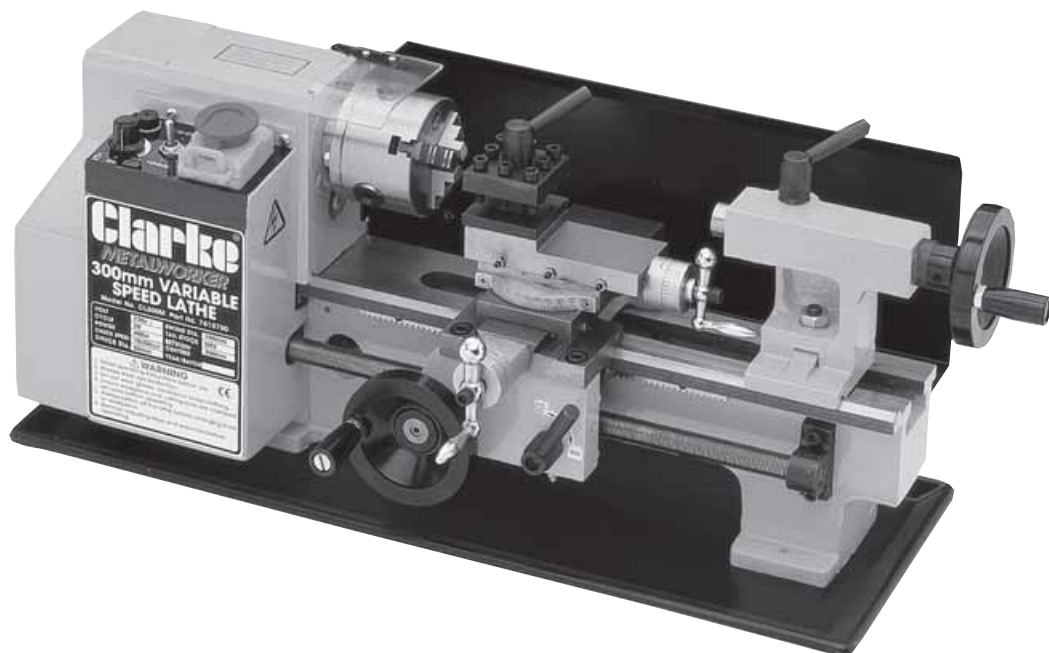


# Clarke<sup>®</sup> **METALWORKER**

## **300mm VARIABLE SPEED METAL LATHE**

**Model No. CL300M**



## **OPERATING & MAINTENANCE INSTRUCTIONS**



## SPECIFICATIONS

Motor .....	230VAC, 50Hz, 1 Phase
Power Rating .....	300Watts
Current Rating .....	5Amps
Distance Between Dead Centres .....	300mm
Centre Height .....	90mm
Max. Work Diameter .....	180mm
Spindle Bore .....	20mm
Spindle Taper .....	No.3 Morse Taper
Tailstock Taper .....	No.2 Morse Taper
Cross Slide Travel .....	65mm
Compound Slide Travel .....	55mm (effective)
Spindle Speeds .....	100 to 2,500 RPM
Overall Dimensions .....	820x295x300mm
Weight .....	40kg
Screw Threads - Imperial .....	12 - 104 TPI in 26 steps
Metric .....	0.4 - 2.0mm pitch in 10 steps

## SPARE PARTS & SERVICE



For Spare Parts and Servicing, please contact your nearest dealer, or  
CLARKE International, on one of the following numbers.

**PARTS & SERVICE - 020 8988 7400**

**e-Mail: [Parts@clarkeinternational.com](mailto:Parts@clarkeinternational.com) or [Service@clarkeinternational.com](mailto:Service@clarkeinternational.com)**

Please note that the details and specifications contained herein, are correct at the time of going to print. However, CLARKE International reserve the right to change specifications at any time without prior notice.

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Clarke

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## INTRODUCTION

Thank you for purchasing this CLARKE 300mm Metal Lathe.

The compact rugged construction and screw cutting capabilities, makes the CL300M ideal for model makers etc., both professional and DIY alike.

The Machine is capable of turning up to a maximum diameter of 180mm and an overall length of 300mm. It is further capable of producing short tapers and Imperial threads, both left and right hand. Metric threads may also be cut with the addition of a Metric Conversion Kit, available from your Clarke dealer (see 'Accessories' for details).

Before attempting to operate this machine, please read this instruction manual thoroughly and follow all directions carefully. By doing so you will ensure the safety of both yourself and others around you, and at the same time you should look forward to long and trouble free service from your Clarke Metal Lathe.

## GUARANTEE

This product is guaranteed against faults in manufacture for 12 months from date of purchase. Please keep your receipt as it will be required as proof of purchase.

This guarantee is invalid if the product has been found to have been abused or tampered with in any way, or not used for the purpose for which it was intended. The reason for return must be clearly stated.

This guarantee does not affect your statutory rights.

## IMPORTANT

***This manual is intended to instruct the user on the operations peculiar to the CL300M lathe ONLY. Although some reference is made, and advice given, regarding various metal turning techniques, it should not be regarded as a general tutorial on the subject.***

***It is assumed that the user has some knowledge of machinery of this type, and is familiar with metal turning. If this is not the case, we strongly advise that he/she enrol in a course at a local education centre where possible, or seek advice from a qualified person.***

## GENERAL SAFETY PRECAUTIONS FOR OPERATING MACHINERY

### CAUTION

***As with all machinery, there are certain hazards involved with their operation and use. Exercising respect and caution will considerably lessen the risk of personal injury. However, if normal safety precautions are overlooked or ignored, personal injury to the operator or damage to machinery may result.***

1. KNOW YOUR MACHINE. Read the manual carefully. Learn the machines applications and limitations, as well as the specific potential hazards peculiar to it.
2. KEEP GUARDS IN PLACE and in working order.
3. EARTH ALL MACHINES. If the machine is equipped with three-pin plug, it should be plugged into a three-pin electrical socket. Never remove the earth pin.
4. REMOVE ALL ADJUSTING KEYS AND WRENCHES. Form the habit of checking to ensure that keys, wrenches and tools, are removed from the machine.
5. KEEP WORK AREA CLEAN. Cluttered areas and benches invite accidents.
6. DON'T USE IN DANGEROUS ENVIRONMENT. Don't use machinery in damp or wet locations, or expose them to rain. Keep work area well lit.
7. MAKE WORKSHOP CHILDPROOF - with padlocks, master switches or by removing starter keys.
8. KEEP CHILDREN AND VISITORS AWAY. All children and visitors should be kept a safe distance from work area
9. DON'T FORCE THE MACHINE. It will do the job better and safer, at the rate for which it was designed.
10. USE THE RIGHT TOOL. Don't force a tool or attachment to do a job for which it was not designed.
11. WEAR PROPER APPAREL. Loose clothing, gloves, neckties, rings, bracelets, or other jewellery may get caught in moving parts. Nonslip footwear is recommended. Long hair should be contained.
12. USE SAFETY GLASSES. Everyday eyeglasses only have impact resistant lenses, they are NOT safety glasses.
13. DON'T OVERREACH. Keep proper footing and balance at all times.
14. MAINTAIN TOOLS IN TOP CONDITION. Keep tools sharp and clean for best and safest performance. Follow instructions for lubricating and changing accessories.
15. ALWAYS DISCONNECT THE MACHINE before servicing or changing accessories.
16. AVOID ACCIDENTAL STARTING. Switch Machine OFF before plugging in.
17. CHECK FOR DAMAGE. If any part of the machine, (eg. A cover or guard) is damaged, it should be carefully inspected to ensure that it can perform its intended function correctly. If in doubt, the part should be renewed. Damage to moving parts or major components should be Inspected by a qualified technician before operating the machine. Contact your local dealer for advice.

