HARRISON

OPERATOR'S HANDBOOK AND SPARE PARTS LIST

11" swing lathe

5½" centre

MODEL L5A

PRICE 30/-
(£1·50)

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Contents

INSTRUCTIONS FOR ORDERING SPARES

When ordering Spare parts **always quote Machine No.**

which is stamped on the bed at the tailstock end.

Spares can be obtained through your usual machinery dealer, or

direct from the manufacturers:—

T. S. HARRISON & SONS LTD.

P.O. BOX 20,

HECKMONDWIKE,

YORKSHIRE, ENGLAND.

Telephone: Heckmondwike 3751 *Telegrams:* Harrison, Heckmondwike *Telex* 55217

SPECIFICATION AND LEADING DIMENSIONS

	TYPE KL1124	
Swing over bed	$11\frac{3}{8}$″	290 mm.
Admits between centres	24″	610 mm.
Bed length	51″	1,295 mm.
Swing over saddle	$8\frac{1}{8}$″	205 mm.
Swing in gap — diameter	$18\frac{3}{4}$″	475 mm.
Swing in gap — width in front of faceplate	$3\frac{3}{8}$″	85 mm.
Maximum cross slide feed	7″	180 mm.
Maximum top slide feed	$2\frac{7}{8}$″	75 mm.
Maximum movement of tailstock spindle	4″	100 mm.
Maximum set over of tailstock	$\frac{3}{8}$″	9·5 mm.
Centre to tool base	$\frac{15}{16}$″	23·8 mm.
Maximum tool section	$1\frac{1}{8}$″ × $\frac{5}{8}$″	28·5 × 15·9 mm.
Spindle speeds — number	8 or 16	
Range in r.p.m. with 2 h.p. single speed motor	45 to 1,000	
Range in r.p.m. with 3/$1\frac{1}{2}$ h.p. two speed motor	34 to 1,500 45 to 2,000	
Spindle bored to pass — diameter	$1\frac{3}{8}$″	35 mm.
Size of morse taper centres	No. 3	
Leadscrew — diameter	$1\frac{1}{8}$″	28·6 mm.
Leadscrew — T.P.I.	4	6 mm. Pitch
Range of threads (T.P.I.) — Norton gearbox, 4 t.p.i. leadscrew	4 to 60	
Range of metric pitches — Norton gearbox, 4 t.p.i. leadscrew		·5 to 7 mm. Pitch
Range of metric pitches — Metric gearbox, 6 mm. P. leadscrew		·2 to 7 mm. Pitch
Range of threads (T.P.I.) — Metric gearbox, 6 mm. P. leadscrew	4 to 60	
Range of sliding feeds — Norton gearbox, 4 t.p.i. leadscrew	·0021″ to ·032″	
Range of surfacing feeds — Norton gearbox, 4 t.p.i. leadscrew	·0012″ to ·018″	
Range of sliding feeds — Metric gearbox, 6 mm. P. leadscrew		·027 to 1·002 mm.
Range of sliding feeds — Metric gearbox, 6 mm. P. leadscrew		·012 to ·469 mm.
Range of threads (T.P.I.) — 3 speed gearbox, 4 T.P.I. leadscrew	$2\frac{1}{2}$ to 80	
Range of metric pitches — 3 speed gearbox, 4 T.P.I. leadscrew		1 to 9 mm. Pitch
Range of metric pitches — 3 speed gearbox, 6 mm. P. leadscrew		·5 to 9 mm. Pitch
Range of threads (T.P.I.) — 3 speed gearbox, 6 mm. P. leadscrew	4 to 24	
Range of feeds, (sliding) — 3 speed gearbox, 4 T.P.I. leadscrew	·002″ to ·050″	
Range of feeds, (surfacing) — 3 speed gearbox, 4 T.P.I. leadscrew	·001″ to ·030″	
Range of feeds, (sliding) — 3 speed gearbox, 6 mm. P. leadscrew		·066 to 1·098 mm.
Range of feeds, (surfacing) — 3 speed gearbox, 6 mm. P. leadscrew		·008 to ·160 mm.

INTRODUCTION

The main purpose of this booklet is to provide users with a full list of parts, should replacements become necessary. When ordering spares please quote the part number, description and the LATHE NUMBER, which will be found stamped at rear end of bed.

Attention has been drawn to a few points which may be of use to the purchaser of a "HARRISON" lathe, the observance of which will ensure satisfactory service.

New developments and modifications resulting in improved performance may be incorporated from time to time on them and the right is reserved to modify the specification as may be required.

INSTALLATION

Slinging: Holes are provided in the base under the headstock and tailstock through which a bar may be passed for slinging purposes.

Care should be taken to avoid the lifting ropes bearing on the leadscrew or feed rod.

Cleaning: All bright surfaces are covered with an anti-corrosive compound before despatch from the works. This should be removed with petrol or paraffin before putting the machine into operation.

Levelling: Because of the rigid integrated construction of the bed and cabinet base the machine is inherently accurate and capable of performance within the specification when it leaves the works.

The lathe should not be bolted down but should be lowered on to locating pins secured to a rigid floor and the jacking screws adjusted to eliminate rock. By bolting down, distortion could occur, introducing twist in the bed and the resultant damage may not be corrected by releasing the nuts on the bolts.

It is advisable to support the jacking screws on steel plates. The screws should be adjusted to enable the headstock end of the lathe to be slightly higher than the tailstock end so that the front of the machine is raised relative to the rear. This facilitates return of the coolant to the sump.

Before despatch the machine has been carefully tested for smooth running and accuracy. (See Test Chart.)

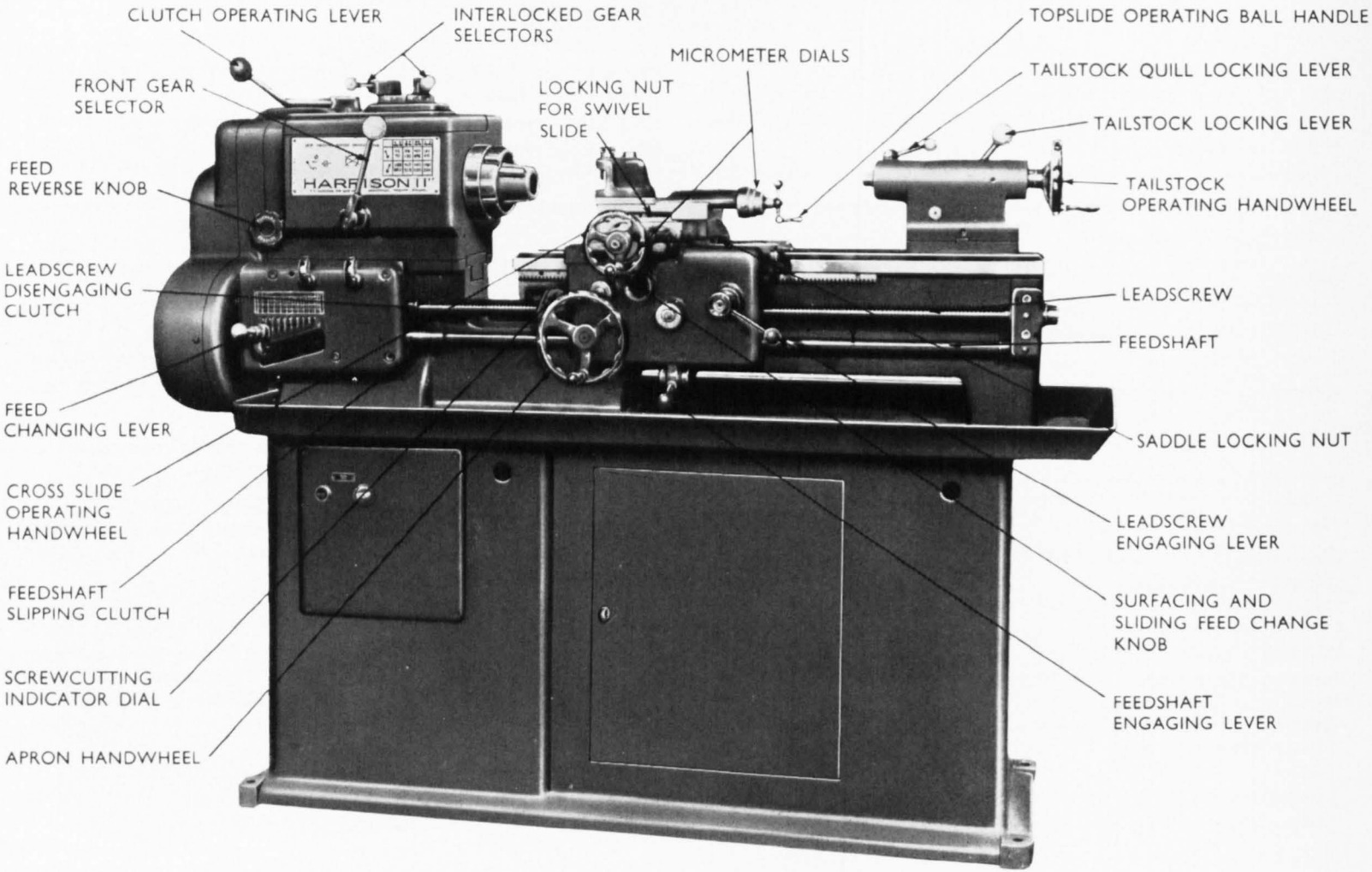
Any checks for accuracy MUST be made with the machine on a rigid floor. Ensure that the test mandrels are true, clean and free from burrs on the taper seating. Clean and inspect the internal taper of the spindle before inserting the mandrel. DETAILS OF ANY DISCREPANCY BETWEEN THE TEST CHART AND YOUR OWN TESTS SHOULD BE REPORTED TO THE MANUFACTURERS BEFORE ANY ADJUSTMENT IS MADE.

Electrical connection: The supply wires should be connected to the isolator switch at the end of the cabinet in the usual manner.

Initial operation: It is important to make sure that the feed or screwcutting levers are in the disengaged position before operating the Lathe otherwise damage can be caused by the saddle or tools running into the headstock or tailstock.

As the headstock is the most important unit of the Lathe, only the best materials and workmanship are incorporated in this assembly. All the gear teeth are induction hardened to 450/500 Brinell and honed to a smooth and accurate form. The hardening may result in a sound of higher pitch than is evident on a Lathe which does not have hardened gears.

To ensure satisfactory operation of the bearings it is essential to run in the machine at lower speeds only during the first 40/50 hours of operation. After this initial run in period we also recommend that a further gradual build-up to the top speed operation is followed.



CONTROLS ON MODEL L5A LATHE

CONTROLS

All control levers are shown on the illustration on the opposite page.

(*a*) **Electrical Controls.** A single panel, on the front of the lathe, contains all the electrical controls within easy reach of the operator. A push-button operated starter with overload and no-volt protection is standard equipment on all machines; other controls available being two speed, reversing and coolant pump rotary type switches.

(*b*) **Headstock.** Speed changes should only be made after disengagement of the clutch. The clutch lever is at the top of the headstock, engagement is by moving to the right, disengagement by moving to left.

A two-position front gear lever selects the high speed range when in the right-hand position and the low speed range in the left-hand position and this, used in conjunction with the two position twin selectors at the top of the headstock, gives a total of eight spindle speeds. Freely sliding gears combined with a direct reading speed chart ensures effortless and instantaneous speed change.

Forward or reverse rotation of the feed gear train is obtained by rotating the knob at the front of the headstock.

(*c*) **Norton Feed Gearbox.** Thirty-six changes of threads and feeds are obtained by manipulation of the tumbler lever in conjunction with the two adjacent compound gear levers. The lever positions are determined by reference to the direct reading screwcutting and feed chart. For changewheel combinations see charts on pages 12 and 13. When not being used it is recommended that the leadscrew be disengaged by operation of the dog clutch.

(*d*) **Apron.** Instantaneous engagement and disengagement to both feeds is obtained by the trip lever of the drop out worm box situated at the base of the apron. The feed selector knob which is directly below the cross slide handwheel should be pushed in for sliding feeds and pulled out for surfacing feeds.

Engagement of the leadscrew for screwcutting is by means of the lever at the right of the apron which is pulled up for engagement and pushed down for disengagement. Simultaneous engagement of leadscrew and feedshaft is prevented by interlocking control.

The carriage may be locked to the bed by means of the hexagon screw on the right-hand side of the saddle.

Exact repeat of leadscrew engagement is obtained with the screwcutting indicator.

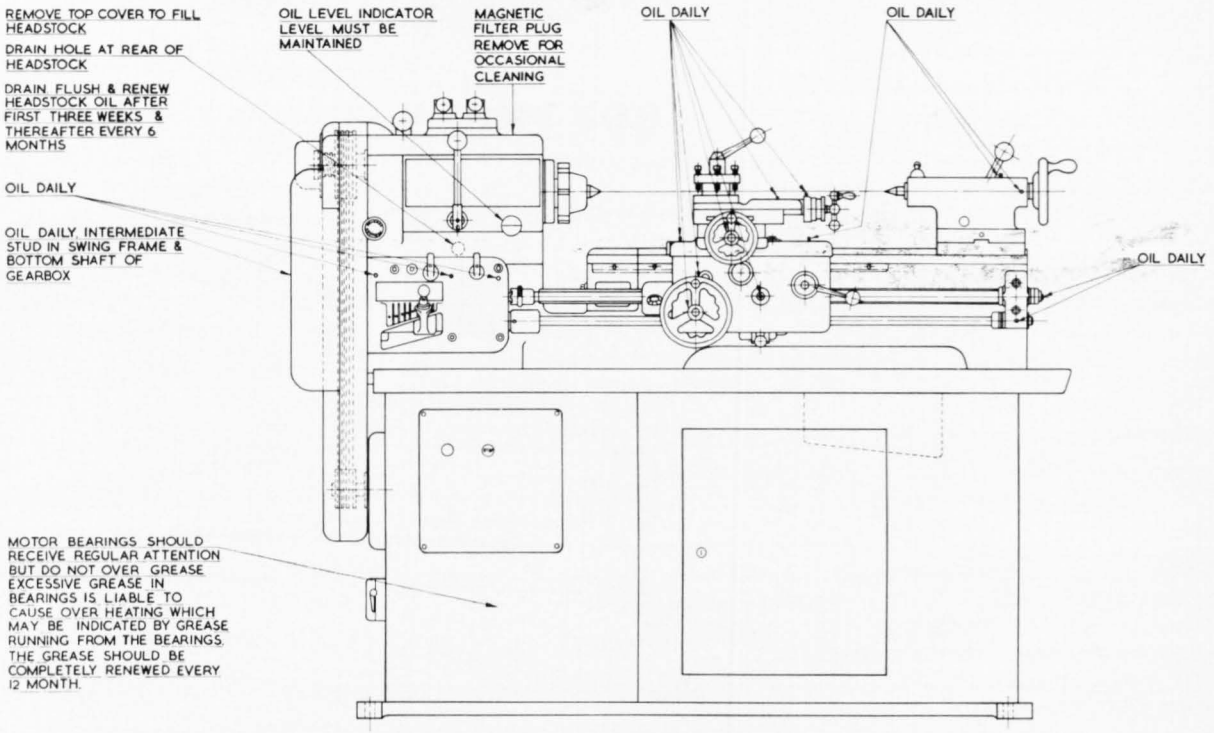
To cut even threads per inch engage at any graduation.
To cut odd threads per inch engage at any numbered graduation.
To cut half threads per inch engage at graduations 1 or 3.
To cut quarter threads per inch engage at graduation 1.

On metric models:—
To cut ·5, ·75, 1, 1·5, 2, 3 and 6 engage at any graduation.
To cut 1·25, 2·5, 5 and 10 engage at any numbered graduation.
To cut 4 engage at graduations 60 or 120.

The pivoting screwcutting indicator should be disengaged when not in use.

(*e*) **Slides.** Cross slide and tool slide are fitted with friction grip micrometer dials graduated to read ·001″ or alternatively 0·02 mm. The tool slide assembly is arranged to rotate through 360 degrees on the graduated cross slide and locking is by means of the two nuts on the swivel slide.

(*f*) **Tailstock.** Clamping to the bed is effected by the lever at the rear and spindle quill locking is by means of the pad bolt on top of the tailstock.



LUBRICATION

Complete lubrication is essential before running a new lathe and light running for a short period is recommended.

Daily lubrication will reduce wear and ensure trouble free running. All oil nipples are easily visible and an oil gun is provided.

When lubricating the tailstock it is essential to lubricate both spindle and screw by the following procedure:-

1. Wind the spindle to its extreme backward position and lubricate through the nipple on top of the tailstock.

2. Wind the spindle forward approx. 3" and lubricate the screw through the same nipple.

The headstock level should be kept within the limits shown on the oil indicator at the front of the headstock. Incorporated in the oil indicator are screwed filler and drain plugs.

The external reverse gears on the headstock should be kept clean and occasionally smeared with grease based with Molybdenum Disulphide such as (Rocol) Molygear.

