

THE SMART & BROWN  
MODEL "M"  
SURFACING and  
SCREWCUTTING LATHE

*Serial 5.5732*

SMART & BROWN (Machine Tools) LTD.,  
BIGGLESWADE, BEDS.

Tel. Biggleswade 2361 (P.B.X).

INSTRUCTIONS  
*for the*  
OPERATION  
*and*  
MAINTENANCE  
*of the*  
MODEL "M" LATHE

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SMART & BROWN PRECISION LATHES have an established reputation for accuracy and reliability, and the minimum of care and attention is required in installation and maintenance in order to get maximum results.

Neglect of certain essentials will, however, result in faulty work and may eventually lead to breakdowns.

This booklet has been prepared to enumerate those points to which attention must be paid, in order that the machine will be given a fair chance to operate at its best.

IN ANY CORRESPONDENCE RELATING TO  
THIS MODEL "M" LATHE  
PLEASE QUOTE SERIAL No. OF MACHINE  
TO BE FOUND ON THE R.H. END OF THE  
BED.

For other Products see page 10.

## GENERAL SPECIFICATION

### CAPACITY

Take between Centres	...	...	...	...	18"
Swing over Bed	..	..	..	..	8" dia.
Swing over Carriage	..	..	..	..	4 $\frac{5}{8}$ " dia.
Travel of Carriage	..	..	..	..	14 $\frac{1}{4}$ "
Capacity of Travelling Steady	..	..	..	..	$\frac{3}{8}$ " to 1"
Section of Tool	..	..	..	..	$\frac{3}{8}$ " $\times$ $\frac{3}{8}$ "

### HEADSTOCK

Six Spindle Speeds ; range of speeds, optional. Range "A" will be supplied unless otherwise specified when ordering.

<i>Range.</i>	<i>Back Gear.</i>			<i>Open Belt.</i>		
A	66	106	183	480	752	1300
B	99	159	275	720	1128	1950

For Range "A" motor drive is by  $\frac{3}{4}$  h.p. motor (960 r.p.m.).

For Range "B" motor drive is by  $\frac{3}{4}$  h.p. motor (1440 r.p.m.).

Front Bearing	..	..	..	2" dia.	$\times$ 2 $\frac{1}{8}$ " long
Rear Bearing	..	..	..	1 $\frac{9}{16}$ " dia.	$\times$ 2 $\frac{7}{8}$ " long
Hole in Spindle	..	..	..	..	.. $\frac{5}{8}$ "
Maximum bore in Collet	..	..	..	..	.. $\frac{3}{4}$ "

Thread on Spindle Nose 1.75" 8T.P.I. R.H. Whit. Form.

### TAILSTOCK

Diameter of Barrel	..	..	..	..	1 $\frac{1}{4}$ "
Travel of Barrel	..	..	..	..	3 $\frac{1}{2}$ "
Morse Taper in Barrel	..	..	..	..	No. 2
Set over for Taper Turning	..	..	..	..	$\frac{3}{8}$ "

### THREADS AND FEEDS

*(With Standard Changewheels)*

Threads per inch : 4, 4 $\frac{1}{2}$ , 5 to 16, 18, 19, 20, 22, 24,  
26, 28, 30, 32, 36, 38, 40, 48, 50,  
56, 60.

Feeds : Surfacing .0075" down to .0005"  
Sliding .015" down to .0010"

Leadscrew Diameter : 1"

Pitch of Leadscrew : 6 T.P.I. Acme Form.

### FLOOR SPACE

Length : 4' 10". Width : 2' 0". Height : 3' 10 $\frac{1}{2}$ ".

## STANDARD EQUIPMENT

Spindle End Shield.  
 Driving Plate with Driver.  
 American Type Tool-holder.  
 No. 2 Morse Taper Plain Centres.  
 Centre Adaptor.  
 Travelling Steady, Capacity  $\frac{3}{16}$ " to 1".  
 14 Change Wheels.  
 Micrometer Dead Stop.  
 Geared Suds Pump, Tank and Fittings.  
 Oil Gun and Spanners.