18. DO NOT STAND ON THE MACHINE. Serious injury could occur if the machine is tipped over. Do not store materials above or near the machine such that it is necessary to stand on the machine to get to them.
19. NEVER operate a machine when under the influence of alcohol, drugs or medication.
20. ALWAYS ENSURE THAT ADEQUATE LIGHTING is available. A minimum intensity of 300 lux should be provided. Ensure that lighting is placed so that you will not be working in your own shadow.

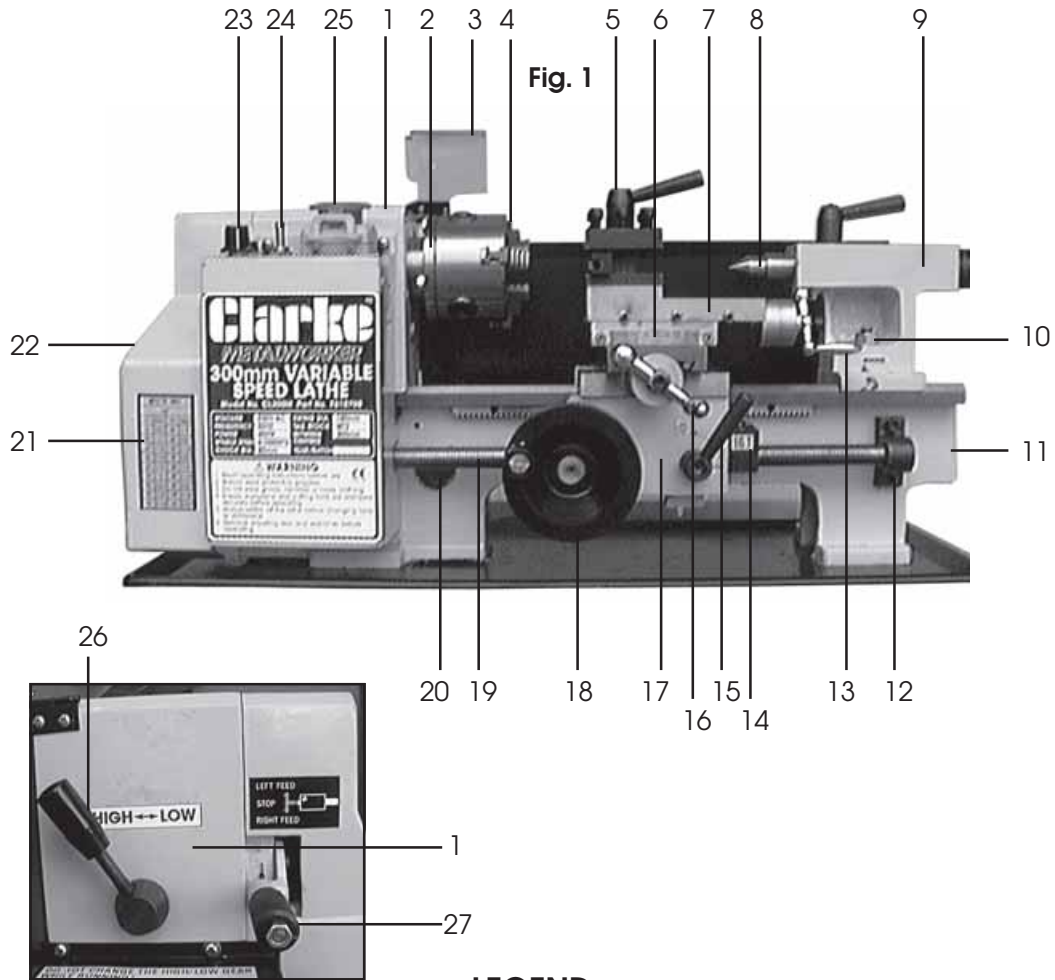
## ADDITIONAL SAFETY RULES FOR METAL LATHES

### **WARNING:**

***THIS MACHINE MUST NOT BE MODIFIED OR USED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS DESIGNED.***

1. **IMPORTANT:** You should not operate this machine unless you are thoroughly familiar with metal turning lathes and turning techniques. If there is any doubt whatsoever, you should consult a qualified person.
2. Do not operate the machine until it is completely assembled, and this entire manual, has been read and understood.
3. Ensure the proper electrical regulations are followed, and that the machine is properly earthed.
4.
  - a. Ensure all chuck keys, spanners and wrenches are removed from the machine.
  - b. Examine the setup carefully, ensuring that nothing could possibly interfere with the rotating workpiece.
  - c. Ensure the tool post is secure and the cutting tool is adjusted to the correct height.
  - d. Ensure your clothing is properly adjusted.
  - e. Ensure the workpiece is properly secured.
5. Make all adjustments with the power OFF.
6. ALWAYS cut at correct speed for the size and type of material being worked. (Refer to a suitable Turning Manual for cutting speeds)
7. NEVER leave the lathe unattended whilst it is running.
8. When you have finished with machine, always remove and store the cutting tools.
9. When using a coolant in conjunction with the chip tray, **On no account** must suds be allowed to enter the electrical system.

## FEATURES



Rear view of headstock

### LEGEND

- |                                |                                       |
|--------------------------------|---------------------------------------|
| 1. Headstock                   | 15. Automatic Feed Lever              |
| 2. Spindle Flange              | 16. Cross-Slide Feed Handle           |
| 3. Chuck Guard                 | 17. Apron                             |
| 4. 3- Jaw Chuck                | 18. Manual (Saddle) Feed Handle       |
| 5. Tool Post                   | 19. Leadscrew                         |
| 6. Cross-Slide                 | 20. Motor Brush Cap                   |
| 7. Compound Slide              | 21. Thread Dial Indicator Table       |
| 8. Tailstock Centre            | 22. Running Gear Cover                |
| 9. Tailstock                   | 23. Variable Speed Control Knob       |
| 10. Tailstock Securing Nut     | 24. Forward/Off/Reverse Switch        |
| 11. Bed                        | 25. Emergency Stop Switch             |
| 12. R.H. Leadscrew Bearing     | 26. High/Low Speed Range Lever        |
| 13. Compound Slide Feed Handle | 27. Leadscrew Fwd/Neutral/Rvrse Lever |
| 14. Thread Dial Indicator      |                                       |

## **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 centre for use with a face plate or turning clamp, (See 'Accessories' on page 24).

