, the overhang should be approx. 10 mm but not more than 15 mm for a straight tool). It is IMPORTANT to ensure that the tip of the cutting tool is on the horizontal center line of the work, or very slightly below it. On no account should it be above the center line. When necessary, shims should be used beneath the tool to achieve the correct height. Or, if the tip is too high, the only recourse is to select another tool or grind down the tip.

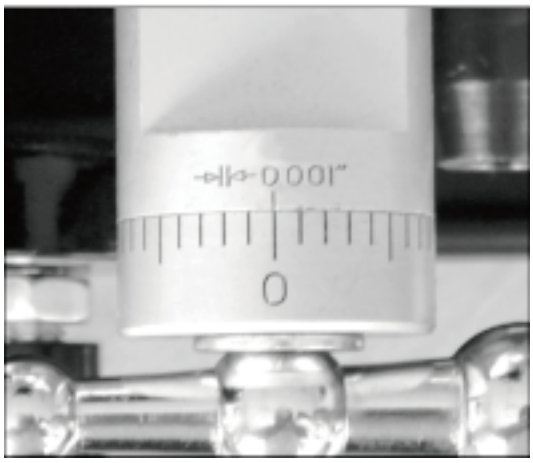
To check take the tip is at the correct height, position the tool so that the tip coincides with the point of the tailstock center. If necessary, adjust using shims, grind down the cut- ting tool tip, or select another tool.

When satisfied, mount the work either in the chuck or on a faceplate. And, if necessary, use the tailstock center for additional support if the work cannot be adequately secured by the chuck, or if it is a long place or of small diameter. Additionally, 'Steadies' or rests may be used, which are described in greater detail under 'Accessories'. If the Tailstock is not to be used, you may remove it completely by slackening off the securing nut at its bade and sliding it free of the bed.

It may be necessary to adjust the position of the compound rest or reposition the work in the chuck to guarantee that there is adequate clearance.

When satisfied, retract the cutting tool, and crank the carriage/saddle away from the headstock, then crank the cutting tool up to the work along the length to be cut while rotating the work by hand using the chuck. Continue to advance the cutting tool slowly until it just touches the surface. Record this position by zeroing the scale on the cross slide, i.e., turn the moveable scale until the zero marks coincide, (see diagram opposite). Once zeroed, retract the cross slide one complete turn, then move the carriage/saddle until the tool is a short distance from the right-hand edge of the work. Crank in the cross slide again one full turn until the zero marks line up.

Fig.7



IMPORTANT: If you go past the zero marks, back off again at least one half of a turn, then slowly bring the marks back together. Whenever you use the scale, as an indicator, to advance the cross slide or compound rest, ALWAYS use this procedure to align the marks, this is to take up any backlash or other clearances in the gearing and slides etc.

Continue to turn the handle an amount equivalent to your desired depth of cut.

NOTE: We recommend that for rough cutting, you do not exceed 0.001" (0.25 mm) as your depth of cut.

The setup is now complete to begin your cutting operation, but, before starting, check the position of:

a. Auto feed lever. Ensure it is in the UP position for manual feed.

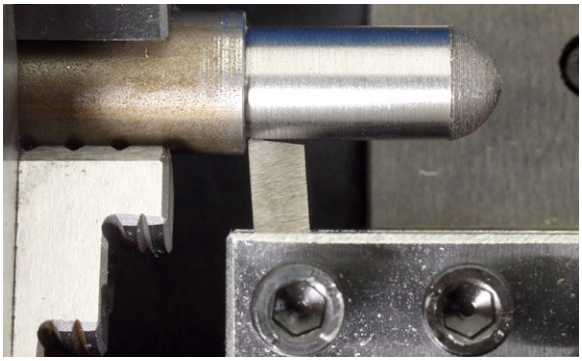
b. If auto feed is not required, set the forward/neutral/reverse lead screw lever to 'Neutral'.

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 Web site has a calculator to help you determine appropriate cutting speeds at http://littlemachineshop.com/Reference/CuttingSpeeds.php.
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 Auto 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.

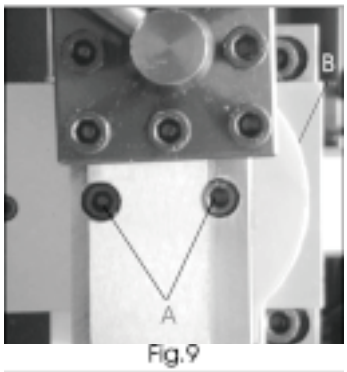
For turning, the change gear train is configured with 20 tooth gears in positions A and C, and 80 tooth gears in positions B and D. This is the way the lathe comes from the factory and is how you should reset it after threading. If you haven't changed the gearing, this is the way your lathe is configured.

To turn with auto 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/neutral/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 Web site has a calculator to help you determine appropriate cutting speeds at http://littlemachineshop.com/Reference/CuttingSpeeds.php.
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.
11. Be sure to move the power feed forward/neutral/reverse lever to the neutral position when you have completed the turning operation.