### Additional Equipment Available.

Headstock Conversion Unit Type SB. 119, including complete assembly to convert handwheel operated headstock to lever operation.

Spindle Indexing Attachment Type SB:120 .. .. .  
 Headstock Chuck Type AD 5" 3-jaw geared scroll .. .. .  
 Headstock Chuck Type BC 6" 4-jaw independent .. .. .  
 3-point Fixed Steady  $\frac{3}{16}$ " to  $2\frac{1}{8}$ " Type SB. 105 .. .. .  
 Four-station indexing Tool Slide, Type CXP screw-operated, with micrometer dial top section only to interchange with top section of standard Slide Rests .. .. .  
 Face Plate, Type SB.101  $7\frac{1}{2}$ " dia. .. .. .  
 Collets : Pull-in pattern Type 4A. In all sizes up to  $\frac{3}{4}$ " maximum by  $\frac{1}{64}$ " steps. Also metric sizes to 19 m/m. .. .. .  
 Expanding Ring Chucks, Type 4G. Complete set of 4 covers min.  $\frac{1}{2}$ " to max.  $2\frac{1}{2}$ " by  $\frac{1}{16}$ " steps .. .. .  
 Opener unit for the above .. .. .  
 Closing Disc Collets, Type 4H. Complete set of 4 covers min.  $\frac{1}{2}$ " to max.  $2\frac{1}{2}$ " by  $\frac{1}{16}$ " steps .. .. .  
 Closer Unit for the above .. .. .  
 Oversize Collet Attachment, Type 4F .. .. .  
 Oversize Collets from  $\frac{3}{4}$ " to  $1\frac{1}{2}$ " dia. by  $\frac{1}{16}$ " steps. Also metric sizes up to 38 m/m.  
 Drill Chuck, Type 2D. Key operated, No. 2 Morse stem. Max. capacity  $\frac{1}{2}$ " or  $\frac{3}{8}$ "  
 Lathe Centres :  
 Hollow Centre (No. 2 Morse) Type 3J .. .. .  
 Half Centre (No. 2 Morse) Type 3L .. .. .  
 Gear Wheels :  
 127 T. Gear for Metric Threads covering pitch of .5 to 4.5 m/m. .. .. .  
 Complete set of 11 Changewheels for B.A. threads 0 to 15 including 127T.  
 Lathe Carriers .. .. .

## INSTALLATION.

In order to maintain the accuracy of the machine, it should be installed on a rigid foundation.

Failure to provide a solid seating may result in the bed becoming distorted.

Care taken in levelling the machine will be amply repaid in maintained accuracy. Levelling should be carried out as follows:—

Place two parallels along the bed, one at the front and the other at the rear, with an accurate precision level across them. The machine should then be levelled up by inserting suitable packing pieces under the cabinet.

This procedure should be carried out at the headstock end, the tailstock end and finally in the centre of the bed. The machine can then be bolted to the floor.

## ALIGNMENT.

If at any time it is found that the machine does not turn true, the first thing to check is the levelling and it is recommended that during the first few months this be checked frequently.

Levelling of the bed lengthwise is not important, so long as the bed is not twisted through faulty clamping.

Ground test bars should be used for checking alignment.

First check the alignment of the headstock spindle with the bedways by using a test bar ground to fit accurately in the taper bore of the spindle. The bar should be pulled into position by the draw bolt and should project 12" (Fig. 1).

Check on top and side of test bar using dial gauge.

Alignment of tailstock can be checked in a similar manner on a parallel bar held between centres.