The Chuck Guard (3), is an essential component and is mounted on a pin which is secured to the headstock by two screws. This should always be be in place when using a chuck.

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' on page 24.

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' on page 24).

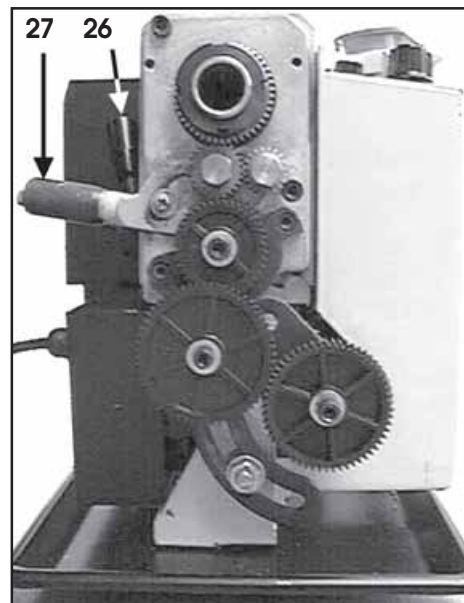
## **THE RUNNING GEAR**

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 (worm), drive is transmitted to the saddle, and consequently the cutting tool, thereby providing a power feed for screw 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 'Screwcutting' on page 17.

The drive to the leadscrew may be disconnected by operating the lever (27), and the same lever is used to drive the leadscrew in a forward or reverse direction. (These actions are described in greater detail under 'Screwcutting' on page 17.

Fig 2



## **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 Centre (8) provided. A Revolving Centre and Drill Chuck are also available from your Clarke dealer. (See Accessories on page 23).

### **THE SADDLE**

The Saddle carries the Cross-Slide (6), on to 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 Leadscrew, via a Drive 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 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, or 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' on page 17.

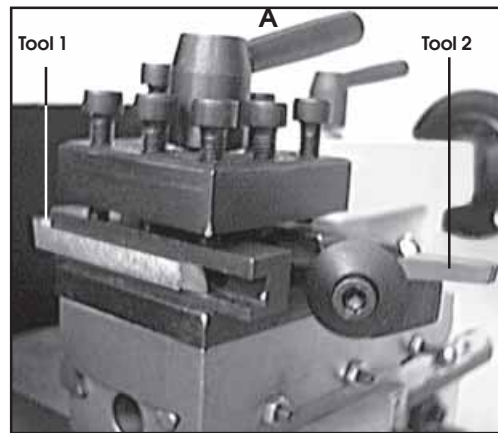
The cross-slide and compound slide feeds are provided with a scale. These are used to move the tool by precise amounts - one division being equivalent to 0.001" (0.025mm). As the feed handle is turned, so does the scale. The scale on the cross-slide feed handle may also be held stationary whilst the 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 may be mounted for convenience and to speed up your operation. Two are shown mounted in fig.3.

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

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

Fig. 3



### **THE MOTOR**

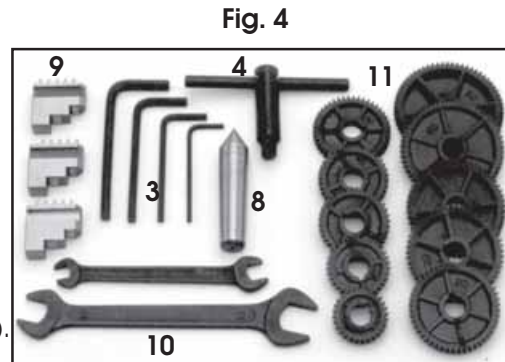
It is not recommended that you dis-assemble the motor. Brushes may be replaced as described under 'Maintenance'. For all other servicing and repairs, please contact your Clarke dealer.

## UNPACKING & PREPARING FOR USE

On receipt, carefully unpack the lathe. Inspect to ensure that no damage was suffered in transit and all parts are accounted for. Should any damage be apparent, or parts are missing, please contact your Clarke dealer immediately.

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

1. 4 x Rubber Feet.\*
  2. 4 x M6 Pan Head Screws.\*
  3. 4 x Hex. Keys.
  4. 1 x Chuck Key.
  5. 1x Plastic Oil Container.\*
  6. 1 x Spare Fuse - 2amp, glass type.\*
  7. 2 x Plastic Handles w/Nuts and Bolts.\*
  8. No.2 Morse Taper Centre (for Tailstock).
  9. 3 x External Jaws (for 3-Jaw Chuck).
  10. 2 x Double Open Ended Spanners 8x10mm and 14x17mm.
  11. 1 x Gear Set. Sizes: 30, 35, 40, 40, 45, 50, 55, 57, 60, 65 Teeth.
- \* denotes not illustrated.



With assistance, considering the weight of the machine, raise it on to a good solid surface or workbench. Proceed to remove all traces of preservative with paraffin or good quality solvent, and 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 are free and move evenly and smoothly.

Attach the plastic handles to the rims of the manual feed and tailstock feed handwheels respectively, ensuring the nuts are tight and the handles spin freely about the bolts, without excessive end play.

Saddle, cross-slide and compound slide adjustments are all factory set to ensure smooth movement in both directions. If however the adjustments have been upset during transit, indicated by stiff or erratic movement, refer to 'Settings and Adjustments' on page 22 for the methods of adjustment.

All hex. keys and spanners necessary to carry out various adjustments are supplied, together with a chuck key for the 3-Jaw chuck and a spare 2 Amp fuse. The fuse holder is located on the main control panel.

The four rubber feet are attached to the underside of the bed, using the four M6 pan 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' on page 11.

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' on page 24.

## INSTALLATION

### CAUTION!

**DO NOT ATTEMPT TO USE THE MACHINE UNTIL INSTALLATION IS COMPLETED, AND ALL PRELIMINARY CHECKS HAVE BEEN MADE IN ACCORDANCE WITH THIS MANUAL.**

### A. ELECTRICAL CONNECTIONS

Connect the mains lead to a standard, 230 Volt (50Hz) electrical supply through an approved 13 amp BS 1363 plug, or a suitably fused isolator switch.

#### WARNING! THIS APPLIANCE MUST BE EARTHED

**IMPORTANT:** The wires in the mains lead are coloured in accordance with the following code:

Green & Yellow	-	Earth
Blue	-	Neutral
Brown	-	Live

As the colours of the flexible lead of this appliance may not correspond with the coloured markings identifying terminals in your plug proceed as follows:

- Connect GREEN & YELLOW coloured cord to plug terminal marked with a letter "E" or Earth symbol "⏏" or coloured GREEN or GREEN & YELLOW.
- Connect BROWN cord to plug terminal marked with a letter "L" or coloured RED.
- Connect BLUE cord to plug terminal marked with a letter "N" or coloured BLACK.

