

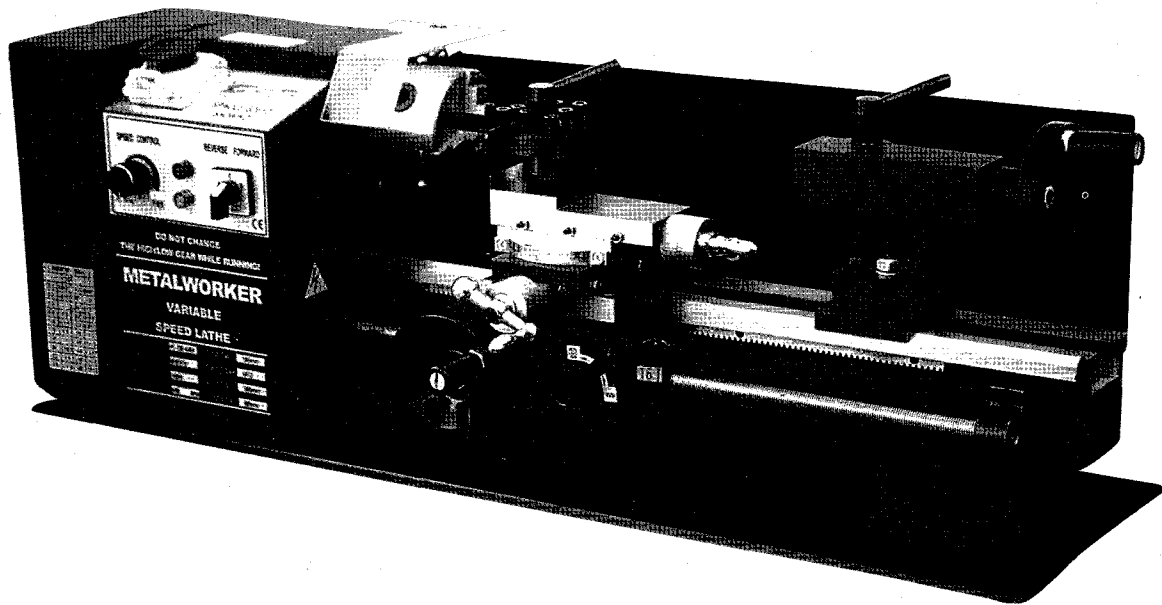
# VARIABLE SPEED MINI LATHE

## Instruction Manual

For further information, contact:

**PROCON TECHNOLOGY**  
PO Box 655, Mt. Waverley  
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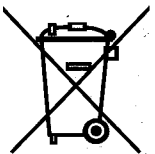
Or on the internet:  
[www.procontechology.com.au](http://www.procontechology.com.au)



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Please read this instruction manual thoroughly and follow all directions carefully.

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## SPECIFICATIONS

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Max. swing over bed	180mm ( 7")
Max. length of workpiece	350mm (14")
Spindle taper	Morse No.3
Tailstock taper	Morse No.2
Spindle bore	20mm (0.787")
Cross slide travel	65mm (2.559")
Compound slide travel	55mm(2.165")
Spindle speed (variable speed)	100 - 3000 rpm(effective)
Longitudinal feeds	0.1 - 0.2mm
*Screw threads-Imperial	12-52 TPI in 18 steps
or Metric	0.4-2.0 mm in 10 steps

The item marked (\*) has different choice, see the label in front of the machine or ask information to your dealer.

## Important Safety Instructions

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**READ ALL INSTRUCTIONS AND WATNINGS BEFORE USING THIS TOOL.**

### Operator

COMMON SENSE AND CAUTION ARE FACTORS WHICH CANNOT BE BUILT INTO ANY PRODUCT. THESE FACTORS MUST BE SUPPLIED BY THE OOPERATOR. PLEASE REMEMBER:

1. When using electric tools, machines or equipment, basic safety precautions should always be followed to reduce the risk of fire, electric shock, and personal injury.
2. Keep work area clean. Cluttered areas invite injuries.'
3. Consider work area conditions. Do not use machines or power tools in damp, wet or poorly lit locations. Do not expose equipment to rain. Keep work area well lit. Do not use tools in the presence f flammable gases or liquids.
4. Keep children away. All children should be kept away from the work area.
5. Guard against electric shock. Prevent body contact with grounded surfaces such as pipes, radiators, ranges, and refrigerator enclosures.
6. Stay alert. Never operate equipment if you are tired.
7. Do not operate the product if under the influence of alcohol or drugs. Read warning labels on prescriptions to determine if your judgment or reflexes might be impaired.
8. Do not wear loose clothing or jewelry as they can be caught in moving parts.
9. Wear restrictive hair covering to contain long hair.
10. Use eye and ear protection. Always wear.
  - ANSI approved chemical splash goggles when working with chemicals.
  - ANSI approved impact safety goggles at other times.
  - ANSI approved dust mask or respirator when working around metal, wood, and chemical dusts and mists.
  - A full face shield if you are producing metal or wood filings and/or chips.

11. Keep proper footing and balance at all times.
12. Do not reach over or across running machinery.
13. Always check that adjusting keys and wrenches are removed from the tool or machine before starting it.
14. Do not carry any tool with your finger on the start button or trigger.
15. When servicing. Use only identical replacement parts.

## Before Operation

1. Be sure the switch is OFF when not in use and before plugging in to wall outlet.
2. Do not use inappropriate attachments in an attempt to exceed the tool's capacity. Approved accessories are available from the dealer or machine maker.
3. Check for damaged parts. Before using any tool, any part that appears damaged should be carefully checked to determine that it will operate properly and perform its intended function.
4. Check for alignment and binding of all moving parts. Broken parts or mounting fixtures and any other condition that may affect proper operation. Any part that is damaged should be properly repaired or replaced by a qualified technician.
5. Do not use the tool if any switch does not turn off and on.

## Operation

1. Never force the tool or attachment to do the work of a larger industrial tool. It is designed to do the job better and more safely at the rate for which it was intended.
2. Do not carry the tool by its power cord.
3. Always unplug the cord by the plug. Never yank the cord out of the wall outlet.
4. Always turn off the machine before unplugging.

