

Contents

	PAGE
Instructions for Ordering Spares	4
Introduction	5
Controls	6, 7
Foundation Plan	8
Specification and Leading Dimensions	9
Lubrication	10
Attachments	11, 12
Maintenance	13
Recommended Lathe Practice	14 to 19
Hydraulic Profiling Unit	20 to 25
 Spare Parts List	
Bed and Drive Assembly	26 to 28
All Geared Headstock Assembly	29 to 32
Feed Gearbox English and American	33 to 36
Feed Gearbox Metric	37 to 40
Apron Assembly	41 to 43
Saddle and Slides Assembly	44 to 47
One Shot Lubrication	48, 49
Leadscrew, Feed Shaft, Third Shaft, Rack and Bracket Assembly	50 to 52
Tailstock Assembly	53, 54
Change Wheel Assembly	55 to 58
Standard Accessories	59, 60
Electric Pump and Fittings	61, 62
Taper Turning Attachment	63 to 65
Miscellaneous Accessories	66, 67
Profile Copying Attachment	68 to 71
Profile Copying Attachment Miscellaneous Accessories	72 to 74
Electrical Equipment	75 to 80

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 LIMITED
P.O. BOX 20
HECKMONDWIKE
YORKSHIRE, ENGLAND

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

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

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

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 placed on a rigid floor and the jacking screws adjusted to eliminate rock. It is advisable to support the jacking screws on steel plates. The screws should be adjusted so that the headstock end of the lathe is slightly higher than the tailstock end, and so that the front of the machine is raised relative to the rear. This facilitates the return of the coolant into the sump.

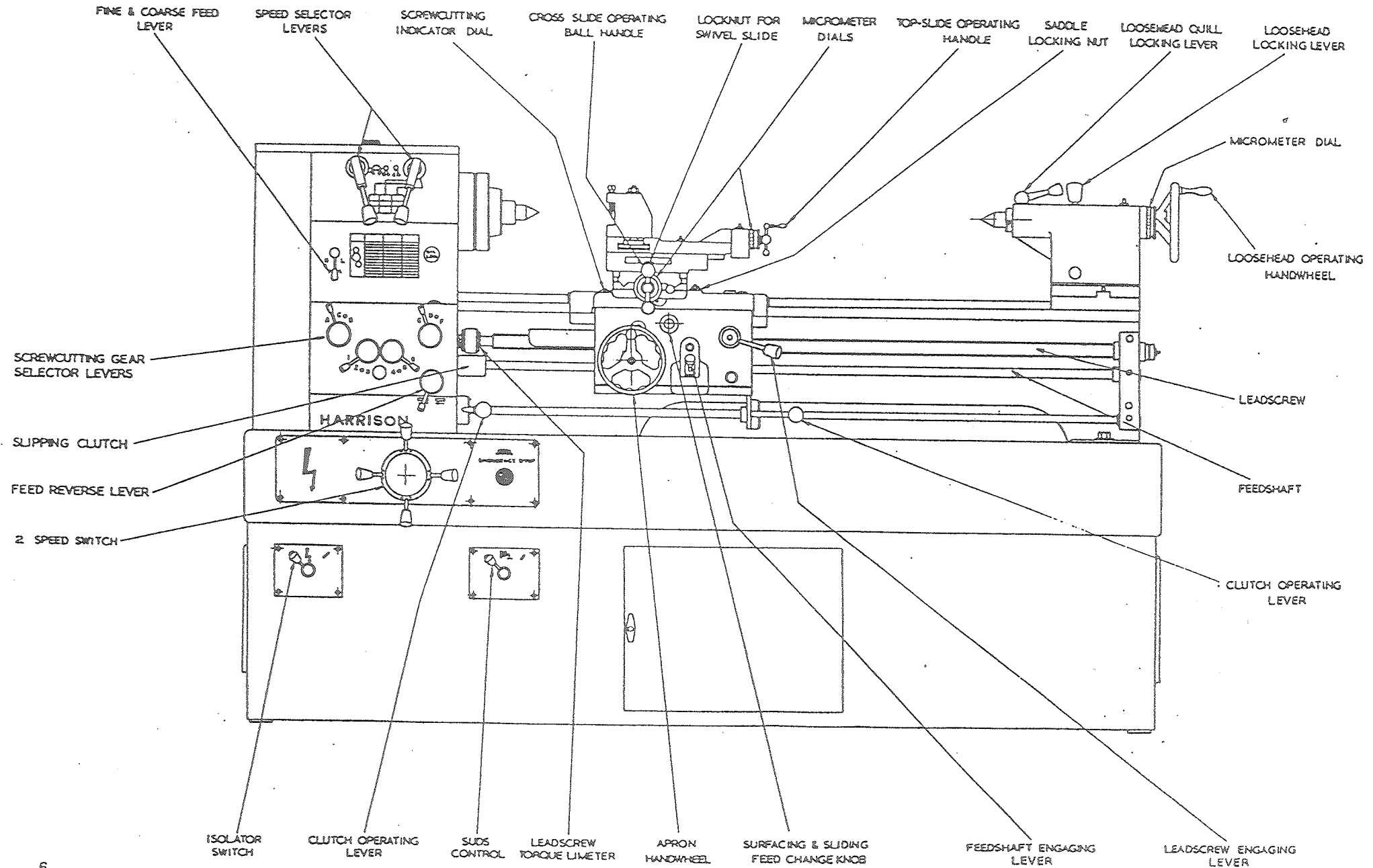
Electrical connection: The supply wires should be connected to the isolator switch (line switch) at the end of the cabinet in the usual manner.

Initial operation: It is important to make sure that the feed or screw-cutting 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



CONTROLS

(a) **Electrical Controls.** A single panel on the front upper part of the lathe cabinet contains all the motor controls within easy reach of the operator.

On the two-speed model, the panel incorporates the speed and direction switch which operates a no-volt and overload protected starter. Also on the panel is an "emergency stop" button, positioned so as to be easily contacted by the operator's knee.

On the single speed model, the panel contains only a pushbutton operated starter with overload and no-volt protection and a forward and reverse switch when fitted.

Other controls if fitted, such as the coolant and hydraulic pump switches, are on the lower part of the cabinet directly below the main panel.

(b) **Headstock.** Speed changes should be made with the spindle stationary. The clutch levers at the front of the machine are adjacent to the feed gearbox and apron. On machines with an electrical third shaft control there is only one lever which is adjacent to the apron and operates the forward and reverse motions.

Selection on any of the speeds (18 on two speed model, 9 on single speed model), is by the manipulation of twin gear levers in front of the headstock. Freely sliding gears combined with direct reading speed chart ensures effortless and instantaneous speed change. Fine or coarse feeds are obtained by the lower selector lever at the front of the headstock.

(c) **Totally Enclosed Gearbox.** The standard model has 36 changes of threads and feeds (47 on American models and 35 on Metric models). English—Metric conversion change wheels can be supplied for the standard gearbox to give 35 metric pitches. Metric—English conversion change wheels can be supplied for the Metric gearbox to give 36 English threads.

The lever positions are determined by reference to a direct reading screwcutting chart. Forward and reverse rotation of the feed motion is obtained by the lower gear selector.

(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

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 feed rod is prevented by interlocking control.

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

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

On English and American models.

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 mm pitch, engage at any graduation.

To cut 1.25, 2.5, 5 and 10 mm pitch, engage at any numbered graduation.

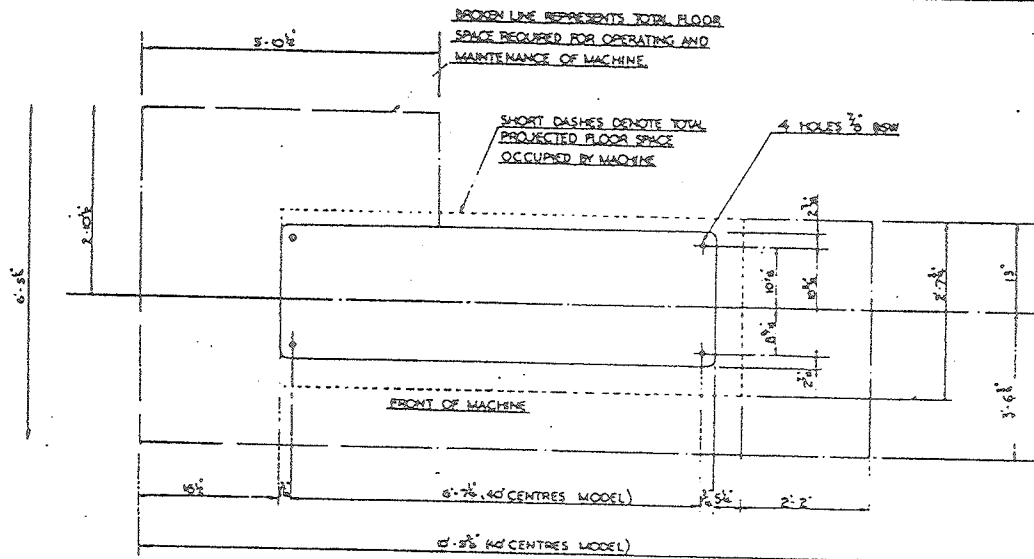
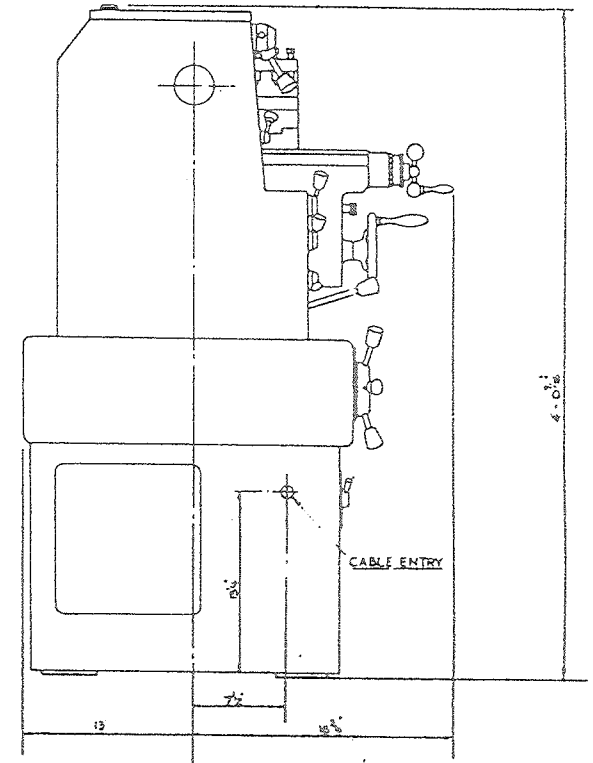
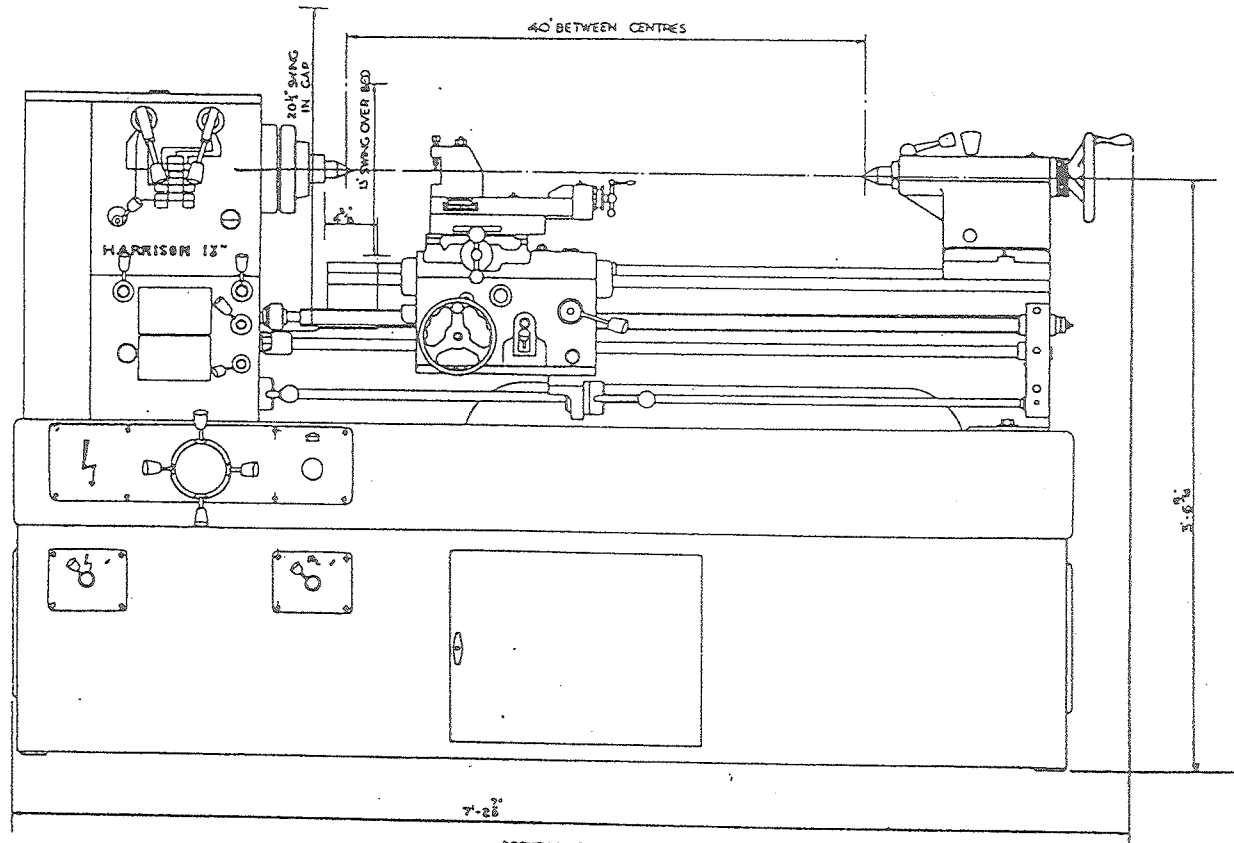
To cut 4 mm pitch, engage at graduations 60 or 120.

