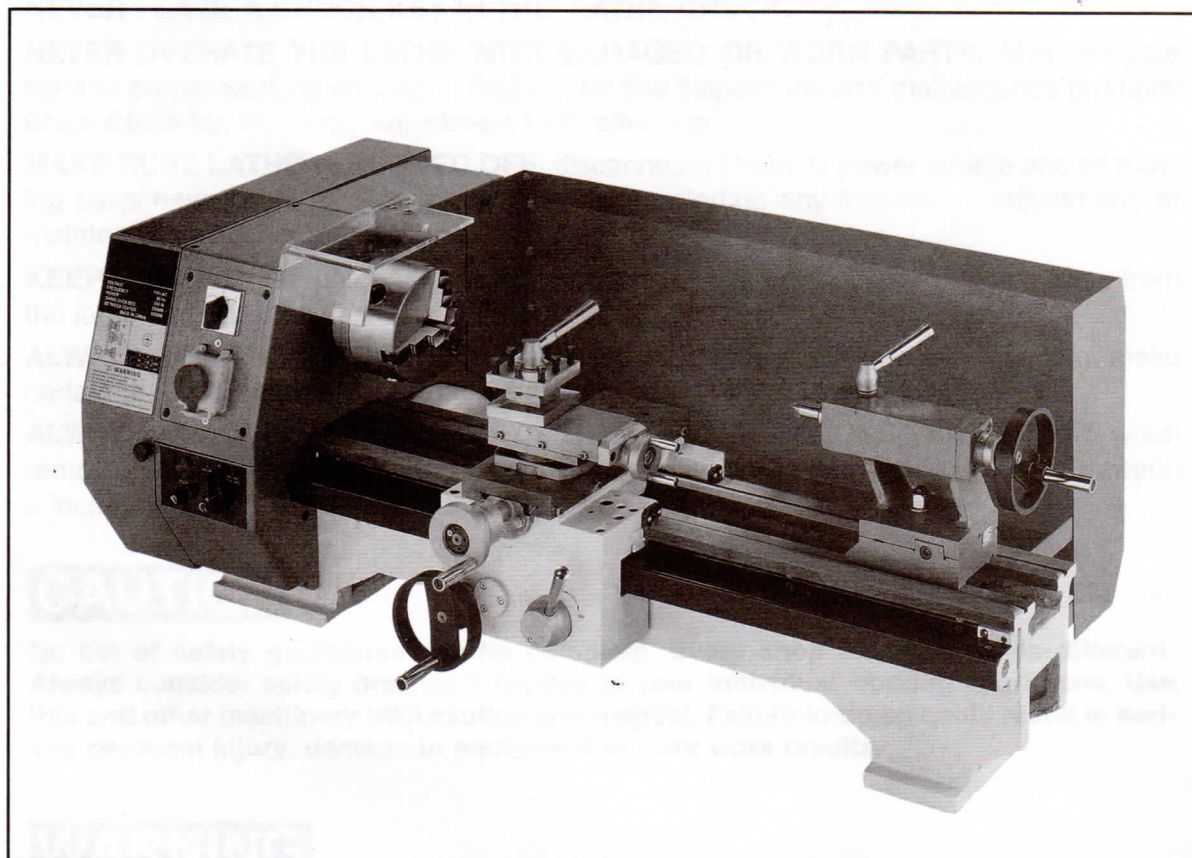


# INSTRUCTION MANUAL

## BENCH LATHE



*Before using be sure to read this manual carefully*

-C6-



# Safety Instructions For Lathe

1. **MAKE SURE ALL GUARDS** are in place and that the lathe sits on a flat, stable surface.
2. **BEFORE STARTING THE LATHE** be certain the workpiece has been properly engaged in the chuck, tailstock, center, and that there is adequate clearance for full motion.
3. **ADJUST TOOL POST** to provide proper support for the turning tool you will be using. Test tool post clearance by rotating workpiece by hand before turning lathe on.
4. **SELECT THE TURNING SPEED** which is appropriate for the type of work, material, and tool bit. Allow the lathe to gain its full speed before beginning a cut.
5. **NEVER REVERSE MOTOR DIRECTION** while the lathe is in motion.
6. **DO NOT STOP LATHE USING YOUR HAND** against the workpiece or chuck.
7. **DO NOT LEAVE LATHE RUNNING UNATTENDED** for any reason.
8. **NEVER LEAVE A CHUCK KEY IN THE LATHE CHUCK.**
9. **NEVER OPERATE THE LATHE WITH DAMAGED OR WORN PARTS.** Maintain your lathe in proper working condition. Perform routine inspections and maintenance promptly when called for. Put away adjustment tools after use.
10. **MAKE SURE LATHE IS TURNED OFF**, disconnected from its power source and all moving parts have come to a complete stop before starting any inspection, adjustment, or maintenance procedure.
11. **KEEP LOOSE CLOTHING ARTICLES** such as sleeves, belts or jewelry items away from the lathe and drill spindles.
12. **ALWAYS USE THE PROPER CUTTING TOOLS** for the material you are turning, make certain they are sharp and that they are held firmly in the tool post.
13. **ALWAYS PLACE A BOARD OR PIECE OF PLYWOOD ACROSS THE BEDWAY** when removing or installing chucks to avoid the possibility of a finger pinch occurring between a loose chuck and the edges of the bedway.