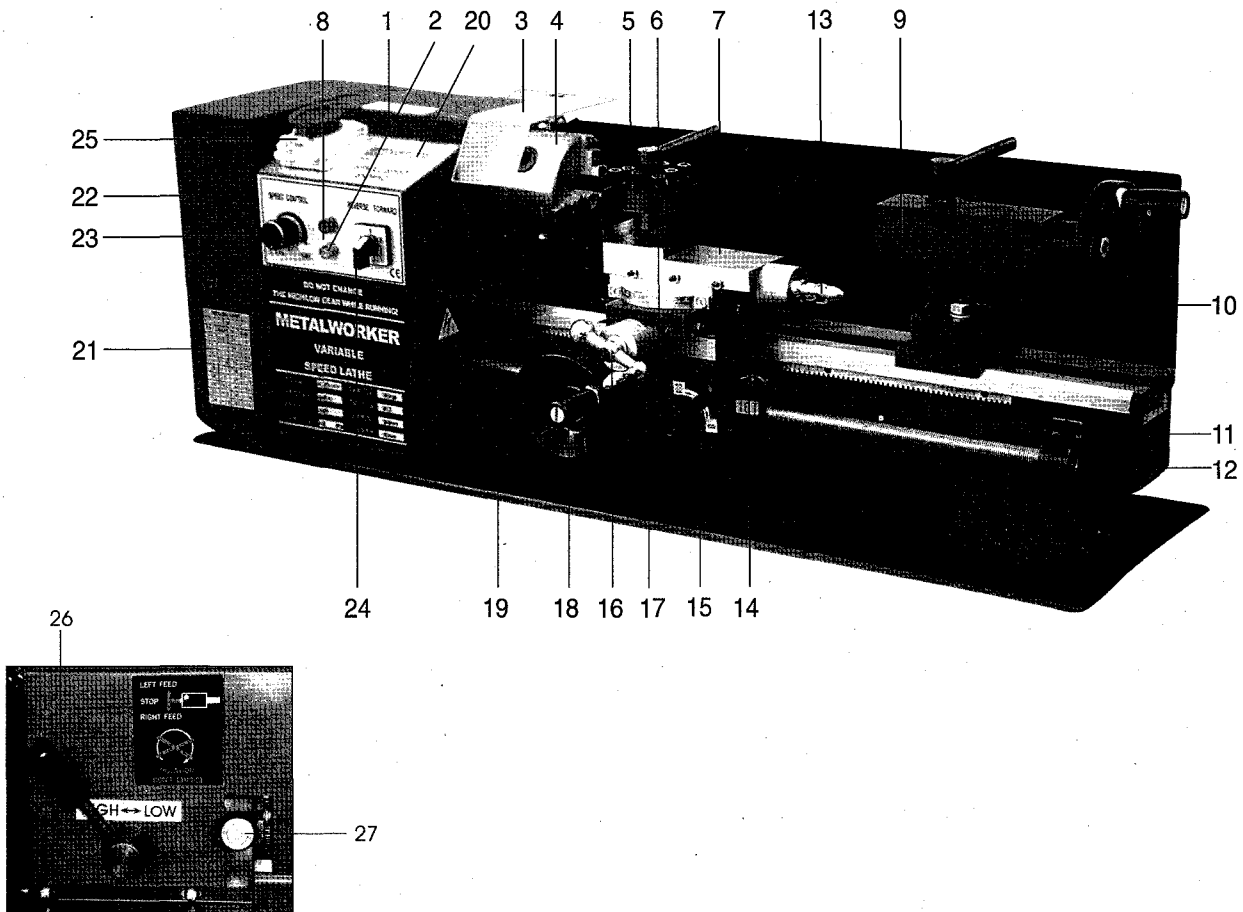
***IF YOU QUESTION THE SAFE CONDITION  
OF THE MACHINE, DO NOT OPERATE IT!***

## Electrical Grounding Instructions

This machine has a three-prong plug(can choose), the third (round) prong is the ground. Plug this cord only into a three-prong receptacle. Do not attempt to defeat the protection the ground wire provides by cutting off the round prong. Cutting off the ground will result in a safety hazard and void the warranty.

**DO NOT MODIFY THE PLUG IN ANY WAY.  
IF YOU ARE NOT SURE ABOUT THE CONNECTIONS,  
CALL A QUALIFIED ELECTRICIAN.**

# FEATURES



## Legend

1. Headstock	15. Automatic feed lever
2. Yellow lamp	16. Cross-slide feed Handle
3. Chuck guard with power off	17. Apron
4. 3-jaw chuck	18. Manual(Saddle) feed handle
5. Tool post	19. lead screw
6. Cross-slide	20. Spindle speed show
7. Compound slide	21. Thread dial indioater table(Accessory)
8. Green lamp	22. Runing gear cover
9. Tailstock	23. Variable speed control knob
10. Tailstock securing nut	24. Forward/Off/Reerse switch
11. Bed	25. Emergency stop switch
12. R.H. Lead screw bearing	26. High/Loe speed range lever
13. Compound slide feed handle	27. leadscrew Fwd/Neutral/Reverse lever
14. Thread dial indicator (Accessory)	

## 1. THE 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 (2). 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 under 'Accessories'

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 Accessories)

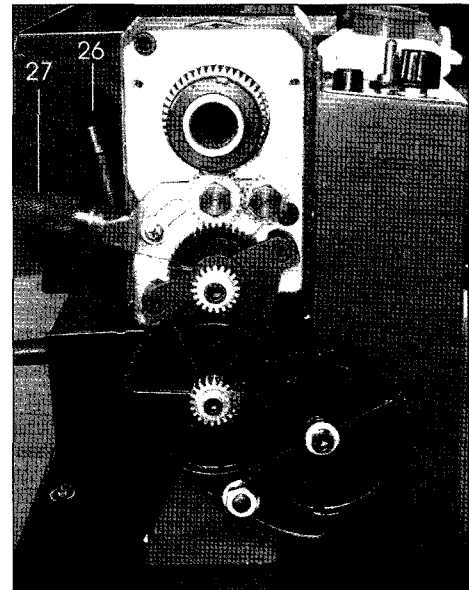
## 2. THE RUNNING GEAR

The Running Gear is protected by a cover (22), which is removed by unscrewing the two securing hex. Screws.

The gear train, shown in Fig. 2, transmits drive to 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 "Screw cutting".

The drive to the lead screw may be disconnected by operating the lever (27). And the same lever is used to drive the lead screw in a forward or reverse direction.(These actions are described in detail under 'Screw cutting')

Fig.2



## 3. THE TAILSTOCK

The tailstock (9) may be moved along the bed to any desired position and is secured in position by a single nut(10), at its base. The Tailstock spindle carries an internal No.2 Morse taper for use with the Center provided. A Revolving Live Center and Drill Chuck are also available from your dealer. (See Accessories)

## 4. THE CARRIAGE/SADDLE

The Saddle carries the Cross-Slide(6) onto which is mounted the Compound Slide(7) with Tool post (5), allowing intricate and delicate operations to be performed. It may be driven by the Lead screw, via a driver nut, to provide automatic feed when the Auto Feed lever (15), mounted on the Apron (17), is operated.

The position of the tool is effected 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 slide feed handle (13) 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 slide feeds are provided with a scale. These are used to move the tool by precise amounts - one division being equivalent to 0.001"(0.025mm). As the feed handle is turned. So does the scale. The scale on the cross-slide feed may also be held stationary whilst the handle is turned. Allowing the scale to be 'zeroed'. The manner in which this is put to use is discussed in greater detail under 'Operation'.

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.

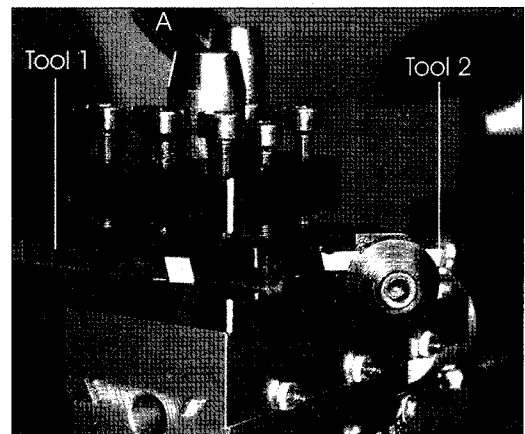
The tool post is rotated by slackening the lever (A) on its top a sufficient amount so the post can be lifted slightly and then turned to the desired position.