Note:— The indicator dial cannot be used for metric, B.A. and other special threads when a 4T.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 leadscrew and return the carriage by using the electrical reverse, enabling repeat cuts to be taken.

(e) **Slides.** Cross slide and compound slide are fitted with friction grip micrometer dials graduated to read .001 in. or alternatively .02 mm. The compound 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 the spindle quill locking is by means of a pad bolt on the top of the tailstock. A friction grip micrometer dial, graduated to read .001 in. or alternatively .02 mm is fitted. The quill is graduated in Imperial and

Foundation Plan



Specification and leading dimensions

	STANDARD LATHE		WITH PROFILING EQUIPMENT	
Swing over bed	13"	330 mm.	13"	330 mm.
Swing over cross slide normal	7½"	194 mm.		
Swing in gap, diameter	20½"	521 mm.		
Swing in gap, width in front of faceplate	4 ½"	117 mm.		
Admits between centres	40"	1016 mm.		
Maximum length of copy turning — between centres			36½"	921 mm.
Maximum length of copy turning —with chuck			34½"	870 mm.
Swing over cross slide, copy turning			5½"	140 mm.
Maximum depth of profiling			2"	51 mm.
Minimum front angle (with drawing)			90°	
Maximum back angle (plunging)			30°	
Horsepower of hydraulic pump motor			½	
Bed length	72½"	1841 mm.	72½"	1841 mm.
Bed length	8 ½"	219 mm.	8 ½"	219 mm.
Bed — width over shears	8½"	216 mm.	8½"	216 mm.
Maximum cross slide feed	9½"	241 mm.	9½"	241 mm.
Maximum top slide feed	4½"	108 mm.	4½"	108 mm.
Movement of tailstock spindle	5"	127 mm.	5"	127 mm.
Set over tailstock spindle	½"	9.5 mm.	½"	9.5 mm.
Centre to tool base (front)	1½½"	28 mm.	1½½"	28 mm.
Centre to tool base (rear)	1½½"	28 mm.	1½½"	28 mm.
Maximum tool section	1 ½" x ¾"	28.5 mm x 19 mm.		
Spindle speeds, number (Two Speed Motor)	18		18	
(Single Speed Motor)	9			
Speed range with 3 h.p. (Single Speed Motor)	59 to 1250 r.p.m.			
Speed range with 5/2½ h.p. (Two Speed Motor)	41 to 1750 r.p.m.		41 to 1750 r.p.m.	
Spindle bored to pass	1 ½"	41.27 mm.	1 ½"	41.27 mm.
Spindle nose American type	D1-5" Camlock		D1-5" Camlock	
Morse Taper of centres	No. 3		No. 3	
Leadscrew	1 ½" x 4 T.P.I. or 1 ½" x 6 mm.P.		1 ½" x 4 T.P.I. or 1 ½" x 6 mm.P.	
Range of threads, English and American Gearboxes	2 to 60 T.P.I.		2 to 60 T.P.I.	
Range of pitches, Metric Gearbox	0.4 to 12mm		0.4 to 12mm	
Range of feeds (longitudinal) (English Machine)	0.0015" to 0.046"		0.0015" to 0.046"	
(American Machine)	0.0015" to 0.046"		0.0015" to 0.046"	
(Metric Machine)	0.039" to 1.17 mm		0.039" to 1.17 mm	
Range of feeds (cross) (English Machine)	0.001" to 0.031"		0.001" to 0.031"	
(American Machine)	0.0005" to .0162"		0.0005" to 0.0162mm	
(Metric Machine)	0.018 to 0.585mm		0.018 to 0.585mm	
Approximate weight	19½ cwt.	991 kilos	21½ cwt.	1093 kilos

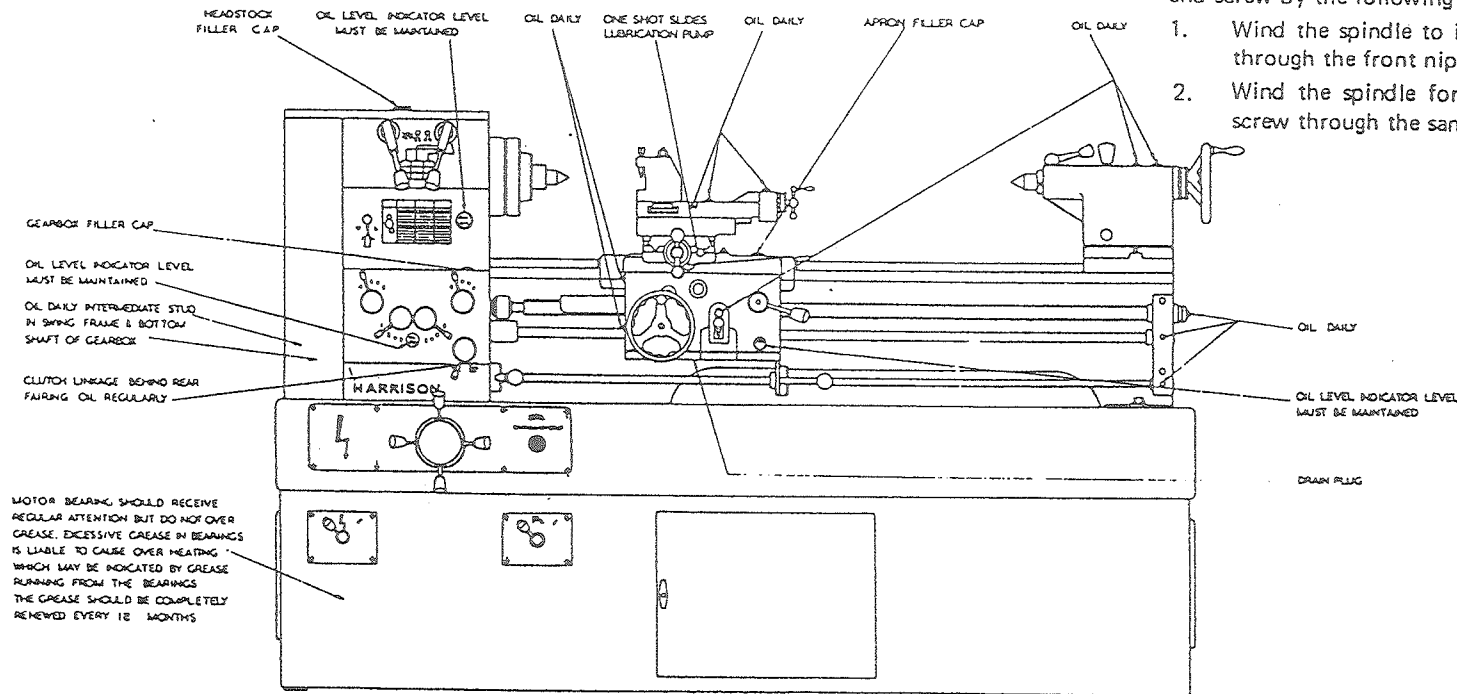
Lubrication Chart

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 holes and nipples are easily visible and an oil gun is provided. The headstock, gearbox and apron oil levels should be maintained at the height shown on the sight glass.

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 front nipple on the top of the tailstock.
2. Wind the spindle forward approximately 3 in. and lubricate the screw through the same nipple.



RECOMMENDED LUBRICANTS

	Mobil	Shell	Eso	Power	Regent	Amoco	Gulf	Castrol	Sun Oil Co.
Headstock, Gearbox Apron, Slideways, Oil Holes and Nipples	DTE Heavy Medium	Tellus 33	Nuto H.44	BP Energol HP 20	Rando H.D.C.	Indoil 31	Service 61	Hyspin AWS 68	Sunvis 831
Motor Grease Cups	Mobilplex 48	Alvania 3	Beacon 3	Energrease LS3	Regal Starfak Premium 3	Amolith 3	Gulfcrown 3	Spheerol AP3	Sun Prestige

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 "HARRISON" Lathes.

Multisize Collet Attachment. The complete assembly is mounted on the spindle nose.

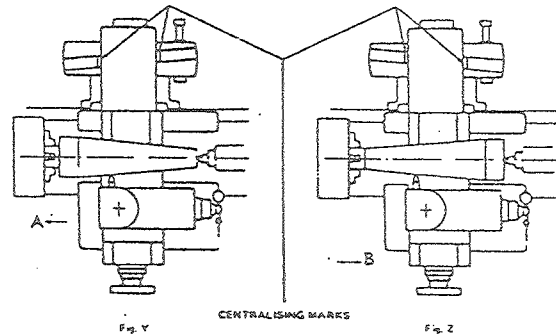
Collets are inserted after removing the closer bush, using the wrench provided.

The capacity of the attachment is $1''$ to $1\frac{1}{2}''$ (3.2 mm to 38.1 mm) 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 carriage 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. (279 mm) 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 operations. Taper turning at any point along the bed can be achieved by setting the support bracket at the rear of the bed to the desired position.



For set up shown in fig. 'Y' with saddle traversing in directions 'A' and set-up shown in fig. 'Z' with saddle traversing in direction 'B', it is advisable to eliminate backlash between cross slide screw and nut before engaging the tool with the work piece, this is achieved by

advancing the tool beyond cutting depth then retracting the tool to the correct cutting position.

With saddle traversing in opposite directions to those shown in figures 'Y' and 'Z' backlash between cross slide screw and nut is removed by normal advancement of the tool.

Changeover 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.

Fourway Toolpost. Is self indexing and positively located. This unit replaces the standard type toolpost.

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

Coolant Pump. The electric pump unit is housed inside the cabinet base and access is through the louvre at the R.H. end of the cabinet.

Feed Stops.

(i) **Micrometer Carriage Stop.** Clamps to the front vee bed way and used for accurate machining of shouldered work.

The screwed spindle is fitted with a micrometer dial having 0.001 in. or alternatively 0.02 mm graduations.

(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.

Fitting and use of attachments — (cont'd.)