## CAUTION

No list of safety guidelines can be complete. Every shop environment is different. Always consider safety first, as it applies to your individual working conditions. Use this and other machinery with caution and respect. Failure to do so could result in serious personal injury, damage to equipment or poor work results.

## WARNING

Like all power tools, there is danger associated with the Lathe. Accidents are frequently caused by lack of familiarity or failure to pay attention. Use this tool with respect and caution to lessen the possibility of operator injury. If normal safety precautions are overlooked or ignored, serious personal injury may occur.

## GROUNDING

In the event of an electrical short, grounding reduces the risk of electric shock by providing a path of least resistance to disperse electric current. The outlet must be properly installed and grounded in accordance with all local codes and ordinances.

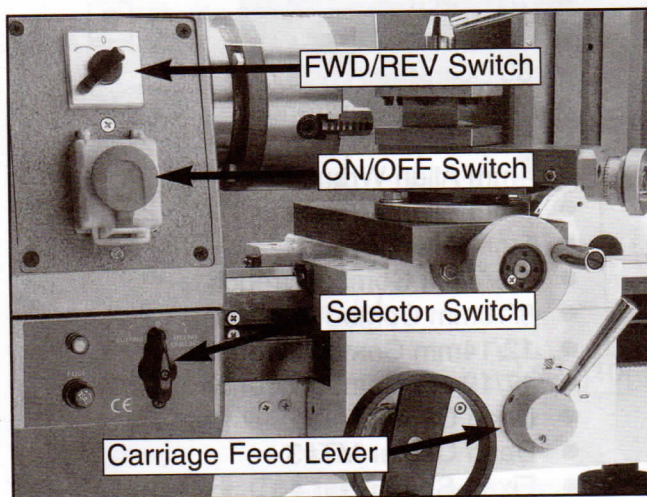


# Test Run Lathe

Before continuing to Operate, test run the lathe to make sure it runs properly.

## To test run the lathe:

1. Make sure that there is NOT a chuck key inserted in the chuck, and that the lathe eye-shield is in the down position over the lathe chuck. *Make this step a habit that you perform every time you start the lathe.*
2. Familiarize yourself with the lathe controls shown in Figure below. Make sure the STOP button is all the way down before continuing.



