



THE COLCHESTER LATHE COMPANY LTD., COLCHESTER, ENGLAND.



THIS MANUAL

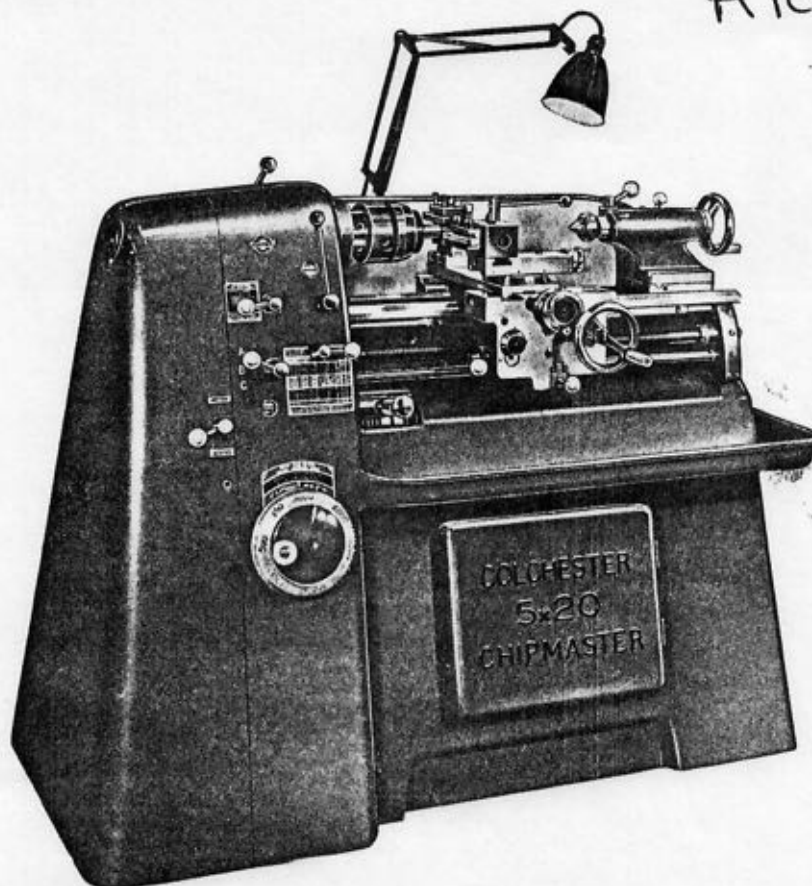
applies to the Colchester 5 in \times 20 in Chipmaster High Speed Precision Lathe. A thorough understanding of its contents will help you to obtain the best results from your machine.

Our Technical Service Department is at your disposal to discuss problems concerning the application of Colchester Lathes and their attachments. Our aim is to ensure that you obtain the maximum satisfaction from your machine.

The serial number will be found on a red disc on each major assembly and **MUST** be quoted in all communications regarding your lathe. Due to the Company's policy of continuous improvement, designs may be modified or changed at any time and this manual applies only to the machine with which it is issued.

THE SERIAL NUMBER OF YOUR MACHINE IS ~~G3056~~

A1037



ONE COPY OF THIS MANUAL IS SUPPLIED FREE WITH EACH MACHINE
FURTHER COPIES MAY BE OBTAINED AT A COST OF 5s. EACH

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BRIEF SPECIFICATION

CAPACITIES

Height of centres	5½ in	143 mm
Swing		
Over bed	11½ in	286 mm
Over cross slide	7 in	178 mm
Distance between centres	20 in	508 mm
Diameter of faceplate	10½ in	276 mm
Diameter of driving plate	6 in	152 mm
Capacity of travelling steady	1½ in	35 mm
Overall length	59½ in	1505 mm
Overall width	29 in	737 mm
Approximate weight	1148 lb	521 kg.

HEADSTOCK

Spindle bore (Max. bar dia.)	1½ in	35 mm
Spindle nose, Camlock		3 in D.1.
Taper in spindle nose bush		No. 3 M.T.
Spindle speeds - infinitely variable		35-3000 r.p.m.

CARRIAGE

Total travel of cross slide	6½ in	162 mm
Total travel of top slide	3½ in	92 mm
Height from top of topslide to centre line of spindle	1½ in	41 mm
Max. tool shank size	½ in × 1 in	12.5 mm × 25.4 mm

THREADS AND FEEDS

Pitch of leadscrew		4 t.p.i.
Number of threads - Whitworth		44
Range		2-120 t.p.i.
Number of threads - Metric		14
Range		0.5 mm-12 mm
Number of feeds		27
Range per rev. of spindle -		
Longitudinal	0.001 in-0.008 in	0.025-0.20 mm
Cross	0.0005 in-0.004 in	0.0125-0.10 mm

TAILSTOCK

Spindle travel (No. 3 M.T. Centre fitted)	4 in	102 mm
Spindle travel (Standard tang drill fitted)	3½ in	89 mm
Taper in spindle		No. 3 M.T.

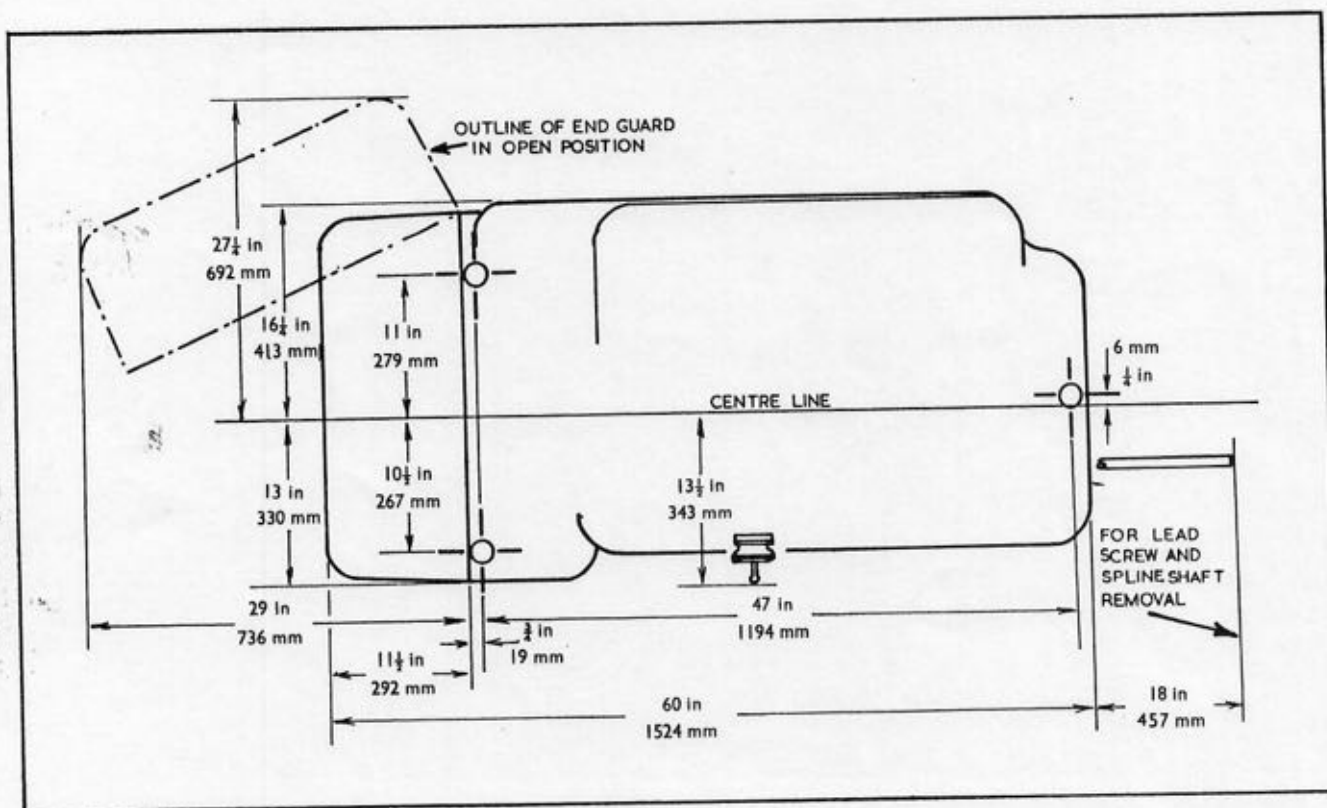
DRIVE

2 h.p. continuously rated single speed motor driving Kopp variable speed unit of 9 : 1 ratio.

STANDARD EQUIPMENT SUPPLIED WITH THE MACHINE

(for details of accessories see page 14)

One 10" diameter faceplate
One 6" diameter driving plate
Two No. 3 Morse taper centres
Centre bush
Travelling steady
Spanners and keys



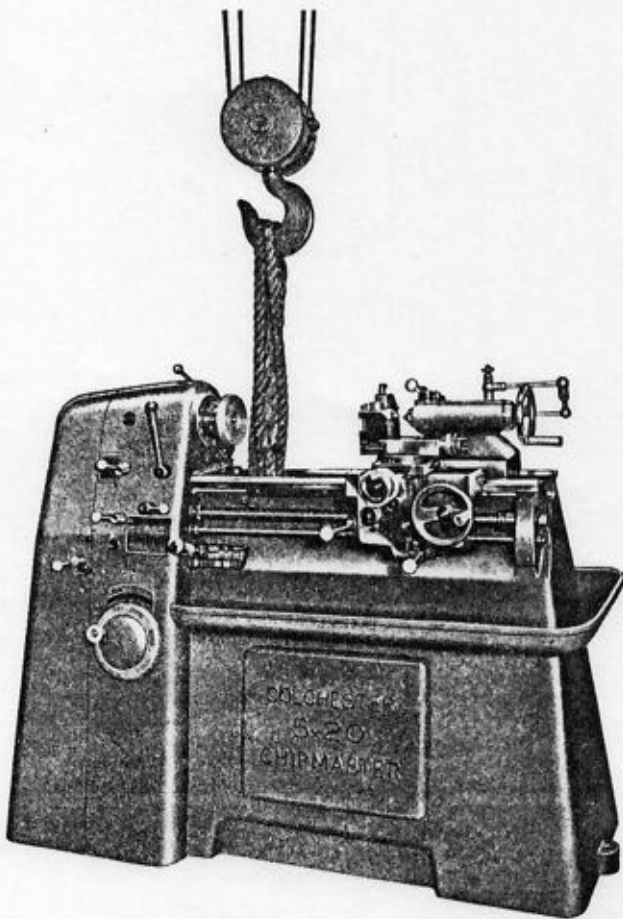
FOUNDATION PLAN

INSTALLATION

LOCATION

NO SPECIAL FOUNDATIONS OR BOLT HOLES ARE REQUIRED. Provided the floor is firm, reasonably level and able to bear the weight, the machine can be located in any convenient position.

