AXMINSTER

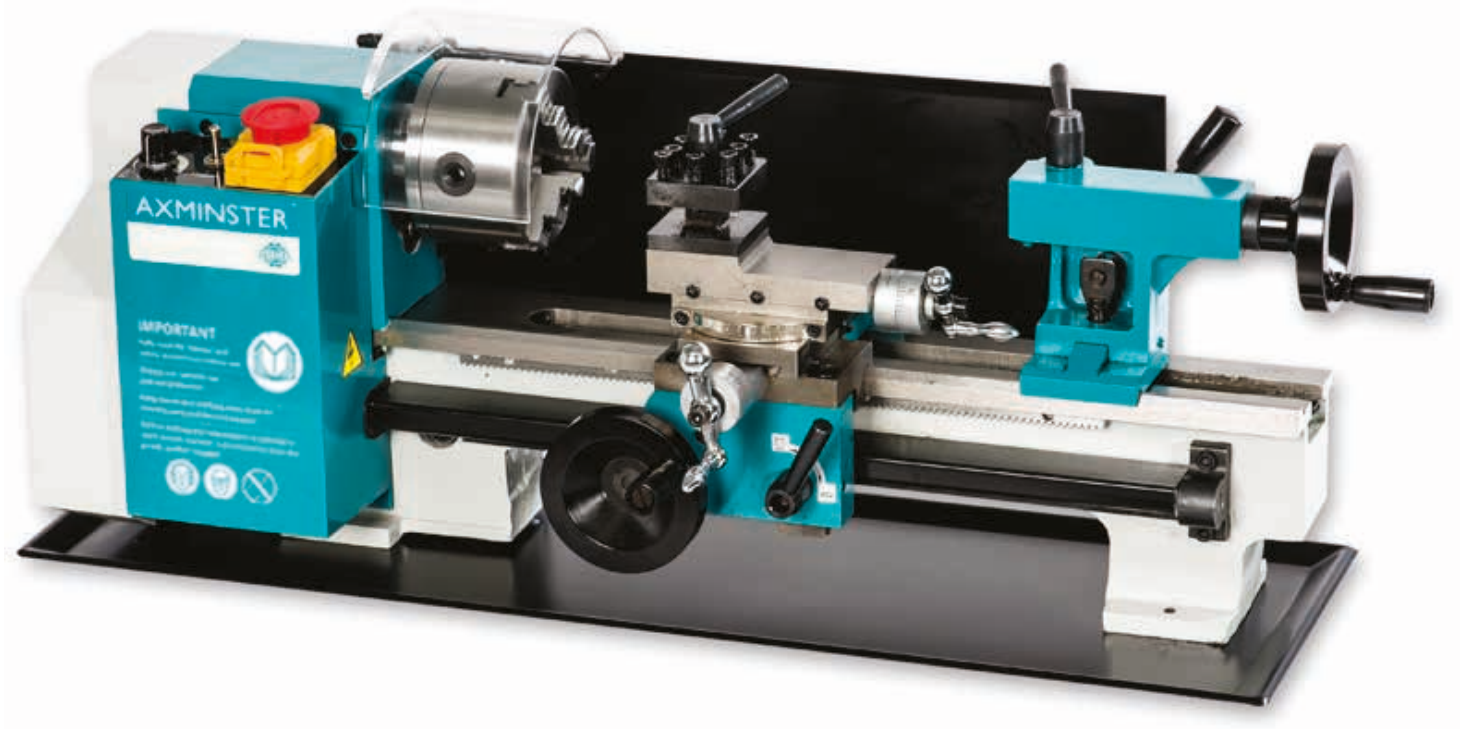
Model Engineer SERIES

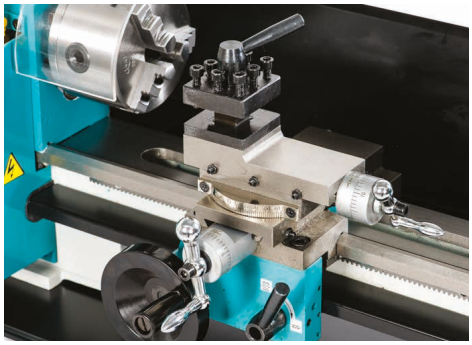
Code 101356

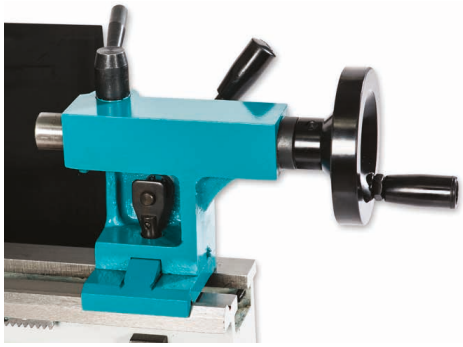
Original Instructions

C2/300

Mini Lathe







AXMINSTER • THREE YEAR GUARANTEE • 3

AT: 30/04/2021
BOOK VERSION: 3

Cert No: C2

Axminster Tool Centre Ltd
Axminster Devon
EX13 5PH UK
axminstertools.com

declares that the machinery described:-

Type	**Mini Lathe**
Model	**C2/300**

Signed

Andrew Parkhouse
Operations Director Date: **10/04/2020**

EU Declaration of Conformity

This machine complies with the following directives:

2006/42/EC
2014/30/EU
EN 55014-1: 2017
EN 55014-2: 2015
EN 61000-3-2: 2014
EN 61000-3-3: 2013

and conforms to the machinery example for which the
EC Type-Examination Certificate No TA 385203406
has been issued by **Shanghai SIEG Machinery Co., Ltd**
at: No. 555 Caofeng Rd., South to No. 17 Bridge of Caoan Rd., Shanghai, China

and complies with the relevant essential health and safety requirements.