Bevel Cutting

Fig.8



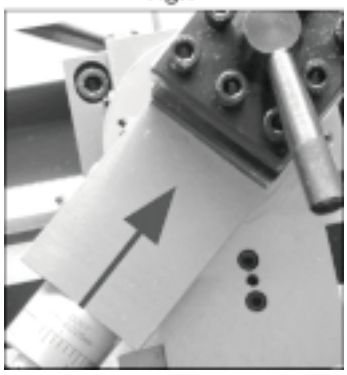
Bevel cutting involves the use of the compound rest, which is mounted on the cross slide and set at right angles to it (indicated by the zero mark on the body of the cross slide) for all normal cutting operations.

To set the compound rest so that the cutting tool will cut a bevel, first retract the slide until the two socket head screws (A) are revealed as shown in Fig. 8.

Loosen the screws sufficiently to allow the compound rest to be turned to the desired angle, as indicated on the scale, and secure the slide in this position by retightening the socket head screws.

The taper, or bevel, is cut by setting the cross slide appropriately then using the compound rest feed handle to advance the cutting tool in the direction of the arrow as shown in Fig. 9.

Fig.9



Screw Cutting

This operation requires a degree of skill and accuracy and should not be attempted unless you are completely familiar with all aspects of the lathe. Essentially, the carriage/saddle will move towards the headstock under power, the same as cutting with auto feed, except the rate of feed is greater, as determined by the gear configuration. The cutting tool, therefore, is moving ever closer to the rotating chuck. Great care and concentration must be exercised to ensure that the two do not meet when the machine is operating, as the possible damage caused could be disastrous.

The lathe is supplied with a lead screw that will produce Imperial Threads in a range from 12 to 52 threads per inch, or metric threads in a range from 0.4-2.0 mm pitch. It is important to remember that the type of thread you need to cut (i.e., UNF, BA, BSP, BSW etc.), will be totally dependent upon the cutting tool profile, as profiles differ from thread to thread. For detailed information regarding screw cutting techniques, cutting tools, etc., you should consult a suit- able handbook or obtain advice and/or training from a qualified person.

The general procedure for screw cutting is as follows:

1. Try to get as much distance from the chuck to the end of the proposed screw thread as possible, and if your design allows, cut a 'run-off' into the work piece which is of a smaller diameter than the root diameter of the proposed screw thread.
2. Install the appropriate gears for the thread required, and correctly mount the cutting tool. Set your required depth of cut and position the tool ready to begin cutting.

Note: Depth of cut is vitally important and may be calculated or obtained from an appropriate reference manual.

3. Take all necessary precautions previously stated and start the machine with the automatic feed lever in its' disengaged position (UP).
4. Engage the auto-feed lever sharply, turn the forward/neutral/reverse lever switch to 'Forward'. The lever is shown in the lathe components drawing as #27 and is positioned on the rear of the machine.
5. As the tool approaches the end of the desired thread, turn the switch button to 'Off'. Do not disengage the auto-feed lever.
6. Retract the tool, using the cross slide feed handle, noting the exact position on the scale and the exact number of turns.
7. Turn the switch to 'Reverse', the carriage/saddle crank back to the beginning and turn switch to 'Off'.
8. Restart the tool by winding 'IN' the cross slide the exact number of turns previously wound 'OUT' and then continue to wind 'IN' the to the desired depth of cut.
9. Repeat the step 4 and 5. Proceed in this manner until the thread is completed.

Facing

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

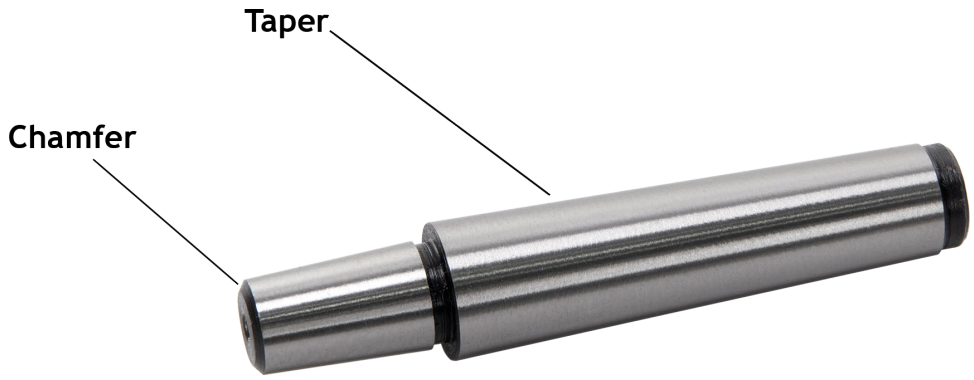
To face a workpiece:

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 Web site has a calculator to help you determine appropriate cutting speeds at http://littlemachineshop.com/Reference/CuttingSpeeds.php.
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.



Using A Lathe Chuck

The lathe comes with a 3-jaw self-centering lathe chuck. The chuck is mounted directly to the spindle. Visit LittleMachineShop.com to see our complete line of lathe chucks if you need a 4-jaw chuck or a larger chuck to use on this lathe.

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.

Changing Chuck Jaws

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

The standard 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 1/4 turn to engage jaw 1.
6. Slide jaw 2 into the next slot counterclockwise from jaw 1 when you are looking toward the headstock.
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.