It must be borne in mind however, that since swarf removal is effected from the back of the lathe and access to the end gears and drive assembly is made by swinging open the end guard, a reasonable working area must be allowed around the machine. The main dimensions and recommended minimum space for the efficient operation and servicing of the lathe are given in the foundation plan opposite.



LIFTING

Lifting should be carried out with the greatest care, since the machine is heavy at the headstock end. Immediately in front of the headstock will be found a cross bar and full use should be made of this in manoeuvring the machine. UNDER NO CIRCUMSTANCES should a pinch bar be used. Proper equipment should be available for lifting the machine which weighs approximately 1150 lb.

CLEANING

When the lathe is delivered all bright machined surfaces are covered by a heavy protective coating. This must be removed with white spirit or kerosene before attempting to use the machine. **DO NOT USE CELLULOSE SOLVENTS AS THESE WILL DAMAGE THE PAINTWORK.**

Particular attention should be paid to the slides and spindle nose, and it is essential that the end guard is opened and the assemblies covered by this carefully cleaned. All traces of the cleaning agent should then be removed and the bright surfaces given a light coating of Shell Tellus 33 Oil.

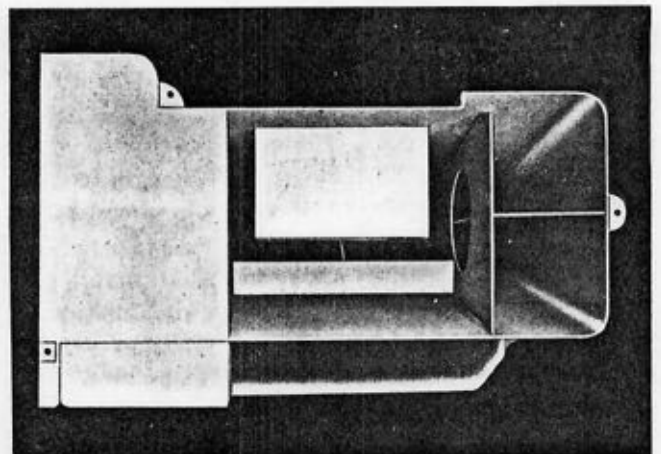
POSITIONING

When the machine has been moved into position it should be raised and the pads provided placed under the mounting bosses. (See photograph). **THE MACHINE SHOULD NOT BE GROUTED IN.**

LEVELLING

As the lathe stands on three special mounting pads no further levelling is necessary.

POSITION OF MOUNTING PADS

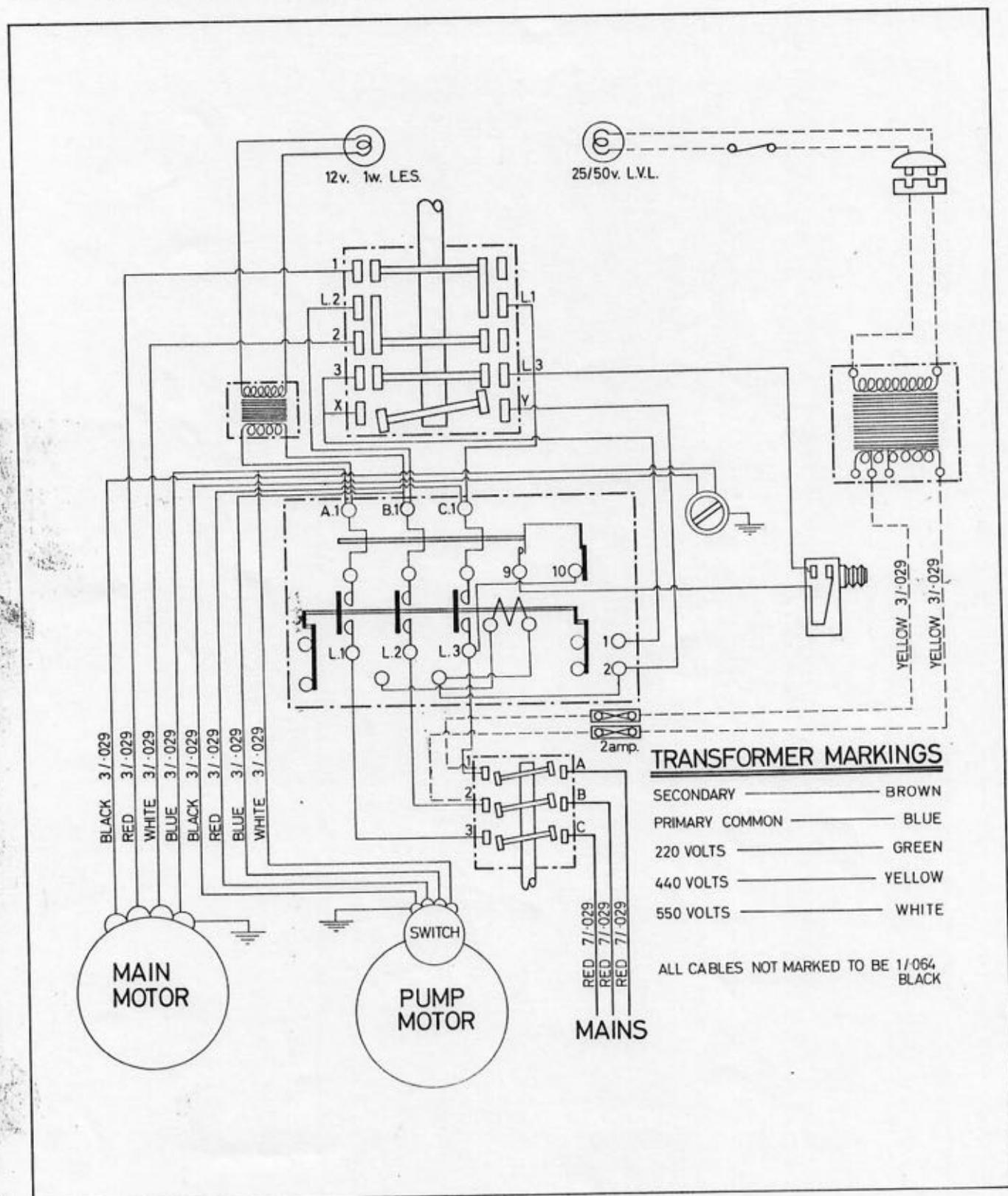


ELECTRICAL WIRING

The external wiring of the machine to the mains supply should be carried out by a competent electrician and all wiring should be of a permanent character. It is essential that a really efficient earth is provided in the installation as shown in the wiring

diagram.

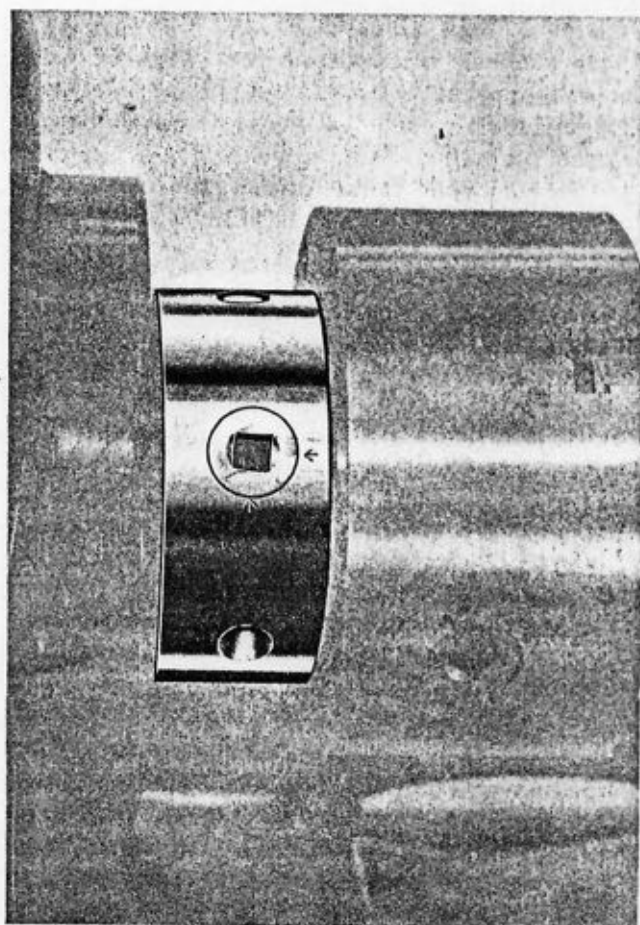
The main spindle must rotate in the forward direction with the starting lever set to the right. If this is not so the rotation is reversed by interchanging any two of the input wires.



CHUCK MOUNTING

The American type D1-3 in Camlock spindle nose has been selected to overcome the danger of chucks or faceplates becoming detached whilst rotating. However, care must be taken to ensure that each spindle nose cam is fully secured in order to obtain maximum grip. It may be necessary to re-set the camlock studs in any new accessories which are to be mounted on the spindle nose.