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SPECIFICATIONS

Max. swing over bed	180mm
*Max. length of workpiece	200mm (model 200)
	300mm (model 300)
Spindle taper	Morse No.3
Tailstock taper	Morse No.2
Spindle bore	20 mm
Cross slide travel	65 mm
Compound slide travel	55 mm (effective)
Spindle speed (variable speed)	100-2500 rpm (effective)
Longitudinal feeds	0.1-0.2 mm
*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

READ ALL INSTRUCTIONS AND WARNINGS 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 OPERATOR. 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 of flam-mable gases or liquids.
4. Keep children away. All children should be kept away from the work area.
5. Guard against eleçtric shock. Prevent body contact with grounded surfaces such as pipes, radiators, ranges, and refrig erator 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.

11. Keep proper footing and balance at all times.
12. Do not reach over or across running machines .
13. Always check that adjusting keys and wrenches are removed from the tool or machine work surface before plugging it in.
14. Do not carry any tool with your finger on either 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.
2. Do not attempt to 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 ofall moving parts, broken parts or mounting fixtures and any other condition that may affect proper operation. Any part that is damaged should be prop erly repaired or replaced by a qualified technician.
5. Do not use the tool if any switch does not turn off and on properly.

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.
4. Always turn off the machine before unplugging.

IF THERE IS ANY QUESTION ABOUT A CONDITION BEING SAFE OR UNSAFE, DO NOT OPERATE THE TOOL!

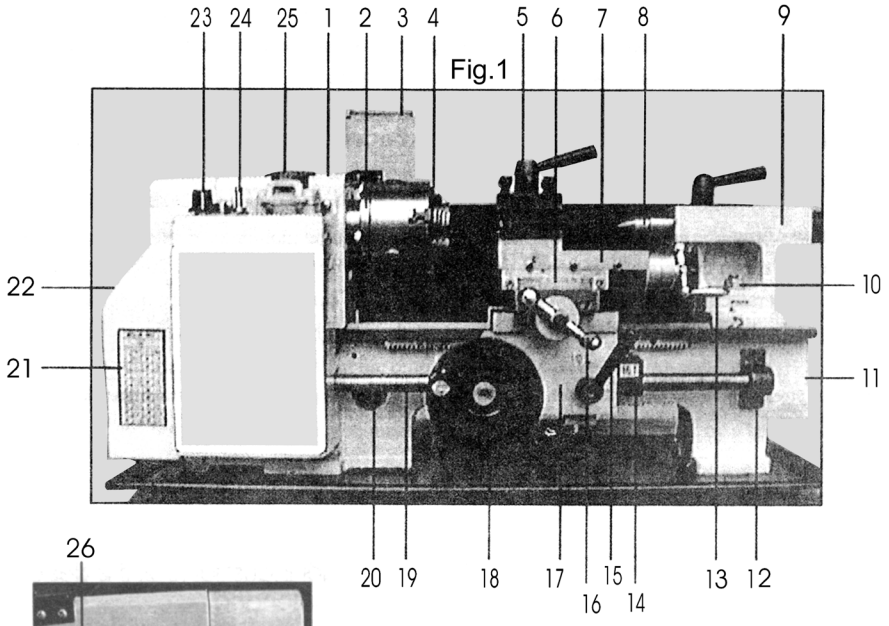
Grounding Instructions

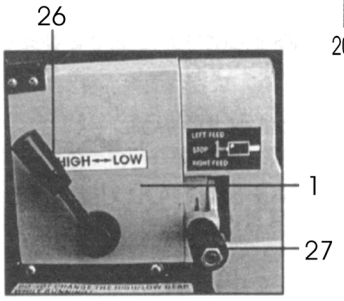
This machine has a three-prong plug, the third(round)prong is the ground. Plug this cord only into a three-prong receptacle. Do not attempt to defeat the protection the ground wire provides by cutting off the round prong. Cutting off the ground will result in a safety hazard and void the warranty.

DO NOT MODIFY THE PLUG IN ANY WAY. IF YOU HAVE ANY DOUBT, CALL A QUALI-FIED ELECTRICIAN.

FEATURES

Fig.1





Rear view of headstock

LEGEND

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

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 centre 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.

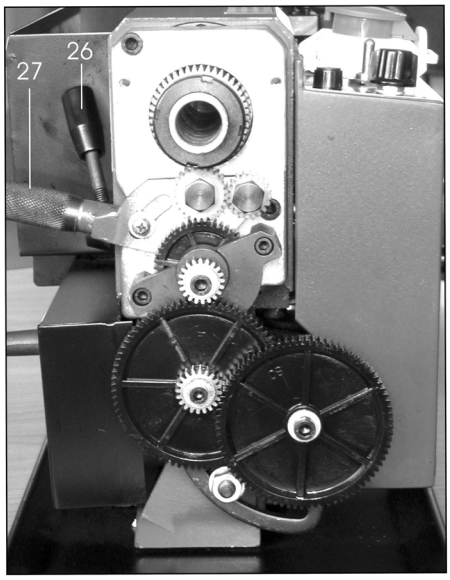
Three external jaws are also supplied which extend the capacity. of the chuck. Their uses and method of assembly is described under 'Accessories'

The spindle has 6 holes drilled in its flange to accommodate a range of fixtures such as d 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.

Fig.2



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.