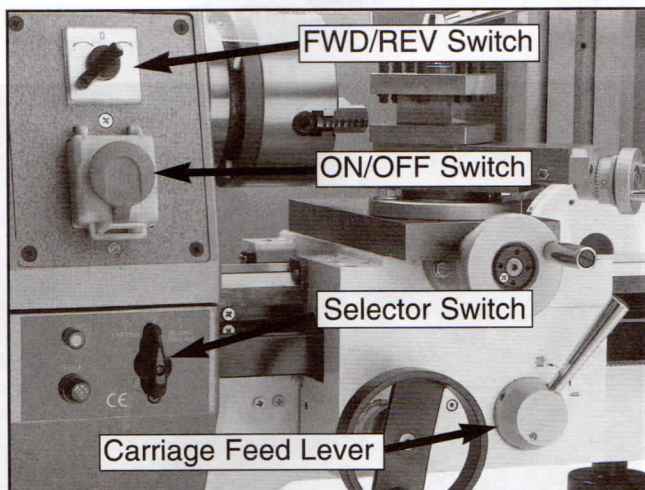
Lathe controls

3. Plug the lathe into the power outlet!
4. Move the carriage feed lever up to the disengage mode. It is important that the carriage feed is NOT moving and is in the neutral position until later.
5. Turn the to left Selector switch to the "CUTTING" position. The lathe power indicator light should light up. Note—*If it does not light up, unplug the machine and check the fuse, your power source, and the connections on the machine before attempting to start the lathe. Call our service department if you cannot easily resolve the issue.*
6. Turn the FWD/REV switch clockwise. This should make the lathe chuck turn clockwise when you start the machine.
7. Flip up the emergency stop button to reveal the red and green ON/OFF buttons.
8. Stand to the side of the lathe chuck line of rotation, and press the green button to turn the lathe ON. If the carriage starts moving, immediately push the STOP button and disengage the carriage feed lever, then restart the lathe.
9. Allow the lathe to run for at least two full minutes to make sure it is running satisfactorily.
10. Press the lathe emergency stop button to turn the lathe OFF.
11. After the lathe chuck has come to a complete stop, turn the FWD/REV switch counter-clockwise.
12. Stand to the side of the lathe chuck line of rotation, and press the green button to turn the lathe ON.
13. Allow the lathe to run for at least two full minutes to make sure it is running satisfactorily.
14. Press the emergency stop button to turn the lathe OFF.
15. After the lathe has come to a complete stop, engage the carriage handwheel, rotate the handwheel to center the carriage on the bed, then disengage the handwheel.
16. Engage the automatic carriage feed lever.
17. Stand to the side of the lathe chuck line of rotation, and press the green button to turn the lathe ON.
18. Verify that the carriage moves along the bed, and press the emergency stop button to turn the lathe OFF.

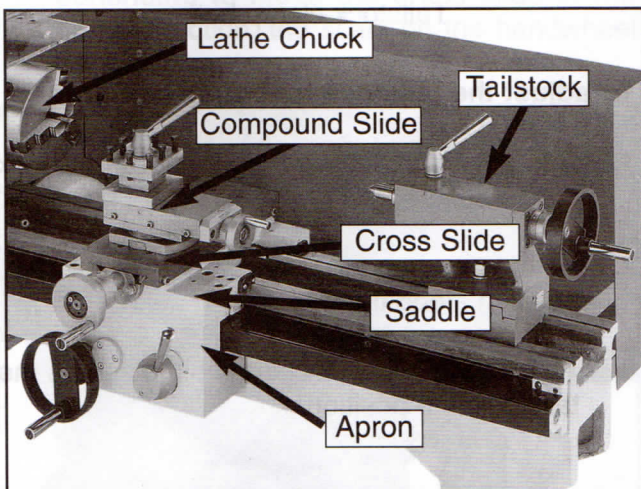


# OPERATIONS

To get the most out of your machine, please take the time to familiarize yourself with the various controls as shown in Figures below.



Lathe controls



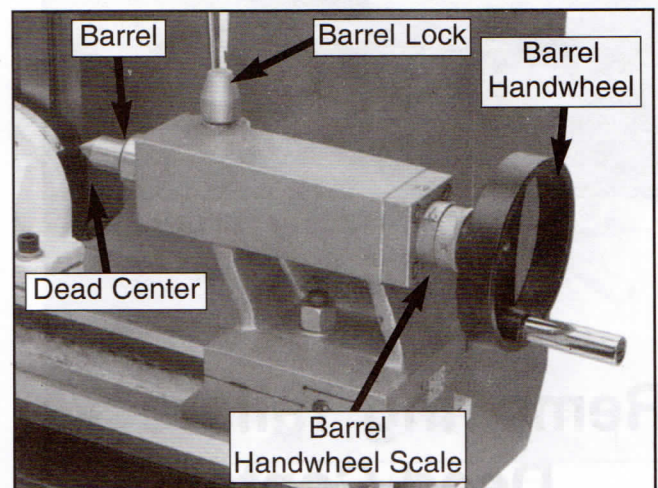
Lathe components

## Installing Tailstock Dead Center

There are 2 dead centers included with the Lathe. The smaller dead center is a MT#2 (Morse Taper) and fits in the tailstock barrel.