Change Wheel Combinations

Type Gearbox	Range T.P.I.	Range mm Pitches	Change Wheel Combination		
			Top Shaft	Inter-mediate Shaft	Bottom Shaft
English	2-60	—	30	127	60
American	2-60	—	30	127	60
English Metric with conversion changewheels	2-60	0.4-12mm	30	127	60
			28	127-135	63 or 60
			35	127-135	63 or 60
Metric English with conversion changewheel	2-60	0.4-12mm	60	120	45
			32	120-127	26 or 27 or 28 or 30 or 33 or 38

Complete Range of T.P.I.

English

2	2.25	2.375	2.5	2.75		3	3.25	3.5	3.75	4	4.5	5
6	7	8	9	10	11		12	13	14	16	18	19
20	22	24	26		28	32	36	40	44	48	56	60

also Metric Gearbox with conversion change wheels, except 2.375

American

2	2.25		2.5	2.75	2.875	3	3.25	3.5	3.75	4	4.5	
5	5.5	5.75	6	6.5	7	7.5	8	9		10	11	11.5
12	13	14	15	16	18		20	22	23	24	26	27
28	30	32	36		40	44	46	48	52	54	56	60

Warning: When cutting threads coarser than $\frac{1}{4}$ " (6 mm) 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 $10^\circ - 12^\circ$.

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.

Complete Range of Metric Pitches

Metric

0.4	0.45	0.5	0.6	0.7	0.75	0.8	0.9	1	1.2	1.25	1.4	1.5
1.6	1.75	1.8	2.0	2.4	2.5	2.8	3.0	3.2	3.5	3.6	4	4.5
4.8	5	5.6	6	7	8	9	10	12				

also English gearbox with conversion change wheels.

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

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 a horizontal platform inside the cabinet. Vee belt tension is adjusted by means of the adjustable motor platform retention screw.

Procedure for replacing vee belts is as follows:—

- Remove the end and rear inspection covers from the cabinet.
- Release the tension in the vee belts by adjusting the motor platform retention screw.

- Replace the belts and carefully re-tension.

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 the adjustment is as follows:—

- Remove drive guard.

- Increase spring load by slightly rotating nut (anti-clockwise, i.e. L.H. thread) on end of clutch shaft.

Constant operation of the clutch results eventually 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.

- Removing fairing (at rear of bed, beneath headstock).

- Release outer nut on operating linkage one complete turn and reclamp with inner nut.

The clutch should be dismantled at six-monthly intervals and any lubricant on the driving faces removed by washing in paraffin.

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

- Open change wheel guard.

- Release the split locknut clamping screw.

- Rotate the locknut sufficiently to obviate play.

- Retighten the locknut clamping screw.

It must be emphasised that this operation requires the utmost care as over-tightening can seriously impair the life of the bearings.

Carriage. To adjust the rear strip, release the nuts on the underside of the strip, adjust the headless setscrews by turning clockwise and re-lock the nuts. To adjust the front strips release the cap head screws which secure the adjusting screws and rotate the latter anti-clockwise, reclamp the cap head screws. Care should be taken to avoid over adjustment.

Cross Slide. Take up of wear on the retaining strips is by releasing the cap head and jacking screws, retightening the cap head screws (finger tight) and adjusting the jacking screws until the load on the screws is observed. When a good sliding fit is achieved tighten the cap head screws.

Compound 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 (line switch) is in the OFF position. The isolating switch (line switch) MUST NOT be removed until the mains leads have been isolated.

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 the 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 nose of the spindle and the bore of the chuck and lubricate with oil.

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.

Recommended lathe practice— (cont'd.)

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 point 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 in 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.

Recommended lathe practice — (cont'd.)

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

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

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. 3 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.

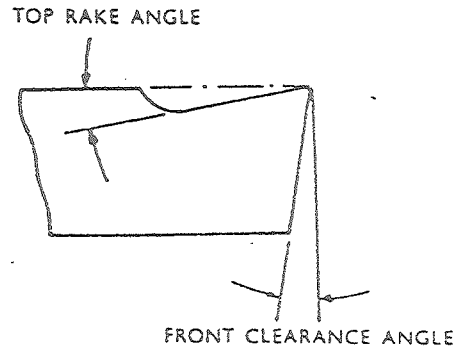


TABLE 1
Cutting Angles for H.S.S. and Cemented Carbide Tools

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.)

Materials	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	1000	305

TABLE 3

Feeds in inches per revolution (mm per revolution)

Materials	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

LATHE TOOLS

In mounting turning tools in the rest, the tools should only extend the minimum amount from the rest to obtain the maximum support against the downward pressure of the cut.

Recommended lathe practice — (cont'd.)

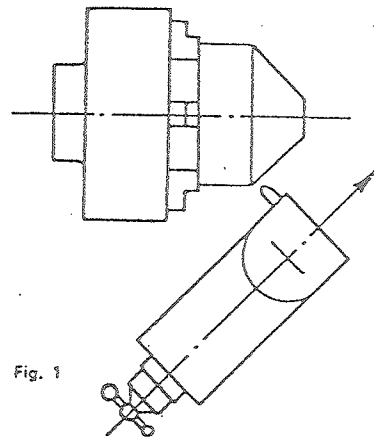


Fig. 1

The recommended cutting speeds for reaming are:—

Cast iron	..	..	..	..	20 ft.per min.	(6m)
Mild steel	..	..	..	..	35 "	" (10.6m)
Medium carbon steel	..	..	..	..	30 "	" (9m)
Phosphor-bronze	..	..	..	..	35 "	" (10.6m)
Aluminium and duralumin	..	..	..	..	35 "	" (10.6m)

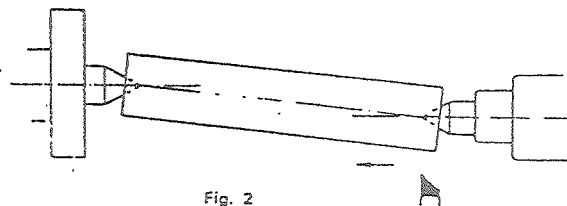


Fig. 2

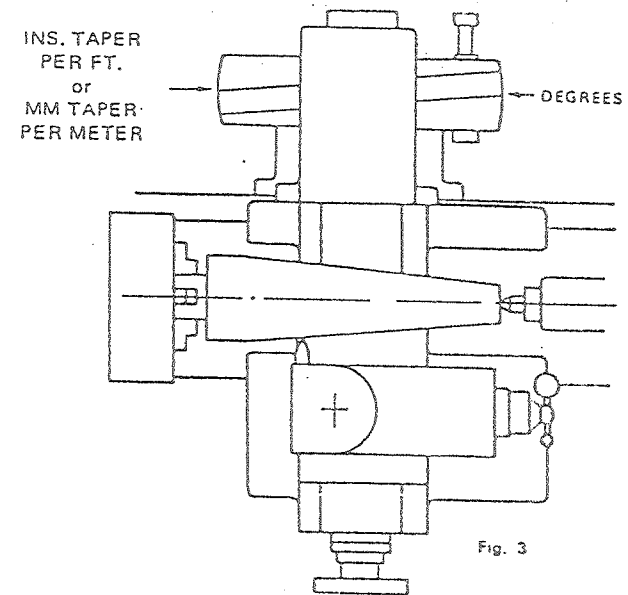


Fig. 3

Methods of Taper Turning and Boring. Three general methods are applicable. (1) As shown in fig. 1, 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. 2 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.

Recommended lathe practice — (cont'd.)

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 to the entire compound rest.

Boring tools may be 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

$$N = \frac{3.82 \times S}{D} \text{ or } N = \frac{318 \times S \text{ (metres/min.)}}{D \text{ (mm)}}$$

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

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

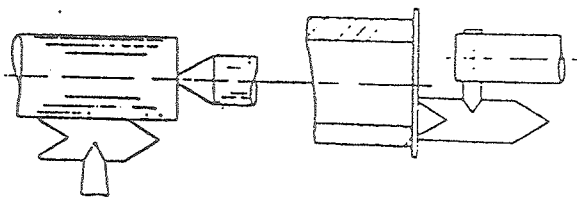


FIG. 4

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

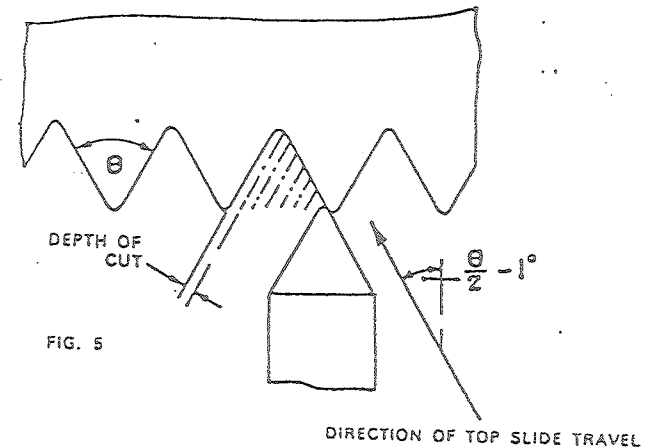


FIG. 5

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. 4 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.

Recommended lathe practice — (cont'd.)

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 multiple 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 $0.5 P + 0.01$ in. and width at bottom is $0.3707 P - 0.0052$ in. where P is the thread pitch.

Hydraulic Profiling Unit

DESCRIPTION

The attachment comprises an independently operated rear tool slide fitted to a hydraulically operated angle slide, the whole being mounted on an extended cross slide. (A front compound slide is also fitted for normal turning.) Automatic copying control from the template to the hydraulic slide is by means of a stylus arm, mounted on taper roller bearings, actuating a spool type valve.

Template support heads and slide are mounted on the rear of the bed, one of the heads having a graduated eccentric sleeve to give 'set over' when required. Both heads can be locked in any position along the slide, the centres of each being adjustable by a handwheel.

Oil is supplied by the hydraulic pump unit usually placed on the floor at the tailstock end of the machine. The unit comprises an oil container, flange mounted motor and geared pump with pressure relief valve. Three flexible hoses connect the pump unit to the hydraulic slide, these being pressure, return and drain lines.

Copy turning is carried out with the tool in the normal upright position; an electrical reversing switch facilitating quick change-over from normal turning. The American type camlock and long taper key drive spindle noses ensure complete protection and positive drive in both directions of rotation.

A micrometer saddle stop controls the movement of the carriage.

OPERATION

Templates and Component Blanks.

The circular templates are usually produced exactly similar to the finished work, and often the first of a batch of components is used as the template. It is important that the template has a good surface finish, otherwise irregularities will be transmitted to the workpiece.

For work of large diameter a smaller overall diameter template may be used providing the profile and lengths are the same.

It is important that the lengths of the component blanks be similar and the ends centre drilled to a constant depth to ensure uniformity of shoulder lengths throughout the batch.

Preparation and Setting Up (Fig. 7)

The oil container should be filled with the recommended grade of hydraulic oil and the level always maintained between the end and the maximum level shown on the dipstick.

The end fittings of the pressure, return and drain hoses are numbered 1, 2 and 3 respectively, and care must be taken to ensure that these are connected to the fittings on the attachment and oil container bearing corresponding numbers.

Connection of the electrical leads to the hydraulic pump motor should be such that the direction of rotation is anti-clockwise when viewed from above.

Before commencing copy turning, the hydraulic pump unit should be run for a few minutes and the hydraulic slide fed in and out a few times by means of the hand control lever to allow the oil to circulate quite freely through the system. This should apply whenever the machine has been idle for any length of time. The oil pressure reading on the gauge should be 150 lb. per sq. inch approximately.