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 detail under 'Screwcutting')

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 Centre (8) provided. A Revolving Centre and Drill Chuck are also available from your dealer. (See Accessories)

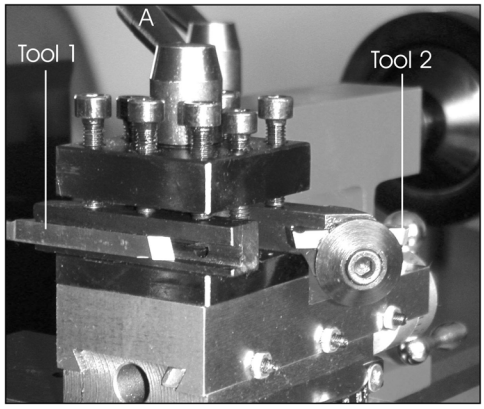
4. THE SADDLE

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' .

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 furned. 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'.

Fig.3



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.

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.

5. THE MOTOR

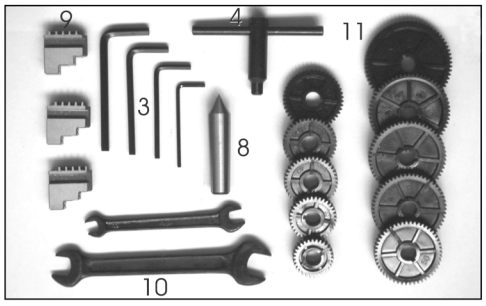
It is not recommended that you dis-assemble the motor. Brushes may be replaced as described under 'Maintenance'. For all other servicing and repairs. please contact your dealer.

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 dealer immediately.

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

Fig.4



1. 4 x Rubber Feet.*
2. 4 x M6 Pan Head Scews.*
3. 4 x Hex.Keys.
4. 1 x Chuck Key.
5. 1 x Plastic Oil Container.*
6. 1 x Spare Fuse 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. Imperial-Z:30,35,40,40,45,50,55,57,60,65 (Metric-Z:30,35,40,40,50,60)*

* 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 movenlent. refer to 'Settings and Adjustments' 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 fuse. The fuse holder is located on the main control panel.

The four rubber feet are attached to the underside of the bed, using ths 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'.

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

CAUTION!

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

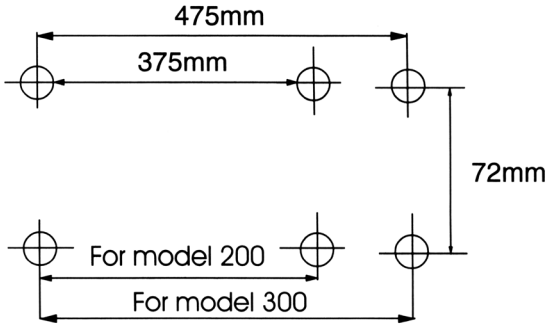
MOUNTING THE LATHE

The lathe should be mounted on a strong, heavy workbench, of suffcient 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.
Driii four M6 clearance holes in a worktop. at the dimensions shown in the diagram opposite. and with appropriate length M6 boits. or screws, with flat washers, (not supplied) proceed to secure the lathe to the worktop ensuring the chip tray is in place.



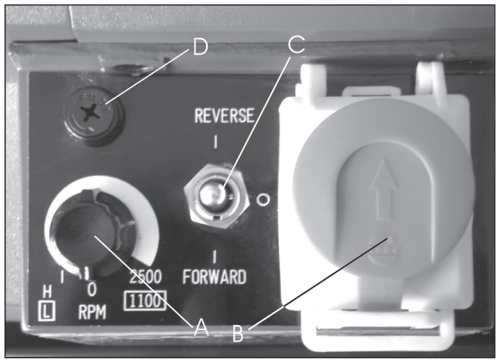
Alternatively, if you do not wish for a permanent installation, you may secure the lathe to a 5/8" thick plywood board with a minimum recommended dimension of 800x300mm, the mounting holes being centralised on the board. When the lathe is in use, the board should be clamped to work-bench using with 'G' clamps.

STARTING PROCEDURE

A. PLUG IT IN AND SWITCH IT ON (At the wall socket).

1 Forward-off-Reverse switch to off. (C)
2 Stop button open. (B)
3 Speed knob fully anticlockwise (A)
4 Chuck guard down over chuck. (3)
5 Now switch the Forward--off-Reverse switch to the direction wanted. (C)
6 Now turn the speed control for the speed required. (A). (It will now run).
7 If at any time the yellow led light is on, the machine will not run. This is a (Fault condition) the lathe will remember this fault until the Forward - off - Reverse switch (C) is switched off.

Fig.5



If you over load the lathe, or stop the lathe with the emergency stop button or lift the chuck guard. You will cause a (Fault condition) you will then have to set the Forward-off-Reverse switch to the off position for a couple of seconds to reset the fault light to get it to operate again.

To check that the chuck guard micro switch is working.
Set:-
Power on. (At the wall socket).
Stop button open. (B)
Speed knob fully anticlockwise. (A)
Chuck guard down over chuck. (3)
Now switch the Forward-off-Reverse switch to either direction. (C)

If you lift the chuck guard up and down the fault light should go on and off Now switch the Forward-off-Reverse switch to off. The light will go off.

If you always use the Forward-off-Reverse switch (C) to Stop and start the lathe you will not cause a fault condition and it will be quicker to use.

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 auto matic feed is required.

   IMPORTANT: This should ALWAYS be a deliberate, conscious action.

NOTE: If Auto feed is required, the Leadscrew Foward/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. If the machine is finished with or is to be left unattended, turn the F/O/R switch to the OFF position then disconnect from the mains supply.