RECOMMENDED LUBRICANTS

	MOBIL	SHELL	ESSO	POWER	REGENT	CASTROL	AMOCO	GULF	SUN OIL CO.
Headstock, Slideways and nipples ...	D.T.E. Heavy Medium	Tellus 33	Nuto H 44	B.P. Energol HP20	Rando H.D.C.	Hyspin AWS 68	Indoil 31	Service 61	Sunvis 831
Motor, grease cups ...	Mobilplex 48	Alvania Grease 3	Beacon Grease 3	B.P. Energrease LS 3	Regal Starfak Premium 3	Spheerol AP 3	Amolith Grease 3	Gulfcrown Grease 3	Sun Prestige 43

FITTING AND USE OF ATTACHMENTS

Many operations other than turning are possible on a lathe fitted with a few attachments and these enable further operations to be carried out without recourse to special machines. The following attachments are available for "KERRY" Lathes.

Collet Attachments. This type of chuck provides a most accurate means of gripping work, the accuracy being 0·0005 in. at the collet nose, and 0·003 in. at a distance of 3 in. out.

Use of attachments is not restricted to cylindrical work and collets for square or hexagonal bar can be provided.

(i) **Draw Tube Type Collet Attachment.** To fit the attachment, remove chuck or faceplate, centre and sleeve from spindle nose. Pass the draw tube through the spindle from nose, then assemble handwheel and clamping nut on to tube. Mount spindle nose cover on to taper and secure with draw-nut which is integral with spindle. Assemble the closer bush into mouth of spindle, insert required size of collet and screw on to draw tube. The standard range of collets is from $\frac{1}{16}$ in. to 1 in. maximum in increments of $\frac{1}{16}$ in., but any size within this range (including metric) can be provided.

(ii) **Multisize Collet Attachment.** The complete assembly is mounted on the spindle nose. Collets are inserted after removing the closer bush with the wrench provided. The capacity of the attachment is $\frac{1}{8}$ in. to $1\frac{1}{2}$ in. and is covered by 11 collets.

Taper Turning Attachment. Whilst it is preferred that this attachment be fitted at the works, little difficulty should be experienced by the engineer wishing to make this addition to the lathe.

Bolt holes are drilled in the rear of the saddle on all lathes to accept the support bracket of the attachment and an assembly instruction drawing is supplied with each unit. Taper turning of lengths up to 11 in. with included angles up to 20 degrees can be carried out, graduated scales being provided, reading degrees at the tailstock end and inches taper per foot at the headstock end.

Instructions for setting up prior to taper turning are as follows:—

Release the two nuts clamping the swivel bar, set to the required angle by means of the adjusting screw at the rear and reclamp.

Release the two socket head cap screws at the left-hand side of the attachment – these must remain released during taper turning.

Taper turning at any point along the bed can be achieved by setting the support bracket at the rear of bed to the desired position.

Change over to normal turning is as follows:—

Set swivel bar to zero graduation.

Withdraw support bracket to tailstock end of bed.

Lock the two socket head cap screws.

Milling Attachment. This attachment is mounted on to the top slide, replacing the toolpost. The tee slotted, vee grooved slide has vertical screw adjustment and is arranged to swivel against a scale graduated 45 degrees each side of the vertical centre line. An arbor for mounting between centres and driven by the lathe driver plate is available to take 1 in. bore cutters. Machining by this means is, however, restricted to thin work and so, wherever possible, face or end milling is recommended. Face and end mills together with Woodruff key cutters can be provided having No. 3 morse taper shanks for direct fitting in the spindle nose.

Milling and Gearcutting Attachment. As in the previous case, this attachment is mounted on the top slide in place of the toolpost. On the vertical slide assembly, of similar construction to the milling attachment, is fitted a support for the work arbor together with indexing mechanism. Cutter arbor and cutter are mounted between the lathe centres, the drive being by driver plate and pin. It is important that, when setting up for gear cutting, the work arbor be exactly at right angles to the cutter arbor and the cutter directly under the centre line of the work arbor. Gears up to 7 in. diameter can be cut and cutters covering a wide range of gear pitches are available.

Dividing Attachment. Accurate indexing of the lathe spindle is achieved by use of this attachment. Work mounted in the chuck, on faceplate or between centres can be indexed for operations such as graduating, slotting, key seating, etc. The attachment fits on the top changewheel shaft after removal of the gear, the hinged guard remaining open whilst in use. A very wide range of divisions is possible with the standard index plate, but special plates can be provided when necessary.

Boring Table. This attachment fits directly on to the saddle. A boring bar with six cutters for use between centres can be supplied. To fit the table, remove the complete cross slide by turning the handwheel until the slide becomes free and can be taken from the rear of the saddle. Replace by the boring table, feeding on to the screw which is operated in the reverse direction. Place the boring bar between the lathe centres and drive by means of the driver plate.

Fourway Toolpost. Is of the ball indexing type. This unit replaces the standard type toolpost.

American Toolpost. Of the recognised American pattern with swivelling base plate and single clamp screw.

Electric Pump Unit. This attachment comprises a flanged electric pump mounted on a storage tank, the whole being secured to the rear of the cabinet base. It is recommended for high speed lathes and for work requiring continuous, copious supplies of coolant.

Feed Stops.

(i) **Micrometer Carriage Stop.** Clamps to the front vee bed way and is used for accurate machining of shouldered work. The screwed spindle is fitted with a micrometer dial having 0·001″ graduations, or alternatively 0·02 mm.

(ii) **Four Position Carriage Stop.** Similar to the above, this unit clamps to the front vee bed way and is used for multi-shouldered work. The indexing body contains four adjustable screws each of which can be used in turn to control various shoulder lengths.

(iii) **Cross Slide Stop.** Is located on the cross slide ways and is used on facing operations.

Bed Turret (Model L5A only). This attachment is clamped to the bed ways replacing the tailstock. It comprises a lever operated slide of 4 in. stroke length with a six station automatically indexing turret, each station having an adjustable stop screw. Supplied with lathe, the turret head is bored suitable for 1 in. diameter tool shanks but otherwise is left solid for boring *in situ* to ensure perfect alignment with the headstock centre.

Cut-off Slide. Used for parting off and facing operations. This quick acting lever operated slide, with front and rear toolposts, is clamped to the bed ways immediately in front of the chuck.

Changewheels for Screwcutting

Metric Threads (Norton Feed Gearbox with 4 TPI Leadscrew). A thread pitch range of 0·5 to 7 mm. is available. Additional wheels required are 40, 60, 63 and 127T. The 60T gear is not required with a machine having 750 r.p.m. top speed, this is supplied in the standard set. Combinations are given on chart 63 (*page* 12).

Metric Threads (Norton Feed Gearbox with 6 mm. pitch Leadscrew). With this combination a metric pitch range of 11 pitches, 0·5 to 6 mm. can be achieved. Change wheels required are 1 – 50T, 1 – 80T and 1 – 85T. A range of 36, English and American threads from 4 to 60 can be obtained by using the following extra change wheels, 1 – 63T and 1 – 120T. (*see page* 13).

Metric Threads (Metric Norton Feed Gearbox with 6 mm. pitch Leadscrew). The thread pitch range available with this arrangement is 0·5 to 7 mm. (coarse) and 0·2 to 0·9 mm. (fine). Change wheels required are 1 – 25T, 1 – 50T, 1 – 60T, 2 – 80T, 1 – 100T and 1 – 120T. Extra gears required for converting to English and American threads are 1 – 40T and 1 – 63T. These gears, used in conjunction with some of the metric gears, will give a range of 36 threads, 4 to 60 TPI. (*see page* 13).

American Pipe Threads (Norton Feed Gearbox). The complete range of pipe threads is directly available through the gearbox with the exception of 11½ and 27 TPI: the additional changewheels required for these together with their combinations are given on page 11.

Metric Threads (Three Speed Gearbox with 4 TPI Leadscrew). A thread pitch range of 1 to 9 mm. are obtained with additional changewheels, 1 – 30T, 1 – 72T and 1 – 127T. Combinations are given on chart No. 113 on page 12.

Metric Threads (Three Speed Gearbox with 6 mm. pitch Leadscrew). The range of metric threads is 0·5 to 9 mm. pitch (total 20). Changewheels required are 1 – 20T, 1 – 40T, 1 – 45T, 2 – 50T, 1 – 55T, 1 – 60T, 1 – 70T, 1 – 80T, 1 – 100T and 1 – 120T.

A range of 4 to 24 TPI (total 17) can be obtained by using the following extra gears in conjunction with some of the gears supplied for cutting metric pitches. 1 – 63T, 1 – 66T, 1 – 77T, 1 – 81T, 1 – 84T, 1 – 90T, 1 – 105T, 1 – 126 and 1 – 135T. (*see page* 13).

Special Threads. Changewheels can be provided for comprehensive ranges of B.A., module, diametral, fractional and many other special thread pitches.

Note.—The indicator dial cannot be used for metric, B.A. and other special threads when a 4 T.P.I. leadscrew is fitted. It can be used for metric threads (divisible into 120) when a metric leadscrew is fitted but not for special threads, including English and American. For all special threads it is necessary to maintain engagement of the leadscrew and return the carriage by using the electrical reverse, enabling repeat cuts to be taken.

Two Speed Equipment. Spindle speed ranges can be doubled by fitting a two speed motor and selector switch. The standard is 31 to 1440 r.p.m., but 45 to 2,000 can be provided.

Additional Equipment. A wide selection of equipment available includes chucks of all sizes within the capacity of the lathe, tailstock drill chuck, rotating centre, half centre, pipe centre, turning tools and tool holders, etc.

FITTING AND USE OF ATTACHMENTS—(contd.)

11″ SWING (MODEL L5A) LATHE (Norton Gearbox)

RANGE	T.P.I.	TOP SHAFT	INTER-MEDIATE SHAFT	BOTTOM SHAFT	G'BOX LEVER POSITION	
Standard	4 to 60	50	60	100	AS G'BOX CHART	* †
Fine	8 to 120	50	100–50	100	4 to 60	For machines with 750 r.p.m. top speed
Coarse	2 to 30	50	100	50	4 to 60	
Standard	4 to $7\frac{1}{2}$	50	80	100	4 to $7\frac{1}{2}$	For machines with 1000 r.p.m. top speed and over
	8 to 120	25	80	100	8 to 120	
Special	$11\frac{1}{2}$	50	60	115	10	
Threads	27	40	100	60	36	

* G'box T.P.I. Position = $\frac{\text{T.P.I. Required}}{2}$

† G'box T.P.I. Position = T.P.I. Required × 4

COMPLETE RANGE OF T.P.I. (Norton Gearbox)

Coarse	2	$2\frac{1}{4}$	$2\frac{3}{8}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3	$3\frac{1}{4}$	$3\frac{1}{2}$	$3\frac{3}{4}$
Standard	4	$4\frac{1}{2}$	$4\frac{3}{4}$	5	$5\frac{1}{2}$	6	$6\frac{1}{2}$	7	$7\frac{1}{2}$
	8	9	$9\frac{1}{2}$	10	11	12	13	14	15
	16	18	19	20	22	24	26	28	30
	32	36	38	40	44	48	52	56	60
Fine	64	72	76	80	88	96	104	112	120
Special	$11\frac{1}{2}$	27							

METRIC SCREWCUTTING CHART FOR THREE-SPEED GEARBOX

METRIC PITCH MM.	TOP SHAFT	INTER-MEDIATE SHAFT	BOTTOM SHAFT	GEARBOX LEVER
1	40	60	127	A
1·25	50	60	127	A
1·5	60	60	127	A
1·75	70	60	127	A
2	40	60	127	C
2·25	60	40–60	127	A
2·5	50	60	127	C
2·75	55	60	127	C
3	60	60	127	C
3·5	70	60	127	C
4	80	60	127	C
4·5	60	40–60	127	C
5	80	40–50	127	C
5·5	80	40–55	127	C
6	80	40–60	127	C
7	80	40–70	127	C
8	80	30–60	127	C
9	75	30–72	127	C

No. 113

METRIC SCREWCUTTING CHART FOR "NORTON" TYPE GEARBOX

METRIC PITCH MM.	TOP SHAFT	INTER-MEDIATE SHAFT	BOTTOM SHAFT	T.P.I. POSITION
·5	50	40–60	127	60
·75	50	40–60	127	40
1	50	40–60	127	30
1·25	50	40–60	127	24
1·5	50	40–60	127	20
1·75	50	40–63	127	18
2	50	40–60	127	15
2·5	50	40–60	127	12
3	50	40–60	127	10
3·5	50	40–63	127	9
4	50	40–60	127	$7\frac{1}{2}$
4·5	50	40–63	127	7
5	50	40–60	127	6
6	50	40–60	127	5
7	50	40–63	127	$4\frac{1}{2}$

No. 63

For machines with 750 r.p.m top speed. No. 334 for machines with 1000 r.p.m. top speed and over. Double T.P.I. position i.e. 60 will become 120.

WARNING: When cutting threads coarser than $\frac{1}{4}$″ pitch it is advisable to engage the half nuts with the spindle stationary, then engage the clutch.

The use of the lowest spindle speed is essential.

The maximum pitch that can be cut on a centre lathe is determined by the diameter and depth of cut required. The recommended maximum helix for roughing is 8° and a light cut up to 10°—12°.

The cutting of a coarse thread should only be carried out by a skilled operator who will appreciate the limitations imposed by the conditions which will vary according to the type of material, thread and depth of cut, etc.

FITTING AND USE OF ATTACHMENTS — (contd.)

Norton Gearbox, Metric Leadscrew

RANGE	Pitch or T.P.I.	Top Shaft	Inter-mediate Shaft	Bottom Shaft	G'box Lever Position
Metric	0·5 to 6 mm. Pitch	50	85	80	As G'box Chart
Threads Per Inch	4 to 60 T.P.I.	50	63–80	120	4 to 60

Full range of metric pitches

6	5	4	3
2·5	2	1·5	1·25
1	·75	·5	

Full range of threads per inch

4	4½	4¾	5	5½	6	6½	7	7½
8	9	9½	10	11	12	13	14	15
16	18	19	20	22	24	26	28	30
32	36	38	40	44	48	52	56	60

Metric Norton Gearbox, Metric Leadscrew

RANGE	Pitch or T.P.I.	Top Shaft	Inter-mediate Shaft	Bottom Shaft	G'box Lever Position
Metric Coarse	4 to 7 mm. Pitch	50	80	80	As G'box Chart
Metric Coarse	0·5 to 3·5 mm. Pitch	25	100	80	As G'box Chart
Metric Fine	0·2 to 0·9 mm. Pitch	25	100–60	120	As G'box Chart
T.P.I.	4 to 7½ T.P.I.	50	63–80	120	4 to 7½
T.P.I.	8 to 60 T.P.I.	50	63–40	120	8 to 60

Full range of metric pitches

7	6	5	4·5	4	3·5	3	2·5	2·25	2
1·75	1·5	1·25	1·125	1	0·9	·875	0·8	0·75	0·7
·625	0·6	·5625	0·5	0·45	0·4	0·35	0·3	0·25	0·2

Full range of Threads Per Inch, as for standard Norton Gearbox

Three Speed Gearbox, Metric Leadscrew.

	METRIC THREADS				
	PITCH	TOP SHAFT	INTER-MEDIATE SHAFT	BOTTOM SHAFT	GEARBOX LEVER POSITION
	·5	20	70	120	A
	·75	20	100	80	A
	1	40	60	120	A
	1·25	50	60	120	A
	1·5	20	100	80	C
	1·75	50	50–70	120	A
	2	40	60	120	C
	2·25	45	100	60	A
	2·5	50	60	120	C
	2·75	55	100	60	A
	3	50	100	50	A
	3·5	50	50–70	120	C
	4	40	100	60	C
	4·5	45	100	60	C
	5	50	100	60	C
	5·5	55	100	60	C
	6	50	100	50	C
*	7	70	100	60	C
*	8	60	100	45	C
*	9	60	80–100	50	C

	THREADS PER INCH				
	T.P.I.	TOP SHAFT	INTER-MEDIATE SHAFT	BOTTOM SHAFT	GEARBOX LEVER POSITION
*	4	60	90–100	63	C
*	4½	60	81–80	63	C
*	5	60	90–80	63	C
*	5½	70	77–80	63	B
*	6	60	90–100	63	B
*	7	60	84–80	63	B
*	8	60	90–100	63	A
*	9	60	81–80	63	A
*	10	60	90–80	63	A
*	11	40	90–100	77	B
	12	50	90–80	63	A
*	14	50	105–80	63	A
	16	80	63–50	120	A
	18	40	81–80	84	A
	20	80	63–40	120	A
*	22	60	66–40	126	B
	24	60	63–50	135	A

* Remove tail end sleeve from main spindle

MAINTENANCE

Periodic inspection with adjustment where necessary, as given below, will ensure that this lathe retains its original high standard of accuracy and performance.