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

## 5. THE MOTOR

Disassembly of the motor is not recommended. Brushes may be replaced as described under 'Maintenance'. For all other servicing and repairs. Please contact your dealer.

Fig.3



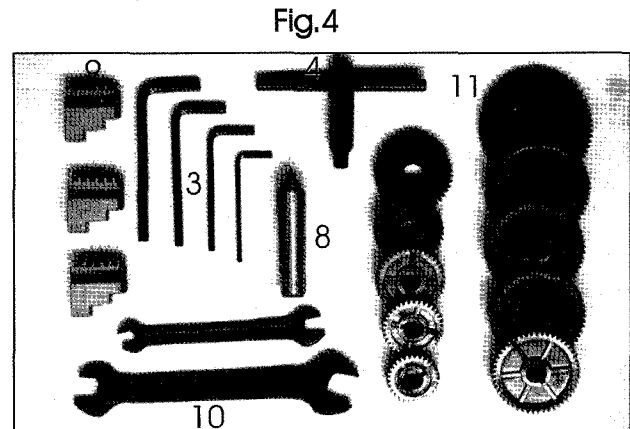
## UNPACKING & PREPARING FOR USE

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 your dealer immediately.

The following loose items are to be found in the packing case.

1. 4 Rubber Feet.\*
2. 4 Hex Keys.
3. 1 Chuck key.
4. 1 Plastic Oil Container.\*
5. 1 Spare Fuse\*
6. 2 Plastic Handles w/Nuts and Bolts.\*
7. No.2 Morse Taper Centre (for Tailstock).
8. 3 External Jaws (for 3-Jaw Chuck).
9. 2 Open end wrench 8X10mm and 14X17mm
10. 1 gear set (imperial or metric)

\* denotes not illustrated.



The machine 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.

You will notice that, for transit purposes, the cross slide feed handle 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 plastic handles to the rims of the manual feed and tailstock feed hand wheels respectively, ensuring the nuts are tight and the handles spin freely about the bolts, without excessive end play.

The carriage/saddle, cross-slide and compound slide 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 and two supporting are to be attached to the underside of the bed, using the four M8 head screws, in the tapped holes provided. These screws are also used to secure the chip tray. We strongly recommend however. 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'.

# INSTALLATION

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## **CAUTION!**

*DO NOT USE THE MACHINE UNTIL INSTALLATION IS COMPLETE AND ALL PRELIMINARY CHECKS HAVE BEEN MADE IN ACCORDANCE WITH THIS MANUAL*

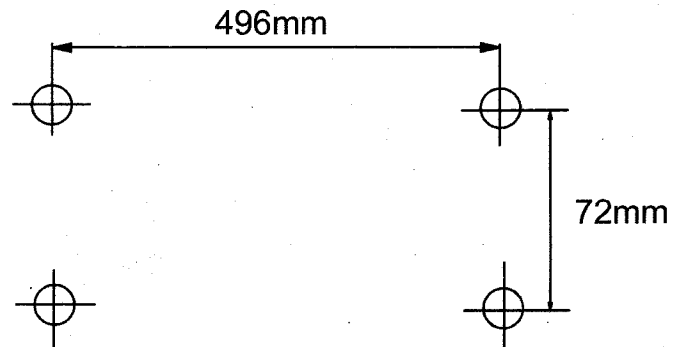
## MOUNTING THE LATHE

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 machine is very heavy, so get assistance from another person when moving the machine.

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 M8 screws which secure the rubber feet and chip tray to the machine (if already fitted) and discard the feet. Drill four 10mm clearance holes in the bench top at the dimensions shown in the diagram at right and, with appropriate length M8 bolts or screws with flat washers (not supplied), secure the lathe to the worktop ensuring the chip tray is in place.



Alternatively, if you do not wish for a permanent installation, you may secure the lathe to a 18mm thick plywood board with a minimum recommended dimension of 800X300mm, the mounting holes being centralized on the board. When the lathe is in use, the board should be clamped to workbench using with C- clamps.



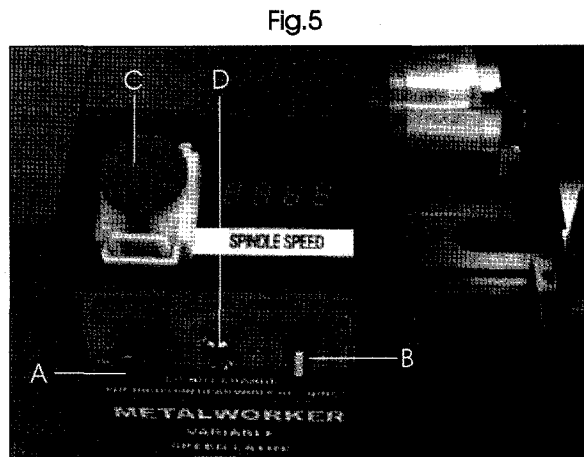
## STARTING PROCEDURE

### A. DURING INSTALLATION - INITIAL START (ref, Fig.5)

Taking all precautions previously stated, set the High-Low range lever (item 26) to Low. Must close the chuck guard for 3-jaw chuck.

Be sure the cross-slide is well away from the chuck. And the automatic feed lever is in its disengaged position, (i.e. lever is UP). Insert the electric plug into the wall socket.

Select **FORWARD**, using the Forward/Off/Reverse (F/O/R) Switch (B) on the main control panel, then release the Emergency Stop Switch by pushing down on the red knob slightly and pushing it in towards the headstock, as indicated by the arrow on the top of the red knob(C). The green lamp will light.



Switch on the machine by SLOWLY turning the variable speed control knob (A). clockwise. Speed will increase progressively the further the knob is turned. You can then see the spindle speed on the digital readout.

**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.

Repeat the procedure at the **HIGH** range setting

Should any adjustments be necessary, refer to the appropriate section under "Settings and Adjustments".

**CAUTION:**  
*NEVER attempt to change from  
HIGH to LOW range with the machine running.*

## B. STARTING UNDER NORMAL CONDITIONS (ref, fig.5)

1. Take all necessary precautions previously stated, 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 Forward/Off/Reverse (F/O/R) switch (B) on the main control panel, to the FORWARD position.
4. Engage or ensure the Auto Feed lever in disengaged, depending upon whether or not 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 located 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 a yellow lamp (D) will light. To restart, turn the Forward/Off/Reverse switch (B) 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 indesired position.(Green light should be on and yellow of.) adjust speed as required.