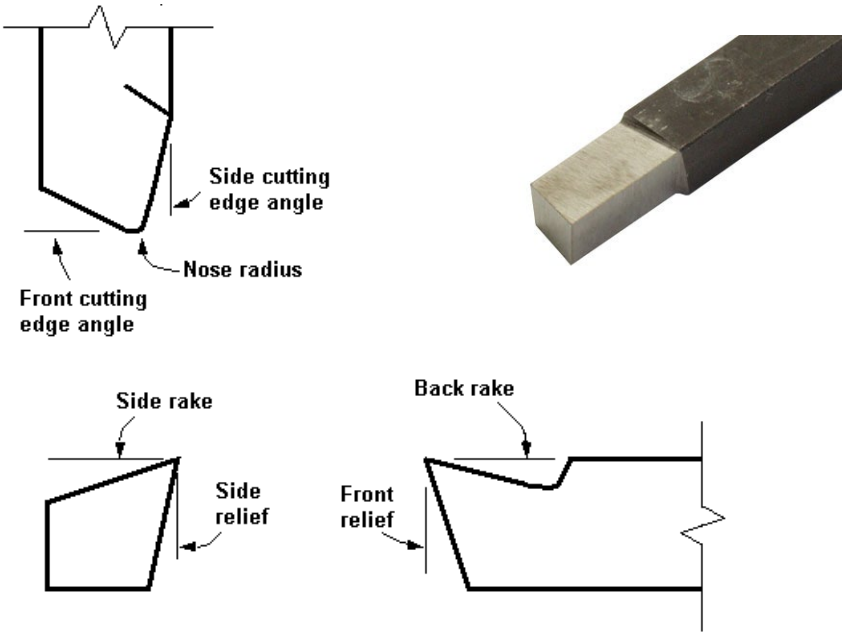
Grinding Tool Bits

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.



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 relieve 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.

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

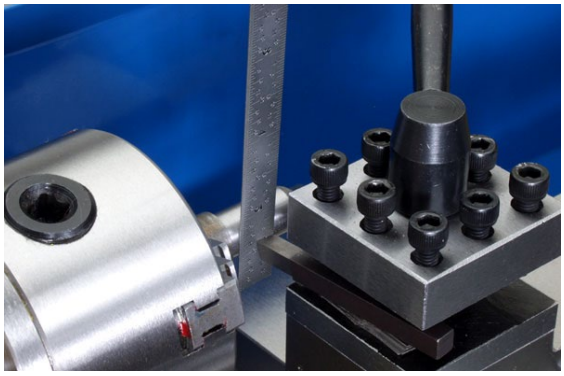
Tool Post

The tool bits are held securely by the tool post. This mini lathe comes with a four sided tool post that can be rotated so that more than one tool can be secured for use and you can change between cutting tools as needed by loosening and then retightening the top lever.

The tool post is designed for 5/16" cutting tools. If you wish to use bigger cutters, see 'Quick Change Tool Post' below or contact LittleMachineShop.com.

Adjusting Tool Bit Height

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



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.

Quick Change Tool Post

One of the most versatile upgrades you can make to your lathe is the addition of a Quick Change Tool Post. Quick Change Tool Posts (QCTP) are sold as sets or the tool post and tool holders can be purchased individually to fit specific needs.

A QCTP is the easy way to adjust the tool bit height. Virtually all Quick Change Tool Posts incorporate a mechanism for easily adjusting the tool bit height.

Quick Change Tool Posts come in different size standards and the individual tool holders can have different angles for holding the cutting tool. Care should be taken to ensure that you buy the correct size for your lathe. This mini lathe uses an OXA size tool post and the tool holders should have horizontal cutting angles. Visit LittleMachineShop.com and view product number 3112 for a QCTP set to fit this lathe. http://lmscnc.com/3112

Changing Gears for Cutting Threads

The lathe gears drive the lead screw by a gear on the spindle. The gear ratio will determine the rotational speed of the lead screw with relation to the spindle, i.e., one turn of the spindle will turn the lead screw an amount determined by the gear ratio. The series of gears that drive the lead screw are called change gears because you change them to achieve different ratios, impacting the leadscrew, resulting in different possible thread pitches when cutting.

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.

NOTE: The factory setup for the lathe provides for normal turning using the power or auto feed, and the gear configuration is as follows:

Fig A: Gear A (20T) Gear B (80T) Gear C (20T) Gear D (80T)

Fig A

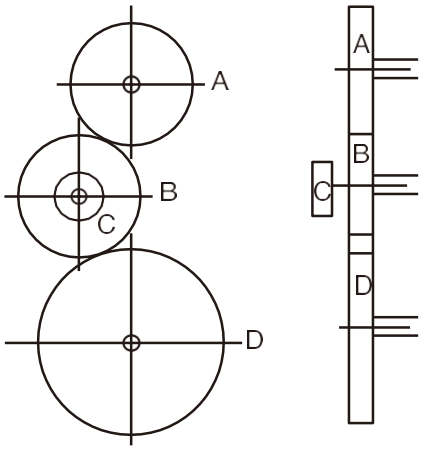
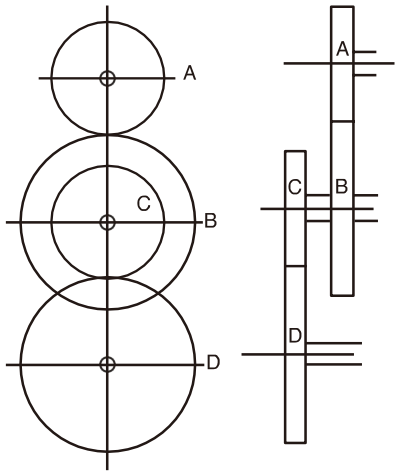


Fig B



The change gear charts (see below) shows the thread sizes that may be cut using different gear configurations shown in corresponding columns.