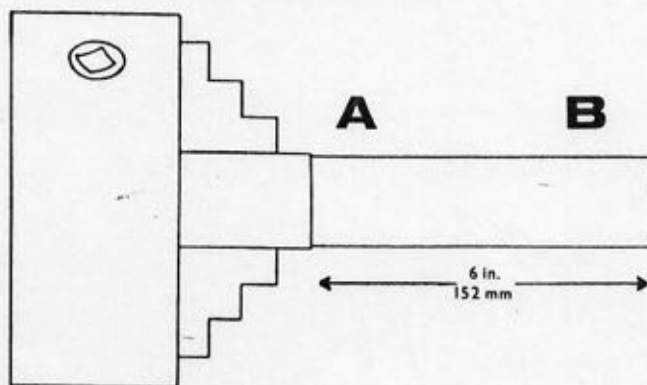
To do this remove the cap head screws locking the studs and set each stud so that the scribed datum lines are as close to the rear face of the accessory as possible without being below the surface, with the grooves lining up with the locking screw holes. Mount the accessory on the spindle nose and tighten the three camlocks in turn. These should be fully tightened when the datum line on the camlock is between the two arrows on the spindle nose. If any of the camlocks do not tighten within the limits of the arrows remove the accessory and turn the stud concerned through 360° in a clockwise direction. (This will bring the scribed line on the stud below the rear face of the accessory.) Re-mount and check the locking action again and repeat the above procedure until all three camlocks tighten within the limiting arrows. Finally, replace the locking screws beside each stud.



ALIGNMENT CHECKS

When the machine has been completely installed it is advisable to check the alignment of the headstock and tail stock. All machines are accurately aligned before despatch but transit shocks may necessitate adjustments.

HEADSTOCK ALIGNMENT TEST

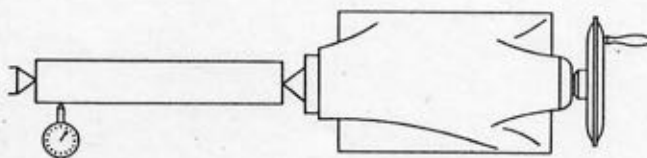


Headstock Alignment:

Place a length of mild steel bar in the chuck and take a light cut over the o.d. for about 6 in of its length. (Do not use the tailstock centre as a steady during this test). Micrometer readings at the two ends of the turned diameter (A and B in the sketch) should be the same. If the readings differ the head stock may easily be re-aligned as follows:

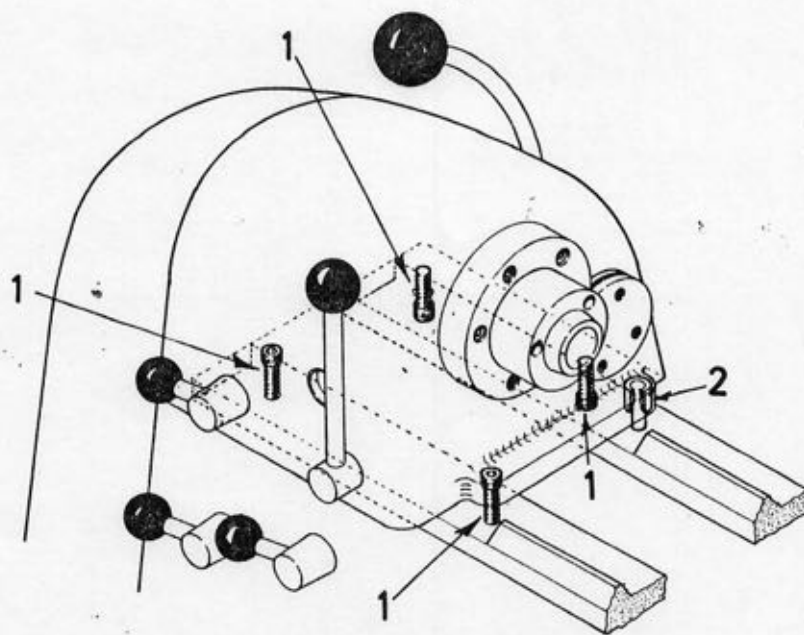
Slacken off the headstock holding down bolts (1) until they are only finger tight, which will allow the headstock to pivot round the locating dowel (2). A light tap with the palm of the hand in the required direction is all that is necessary to affect an adjustment. As a guide, with a dial indicator set against point B of the test piece it will be necessary to swing the headstock approximately $2\frac{1}{2}$ times the difference in micrometer readings between point A and point B. It is important that if any adjustments have been made, all holding-down bolts are securely tightened.

TAILSTOCK ALIGNMENT TEST



Tailstock Alignment:

Place a 12 in long ground steel bar between centres. Fix a dial gauge to the topslide with its anvil running along the horizontal centre line of the bar. By traversing the saddle along the bed an accurate check on alignments may be made. If any error is found it may be rectified by adjustment of the two set-over screws in the base of the tailstock.



ADJUSTMENT OF HEADSTOCK ALIGNMENT

LUBRICATION

The accuracy and life of the machine depend on correct lubrication. All oiling points should be properly lubricated and the oil levels of the headstock, gearbox and variator checked before the machine is used.

The lubrication chart gives information on the points which need periodic attention and it cannot be stressed too strongly that all points marked with a red diamond should receive daily attention to ensure efficient operation.

When carrying out the weekly check on the headstock and gearbox always stop the machine to allow the oil to settle so that a true reading is obtained. If this precaution is not taken there is a risk of overfilling which will result in the generation of excessive heat and the loss of oil by leakage.

After the machine has been in operation for 160 hours or four weeks—whichever is the sooner—the headstock, gearbox and variator should be drained, flushed with clean flushing oil and re-filled to the correct level with the appropriate grade of oil. This procedure should be repeated every 500 hours or 3 months; whichever is the sooner.

The variator should also be topped up weekly to the level of the filler hole with the correct grade of oil. Failure to use the specified quality of oil will cause serious loss of efficiency or permanent damage to the unit.

When the machine is despatched from the works the headstock, gearbox and variator are filled with the recommended grade of oil as follows:

Headstock: Shell Tellus Oil 15 = ~~VELOC~~ ⁶¹
Gearbox: Shell Tellus Oil 33 = ~~VELOC~~ ⁶¹
Variator: Shell Vitrea Oil 21 = ~~VELOC~~ ⁶¹

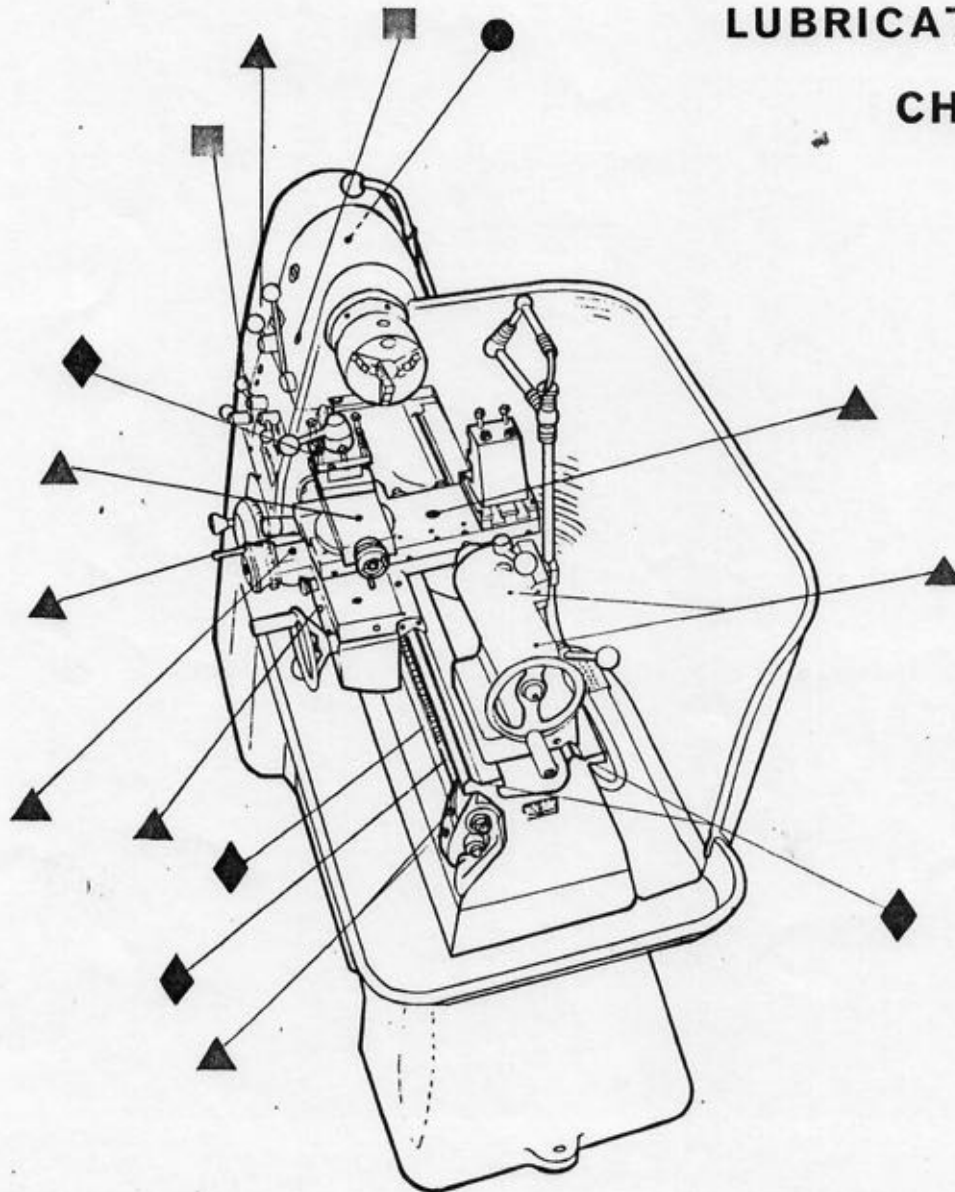
These oils may be obtained from Shell Oil Companies throughout the world but in case difficulty is experienced in obtaining these particular grades the physical properties are given below:

	Shell Tellus Oil 15	Shell Tellus Oil 33	Shell Vitrea Oil 21
Specific Gravity at 60°F	0.845	0.876	0.855
Flash point closed	300°F	410°F	320°F
Pour point	-20°F	-20°F	-20°F
Viscosity			
Redwood No. 1:			
70°F	100 secs	750 secs	160 secs
140°F	42 secs	112 secs	50 secs
200°F	—	52 secs	—

THE USE OF AN INCORRECT GRADE OF OIL IS LIABLE TO CAUSE OVERHEATING AND POSSIBLE DAMAGE.