**To install the tailstock dead center:**

1. Familiarize yourself with the tailstock components shown below.

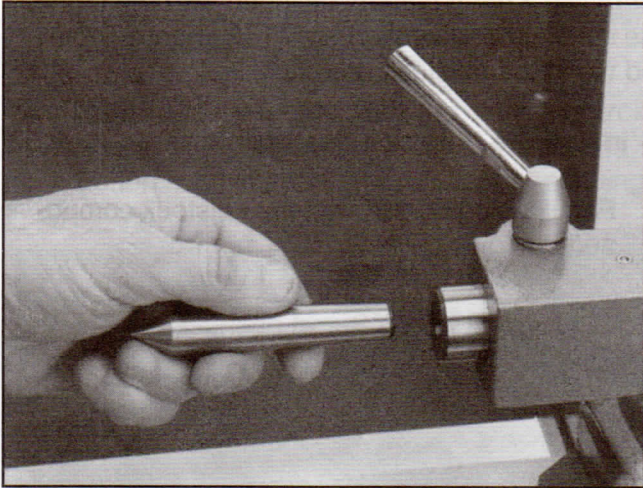


Tailstock components

2. Make sure that the MT#2 dead center and tailstock barrel are clean and free of any dirt, dust, grease or oil. These parts will last longer and remain accurate when properly cleaned before each assembly. Morse tapers will not interlock when dirt or oil are present on the mounting surfaces.



3. Insert the end of the dead center into the tailstock barrel, as shown below, until it seats tight enough that it will not rotate when turned by hand. *Note—do not worry about pushing the dead center into the barrel too far. The force of the center contacting a mounted workpiece will fully seat the taper when the handwheel is tightened.*
4. Tighten the barrel lock to prevent the tailstock barrel from moving during operation.



Inserting dead center into tailstock barrel

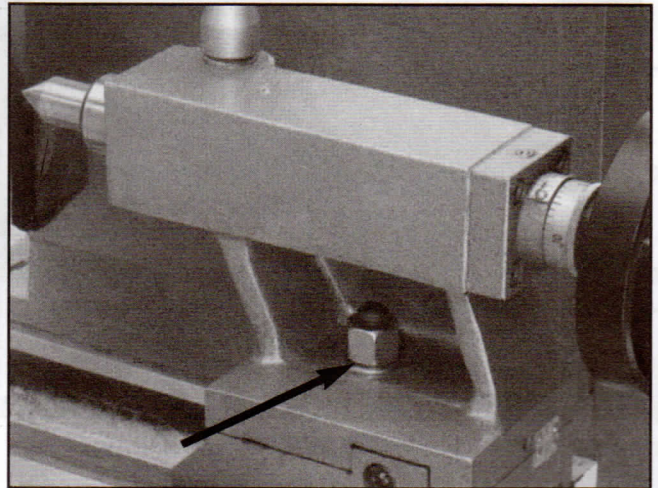
## Removing Tailstock Dead Center

**To remove the tailstock dead center:**

1. Use the barrel handwheel to move the tailstock barrel all the way back into the tailstock until the handwheel will no longer turn.
2. Pull the dead center out of the tailstock barrel.

## Adjusting Tailstock Longitude Position

The tailstock on the Lathe clamps to the bed with the nut shown below. This nut allows the tailstock to be positioned longitudinally along the bed and then locked in place.



Tailstock clamp bolt

**To adjust the tailstock longitude position:**

1. Use a 17mm wrench to loosen the tailstock clamp bolt.
2. With your hands, move the tailstock into position along the bed.
3. Tighten the tailstock clamp bolt to secure the tailstock into position.

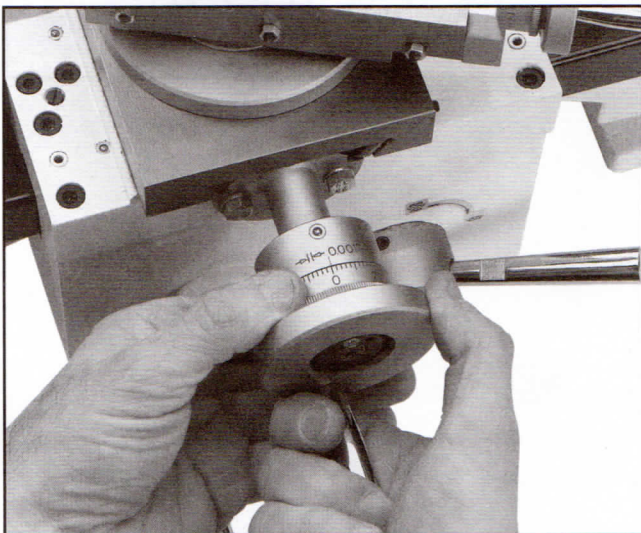


## Adjusting Cross Slide

The cross slide is only designed to move perpendicular to the longitudinal axis of the lathe, and it features a scale on the handwheel that displays graduations of one thousandths of 25mm (0.025mm).