The actual thread produced will be totally dependent upon the profile of the cutting tool. It is not within the scope of this manual to provide detailed information regarding types of cutting tool, cutting speeds, and working with various types of material etc., and it is strongly advised that you consult appropriate handbooks or seek advice from a qualified person.

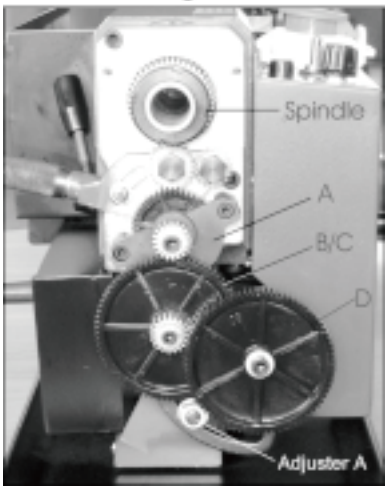
Remove the gear train cover which is secured with two socket head screws. Gear A may be considered as the 'driver', and Gear D as the 'driven' gear.

When a simple gear train is configured, as previously illustrated in Fig. A the gear at B acts as an idler and its size is therefore irrelevant - any convenient gear will suffice to connect A and D. This is denoted by a blank space in the column in the gear chart.

The positions of the shafts carrying gears A and D are fixed, therefore all adjustments are carried out on the shaft carrying gears B and C and the Adjuster 'A', shown in Fig. 10.

1. Unscrew the hex socket head screws, securing gears A and D, followed by the screw securing gears B and C.
2. To allow the gears B and C to disengage completely and to provide for easier reassembly, unscrew the nut securing the shaft carrying B and C, and the nut securing the adjuster A.
3. Remove the gears, taking care to retain the small keys on each shaft, and replace with those necessary to produce your screw thread. They may be mounted either way round. The number of teeth on each gear is clearly marked, Replace the securing screws, ensuring the flat washer gears up against the gear hub in each case.

Fig.10



NOTE: If a compound gear train is required, as shown in Fig, B ensure the spacer, which is keyed to the shaft carrying gear D, is located on the shaft BEFORE the gear, to align gear D with gear C.

4. Proceed to move the shaft carrying B and C and the adjuster 'A' so that all gears mesh correctly, then tighten the adjuster securing nuts. This may take one or two attempts but make sure there is as little backlash as possible without being over-tight, (Turn the spindle by hand to test for backlash).
   Replace the cover and secure with the two hex socket head bolts.

Note: To change the gears, ensure the machine is switched OFF and disconnected from the wall outlet.

Gear Chart for Cutting Imperial Threads (Inch)

The change gear chart shows the thread sizes that may be cut using the gear configuration shown in corresponding columns.

Threads Per Inch	Gear A	B	C	D
12	40	65	/	30
13	40	65	60	30
14	40	65	/	35
16	40	65	/	40
18	40	65	/	45
19	40	50	60	57
20	40	65	/	50
22	40	65	/	55
24	40	65	/	60
26	40	60	/	65
28	20	65	/	35
32	20	65	/	40
36	20	65	/	45
38	20	50	60	57
40	20	65	/	50
44	20	65	/	55
48	20	65	/	60
52	20	65	/	65

Gear Chart for Cutting Metric Threads (mm)

With a lead screw designed for TPI threading, you can also cut American Standard Metric Threads. The following chart shows typical threading setup for metric. To explore a wider range of threading options, visit the LittleMachineShop.com Change Gear Threading Calculator page. https://littlemachineshop.com/reference/change_gears.php

mm	Gear A	B	C	D
0.4	20	50	40	60
0.5	20	50	/	60
0.6	40	50	30	60
0.7	40	50	35	60
0.8	40	50	40	60
1.0	20	60	/	30
1.25	50	40	/	60
1.5	40	60	/	40
1.75	35	60	/	30
2.0	40	60	/	30

The addition of a 21-tooth change gear will increase accuracy of metric threading on a mini lathe. Visit LittleMachineShop.com to learn more. http://lmscnc.com/2459

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.

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.

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.

> ***Note: You simply cannot 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 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.

Threading Dial Divisions

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
26	1, 5
28	1, 3, 5, 7
32	Any

Threads per inch	Dial divisions
36	1, 3, 5, 7
38	1, 5
40	Any
44	1, 3, 5, 7
48	Any
52	1, 3, 5, 7

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 headstock) to cut right-hand threads, or from left to right (away from the headstock) 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.
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.

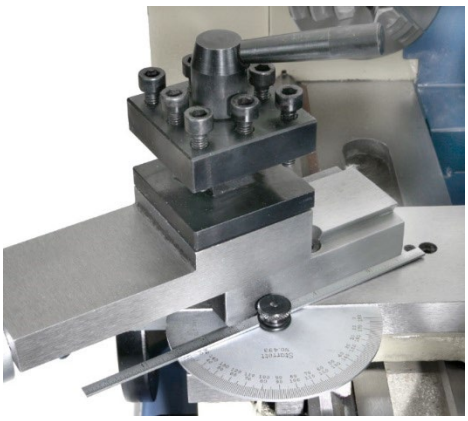
After you have made the first pass, which should leave just a spiral mark on the workpiece, use a thread gage to check that you are cutting the correct number of threads per inch.