### **CAUTION:**

*ALWAYS turn the machine OFF at the Forward/off/Reverse switch BEFORE ATTEMPTING TO CHANGE ANY SETTINGS OR MAKE ANY ADJUSTMENTS, INCLUDING CHANGING FROM HIGH TO LOW RANGE.*

## **OPERATION**

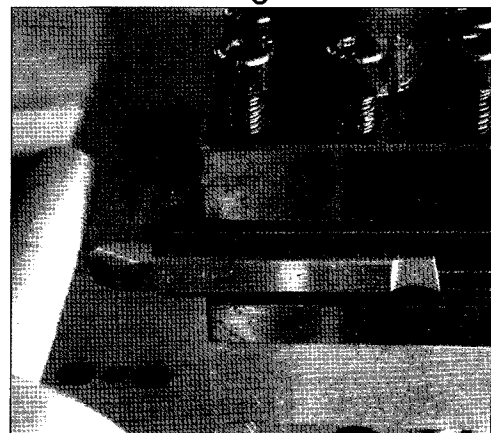
### A. SIMPLE TURNING

Before starting the machine as described above, it is imperative 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



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. 10mm but not more than 15mm 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 in order 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.

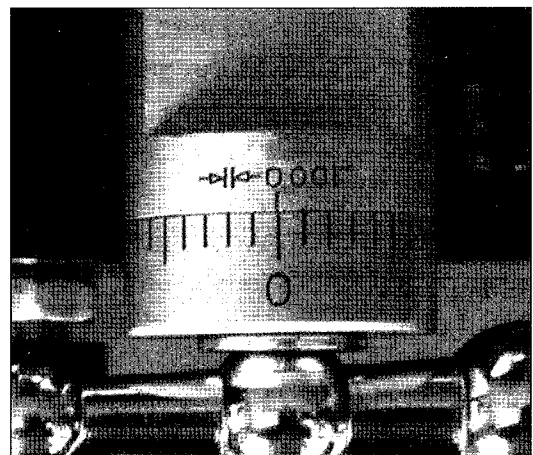
To check take the tip is at the correct height, position the tool so that the tip coincides with the point of the tailstock center. If necessary, make adjustments using shims, grind down the cutting tool tip, or select another tool.

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 piece 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 base and sliding it free of the bed.

It may be necessary to adjust the position of the compound slide 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 again coincide.

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 slide, **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 0.010" (0.25mm) 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. Forward/Neutral/Reverse lead screw lever. If Auto feed is not required, set to 'Neutral'.
- c. HIGH/LOW lever. Select required speed range.

Switch the machine ON as described under 'Starting Procedure' and slowly feed the cutting tool into the work using the Manual Feed handle. Proceed until you reach the previously marked line on the work, then retract the tool one or two complete turns on the Cross-Slide feed handle. Crank the carriage/saddle back to the beginning, then crank the tool the same number of turns 'in', plus the depth of desired cut, and proceed to cut once more.

NOTE: This describes the procedure for general, rough cutting. For other types of cuts/finishing... cutting shoulders, etc... you should consult a suitable handbook.

## B. SIMPLE TURNING WITH POWER FEED

The same basic setup is used as described above, except that, before starting, the lead screw F/N/R Lever (25, on the rear of head stock) is set to the 'Forward' position and the Auto feed Lever (13), is operated in order to drive the carriage/saddle. As mentioned previously, the rotational speed of the lead screw, and hence the rate of feed of the tool, is dependent upon the gear configuration of the gear train. The feed rate for normal turning is considerably less than that used for screw cutting.

The lathe is factory-configured for normal turning; however, if you have been screw cutting, always remember to reset the gear configuration to that for normal turning. Please refer to the chart on later page which shows the gear configuration, and the explanation of how to change the gears.

1. Taking all precautions previously mentioned, position the cutting tool a short distance to the right of the work piece with the appropriate depth of cut set on the cross-slide.
2. Ensure the lead screw F/N/R lever is set to 'Forward' and select 'Forward' on the Forward/Off/Reverse switch on the main control panel. Switch on the machine.
3. Turn the knob to achieve your desired spindle speed with your right hand and push down on the auto feed lever until the nut becomes firmly engaged with the lead screw.

IMPORTANT: Your left hand should always be free in order to hit the emergency stop should it become necessary.

4. Carefully observe the movement of the tool and as it approaches the mark on the surface (denoting the end of cut), pull the Auto Lever UP sharply and ensure it stays UP. If a degree of accuracy is required, it is recommended that you finish the cut by hand.

NOTE: If you require a shoulder with perfectly clean corners, then you need to use an appropriately shaped tool.

5. Retract the tool one or two complete turns on the cross-slide feed. Then crank the carriage/saddle so that the tool is at the start point once again. Advance the tool the same number of turns, plus the depth of cut, and when ready, push down the auto feed lever and proceed to take another cut.

## C. BEVEL CUTTING

Bevel cutting involves the use of the compound slide, 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 slide 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 slide 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 slide feed handle to advance the cutting tool in the direction of the arrow as shown in Fig.9.

## D. 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 0.4-2.0mm 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 dependant 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 suitable 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.

Fig.8

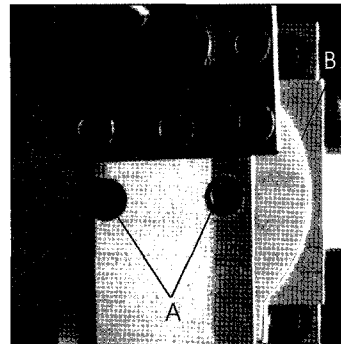


Fig.9



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/OFF/REVERSE (F/O/R) switch (B) to 'FORWARD'.

As the tool approaches the end of the desired thread, turn the switch (B) to 'OFF'. Do not disengage the auto-feed lever.

5. Retract the tool, using the cross-slide feed handle, noting the exact position on the scale and the exact number of turns.

Turn the switch (B) to 'REVERSE', the carriage/saddle crank back to the beginning and turn switch (B) to 'OFF'.

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.

6. Repeat the step 4 and 5. Proceed in this manner until the thread is completed.

## CHANGING GEARS FOR SCREWCUTTING

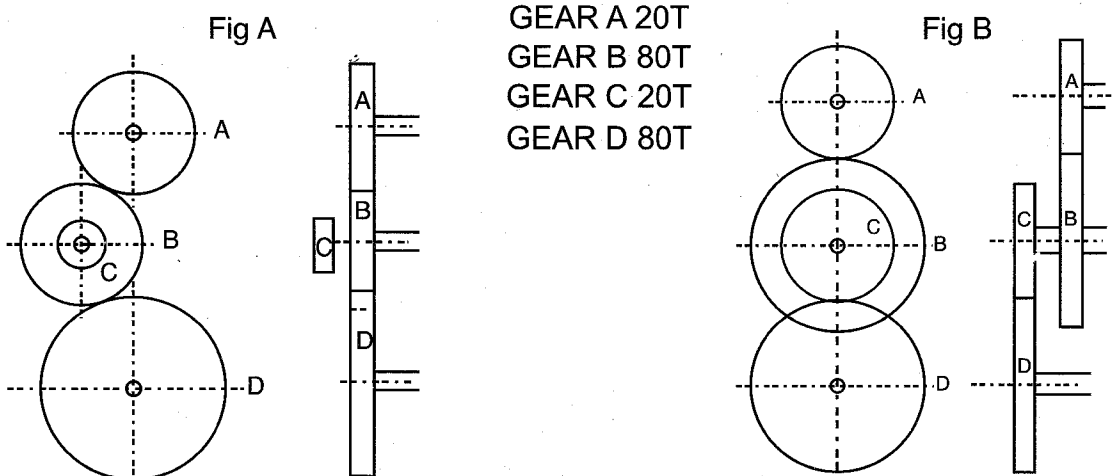
The lead screw is driven via a gear train by a gear on the spindle. The gear ratio will determine the rotational speed of the lead screw with relation to the spindle, i.e., one turn of the spindle will turn the lead screw an amount determined by the gear ratio.