### To adjust the cross slide:

1. Using the handwheel, back the cross slide away from your starting point by at least 0.4mm, then move the cross slide forward to your starting point. *Note—this procedure will clear any free movement (or backlash) in the lead screw so your handwheel scale reading will be accurate.*
2. Hold the handwheel still and turn the scale so the “0” mark lines up with the “.000” mark on the cross slide, as shown in Figure below. As long as you avoid backlash by continuing to move the cross slide in the same direction, the scale on the handwheel will be accurate.



Adjusting handwheel scale

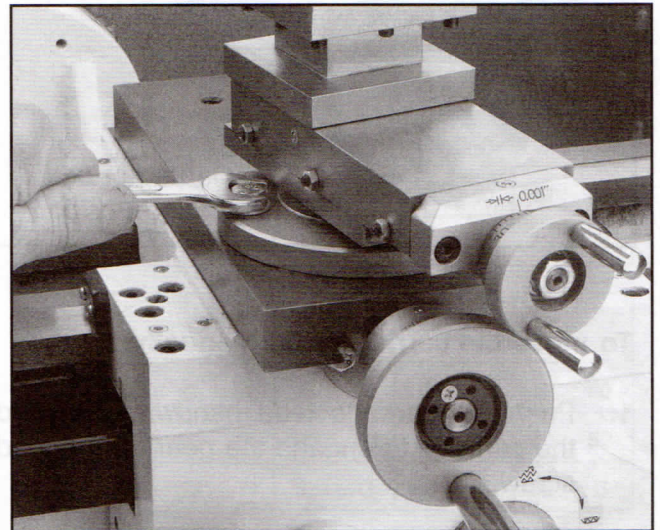
3. After moving the cross slide backward after your operation, remember to clear the backlash before moving the cross slide forward to the “0” mark for the next cut.

## Adjusting Compound Slide

Similar to the cross slide, the compound slide features a scale that displays graduations of one thousandths of 25mm (0.025mm). Unlike the cross slide, the compound slide can be rotated to a set angle and then it can be moved back and forth along the axis of that angle.

### To adjust the compound slide:

1. Loosen the compound slide bolts shown below to allow it to be rotated.



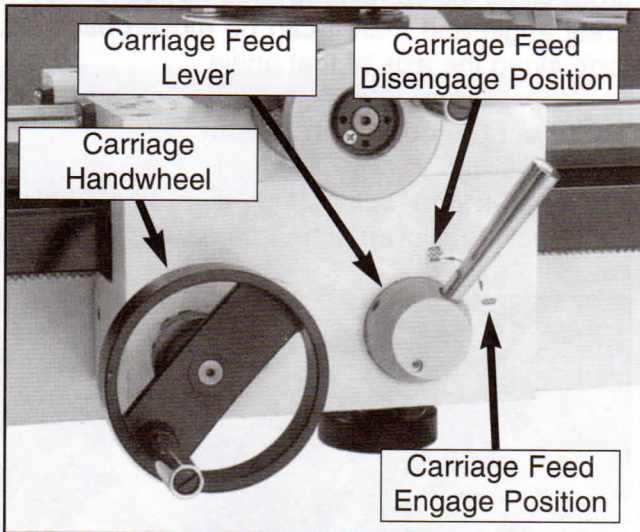
Compound slide bolts

2. Rotate the compound slide to the angle needed for your procedure.
3. Tighten the compound slide bolts, and check the angle again to make sure it did not move during tightening.
4. Use the compound slide handwheel to move the tool back and forth along the axis of the new angle. Similar to adjusting the cross slide handwheel, make sure the threads are engaging and all backlash has been cleared before you set the handwheel scale to “0”, or it will not be accurate.



# Adjusting Carriage

Like most lathes, the longitudinal movement of the carriage (carriage feed) on the Lathe can be controlled both manually and automatically. Before proceeding, take a closer look at the carriage controls shown below



Carriage controls

## To move the carriage feed manually:

1. Push the carriage feed handwheel toward the carriage to engage the gear on the lead screw.
2. Rotate the handwheel clockwise to move the carriage right and rotate the handwheel counterclockwise to move the carriage left.
3. Set the handwheel scale in the same manner as described in the "Adjusting Cross Slide" instructions, and be sure to account for the backlash.

## To use the automatic carriage feed:

1. Select the desired feed rate you need by looking at the charts on the lathe drive cover. When new, The Lathe is geared for a carriage feed rate of 0.1mm per revolution.

Use the manual feed handwheel to position the carriage to your desired starting point and set the scale on the handwheel to "0".