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

Tool Bits

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



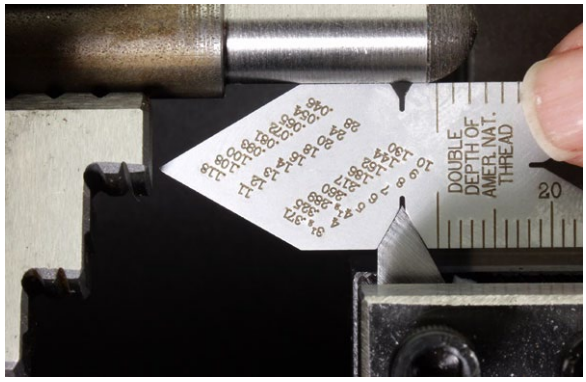
Set the compound rest at a 29.5° angle from a line perpendicular to the axis of the lathe. This allows you to advance the tool with the compound rest. At this angle the tool cuts only on the left side of the thread form. This helps prevent chatter that might result from cutting the entire V form of the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

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 contacts the workpiece.
6. Zero the cross slide dial. Hold the cross slide feed handle and rotate the graduated dial.

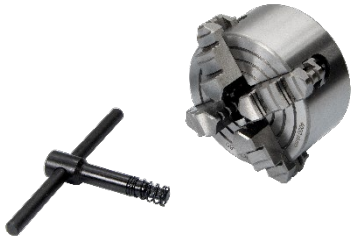


Optional Accessories

A complete range of accessories are available for your mini lathe. Below are some of the most common accessories however for a full range of accessories and upgrades, visit LittleMachineShop.com and view 7 x 10/12/14 Mini Lathe (C2/C3) Accessories or view our catalog for accessories, tooling and upgrades.

Common Accessories

4-Jaw 3" lathe chuck (80 mm)
LittleMachineShop.com part # 1175



Steady Rest
LittleMachineShop.com part # 1197

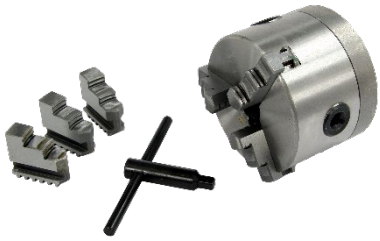
Follower Rest
LittleMachineShop.com part # 1198

Live Center (Tailstock - 2MT short)
LittleMachineShop.com part # 1189

Live Center (Spindle - 3MT)
LittleMachineShop.com part # 3702

Face plate - 160 mm diameter
(Only use with 80 mm 3-Jaw chuck.)
LittleMachineShop.com part # 1199

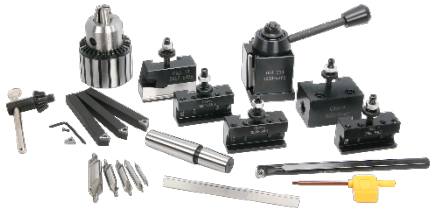
3-Jaw 4" Lathe chuck with Adapter (100 mm)
LittleMachineShop.com part # 1941