By setting the gears to a known ratio, we can therefore produce threads to a known size, and as the lead screw supplied produces Imperial threads, the known values will be in Threads Per Inch (TIP), or if the lead screw supplied produces Metric threads, the known values will be in mm pitch.

As previously mentioned, the actual thread produced will be totally dependant 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.

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

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



## GEAR CHART FOR CUTTING IMPERIAL THREADS

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

**Examples:**

1. Ref. Fig A  
To cut 12 TPI, use  
40T in position A,  
30T in position D,  
and any convenient gear  
in position B to connect A and D.

2. Ref. Fig B  
To cut 13. TPI, use  
40T in position A  
65T in position B  
60T in position C  
30T in position D

\*If you purchase a "METRIC THREAD CONVERSION KIT", you can cut metric thread according to the table below.

## GEAR CHART FOR CUTTING METRIC THREADS

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

**Examples:**

1. Ref. Fig A  
To cut 0.5mm/T. use  
20T in position A  
50T in position B  
60T in position D  
and any convenient  
gear in position C.

2. Ref. Fig B  
To cut 0.4mm/T. use  
20T in position A  
50T in position B  
40T in position C  
60T in position D

In order to change the gears, ensure the machine is switched OFF and disconnected from the wall outlet.

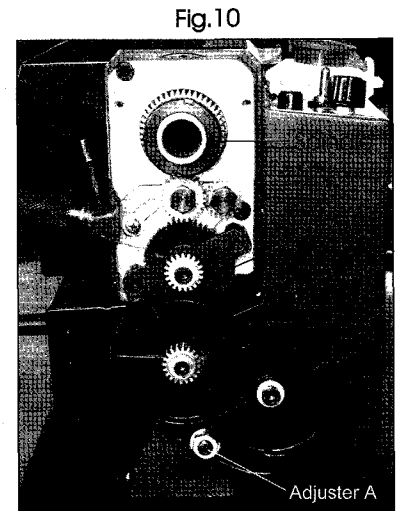
Remove the gear train cover which is secured with two socket head screws.

Gear A may be considered as the Driver, and Gear D as the Driven gear.

When a Simple gear train is configured, as illustrated in Fig. At 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.



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, in order 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.

## **MAINTENANCE**

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

### **BERORE USE**

Always inspect before use. Any damage should be repaired and misadjustments 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 in order to oil the left hand bearing.

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



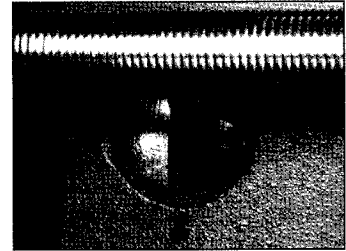
## AFTER USE

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



## SETTINGS AND ADJUSTMENTS

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Occasionally, it may be necessary to readjust various components in order to maintain optimum performance. The adjustments that may be performed follows:

### A. CROSS-SLIDE ADJUSTMENTS

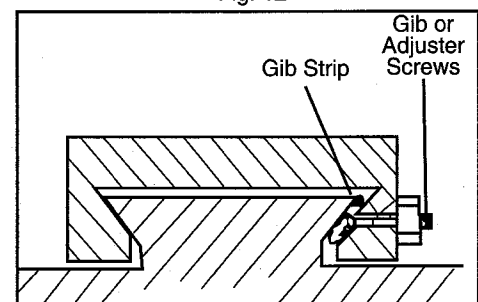
The cross-slide is mounted on a dovetail slide, as shown in fig, 12, Between the sloping surfaces on one side of the dovetail, a 'jib strip' is inserted, which may be tightened against the dovetail under the influence of three adjuster, of 'jib' screws, mounted along its' length.

The jib screws are to be found on the right hand side of the slide, directly beneath the compound slide handle. In time, wear will occur on the mating surfaces resulting in a 'sloppiness' of action.

To adjust the jib strip, to account for wear and ensure the slide moves evenly and smoothly, proceed as follows:

1. Loosen off all lock nuts and screw in the jib screws evenly, i. e., use the same torque for each screw. The slide should be held firmly. Test by trying to turn the handle, but do not force it.
2. Screw out each jib screw by one quarter of a turn ONLY, and nip up the lock nuts
3. Test again, by turning the handle. The movement should be even and smooth along its complete length.
4. If the movement is too loose, screw all adjusters 'in' by one eighth of a turn, and re-try. Similarly, if the movement is too stiff, screw 'out' the adjusters by one eighth of a turn until the correct adjustment is attained.
5. Tighten all lock nuts. Take care you do not move the jib screws while doing so.
6. When finished, retract the side fully and apply oil to all mating surfaces and the feed screw thread. Then crank the slide back to its normal position.

Fig. 12



## B. CROSS-SLIDE HANDLE

The cross slide feed should run smoothly, and the scale must rotate with the handle.

If any stiffness occurs, it is probably the result of chips or other lodging between the mating surfaces. Undo the socket head screw which secures the handle. Remove the handle and pull off the collar with the scale taking great care to retain the small spring plate which sits in a groove beneath the collar.

Clean the assembly and reassemble in reverse order. It will be necessary to hold the spring plate in place with a small screwdriver, or similar tool, and pushing down on it to allow the collar to be correctly located on to the shaft.

## C. COMPOUND SLIDE ADJUSTMENTS

Compound slide adjustments are made in the same way as those for the cross-slide. The jib screws are to be found on the left hand side of the slide, i. e. facing the front of the lathe.

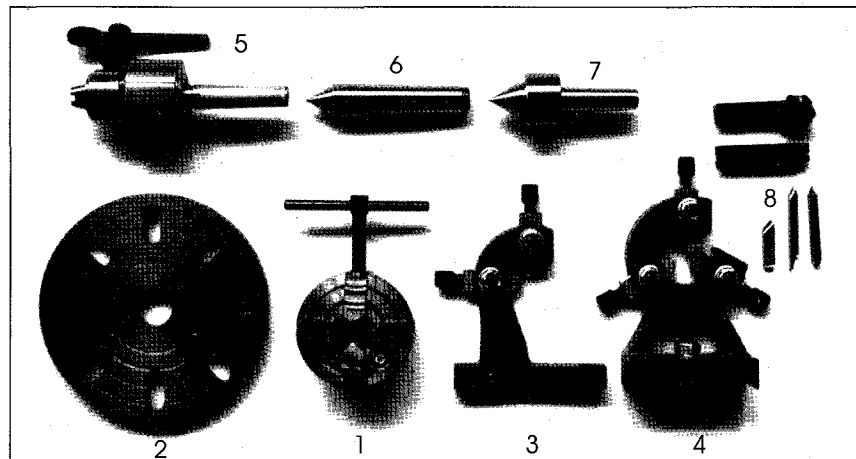
### **NOTE:**

It is important that the cross-slide and compound slide adjustments are correctly carried out and that there is "no sloppiness" of action. Any misadjustments will have a serious effect on the quality of your work, as they will all be transferred to the tool tip, it is vital that there is as little movement of the tool as possible.