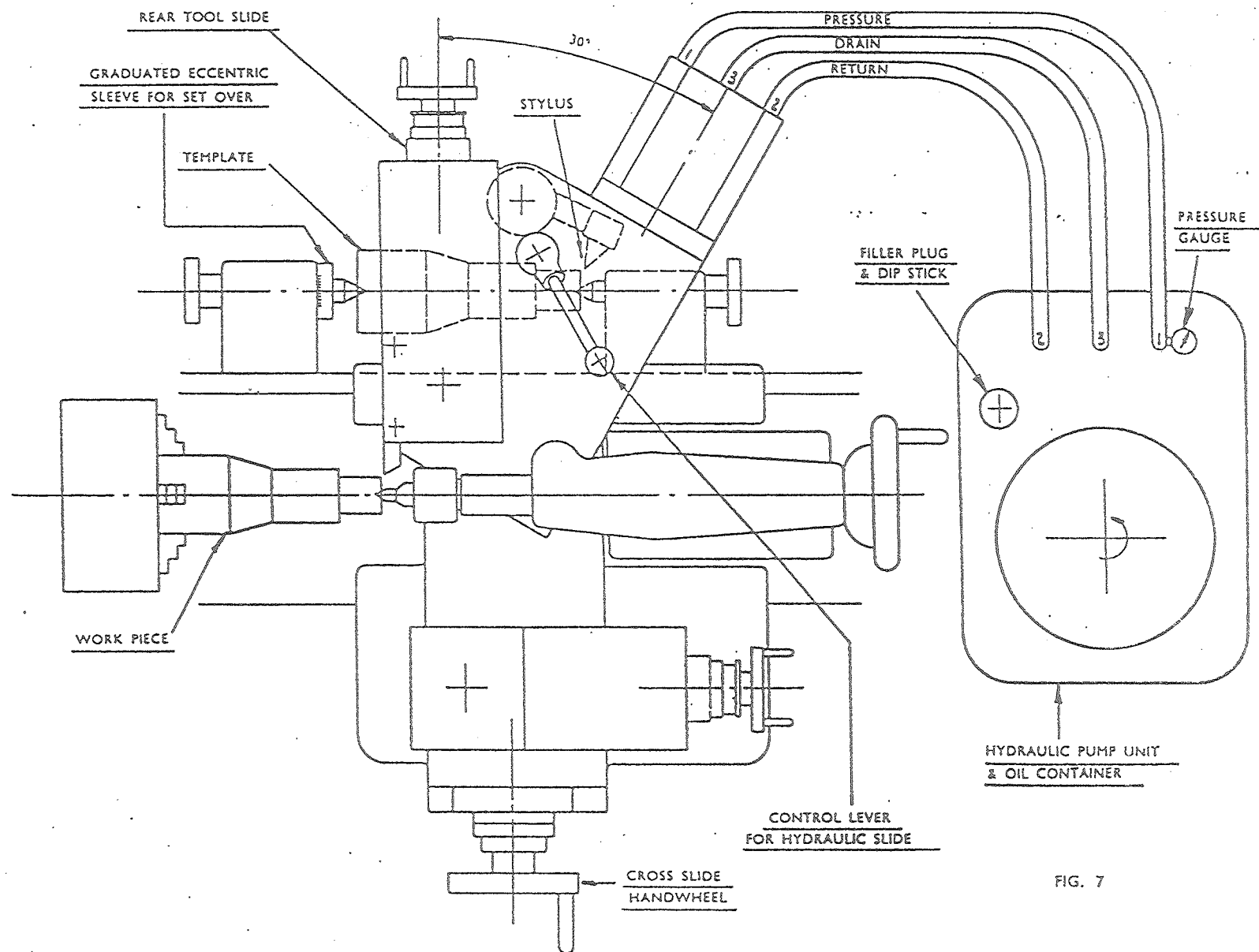


FIG. 7

Operation — (cont'd.)

As the tool lies approximately 6¼ in. to the left of the stylus point, the template should be placed between the centres of the support heads a similar distance to the right of the intended position of the finished workpiece.

The hydraulic angle slide should be fed to its extreme inward position by means of the hand control lever.

Rotate the cross slide handwheel in an anti-clockwise direction until the stylus point contacts the smallest diameter of the template and commences actuating the valve controlling the hydraulic slide.

With a tool overhang of approximately 1 in. position the rear tool slide to ensure that the tool is clear of the largest diameter of the workpiece blank. Care should be taken to ensure that the tool is set exactly to centre height otherwise discrepancies will occur especially on small diameter work.

Copy turning can now commence, the depth of cuts for the 'first off' only being set by the rear tool slide handwheel.

On completion of the first workpiece, withdraw the hydraulic slide by means of the hand control lever and, only if more than one cut is necessary, traverse the whole slide assembly away from the work by means of the cross slide handwheel a distance equal to the depth of profile; on subsequent workpieces the cuts should be applied by this handwheel. The setting of the rear tool slide should not be altered after completion of the 'first off' unless a uniform fine finishing cut over the entire profile of the workpiece is required.

The micrometer saddle stop supplied with the lathe can be set towards the tailstock to position carriage after completion of each cut.

The cutting speed, depth of cut and feed rate are, as in normal turning, dependent upon the material, but accepted practice using carbide tipped tools is to combine high cutting speed with a fine feed to obtain the best surface finish.

E.g. material — mild steel, cutting speed 200 ft. (61 m) per min., depth of cut 3/16 in. (5 mm), feed rate 0.002 in. (0.05 mm) per revolution.

A minimum number of cuts per component should be taken to minimise tool point wear, thereby maintaining repeat accuracy throughout the batch. Wherever possible, the more robust (a) of the two cutting tools should be used, the lighter tool (b) being reserved for work requiring steep back angles and grinding reliefs (fig. 10).

SCREWCUTTING (Fig. 8)

A higher cutting speed for screwcutting can be achieved by use of the Copying equipment. Whilst the only purpose of the equipment during screwcutting is the automatic withdrawal of the tool, the manual withdrawal speed is usually the factor limiting a threading operation, so the advantage to be gained from using the equipment will be readily appreciated. The most satisfactory results are obtained on fine threaded work and with the more free cutting materials, e.g. brass, cast iron, etc.

For cutting right-hand threads the tool should be in an inverted position, the direction of rotation of the headstock spindle therefore being in an anti-clockwise direction when viewed from the tailstock end of the lathe.

For cutting left-hand threads the tool should be in the normal upright position, the direction of rotation of the headstock spindle being in a clockwise direction.

The template required should have a single shoulder of sufficient depth to allow the tool to be automatically withdrawn from the work. The stylus point must always be clear of the template diameter contacting only the shoulder at point of withdrawal. If more than one cut is necessary, then these should be applied by the cross slide handwheel.

Taper screwcutting can be carried out to advantage (the above remarks regarding fine threads or free cutting materials again applicable), but the 'setting-up' differs slightly from that of parallel screwcutting. A template is required having a taper similar to that of the taper thread being produced, the stylus point contacting this

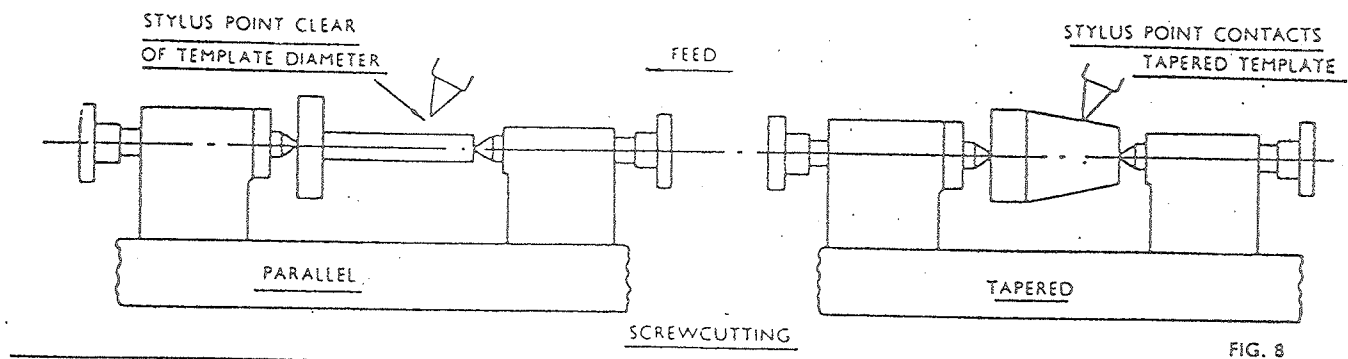


FIG. 8

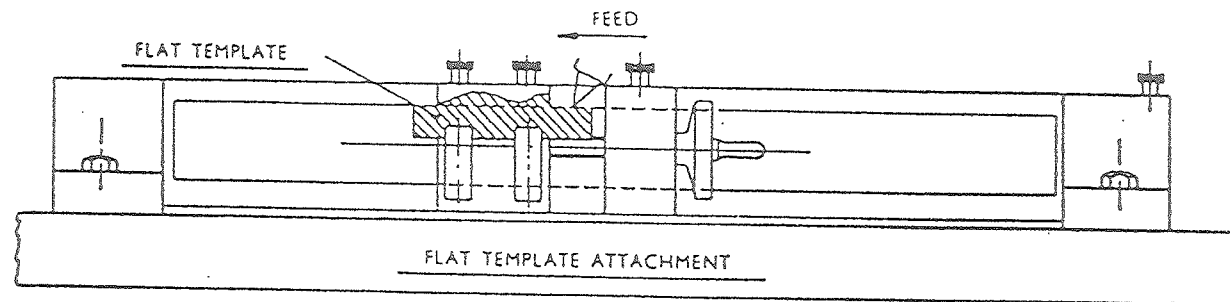


FIG. 9

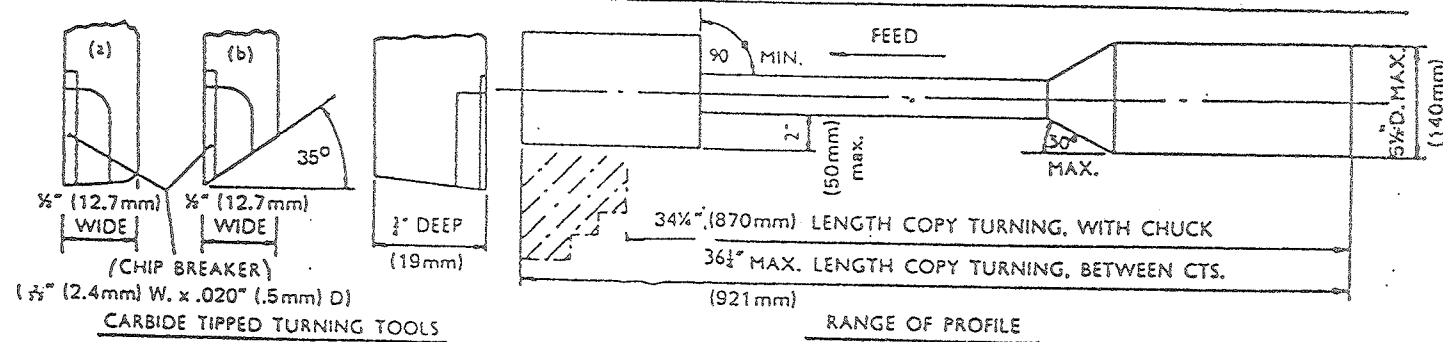


FIG. 10

Operation (cont'd.)

during thread cutting. If more than one cut is necessary then this should be applied with the rear tool slide handwheel. Because of the angular action of the hydraulic slide a modified changewheel combination is required for each different taper.

Flat Template Attachment Fig. 9

(ADDITIONAL EQUIPMENT)

Whilst the major proportion of profile turned work is accomplished

by the use of cylindrical templates an attachment is available specifically designed to accommodate flat templates.

The unit replaces the cylindrical templates support heads and is clamped to the tenoned block attached to the rear of the lathe bed.

Provision is made for accurate alignment of the template to the lathe axis and a graduated dial provides micro longitudinal adjustment.

COPYING DISCREPANCIES

Discrepancies occurring between workpieces and template may be attributed to the following

(1) Tool requires regrinding.

(2) Tool is not on centre height particularly important on small diameter work.

(3) Template and workpiece are not parallel adjust by means of graduated eccentric sleeve in template support head.

(4) Gib strips on slides require adjusting.