The Matrix machine tool clutch should be greased every three months. The bearings of the pump motor (where this is supplied) should also be greased periodically and for both of the above applications we recommend Shell Alvania 3 Grease. The motor bearings should also occasionally be checked to ensure that they have an adequate supply of the grade of grease recommended by the manufacturer.

LUBRICATION CHART



- ▲ Oil once per week with light oil.
- ◆ Clean and oil with light oil each day.
- Top up with recommended oil each week.
- Oil when needed.

Grease Matrix Clutch when needed

OPERATION

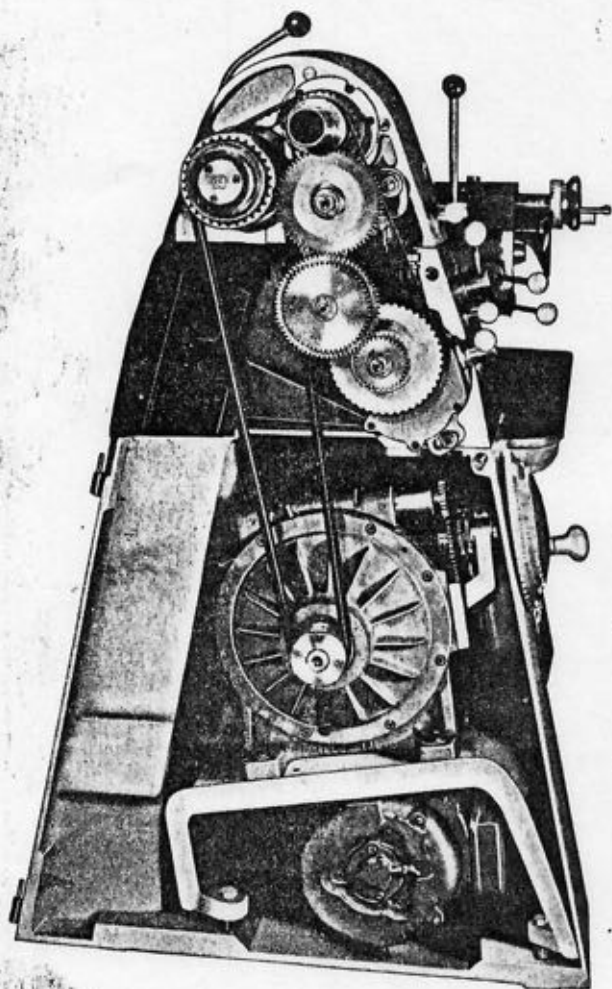
DRIVE

The headstock is driven by a single speed motor coupled to a Kopp variable speed unit by a toothed rubber timing belt, the motor being mounted on the underside of the variator plate to form a compact unit. From the variator vee belts transmit the drive to a Matrix machine tool clutch.

Spindle speeds are controlled by a graduated handwheel on the left hand side of the cabinet base. A safety device is fitted to this to avoid damage to the variator should the handwheel be moved without the motor running.

When correctly tensioned the vee belts should have approximately $\frac{3}{4}$ in (19 mm) free side movement in either direction under light pressure.

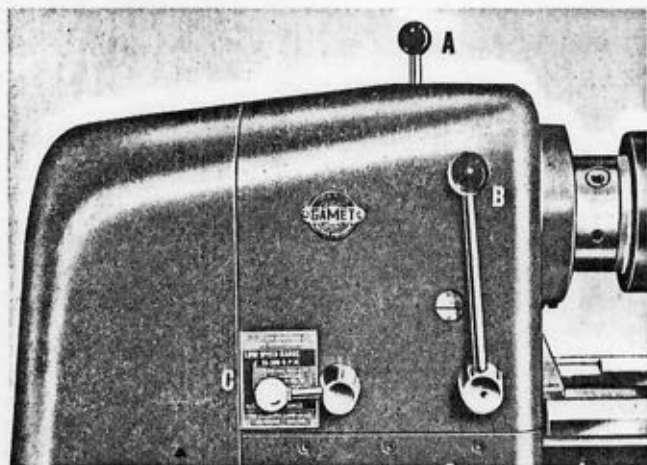
The motor is controlled by the illuminated lever (A). With this in the central position the motor is stationary. If the machine is correctly wired (see page 6) and with the clutch engaged, the spindle will rotate in the forward direction with the lever to the right and in the reverse direction with the lever to the left.



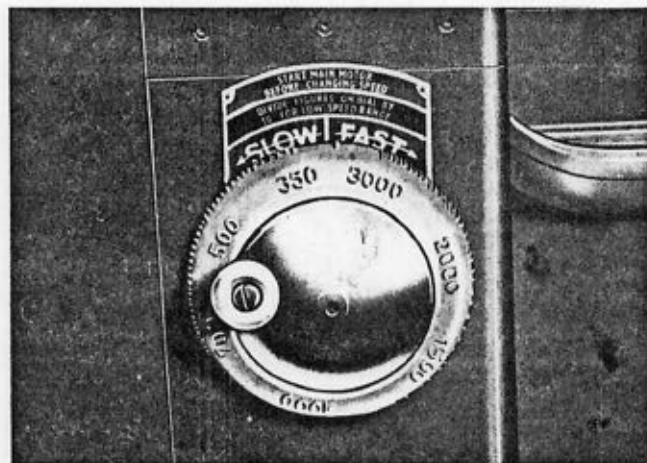
HEADSTOCK

Lever (B) on the front of the headstock controls the movement of the spindle through the Matrix clutch and brake. With the lever in the vertical position the spindle is stationary. By moving the lever to the right drive is taken up by the clutch and the spindle rotates. Instantaneous braking is achieved by returning the lever to the neutral position and applying pressure in the reverse direction.

Lever (C) selects the speed range required and **MUST NOT BE MOVED WHEN THE SPINDLE IS RUNNING**. In the lower speed range drive to the spindle is through the headstock gearing. In the higher speed range this gearing is disengaged and the spindle is driven direct from the clutch by a toothed timing belt. By using this belt for high speeds and eliminating the gearing, finishes of the highest order can be obtained.



HEADSTOCK CONTROLS



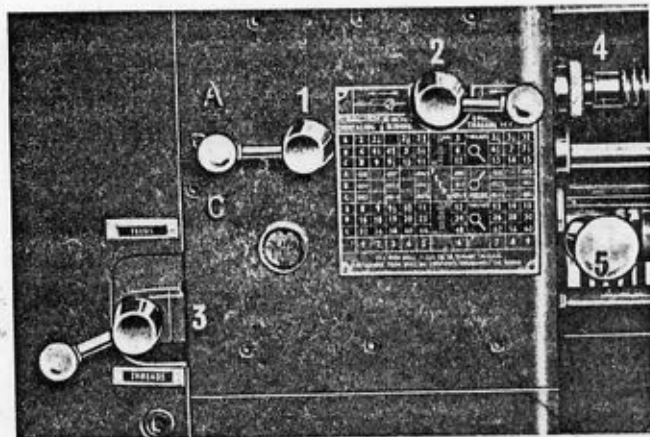
VARIATOR HANDWHEEL

GEARBOX

Control of the gearbox is by three levers and a tumbler shaft as illustrated. The tumbler shaft (5) incorporates a spring loaded plunger which engages in the slotted tumbler bearing extension to provide positive positioning and locking.

All available threads and feeds in the gearbox can be obtained by setting the tumbler shaft in conjunction with selector lever (1) in accordance with the feed and thread plate. Lever (3) is used in conjunction with the speed range selector lever (C) to engage the end gear train. In order to cut coarse, multi-start or special threads the lower speed range must be used with lever (3) in the down position. Standard fine threads up to 16 t.p.i. single start may be cut in the higher speed range with lever (3) in the up position. Lever (2) is used to reverse the direction of rotation of the leadscrew and feedshaft and a dog clutch (4) is provided so that the leadscrew may be disengaged as this should not be allowed to revolve except when screw cutting. The screw should be cleaned and lightly oiled before use.

THE SPINDLE AND HEAD-STOCK GEARING MUST BE STOPPED BEFORE ANY OF THE LEVERS CONTROLLING THE GEAR BOX ARE MOVED.



GEARBOX CONTROLS

SLIDING FEEDS IN INCHES SURFACING — SLIDING						ENGLISH THREADS PER INCH					
32-440 220-3000			32-440 220-3000			32-440 220-3000			32-440 220-3000		
A	B	C	A	B	C	A	B	C	A	B	C
1	2	4	8	8	16	32	16	32	64	.008	.004
2	2 1/4	4 1/2	9	9	18	36	18	36	72		
3		4 3/4	9 1/2	9 1/2	19	38	19	38	76	.007	.0035
4	2 1/2	5	10	10	20	40	20	40	80		
5	2 3/4	5 1/2	11	11	22	44	22	44	88	.0065	.0032
6	3	6	12	12	24	48	24	48	96	.006	.003
7	3 1/4	6 1/2	13	13	26	52	26	52	104	.005	.0025
8	3 1/2	7	14	14	28	56	28	56	112		
9	3 3/4	7 1/2	15	15	30	60	30	60	120	.004	.002
66 33			33 66			THREADS			FEEDS		
FILL WITH SHELL TELLUS OIL 33 TO MARK ON GLASS			OBTAINABLE FROM SHELL OIL COMPANIES THROUGHOUT THE WORLD								