CAUION:

ALWAYS turn the machine OFF at 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

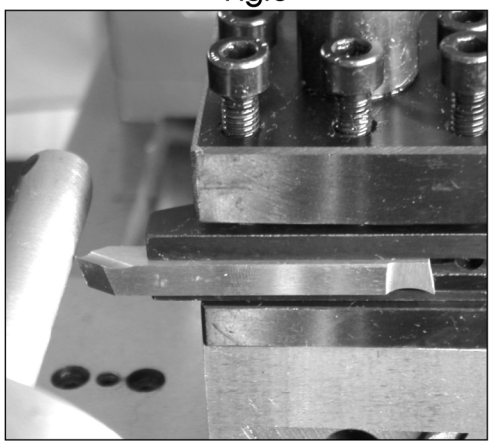
Before starting the machine, as described above, it is imperative that the setup for the type of work to be carried out is fully checked.

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. 10mm but not more than 15mm for a straight tool).

Fig.6



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.

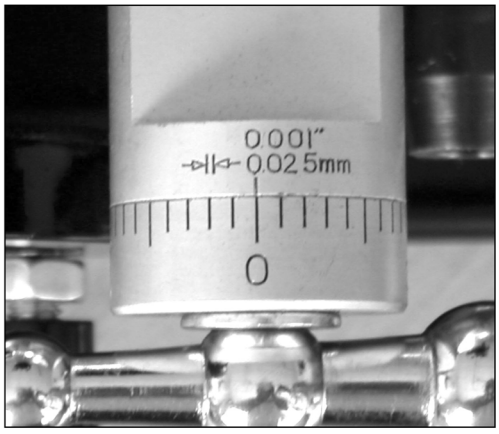
To check to ensure the tip is at the correct height, position the tool so that the tip is almost touching the point of the tailstock centre. They should coincide. If necessary make adjustments using shims, grind down the cutting tool tip or select another tool.

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 ths 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 scriber 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.

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.

Fig.7



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.

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"(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 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 begining 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 (13), 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 furning is considerably iess 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 cofiguration, 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. Switch on the machine.
3. Turn the knob to achieve your desired spindle speed 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.

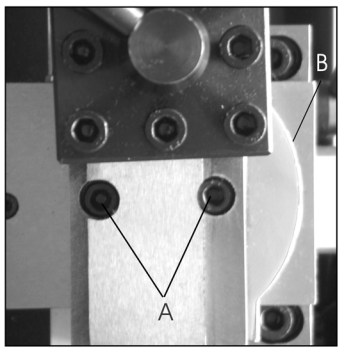
4. Carefully observe the movement of the tool and as it approaches the mark on the surface, denoting the end of cut, pull the Auto Lever UP sharply and ensure it stays UP. If a degree of accuracy is required, it is recomended that you finish the cut by hand.

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

Fig.8



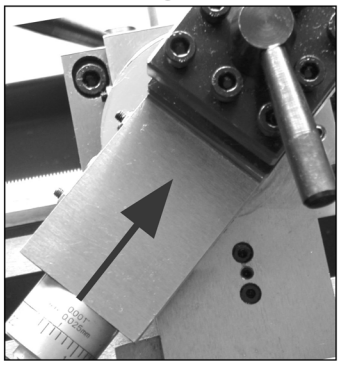
Bevel cutting invoives the use of the compound slide, which is mounted on the cross-slide and set at right angles to it for all normal cutting operations. This is indicated by the zero mark, on the scale, (B, Fig. 8), lining up with the mark etched on the body of the cross-slide.

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 9.

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 retightening 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.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 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 screwcutting techniques, cutting tools etc., you should consult a suitable handbook or obtain advice from a qualified person.

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 workpiece which is of a smaller diam eter than the root diameter of the proposed screw thread.
   Note, that for long threads it may be necessary to use 'steady's'(see 'Accessories').
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 appropri ate 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 (C) to 'FOR WARD'.
   As the tool approaches the end of the desired thread, turn the switch (C) 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 (C) to 'REVERSE', the saddle winds back to the beginning and turn switch (C) to 'OFF'.
   Reset 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 4,5. Proceed in this manner until the thread is completed.

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), or if the leadscrew 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 A 20T
Gear B 80T
Gear C 20T
Gear D 80T

Fig A

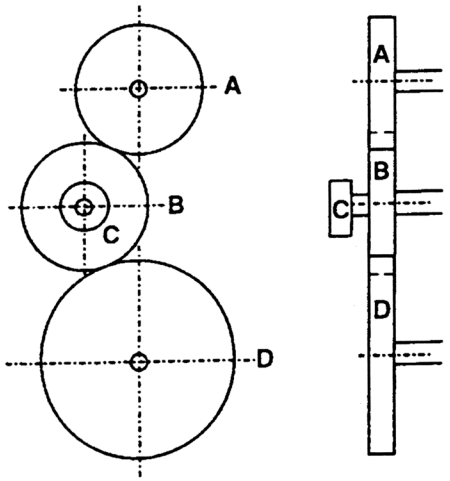
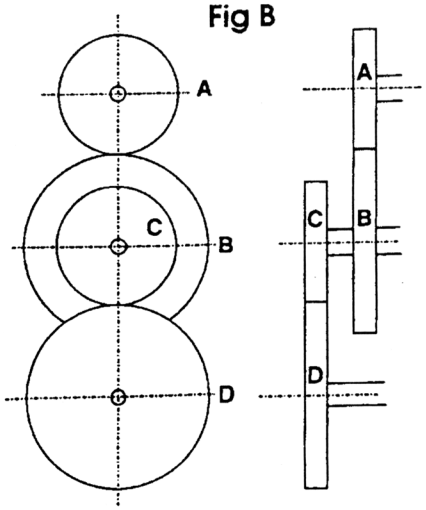


Fig B



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

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 O.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 O.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 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. 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.