MAINTENANCE

Hydraulic Pump Unit

Recommended grades of hydraulic oil -

Mobil	Shell	Castrol	Esso	B.P. Power	Regent	Amoco	Gulf	Sun Oil Co.
DTE Oil Heavy Medium	Tellus Oil 33	Hy-Spin AWS-68	Nuto H-54	B.P. Energol HL100	Rando HDC	Indoil 31	Harmony 53	Sunoco Sunvis 831

The oil container should be drained, cleaned and renewed with oil at six-monthly intervals, whilst the filter fitted to the inlet port of the

pump should be cleaned at three-monthly intervals. A drain plug is fitted at the base of the container and after draining, the cover and pump unit complete should be removed by releasing the four screws at the corners of the cover. The container is then available for easy cleansing.

The working pressure registered on pressure gauge should read approximately 150 lb. per sq. inch, but if readings differ greatly from this figure then adjustment should be made to the relief valve which is inside the container.

Capacity of oil container approximately 3 gallons (13.6 litres).

Maintenance — (cont'd.)

Lubrication

Being a closed hydraulic system, the internal mechanism of the attachment requires no additional lubrication except for an oil nipple provided for lubrication of the stylus arm bearings and this together with periodic lubrication of the slides is all that is necessary.

(It is recommended that the slides be lubricated with molybdenum disulphide in petroleum jelly.)

Play in Slideways

All the slides are provided with gibs. Adjustment should be effected as required and the set screws and locknuts carefully tightened.

Replacement of Hydraulic Ram Leather (Fig. 11)

Instructions for replacing the hydraulic ram leather sealing the piston rod in the cylinder are as follows —

Remove cap screws 'A' and withdraw hydraulic slide in direction of arrow.

Release set screw 'B' and raise item 'C' clear of the cross slide — cylinder and valve unit should now be clear.

Remove end cover 'D' and withdraw piston and rod from the cylinder.

Remove piston.

Replace ram leather 'E' — care being taken to ensure that the sealing lip is not damaged.

On assembling end cover 'D' use sealing compound on face.

This hydraulic equipment has been made in the simplest and most foolproof form without unnecessary complications, and we believe that this is the most effective way of dealing with such apparatus. IT IS IMPORTANT TO SWITCH OFF THE HYDRAULIC UNIT WHEN NOT IN USE, so as to minimise temperature rise in the hydraulic tank. Heat is generated when the hydraulic fluid is by-passed through the relief valve to the tank and if the pump is left running unnecessarily without utilising the copying slides, viscosity of the oil can be reduced and can affect smooth operation.

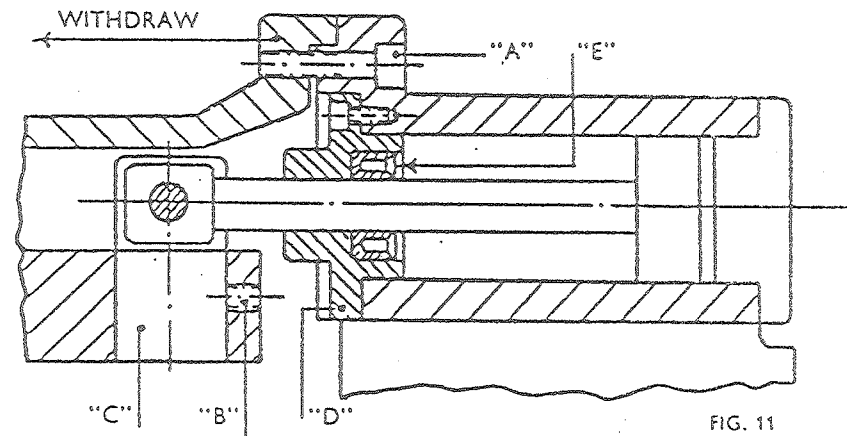


FIG. 11

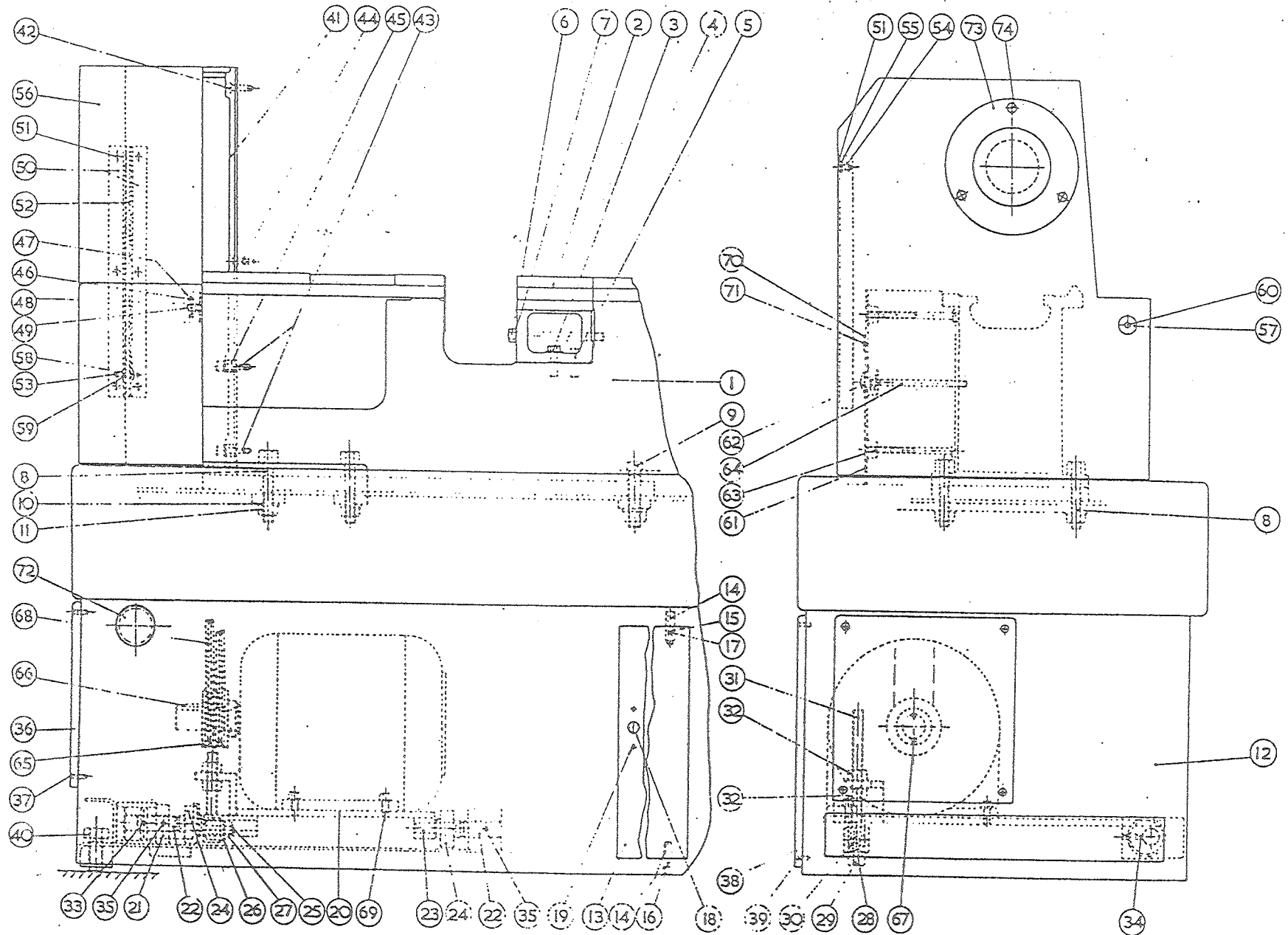
Bed and Drive Assembly *(illustrated opposite)*

Item No.	Part No.	Description	No. Off
1	11001001A	Straight Bed	1
	11001002A	Gap Bed	1
2	L16-1-2	Gap Piece	1
3	½" FH 1¼"		
	(Whit.)	Hexagonal Head Set Screw (High Tensile)	2
4	½" FW	Washer	2
5	L5-737	Taper Pin	1
6	½" FH 5¼"		
	(Whit.)	Hexagonal Head Bolt (High Tensile)	1
7	½" FW	Washer	1
8	¾" FH 3¾"		
	(Whit.)	Hexagonal Head Bolt (Bright)	5
	¾" FH 2¾"		
	(Whit.)	Hexagonal Head Bolt (Bright) (Front bolt, tailstock end of bed)	1
9	¾" BS 3¾"		
	(Whit.)	Square, Square Head Bolt	2
10	¾" FW	Washer	8
11	¾" FN (Whit.)	Hexagonal Nut	7
12	11001010	Cabinet Base	1
13	11001012	Door (11001030 on machines for U.S.A.)	1
14	L5-1-181	Boss	3
15	L5-1-182A	Boss	1
16	L5-1-183	Hinge Pin	2
17	4BA FX ½"	Hollow Set Screw Cup Point	1
18	ZA	Lock (T44/RE on machines for U.S.A.)	1
19	¾" FR ½"	Round Head Set Screw	2
20	11001015	Motor Platform (1501071A for 213 Motor)	1
21	11001016	Eccentric Bush	1
22	L17-1-7	Pivot Screw	2
23	L17-1-5	Roller Shaft	2
24	L17-1-6	Roller	2
25	11001022A	Pivot Adjusting Screw	1
26	½" FW	Washer	1
27	½" FN (Whit.)	Hexagonal Nut	1
28	¾" FW	Washer	2
29	¾" FH 1"		
	(Whit.)	Hexagonal Head Set Screw	2

*Not illustrated

Item No.	Part No.	Description	No. Off
30	11001021	"Silent Bloc" Bush (E2099)	1
31	L17-1-52	Adjusting Screw	1
32	¾" FL (Whit.)	Hexagonal Locknut	2
33	¾" FX ½"		
	(Whit.)	Hollow Set Screw "W" Point	1
34	11001036	Brass Pad	2
35	¾" FX ¾"		
	(Whit.)	Hollow Set Screw "W" Point	2
36	11001013	Inspection Cover	2
37	¾" FV ½"		
	(Whit.)	Countersunk Hollow Set Screw	8
38	11001014	Rear Cover	1
39	¾" FV ½"		
	(Whit.)	Countersunk Hollow Set Screw	6
40	11001025	Jacking Screw	4
41	1301001	Rear Support, Change Wheel Guard	1
42	¾" FY 1"		
	(Whit.)	Socket Head Cap Screw	2
43	¾" FY 1½"		
	(Whit.)	Socket Head Cap Screw	2
44	¾" FT ¾"		
	(Whit.)	Countersunk Head Set Screw	2
45	1501029	Jacking Screw	2
46	¾" FY 1"		
	(Whit.)	Socket Head Cap Screw	2
47	1501032	Catch Plate	1
48	L17-8-92	Spring Clip	1
49	1501023	Stud	1
50	1501013	Angle	2
51	¾" FV ¾"		
	(Whit.)	Countersunk Hollow Set Screw	6
52	1501008	Hinge	1
53	¾" FV ½"		
	(Whit.)	Countersunk Hollow Set Screw	6
54	¾" FN (Whit.)	Hexagonal Nut	6
55	¾" WS	Spring Washer	6
56	13001012	Door, Change Wheel Guard	1
57	1501012	Knob	1
58	¾" FN (Whit.)	Hexagonal Nut	6
59	¾" WS	Spring Washer	6
60	¾" FN (Whit.)	Hexagonal Nut	1

Bed and Drive Assembly



Item No.	Part No.	Description	No. Off
61	11001029	Fairing	1
62	1501006	Nut	1
63	1/2" FH 5" (Whit.)	Hexagonal Head Set Screw	3
64	1501005	Stud	1
65	L16-1-37C	Motor Pulley (1750 rpm Top Speed) for C213 Motor (50 cycles)	1
66	1" x 1/4" KR3	Rectangular Key for C213 Motor (50 cycles)	1
65	L16-1-37F	Motor Pulley (1750 rpm Top Speed) for D112M Motor (50 cycles)	1
66	8mm x 7mm KR 40mm	Rectangular Key for D112M Motor (50 cycles)	1
65	L16-1-41C	Motor Pulley (1250 rpm Top Speed) for C164 Motor (50 cycles)	1
66	1/2" KS 1 1/2"	Square Key for C164 Motor (50 cycles)	1
65	L16-1-42F	Motor Pulley (1750 rpm Top Speed) for K184T Motors (60 cycles)	1
66	1/2" KS 2"	Square Key for K184T Motors (60 cycles)	1
65	L16-1-61B	Motor Pulley (1250 rpm Top Speed) for K145T Motors (60 cycles)	1
66	1/2" KS 1 1/2"	Square Key for K145T Motors (60 cycles)	1
67	1/2" FX 1" (Whit.)	Hollow Set Screw 1/2 Dog Point	1
68	A78	Vee Belt	2
69	1/2" FH 1" (Whit.)	Hexagonal Head Set Screw	4
70	364	Lubrication Instruction Plate	1
71	1/2" x 1/4"	Rivet	2
72	19353	Rubber Grommet	4
73	13001004	Cover Plate	1
74	2BA FV 1/2"	Countersunk Hollow Set Screw	3
•	11001038	Door	1
•	JL66	Hinge	2
•	2BA FT 1/2"	Countersunk Head Set Screw	12
•	JG 145	Louvered Cover	2
•	1/2" FR 1" (Whit.)	Round Head Screw	8
•	1/2" FW	Washer	8

* Not illustrated

Item No.	Part No.	Description	No. Off.