Drive Belts. The drive motor is mounted on slide rails and adjustment to the vee belt tension is by screws beneath the motor feet. Procedure for replacing vee belts is as follows:—

Remove outer section on the drive guard (secured to inner section by three socket head screws).
Release tension in belts by adjusting screws beneath motor feet.
Replace belts and carefully retension.
Check for correct alignment of motor pulley by laying a straight edge across face of pulley. This should line up with face of head pulley.
It is important to ensure that the belts do not slip as this would only increase both pulley and belt wear.

Clutch. If slip occurs then adjustment is as follows:—Fig. 1.

Remove the small cover at the top of the outer drive guard.
Release the screw and die in the collar of the adjusting nut. Set the clutch in the OFF position and tighten nut 'A' (anti-clockwise) until solid, i.e. until disc springs 'B' are fully compressed, then unscrew $\frac{1}{3}$ of a turn. Re-tighten the screw and die and replace small cover.
Constant operation of the clutch eventually results in wear on the driving faces (usually signified by clutch refusing to drive), and the following adjustment will be necessary:—
Stop motor, leaving clutch in ON position.
Remove outer, and changewheel guard complete.
Release screw and die in adjusting nut 'A' and remove nut, (turn clockwise), disc spring 'B' and spring 'C'.
Withdraw clutch plate 'D', until it is clear of splines, leaving nut 'E' in engagement with splines.
Turn clutch plate 'D' clockwise 2 splines, i.e. 2/7 of a turn, and push back in position. Replace spring 'C' disc springs 'B' (in same order as shown in Fig. 1), and nut 'A'.
Load as explained above for clutch slip.
When the clutch lever is in the START position a radial clearance of approximately 1″ should be evident at the end of the lever.

Headstock Spindle Bearings. Adjustment for wear on the Timken taper roller bearings at the front of the main spindle is as follows:—

Remove headstock cover.
Release locknut (by turning anti-clockwise, i.e. right-hand thread) and rotate adjusting nut sufficiently to obviate play, then re-tighten locknut, It must be emphasized that this operation requires the utmost care as over-tightening can seriously impair the life of the bearings.
Sealing compound should be used when refitting the headstock cover.
The magnetic plug (chromed head) which is fitted in the headstock cover immediately over the front main spindle bearings must be occasionally removed and cleaned of any particles of steel which may have collected there. Always replace the magnetic plug after cleaning.

Saddle Adjustment. To adjust the rear strip release the four nuts on the underside of the strip, adjust the headless set screws by turning clockwise and re-lock the nuts. To adjust the front strip release the cap head screw which secures the adjusting screw and rotate the latter anti-clockwise, re-clamp the cap head screw. Care should be taken to avoid over adjustment.

Cross Slide. Take-up of wear on the taper gib strip is by releasing the locknut, adjusting the screw and re-locking the nut.
The gib strip is of a length to allow adjustment over a range of wear but after a number of adjustments it may be necessary to shorten the screw.

Top Slide. Adjustment to the strip is by releasing the locknuts, tightening the screws and re-locking the nuts.

Electrical Controls. All electrical control equipment is mounted on the panel at the front of the cabinet and if removal is required it is **important** to ensure that the isolating switch, at the end of the machine, is in the OFF position.

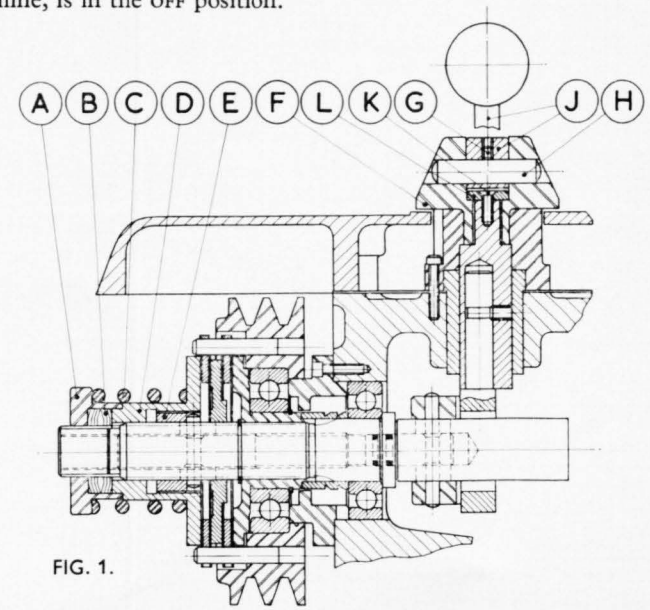


FIG. 1.

RECOMMENDED LATHE PRACTICE

When a component is required to be machined on a lathe, the following principal points must be settled: (1) the manner in which the work should be mounted; (2) the tool set-up to be employed; and (3) the speeds and feeds to be employed.

Turning between Centres. This method of turning necessitates centre holes being drilled in both ends of the work. The operation should be performed by a special drill giving a countersink of 60 deg. angle to suit the lathe centres, the centre drill being held in a drill chuck mounted in the tailstock spindle with the work held in a chuck.

It is usual practice to carry out a facing operation on the end of the work piece before centre-drilling and it is essential that work overhang from chuck jaws, for both facing and drilling operations, should be a minimum, to ensure concentricity. Centre drills are delicate tools and easily broken, largely owing to lack of sensitivity in feeding the drill, and to work speed being too low. To prevent breakage use a high speed of work revolution and a very fine feed.

With the work mounted between centres, and fitted with a driving dog and with the tailstock centre well lubricated, it is important that the work should be free enough to turn by hand but without any end movement. Owing to heat generated by the cutting action, the work expands during machining, and if screwed up tightly before cutting commences, the result is that the centre end may become overheated causing damage to both centre and work.

When using carbide turning tools, the work speed may be so high that damage to a dead centre may take place however much care is used. It is better then, to use a revolving centre which rotates with the work, and is not therefore affected by high work speeds.

Tool Settings. Correct tool setting is important, for accurate grinding of tool angles is of no avail if the tool is improperly set in relation to the work. While normally the tool point should be on the centre line of the work, a setting slightly above centre is permissible, but a setting below centre may cause slender work to deflect and spring on the top of the tool and out of the centres. For all taper turning and screw cutting operations, it is essential that the cutting edge of the tool be mounted exactly on the centre line of the work, otherwise discrepancies in taper and thread form will result. A simple way to obtain correct tool height is by setting to one of the lathe centres.

For parting-off operations, use a tool with a rigid shank and with the overhang from the toolpost kept to a minimum. The cutting edge must be set on the work centre and square to the lathe axis. Do not attempt parting-off unless the work is well supported and ensure that overhang from the chuck is not excessive.

Chuck Work. When a chuck is not in use it should not be left so that cast iron dust or other cuttings may enter the bore or parts of the mechanism. The bore may be protected by plugging with a cloth, nevertheless before mounting the chuck on the lathe spindle, clean the bore of the chuck and the spindle nose, and lubricate with Molybdenum Disulphide, a tube of which is supplied with the machine.

When mounting or removing a chuck, protect the slides of the bed with a piece of wood upon which to rest the chuck before lifting it on to the spindle nose. When tightening chuck jaws, never try to obtain increased gripping power by lengthening the arm of the box key.

For second operation work, or for work which may be difficult to hold

by standard jaws, the use of soft jaws shaped as required will often prove a time saving factor and ensure greater accuracy.

When setting work in an independent four-jaw chuck, make use of the setting rings on the face of the chuck to obtain an approximate location. It is then a simple matter to make the final adjustment for greater accuracy.

Faceplate Work. The remarks in regard to the mounting of chucks apply equally to faceplates and catch plates. Some castings or forgings are so shaped as to be difficult to hold in a chuck, but can be clamped on a faceplate by straps and bolts utilising the holes and slots provided, but do not rely entirely upon these. Whenever possible use stops against the work to take the pressure of the cut.

An angle plate bolted on to the faceplate, on to which the work is mounted, is often useful for boring and facing operations. Always ensure that revolving work is securely fastened and that a balance weight is fitted to counteract the out-of-balance effect of the mounting units and work.

Use of Steadies. Long slender work, if unsupported between centres, will tend to whip or bend under pressure of the cutting action. To prevent this happening, a travelling steady should be employed. When machining black bar, first turn a short length of the bar at the tailstock end to the diameter required, and adjust the steady jaws to touch the work, then lock them in position. The jaws will then support the work at the point of the cut all along the length. Keep jaws well lubricated during the operation.

A stationary steady can be set up at any point along the bed to support a long shaft. If the shaft is of black bar, a ring somewhat wider than the jaws of the rest must be turned as a bearing for the jaws. If the shaft is slender, this can be a delicate operation, so that a sharp pointed tool with a very light cut should be employed.

Another use of a stationary steady is when an operation requires to be performed on the end of a bar. In such instances the distance from the chuck may be too great for machining to take place without additional support, and if drilling is required, the tailstock centre is not available. Thus to support the work by means of a steady, adjust the jaws to touch the work until it is running true, and then lock them. Again, use plenty of oil between the steady jaws and the revolving work.

Drilling and Reaming from the Tailstock. For these operations the work is gripped in a chuck or mounted on a faceplate. It is important that the drill be started true so that a hole concentric with the work diameter is produced, and a common method employed to attain this is by centre drilling before commencing normal drilling.

The limitation of a twist drill as a cutting tool is that it follows its own point which takes the line of least resistance. Incorrect grinding can cause additional inaccuracies by (1) cutting edges being ground to different angles, (2) cutting edges of equal angles but different lengths, (3) cutting edges of unequal angles and lengths causing the points to be off-centre. It is essential then to see that the radial components of the two cutting edges are equal so that they constrain the drill to follow a direct path, but if an accurate bore is required, a drilled hole should be enlarged by a single point tool and final size obtained by reaming.

Straight shank reamers are held on a chuck, while taper shanks may be inserted into the tailstock spindle. The reamer should be fed

carefully through the hole by rotation of the tailstock handwheel, using an ample supply of lubricant when reaming steel.

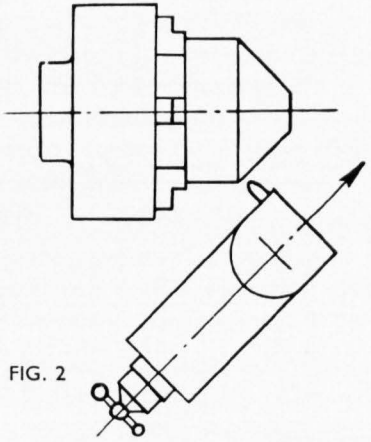


FIG. 2

The recommended cutting speeds for reaming are:

Cast iron	20 ft. per min.	(6 m)
Mild steel	35 „ „	(10·6 m)
Medium carbon steel	30 „ „	(9 m)
Phosphor-bronze	35 „ „	(10·6 m)
Aluminium and duralumin	35 „ „	(10·6 m)

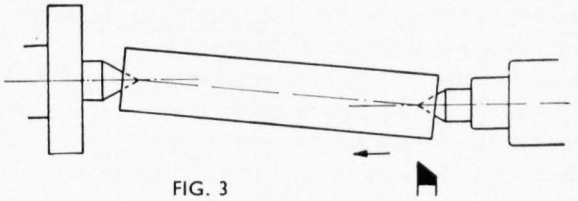


FIG. 3

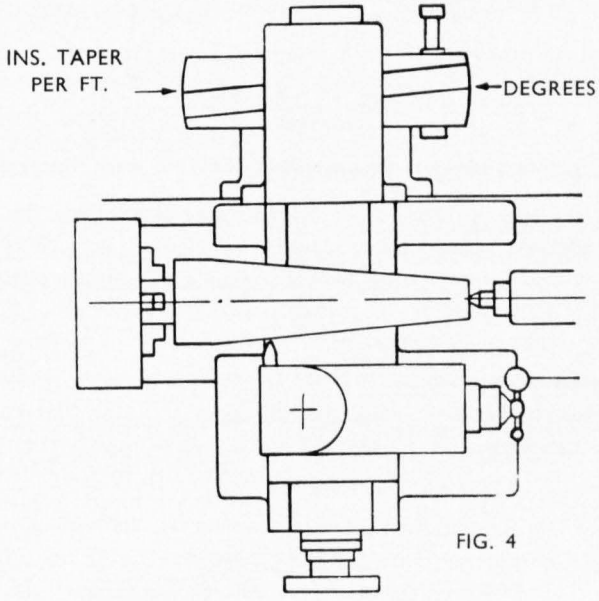


FIG. 4

Methods of Taper Turning and Boring. Three general methods are applicable. (1) As shown in fig. 2, by means of swivelling the compound rest to the angle required for either boring or turning. This method is by hand traverse of the tool, and is limited to the

length of movement of the top slide, but it has the advantage that taper surfaces of any angle can be machined.

(2) The method shown in fig. 3 is by off-setting the tailstock centre. The drawback is that the centre points are not on the axis of the work, so that the centres are subjected to uneven wear and strain. Thus the method is limited to slow tapers on long work.

To find the amount of off-set X, if the taper is T inches per foot on diameter and the length of work is L inches, then $X = \frac{T \times L}{24}$ inches.

or

To find the amount of off-set X, if taper is T mm per metre on diameter and length of work is L mm, then $X = \frac{T \times L \text{ mm}}{2{,}000}$

If the included angle of the taper is θ, $X = L \times \tan \frac{\theta}{2}$ inches. (mm)

(3) If the lathe is fitted with a taper turning attachment, fig. 4, then more accurate tapers, either external or internal, can be produced than by the two preceding methods. By the use of this attachment, the lathe centres are not of course taken out of alignment, so that the bearing surfaces are unaffected.

LATHE TOOLS

In mounting turning tools in the rest, the tool should only extend the minimum amount from the rest to obtain the maximum support

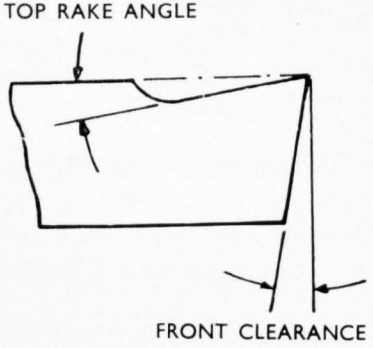


TABLE 1
Cutting Angles for H.S.S. and Cemented Carbide Tools

Materials	H.S.S.		Cemented Carbide	
	Top Rake	Clearance	Top Rake	Clearance
Mild steel	20°	6°	8°	4°–6°
High carbon steel ...	10°	4°	3°–4°	4°–6°
Soft cast iron	10°	8°	4°–8°	4°–6°
Chilled iron	0°	4°	0°	2°–4°
Copper	12°	10°	13°	4°–6°
Brass	0°–6°	10°	3°	4°–6°
Aluminium	30°	10°	16°	6°–8°

TABLE 2
Cutting Speeds in feet per minute (metres per min.)

Material	H.S.S. Tools				Cemented Carbide			
	Roughing		Finishing		Roughing		Finishing	
	ft.	m.	ft.	m.	ft.	m.	ft.	m.
Mild steel	130	40	200	61	200	61	300	91
High carbon steel ...	45	14	60	18	200	61	400	122
Soft cast iron	60	18	75	23	200	61	350	107
Chilled iron	10	3	15	4·5	15	4·5	30	9
Copper	200	61	200	61	400	122	700	213
Brass	250	76	400	122	400	122	700	213
Aluminium	300	91	400	122	500	152	1,000	305

TABLE 3
Feeds in inches per revolution (mm per revolution)

Material	H.S.S. and Cemented Carbide Tools			
	Roughing		Finishing	
	inches	mm	inches	mm
Mild steel	·010	·254	·007	·178
High Carbon Steel ...	·010	·254	·007	·178
Soft cast iron	·013	·330	·008	·203
Chilled iron	·008	·203	·005	·127
Copper	·020	·508	·008	·203
Brass	·020	·508	·008	·203
Aluminium	·013	·330	·007	·178

against the downward pressure of the cut. For clamping the tool, ample pressure is provided with the spanner supplied, and on no account should extra pressure be applied by lengthening the leverage by dubious means such as a piece of piping. Such methods are unnecessary, and cause damage not only to the clamping screws, but the entire compound rest.

Boring tools may be of one piece solid forged, or may comprise cutter inserts fixed in a boring bar. A point of note in regard to the grinding of boring tools is that the conditions governing the top rake and clearance angles are different from those in turning, so that a secondary clearance is required for the front of the tool to clear the enveloping curve of the bore.

Speeds and Feeds. The cutting speed is expressed in surface feet per minute, and is the speed at which the surface of the work passes the tip of the tool. If D is the diameter of the work in inches, N the work speed in r.p.m., and S the cutting speed in feet per minute, then

$$N = \frac{3{\cdot}82 \times S}{D} \text{ or } N = \frac{318 \times S \text{ (Metres/Min)}}{D \text{ mm}}$$

The feed rate is expressed in inches per revolution of the headstock spindle.