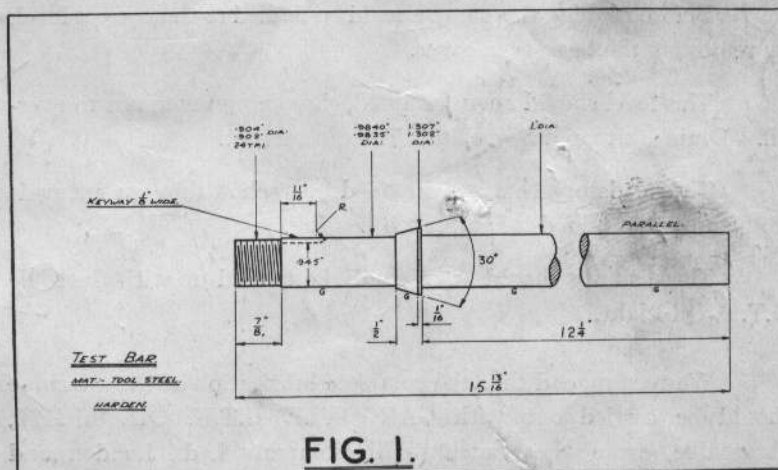


FIG. 1.



## CLEANING AND LUBRICATION.

### General.

The bed ways and slides should be regularly cleaned, swarf removed, and a film of oil applied at frequent intervals.

If the wipers on the saddle are removed and the felt pads cleaned and oiled occasionally, scoring of the bedways will be considerably reduced.

The taper bores in the headstock and tailstock spindles should be wiped before inserting the shanks of centres, drills, etc.

The tool rest and boat piece should be cleaned before mounting a tool.

If these small items are attended to regularly the operator will be recompensed by the maintained accuracy of the machine which will thus be achieved.

Lubrication is of paramount importance, and the oil gun supplied in the tool kit should be used daily before starting up the machine.

### HEADSTOCK.

The lathe was run several hours before despatch, and oil then drained from the Back Gear Sump (Fig. 2).

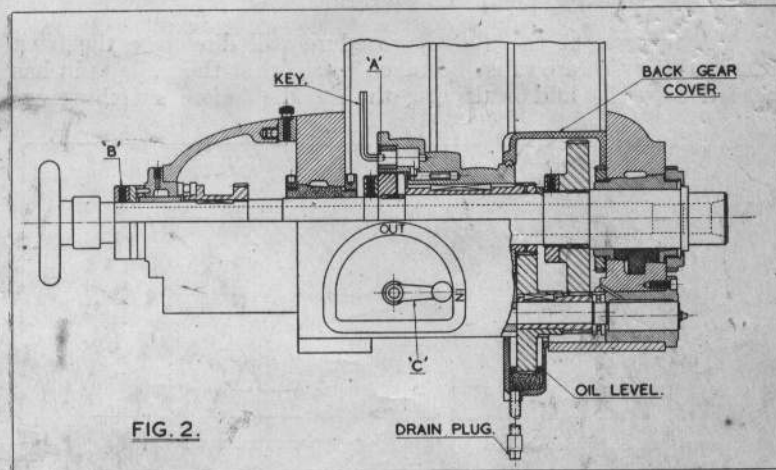
Before running this sump should be refilled to the correct level, by removing the back gear cover.

This level should be maintained, care being taken not to over-fill. Drain is situated above Suds Tank in cabinet.

The headstock bearings are oiled by syphon through felt pads from sumps contained beneath each bearing.

These sumps should occasionally be topped up with Gargoyle D.T.E. Oil Light.

We recommend that the complete lubrication of the machine should be carried out with GARGOYLE D.T.E. OIL LIGHT, obtainable from the Vacuum Oil Company Ltd., London and Branches.



#### HEADSTOCK ADJUSTMENT.

The spindle bearings are accurately adjusted before leaving our works, and should run for along period without further adjustment.

When adjustment becomes necessary, this should be carried out as follows :—

##### Front Bearing.

Slacken off front bearing outer nut and close bearing by tightening inner nut, after adjusting, lock outer nut.

##### Rear Bearing.

Pull out rear bracket filler piece, release outer nut and close bearing by tightening inner nut, after adjusting lock outer nut.

##### End Thrust Bearing.

End thrust is taken by a ball thrust washer and end location can be adjusted by carefully tightening rear nut "B" (Fig 2).

This nut is locked by a grub screw which should be slackened off and locked after adjusting.