4-Jaw 4" Lathe chuck with Adapter (100 mm)
LittleMachineShop.com part # 1697

Tooling Packages

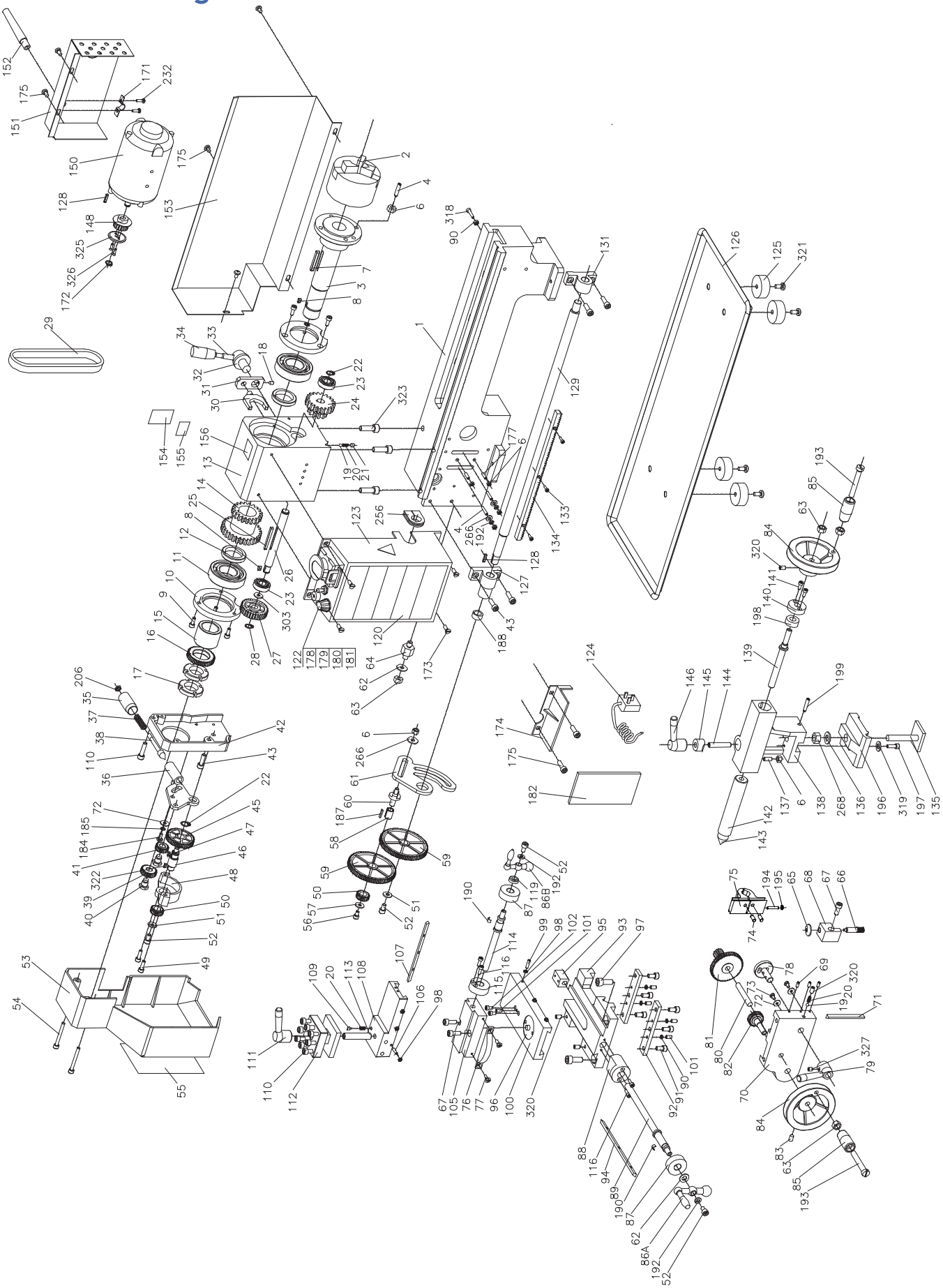
Tooling packages from LittleMachineShop.com are another way to get your essential tooling at a discount. Visit our website for more information.



Replacement Parts

LittleMachineShop.com is committed to carry the replacement parts for our line of machines. To view all available replacement parts, visit our website https://littlemachineshop.com/products/product_model.php and select either model # 1012 or #1014 for parts and a high-resolution drawing.