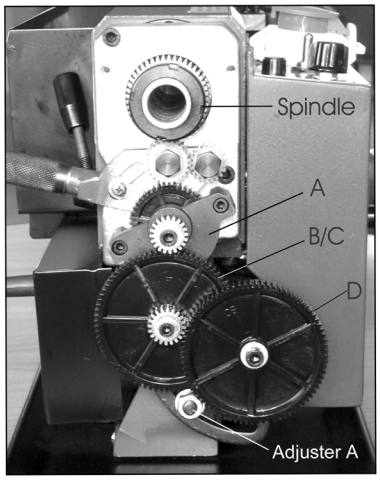
The positions of the shafts carrying gears A and D are fixed, therefore all adjustments are carried out on the shaft carrying gears B and C and the Adjuster 'A', shown in fig. 10.

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 com pletely and to provide for easier reassembly, un screw 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 neces sary 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.

Fig.10



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

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. Dam-age 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 ortwice during the day if used continuously. It will be necessary to remove the gear train cover in order to oil the left hand bearing.

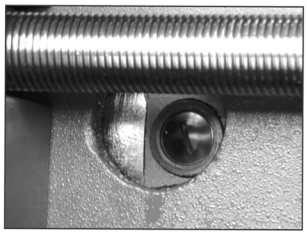
Inject a few drops also to the compound slide oilway, located on the slides' top surface, between the two hex socket head screws.

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 mochined surfaces should be lightly oiled.
Always remove cutting tools, and store in a safe place.

MOTOR BRUSHES

Fig.11



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.

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:

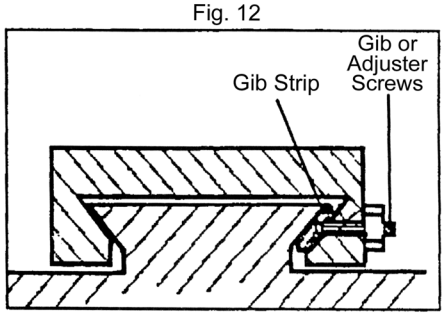
A. CROSS-SLIDE ADJUSTMENTS

The cross-slide is mounted on a dovetail slide, as shown in fig. 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, 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 handie. 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:

Fig. 12



1. Slacken off all lock nuts and screw inthe 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.

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.

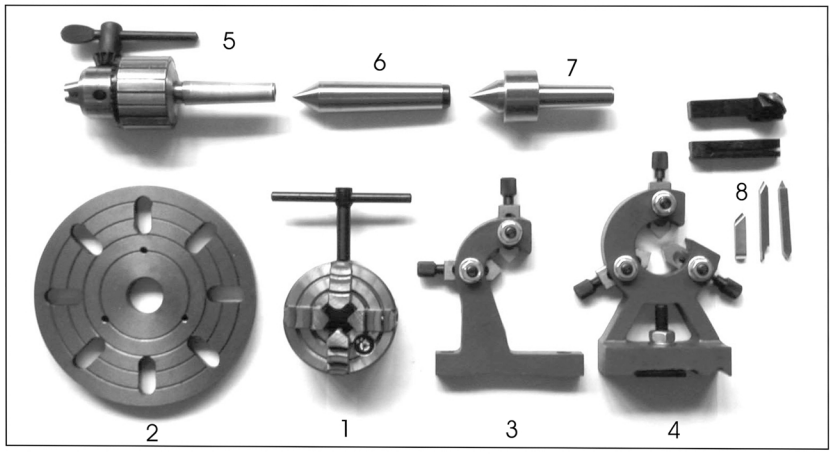
NOTE:

It is important that the cross-slide and compound slide adjustments are correctly carried out and that there is no 'sloppiness' of action.Any maiadjustments 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 versatility of your machine. These are as follows:

Fig. 13

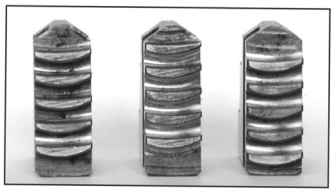


1. Independant 4-Jaw Chuck 100mm dia.
2. Face Plate - 160mm dia
3. Moving Steady
4. Fixed Steady
5. Tailstock Drilling Chuck with a 13 mm capacity.
b. Headstock Centre (MT3)
7. Revolving Centre (Tailstock - MT2)
8. 6 Piece Cutting Tool Set.
   Comprising tools for 60 thread cutting,
   parting/grooving, facing and general turning work.
   (Hex. wrench not shown)
9. Thread Dial indicator (not shown)
   (Imperial or Metric)

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.