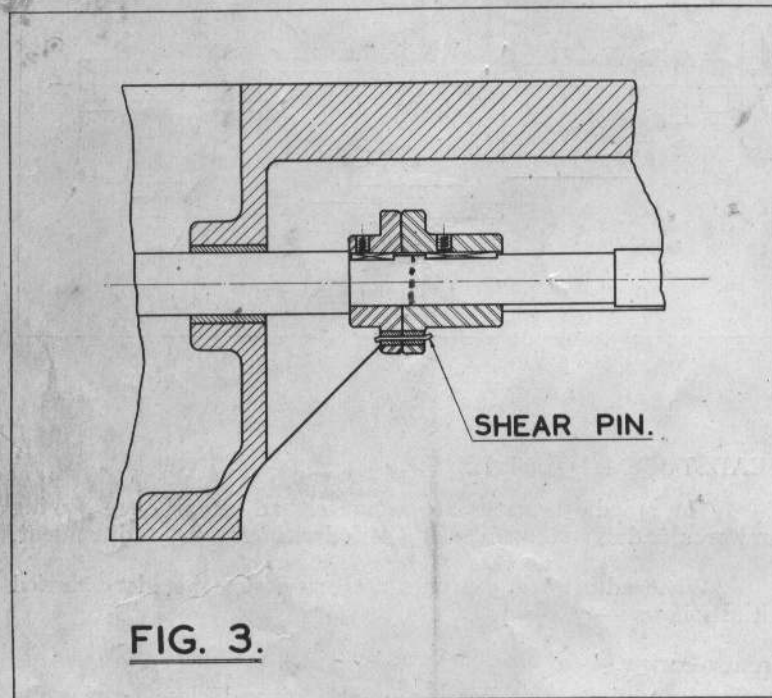
Note :— Adjust when warm.



### OPERATION OF BACK GEAR.

Revolve pulley until socket "A" is at top (Fig. 2). Insert special hexagon key as shown and turn through 180° in a clockwise direction. Set lever "C" at "IN" position

A reversal at the above procedure will disengage the back gear, in this case care must be taken to see that the pulley pin has engaged correctly and is driving the spindle before switching on.



### SHEAR PIN.

A shear pin is provided to avoid risk of damage when screw-cutting. This is located in the flanges of the couplings at the L.H. end of the leadscrew. (Fig. 3).

If a new shear pin is required it should be .0625" dia. silver steel 1" long, and fitted as shown in Fig. 3.

### DRUNKEN THREAD.

Drunken thread, or alternatively thick and thin threads can be caused due to the leadscrew thrust requiring attention careful adjustment of the thrust washer at the R.H. end of the leadscrew will usually remedy this trouble.

## SCREWCUTTING

The set of changewheels supplied will enable the user to cut all the pitches shown on the plate fitted to the front of the feedbox.

By the addition of a 127T. gear to this set a range of Metric pitches from .5 to 4.5 m/m can be cut.

Using an additional set of 11 gears (including the 127T.) a range of BA pitches from 0 to 15 BA can be cut.

If it is desired to cut pitches not shown on the changewheel chart the following formulae should be applied.

### ENGLISH PITCHES

$$\frac{\text{T.P.I. (Lead screw)}^6}{\text{work T.P.I.}} = \frac{\text{DRIVER}}{\text{DRIVEN}} \times \frac{\text{DRIVER}}{\text{DRIVEN}}$$

### METRIC PITCHES

$$\frac{30 \times \text{pitch in m/m}}{127} = \frac{\text{DRIVER}}{\text{DRIVEN}} \times \frac{\text{DRIVER}}{\text{DRIVEN}}$$

The 127T Changewheel being the second Driven gear.

The formula for metric pitches is used for BA pitches, as the BA pitches are in millimetres.

### Electrical Equipment.

The internal wiring between switches, contactors and motor, is complete when the machine leaves our works. All that is necessary is to connect the supply lines to the contactor as shown in the contactor instruction leaflet supplied with this booklet. An isolating switch can be incorporated if required, and we will fit one if specially requested when the machine is ordered.

We draw your attention to the following list of other well-known products manufactured by SMART & BROWN (Machine Tools) LTD. :—

PRECISION TOOLROOM LATHES.