If this appliance is fitted with a plug which is moulded onto the electric cable (i.e. non-wirable) please note:

1. The plug must be thrown away if it is cut from the electric cable. There is a danger of electric shock if it is subsequently inserted into a socket outlet.
2. Never use the plug without the fuse cover fitted.
3. Should you wish to replace a detachable fuse carrier, ensure that the correct replacement is used (as indicated by marking or colour code).
4. Replacement fuse covers can be obtained from your local dealer or most electrical stockists.
5. **The fuse in the plug must be replaced with one of the same rating (5 amps) and this replacement must be ASTA approved to BS1362.**

### B. MOUNTING THE LATHE

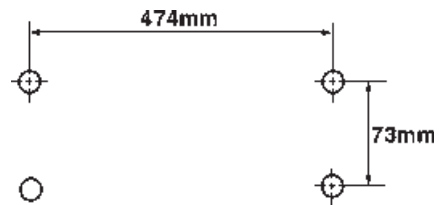
The lathe should be mounted on a strong, heavy workbench, of sufficient height so that you do not need to bend your back to perform normal operations. Take the necessary precautions when moving the lathe considering its weight. **Assistance will be required.**

Ensure the location is adequately lit and that you will not be working in your own shadow.

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

To do this, remove the four M6 screws which secure the rubber feet and chip tray to the machine (if already fitted) and discard the feet.

Drill four M6 clearance holes in a worktop, at the dimensions shown in the diagram opposite, and with appropriate length M6 bolts, or screws, with flat washers, (not supplied) proceed to 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 5/8" thick plywood board with a minimum recommended dimension of 800 x 300mm, the mounting holes being centralised on the board.

When the lathe is in use, the board should be clamped to workbench using with 'G' clamps.

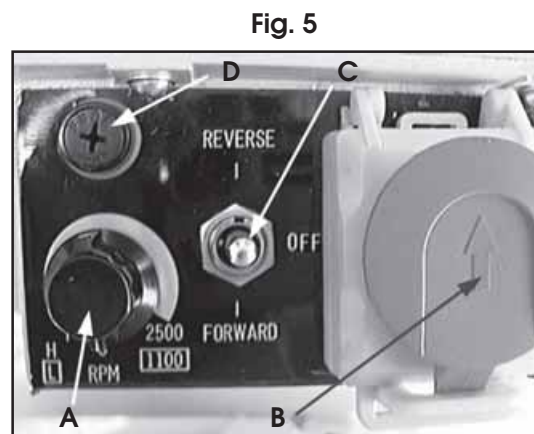
## STARTING PROCEDURE

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

1. Taking all precautions previously stated, set the High - Low range lever (item 26 page 7) to LOW.

2. Ensuring the cross-slide is well away from the chuck, and the automatic feed lever is in its **dis-engaged** position, (i.e. lever is UP), insert the electric plug into its socket.

Select FORWARD, using the Forward/Off/Reverse (F/O/R) switch (C), 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 (B).



Switch on the machine by **GENTLY** turning the Variable Speed control knob (A), clockwise. A click will be heard as power is turned on, but the spindle will not rotate until the knob is turned clockwise a little further. Speed will increase progressively the further the knob is turned.

3. 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 mains 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.

**NOTE:** *When changing from HIGH to LOW range, it may be necessary to turn the spindle by hand, in order for the gears to mesh correctly.*

**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 workpiece can rotate fully without obstruction.
2. Set the Speed Range control lever to HIGH or LOW as required.
3. Set the Forward/Off/Reverse (F/O/R) switch (C), on the main control panel, to the FORWARD position.
4. Engage or ensure the Auto Feed lever is dis-engaged, 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 Leadscrew 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, on its end, locates in the middle pit mark in the casing.*

5. Proceed to start the machine as described in Section. A above.
6. To stop the machine, turn the Variable Speed Control knob (A) to its OFF position. If the machine is finished with or is to be left unattended, turn the F/O/R switch also to the OFF position then disconnect from the mains supply.

**CAUTION:**

**ALWAYS turn the machine OFF at both the Variable Speed Control and the Forward/Off/ Reverse switch BEFORE attempting to change any settings or make any adjustments. This includes 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 in order 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/verniers/calipers etc.

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 using three hex socket head screws in the manner shown in FIG. 6.

(Ideally, the overhang should be approx. 10 mm but not more than 15mm for a straight tool).

It is IMPORTANT to ensure that the tip of the cutting tool is on the centre line of the work, or very slightly below it. On no account should it be above the centre line. Where 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 to ensure the tip is at the correct height, position the tool so that the tip is almost touching the point of the tailstock centre. They should coincide. If necessary make adjustments using shims, grind down the cutting tool tip or select another tool.

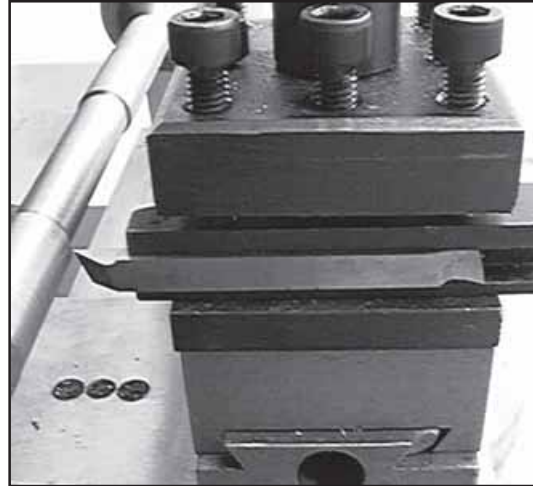
When satisfied, mount the work, either in the chuck or on a faceplate, and if necessary, use the tailstock centre for additional support (If the work cannot be adequately secured by the chuck, or if it is a long piece, or of small diameter). Additionally, 'Steadies' may be used which are described in 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.

Mark the surface of the work at the point where the cut is to end, i.e. the shoulder, using a scribe or similar means, and move the saddle so that the cutting tool is directly opposite the mark, then wind in the cross-slide so that the tool touches the surface of the work.

Whilst carrying out these manouvres, rotate the chuck by hand to ensure that nothing will come into contact with it when turning takes place, i.e. there is adequate clearance between the saddle, cross-slide, tool post or cutting tool, and the chuck.

Fig 6



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 wind the saddle away from the headstock, then wind the cutting tool up to the work, somewhere along the length to be cut, whilst 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 saddle until the tool is a short distance from the right hand edge of the work. Wind in the cross-slide again one full turn until the zero marks again coincide.