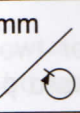
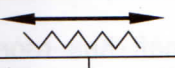
2. Move the carriage feed lever down to engage the half-nut, which in turn, makes the automatic carriage feed active.
3. Pull out the carriage manual feed handwheel to unlock it so it does not rotate when the automatic carriage feed is engaged.

*The carriage feed will now move forward or backward, depending on which direction you have selected for lathe rotation.*

# Understanding Gear Charts


The Lathe can be geared for a variety of different feed rates, so charts are placed on the drive cover of the lathe that explain how to set up the gear combinations for each type of carriage feed application. These applications are broken into two categories of charts—turning and threading.


**Turning Chart**—The speeds given on the turning chart represent standard speeds for most types of turning applications. See below.


mm 		
	0.1	0.2
V D	33 80	50 80
F E	90 25	90 33
G L	G 90	G 90


Turning chart

**Threading Charts**—By arranging the gears as shown on the charts, you can set up the carriage feed to cut any of the thread pitches displayed. See below.

mm 	0.4	0.5	0.6	0.7	0.8	1
G D	G 80	G 80	G 80	G 80	G 52	G 66
F E	30 80	30 60	30 50	42 60	60 80	60
L G	75 G	80 G	80 G	80 G	75 G	G 80

mm 	1.25	1.5	1.75	2	2.5	3
G D	G 52	G 66	G 80	G 70	G 80	G 80
F E	75 80	75 80	70 80	80	75 80	75 25
L G	60 G	50 G	40 G	G 40	30 G	80 G

1"/n 	10	11	14	19
G D	G 80	G 80	G 80	G 80
F E	66 40	60 40	75 50	50 40
L G	52 G	52 G	66 G	75 G

1"/n 	20	22	40	44
G D	G 60	G 80	G 80	G 80
F E	66 80	60 80	33 52	30 52
L G	52 G	52 G	80 G	80 G

Threading charts



### This is how to read the feed rate charts:

1. The box in the upper left-hand corner of each chart tells whether that chart represents carriage feed movement for standard or imperial threads. These boxes are shaded below.

mm ⌘	1.25	1.5	1.75
G D	G 52	G 66	G 80
F E	75 80	75 80	70 80
L ⇌ G	60 G	50 G	40 G

1"/n ⌘	10	11
G D	G 80	G 80
F E	66 40	60 40

The shaded box indicates whether the chart is for standard or imperial threads

2. The boxes in the top row of each chart (excluding the box in the left-hand corner) shows the thread pitches listed on that chart. These boxes are shaded below.

mm ⌘	0.4	0.5	0.6	0.7	0.8	1
G D	G 80	G 80	G 80	G 80	G 52	G 66
F E	30 80	30 60	30 50	42 60	60 80	60
L ⇌ G	75 G	80 G	80 G	80 G	75 G	G 80

The shaded boxes show the thread pitches listed on this chart

3. The boxes on the left-hand column (excluding the box in the upper left-hand corner) represent the gear positions on each shaft. These boxes are shaded below and the shafts are called out with arrows.

mm ⌘	0.4
G D	G 80
F E	30 80
L ⇌ G	75 G

Upper Adjustable Shaft →

Lower Adjustable Shaft →

Pivot Shaft →

The shaded boxes show the thread pitches listed on this chart

4. Each shaft has room for two positions to mount the gears—a forward position and a rear position. Figure below separates these positions into different shades for you to understand better.

mm ⌘	1.25	1.5	1.75
G D	G 52	G 66	G 80
F E	75 80	75 80	70 80
L ⇌ G	60 G	50 G	40 G

↑ Rear

↑ Forward

The shaded boxes show the thread pitches listed on this chart


Both forward and rear positions must be filled on the shaft in order for the gears to work properly. A good example of this is the blank spot "G," as shown in the chart above. Although the chart shows this as a blank spot, there should actually be a spacer in this position on the machine. This spacer is only reflects ACTIVE gear positions.



## NOTICE

On some setups, smaller gears must be used as spacers on the adjustable shafts.

5. The lines between gears "D" & "E" and gears "F" & "L" on the chart below indicate where the gears should be in mesh.

mm 	0.4	0.5	0.6
G D	G 80	G 80	G 80
F E	30 80	30 60	30 50
L ⇌ G	75 G	80 G	80 G

The shaded boxes highlight the gear mesh lines

6. The boxes shaded below represent the actual gear combinations required to cut the thread pitches.

mm ⌵	1.25	1.5	1.75	2	2.5	3
G D	G 52	G 66	G 80	G 70	G 80	G 80
F E	75 80	75 80	70 80	80	75 80	75 25
L ⇌ G	60 G	50 G	40 G	G 40	30 G	80 G

The shaded boxes show specific gear setups

Here is a real-world example of a gear setup as shown on the chart:

When the lathe is shipped from the factory, it is geared for a carriage feed rate of 0.1mm per spindle revolution, or the gear combination shaded below.