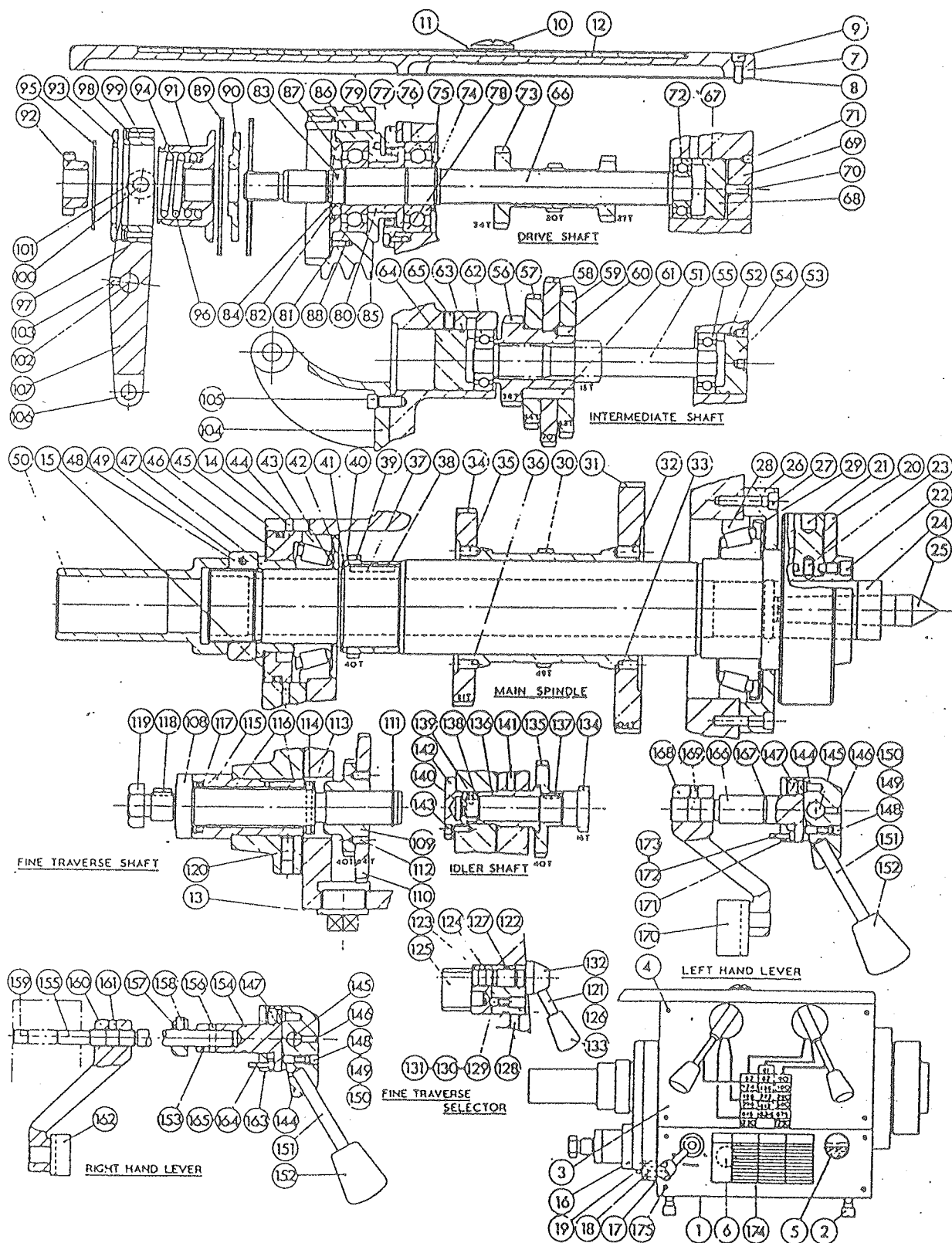
All Geared Headstock Assembly (illustrated on page 30)

Item No.	Part No.	Description	No. Off
1	13002001	Headstock	1
2	½" FY 1½" (Whit.)	Socket Head Cap Screw	4
3		Speed Plate (When ordering please state speed range)	1
4	¾" x ¼"	Self Tapping Screws	4
5	IC4612	Oil Level Window 1½" Dia.	1
6	A8100/90	Magnetic Drain Plug 1" B.S.P.	1
7	11002002	Top Cover	1
8	11002003	Gasket	1
9	½" FY ¾" (Whit.)	Socket Head Cap Screw	2
	½" FY 1" (Whit.)	Socket Head Cap Screw	5
10	1502048	Filler cap	1
11	SP 41	Fibre Washer	1
12	11002057	Rubber Mat	1
13	1" B.S.P.	Malleable Pressure Plug 1" Square	1
14	¼" FX ¾" (Whit.)	Hollow Set Screw 'W' Point Wedgelok	1
15	¼" FX ½" (Whit.)	Hollow Set Screw 'W' Point Wedgelok	1
16	11002069	Rear Cover	1
17	11002007	Gasket Rear Cover	1
18	¾" FY 1½" (Whit.)	Socket Head Cap Screw	4
19	11002068	Silver Steel Dowel 1" Dia. x 1½" Long	2
20	11002008	Main Spindle (5" Camlock)	1
21	11002009	Cam	6
22	11002010	Cam Screw	6
23	11002011	Cam Spring	6
24	11002012	Sleeve for Centre	1
25	11002058	Centre	1
	WR 48	Camlock Nose Key	1
26	11002065A	Bearing Cover, Front	1
27	¾" FY 1½" (Whit.)	Socket Head Cap Screw	5
28	495A/493B	Timken Taper Roller Bearing	1

Item No.	Part No.	Description	No. Off
29	11002066	Baffle Plate	1
30	L16-2-122G	Main Drive Gear 49T	1
31	L16-2-5G	Main Drive Gear 104T	1
32	¾" FX ½" (Whit.)	Hollow Set Screw Cup Point	2
33	¼" PG ½"	Grooved Pin	2
34	L16-2-144G	Main Drive Gear 81T	1
35	¾" FX ½" (Whit.)	Hollow Set Screw Cup Point	2
36	¼" PG ½"	Grooved Pin	2
37	¾" KR 1½"	Key	1
38	11002062	Bush	1
39	L16-2-129G	Gear 40T	1
40	11002061	Spacing Washer	1
41	5100/237	Truarc External Retainer	1
42	L16-2-79	Baffle Plate	1
43	L16-2-80	Waved Thrust Washer	1
44	462/453B	Timken Taper Roller Bearing	1
45	OS 49	'O' Ring	1
46	11002070	Sealing Ring	1
47	L16-2-29A	Spacer	1
48	L16-2-162	Locknut	1
49	¾" FY 1½" (Whit.)	Socket Head Cap Screw	1
50	11002018	Tail End Sleeve	1
	WR 20	Hook Spanner	1
51	L16-2-112G	Intermediate Shaft	1
52	131D1615M	'O' Ring	1
53	11002019	Bearing Locating Bush	1
54	¾" FX ½" (Whit.)	Hollow Set Screw Cup Point	1
55	LJ ¾"	Single Row Ball Bearing	1
56	L16-2-113G	Gear 38T	1
57	L16-2-10G	Gear 56T	1
58	L16-2-9G	Gear 70T	1
59	L16-2-8G	Gear 63T	1
60	¾" FX ½" (Whit.)	Hollow Set Screw Cup Point	2

*Not illustrated

All Geared Headstock Assembly



All Geared Headstock Assembly *(illustrated opposite)*

Item No.	Part No.	Description	No. Off
61	A" PG 1½"	Grooved Pin	2
62	LJ ¾"	Single Row Ball Bearing	1
63	131D1615M	'O' Ring	1
64	L16-2-163	Bearing Locating Bush	1
65	¾" FX ½"		
	(Whit.)	Hollow Set Screw, Dog Point	1
66	L16-2-108	Driving Shaft	1
67	131D1615M	'O' Ring	1
68	L16-2-177	Bearing Locating Bush	1
69	L16-2-179	Bearing Locating Bush	1
70	¾" FX ¾"		
	(Whit.)	Hollow Set Screw, 'W' Point, Wedgelok	1
71	¾" FX ¾"		
	(Whit.)	Hollow Set Screw Cup Point	1
72	LJ ¾"	Single Row Ball Bearings	1
73	L16-2-109G	Gear 20, 27 & 34T	1
74	1400-1½"	External Circlip	1
75	L16-2-74	Washer	1
76	MJT 1½"	Single Row, Double Purpose Bearing	1
77	L16-2-17	Locating Plate	1
78	2BA FY ½"	Socket Head Cap Screw	4
79	11P-25019931	Oil Seal	1
80	L16-2-32	Bearing Spacer	1
81	MJ 1½"	Single Row Rigid Ball Bearing	1
82	L16-2-120	Retaining Ring	1
83	4BA FX ½"	Hollow Set Screw Cup Point	1
84	1400-1½"	External Circlip	1
85	L16-2-16	Head Pulley	1
86	L16-2-182	Pin for Clutch Disc	6
87	L16-2-18A	Locating Plate	1
88	2BA FV ½"	Countersunk Hollow Set Screw	4
89	DC 8	Clutch Disc	2
90	L16-2-110	Clutch Plate	1
91	L16-2-21A	Clutch Operating Sleeve	1
92	L16-2-22	Clutch Adjuster Nut	1
93	L16-2-82	Braking Plate	1
94	¾" PT ½"	Taper Pin	1
95	5100/237	'Truarc' External Retainer	1

Not
required
with
electrical
third
Shaft
Control

Item No.	Part No.	Description	No. Off
96	SG 216	Spring	1
97	L16-2-43A	Shoe, Clutch	1
98	L16-2-77A	Brake Disc	1
99	2BA FV ½"	Countersunk Hollow Set Screw	4
100	L16-2-76	Pin, Clutch Shoe	2
101	2BA FX ½"	Hollow Set Screw, Cup Point	2
102	L16-2-42	Swivel Pin	1
103	¾" FX ¾"		
	(Whit.)	Hollow Set Screw Cup Point	1
104	L16-2-39	Support Bracket	1
105	¾" FY ¾"		
	(Whit.)	Socket Head Cap Screw	3
106	L16-2-41	Swivel Pin, Link Arm	1
107	L16-2-40	Operating Lever, Clutch	1
108	11002021	Fine Traverse Shaft	1
109	11002022	Gear 40T	1
110	11002023	Gear 64T	1
111	1500-743E	External Circlip	1
112	¾" FX ¾"	Hollow Set Screw, Cup Point	2
113	11002026	Locating Collar	1
114	¾" PT 1½"	Taper Pin	1
115	11002027A	Sleeve	1
116	L16-2-34A	Bush	2
117	W16211231R4	Oil Seal	1
118	¾" KS ¾"	Key	1
119	¾" FB	Hexagonal Nut 12 T.P.I.	1
120	¾" FX ¾"		
	(Whit.)	Hollow Set Screw	1
121	11002028	Fine Traverse Selector Shaft	1
122	4-007	'Nu-Lip' Ring	1
123	11002029	Selector Lever	1
124	2BA FX ¾"	Hollow Set Screw Cup Point	1
125	11002030	Gear Mover Shoe	1
126	11002031	Bush	1
127	OS-23	'O' Ring	1
128	¾" FX ½"		
	(Whit.)	Hollow Set Screw Cup Point	1
129	SB 3	Steel Ball ¼" Dia.	1