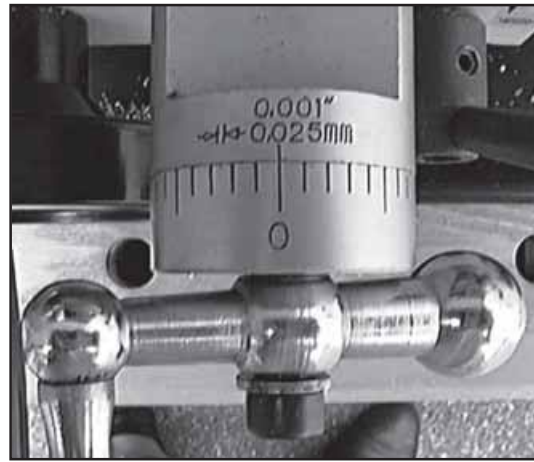


Fig 7

Wind in the cross-slide again one full turn until the zero marks again coincide.

**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 into account backlash and 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" 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 leadscrew 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.

Wind the saddle back to the beginning then wind 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 Leadscrew F/N/R Lever (25) is set to the 'Forward' position and the Auto Feed Lever (15), is operated in order to drive the saddle.

As mentioned previously, the rotational speed of the leadscrew, and hence the rate of feed of the tool, is dependant 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 page 19 which shows the gear configuration, and the explanation of how to change the gears on the same page.

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

**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 wind the 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 procede 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 for all normal cutting operations. This is indicated by the zero mark, on the scale, (B, Fig. 8), lining up with the mark etched on the body of the cross-slide.

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

Slacken the screws sufficient 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 re-tightening the hex. 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.

Fig 8

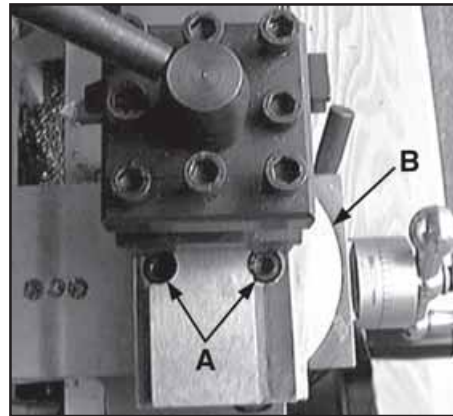
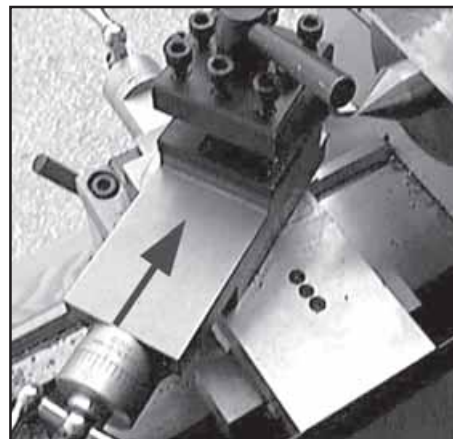


Fig 9



### D. SCREWCUTTING

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 saddle will move towards the headstock **under power**, the same as cutting using 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 leadscrew that will produce Imperial Threads in a range from 12 to 104 threads per inch. 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 screwcutting techniques, cutting tools etc., you should consult a suitable handbook or obtain advice from a qualified person.

A leadscrew, with corresponding half nuts and thread dial indicator, for the production of Metric threads is available from your Clarke dealer, see 'Accessories' on page 24.

The general procedure for screwcutting 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 which is of a smaller diameter than the root diameter of the proposed screw thread. Note, that for long threads it may be necessary to use 'steady's' (see 'Accessories' on page 24).
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).

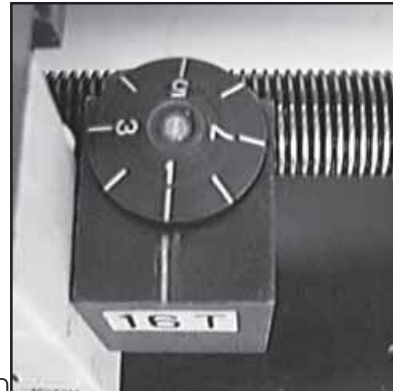
**NOTE: Mounted on the Apron, adjacent to the Auto Feed Lever, is the Thread Dial Indicator, shown in fig. 10.**

**This is permanently connected to the leadscrew and as the leadscrew turns, the 'dial' spins. Eight radial marks are etched on the dial and these are used to determine the exact position of the leadscrew thread in relation to the saddle.**

**Mounted on the front of the gear train cover is the Indicator Table, which is duplicated on page 20.**

**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 now proceed as follows:**

Fig 10



4. Observe the spinning Dial. In particular, concentrate on the marks etched on the dial which corresponds to the scale number given in the Indicator Table.  
(In our example, this could be 1,3, 5 or 7)  
As your line passes the mark on the body of the dial indicator, engage the auto lever sharply and thread cutting will commence.
5. As the tool approaches the end of the desired thread, DISENGAGE THE AUTO FEED LEVER. Do not switch the machine OFF.
6. Retract the tool, using the cross-slide feed handle, noting the exact position on the scale and the exact number of turns.  
Wind the saddle back to the beginning and reset the tool by winding IN the cross-slide the exact number of turns previously wound OUT and then continue to wind IN to the desired depth of cut.
7. 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 thread on the leadscrew each time, thereby ensuring the cutting tool is in the same place for each pass which in turn produces a perfect thread.

## CHANGING GEARS FOR SCREWCUTTING

The leadscrew is driven, via a gear train, by a gear on the spindle. The gear ratio will therefore determine the rotational speed of the leadscrew with relation to the spindle. i.e. one turn of the spindle will turn the leadscrew 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 leadscrew supplied produces Imperial threads, the known values will be in Threads Per Inch (TPI).

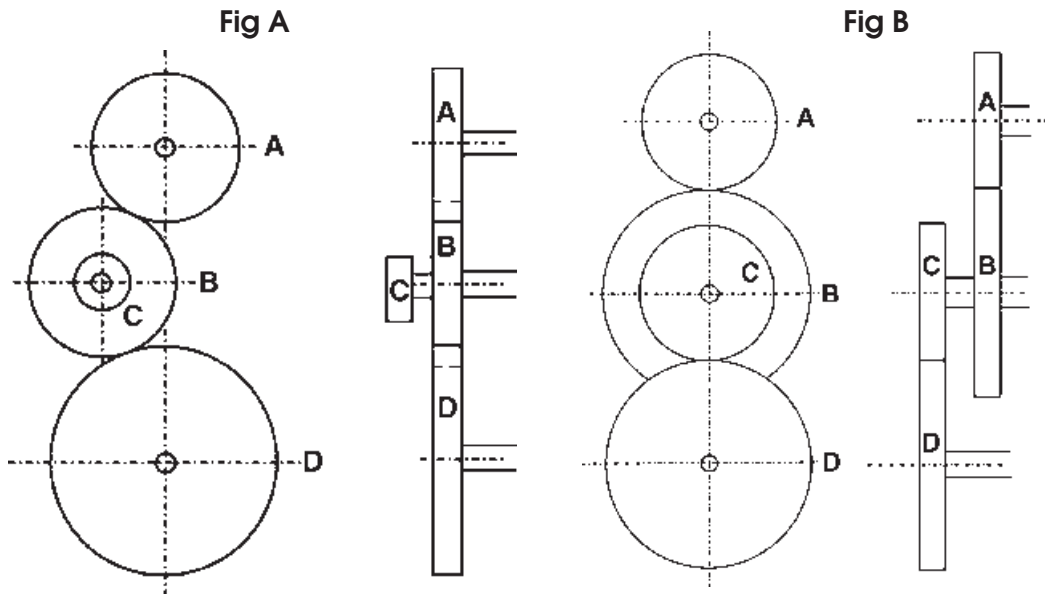
A leadscrew for Metric thread cutting, complete with half nuts is available from your Clarke dealer.