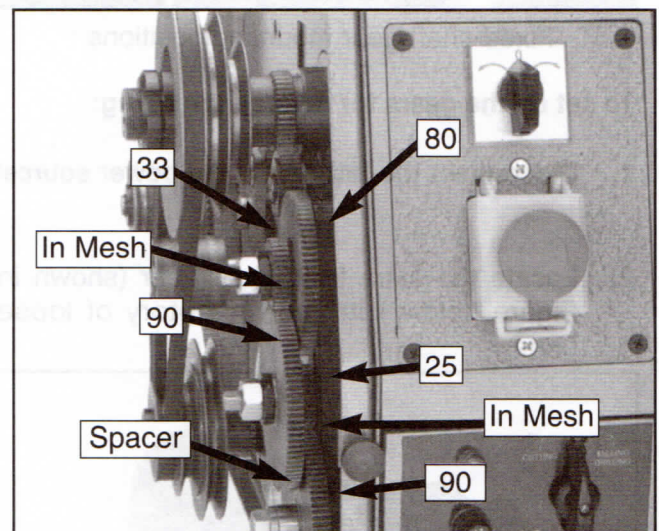
mm 		
	0.1	0.2
V D	33 80	50 80
F E	90 25	90 33
G L	G 90	G 90

Chart showing gear setup for 0.1mm

Figure below shows a profile of the 0.1mm feed rate actual gear setup on the machine. Notice how the gears mesh together in the locations displayed on the chart.

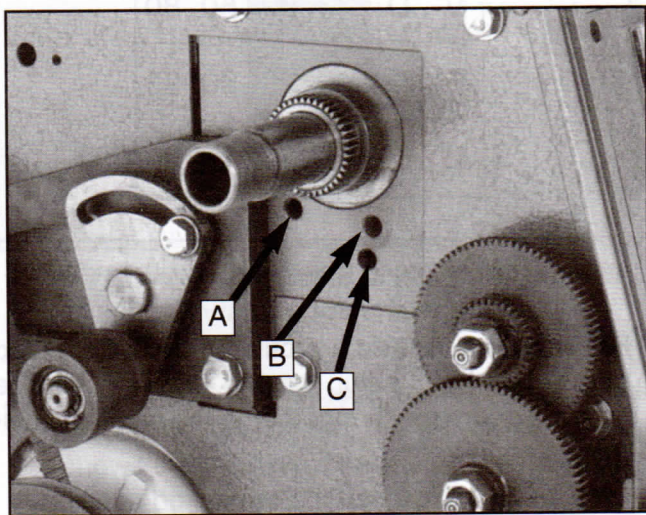


Actual gear setup for 0.1mm feed rate



# Reverse Threading

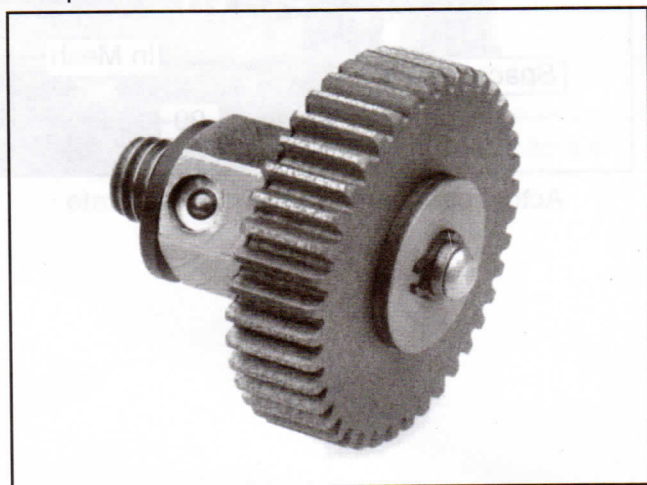
The Lathe can be setup to turn left-handed threads by adding another fixed-shaft gear and moving the original fixed-shaft gear to another mounting location. Figure below shows the three mounting locations for fixed-shaft gears (spindle drive pulley is removed for clarity). For illustration purposes, we label these mounting positions A, B & C.