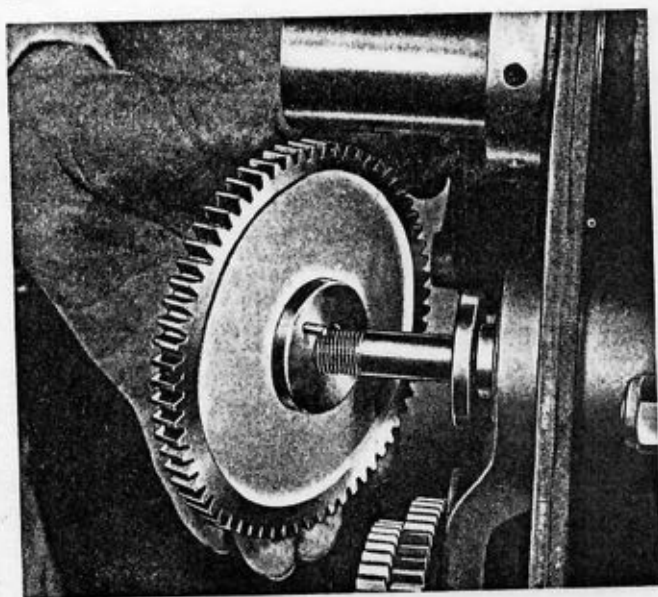
FEED AND THREAD PLATE

TABLE OF METRIC PITCHES AVAILABLE FROM STANDARD BOX										
GEAR	LEVER	HOLE IN LOCATION BAR								
		1	2	3	4	5	6	7	8	9
66 65 33	A				12 ^M / _H		10 ^M / _H			8 ^M / _H
	B				6 ^M / _H		5 ^M / _H			4 ^M / _H
	C				3 ^M / _H		25 ^M / _H			2 ^M / _H
33 65 66	A				3 ^M / _H		25 ^M / _H			2 ^M / _H
	B				1.5 ^M / _H		12.5 ^M / _H			1 ^M / _H
	C				.75 ^M / _H					.5 ^M / _H
		1	2	3	4	5	6	7	8	9
OIL CHANGE GEARS AND SLEEVE WITH SHELL TELLUS 33 OBTAINABLE FROM SHELL COMPANIES THROUGHOUT THE WORLD										
THE COLCHESTER LATHE CO. LTD. HYTHE, COLCHESTER, ENGLAND.										

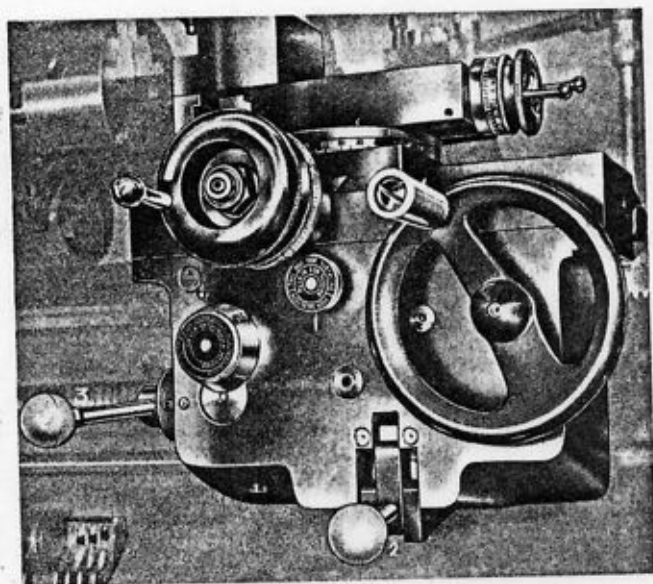
METRIC THREAD PLATE

SHEAR PIN DEVICE

A shear pin device is fitted as a precautionary measure to protect the leadscrew against overload in the low speed range. A broken pin can easily be replaced by removing the top gear in the end train and then the splined sleeve which carries the gear. The broken pin can then be tapped out of the sleeve. To remove the remainder of the pin rotate the shaft until the pin hole is opposite the slot in the housing. This can now be knocked through and will drop out through the slot. A new pin may now be fitted and the change gear sleeve re-assembled. When the end guard is opened the electrics are isolated by a micro-switch incorporated in the guard lock.



SHEAR PIN DEVICE



APRON CONTROLS

APRON

Surfacing and sliding feeds are selected by a plunger (1). Surfacing feeds are obtained with the plunger fully extended and sliding feeds with the plunger fully depressed. The feeds are engaged by lever (2) which incorporates a safety device to prevent overloading. This device also allows the use of feed stops which automatically disengage the feed mechanism on contact with a pre-set limit stop. When screw cutting the lead nut is controlled by lever (3).

THREAD CUTTING

1. Threads available from the gearbox

The screw-cutting dial on the front face of the apron has four numbered divisions and four sub-divisions. To cut an even number of threads—i.e., 12 t.p.i.—the leadscrew may be engaged at any division. For odd-numbered threads—i.e., 13 t.p.i.—the leadscrew may be engaged at any numbered division, and for fractional threads—i.e., 11½ t.p.i.—the leadscrew must be engaged at the same mark at each pass.

For metric threads, the dial indicator cannot be used. The nut must be closed over the leadscrew and the machine reversed by the reversing switch over the headstock after each cut and tool withdrawal. The nut must not be released until the thread is complete.

2. Threads not available from the gearbox.

To cut special and multi-start threads where special change gears may be required, the following formula is used:

$$\frac{\text{Drivers}}{\text{Driven}} = \frac{X}{Y \times \text{threads per inch}}$$

Where X=hole in location strip=16, 18, 19, 20, 22, 24, 26, 28, 30.

and Y=lever position—i.e., A=4, B=2, C=1.

Example.

It is required to cut 11½ t.p.i.

Choose X=22.

$$\text{Then } \frac{22}{4 \times 11\frac{1}{2}} = \frac{11}{23} = \frac{33}{69}$$

33T is the standard change wheel, therefore a 69T gear will be required.

3. Multi start threads

These can be cut in one of three ways.

1. By repositioning the compound slide one pitch forward for each start. It will be realised, however, that the accuracy of this method depends upon the operator.

2. By using an accurately divided driver plate and turning the workpiece one division forward for each start.

3. By advancing the driver gear a calculated number of turns to advance the spindle by one pitch of the

thread to be cut. The accuracy of this method is that of the machine.

The ratio between spindle and driver gear shaft is 2 : 1, i.e., for 1 revolution of the spindle the driver gear shaft rotates 2 revolutions. To use this method, therefore, the number of teeth in the driver gear must be divisible by the number of starts being cut. The driver gear is then advanced by twice this number of teeth to cut each thread start.

Example.

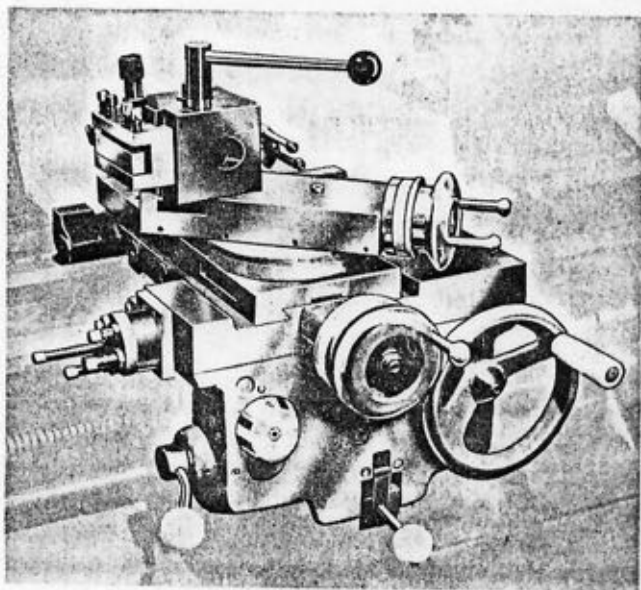
It is required to cut a 3 start thread.

Cut 1 start. Mark meshing teeth on all gears. Count number of teeth in driver gear; if there are, say 33 teeth, mark the 22nd tooth ($\frac{33 \times 2}{3}$) from the original mark. Remove the idler. Turn driver to mark on 22nd tooth and remesh the idler. Check marks. Cut the next start and repeat process for remaining start.

It will be appreciated that although this is the best method to use, in certain cases the number of starts may not be a factor of the number of teeth in the driver gear.

SADDLE AND SLIDES

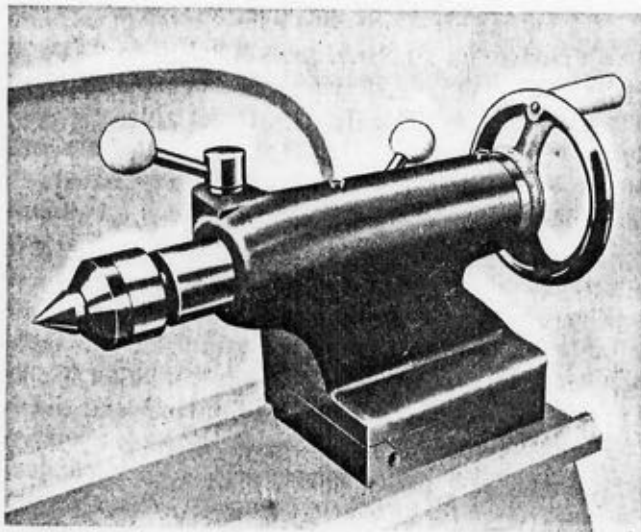
The saddle is secured to the bed by adjustable gibs at the front and rear and can be locked on the bed in any position. The slides carry large diameter micrometer dials graduated in 0.001 in divisions. The cross slide is radially graduated 90°-0°-90° each side for accurate setting of the compound slide. The American pillar type toolpost is fitted as standard suitable for $\frac{1}{2}$ in \times 1 in tools. As an alternative the multi-type toolpost is available as additional equipment.



SADDLE AND SLIDES

THE BED

The lathe bed should be cleaned down as often as possible by brushing to keep it free from cuttings. Do not use an air line which will drive chips under the sliding surfaces and blow away the protecting oil film. After each cleaning the bed should be coated with Shell Tellus 33 Oil to prevent rust formation. The bed is so designed that cuttings will fall away into the swarf disposal area at the back of the machine.