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, on page 20, shows the thread sizes that may be cut using the gear configuration shown in the corresponding columns.

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

- Gear A ..... 20T
- Gear B ..... 80T
- Gear C ..... 20T
- Gear D ..... 80T



**GEAR CHART FOR CUTTING IMPERIAL THREADS**

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	60	-	65

**INDICATOR TABLE**

TPI	SCALE
12	1,3,5,7
13	1
14	1,5
16	1~8
18	1,5
19	1
20	1,3,5,7
22	1,5
24	1~8
26	1,5
28	1,3,5,7
32	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

1~8 indicates that any of the 8 lines may be used.

Examples:

1. Ref. Fig A on page 19.

To cut 12 TPI, use 40T in position A,  
30T in position D,  
use the 65 tooth gear in position B to connect A and D.

2. Ref. Fig B on page 19.

To cut 38 TPI, use 20T in position A  
50T in position B  
60T in position C  
57T in position D

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

Remove the gear train cover which is secured with two hex. 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. A, page 19, 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. 11.

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.

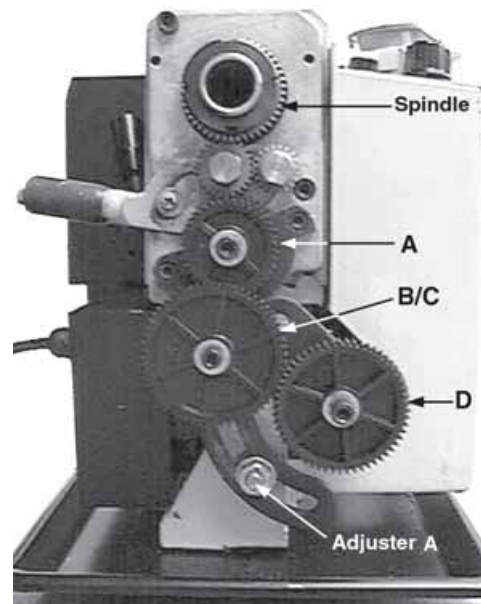
Replace the securing screws, ensuring the flat washer bears up against the gear hub in each case.

**NOTE: If a compound gear train is required, as shown in Fig. B on page 18, 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 overtight. (Turn the spindle by hand to test for backlash).

Replace the cover and secure with the two hex socket head bolts.

Fig 11



**CAUTION:**

**NEVER run the machine with the cover removed.**

## MAINTENANCE

For maximum performance, it is essential that the lathe is 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.

Inject a few drops of oil to the oilways at both leadscrew bearings (each end bracket) and 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.

Inject a few drops also to the compound slide oilway, located on the slides' top surface, between the two hex socket head screws.

### **AFTER USE**

Remove all swarf from the machine and thoroughly clean all surfaces. If coolant has 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 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. 12

Fig. 12



## SETTINGS AND ADJUSTMENTS

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

### **A. CROSS-SLIDE ADJUSTMENTS**

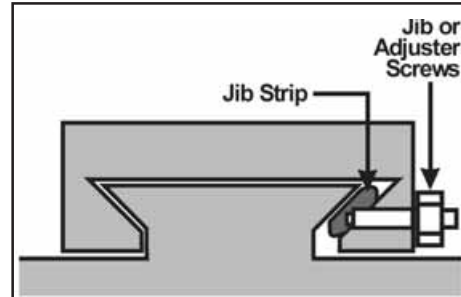
The cross-slide is mounted on a dovetail slide, as shown in fig. 13. Between the sloping surfaces on one side of the dovetail, a 'jib strip' is inserted, which may be tightened against the dovetail under the influence of three adjuster, or 'jib' screws, mounted along its' length.

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. Slacken 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 slack, 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 taking care to ensure you do not move the jib screws whilst doing so.
6. When completed, retract the slide fully and apply oil to all mating surfaces and the feed screw thread, then wind the slide back to its normal position.

Fig. 13



## **B. CROSS-SLIDE FEED 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 swarf lodging between the mating surfaces. Undo the securing hex socket head screw securing 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.

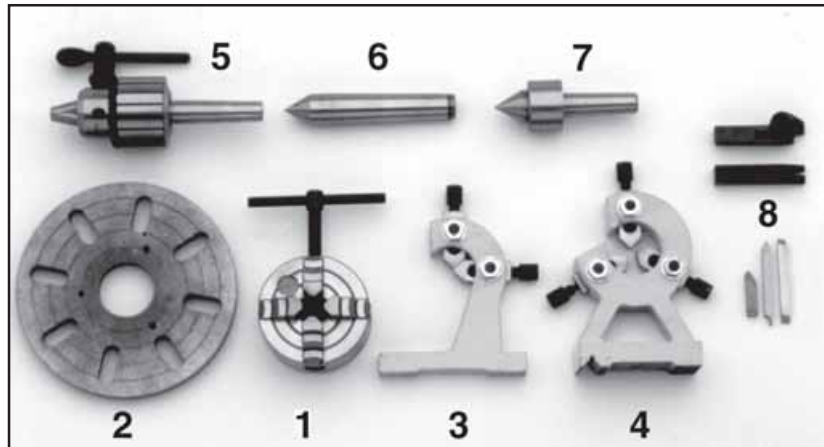
### **NOTE:**

***It is important that the cross-slide and compound slide adjustments are correctly carried out and that there is no 'sloppiness' of action. Any maladjustments 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 range of accessories is available from your Clarke dealer which extends the versatility of your machine. These are as follows:



1. Independant 4-Jaw Chuck 80mm dia. .... Part No. . 7610721
2. Face Plate - 160mm dia..... 7610723
3. Moving Steady . .... 7610724
4. Fixed Steady ..... 7610722
5. Tailstock Drilling Chuck with a 30mm capacity. .... 7610725
6. Headstock Centre (MT3) ..... 7610726
7. Revolving Centre (Tailstock - MT2) ..... 7610727
8. 6 Piece Cutting Tool Set. .... 7610728  
*Comprising tools for 60° thread cutting,  
 parting/grooving, facing and general turning work.  
 (Hex. wrench not shown)*
9. Metric Thread Cutting Kit (not shown) ..... 7610720  
 Comprising Leadscrew, Half Nuts and Dial Indicator

### **EXTERNAL JAWS - 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 screwthread within the chuck. It is therefore necessary to assemble the jaws in the correct order.