The time to complete one cut, in minutes, can be calculated from

$$\frac{\text{Length of cut (in.) or (mm)}}{\text{Spindle speed (r.p.m.)} \times \text{feed (in. per rev.) or (mm per rev.)}}$$

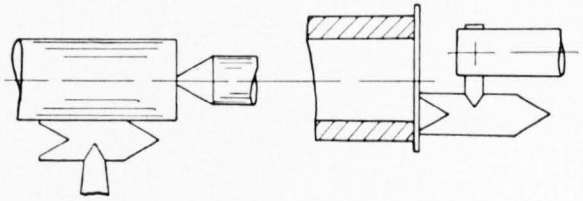


FIG.5

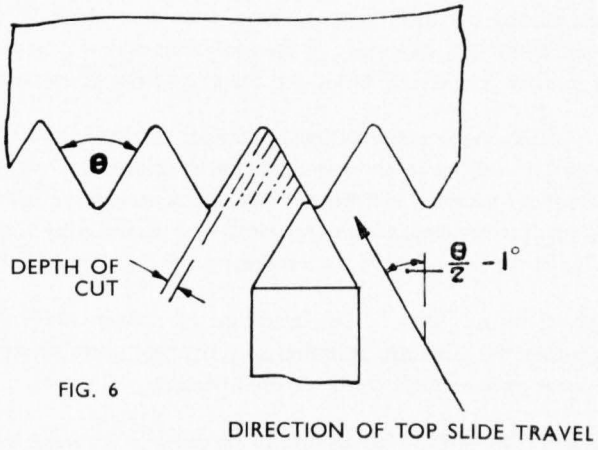


FIG. 6

Tables 1, 2 and 3 give suitable tool angles, cutting speeds, and feed, for a range of the common engineering materials.

Screwcutting.

For cutting vee threads the top of the tool is placed at centre height, having been previously ground to the required shape without any top rake. Note that if the tool is given top rake the plan angle of the tool is not the angle that will be reproduced in the work.

Fig. 5 shows the use of a setting gauge for both external and internal threading, but when cutting vee threads with the tool set in this manner, slow speeds and light feeds are necessary because the cuttings cannot be free flowing without top rake on the tool. Thus a better method for cutting external vee threads is shown in fig. 5 where the compound slide is swung around so that the tool is fed in at an angle of slightly less than half the included angle of the thread (i.e. approximately 26 deg. from normal, i.e. 64 deg. on cross slide graduations

when cutting standard 55 deg. threads) so that metal is mostly removed by the left-hand side of the tool. Side rake can be provided so that heavier cuts can be taken and the chips flow easily away.

In commencing a screwcutting operation, take a light trial cut and check the number of threads per inch by measuring with a rule or screw pitch gauge. Then proceed by taking successive cuts until the full depth is reached. Check for depth and accuracy by means of the nut to fit the screw, or by a thread gauge of the ring type.

Tapered threads may be cut by means of a taper attachment or by off-setting the tailstock. In either case the tool must be set square to the work axis, and not to the tapered portion.

Square Threads. This section of thread is often used for multiple threaded screws, and the terms "pitch" and "lead" should be understood. Pitch is the distance from a point on one screw thread to a corresponding point on the next thread, measured parallel to the axis.

Lead is the distance that a screw thread advances axially in one turn. Thus on a single threaded screw the terms are identical, but a notation such as $\frac{1}{8}$ in. pitch, $\frac{1}{4}$ in. lead, would indicate a two start screw, and to produce this, the gearbox would require to give a saddle movement of $\frac{1}{4}$ in. for every revolution of the spindle, while the tool would be ground to produce $\frac{1}{8}$ in. pitch section of thread. The procedure when cutting a muliple start screw is to set the top slide parallel with lathe axis and cut the first thread in the usual manner at the correct LEAD. Cut subsequent threads by advancing the top slide each time a distance equal to the lead divided by the number of starts. This, of course, applies to all multiple threaded screws regardless of thread section.

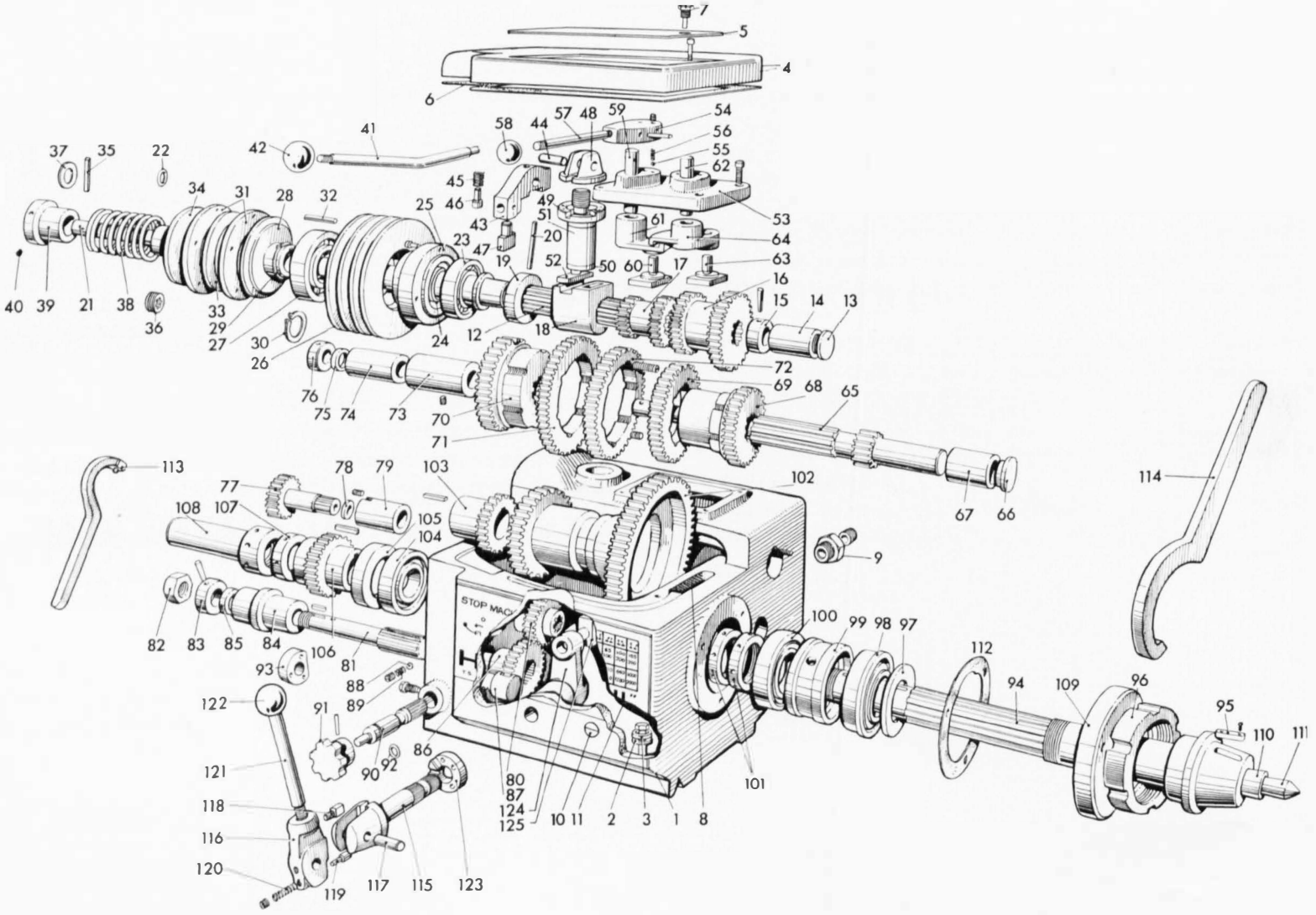
Acme and Worm Threads. The procedure to be adopted for Acme and worm thread cutting is similar to that recommended for vee threads except for the setting angle of the compound slide. In this case the thread included angle is 29 deg. so that a slide setting of approx. 13 deg. from normal (i.e. 77 deg. on cross slide graduations) would be appropriate.

Full depth of an Acme thread is $0{\cdot}5\ P + 0{\cdot}01$ in. and width at bottom is $0{\cdot}3707\ P - 0{\cdot}0052$ in. where P is the thread pitch.

SPARE PARTS LIST

ALL-GEARED HEAD

ALL-GEARED HEAD



ALL-GEARED HEAD *(illustrated opposite)*

Item No.	Part No.	Description	No. Off
			1
1	L5-2-238	Headstock	4
2	L5-2-106	Washer	4
3	OS-10	'O'-Ring	1
4	L5-2-236	Cover	1
5	L5-2-237	Rubber Mat	1
6	L5-2-239	Gasket	1
7	L6-2-104	Magnetic Plug	1
8	L5-2-115	Gauze, Oil Filter	1
9	L5-2-123A	Reducer, Plug	1
10	IC4612	Oil Level Indicator	1
11		Speed Plate (Please state speed range)	1
12	L5-2-172	Drive Shaft	1
13	L5-2-99	Sealing Plug	1
14	L5-212	Bearing	1
15	L5-2-149	Collar	
16	L5-2-219 & 220	Double Gear 35T and 45T	1
17	L5-2-173G	Double Gear 20T and 26T	1
18	L5-2-193	Clutch Operating Block	1
19	L5-2-194	Braking Collar	1
20	$\frac{1}{4}$" GP 2"	Grooved Pin	1
21	L6-2-23B	Clutch Push Rod	1
22	4-009	Nu-Lip Ring	1
23	LJ $1\frac{1}{8}$WSR	Ball Journal	1
24	L5-2-150	Spacer	1
25	L5-2-221	Locating Plate	1
26	L5-2-187A	Head Pulley	1
27	LJ $1\frac{3}{8}$"WSRR	Ball Journal	1
28	L6-2-126	Clutch Plate, Inner	1
29		$1\frac{3}{8}$" External Circlip	1
30		$1\frac{1}{16}$" External Circlip	2
31	DC8	Clutch Disc	6
32	L16-2-182	Pin, Clutch Discs	1
33	L16-2-110	Clutch Plate, Centre	1
34	L6-2-124	Clutch Plate, Outer	1
35	$\frac{1}{4}$" GP $1\frac{1}{4}$"	Grooved Pin	1
36	L6-2-125	Clutch Plate Adjusting Nut	12
37	K6203	Disc Spring	1
38	SG236	Spring	1
39	L6-2-24	Adjusting Nut	1
40	L5-10-143	Slug	1
41	L5-2-171A	Clutch Lever	1
42	BB2	$1\frac{1}{2}$" Dia. Bakelite Ball	1
43	L5-2-170D	Pivot, Clutch Lever	1
44	L5-2-188	Pivot Pin	1
45	SG 231	Spring	

Item No.	Part No.	Description	No. Off
46	L5-2-112	Return Pin	1
47	L5-2-235	Plunger	1
48	L5-2-169A	Fork	1
49	L5-2-168	Locating Plate	1
50	L5-2-167A	Eccentric Stud	1
51	L5-2-6	Bush	1
52	L5-610	Shoe	1
53	L5-2-3	Top Selector Lever Bracket	1
54	L5-2-18	Top Selector Lever Boss	2
55	SB3	$\frac{1}{4}$" dia. Steel Ball	2
56	SG5	Spring	2
57	L5-654	Top Selector Lever	2
58	BB1	1" dia. Bakelite Ball	2
59	L5-2-17	Stud, Left Hand	1
60	L5-220A	Shoe	1
61	L5-206	Left-hand Interlocking Lever	1
62	L5-2-16	Stud, Right Hand	1
63	L5-221	Shoe	1
64	L5-205	Right-hand Interlocking Lever	1
65	L5-2-175G	Intermediate Shaft	1
66	L5-2-95	Sealing Plug	1
67	L5-214	Bearing	1
68	L5-2-177G	46T Gear } Supplied	1
69	L5-2-12G	56T Gear } Integral	1
70	L5-2-176G	56T Gear } Supplied	1
71	L5-2-9G	71T Gear } Integral	1
72	L5-2-10G	65T Gear }	1
73	L5-2-178	Spacing Bush	1
74	L5-215A	Bearing	1
75	M1-062100 $\frac{1}{4}$" SE85	Oil Seal	1
76	L5-615A	Collar	1
77	L5-2-22G	Idler Gear, Outer 32T	1
78	M1-075112 $\frac{1}{4}$" SE85	Oil Seal	1
79	L5-218A	Bush	1
80	L5-2-23G	Idler Gear, Inner 32T	1
81	L5-2-179	Reverse Shaft	1
82	$\frac{7}{8}$" FB	Hexagonal Nut 12 TPI	1
83	L5-626	Collar	1
84	L5-2-116A	Bearing	1
85	M1-087125 $\frac{9}{32}$" SE85	Oil Seal	1
86	L5-2-180G	42T Feed Gear	1
87	L5-629	Feed Gear Selector Rack	1

ALL-GEARED HEAD *(illustrated on page 22)*

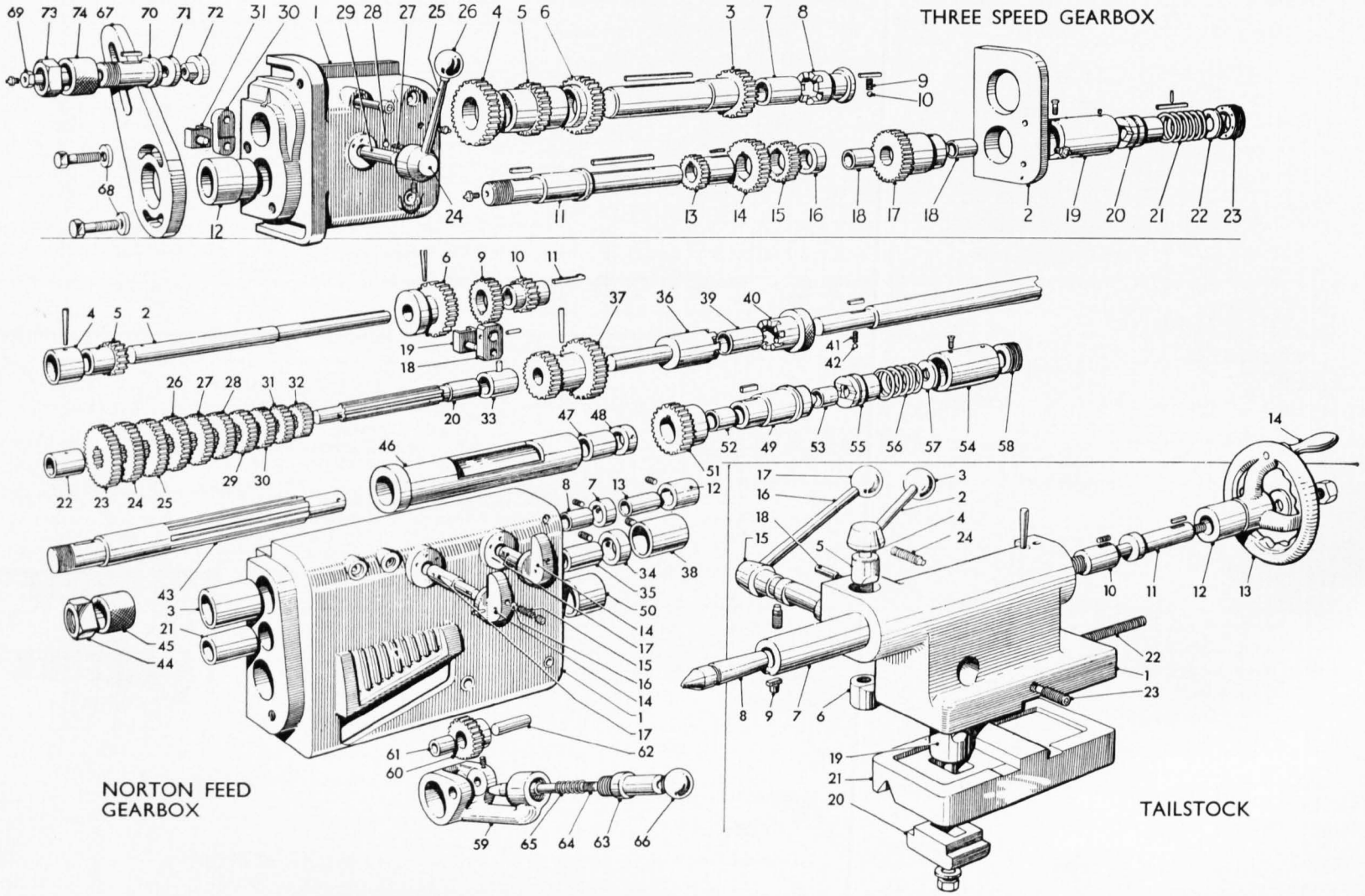
Item No.	Part No.	Description	No. Off
88	SB.3	$\frac{1}{4}$" dia. Steel Ball	1
89	SG.5	Spring	1
90	L5-2-13	Feed Gear Selector	1
91	SP.40	Handwheel	1
92	4-011	"Nu-lip" Ring	1
93	L5-2-232	Bush	1
94	L5-2-190	Main Spindle	1
95	L5-2-77	Key	1
96	L5-2-151	Draw Nut	1
97	L5-2-45	Washer	1
98	387/382B	"Timken" Taper Roller Bearing ...	1
99	L5-2-42	Spacer	1
100	387/382A	"Timken" Taper Roller Bearing ...	1
101	L5-2-83	Adjusting Nut	2
102	L5-2-192G	Main Spindle Gear	1
103	L5-2-37G	42T Spindle Gear, Inner	1
104	XLJ $1\frac{3}{4}$"	Ball Journal	1
105	L5-2-79	Sealing Ring	1
106	L5-2-38G	42T Spindle Gear, Outer	1
107	L5-2-39	Lock Nut	1
108	L5-2-165	Tail End Sleeve	1
109	L5-2-41A	Front Bearing Cover	1
110	L5-2-101	Sleeve for Centre	1
111	L5-585A	Centre	1
112	L5-2-156	Gasket, (Front Bearing Cover)	1
113	WR.20	Hook Spanner	2
114	WR.17	Hook Spanner	1
115	L5-2-108A	Front Selector Lever Shaft	1
116	L5-2-114A	Front Selector Boss	1
117	L5-2-113	Swivel Pin	1
118	L5-2-111B	Plunger	1
119	L5-2-112	Return Pin	1
120	SG.231	Spring	1
121	L5-2-109	Hand Lever	1
122	BB.2	$1\frac{1}{2}$" dia. Bakelite Ball	1
123	L5-2-110A	Locating Plate	1
124	L5-2-44A	Front Selector Lever	1
125	L5-2-43	Shoe	1