Parts drawing Model 1012

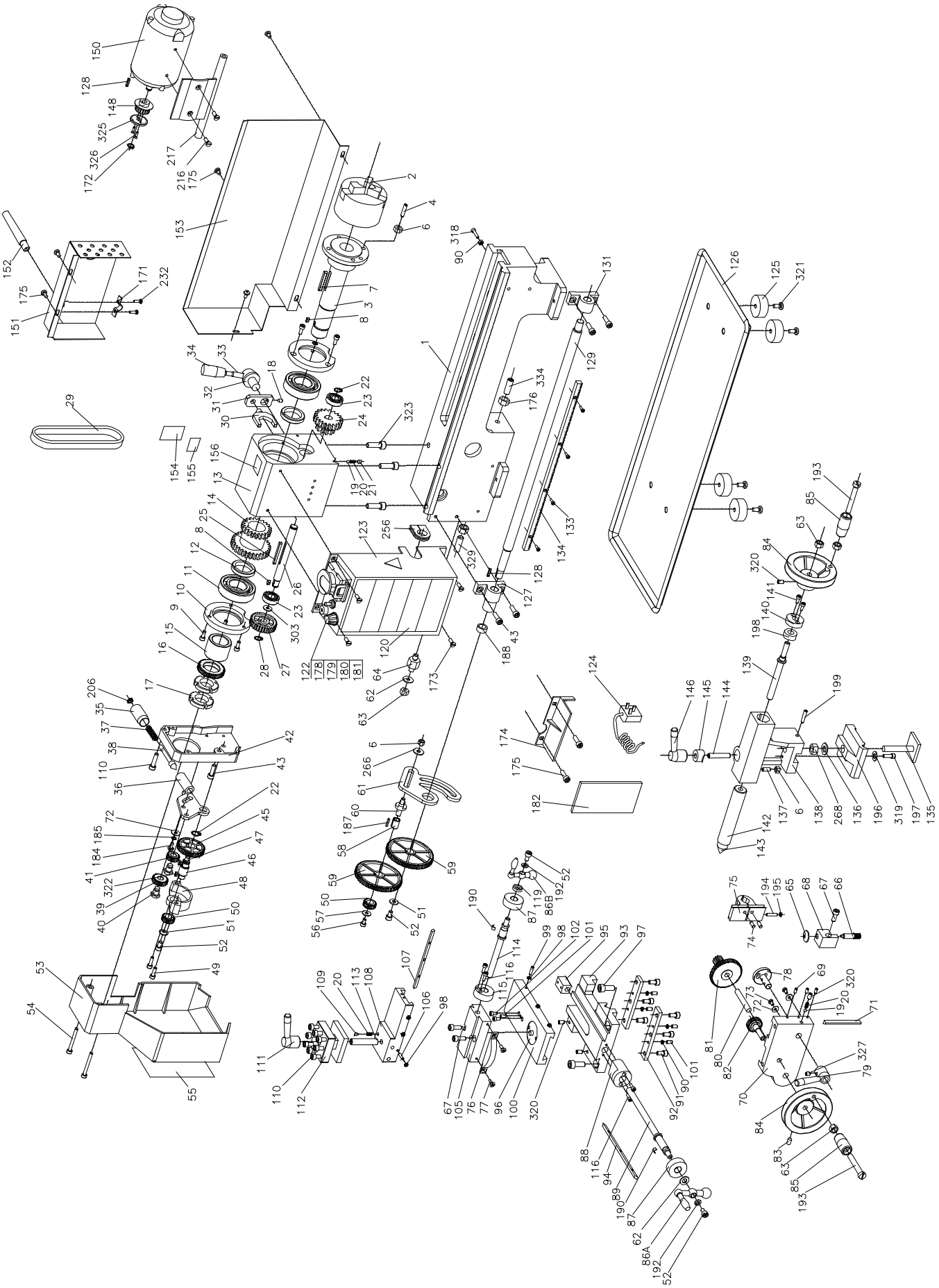


Parts List Model 1012

No	Description	Qty	No	Description	Qty
1	#1012 - 12" Bed Way	1	52	Screw M6x8	4
2	3" 3-Jaw Chuck	1	53	Change Gears Cover	1
3	3MT Spindle	1	54	Screw M5 x 45	2
4	Stud M6x25	5	55	Threads Cutting Chart	1
6	Nut M6	9	56	Screw M5x8	1
7	Key M5x40	1	57	Washer M5	1
8	Key M4x8	2	58	Bushing and Key	1
9	Cap Screw M5x12	6	59	Gear 80T	2
10	Spindle Bearing Cover	2	60	B & C Gears Shaft	1
11	Bearing	2	61	Adjustment Plate	1
12	Spindle Spacer	2	62	Washer M8	2
13	Headstock Casting	1	63	Nut M8	4
14	H/L Gear 21/29T	1	64	Adjusting Stud	1
15	Spindle Spacer	1	65	Threading Dial Label	1
16	Drive Gear 45T	1	66	Threading Dial Shaft	1
17	Spindle Nut M27x1.5	2	67	Screw M5x16	3
18	Screw M5x8	1	68	Dial Indicator Body	1
19	Steel Ball	2	69	Screw M4x10	3
20	Fixed Spring	3	70	Apron	1
21	Screw M6x6	1	71	Gib Strip	1
22	External Retaining Ring M12	2	72	Washer M4	3
23	Bearings	2	73	Screw M4x8	2
24	Intermediate Shaft Gear 12T/20T	1	74	Pin M5x12	2
25	Parallel Key M4x45	1	75	Half Nuts	2
26	Intermediate Shaft	1	76	Protractor Compound Rest	1
27	Timing Pulley	1	77	Screw M4x10	2
28	External Retaining Ring M10	1	78	Half Nut Cam	1
29	Timing Belt	1	79	Half Nut Handle	1
30	H/L Shifting Fork	1	80	Shaft Saddle Drive	1
31	H/L Shifting Arm	1	81	Gear Saddle Drive (A) 11T/54T	1
32	H/L Shifting Pivot	1	82	Gear Saddle Drive (B) 24T	1
33	H/L Shifting Lever	1	83	Screw M6x12	1
34	Shifting Knob	1	84	Handwheel	2
35	Handle	1	85	Handwheel Handle Set	2
36	Handle Pivot	1	86A	Cross Slide Three Ball Handle	1
37	Compressive Spring	1	86B	Compound Rest Three Ball Handle	1
38	Detent Rod	1	87	Graduated Dial	2
39	Pinion 25T	1	88	Cross Slide Screw Retainer	1
40	Support Screw	2	89	Feed Screw	1
41	Pinion 20T	1	90	Nut M5	5
42	Drive Belt Cover	1	91	Screw M6x12	6
43	Screw M6x20	5	92	Saddle Retainer	2
45	Gear 45T	1	93	Saddle	1
46	A-Gear Shaft	1	94	Gib Strip	1
47	Parallel Key 3x8	1	95	Nut Cross Slide Feed	1
48	Mount Change Gear	1	96	Swivel Disk	1
49	Screw M5x18	2	97	Screw M8x20	2
50	Gear 20T	2	98	Nut M4	6
51	Washer M6	2	99	Screw M4x16	3