THE TAILSTOCK

The barrel is graduated in inch and metric divisions and induction hardened both in the No. 3 morse taper bore and on the outside diameter. All standard tang drills are driven by the tang and eject at zero graduation. A tool height indicator line is stamped onto the front face of the nose chamfer to assist in setting tools to the correct centre height when a workpiece is being held between centres. There are two parts to the tailstock casting, the base proper which slides along the bedways and the tailstock body, which may be moved laterally on the base. This movement or 'setting over' allows shallow tapers to be turned without the need of a special taper-turning attachment. The tailstock is set over by first releasing the bedway clamp lever and adjusting the two set-over screws fitted for this purpose. THE TWO SPRING-LOADED SHOULDER BOLTS HOLDING THE BASE TO THE MAIN CASTING DO NOT REQUIRE SLACKING OFF AT ANY TIME. Quick lever clamping is employed to lock the assembly in position on the bedways. The tailstock barrel is locked by a lever operated clamp.

ACCESSORIES

A comprehensive range of accessories is available for the Colchester Chipmaster lathe, specifically designed for the machine and engineered for simplicity, robustness and reliability.

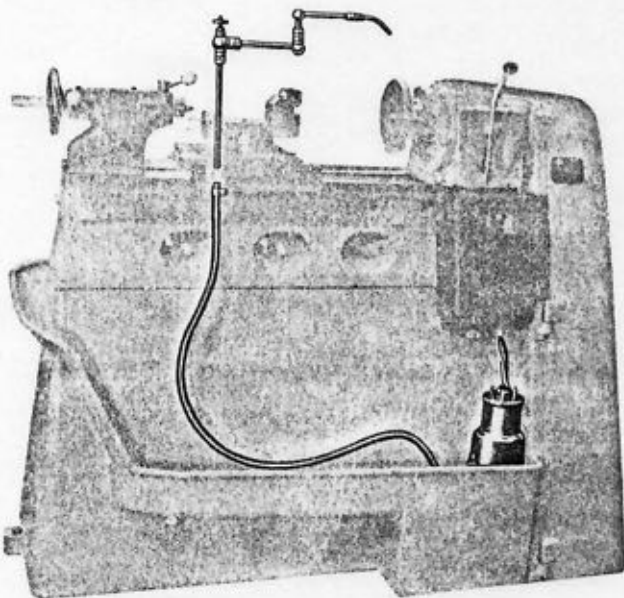
A brief list of these is given below and more detailed information on certain items is given in subsequent pages. All these accessories can be fitted to the machine after it has left the works.

Series '300' hydraulic copying unit	167	Additional universal holders for above	156 ✓
Turret stop for above	168	Turning toolholder for above	157
Facing beam for above	169	Boring bar holder for above	158
5-Station inclined head capstan slide with adjustable rotating stops and maximum working stroke of 4½ in	161	Parting off toolholder for above	159
Air operated swing forward type bar feed for use with above, capacity for bars 1½ in dia × 10 ft long	162	No. 2 M.T. Reduction sleeve for above	160
1½ in capacity Burnerd lever operated Multisize collet chuck	163	Electric coolant pump and fittings	108 ✓
✓ 1½ in capacity Burnerd Multisize key operated collet chuck	152	3-point Stationary steady	109 ✓
✓ Flexible round bore collets for above each having ⅛ in capacity in steps from 1/16 in—1½ in	153	Low volt lighting standard 3 phase AC supply only	110 ✓
Flexible square pattern collets each having ⅛ in capacity in steps from 1/16 in—1 in A/F	165	Reversible work holding tray	112
Flexible hexagon pattern collets each having ⅛ in capacity in steps from 1/16 in—1¼ in A/F	166	Heavy duty plastic cover to protect machine to tray level	113
✓ 5 in diameter Burnerd 3-jaw Geared Scroll Camlock chuck	101	3 Morse Taper Gamet super precision rotating centre	117 ✓
✓ 8 in diameter Burnerd 4-jaw Independent Camlock chuck	102	Additional change wheels for special thread pitches. Pitches required to be advised	119
✓ Perspex Chuck/Chip guard for fitting to lathe bed or saddle	164	Set of 7 Work driving dogs ½ in—2 in capacity	120
✓ Colchester Multi-type toolpost complete with universal holder	155	Jacobs type drill chuck with 3 M.T. arbor 0 in—½ in capacity	122 ✓
		Precision ground angle plate suitable for mounting on standard faceplate	123
		Feed stops for cross feed	124 ✓
		Feed stops for longitudinal feed	125 ✓
		Machined backplates	127 ✓
		Circular permanent magnet chuck	130
		Telescopic taper turning attachment	132
		Rear toolpost	146

THE COOLANT SYSTEM

The bed is so designed that coolant and swarf will fall away into the disposal area at the back of the cabinet at the headstock end of which is a coolant sump. A perforated cover incorporating the pump mounting is supplied with the coolant system to fit over the sump, preventing the entry of swarf. Coolant is fed to any required position by the fully universal delivery assembly which is attached to the back of the saddle by a simple clamp and connected to the pump by strong polythene tubing. The supply is controlled by a ball type valve.

An electric pump of robust design incorporates an independent switch on top of the motor housing, power being supplied from the main electrical panel. (See wiring diagram.) The pump motor **MUST** be switched off if the sump is dry or coolant not used for long periods. The sump **MUST** be cleaned at frequent intervals and the overflow hole kept clear. Also coolant **MUST NOT** be splashed over the pump when refilling. By taking these precautions damage to and subsequent failure of the pump will be avoided. The whole unit has been designed to eliminate the leaks which are usually inherent in coolant systems.



Soluble oil emulsions

For most work a soluble oil emulsion should be chosen, since this will almost always be adequate for the work in hand and will be preferred by the machine operator.

When screwing with a die head, tapping, or reaming, some extra coolant applied locally may be required. If much work of this type is contemplated, it may be

better to use an emulsion of an extreme pressure soluble oil in the machine sump. A good quality oil of this type will give results equal to neat cutting oil whilst retaining the cleanliness of soluble oil.

Good quality soluble oil should always be chosen and mixed in accordance with the suppliers' recommendations. The following grades have been tested and used in our own works with complete satisfaction. Shell Dromus Oil B—conventional milky soluble oil mixed with water in the ratio 25/30:1.

Shell Dromus Oil D—translucent soluble oil mixed with water in the ratio 40:1.

Shell Dromus Oil F—extreme pressure oil mixed with water in the ratio 10/15:1.

Soluble oils and machine maintenance

No soluble oil, however good, can completely prevent rust without help from the operator. The machine should therefore be cleaned down regularly and the bright parts wiped over with machine oil. It should never be left, especially over weekends or holidays, with wet swarf on the bed or slides. When the work in hand requires the saddle or slides to be clamped in position for long periods it is advisable to spread a little machine oil on the bed beforehand to ensure a film of oil between the surfaces.

The sump should be emptied, cleaned out and refilled with newly mixed soluble oil at regular intervals.

COLCHESTER MULTI-TOOLHOLDER

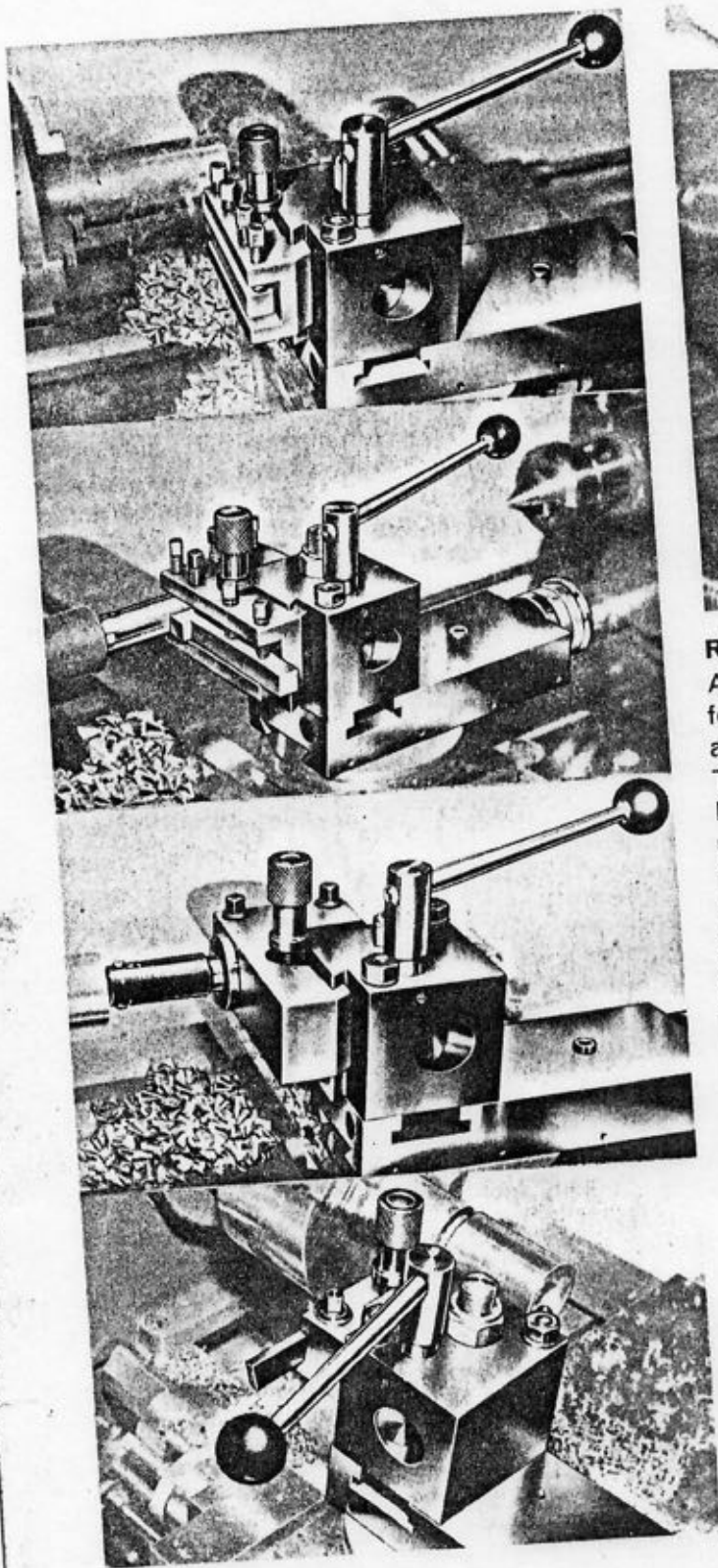
Designed to cut down time on repetition work, this unit can be attached to existing slides without modification.