Item No.	Part No.	Description	No. Off

SPARE PARTS LIST

GEARBOXES AND TAILSTOCK

GEARBOXES and TAILSTOCK



GEARBOXES and TAILSTOCK *(illustrated opposite)*

Item No.	Part No.	Description	No. Off
		ENGLISH NORTON GEARBOX ASSEMBLY	
1	L5-3-1A	Gearbox	1
2	L5-3-5	Topshaft	1
3	L5-3-40	Bush, Left Hand	1
4	L5-3-7	Sleeve	1
5	L5-3-6	16T Gear	1
6	L5-3-8	32T Gear	1
7	L5-3-59	Sleeve	1
8	L5-3-41	Bush, Centre	1
9	L5-3-10	24T Sliding Gear	1
10	L5-3-9	16T Sliding Gear	1
11	SK.8	Key	1
12	L5-3-60	Sleeve	1
13	L5-3-42	Bush, Right Hand	1
14	L5-3-3	Selector Handle	2
15	SG.142	Spring	2
16	SB.2	$\frac{3}{16}$" dia. Steel Ball	2
17	L5-3-56	Selector Shaft	2
18	L5-3-39A	Selector Lever	2
19	L5-3-38	Selector Shoe	2
20	L5-3-63	Middle Shaft	1
21	L5-3-58	Sleeve	1
22	L5-3-43	Bush, Left Hand	1
23	L5-3-73	32T Gear	1
24	L5-3-72	30T Gear	1
25	L5-3-71	28T Gear	1
26	L5-3-70	26T Gear	1
27	L5-3-69	24T Gear	1
28	L5-3-68	22T Gear	1
29	L5-3-67	20T Gear	1
30	L5-3-66	19T Gear	1
31	L5-3-65	18T Gear	1
32	L5-3-64	16T Gear	1
33	L5-3-76	Spacer	1
34	L5-3-61A	Sleeve	1
35	L5-3-75	Bush, Right Hand	1
36	L5-3-74	Clutch Shaft, Leadscrew	1
37	L5-3-13	24T and 32T Gear	1
38	L5-3-45	Bush, Clutch Shaft	1
39	L5-3-49	Bush, Leadscrew	1
40	L5-3-15A	Clutch	1
41	SG.5	Spring	1
42	SB.3	$\frac{1}{4}$" dia. Steel Ball	1
43	L5-3-77	Bottom Shaft	1
44	$\frac{7}{8}$" FB	Hexagonal Nut	1

Item No.	Part No.	Description	No. Off
		English Norton Gearbox Assembly (contd.)	
45	L5-502	Change Wheel Collar	1
46	L5-3-78A	Sleeve	1
47	L5-3-47	Bush, Right Hand	1
48	L5-3-17	Collar	1
49	L5-3-31	Slipping Clutch Shaft	1
50	L5-3-48	Bush	1
51	L5-3-30	32T Gear	1
52	L5-3-50	Bush, Feedshaft	1
53	L5-3-89	Bush, Feedshaft	1
54	L5-3-35	Sleeve	1
55	L5-3-32	Slipping Clutch	1
56	SG.266	Spring	1
57	L5-3-34	Washer	1
58	L5-3-33	Adjusting Nut	1
59	L5-3-2	Swing Lever	1
60	L5-3-29	22T Gear	1
61	L5-3-55	Bush	1
62	L5-3-28	Pin	1
63	L5-3-36	Plunger Sleeve	1
64	L5-3-37	Plunger	1
65	SG.141	Spring	1
66	BB.1	1" dia. Bakelite Ball (White)	1
67	L5-13-13	Banjo Plate	1
68	L5-13-18	Lock Washer	1
69	L5-196	Changewheel Stud	2
70	L5-505	Socket	1
71	L5-198	Socket Stud Collar	1
72	L5-197	Socket Nut	1
73	$\frac{7}{8}$" FB	Hexagonal Nut	1
74	L5-502	Changewheel Collar	1

GEARBOXES and TAILSTOCK *(illustrated on page 26)*

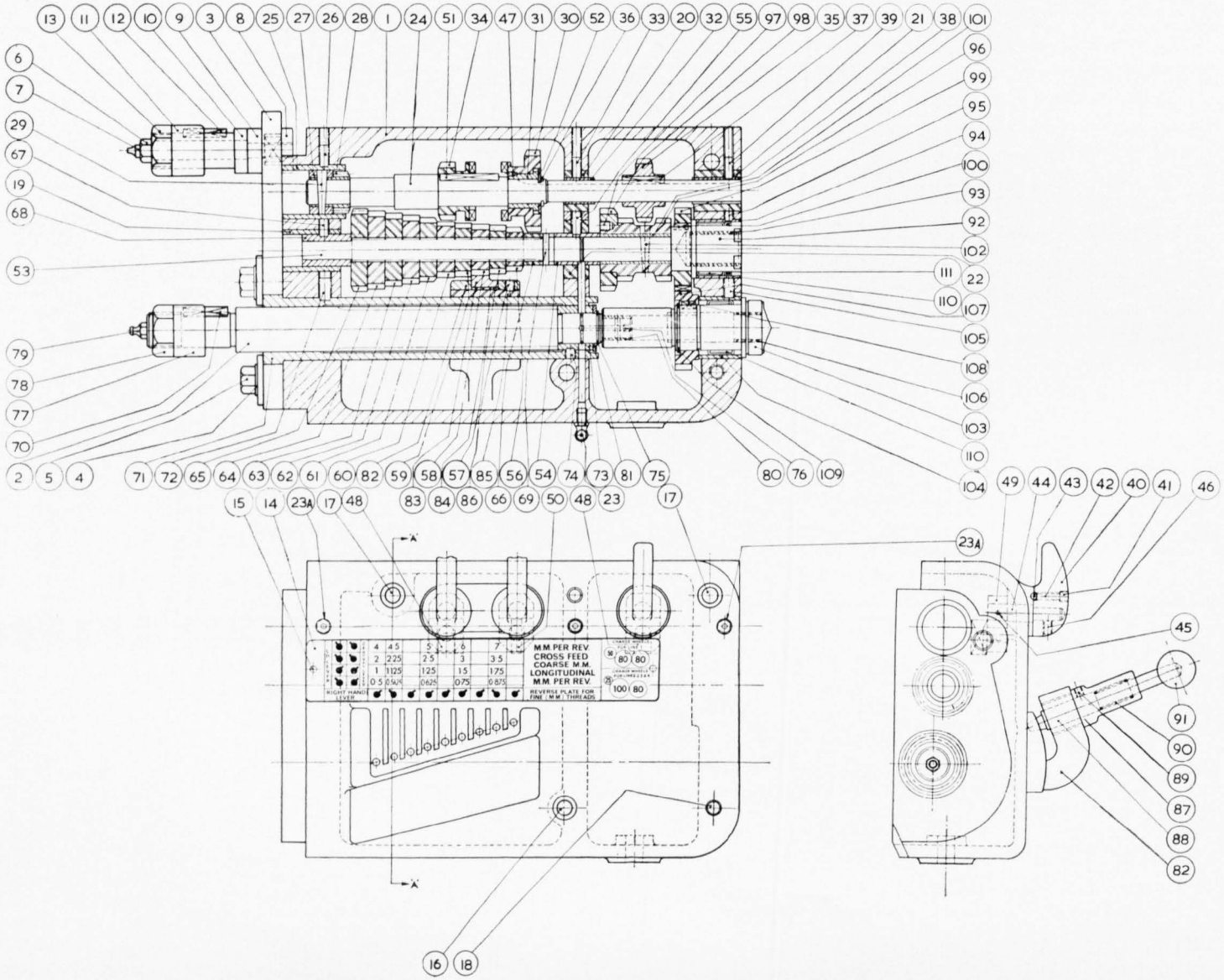
Item No.	Part No.	Description	No. Off
		THREE SPEED GEARBOX	
1	L5-6-1A	Gearbox	1
2	L5-53	Endplate	1
3	L5-555	Top Shaft	1
4	L5-6-6	Gear 40T	1
5	L5-6-7	Gear 30T	1
6	L5-6-9	Gear 36T	1
7	L5-6-12	Bearing	1
8	L5-3-15A	Clutch	1
9	SG.5	Spring	1
10	SB.3	Steel Ball, $\frac{1}{4}$" dia....	1
11	L5-6-4	Bottom Shaft	1
12	L5-6-5	Bearing, L.H.	1
13	L5-557	Gear 20T	1
14	L5-549	Gear 30T	1
15	L5-550	Gear 24T	1
16	L5-6-10	Bearing, R.H.	1
17	L5-6-8	Pinion, Feed Shaft	1
18	L5-3-50 & 89	Bearing	1 off each
19	L5-3-35	Sleeve	1
20	L5-3-32	Slipping Clutch	1
21	SG.266	Spring	1
22	L5-3-34	Washer	1
23	L5-3-33	Adjusting Nut	1
24	L5-6-11	Selector Boss	1
25	L5-713	Lever	1
26	BB.1	Ball, 1" dia.	1
27	SG.5	Spring	1
28	SB.3	Steel Ball. $\frac{1}{4}$" dia.	1
29	L5-6-13	Selector Shaft	1
30	L5-6-2	Gear Mover Lever	1
31	L5-6-3	Gear Mover Shoe	1
		Refer to items 67–74 page 27 for Banjo Plate Assembly.	

Item No.	Part No.	Description	No. Off
		TAILSTOCK	
1	L5-7-27	Tailstock	1
2	L5-7-23	Locking Lever, Quill	1
3	BB.1	1" dia. Bakelite Ball (White)	1
4	L5-7-21	Locking stud	1
5	L5-7-18	Locking Bush, Top	1
6	L5-7-22	Locking Bush, Bottom	1
7	L5-595C	Quill	1
8	L5-585A	Centre	1
9	L5-94	Key	1
10	L5-96	Nut	1
11	L5-7-15A	Screw	1
12	L5-49	Bush	1
13	L5-7-16	Handwheel	1
14	L5-598	Handle	1
15	L5-7-10	Eccentric Lock Stud	1
16	L5-7-9	Locking Lever	1
17	BB.2	2" dia. Bakelite Ball (White)	1
18	L5-7-13	Stop Pin	1
19	L5-7-6	Eye Bolt	1
20	L5-50	Holding Down Plate	1
21	L5-7-28	Base	1
22	$\frac{1}{2}$"BSF/FX 3"	Set Up Screw, Longitudinal	1
23	$\frac{1}{2}$"BSF/FX 1$\frac{1}{2}$"	Set Up Screw, Front	1
24	$\frac{1}{2}$"BSF/FX 1$\frac{1}{4}$"	Set Up Screw, Rear	1

SPARE PARTS LIST

METRIC GEARBOX

METRIC GEARBOX



METRIC GEARBOX *(illustrated opposite)*

Item No.	Part No.	Description	No. Off
		METRIC GEARBOX	
1	L5-3-109	Gearbox	1
2	L5-3-77B	Bottom Shaft	1
3	L5-13-13	Banjo Plate	1
4	L5-13-18	Lock Washer	2
5	¼"FH1¼"	Hexagonal Head Set Screw	2
6	L5-196	Changewheel Stud	1
7	H4146	Lubricator, Straight, ¼" Whit.	1
8	L5-197	Socket Nut	1
9	L5-198	Collar, Socket Stud	1
10	L5-505	Socket	1
11	L5-502	Changewheel Collar	1
12	¼"KS1⅛"	Square Key	1
13	⅞" FB	Hexagonal Nut	1
14	352	Screwcutting and Feed Plate	1
15	L5-3-90	Stud	2
*	468	English Screwcutting Plate	1
16	⅜"FY3½"	Socket Head Cap Screw	1
17	⅜"FY 3¼"	Socket Head Cap Screw	2
18	5/16"PG 2"	Grooved Pin	2
19	L5-3-58	Sleeve	1
20	L5-3-59	Sleeve	1
21	L5-3-60	Sleeve	1
22	L5-3-61A	Sleeve	1
23	H.466	Lubricator, Angled 90 deg. ¼" Whit. ...	1
23A	H.4146	Lubricator, Straight, ¼" Whit.	3
24	L5-3-98	Top Shaft	1
25	L5-3-40	Bush, Left Hand	1
26	¼"FX ½"	Hollow Set Screw, ½ Dog Point ...	1
27	L5-3-7C	Sleeve	1
28	L5-3-6C	16T Gear	1
29	¼"PT 1¼"	Taper Pin	1

Item No.	Part No.	Description	No. Off
		Metric Gearbox (contd.)	
30	L5-3-102	32T Sliding Gear	1
31	L5-3-116	Flanged Bush	1
32	L5-3-41	Bush, Centre	1
33	¼"FX ½"	Hollow Set Screw, ½ Dog Point ...	1
34	L5-3-103	24T Sliding Gear	1
35	L5-3-104	21T Sliding Gear	1
36	⅝" Dia.	External Circlip	1
37	SK.8	Peg Feather Key	1
38	L5-3-42	Bush, Right Hand	1
39	¼"FX ½"	Hollow Set Screw, ½ Dog. Point ...	1
40	L5-3-3	Selector Handle	3
41	¼"FX ¼"	Hollow Set Screw Cup Point ...	3
42	SG.142	Spring	3
43	SB.2	3/16" Dia. Steel Ball	3
44	L5-3-56	Selector Shaft	3
45	3/16"PT 1"	Taper Pin	3
46	¼"FX ⅜"	Hollow Set Screw ½ Dog Point ...	3
47	4 BA FX ¼"	Hollow Set Screw, Cup Point	1
48	L5-3-38	Selector Shoe	2
49	L5-3-39A	Selector Lever	3
50	L5-3-93	Selector Shoe, Central	1
51	3/16"KS 1½"	Square Key	1
52	L5-3-114D	Spacing Washer	1
53	L5-3-111	Middle Shaft	1
54	L5-3-43C	Bush, Right Hand	1
55	5/16"FX ½"	Hollow Set Screw ½ Dog Point ...	1
56	L5-3-64	16T Splined Gear	1
57	L5-3-65	18T Splined Gear	1
58	L5-3-66	19T Splined Gear	1
59	L5-3-67	20T Splined Gear	1
60	L5-3-68C	22T Splined Gear	1