Not
required
with
electrical
third
Shaft
Control

All Geared Headstock Assembly (illustrated on page 30)

Item No.	Part No.	Description	No. Off
130	SG 5	Spring	1
131	$\frac{1}{4}$ " FX $\frac{1}{4}$ " (Whit.)	Hollow Set Screw	1
132	11003285	Handle	1
133	11002033	Hand Knob	1
134	11002034B	Idler Gear 16T	1
135	11002035	Idler Gear 40T	1
136	11002038B	Bush, Idler Gear	1
137	$\frac{1}{4}$ " KS $\frac{1}{4}$ "	Key	1
138	11002059B	Collar	1
139	$\frac{1}{4}$ " PG $\frac{1}{4}$ "	Grooved Pin	1
140	1400- $\frac{1}{2}$ "	External Circlip	1
141	$\frac{1}{4}$ " FX $\frac{1}{4}$ " (Whit.)	Hollow Set Screw, Cup Point	1
142	11002060	Cover	1
143	2BA FY $\frac{1}{2}$ "	Socket Head Cap Screw	3
144	11002063	Boss, Gear Selectors	2
145	11002042	Swivel Pin	2
146	2BA FX $\frac{1}{2}$ "	Hollow Set Screw	2
147	11002064	Plunger	2
148	L5-2-112	Return Pin	2
149	SG 231	Spring	2
150	$\frac{1}{4}$ " FX $\frac{1}{4}$ " (Whit.)	Hollow Set Screw Cup Point	2
151	11002043	Handle	2
152	11007019	Hand Knob	2
153	11002044	Gear Selector Fork, Right Hand	1
154	4-013	Nu-Lip Ring	1
155	L16-2-52	Gear Change Shaft	1
156	$\frac{1}{4}$ " PT 1"	Taper Pin	1
157	L16-2-54	Collar	1
158	$\frac{1}{4}$ " FX $\frac{1}{4}$ " (Whit.)	Hollow Set Screw, Cup Point	1
159	L16-2-53	Plug	1
160	L16-2-50	Selector Lever, Right Hand	1
161	$\frac{1}{4}$ " FX $\frac{1}{4}$ "	Hollow Set Screw, Cup Point	1
162	L16-2-51	Gear Mover Shoe, Right Hand	1
163	11002045	Locating Plate, Right Hand	1

* Not illustrated

Item No.	Part No.	Description	No. Off
164	$\frac{1}{4}$ " PG $\frac{1}{4}$ "	Grooved Pin	2
165	4BA FY $\frac{1}{2}$ "	Socket Head Cap Screw	2
166	11002046	Gear Selector Fork Left Hand	1
167	4-013	'Nu-Lip' Ring	1
168	L16-2-57	Selector Lever Left Hand	1
169	$\frac{1}{4}$ " FX $\frac{1}{4}$ " (Whit.)	Hollow Set Screw, Cup Point	1
170	L16-2-58	Gear Mover Shoe, Left Hand	1
171	11002047	Locating Plate, Left Hand	1
172	$\frac{1}{4}$ " PG $\frac{1}{4}$ "	Grooved Pin	2
173	4BA FY $\frac{1}{2}$ "	Socket Head Cap Screw	2
*	L16-2-175	Head Pulley	1
*	L16-2-178	Oil Seal Mount	1
*	L16-2-24	Nut	1
174		Screwcutting Plate (See Change Wheel List)	1
175	$\frac{1}{4}$ " x 1"	Rivet	4

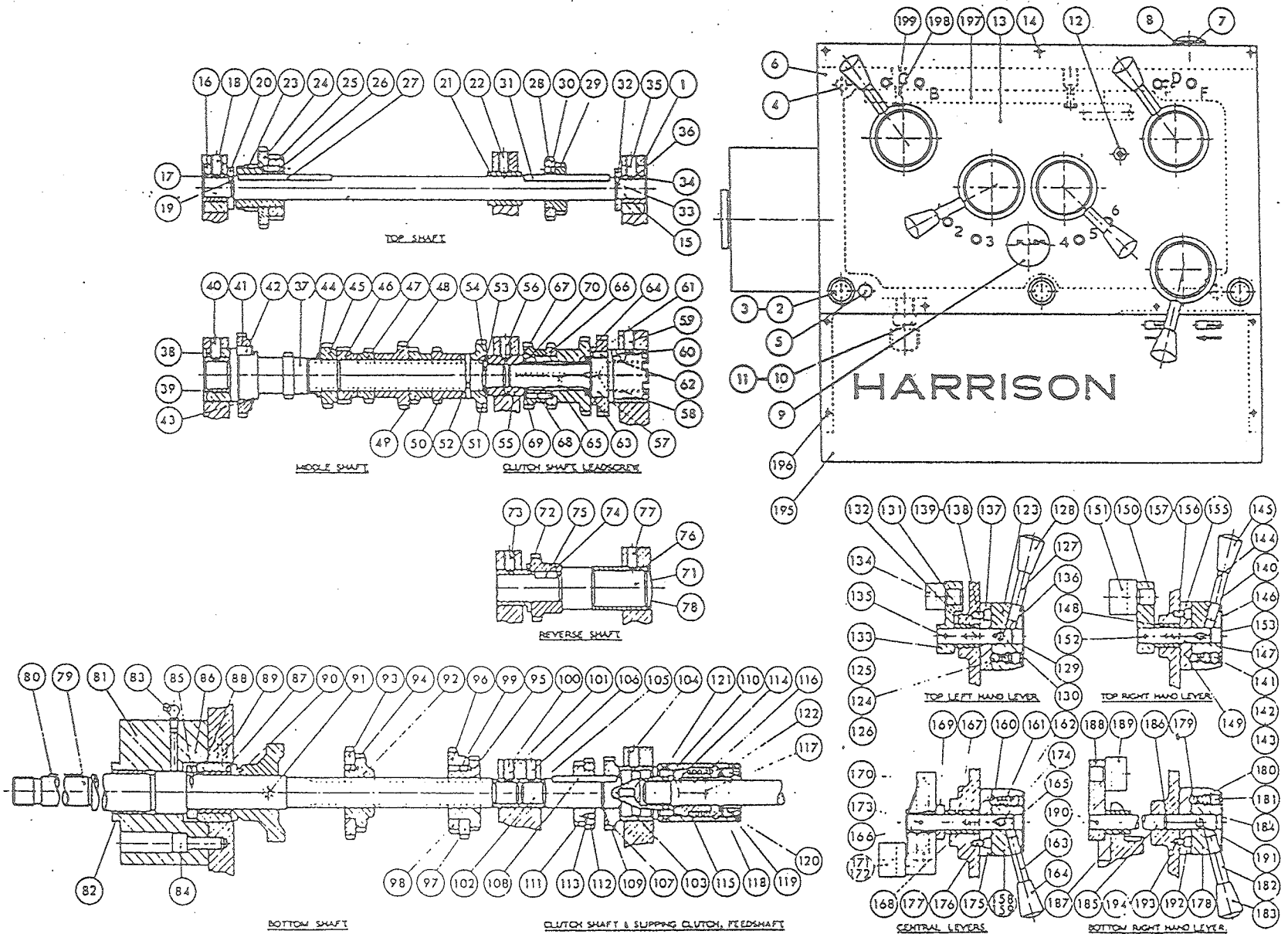
only used with
electrical third-
shaft control

Feed Gearbox English and American (illustrated on page 34)

Item No.	Part No.	Description	No. Off
1	11003201A	Gearbox	1
2	$\frac{1}{2}$ " FY $1\frac{1}{2}$ " (Whit)	Socket Head Cap Screw	3
3	11003289	Plastic Plugs	3
4	$\frac{3}{8}$ " FY $1\frac{1}{2}$ " (Whit)	Socket Head Cap Screw	2
5	$\frac{3}{8}$ " PD $1\frac{1}{2}$ "	Dowel	2
6	11003282	Gasket	1
7	L16-3-12	Filler Plug	1
8		Fibre Washer $\frac{11}{16}$ " Bore	1
9	IC4629	Oil Level Indicator	1
10	$\frac{1}{4}$ " Gas	Hexagonal Screwed Nipple	1
11	$\frac{1}{4}$ " Gas	End Cap	1
12	H4146	Hydraulic Nipple Straight $\frac{1}{4}$ " Whit	1
13	577	Front Cover Plate	1
14	$\frac{3}{16}$ " x $\frac{1}{4}$ "	Self Tapping Rivets	5
15	11003243A	Top Shaft	1
16	11003249A	Sleeve	1
17	11003039A	Bearing	1
18	$\frac{5}{16}$ " FX $\frac{5}{8}$ " (Whit)	Hollow Set Screw $\frac{1}{2}$ Dog Point	1
19	$\frac{3}{16}$ " PG $\frac{1}{4}$ "	Grooved Pin	1
20	11003250A	Spacer	1
21	11003251	Bearing Centre	1
22	$\frac{5}{16}$ " FX $\frac{5}{8}$ " (Whit)	Hollow Set Screw $\frac{1}{2}$ Dog Point	1
23	11003244A	19T Shifter Gear	1
24	11003245	38T Gear	1
25	11003246	24T Gear	1
26	2BA FX $\frac{5}{8}$ "	Hollow Set Screw Cup Point	2
27	$\frac{1}{16}$ " KS $2\frac{1}{2}$ "	Square Key	1
28	11003253	20T Gear	1
29	11003252A	16T Gear	1
30	2BA FX $\frac{5}{8}$ "	Hollow Set Screw Cup Point	2
31	$\frac{1}{16}$ " KS $2\frac{1}{2}$ "	Square Key	1
32	11003250A	Spacer	1
33	$\frac{3}{16}$ " PG $\frac{1}{4}$ "	Grooved Pin	1
34	11003039A	Bearing	1
35	$\frac{5}{16}$ " FX $\frac{5}{8}$ " (Whit)	Hollow Set Screw $\frac{1}{2}$ Dog Point	1
36	11003249A	Sleeve	1
37	11003214	Middle Shaft	1

Item No.	Part No.	Description	No. Off
38	11003215	Sleeve	1
39	11003116	Bearing, Left Hand	1
40	$\frac{5}{16}$ " FX $\frac{5}{8}$ " (Whit)	Hollow Set Screw $\frac{1}{2}$ Dog Point	1
41	11003217	38T Gear	1
42	$\frac{1}{4}$ " KS $\frac{1}{2}$ "	Square Key	1
43	5103137	External Circlip, Crescent	1
44	11003216	Sleeve Bush	1
45	11003218	24T Gear	1
46	11003219	16T Gear	1
47	11003220	18T Gear	1
48	1103221	26T Gear (English Box)	1
	11003226	23T Gear (American Box)	1
49	11003222	19T Gear (English Box)	1
	11003221	26T Gear (American Box)	1
	11003223	20T Gear (English Box)	1
	11003225	20T Gear (American Box)	1
51	11003224	28T Gear	1
52	$\frac{1}{8}$ " PG $1\frac{1}{4}$ "	Grooved Pin	1
53	11003279	Spacer	1
54	$\frac{3}{16}$ " PG $\frac{1}{4}$ "	Grooved Pin	1
55	11003230	Bearing Centre	1
56	$\frac{5}{16}$ " FX $\frac{5}{8}$ " (Whit)	Hollow Set Screw $\frac{1}{2}$ Dog Point	1
57	11003256	Clutch Spindle, Leadscrew	1
58	11003015	Bearing	1
59	$\frac{5}{16}$ " FX $\frac{5}{8}$ " (Whit)	Hollow Set Screw $\frac{1}{2}$ Dog Point	1
60	11003257	Bearing	1
61	11003258	24T Driver Gear	1
62	$\frac{1}{16}$ " KS $\frac{3}{4}$ "	Square Key	1
63	11003140	Thrust Bush	1
64	S108	Needle Roller Bearing	2
65	11003259	24T Leadscrew Gear	1
66	11003253	20T Gear	1
67	11003261	22T Gear	1
68	2BA FX $\frac{5}{8}$ "	Hollow Set Screw, Cup Point	2
69	11003262	Thrust Washer	1
70	$\frac{3}{16}$ " PG $\frac{1}{4}$ "	Grooved Pin	1
71	11003306	Reverse Shaft	1
72	11003277	Flanged Bearing	1
73	$\frac{5}{16}$ " FX $\frac{5}{8}$ " (Whit)	Hollow Set Screw $\frac{1}{2}$ Dog Point	1