The clamping head can be fitted with a variety of toolholders incorporating a height adjustment screw and once the tool has been set the holder can be removed with the certain knowledge that the tool will be at the correct centre height each time it is re-mounted.

The toolholder is located on an accurately ground dove-tail slide and locked in position by a lever operated plunger. The head and toolholder then form a very rigid unit with a guaranteed accuracy of 0.0004 in consistency at the tool point.

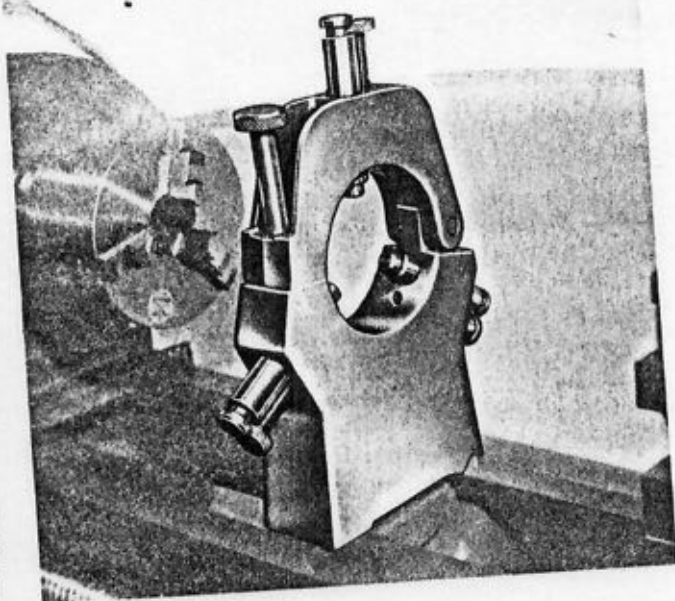
The following toolholders are available:—

- (a) Universal toolholder. Suitable for boring and facing work or similar combined operations. Tool capacity $\frac{7}{8}$ in square or round shank.
- (b) Turning toolholder. Tool capacity $\frac{7}{8}$ in square.
- (c) Parting Toolholder. Tool capacity $\frac{5}{8}$ in \times $\frac{1}{4}$ in trapezoidal form.
- (d) Boring toolholder. Tool capacity $1\frac{1}{8}$ in dia.
- (e) No. 2 Morse Taper sleeve for boring bar holder.



STATIONARY STEADY

Of extremely rigid design and having a maximum capacity of 4 in bar diameter, this attachment is rapidly clamped on to the bed by a plate and bolt and easily removed when not required. The top section is locked by a knurled screw and the adjustable fingers are fitted with replaceable sintered bronze press fit inserts.



REAR TOOLPOST

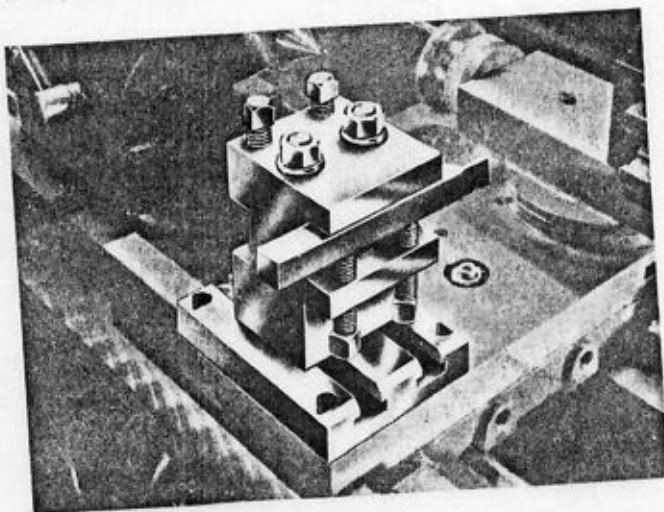
As an aid to production, a rear toolpost is available for fitting direct to the cross slide, which is drilled and tapped ready to receive it.

Two tool positions are provided so that the tool may be fitted in the conventional manner or in the inverted position.

Using this toolpost (with the tool fitted in the conventional manner) left-hand threads can be very easily cut.

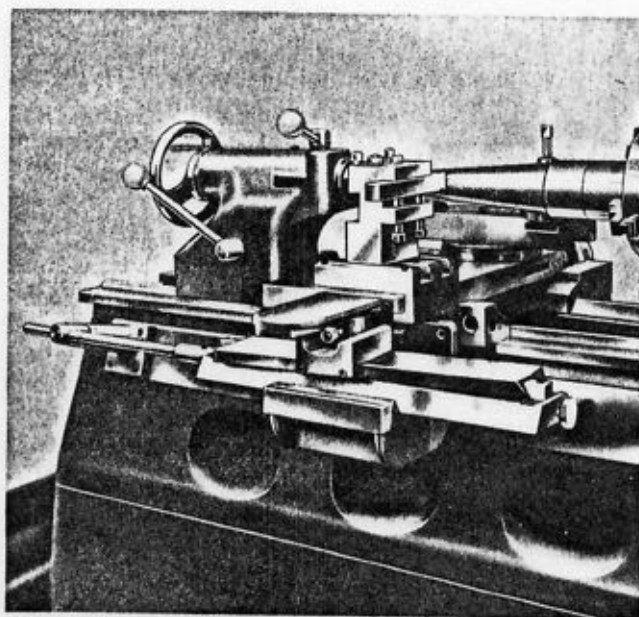
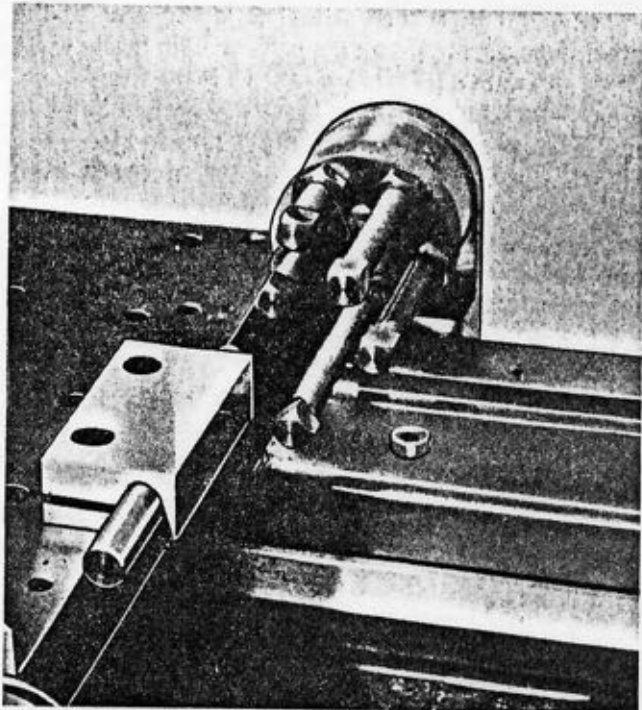
Supplied complete with all the necessary fixing screws, the only fitting required is the physical bolting of the base pad to the cross slide. Tee slots are provided in the base pad so that the toolpost may be adjusted in position on the base. Maximum tool depth that can be accommodated in either position is $\frac{5}{8}$ in.

The standard Allen keys and spanners supplied with the machine will fit all the nuts and screws in this assembly.



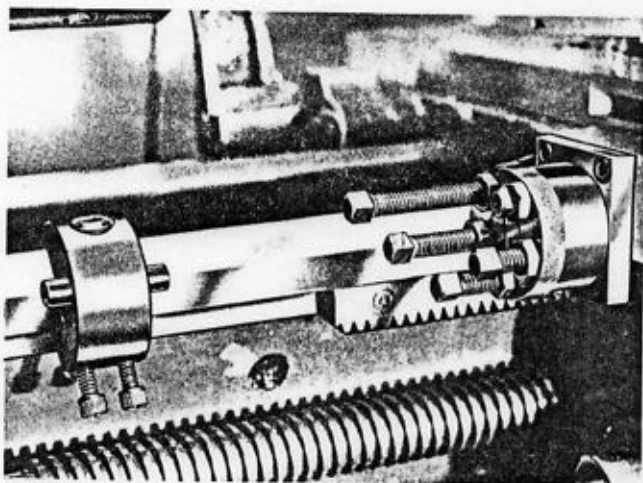
FEED STOPS

To provide an accurate and reliable means of repeating shoulder lengths single type or five-position type feed stops are available. A five-position stop can also be supplied for repeating diameters. With these units the saddle or cross slide can be stopped in any desired position, the feed mechanism in the apron disengaging immediately contact is made.



The swivel slide is graduated in $\frac{1}{4}^\circ$ of arc and in $\frac{1}{8}$ in taper per foot and great sensitivity of control is obtained when setting a taper by the use of the micro adjustment screw.

The cross slide handwheel is always used to control the tool and the base slide can be adjusted along the bed so that the taper may be cut in any position. The attachment will deal with a length of 10 in of taper at any one setting.



TELESCOPIC TAPER ATTACHMENT

This attachment can be used for producing tapers up to 10° in either direction.

It can be mounted directly onto the rear of the saddle without any modification other than the fitting of a new saddle screw and nut which is supplied with the unit.

After attaching to the machine, all that is required to prepare the taper turner for use is the clamping of the connecting rod in the anchor bracket by means of the knurled thumb-screw.

The fitting of this attachment in no way detracts from the use of the machine as a normal centre lathe. Change over can be simply accomplished by loosening the connecting rod clamping screw and traversing the saddle towards the headstock to disengage the connecting rod from the clamp. Then remove the anchor bracket from the bed so that there is no obstruction to foul the connecting rod. By replacing the bracket and engaging the connecting rod the taper turner is rapidly reset for use.

Great care should be taken when readjusting or altering the fit of the base slide in the taper turner bracket, as any slackness will result in incorrect tapers.