* Not Illustrated

METRIC GEARBOX *(illustrated on page 30)*

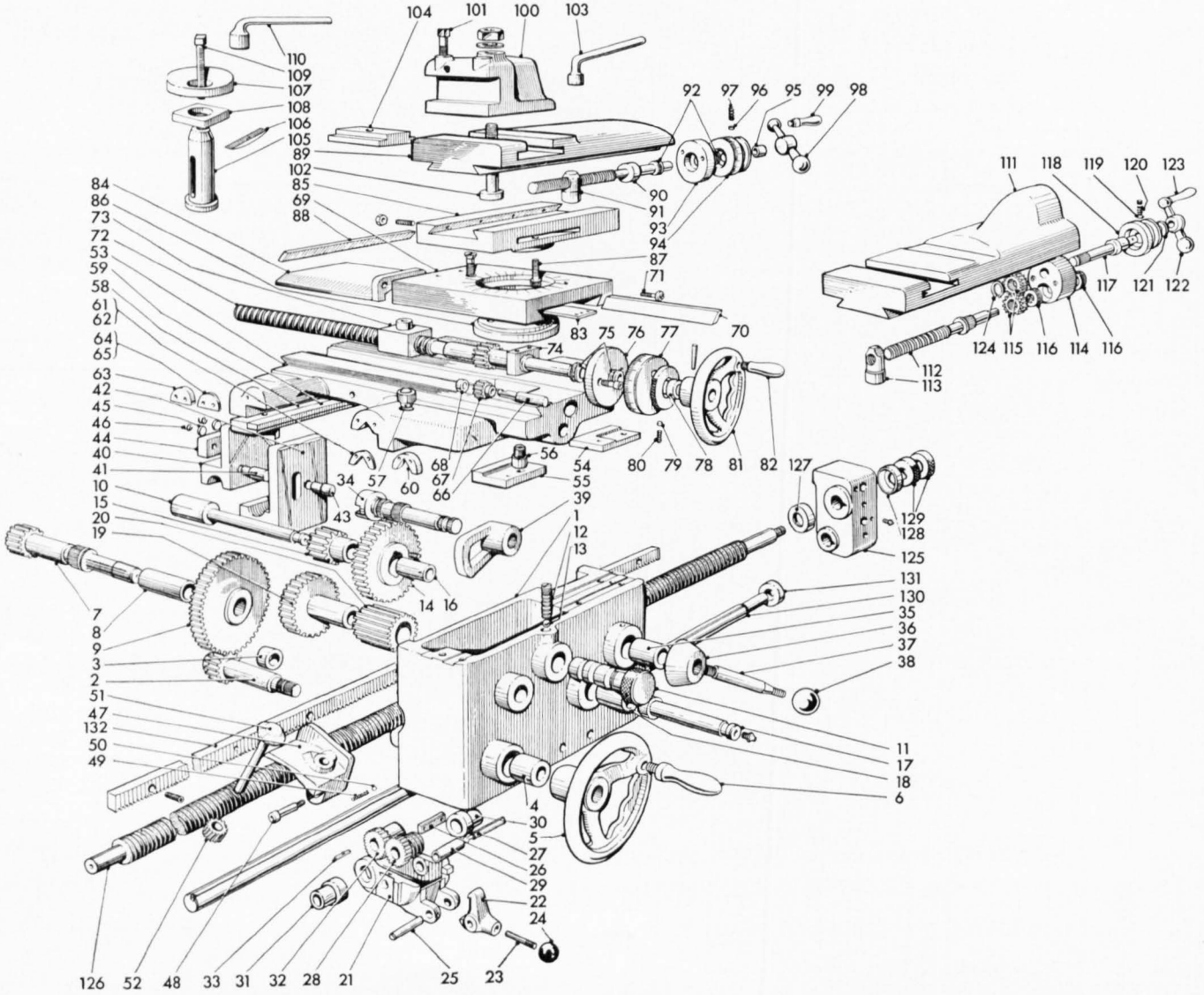
Item No.	Part No.	Description	No. Off
		Metric Gearbox (contd.)	
61	L5-3-69C	24T Splined Gear	1
62	L5-3-70	26T Splined Gear	1
63	L5-3-71	28T Splined Gear	1
64	L5-3-72	30T Splined Gear	1
65	L5-3-73	32T Splined Gear	1
66	L5-3-76C	Spacer	1
67	$\frac{5}{16}$"FX $\frac{1}{2}$"	Hollow Set Screw $\frac{1}{2}$ Dog Point ...	1
68	L5-3-75	Bush, Left Hand	1
69	$\frac{1}{8}$" Dia.	"Spirol" Pin	1
		BOTTOM SHAFT ASSEMBLY	
70	$\frac{1}{4}$"KS $1\frac{1}{8}$"	Square Key, Bottom Shaft...	1
71	L5-3-78A	Sleeve	1
72	$\frac{5}{16}$"FX $\frac{1}{2}$"	Hollow Set Screw, Full Dog Point ...	1
73	L5-3-47A	Bush, Right Hand	1
74	$\frac{1}{4}$"FX $\frac{1}{4}$"	Hollow Set Screw, $\frac{1}{2}$ Dog Point ...	1
75	$\frac{3}{8}$" Dia.	External Circlip	1
76	$\frac{1}{4}$"FX $\frac{1}{4}$"	Hollow Set Screw, Cup Point	1
77	L5-502	Changewheel Collar	1
78	$\frac{7}{8}$" FB	Hexagonal Nut	1
79	H.4146	Lubricator, Straight $\frac{1}{4}$" Whit.	1
80	L5-3-55	Bush	1
81	L5-3-114F	Spacing Washer	1
82	L5-3-2	Swing Lever...	1
83	L5-3-29	22T Gear	1
84	L5-3-55	Bush	1
85	L5-3-28	Shaft	1
86	$\frac{1}{4}$"FX $\frac{1}{4}$"	Hollow Set Screw $\frac{1}{2}$ Dog Point ...	1
87	L5-3-36	Plunger Sleeve	1
88	L5-3-37	Plunger	1

Item No.	Part No.	Description	No. Off
		Metric Gearbox (contd.)	
89	2BA/FX$\frac{5}{16}$"	Hollow Set Screw $\frac{1}{2}$ Dog Point ...	1
90	SG.141	Spring	1
91	BB.1	Bakelite Ball 1" Dia. (White)	1
92	L5-3-124A	Clutch Shaft, Leadscrew	1
93	L5-3-49	Bush, Leadscrew	1
94	L5-3-126	Bush, Clutch Shaft	1
95	$\frac{5}{16}$"FX $\frac{1}{2}$"	Hollow Set Screw, $\frac{1}{2}$ Dog Point ...	1
96	L5-3-105B	21T and 20T Gear	1
97	$\frac{1}{4}$"FX $\frac{1}{4}$"	Hollow Set Screw, Cup Point	2
98	L5-3-101	32T Gear	1
99	L5-3-112	32T Gear	1
100	$\frac{3}{16}$"KS $\frac{3}{8}$"	Square Key	1
101	L5-3-43	Bush	1
102	$\frac{1}{4}$"PT $1\frac{1}{8}$"	Taper Pin	1
103	L5-3-123	Slipping Clutch Shaft	1
104	L5-3-48C	Bush	1
105	$\frac{5}{16}$"FX $\frac{1}{2}$"	Hollow Set Screw $\frac{1}{2}$ Dog. Point ...	1
106	L5-3-50	Bush, Feedshaft	1
107	L5-3-96	32T Gear	1
108	$\frac{3}{16}$"KS $\frac{3}{8}$"	Square Key	1
109	$1\frac{1}{8}$" Dia.	External Circlip	1
110	SC.1812	Needle Bearing	2
111	GSC. 18	Oil Seal	1

Refer to Pages 26 and 27 for Details of Slipping Clutch

APRON, SADDLE and SLIDES

APRON SADDLE and SLIDES



APRON SADDLE and SLIDES *(illustrated opposite)*

Item No.	Part No.	Description	No. Off
		APRON	
1	L5-4-1	Apron	1
2	L5-4-43	Hand Motion Pinion	1
3	L5-4-3	Bearing, Rear	1
4	L5-4-42	Bearing, Front	1
5	L5-4-39	Handwheel	1
6	L5-597	Handle	1
7	L5-4-15B	Rack Pinion	1
8	L5-4-4	Bearing	1
9	L5-4-33	Rack Pinion Wheel	1
10	L5-4-37	Sliding Shaft	1
11	L5-4-35	Sliding Knob	1
12	SG.5	Spring	1
13	SB.3	$\frac{1}{4}$" dia. Steel Ball	1
14	L5-583A	Sliding Intermediate Gear	1
15	L5-576A	Sliding Intermediate Pinion	1
16	L5-4-41	Bush	1
17	L5-4-38	Worm Wheel Shaft	1
18	L5-4-7	Bearing	1
19	L5-88	Worm Wheel	1
20	L5-565	Broad Pinion	1
21	L5-4-9	Worm Box	1
22	L5-4-10	Clip	1
23	L5-4-18	Lever	1
24	BB1	1" dia. Bakelite Ball	1
25	L5-4-11	Pin	1
26	L5-564	Clip Bar	1
27	L5-4-40	Worm Stud	1
28	L5-567	Worm and Pinion	1
29	L5-87	Bush	1
30	L5-86A	Bearing, Right Hand	1
31	L5-86	Bearing, Left Hand	1
32	L5-566	Gear	1
33	L5-699	Key	1
34	L5-4-36	Shaft, Nut Slides	1
35	L5-4-48	Bearing	1
36	L5-4-17A	Boss for Lever	1
37	L5-4-16	Lever	1
38	BB1	1" dia. Bakelite Ball (White)	1
39	L5-4-34	Interlocking Quadrant	1
40	L5-4-19	Nut Slide, Top (L5-4-19A Metric)	1
41	L5-538	Pin, Long	1
42	L5-4-20	Nut slide, Bottom (L5-4-20A Metric)	1
43	L5-539	Pin short	1
44	L5-4-32	Nut Slide Plate	1

Item No.	Part No.	Description	No. Off
		Apron (contd.)	
45	L5-4-31	Pad	2
46	WS.$\frac{5}{16}$"	$\frac{5}{16}$" Double Coil Spring Washers	2
47	L5-4-21	Indicator Bracket (L5-4-21A Metric)	1
48	SS.$\frac{5}{16}$"×2"	Pivot Stud	1
49	SG.5	Spring	1
50	SB.3	$\frac{1}{4}$" dia. Steel Ball	1
51	L5-4-13	Dial (L5-4-13A Metric)	1
52	L5-90	Indicator Pinion (L5-90A Metric)	1
		SADDLE AND SLIDES ASSEMBLY	
53	L5-5-96	Saddle	1
54	L5-34B	Right-hand Front Strip	1
55	L5-5-95	Left-hand Front Strip	1
56	L5-5-93	Adjusting Screw	1
57	L5-5-94	Locking Piece	1
58	L5-5-91	Rear Support Strip	1
59	L5-5-92	Rear Strip	1
60	L5-5-16	Front Wiper Cover	2
61	L5-5-7	Front Wiper	2
62	L5-5-9	Felt Wiper	2
63	L5-5-17	Rear Wiper Cover	2
64	L5-5-8	Rear Wiper	2
65	L5-5-10	Felt Wiper	2
66	L5-697	Stud	1
67	L5-696	Pinion	1
68	L5-698	Collar	1
69	L5-25	Cross Slide	1
70	L5-33	Strip	1
71	L5-16-39	Adjusting Screw	1
72	L5-5-46A	Screw (L5-5-48A Metric) (L5-599 single start)	1
73	L5-93	Nut (L5-808 Metric) (L5-5-100 Single start)	1
74	L5-5-61	Swarf Shield	1
75	SKF.51102	Thrust Bearing	2
76	L6-5-8	Fixed Collar (L6-5-80 For single start screw)	1
77	L5-5-42	Micrometer Collar (L5-5-45 Metric)	1
78	L5-5-43A	Bush	1
79	L5-5-15	Die	2
80	SG.289	Spring	2
81	L5-31B	Handwheel	1

APRON SADDLE and SLIDES *(illustrated on page 34)*

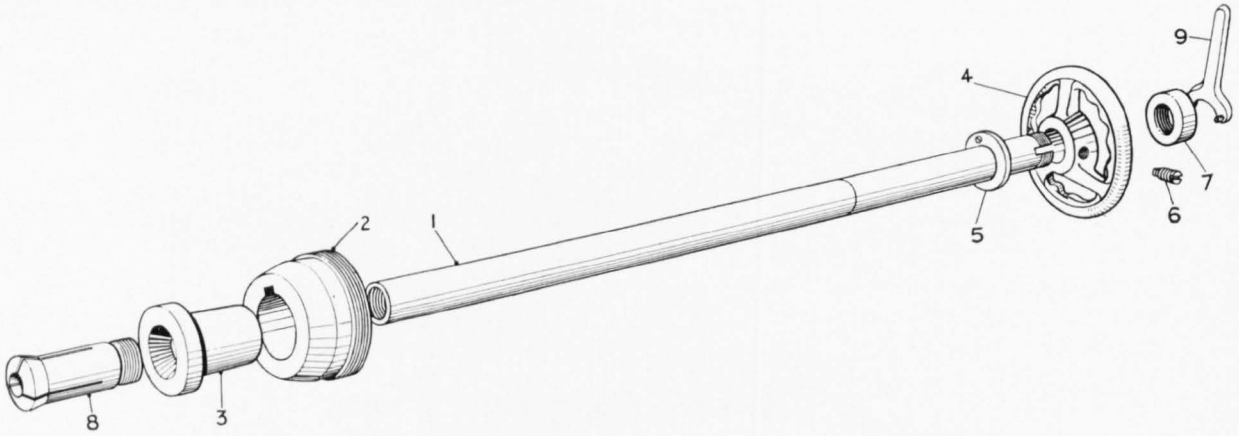
Item No.	Part No.	Description	No. Off
		Saddle and Slides Assembly (contd.)	
82	L5-5-60	Handle	1
83	L5-345	Front Cover Plate	1
84	L6-5-11	Cover, Cross Slide Ways	1
85	L5-26B/N	Swivel Slide	1
86	L5-572A	Clamp Plate	1
87	L5-573A	Stud	2
88	L5-91	Strip	1
89	L5-5-22A/N	Top Slide	1
90	L5-5-47B	Screw (L5-5-49B Metric)	1
91	L5-92	Nut (L5-811 Metric)	1
92	SKF.51101	Thrust Race	2
93	L5-5-40C	Fixed Collar	1
94	L5-5-39	Micrometer Collar (L5-5-44 Metric)	1
95	L5-5-55A	Bush	1
96	L5-5-15	Die	2
97	SG.290	Spring	2
98	L5-5-57A	Ball Handle	1
99	L5-570	Handle	1
100	L5-2-28	Tool Holder	1
101	$\frac{3}{8}$″FZ1$\frac{3}{4}$″	Square Head Set Screw	2
102	L5-5-29	Pivot Stud	1
103	WR.7	Wrench	1
104	L5-5-30	Tee Piece	1
		AMERICAN TYPE TOOLPOST (Alternative to Standard Toolpost)	
105	L5-5-25	Tool Post	1
106	L5-5-24	Tool Plate	1
107	L5-5-23	Ring	1
108	L5-5-26	Clamp Plate	1
109	$\frac{1}{2}$″FZ2$\frac{1}{2}$″	Square Head Screw	1
110	WR.10	Wrench	1
*		**FOUR WAY TOOLPOST (Alternative to Standard and American Toolposts)**	1

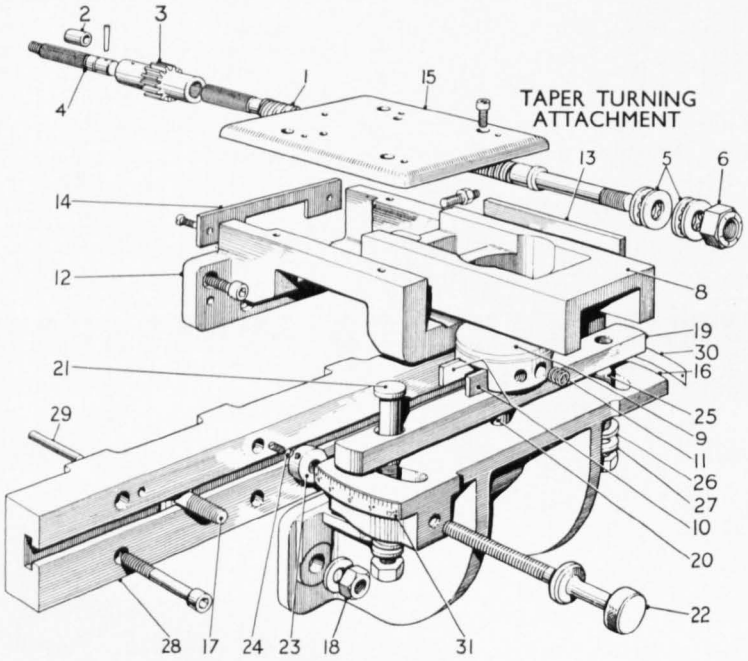
Item No.	Part No.	Description	No. Off
		GEARED TOP SLIDE (American M/C's only)	
111	L6-5-2/N	Top Slide	1
112	L6-5-6A	Screw	1
113	L6-5-7	Nut	1
114	L6-5-3B	Bearing Housing	1
115	L6-5-5	16T Gear	2
116	SKF.51101	Thrust Race	2
117	L6-5-4B	Shaft, Top Slide Handle	1
118	L5-5-39	Graduated Collar	1
119	L5-5-15	Die	2
120	SG.290	Spring	2
121	L5-5-55	Spacer	1
122	L5-5-57A	Ball Handle	1
123	L5-570	Handle	1
124		Ext. Circlip $\frac{1}{2}$″ dia.	1
		LEADSCREW, FEEDSHAFT, RACK AND BRACKET	
125	L5-8-1	Bracket	1
126	L5-561A	Leadscrew (L5-561B Metric) (3 Speed Gearbox)	1
	L5-3-51	Leadscrew (L5-51A Metric) (Norton Feed Gearbox)	1
127	L5-588	Collar	1
128	L5-541	Washer	1
129	L5-540	Nut	2
130	L5-8-2	Feed Shaft (3 Speed Gearbox)	1
	L5-3-82	Feed Shaft (Norton Feed Gearbox)	1
131	L5-645	Collar	1
132	L5-8-5	Rack (24″ long)	1