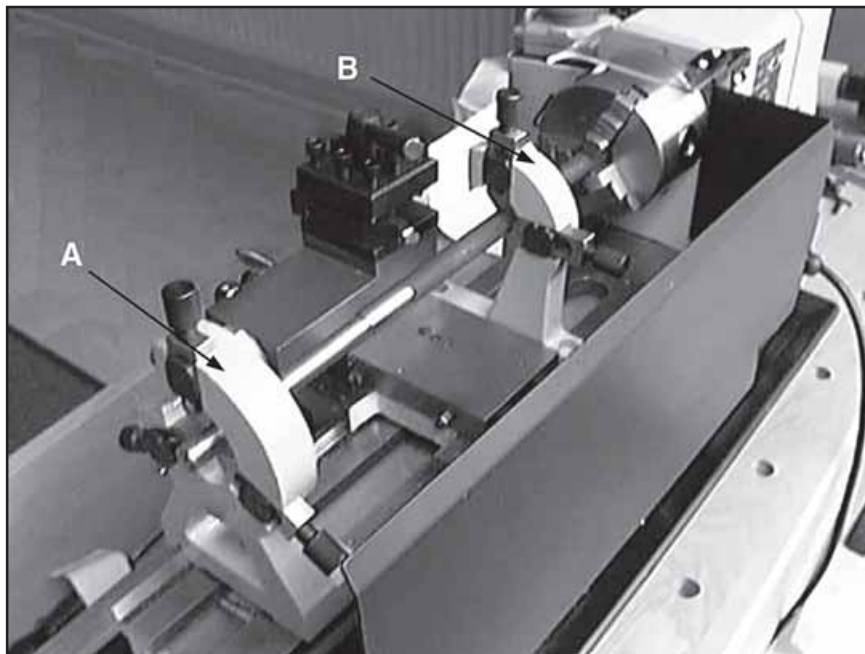


Place them as shown in the fig. 14, and assemble in the same order, clockwise in the slots in the chuck, turning the chuck key as you insert them. Close the jaws fully and check to ensure they all meet at the centre. If a jaw is out, open the jaws fully, and retain pressure on the jaw in question whilst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