Fig.14



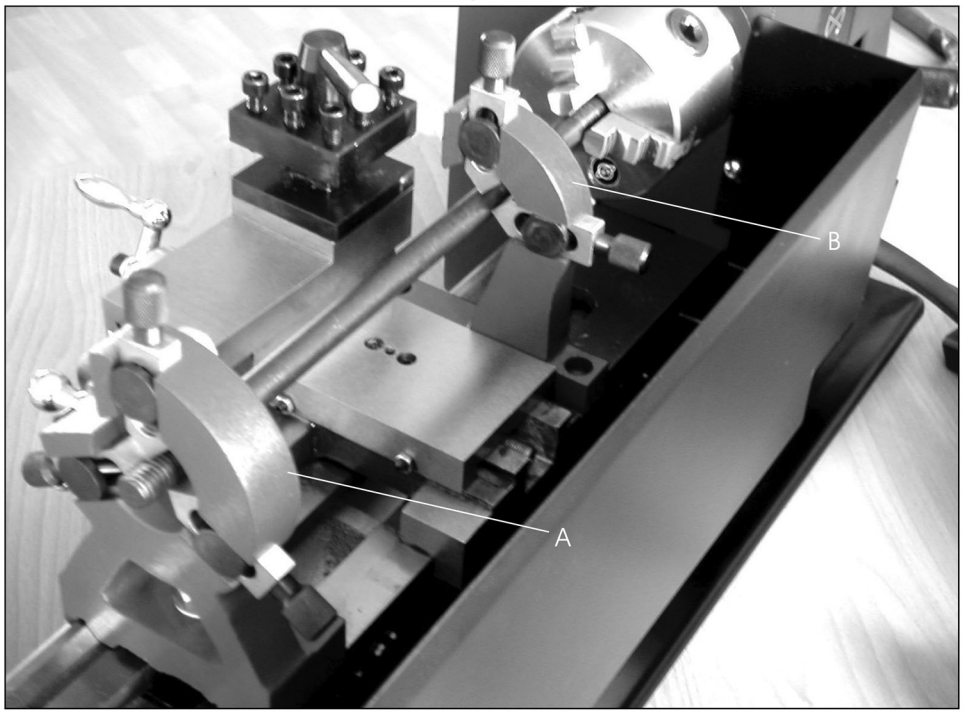
The thread segments of the jaws are progressively 'stepped' as shown in fig 14. They are also numbered 1 to 3. This is to take into account the lead of the screwthread within the chuck. It is therefore necessary to assembie the jaws in the correct order.

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 quesfion whist 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 Movong Steady (B) assembled to the lathe, used to support a long workpiece

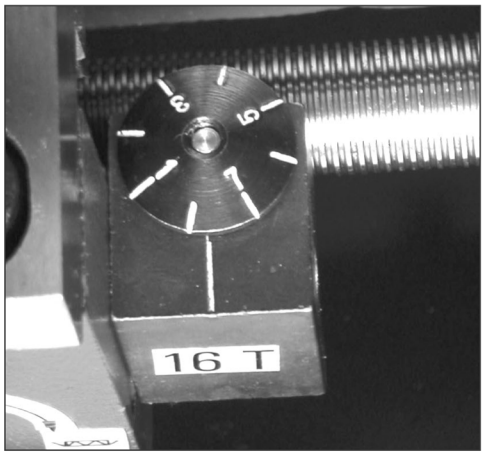
Fig.15



How to use a Thread Dial indicator

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 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.

Fig.15



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 procede as follows:

1. Observe the spinning Dial. In particular, con centrate on one of the numbered 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 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 de sired thread, DISENGAGE THE AUTO FEED LE VER. 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. Wind the saddle back to the begining 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 de sired depth of cut.

4. With the machine still running, observe the dial indicator and as the same numbered line, passses 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 predeter mined 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 per fect thread.

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

IMPERIAL

mm	SCALE
0.4	1,3,5,7
0.5	1~8
0.6	1~8
0.7	1, 4.5
0.8	1,5
1.0	1~8
1.25	1, 3.5
1.5	1~8
1.75	1, 4.5
2.0	1~8