„ PRODUCTION LATHES.

„ INSTRUMENT LATHES.

„ SECOND OPERATION  
LATHES.

„ BENCH LATHES.

PRESSES.

A wide range of ancilliary  
and allied equipment.

We should welcome your enquiries and should be glad to send further details, catalogues, specifications, etc. on application.

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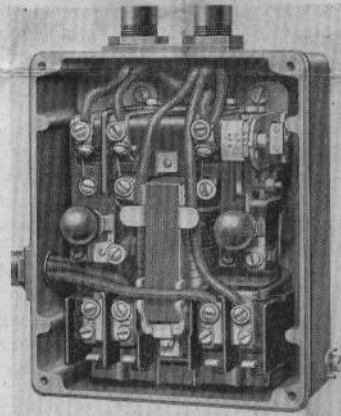
INSTRUCTION BOOK

No. 1564 \*



A.C. DIRECT-ON  
**CONTACTOR STARTERS**

TYPES DOC 70 DOC 85, & DOCR 70  
FOR SQUIRREL-CAGE INDUCTION MOTORS



THE BRITISH THOMSON-HOUSTON Co., LTD.,  
RUGBY, ENGLAND

EDITION E.  
\* Cancels Edition D.

1145



**TYPES DOC 70 & 85                      TYPE DOCR 70**  
**NON-REVERSING STARTERS    REVERSING STARTERS**

**T**HE starter should be secured to a vertical surface. Before wiring up the starter, operate the push-buttons and contactor by hand to ensure that the mechanism is free and that there is no loose packing material present.

Three holes, tapped to take  $\frac{3}{4}$ " conduit in Type DOC 70 and 1" in Type DOC 85, are provided, and the connections should be made in accordance with the appropriate connection diagram shown in Figs. 2, 3, 4, and 5. A three-phase connection diagram is also reproduced on the inside of the starter cover. The most satisfactory method of running the leads is that illustrated on page 1 (which shows the starter wired up for remote push-button control); the leads should be taken across the magnet frame only in the grooves provided for that purpose.

**PROTECTIVE DEVICES**

**Under-Voltage Release.** The contactor opens automatically if the voltage fails. As used normally with push-button control, the contactor will not re-close when the supply is re-established until the "start" button is again depressed. If, however, pilot switch control is used the contactor may re-close as soon as the supply voltage is restored, this depending solely on whether the pilot switch is open or closed.

**Thermal Over-Current Relay.** The relays should be set at the motor full-load current, the value of which is given on the motor name plate. If, due to the nature of the load, the relays trip, the setting may be increased 10 per cent. or if essential it may be raised to  $1\frac{1}{4}$  times full-load current provided that the motor shows no signs of overheating.

These relays have an inherent time-lag, and the time taken to trip varies inversely as the overload; it also depends on the previous loading of the motor and the ambient temperature. It is in this manner that the motor is correctly protected under all conditions of load, whilst obviating a shut-down on momentary overloads. The rating of the relay can be modified by changing the heaters.

Each relay incorporates a hand re-set latched type thermal unit which is re-set by pressing the re-set button.

The relays are adjustable and are calibrated in amperes (corresponding to the maximum current the relay will carry without tripping) at three points on the scale, to enable the relay to be set to the current value desired.

The essential parts of the relay are a helix of thermostatic metal and a heater unit carrying the main current.

The action is as follows:—When the motor is running the heater warms up and the helix tends to twist more and more and in so doing rotates a latch cam. When the limit for which the relay is set is reached, the cam releases the auxiliary contacts which open and interrupt the coil circuit of the line contactor, thus disconnecting the motor, which stops.

After such an overload the relay has to cool down before it is possible to re-set the auxiliary contacts, and this enforced pause enables the motor to cool off also. When the relay has sufficiently cooled, the motor may be started afresh in the usual way.

**Short-Circuit Protection.** The over-current relays provide over-load protection to the motor under ordinary working conditions. Starter and motor should be protected against severe electrical faults, such as short-circuits, by fuses (one in each phase) appropriately rated to suit the installation.