### **FIXED AND MOVING STEADIES**

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

**Fig 15**



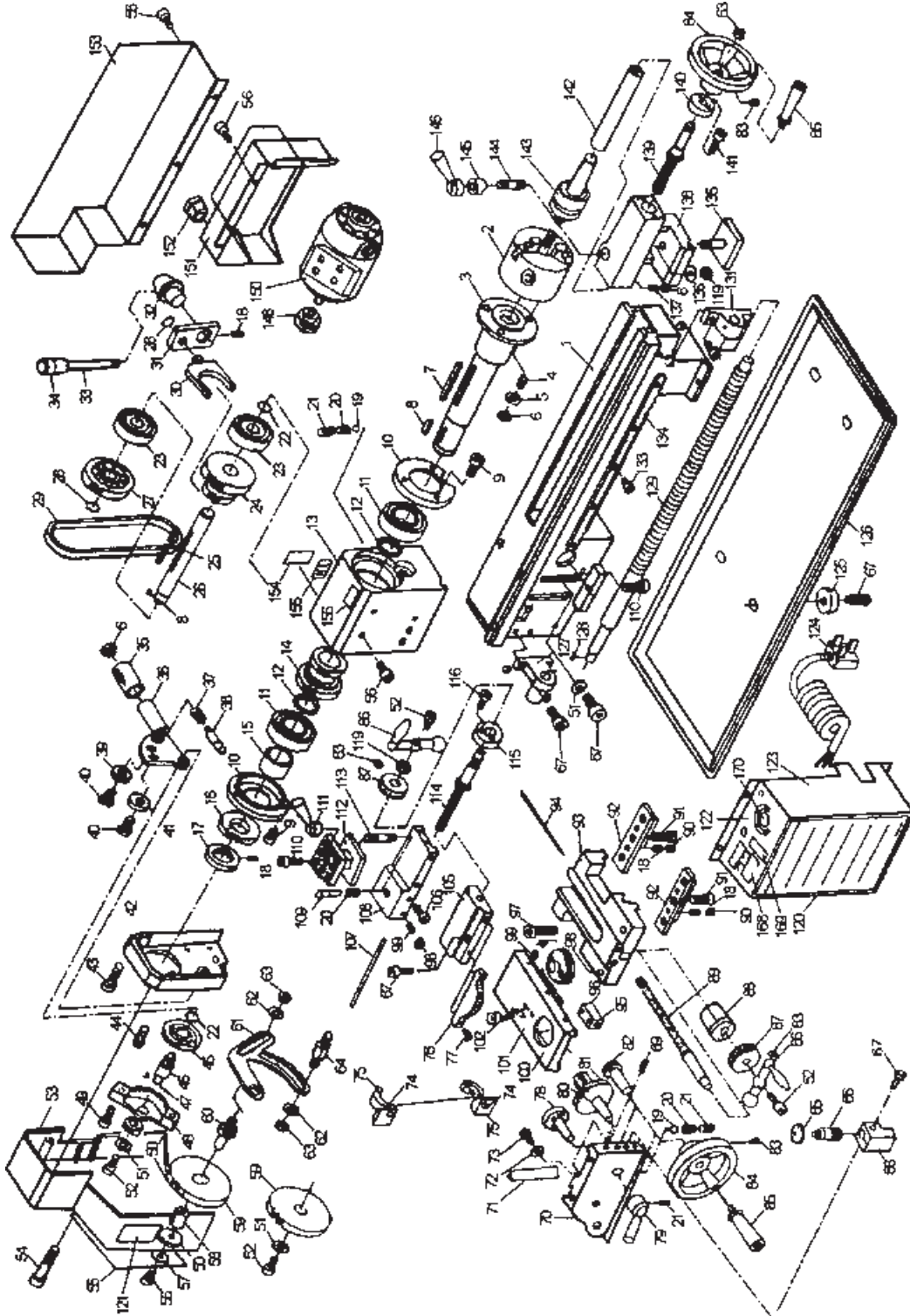
## PARTS LIST

No.	Description	Qty	Part No.	No.	Description	Qty	Part No.
1	Bed Way	1	HT300M001	41	Pinion 20T	1	HT300M041
2	Chuck	1	HT300M002	42	Fixed Cover	1	HT300M042
3	Spindle	1	HT300M003	43	Screw M6x20	2	HT300M043
4	Screw M6x30	3	HT300M004	44	Screw M5x10	1	HT300M044
5	Washer M6	3	HT300M005	45	Gear 45T	1	HT300M045
6	Nut M6	5	HT300M006	46	Shaft	1	HT300M046
7	Key M5x35	1	HT300M007	47	Parallel Key 3x8	1	HT300M047
8	Key M4x8	2	HT300M008	48	Mount	1	HT300M048
9	Screw M5x10	6	HT300M009	49	Screw M5x16	2	HT300M049
10	Cover	2	HT300M010	50	Gearwheel 20T	2	HT300M050
11	Ball Bearing	2	HT300M011	51	Washer M6	6	HT300M051
12	Spacer	2	HT300M012	52	Screw M6x6	4	HT300M052
13	Head Stock Casting	1	HT300M013	53	Cover	1	HT300M053
14	H/I Gear 21T/29T	1	HT300M014	54	Screw M6x45	2	HT300M054
15	Spacer	1	HT300M015	55	Thread Cutting Chart	1	HT300M055
16	Spur Gear 45T	1	HT300M016	56	Screw M5x8	12	HT300M056
17	Nut	1	HT300M017	57	Washer M4	2	HT300M057
18	Set Screw M5x8	1	HT300M018	58	Bush w/Key	1	HT300M058
19	Steel Ball	2	HT300M019	59	Gearwheel 80T	2	HT300M059
20	Compression Spring	3	HT300M020	60	Shaft	1	HT300M060
21	Set Screw M6x6	3	HT300M021	61	Support Plate	1	HT300M061
22	Retaining Ring M12	2	HT300M022	62	Washer M8	3	HT300M062
23	Ball Bearings 6201ZZ	2	HT300M023	63	Nut M8	3	HT300M063
24	H/L Gear 12T/20T	1	HT300M024	64	Shaft	1	HT300M064
25	Parallel Key M4x45	1	HT300M025	65	Dial 16T	1	HT300M065
26	H/L Gear Shaft	1	HT300M026	66	Shaft	1	HT300M066
27	Pulley	1	HT300M027	67	Screw M6x16	10	HT300M067
28	Retaining Ring M10	2	HT300M028	68	Dial Indicator Body	1	HT300M068
29	Timing Belt Lx136	1	HT300M029	69	Set Screw M4x10	3	HT300M069
30	Shifting Fork	1	HT300M030	70	Apron	1	HT300M070
31	Shifting Arm	1	HT300M031	71	Gib Strip	1	HT300M071
32	Shifting Knob	1	T300M0032	72	Washer	2	HT300M072
33	Shifting Lever	1	HT300M033	73	Screw M4	2	HT300M073
34	Shifting Grip	1	HT300M034	74	Shaft	2	HT300M074
35	Handle	1	HT300M035	75	Half Nut Base	2	HT300M075
36	Handle Mount	1	HT300M036	78	Groove Cam	1	HT300M078
37	Spring	1	HT300M037	79	Handle	1	HT300M079
38	Indicator	1	HT300M038	80	Shaft	1	HT300M080
39	Pinion 25T	1	HT300M039	81	Feeding Gear 11T/54T1	1	HT300M081
40	Support Screw	2	HT300M040	82	Feeding Gear 24T	1	HT300M082

**Cont.**

No.	Description	Qty	Part No.	No.	Description	Qty	Part No.
83	Screw M6x12	4	HT300M083	128	Key M3x16	1	HT300M128
84	Wheel	2	HT300M084	129	Lead Screw Imperial	1	HT300M129
85	Knob	2	HT300M085	131	Bracket	1	HT300M131
86	Handle	2	HT300M086	132	Plastic Plug	1	HT300M132
87	Dial	2	HT300M087	133	Screw M4x10	5	HT300M133
88	Bracket	1	HT300M088	134	Rack	1	HT300M134
89	Feeding Screw	1	HT300M089	135	Clamp Plate	1	HT300M135
90	Nut M5	4	HT300M090	136	Washer M10	1	HT300M136
91	Screw M6x12	6	HT300M091	137	Screw M6x16	1	HT300M137
92	Slide Plate	2	HT300M092	138	Tailstock Casting	1	HT300M138
93	Saddle	1	HT300M093	139	Tailstock Screw	1	HT300M139
94	Gib Strip	1	HT300M094	140	Bracket	1	HT300M140
95	Feeding Nut Imperial	1	HT300M095	141	Screw M4x12	1	HT300M141
96	Swivel Disk	1	HT300M096	142	Tailstock Quill	1	HT300M142
97	Screw M8x20	6	HT300M097	143	Centre	1	HT300M143
98	Nut M4	6	HT300M098	144	Stud M8x35	1	HT300M144
99	Screw M4x16	6	HT300M099	145	Clamp	1	HT300M145
100	Cross Slide	1	HT300M100	146	Handle	1	HT300M146
101	Screw M5x10	2	HT300M101	148	Pulley	1	HT300M148
102	Screw M5x10	2	HT300M102	150	Motor	1	HT300M150
105	Compound Rest (B)	1	HT300M105	151	Cover	1	HT300M151
106	Screw M4x16	1	HT300M106	152	Cable Gland	1	HT300M152
107	Gib Strip	1	HT300M107	153	Rear Splash Guard	1	HT300M153
108	Compound Rest (A)	1	HT300M108	154	F/N/R Label	1	HT300M154
109	Position Pin	1	HT300M109	155	High - Low Label	1	HT300M155
110	Screw M8x25	11	HT300M110	156	Top Warning Label	1	HT300M156
111	Clamping Lever	1	HT300M111	-	Gearwheel 30T	1	HT300M157
112	Tool Rest	1	HT300M112	-	Gearwheel 35T	1	HT300M158
113	Stud M10x65	1	HT300M113	-	Gearwheel 40T	2	HT300M159
114	Cross Feed Screw	1	HT300M114	-	Gearwheel 45T	1	HT300M160
115	Bracket	1	HT300M115	-	Gearwheel 50T	1	HT300M161
116	Screw M4x114	2	HT300M116	-	Gearwheel 55T	1	HT300M162
119	Nut M18	2	HT300M119	-	Gearwheel 57T	1	HT300M163
120	Model Label	1	HT300M120	-	Gearwheel 60T	1	HT300M164
121	Indicator Table Label	1	HT300M121	-	Gearwheel 65T	1	HT300M165
122	Switch Label	1	HT300M122	-	External Jaws (set)	1	HT300M166
123	Control Box	1	HT300M123	-	3-Jaw Chuck Key	1	HT300M167
124	Plug w/Cord	1	HT300M124	168	Variable Speed Control Knob	1	HT300M168
125	Rubber Foot	4	HT300M125	169	Fwd/OFF/Rev. Switch	1	HT300M169
126	Chip Tray	1	HT300M126	170	Emergency Stop Sw.	1	HT300M170
127	Bracket	1	HT300M127				

PARTS DIAGRAM



**WIRING DIAGRAM**