## ACCESSORIES

A complete range of accessories is available from your versatility of your machine. These are as follows:

Fig.13



1. Independent 4-Jaw Chuck  
80mm dia.
2. Face plate - 160mm dia.
3. Moving Steady
4. Fixed Steady
5. Tailstock Drilling Chuck with a 13mm capacity.
6. Headstock Centre (MT3)
7. Revolving Centre (Tailstock - MT2)
8. 6 piece Cutting Tool Set

Comprising tools for 60 thread cutting.

Parting/grooving, facing and general turning work. (Hex. Wrench not shown)

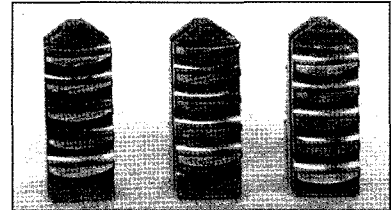
## EXTERNAL JAWS FOR 3-JAW CHUCK

To change the jaws, insert the chuck key and open the jaws to their fullest extent, it will then be possible to remove each jaw in turn.

Replace them with the external jaws, noting the following.

The thread segments of the jaws are progressively 'stepped' as shown in fig 14. They are also numbered 1 to 3. This is to take into account the lead of the screw thread within the chuck. It is therefore necessary to assemble the jaws in the correct order.

Fig.14

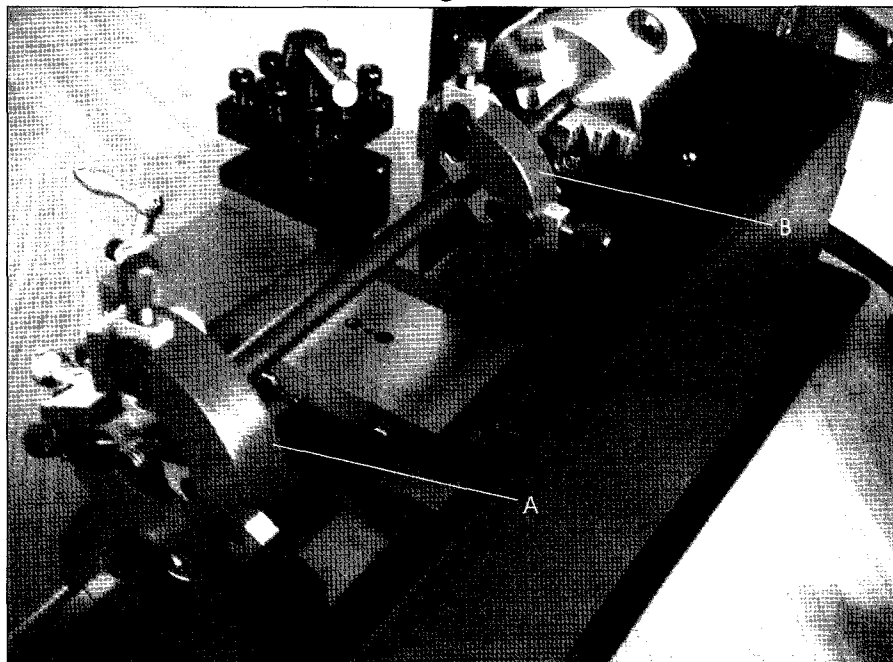


Place them as shown in the fig, 14 and assemble in the same order, clockwise in the slots in the chuck, turning the chuck key as you insert them, Close the jaws fully and check to ensure they all meet at the center. If a jaw is out, open the jaws fully, and retain pressure on the jaw in question while turning the chuck key until it snaps down into position. Re-check to ensure all jaws meet at the center.

## Fixed and Moving Steadies

Fig 15, illustrates the Fixed Steady (A) and Moving steady (B) assembled to the lathe used to support a long work piece

Fig.15



## How to use a Thread Dial indicator (optional accessories)

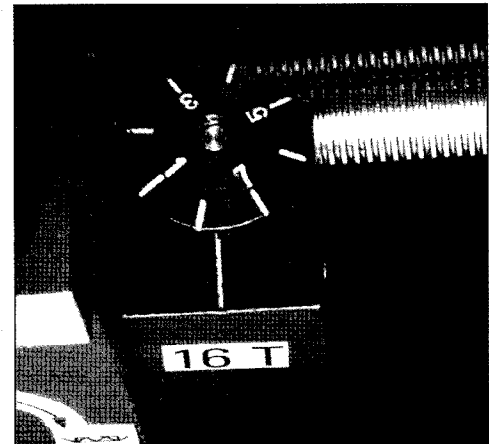
Mounted on the Apron, adjacent to the Auto Feed lever, is the Thread Dial indicator, shown in fig. 15. This is permanently connected to the lead screw and, as the lead screw turns, the 'dial' spins. Eight radial marks are etched on the dial and these are used to determine the exact position of the lead screw thread in relation to the saddle.

The numbers in the 'SCALE' column refer to the numbers on the radial lines on the Indicator Dial. Therefore, if a 20TPI thread is to be cut for example the marks 1, 3, 5 or 7 may be used. You should proceed as follows:


1. Observe the spinning Dial. In particular, concentrate on one of the numbered marks etched in the dial which corresponds to the scale number given in the Indicator Table. (In our example, this could be ,1,3,5 or7) As your line passes the mark on the body of the dial indicator, engage the auto lever sharply and thread cutting will commence.
2. As the tool approaches the end of the desired thread, **DISENGAGE THE AUTO FEED LEVER**, Do not switch the machine OFF.
3. Retract the tool, using the cross-slide feed handle, noting the exact position on the scale and the exact number of turns. Crank the saddle back to the beginning and reset the tool by cranking IN the cross - slide the exact number of turns previously wound OUT and then continue to crank IN to the desired depth of cut.
4. With the machine still running, observe the dial indicator and, as the same numbered line, passes the mark on the body, engage the auto feed lever once again. Proceed in this manner until the thread is completed.

Engaging the auto feed lever as your predetermined line on the dial passes the mark on the body ensures the half nuts of the auto feed mechanism engage in the same place for each pass, which in turn produces a perfect thread.