To fit the taper attachment

1. The saddle and cross slide are ready drilled to receive the attachment, the necessary holes being drilled and tapped during manufacture.
2. Clean down the rear end of the saddle to receive the taper turner bracket.
3. Release the locknut in the centre of the cross slide handwheel.
4. Slide the cross slide to the rear of the saddle.
5. Remove the saddle screw nut fixing bolt and withdraw the screw and nut from the rear.
6. Insert the taper turner saddle screw and nut and secure the nut with the fixing bolt.
7. Pull the cross slide forward and engage the saddle screw in the handwheel pinion. (Note: The lock nut from the original saddle screw is not replaced, but should be retained in case it is needed when refitting the original screw.)
8. The slide block assembly can now be fitted to the thrust block on the rear of the saddle screw assembly. Engage the slides in the bracket and the slide block assembly on the slides. This will enable the bracket to be bolted to the rear of the saddle using the pre-tapped holes provided.
9. Finally, bolt the bottom slide extension piece to the rear of the bottom slide. Fit the connecting rod to the taper turner slide and the connecting rod clamp to the machined face on the back of the bed.

LOW-VOLT LIGHTING UNIT

The 'Angle poise' light is a rigid 50 volt unit with the transformer separately located in the switch panel of the machine. It can be fitted without difficulty as follows:

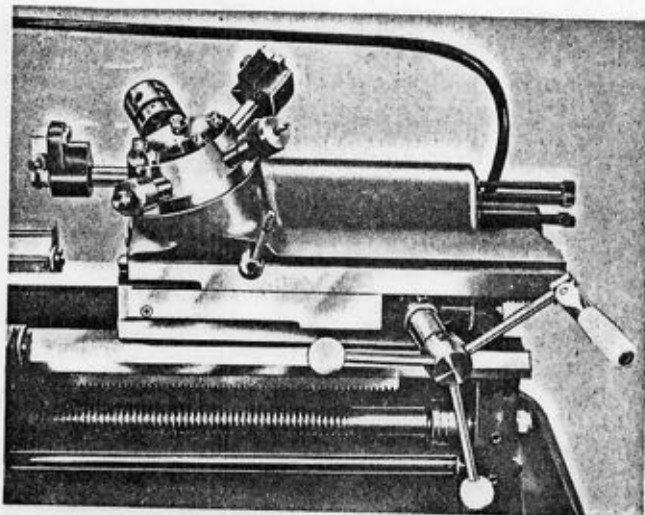
1. Isolate electric panel and remove splash guard.
2. Open panel and fit transformer on the pads on rear wall of box.
3. Wire up transformer for correct voltage as indicated on diagram in lid of panel.
4. Connect transformer secondary (output) winding to the existing socket using the cable provided in the panel.
5. Close panel and move isolator switch to 'on' position.
6. Replace splash guard.
7. Assemble lamp standard into the socket provided on top edge of splash guard, and secure with spring washer and nuts, and insert the bulb.
8. Insert plug in socket at base of electric panel and operate lamp 'On' or 'Off' from switch in lamp holder.

THE COLCHESTER CAPSTAN ATTACHMENT

The five station, manually operated, inclined head capstan attachment is built on a base plate which utilises the existing tailstock ways on the bed and requires no fitting prior to use.

Having a maximum working stroke of $4\frac{1}{2}$ in, the length of travel can be adjusted for each station by setting the stop screws and the turret slide may be locked in any position by a lever situated at the rear of the attachment. Standard single spindle auto toolholders with $\frac{3}{4}$ in shanks (or 20 mm shanks if the attachment is supplied with metric bores) are accommodated in the turret, which is positioned and locked after each indexing to an accuracy of 0.0002 in (0.005 mm) three inches (76 mm) from the turret face.

Whilst indexing is normally achieved by returning the slide fully to the right by the handwheel the turret can be rotated by hand if required.



NOTE—

Tooling should be obtained through your usual supplier

BAR FEED

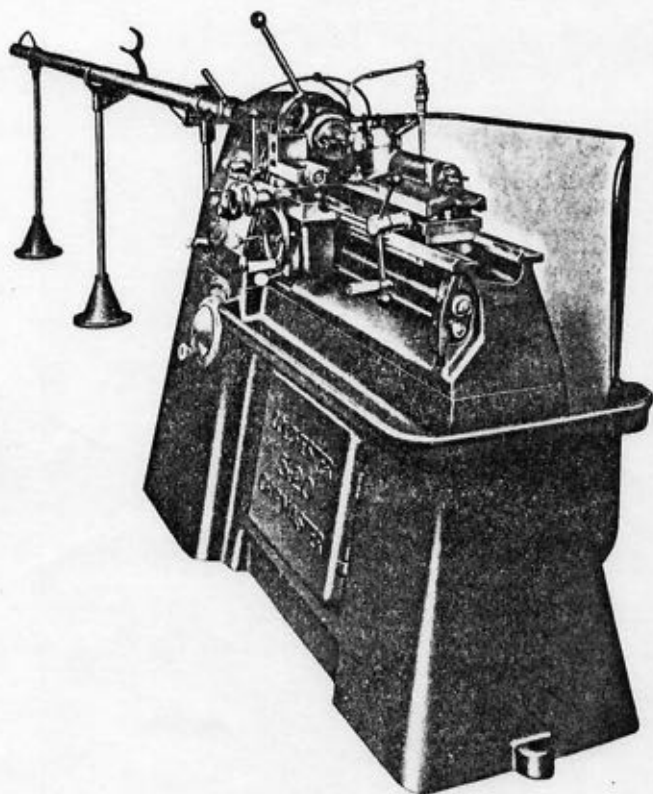
This is the Puckert air operated swing forward type accommodating 10 ft bars from $\frac{1}{2}$ in to $1\frac{3}{8}$ in diameter. Operated by an air pressure of 5 to 15 lbs/sq in, a reducing valve is included for use where the available supply pressure is higher.

The mechanism consists of an inner air cylinder and an outer supporting cylinder carried on three stands. Two of these allow angular and end movement for loading purposes; the third, placed nearest to the lathe, has an interlocking clamp which prevents the cylinder being moved to the loading position without the air supply being cut off and exhausted.

Air pressure is controlled by a handle fitted to the inner cylinder operating a taper-plug valve and incorporates a warning whistle which blows when reloading is necessary.

To do this the cylinder is lifted on to the antler support on the centre stand and the piston and feed rod pushed back into the inner cylinder and the bar fed in.

It is essential that the feed is accurately aligned with the spindle in both the horizontal and vertical plane and the support stands bolted to the floor before this equipment is used.



THE COLCHESTER SERIES 300 HYDRAULIC PROFILING UNIT

Designed for faster and more accurate profiling the standard equipment comprises a profile slide assembly, a rear beam assembly for round or flat masters, a free standing hydraulic power unit and a set of connecting hoses housed in a single flexible armoured conduit.

This equipment can be fitted to Chipmaster Lathes, Serial No. G2376 and above without modification.

The Profile Slide Assembly

Mounted on the cross slide of the lathe, this is an integral unit consisting of the operating cylinder, cartridge type servo valve, stylus lever mechanism and a swivelling Colchester Multi-type Toolpost complete with one turning toolholder.

The cylinder has a 3 in. (76 mm) stroke and a maximum approach/retraction speed of 110 ins. (279 cm.) per minute. The low stylus pressure of 6 oz. (170 g.) allows soft masters to be used if necessary, and the in-feed rate is lever controlled.

A swivelling Colchester Multi-type Toolpost allows

tooling to be pre-set and enables tool changes to be made without re-setting the slide assembly. Sufficient height adjustment is provided to allow the tool to be set for forward or reverse cutting.

The assembly can be set at five alternative angles to the axis of the machine—either 90°, 60°, 30°, 0° or -30°, depending on the work to be produced and a copying accuracy of ± 0.0005 ins. can be achieved. The change in copy diameter at 90° is $5\frac{1}{2}$ in. and at 60° 5 in.

The Rear Beam Assembly

The beam fixes directly to the rear face of the lathe bed and provides a rigid datum surface for carrying the master parallel to the axis of the machine.

Two beam brackets slide on the rear beam and provide a locating surface for the tailstocks which accommodate round masters or flat templates. The tailstocks are adjustable for the micrometer setting of the master or template.

The Hydraulic Power Unit

A free standing unit, designed to fit neatly at the rear of the lathe, has a $\frac{1}{2}$ H.P. pump producing a working pressure of 300 lbs/sq. in. A pressure gauge is fitted and independent switch gear is also incorporated.

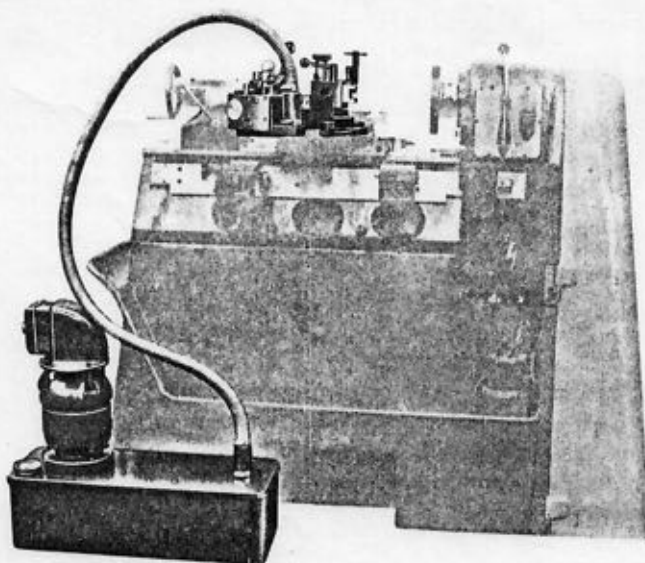
The pump and oil filter can be removed as an assembly for inspection.

Turret Stop

An indexing turret stop is available as an optional extra to enable progressive in-feed to be applied between roughing cuts. Six stops provide for five roughing cuts and one finishing cut to be pre-set. Progressive settings of the turret stop enable roughing cuts to be taken at uniform depth. The final cut follows the full form of the copy master.

Facing Beam

A facing beam is also available as an optional extra. Designed for flat templates, it is secured to the saddle of the machine and incorporates micrometer lateral adjustment.



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