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

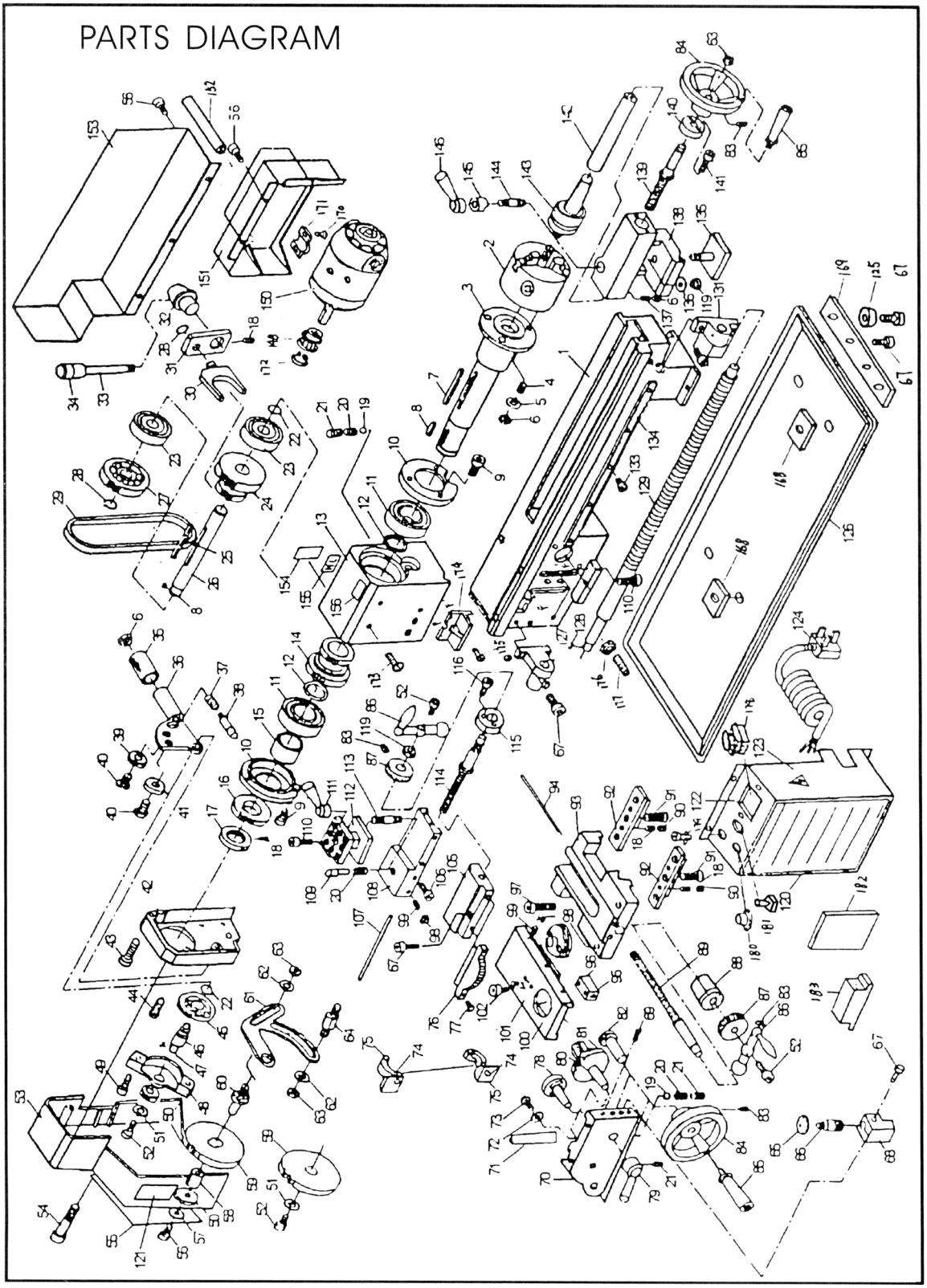
PARTS LIST

No.	Description	Q'ty	No.	Description	Q'ty
1	Bed Way	1	46	Shaft	1
2	Chuck	1	47	Parallel Key 3 × 8	1
3	Spindle	1	48	Mount	1
4	Screw M6 × 25	3	49	Screw M5 × 18	2
6	Nut M6	5	50	Gearwheel 20T	2
7	Key M5 × 40	1	51	Washer M6	4
8	Key M4 × 8	2	52	Screw M6 × 8	2
9	Screw M5 × 12	6	53	Cover	1
10	Cover	2	54	Screw M5 × 45	2
11	Ball Bearing	2	55	Thead Cutting Chort	1
12	Spacer	2	56	Screw M5 × 8	8
13	Head Stock Casting	1	57	Washer M4	2
14	H/L Gear 21T/29T	1	58	Bush W/Key	1
15	Spacer	1	59	Gearwheel 80T	2
16	Spur Gear 45T	1	60	Shaft	1
17	Nut M27 × 1.5	1	61	Support Plate	1
18	Set Screw M5 × 8	1	62	Washer M8	3
19	Steel Ball Φ 5	2	63	Nut M8	3
20	Compression Spring	3	64	Shaft	1
21	Set Screw M6 × 6	3	65	Dial	1
22	Retaining Ring M12	2	66	Shaft 16T	1
23	Ball Bearing 6201ZZ	2	67	Screw M5 × 16	10
24	H/L Gear 12T/20T	1	68	Dial Indicator Body	1
25	Parallel Key M4 × 45	1	69	Set Screw M4 × 10	3
26	H/L Gear Shaft	1	70	Apron	1
27	Pulley	1	71	Gib Strip	1
28	Retaining Ring M10	2	72	Washer	2
29	Timing Belt L × 136	1	73	Screw M4 × 8	2
30	Shifting Fork	1	74	Shaft	2
31	Shifting Arm	1	75	Half Nut Base	2
32	Shifting Knob	1	76	Angle Block	1
33	Shifting Lever	1	77	Screw M4 × 10	2
34	Shifting Grip	1	78	Groove Cam	1
35	Handle	1	79	Handle	1
36	Handle Mount	1	80	Shaft	1
37	Spring	1	81	Feeding Gear 11T/54T	1
38	Indicator	1	82	Feeding Gear 24T	1
39	Pinion 25T	1	83	Screw M6 × 10	4
40	Support Screw	2	84	Wheel	2
41	Pinion 20T	1	85	Knob	2
42	Fixed Cover	1	86	Handle	2
43	Screw M6 × 20	2	87	Dial	2
44	Screw M5 × 8	1	88	Bracket	1
45	Gear 45T	1	89	Feeding Screw	1