Fig.15



INDICATOR TABLE

TPI	SCALE	mm	SCALE
			
12	1,3,5,7		
13	1		
14	1,5	0.4	1,3,5,7
16	1~8	0.5	1~8
18	1,5	0.6	1~8
19	1	0.7	1, 4.5
20	1,3,5,7	0.8	1,5
22	1,5	1.0	1~8
24	1~8	1.25	1, 3.5
26	1,5	1.5	1~8
28	1,3,5,7	1.75	1, 4.5
32	1~8	2.0	1~8
36	1,3,5,7		
38	1,5		
40	1~8		
44	1,3,5,7		
48	1~8		
52	1,3,5,7		

IMPERIAL

METRIC

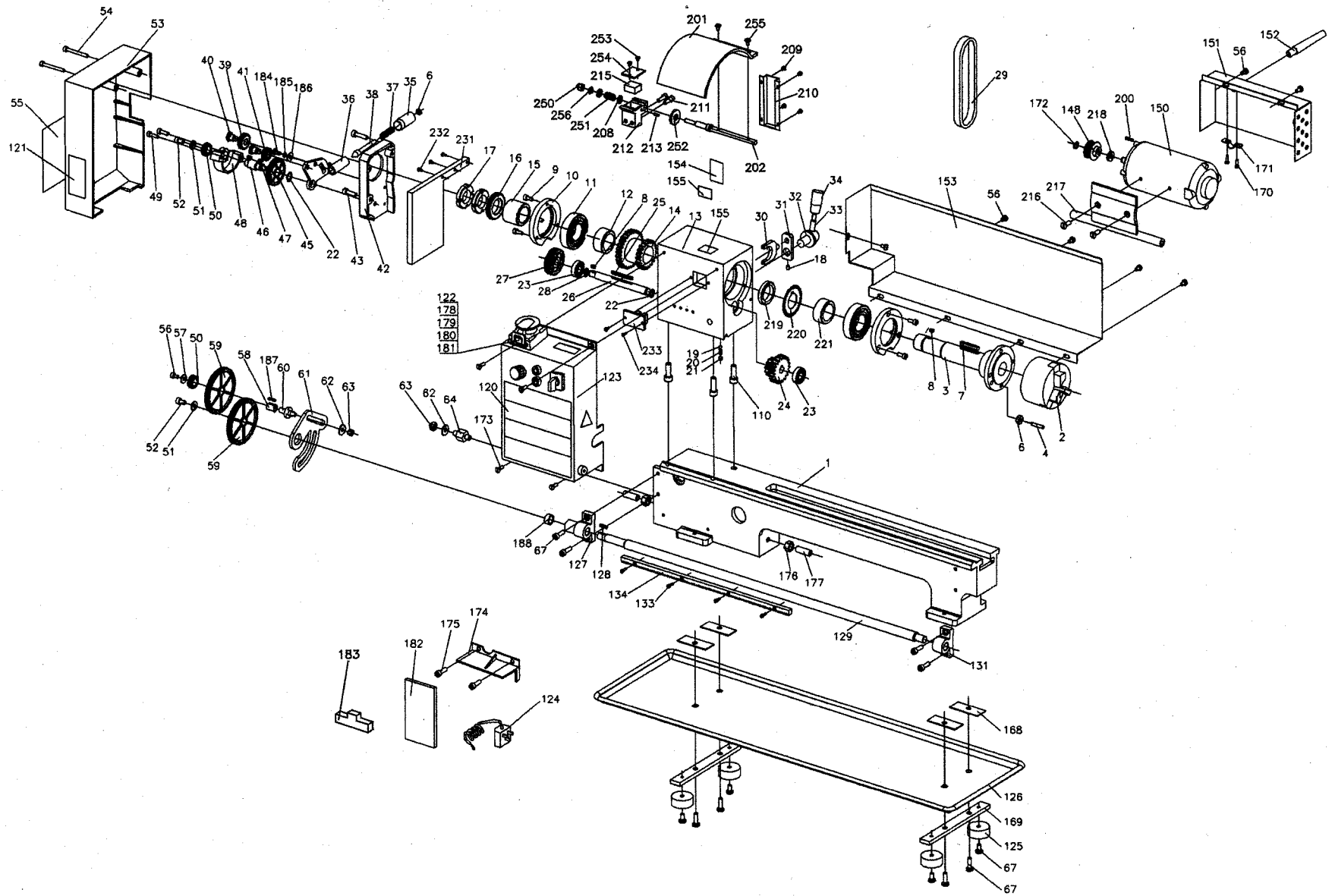
i.e.

1. 0.5mm/T, 0.6mm/T, 1mm/T, 1.5mm/T or 2mm/T=1~8
2. 1.25mm/T=1, 3.5
3. 0.7mm/T, 1.75mm/T=1, 4.5
4. 0.4mm/T=1, 3, 5, 7
5. 0.8mm/T=1, 5