No	Description	Q'ty	No	Description	Q'ty
100	Cross Slide	1	153	Rear Splashguard	1
101	Screw M5x10	5	154	H/L Label	1
102	Screw M4x8	2	155	H/L Label	1
105	Compound Rest	1	156	Warning Label	1
106	Screw M4x14	3	171	Power Cord Clamp	1
107	Gib Strip	1	172	Retaining Ring M8 External	1
108	Compound Rest Top	1	173	Screw M5x8	4
109	Pin Tool Post Detent	1	174	Protector	1
110	Screw M6x25	9	175	Screw M5x8	7
111	Handle Tool Post	1	177	Screw M6x20	2
112	Tool Post	1	178	Emergency Stop Switch	1
113	Stud M10x65	1	179	Fuse Box	1
114	Feed Screw Compound Rest	1	180	Variable Speed Control Knob	1
115	Retainer Compound Rest	1	181	Switch F/O/R	1
116	Screw M4x12	4	182	Control Board	1
119	Nut M18	1	184	Screw M5x10	1
120	Model Label	1	185	Spring Washer 5	1
122	Indicator Table Label	1	187	Key M3x16	1
123	Electric Cover	1	188	Spacer Lead Screw	1
124	Power Cord	1	190	Spring Adjustable Dial	2
125	Rubber Foot	4	192	Washer M6	4
126	#1012 Chip Tray	1	193	Screw M8x55	2
127	Bracket Lead Screw Mounting (L)	1	194	Screw M4x38	1
128	Key M3x16	2	195	Nut M4	1
129	#1012 Lead Screw	1	196	Plate Tailstock	1
131	Bracket Lead Screw Mounting (R)	1	197	Screw M5x16	1
133	Screw M3x10	3	198	Bushing Tailstock	1
134	#1012 Rack	1	199	Screw M5x25	1
135	Clamp Plate Tailstock	1	206	Nut M6	1
136	Washer M10	1	232	Screw M4x6	2
137	Screw M6x14	1	256	Lead Screw Chip Guard	1
138	Tailstock Casting	1	266	Large Washer M6	2
139	Tailstock Screw	1	268	Nut M10	1
140	Tailstock Retainer	1	303	Washer M10	1
141	Screw M4x10	2	318	Screw M5x20	1
142	Tailstock Quill	1	319	Washer M5	1
143	Dead Center 2MT	1	320	Screw M6x10	4
144	Stud M8x40	1	321	Screw M6x16	4
145	Quill Clamp	1	322	Key M3x6	1
146	Quill Clamp Handle	1	323	Screw M8x25	3
148	Motor Timing Pulley	1	325	Flange Timing Pulley	1
150	Motor	1	326	Tapping Screw M2.9x9.5	2
151	Motor Cover	1	327	Screw M6x8	1
152	Strain Relief Power Cord	1			

Parts drawing Model 1014



Parts List Model 1014

No	Description	Qty	No	Description	Qty
1	#1014 - 14" Bed Way	1	52	Screw M6x8	4
2	3" 3-Jaw Chuck	1	53	Change Gears Cover	1
3	3MT Spindle	1	54	Screw M5x45	2
4	Stud M6x25	3	55	Threads Cutting Chart	1
6	Nut M6	5	56	Screw M5x8	1
7	Key M5x40	1	57	Washer M5	1
8	Key M4x8	2	58	Bushing and Key	1
9	Cap Screw M5x12	6	59	Gear 80T	2
10	Spindle Bearing Cover	2	60	B & C Gears Shaft	1
11	Bearing	2	61	Adjustment Plate	1
12	Spindle Spacer	2	62	Washer M8	2
13	Headstock Casting	1	63	Nut M8	4
14	H/L Gear 21/29T	1	64	Adjusting Stud	1
15	Spindle Spacer	1	65	Threading Dial Label	1
16	Drive Gear 45T	1	66	Threading Dial Shaft	1
17	Spindle Nut M27x1.5	2	67	Screw M5x16	3
18	Screw M5x8	1	68	Dial Indicator Body	1
19	Steel Ball	2	69	Screw M4x10	3
20	Fixed Spring	3	70	Apron	1
21	Screw M6x6	1	71	Gib Strip	1
22	External Retaining Ring M12	2	72	Washer M4	3
23	Bearings	2	73	Screw M4x8	2
24	Intermediate Shaft Gear 12T/20T	1	74	Pin M5x12	2
25	Parallel Key M4x45	1	75	Half Nuts	2
26	Intermediate Shaft	1	76	Protractor Compound Rest	1
27	Timing Pulley	1	77	Screw M4x10	2
28	External Retaining Ring M10	1	78	Half Nut Cam	1
29	Timing Belt	1	79	Half Nut Handle	1
30	H/L Shifting Fork	1	80	Shaft Saddle Drive	1
31	H/L Shifting Arm	1	81	Gear Saddle Drive (A) 11T/54T	1
32	H/L Shifting Pivot	1	82	Gear Saddle Drive (B) 24T	1
33	H/L Shifting Lever	1	83	Screw M6x12	1
34	Shifting Knob	1	84	Handwheel	2
35	Handle	1	85	Handwheel Handle Set	2
36	Handle Pivot	1	86A	Cross Slide Three Ball Handle	1
37	Compressive Spring	1	86B	Compound Rest Three Ball Handle	1
38	Detent Rod	1	87	Graduated Dial	2
39	Pinion 25T	1	88	Cross Slide Screw Retainer	1
40	Support Screw	2	89	Feed Screw	1
41	Pinion 20T	1	90	Nut M5	5
42	Drive Belt Cover	1	91	Screw M6x12	6
43	Screw M6x20	5	92	Saddle Retainer	2
45	Gear 45T	1	93	Saddle	1
46	A-Gear Shaft	1	94	Gib Strip	1
47	Parallel Key 3x8	1	95	Nut Cross Slide Feed	1
48	Mount Change Gear	1	96	Swivel Disk	1
49	Screw M5x18	2	97	Screw M8x20	2
50	Gear 20T	2	98	Nut M4	6
51	Washer M6	2	99	Screw M4x16	3

Wiring Diagram (100-120V)