Fixed-shaft gear mounting positions

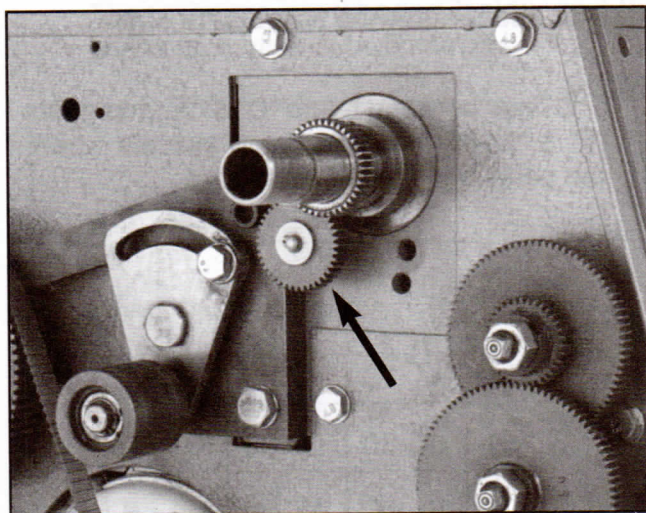
**To set up the gears for reverse threading:**

1. **Disconnect the lathe from the power source!**
2. Locate the extra fixed-shaft gear (shown in Figure below ) in your inventory of loose parts.



Extra fixed-shaft gear

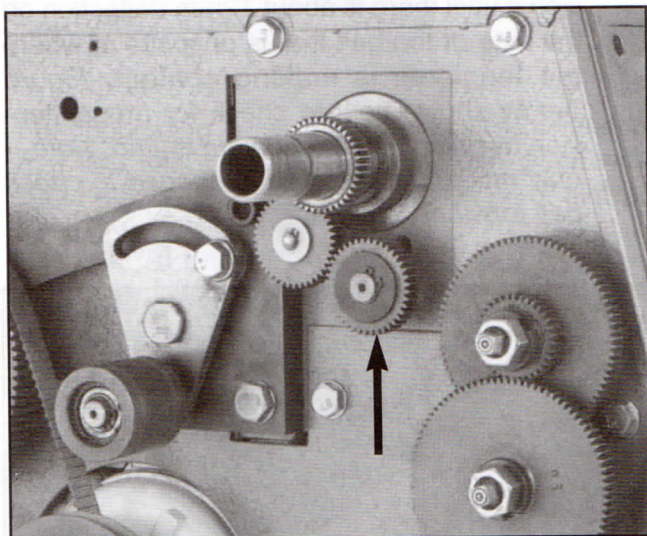
3. Thread the extra fixed-shaft gear into mounting location "A" as shown below.



Extra fixed-shaft gear mounted in position "A"

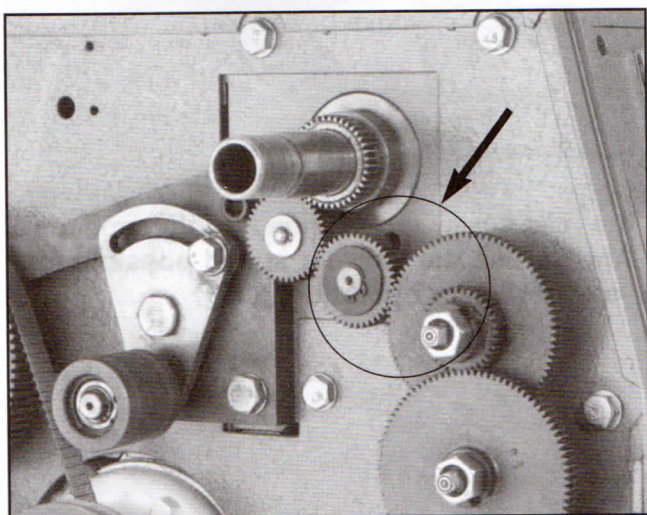


4. When the machine is shipped, a fixed-shaft gear is in position "C." Remove that fixed-shaft gear from mounting location "C" and thread it into mounting location "B" as shown below.



Fixed-shaft gear mounted in position "B"

5. Loosen the cap screw on the gear bracket, and pivot the bracket so the top gear meshes with the fixed-shaft gear that is in position "B," as shown below.



All gears in mesh for reverse threading operations

6. Tighten the cap screw in the gear bracket to keep it from pivoting.
7. Spin the lathe chuck by hand to ensure that the gears do not bind.
8. Replace the cover and test run the machine before proceeding with your specific operation.