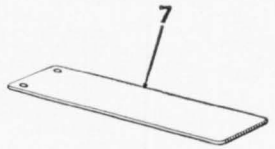
* Not Illustrated

MISCELLANEOUS ACCESSORIES

MISCELLANEOUS ACCESSORIES







MISCELLANEOUS ACCESSORIES

TAPER TURNING ATTACHMENT

Item No.	Part No.	Description	No. Off
1	L5-14-16	Screw (L5-14-29 Metric)	1
2	L16-12-4	Bush	1
3	L5-14-28A	Pinion } Supplied integral	1
4	L6-12-4	Shaft }	1
5	SK.51101	Thrust Bearing	2
6	PT/F146/11/201	Lock Nut $\frac{7}{16}$" B.S.F	1
7	L5-346B	Rear Cover Plate for Screw	1
8	L5-14-10B	Slide Block	1
9	L5-14-40A	Top Slide	1
10	L5-14-20	Strip	2
11	SG.119	Spring	2
12	L5-14-12B	Support Bracket, Slide Block	1
13	L5-14-21	Strip	1
14	L5-14-18B	Cover Strip	1
15	L16-12-12A	Cover Plate	1
16	L5-14-14A	Support Bracket, Swivel Slide	1
17	L5-822	Bolt	2
18	L5-5-69	Lock Nut	2
19	L5-14-41A	Swivel Slide	1
20	L5-14-36A	Swivel Pin	1
21	L5-14-25	Stud, Taper Setting	1
22	L5-14-24	Screw, Taper Setting	1
23	L5-14-26	Collar	1
24	L5-14-32	Die	1
25	L5-14-37	Locking Stud	1
26	L5-14-38	Spherical Washer, (Male)	2
27	L5-14-39	Spherical Washer, (Female)	2
28	L5-16-84	Block, (For 24" between Centres)	1
	L5-16-85	Block, (For 40" between Centres)	1
29	L5-16-122	Dowels	2
30	461	Index Plate (462 Metric)	1
31	460	Index Plate	1

COLLETT ATTACHMENT

Item No.	Part No.	Description	No. Off
1	L5-10-244	Draw Tube	1
2	L5-10-153	Spindle Nose Cover	1
3	L5-10-154	Closer Bush	1
4	L5-10-240A	Handwheel	1
5	L5-10-248	Thrust Washer	1
6	L5-10-270	Key	2
7	L5-10-249	Nut	1
8	L5-10-172	Collet	As requ'd
9	WR.24	Wrench	1

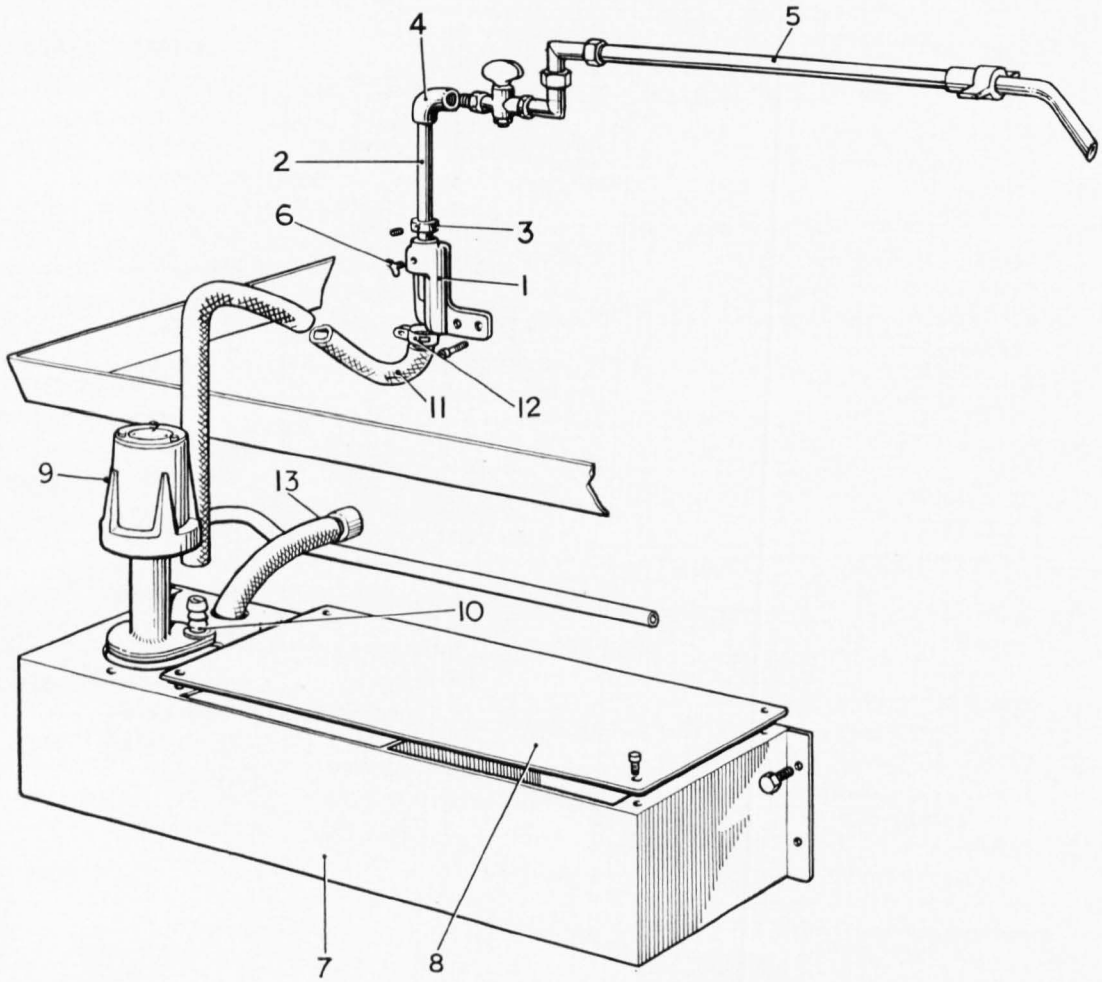
SUDS PUMP

illustrated on page 40

Item No.	Part No.	Description	No. Off
1	L5-12-13	Bracket for Stand Pipe	1
2	L5-12-6	Stand Pipe	1
3	L5-12-7	Collar	1
4	G14-98	Elbow $\frac{1}{4}$" B.S.P.	1
5	LP 198	Telescopic Nozzle	1
6	L5-12-8A	Thumb Screw	1
7	L5-12-41	Suds Tank	1
8	L5-12-3A	Lid	1
9	AQ.3	Suds Pump with Flange	1
10	$\frac{3}{8}$" BSP	Plastic Nozzle	2
11	$\frac{1}{2}$" Bore	Plastic Hose 3' 2" long	1
12	G14-95	Hose Clip	1
13	$\frac{1}{2}$" Bore	Plastic Hose 1' 4" long	1
*	L5-12-17	Connection Pipe } Extra when Taper Turning Attachment is fitted	1
*	G14-98	Elbow $\frac{1}{4}$" BSP }	1

* Not Illustrated

SUDS PUMP

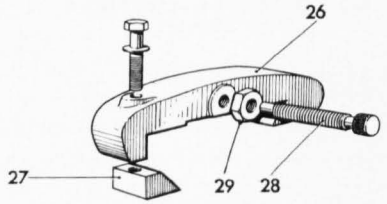


MISCELLANEOUS ACCESSORIES *(illustrated on page 42)*

Item No.	Part No.	Description	No. Off
		STATIONARY STEADY	
1	L5-10-48	Stationary Steady Base	1
2	L5-10-49	Stationary Steady Top	1
3	L5-521	Swivel Stud	1
4	L5-95	Clip	1
5	L5-640	Hinge Pin	1
6	L5-10-50	Pin	3
7	L5-522	Nut	3
8	$\frac{5}{16}$"FY 2$\frac{1}{2}$"	Screw	3
9	L5-50	Clamp Plate	1
10	$\frac{1}{2}$" BC 3"	Clamp Bolt	1
		TRAVELLING STEADY	
11	L5-9-9	Travelling Steady	1
12	L5-522	Nut	2
13	L5-69	Pin	2
14	$\frac{5}{16}$"FY1$\frac{3}{4}$"	Screw	3
		DRIVER AND FACEPLATES	
15	L5-9-5	Driver Plate	1
16	L5-531	Pin	1
17	L5-9-8	Balance Peg	1
18	L5-9-7	9$\frac{1}{4}$" dia. Face Plate	1
19	L5-10-81	15" dia. Face Plate	1
		MICROMETER CARRIAGE STOP	
20	L5-10-31	Body (L5-10-61 Metric)	1
21	L5-10-33	Micrometer Screw (L5-10-59 Metric)	1
22	L5-10-32	Micrometer Collar (L5-10-60A Metric)	1
23	L5-10-35	Die	1
24	L5-10-36	Knurled Screw	1
25	L5-10-34	Clamp Plate	1
		CROSS SLIDE STOP	
26	L5-10-37	Body	1
27	L5-10-38	Clamping Strip	1
28	L5-10-39	Screw	1
29	L5-10-146	Lock Nut	1
		BORING TABLE	
30	L5-247	Table	1
31	L5-260	Strip	1
32	L5-93	Nut	1

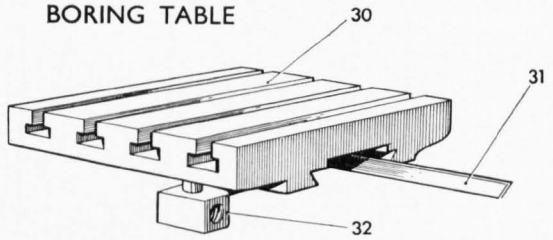
Part No.	Description	No. Off
	BED AND DRIVE ASSEMBLY *(Not illustrated)*	
L5-235A	Gap Bed	1
L5-2	Gap Piece	1
L5-737	Taper Pin for Gap Piece	1
L5-1-40	Splash Guard	1
L5-1-198	Cup Washer	6
L5-1-199	Sealing Washer	6
L5-1-200	Support Washer	6
L5-1-55A	Cabinet Base	1
L5-1-138	Door	1
L5-1-183	Hinge Pin	2
L5-1-88	Hinge	2
L5-1-42	Jacking Screw	4
	Slide Rails	2
L6-1-45	Washer Support	4
L6-1-50	Pad Support	2
L6-1-47	Pad Support	2
L6-1-42	Rubber Washer	4
L6-1-43	Rubber Pad	4
L5-1-2B	Drive Guard	1
L5-1-3B	Drive Cover	1
L5-1-4B	Change Wheel Guard	1
L5-1-8	Hinge Pin	2
L5-1-6	Button	1
L5-1-7	Latch	1
SG.170	Spring	1
L5-1-98	Clutch Spring Cover	1
L5-1-174	Sealing Strip	1
ZA	Lock	1
	ALTERNATIVE DRIVE ASSEMBLIES	
	3 Phase 50 Cycle Machines	
	Top Speed of Machine 750 r.p.m.	
M66A	Motor 1$\frac{1}{2}$ h.p. 1500 r.p.m.	1
L5-1-164A	Pulley	1
A68	Vee Belt	2
L5-1-177	Packing Piece	4
	Top Speed of Machine 1,000 r.p.m.	
M66B	Motor 2 h.p. 1,500 r.p.m.	1
L5-1-165A	Pulley	1
A.71	Vee Belt	2
L5-1-177	Packing Piece	4

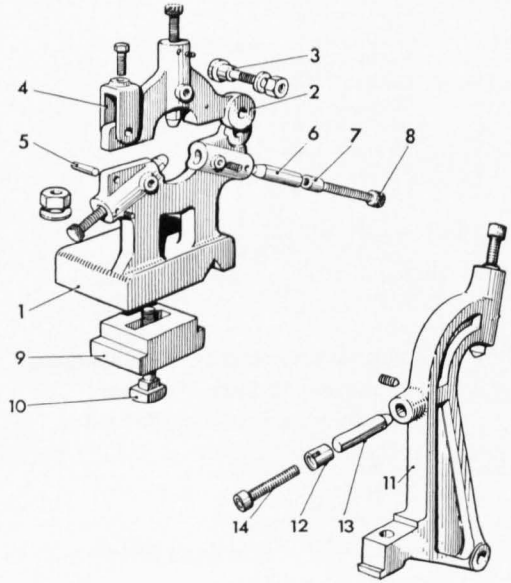
MISCELLANEOUS ACCESSORIES



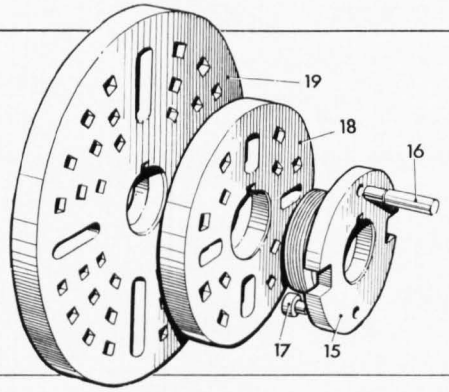
CROSS-SLIDE STOP

BORING TABLE

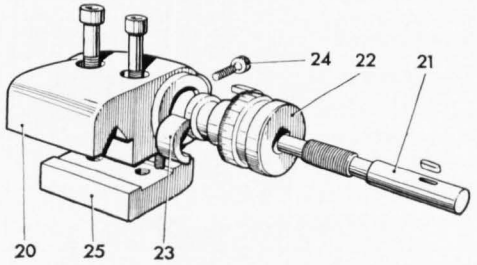




STEADIES



DRIVER,
AND
FACE PLATES



MICROMETER CARRIAGE STOP

MISCELLANEOUS ACCESSORIES *(not illustrated)*

Part No.	Description	No. Off
	Top Speed of Machine 1,500 r.p.m.	
C.184	Motor 2 Speed 3/1½ h.p. 3000/1500 r.p.m.	1
L5-1-164E	Pulley	1
A.68	Vee Belt	2
L5-1-177	Packing Piece	4
	Top Speed of Machine 2,000 r.p.m.	
C.184	Motor, 2 Speed 3/1½ h.p. 3000/1500 r.p.m.	1
L5-1-165E	Pulley	1
A.71	Vee Belt	2
L5-1-177	Packing Piece	4
	3 Phase 60 Cycle Machines	
	Top Speed of Machine 750 r.p.m.	
Nema 184	Motor 1½ h.p. 1800 r.p.m.	1
L5-1-168B	Pulley	1
A.68	Vee Belt	2
L5-1-177	Packing Piece	4
	Top Speed of Machine 1,000 r.p.m.	
Nema 184	Motor 2 h.p. 1800 r.p.m.	1
L5-1-171B	Pulley	1
A.68	Vee Belt	2
L5-1-177	Packing Piece	4
	Top Speed of Machine 1,500 r.p.m.	
Nema 213	Motor 2 Speed 3/1½ h.p. 3600/1800 r.p.m.	1
L5-1-168F	Pulley	1
A.68	Vee Belt	2
L5-1-179	Packing Piece	4
	Top Speed of Machine 2,000 r.p.m.	
Nema 213	Motor, 2 Speed 3/1½ h.p. 3600/1800 r.p.m.	1
L5-1-171F	Pulley	1
A.71	Vee Belt	2
L5-1-179	Packing Piece	4

Part No.	Description	No. Off
	ELECTRICAL EQUIPMENT	
	Starters for 50 cycles supply	
ISH.440	"Prentice" Direct on Line Starter, 3 phase 50 cycles, 400/440 volts for 2 H.P. Motors	1
ISH.540	"Prentice" Direct on Line Starter, 3 phase 50 cycles, 400/440 volts for 3 H.P. Motors	1
	Starters for 60 cycles supply	
ISH.5/6	"Prentice" Direct on Line Starter, 3 phase, 60 cycles	1
	Spares for "Prentice" Starters	
AC52/4	Heater Coil only (2·0-3·75 amps)	3
AC52AS/4	Heater Coil Assembly (2·0-3·75 amps) with base mounting terminals...	3
AC52/5	Heater Coil only (3·0-5·75 amps)	3
AC52AS/5	Heater Coil Assembly (3·0-5·75 amps) with base mounting terminals...	3
AC54/1	Magnetic Coil (State voltage & cycles) ...	1
	Common Parts for "Prentice" Starters	
AC 11 AS	Main Moving Contact	4
AC 13	Main Fixed Contact	8
AC 14	Bow Spring	8
AC 15	Bimetal Strip	3
AC 50	Push Button Spring (for interior)	2
AC 51	Trip Switch Spring	1
AC 53	Trip Scale (State amps and range) ...	1
AC 60 AS	Trip Switch Assembly, without scale ...	1
AC 62 AS	Trip Bar	1
AC 67	Serial Plate † (see note)	1
AC 105	Carrier Spring	2

† If it is desired to change the voltage and/or current rating of an existing starter, please give the serial and list number. A new serial plate (AC 67) will then be supplied to obviate the starter being used under wrong conditions. If the current rating is being altered, a new trip scale (AC 53) will also be required.