### ISOLATION

An isolating switch, or isolating links, should always be connected directly "behind" the contactor starter in order that the latter may be isolated for inspection and maintenance. In the case of pilot switch control it is also necessary to ensure that the motor cannot be started inadvertently during examination of the driven machinery.

### SPARES AND RENEWALS

The silver-tipped contacts on the contactor do not need cleaning and should only be renewed when worn down so far that there is insufficient contact-finger pressure.

To remove the contact fingers or operating coil for renewal, first remove the starter unit from its enclosing case by partly withdrawing the captive screws in the base and then proceed as follows:—

#### FIXED CONTACTS

Each contact is held in position by one screw which can readily be removed.

#### MOVING CONTACTS

1. Slacken the screw which holds the armature stop, and pull the latter forward, this will enable the armature complete with contacts to be withdrawn.
2. To release the contacts undo the four screws on the contact carrier.

#### OPERATING COIL

Proceed as 1 above, then continue as follows:—

- a. Remove the two screws which hold the coil leads in position.
- b. Remove the steel back-plate by undoing the five screws which hold it in position.
- c. Undo all connections from the fixed contact terminals and separate the contactor from the relay.
- d. Remove the split pin which passes through the top of the magnet frame, and withdraw the two guide clips through the bottom of the solenoid, thereby freeing the coil.

When ordering renewals or spare parts, it is imperative that customer states carefully in every case the complete particulars given on the nameplate, particularly the precise type and form, together with a full description of the part or parts required (a sketch or sample will greatly facilitate despatch).

In the case of coils, the "FF" number marked thereon (plainly visible when withdrawn from the starter) should invariably be quoted.

If it is desired to alter the capacity of the thermal relay, a set of thermal heater elements complete with new calibration plate can be supplied which can readily be fitted on site without special testing. Under no circumstances should the setting of the latch cam be interfered with in any way.

**TYPICAL CONNECTION DIAGRAMS**

A separate diagram is supplied for Type DOCR Starters for reversing or special duty.

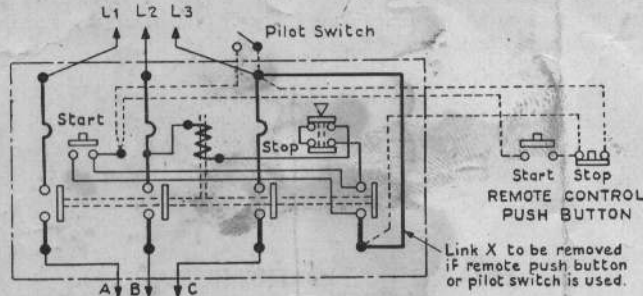


Fig. 2. Starter for three-phase motor.

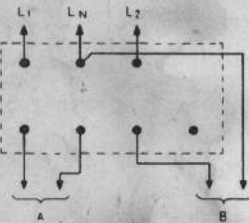


Fig. 3. Starter for two-phase 3-wire motor. (For internal connections, see Fig. 2.)

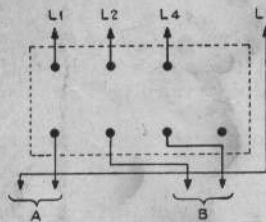


Fig. 4. Starter for two-phase 4-wire motor. (For internal connections, see Fig. 2.)

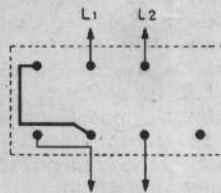


Fig. 5. Starter for single-phase motor. (For internal connections, see Fig. 2.)

**NOTICE.**

BEFORE RETURNING APPARATUS FOR REPAIRS OR OTHER REASON, PLEASE COMMUNICATE WITH HEAD OFFICE, NEAREST DISTRICT OFFICE OR LOCAL REPRESENTATIVE—QUOTING NUMBER ON NAMEPLATE—WHEN THE NECESSARY INSTRUCTIONS WILL BE SENT.

COMPLIANCE WITH THIS REQUEST WILL AVOID DELAY AND INCONVENIENCE.