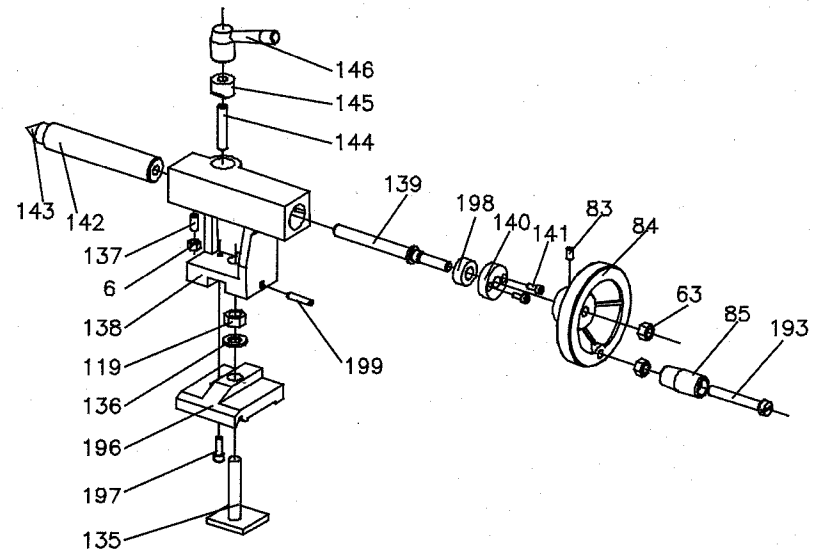
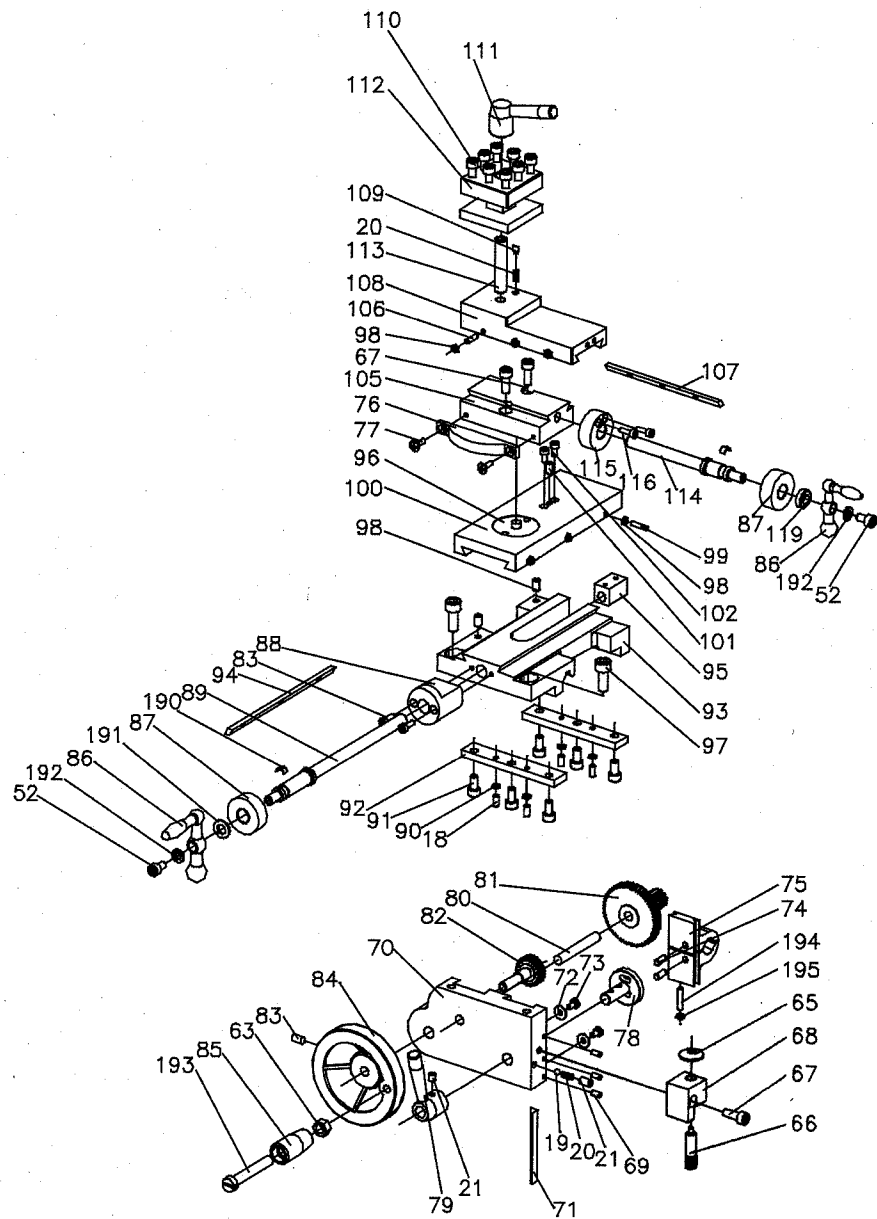
No.	Description	Q'ty	No.	Description	Q'ty
1	Bed way	1	47	Parallel key 3*8	1
2	Chuck	1	48	Mount	1
3	Spindle	1	49	Screw M5*18	2
4	Screw M6*25	3	50	Gearwheel 20T	2
6	Nut M6	5	51	Washer M6	6
7	Key 5*40	1	52	Screw M6*8	2
8	Key 4*8	2	53	Cover	1
9	Screw M5*12	6	54	Screw M5*45	2
10	Cover	2	55	Thread cutting chart	1
11	Ball bearing 80206	2	56	Screw M5*8	4
12	Spacer	2	57	Washer m4	2
13	Headstock casting	1	58	Bush w/key	1
14	H/L gear 21T/29T	1	59	Gearwheel 80T	2
15	Spacer	1	60	Shaft	1
16	Spur gear 45T	1	61	Support plate	1
17	Nut M27*1.5	2	62	Washer 8	3
18	Set screw M5*8	1	63	Nut M8	3
19	Steel ball 5	2	64	Shaft	1
20	Compression spring	3	65	Dial 16T (optional)	1
21	Set screw M6*6	3	66	Shaft (optional)	1
22	Retaining ring 12	2	67	Screw M6*16 (optional)	10
23	Ball bearing 80101	2	68	Dial indicator body (optional)	1
24	H/L gear 12T/20T	1	69	Set screw M4*10	3
25	Parallel key 4*45	1	70	Apron	1
26	H/L gear shaft	1	71	Gib strip	1
27	Pulley	1	72	Washer	2
28	Retaining ring 10	2	73	Screw M4*8	2
29	Timing belt L136	1	74	Shaft	2
30	Shifting fork	1	75	Half nut base	2
31	Shifting arm	1	76	Angle block	1
32	Shifting knob	1	77	Screw M4*10	2
33	Shifting lever	1	78	Groove cam	1
34	Shifting grip	1	79	Handle	1
35	Handle	1	80	Shaft	1
36	Handle mount	1	81	Feeding gear 11T/54T	1
37	Spring	1	82	Feeding gear 24T	1
38	Indicator	1	83	Screw M6*10	4
39	Pinion 25T	1	84	Wheel	2
40	Support screw	2	85	Knob	2
41	Pinion 20T	1	86	Handle	2
42	Fixed cover	1	87	Dial	2
43	Screw M6*20	2	88	Bracket	1
44	Screw M5*8	1	89	Feeding screw	1
45	Gear 45T	1	90	Nut M5	4
46	Shaft	1	91	Screw M6*12	6

No.	Description	Q'ty	No.	Description	Q'ty
92	Slide plate	2	144	Stud M8*40	1
93	Saddle	1	145	Clamp	1
94	Gib strip	1	146	Handle	1
95	Feeding nut	1	148	Pulley	1
96	Swivel disk	1	150	Motor	1
97	Screw M8*20	6	151	Cover	1
98	Nut M4	6	152	Cable gland	1
99	Screw M4*16	3	153	Rear splash guard	1
100	Cross slide	1	154	F/N/R label	1
101	Screw M5*10	2	155	High-low label	1
102	Screw M4*8	2	156	Top warning label	1
105	Compound rest (B)	1	157	Gear 30T	1
106	Screw M4*14	3	158	Gear 35T	1
107	Gib strip	1	159	Gear 40T	2
108	Compound rest (A)	1	160	Gear 45T	1
109	Position pin	1	161	Gear 50T	1
110	Screw M6*25	8	162	Gear 55T	1
111	Clamping lever	1	163	Gear 57T	1
112	Tool rest	1	164	Gear 60T	1
113	Stud M10*65	1	165	Gear 65T	1
114	Cross feed screw	1	166	External jaws (set)	1
115	Bracket	1	167	3-jaw chuck key	1
116	Screw M4*12	2	168	Rubber pad	2
119	Nut M18	2	169	Bracing	2
120	Model label	1	170	Screw M3*5	1
121	Indicator table label (optional)	1	171	Clamp block	1
122	Switch label	1	172	Check ring 9	1
123	Control box	1	173	Screw M5*10	4
124	Plug w/cord	1	174	Protector	1
125	Rubber foot	4	175	Screw M5*10	2
126	Chip tray	1	176	Nut M6	2
127	Bracket	1	177	Screw M6*25	2
128	Key 3*16	1	178	Emergency stop Switch	1
129	Lead screw	1	179	Fuse	1
131	Bracket	1	180	Variable speed control knob	1
			181	Forward/off/Reverse switch	1
133	Screw M3*10	3	182	PC Board	1
134	Rack	1	183	Electric filter	1
135	Clamp plate	1	184	Screw M5*10	1
136	Washer M10	1	185	Spring washer 5	1
137	Screw M5*16	1	186	Washer 5	1
138	Tailstock casting	1	187	Key 3*16	1
139	Tailstock screw	1	188	Spacer	1
140	Bracket	1			
141	Screw M4*10	2	190	Spring	2
142	Tailstock quill	1	191	Washer 8	1
143	Center	1	192	Spring washer 6	2









# WIRING DIAGRAM