MISCELLANEOUS ACCESSORIES *(not illustrated)*

Part No.	Description	No. Off
	Isolating Switches	
TS 520	"Prentice" Isolating Switch	1
229	Instruction Plate	1
246	,, ,, (American Machs. only)...	1
	Reversing Switches	
IPA 46/312P or SR 137K/MTH	Rotary Reversing Switch for 3 phase 50 cycles, 400/440 volts	1
SR 1313 AB 67/MTH	Rotary Reversing Switch for 3 phase 60 cycles, 220/600 volts	1
130	Instruction Plate	1
L5-1-53	Spacer	2
	Two Speed Control Switch	
IPA 413/349P or SR 1314 AX	Rotary 2 speed Control Switch for 3 phase 50 cycles, 220/440 volts	1
92/MTH	Rotary 2 speed Control Switch for 3 phase 50 cycles, 220/440 volts	1
SR 1320AY 56/MTH	Rotary 2 speed Control Switch for 3 phase 60 cycles, 220/600 volts	1
	Electric Suds Pump Switch	
SR 134 or IPA 44/31P	Rotary Switch	1
135	Instruction Plate (for Suds Pump) ...	1
L5-1-53	Spacer	2
	Low Voltage Lighting Unit	
D100 LL Type A4	Low Voltage Lighting Unit with two arm fitting suitable for 50 volts, 25 volts or 12 volts lighting (please state mains voltage and low voltage required) ...	1
L5-10-225	Bracket for Low Voltage Lighting Unit ...	1

Part No.	Description	No. Off
	CHANGE WHEELS FOR THREE SPEED GEARBOX with 4 T.P.I. Leadscrew Wheels for Cutting Whit. and B.S.F. Threads	
*L5-51 T	Change Wheel, 20T	1
*L5-51 Q	Change Wheel, 40T	1
*L5-51 P	Change Wheel, 50T	1
*L5-51 M	Change Wheel, 55T	1
*L5-51 K	Change Wheel, 60T	2
*L5-51 J	Change Wheel, 65T	1
*L5-51 G	Change Wheel, 70T	1
*L5-51 E	Change Wheel, 80T	1
*L5-51 C	Change Wheel, 100T	1
*L5-51 B	Change Wheel, 120T	1
*L5-51 SS	Change Wheel 130T	1
L5-51 S	Change Wheel, 95T (for 19 T.P.I. only) ...	1
	Additional Wheel for Cutting Metric Threads	
L5-51 DD	Change Wheel, 30T	1
L5-51 SSS	Change Wheel, 72T	1
L5-51A	Change Wheel 127T	1
	Additional Wheels for Cutting B.A. Threads	
L5-51 R	Change Wheel, 36T	1
L5-51 Q	Change Wheel, 40T	1
L5-51 N	Change Wheel, 53T	1
L5-51 L	Change Wheel, 59T	1
L5-51 H	Change Wheel, 66T	1
L5-51 F	Change Wheel, 73T	1
L5-51 D	Change Wheel, 81T	1
L5-51 A	Change Wheel, 127T	1
	CHANGE WHEELS FOR THREE SPEED GEARBOX with 6 mm. pitch Leadscrew Wheels for Cutting Metric Threads	
*L5-51 T	Change Wheel, 20T	1
*L5-51 Q	Change Wheel, 40T	1
*L5-51 W	Change Wheel, 45T	1
*L5-51 P	Change Wheel, 50T	2
*L5-51 M	Change Wheel, 55T	1
*L5-51 K	Change Wheel, 60T	1
*L5-51 G	Change Wheel, 70T	1
*L5-51 E	Change Wheel, 80T	1
*L5-51 C	Change Wheel, 100T	1
*L5-51 B	Change Wheel, 120T	1

* Standard equipment

MISCELLANEOUS ACCESSORIES *(not illustrated)*

Part No.	Description	No. Off
	Additional Wheels for Cutting English and American T.P.I.	
L5-51 V	Change Wheel, 63T	1
L5-51 H	Change Wheel, 66T	1
L5-51 LLL	Change Wheel, 77T	1
L5-51 D	Change Wheel, 81T	1
L5-51 BBB	Change Wheel, 84T	1
L5-51 Y	Change Wheel, 90T	1
L5-51 AA	Change Wheel, 105T	1
L5-51 XXX	Change Wheel, 126T	1
L5-51 NN	Change Wheel, 135T	1
	CHANGE WHEELS FOR ENGLISH NORTON GEARBOX with 4 T.P.I. Leadscrew	
	Wheels for Cutting Whit. and B.S.F. Threads	
*L5-51 P	Change Wheel, 50T	1
*L5-13-3	Change Wheel, 60T (Fibre), fitted on machines with 750 r.p.m. top speed ...	1
*L5-51 C	Change Wheel, 100T	1
*L5-51 X	Change Wheel, 25T } fitted to M/cs with	1
*L5-51 E	Change Wheel, 80T } 1,000 r.p.m. top speed and over.	1
	Additional Wheels for Cutting Metric Threads	
L5-51 Q	Change Wheel, 40T	1
L5-51 V	Change Wheel, 63T	1
L5-51 A	Change Wheel, 127T	1
L5-51 K	Change Wheel, 60T (for machines of 1,000 r.p.m. and over)	1
	Additional Wheels for Cutting B.A. Threads	
L5-51 R	Change Wheel, 36T	1
L5-51 Q	Change Wheel, 40T	1
L5-51 N	Change Wheel, 53T	1
L5-51 L	Change Wheel, 59T	1
L5-51 H	Change Wheel, 66T	1
L5-51 F	Change Wheel, 73T	1
L5-51 D	Change Wheel, 81T	1
L5-51 A	Change Wheel, 127T	1

Part No.	Description	No. Off
	Additional Wheels for Fine Thread Range (English Gear Box)	
L5-51 C	Change Wheel, 100T	1
L5-51 P	Change Wheel, 50T	1
	Additional Wheel for Cutting 11½ T.P.I. (English Gearbox)	
L5-51 U	Change Wheel, 115T	1
L5-51 K	Change Wheel, 60T (for machines of 1,000 r.p.m. and over)	1
	Additional Wheel for Cutting 27 T.P.I. (English Gearbox)	
L5-51 Q	Change Wheel, 40T	1
L5-51 K	Change Wheel, 60T (for machines of 1,000 r.p.m. and over)	1
	CHANGE WHEELS FOR ENGLISH FEED GEARBOX with 6 mm. pitch Leadscrew Wheels for Cutting Metric Threads	
L5-51 P	Change Wheel, 50T	1
L5-51 E	Change Wheel, 80T	1
L5-51 JJ	Change Wheel, 85T	1
	Additional Wheels for Cutting English and American T.P.I.	
L5-51 V	Change Wheel, 63T	1
L5-51 B	Change Wheel, 120T	1
	CHANGE WHEELS FOR METRIC GEARBOX with 6 mm. pitch Leadscrew Wheels for Cutting Metric Threads	
*L5-51 X	Change Wheel, 25T	1
*L5-51 P	Change Wheel, 50T	1
*L5-51 K	Change Wheel, 60T	1
*L5-51 E	Change Wheel, 80T	2
*L5-51 C	Change Wheel, 100T	1
*L5-51 B	Change Wheel, 120T	1

* Standard equipment.

MISCELLANEOUS ACCESSORIES *(not illustrated)*

Part No.	Description	No. Off
	Additional Wheels for Cutting English and American T.P.I.	
L5-51 Q	Change Wheel, 40T	1
L5-51 V	Change Wheel, 63T	1
	SPLASH GUARD	
L5-1-77	Rear Splash Guard	1
L5-1-195	Rear Splash Guard, fitted when Lever Operated Collet Attachment is fitted ...	1
L5-10-257	Bracket	1
	QUICK CHANGE TOOLPOST	
S2	Toolpost	1
L16-5-29	Stud...	1
L6-5-70	Locating Bush	1
L6-5-78	Nut	1
	MILLING AND GEARCUTTING ATTACHMENT (Common Parts)	
L5-140	Angle Bracket	1
L5-165	Nipping Stud	1
L5-141	Swivel Slide	1
L5-155	Nut (L5-892 Metric)	1
L5-143	Vertical Slide	1
L5-150	Strip	1
L5-162A	Screw (L5-893A Metric)	1
L5-144	End Plate	1
L5-5-39	Micrometer Collar (L5-5-44 Metric) ...	1
L5-5-15	Die	2
SG-290	Spring	2
L5-351A	Locking Bush	1
L5-14-32	Die	1
L5-5-57A	Ball Handle	1
L5-570	Handle	1
L5-5-30	Tee Piece	1
L5-10-266	Stud...	1

Part No.	Description	No. Off
	GEAR CUTTING ATTACHMENT ONLY	
L5-146	Bracket for Arm	1
L5-164	Nipping Stud	3
L5-167	Support Bar	1
L5-147	Supporting Arm	1
L5-156	Bush	1
L5-159	Centre	1
L5-145	Spindle Bracket	1
L5-160	Spindle	1
L5-142	Worm Bracket	1
L5-151	Worm Wheel	1
L5-161	Nut	1
L5-10-220	Worm	1
L5-662A	Lock Nuts	2
L5-148 A & B	Index Plate	1 off each
L5-10-221	Index Arm	1
L5-10-222	Plunger	1
L5-10-215	Plunger Knob	1
SG.119	Spring	1
L5-170	Cutter Arbor	1
L5-179	Nut	1
L5-173	Short Spacer	2
L5-172	Long Spacer	1
L5-174	Driver Pin	1
L5-169	Work Arbor	1
L5-175	Washer	1
L5-171	Draw Screw	1
L5-10-211	Bush, Index Finger	1
L5-10-214A & B	Index Finger	1 each
L5-10-213	Lock Nut	1
SG.252	Spring Clip...	1
L5-10-229	Clamp Plate	1
	MULTISIZE COLLET ATTACHMENT	
LC 15/L00	Collett Attachment, lever operated ...	1
L5-10-230	Link Bracket	1
L5-10-231	Link	1
L5-10-232	Pin	1
KC 15/L00	Collet Attachment, key operated	1

MISCELLANEOUS ACCESSORIES *(not illustrated)*

Part No.	Description	No. Off
	4 POSITION CARRIAGE STOP	
L5-10-119	Body	1
L5-10-120	Bush	1
L5-10-121	End Plate	1
L5-10-122	Stop Screw	4
L5-10-143	Die Piece	4
SG.5	Spring	1
SB.3	Steel Ball, $\frac{1}{4}$" dia.	1
L5-10-34	Clamp	1
	HIGH SPEED STEEL TURNING TOOLS	
7	R. H. Knife Tool	1
8	L.H. Knife Tool	1
11	Square Nose Tool	1
13	External Screwcutting Tool	1
16	Cut Off Tool	1
17	Straight Round Nose Tool	2
19	R.H. Round Nose Tool	1
20	L.H. Round Nose Tool	1
50	Internal Screwcutting Tool	1
50	Internal Round Nose Tool	1
50	Internal Square Nose Tool	1
	CENTRES, ETC.	
L5-10-185	Half Centre No. 3 M.T.	1
L5-10-186	Square Centre ,,	1
L5-10-193	2 Prong Centre ,,	1
L5-10-192	3 Prong Centre ,,	1
L5-10-191	4 Prong Centre ,,	1
L5-10-170	Light Centre ,,	1
L5-10-194	Screwed Centre ,,	1
L5-10-190	Cup Centre	1
L5-10-189	Hollow Centre ,,	1
L5-10-187	Flange Chuck ,,	1
L5-10-188	Drill Pad ,,	1
	HAND REST	
JL.334	Base	1
JL.146	Eccentric Shaft	1

Part No.	Description	No. Off
	HAND REST (cont.)	
JL.300	Handle	1
L5-664A	Eye Bolt	1
L5-50	Holding Down Plate	1
JL.217	7" Tee (Wood Turning)	1
L5-246	Tee (Metal Turning)	1
JL392A	Nipping Stud } Supplied	1
JL.393	Nipping Handle } Supplied	1
JL391	Flange } Integral	2
	DIVIDING ATTACHMENT	
L5-10-82	Bracket	1
L5-657	Worm	1
L5-10-223	Worm Shaft	1
L5-662A	Lock Nuts	2
L5-10-83	Index Plate	1
L5-10-221	Index Arm	1
SG.119	Spring	1
L5-10-222	Plunger	1
L5-10-215	Plunger Knob	1
L5-138	Worm Wheel	1
L5-10-211	Bush, Index Finger	1
L5-10-224A & B	Index Finger	1 each
L5-10-213	Lock Nut	1
SG252	Spring Clip	1
L5-10-229	Clamp Plate	1
	BORING BARS	
L5-646	$1\frac{3}{4}$" dia. Boring Bar	1
L5-647		
A.B.C.D.E.F.	$\frac{3}{8}$" dia. Bits	6
L5-680	$\frac{9}{16}$" dia. Boring Bar	1
	TORQUE LIMITING DEVICE	
L5-10-259	Body	1
SB.3	Steel Ball, $\frac{1}{4}$" dia.	2
L5-10-234B	Sleeve	1
39·6 × 25·5mm.	Disc Spring	15
L5-10-258B	Adjusting Nut	1
L5-10-242	Spacer	1
L5-10-281	Plate	
SK.24	Key	1

MISCELLANEOUS ACCESSORIES *(not illustrated)*

Part No.	Description	No. Off
	BED TURRET	
DEH 4256/60	Base	1
DEH 4256/54	Clamp, Eccentric	2
DEH 4256/61	Clamp	2
DEH 4256/62	Clamp Pin	2
DEH 4256/28	Trip Plate	1
DEH 4256/29	Pin	1
DEH 4256/30	Spacing Washer	1
DEH 4256/31	Spacing Washer	1
DEH 4256/32	Roller	1
DEH 4256/23	Screwed Pin	2
DEH 4256/49	Spring	1
DEH 4256/63	Gib	1
DEH 4256/64	Gib	1
DEH 4256/65	Gib Clamp	1
DEH 4256/66	Clamp Screw	1
DEH 4256/67	Handle, Clamp Screw	1
DEH 4256/8	Gib Strip	1
DEH 4256/9	Gib Strip	1
DEH 4256/10	Pin, Gib Strip	2
DEH 4256/2	Slide	1
DEH 4256/33	Sleeve	1
DEH 4256/34	Plunger	1
DEH 4256/51	Spring	1
DEH 4256/35	Screw	1
DEH 4256/36	Trip Lever	1
DEH 4256/24	Screwed Pin	1
DEH 4256/37	Roller	1
DEH 4256/38	Stud	1
DEH 4256/52	Spring	1
DEH 4256/39	Indexing Finger	1
DEH 4256/40	Pin	1
DEH 4256/50	Spring	1
DEH 4256-68	Turret Head	1
DEH 4256-69	Tool Clamp	6
DEH 4256-16	Plunger Locating Bush	6
DEH 4256-15	Locating Pin	6
DEH 4256-11	Spigot	1
DEH 4256-17	Pin	1
DEH 4256-26	Bevel, 22T	1
DEH 4256-12	Washer	1
DEH 4256-13	Nut	1
DEH 4256-14	Turret Clamp	1
DEH 4256-5	Locking Handle	1
	Ball, $1\frac{1}{4}$" dia.	1

Part No.	Description	No. Off
	BED TURRET (cont.)	
DEH 4256-19	Index Drum	1
DEH 4256-20	Collar	1
DEH 4256-22	Shaft	1
DEH 4256-27	Bevel, 22T	1
DEH 4256-18	Stop Screw	6
DEH 4256-21	Die	6
DEH 4256-45	Hand Lever	1
DEH 4256-44	Handle	1
DEH 4256-47	Handle Bush	1
DEH 4256-48	Stud	1
DEH 4256-41	Pivot	1
DEH 4256-42	Roller Stud	2
DEH 4256-43	Roller	2
DEH 4256-46	Pivot Bracket	1
	CUT OFF SLIDE	
DEH 4574-40	Saddle	1
DEH 4574/8	Clamp Eccentric	1
DEH 4574/42	Clamp Pin	1
DEH 4574-41	Clamp	1
DEH 4574-20	Rack	1
DEH 4574-10	Cross Slide Stop	1
DEH 4574-1L	Cross Slide	1
DEH 4574-21	Gib Strip	1
DEH 4574/26	Die Piece	6
DEH 4574-28	Pin	1
DEH 4574-11	Stop	2
DEH 4574-19	Stop Clamp	2
DEH 4574-3	Wheel House	1
DEH 4574-4	Gear Wheel Shaft	1
DEH 4574-13	Handle	1
	Ball, $1\frac{1}{4}$" dia.	1
DEH 4754-7	Gear Wheel, 40T	1
DEH 4754-5	Sleeve	1
DEH 4754-6	Collar	1
DEH 4991-1	Toolpost, Rear	1
DEH 4991-3	Clamping Stud, Rear	1
DEH 4991-5	Wedge, Rear	1
DEH 4991-2	Toolpost, Front	1
DEH 4991-4	Clamping Stud, Front	1
DEH 4991-6	Wedge, Front	1
DEH 4991-7	Adjusting Nut	2
DEH 4991-8	Adjusting Screw	2

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