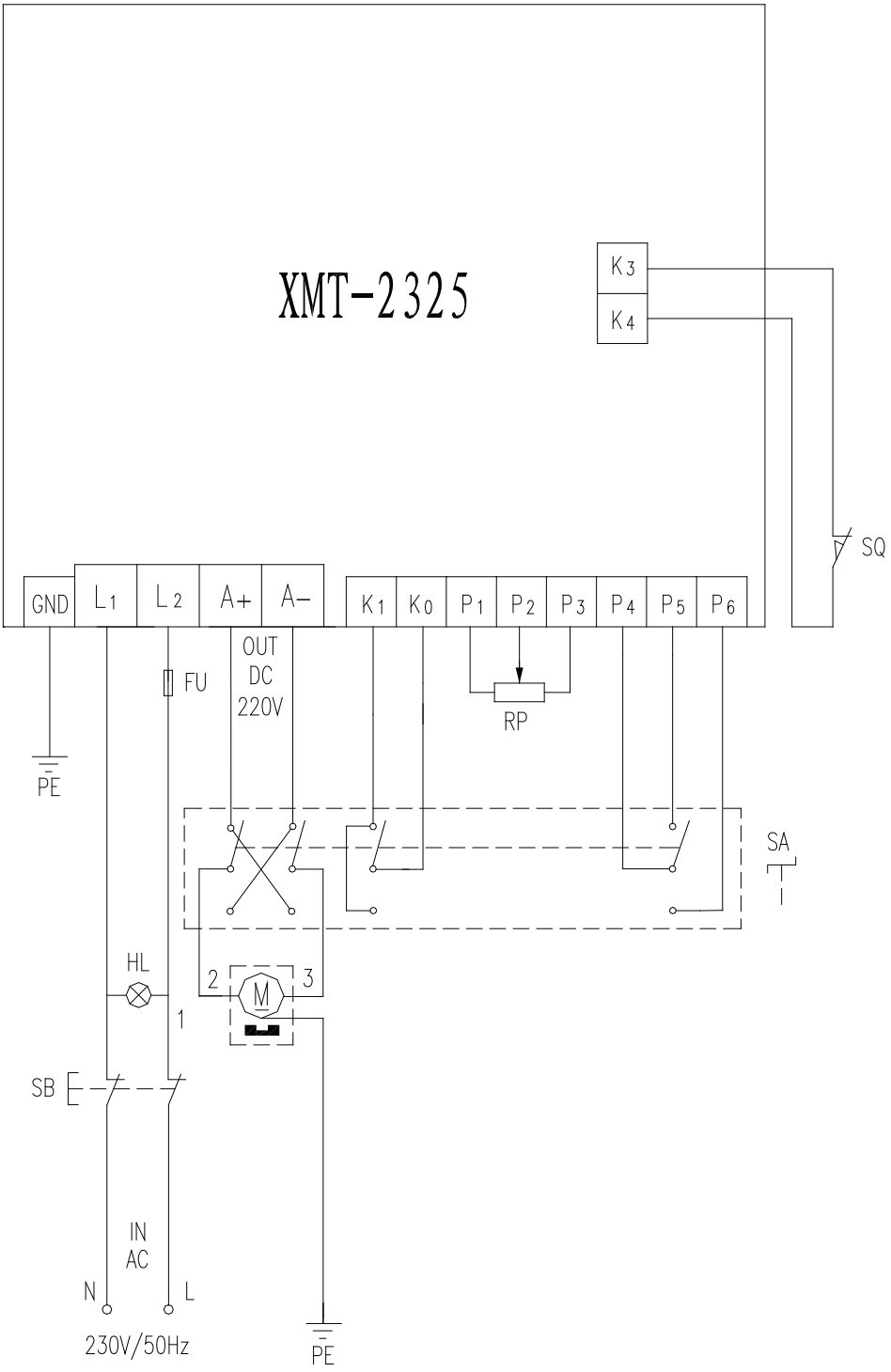
No.	Description	Q'ty	No.	Description	Q'ty
90	Nut M5	4	140	Bracket	1
91	Screw M6 × 12	6	141	Screw M4 × 10	2
92	Slide Plate	2	142	Tailstock Quill	1
93	Saddle	1	143	Centre	1
94	Gib Strip	1	144	Stud M8 × 40	1
95	Feeding Nut Imperial(Metric)	1	145	Clamp	1
96	Swivel Disk	1	146	Hondle	1
97	Screw M8 × 20	6	148	Pulley	1
98	Nut M4	6	150	Motor	1
99	Screw M4 × 16	3	151	Cover	1
100	Cross Slide	1	152	Rubber Pipe	1
101	Screw M5 × 10	2	153	Rear Splash Guard	1
102	Screw M4 × 8	2	154	F/N/R Label	1
105	Compound Rest(B)	1	155	High - Low Label	1
106	Screw M4 × 14	3	156	Top Warning Label	1
107	Gib Strip	1	157	Gearwheel 30T	1
108	Compound Rest(A)	1	158	Gearwheel 35T	1
109	Position Pin	1	159	Gearwheel 40T	2
110	Screw M6 × 25	8	160	Gearwheel 45T	1
111	Clamping Lever	1	161	Gearwheel 50T	1
112	Tool Rest	1	162	Gearwheel 55T	1
113	Stud M10 × 65	1	163	Gearwheel 57T	1
114	Cross Feed Screw	1	164	Gearwheel 60T	1
115	Bracket	1	165	Gearwheel 65T	1
116	Screw M4 × 12	2	166	External Jaws(set)	1
119	Nut M18	2	167	3 - Jaw Chuck Key	1
120	Model Label	1	168	Rubber Pad	2
121	Indicator Table Label	1	169	Bracing	2
122	Swith Label	1	170	Screw M3 × 5	1
123	Control Box	1	171	Clamp Block	1
124	Plug W/Cord	1	172	Check Ring Φ 9	1
125	Rubber Foot	4	173	Screw M5 × 10	4
126	Chip Tray	1	174	Protector	1
127	Bracket	1	175	Screw M5 × 10	2
128	Key M3 × 16	1	176	Nut M6	2
129	Lead Screw Imperial(Metric)	1	177	Screw M6 × 25	2
131	Bracket	1	178	Emergency Stop Switch	1
132	Plastic Plug	1	179	Fuse	1
133	Screw M3 × 10	3	180	Variable Speed Control Knob	1
134	Rack	1	181	Forward/off/Reverse Switch	1
135	Clamp Plate	1	182	P.C Board	1
136	Washer M10	1	183	Electric Filter	1
137	Screw M5 × 16	1			
138	Tailstock Casting	1			
139	Tailstock Screw	1			

Note:No. 157~167 Not Shown in Parts Diagram.

PARTS DIAGRAM



WIRING DIAGRAM



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