Feed Gearbox English and American



Feed Gearbox English and American *(illustrated opposite)*

Item No.	Part No.	Description	No. Off
74	11003276	20T Reverse Gear	1
75	$\frac{3}{16}$ " KS $\frac{3}{8}$ "	Square Key	1
76	11003307	Bearing	1
77	$\frac{5}{16}$ " FX $\frac{3}{8}$ " (Whit)	Hollow Set Screw $\frac{1}{2}$ Dog Point	1
78	$1\frac{1}{2}$ " Dia	Expanding Plug	1
79	11003231	Bottom Shaft	1
80	$\frac{1}{8}$ " KS $1\frac{1}{2}$ "	Square Key	1
81	11003119A	Bearing Block (11003288 with lever operated unit)	1
82	11003158	Bearing	1
83	NA5794/1	Hydraulic Nipple, Angled 67 $\frac{1}{2}$ °, $\frac{1}{4}$ " Whit	1
84	$\frac{3}{8}$ " FY 1" (Whit)	Socket Head Cap Screw	3
85	11003155	Thrust Collar	1
86	$\frac{1}{8}$ " PG $\frac{3}{8}$ "	Grooved Pin	1
87	11003156	Sleeve	1
88	11003117	Bearing	1
89	$\frac{3}{16}$ " FX $\frac{3}{8}$ " (Whit)	Hollow Set Screw $\frac{1}{2}$ Dog Point	1
90	11003305	Oil Flinger	1
91	$\frac{1}{4}$ " FX $\frac{3}{8}$ " (Whit)	Hollow Set Screw $\frac{1}{2}$ Dog Point	1
92	11003234	32T Sliding Gear (English Box)	1
	11003238	32T Sliding Gear (American Box)	1
93	11003235	32T Gear	1
94	2BA FX $\frac{5}{16}$ "	Hollow Set Screw, Cup Point	2
95	11003236	32T Sliding Gear	1
96	11003237	32T Gear (English Box)	1
97	11003239	32T Gear (American Box)	1
98	11003240	32T Gear (American Box)	1
99	2BA FX $\frac{5}{8}$ "	Hollow Set Screw Cup Point	2
100	11003039	Bearing Centre	1
101	$\frac{5}{16}$ " FX $\frac{5}{8}$ " (Whit)	Hollow Set Screw $\frac{1}{2}$ Dog Point	1
102	11003263	Clutch Spindle, Feedshaft	1
103	11003264	Bearing	1
104	$\frac{3}{16}$ " FX $\frac{5}{8}$ " (Whit)	Hollow Set Screw $\frac{1}{2}$ Dog Point	1
105	11003039	Bearing Centre	1
106	$\frac{3}{16}$ " FX $\frac{5}{8}$ " (Whit)	Hollow Set Screw $\frac{1}{2}$ Dog Point	1
*	11003308	Oil Baffle Disc	1

Item No.	Part No.	Description	No. Off
107	11003265	24T Driver Gear	1
108	$\frac{3}{16}$ " KS $1\frac{1}{8}$ "	Square Key	1
109	510387	External Circlip	1
110	L5-3-50	Bearing	1
111	11003266	20T Sliding Reverse Gear	1
112	11003267	24T Gear	1
113	2BA FX $\frac{1}{2}$ "	Hollow Set Screw Cup Point	2
114	L5-3-32	Slipping Clutch	1
115	SG266	Spring	1
116	$\frac{3}{16}$ " KS $1\frac{1}{2}$ "	Square Key	1
117	$\frac{1}{8}$ " PG $\frac{1}{2}$ "	Grooved Pin	1
118	L5-3-34	Washer	1
119	L5-3-33	Adjusting Nut	1
120	L5-3-35	Sleeve	1
121	2BA FV $\frac{3}{8}$ "	Countersunk Hollow Set Screw	2
122	$\frac{3}{16}$ " FX $\frac{3}{8}$ " (Whit)	Hollow Set Screw Cup Point	1
123	11003283	Lever Boss	1
124	SB3	Steel Ball $\frac{1}{4}$ " Dia	2
125	SG5	Spring	2
126	$\frac{5}{16}$ " FX $\frac{1}{4}$ " (Whit)	Hollow Set Screw, Flat Point	2
127	11003285	Handle	1
128	D134	Knob	1
129	11003286	Plastic Cover	1
130	11003298	Shaft	1
131	11003069	Bush	1
132	2BA FX $\frac{3}{8}$ "	Hollow Set Screw Cup Point	2
133	11003247	Mover Lever	1
134	11003248	Mover Shoe	1
135	$\frac{1}{8}$ " x $\frac{1}{4}$ "	'Spirol' Pin	1
136	$\frac{1}{4}$ " FX $\frac{1}{2}$ " (Whit)	Hollow Set Screw $\frac{1}{2}$ Dog Point	1
137	11003292	Dimple Plate	1
138	2BA FY $\frac{3}{8}$ "	Socket Head Cap Screw	1
139	$\frac{3}{16}$ " PG $\frac{1}{2}$ "	Grooved Pin	1
140	11003284	Lever Boss	1
141	SB3	Steel Ball $\frac{1}{4}$ " Dia	2
142	SG5	Spring	2
143	$\frac{5}{16}$ " FX $\frac{1}{4}$ " (Whit)	Hollow Set Screw, Flat Point	2
144	11003285	Handle	1

*Not illustrated

Feed Gearbox Metric *(illustrated on page 38)*

Item No.	Part No.	Description	No. Off
1	11003201A	Gearbox	1
2	$\frac{3}{8}$ " FY $1\frac{1}{2}$ " (Whit)	Socket Head Cap Screw	3
3	11003289	Plastic Plugs	3
4	$\frac{3}{8}$ " FY $1\frac{1}{2}$ " (Whit)	Socket Head Cap Screw	2
5	$\frac{1}{2}$ " PD $1\frac{1}{2}$ "	Dowel	2
6	11003282	Gasket	1
7	L16-3-T2	Filler Plug	1
8		Fibre Washer $\frac{11}{16}$ " Bore	1
9	IC4629	Oil Level Indicator	1
10	$\frac{1}{4}$ " Gas	Hexagonal Screwed Nipple	1
11	$\frac{1}{4}$ " Gas	End Cap	1
12	H4146	Hydraulic Nipple Straight $\frac{1}{4}$ " Whit	1
13	578	Front Cover Plate	1
14	$\frac{3}{32}$ " x $\frac{1}{4}$ "	Self Tapping Rivets	5
15	11003243A	Top Shaft	1
16	11003249A	Sleeve	1
17	11003039A	Bearing	1
18	$\frac{3}{16}$ " FX $\frac{5}{8}$ " (Whit)	Hollow Set Screw $\frac{1}{2}$ Dog Point	1
19	$\frac{3}{32}$ " PG $\frac{1}{4}$ "	Grooved Pin	1
20	11003250A	Spacer	1
21	11003251	Bearing Centre	1
22	$\frac{3}{16}$ " FX $\frac{5}{8}$ " (Whit)	Hollow Set Screw $\frac{1}{2}$ Dog Point	1
23	11003244A	19T Shifter Gear	1
24	11003245	38T Gear	1
25	11003246	24T Gear	1
26	2BA FX $\frac{5}{16}$ "	Hollow Set Screw Cup Point	2
27	$\frac{3}{16}$ " KS $2\frac{1}{2}$ "	Square Key	1
28	11003253	20T Gear	1
29	11003268A	20T Gear	1
30	2BA FX $\frac{5}{16}$ "	Hollow Set Screw Cup Point	2
31	$\frac{3}{16}$ " KS $2\frac{1}{2}$ "	Square Key	1
32	11003250A	Spacer	1
33	$\frac{3}{32}$ " PG $\frac{1}{4}$ "	Grooved Pin	1
34	11003039A	Bearing	1
35	$\frac{3}{16}$ " FX $\frac{5}{8}$ " (Whit)	Hollow Set Screw $\frac{1}{2}$ Dog Point	1
36	11003249A	Sleeve	1
37	11003291	Gear Locating Collar	1

Item No.	Part No.	Description	No. Off
38	11003214	Middle Shaft	1
39	11003215	Sleeve	1
40	11003116	Bearing, Left Hand	1
41	$\frac{5}{16}$ " FX $\frac{5}{8}$ " (Whit)	Hollow Set Screw $\frac{1}{2}$ Dog Point	1
42	11003217	38T Gear	1
43	$\frac{1}{4}$ " KS $\frac{1}{2}$ "	Square Key	1
44	5103137	External Circlip, Crescent	1
45	11003216	Sleeve Bush	1
46	11003218	24T Gear	1
47	1500-743E	External Circlip	1
48	11003235	32T Gear	1
49	11003238	32T Gear	1
50	2BA FX $\frac{5}{16}$ "	Hollow Set Screw Cup Point	2
51	11003242	32T Gear	1
52	11003236	32T Gear	1
53	2BA FX $\frac{5}{16}$ "	Hollow Set Screw Cup Point	2
54	11003279	Spacer	1
55	$\frac{3}{32}$ " PG $\frac{1}{4}$ "	Grooved Pin	1
56	11003230	Bearing Centre	1
57	$\frac{3}{16}$ " FX $\frac{5}{8}$ " (Whit)	Hollow Set Screw $\frac{1}{2}$ Dog Point	1
58	11003256	Clutch Spindle, Leadscrew	1
59	11003015	Bearing	1
60	$\frac{3}{16}$ " FX $\frac{5}{8}$ " (Whit)	Hollow Set Screw $\frac{1}{2}$ Dog Point	1
61	11003257	Bearing	1
62	11003258	24T Driver Gear	1
63	$\frac{3}{16}$ " KS $\frac{1}{8}$ "	$\frac{3}{16}$ " Square Key	1
64	11003140	Thrust Bush	1
65	S108	Needle Roller Bearing	2
66	11003270	25T Leadscrew Gear	1
67	11003271	20T Gear	1
68	2BA FX $\frac{1}{4}$ "	Hollow Set Screw Cup Point	2
69	11003262	Thrust Washer	1
70	$\frac{3}{32}$ " PG $\frac{1}{4}$ "	Grooved Pin	1
71	11003306	Reverse Shaft	1
72	11003277	Flanged Bearing	1
73	$\frac{5}{16}$ " FX $\frac{5}{8}$ " (Whit)	Hollow Set Screw $\frac{1}{2}$ Dog Point	1
74	11003276	20T Reverse Gear	1
75	$\frac{3}{16}$ " KS $\frac{5}{8}$ "	$\frac{3}{16}$ " Square Key	1

Item No.	Part No.	Description	No. Off
145	D134	Knob	1
146	11003286	Plastic Cover	1
147	11003298	Shaft	1
148	11003069	Bush	1
149	2BA FX $\frac{1}{8}$ "	Hollow Set Screw, Cup Point	2
150	11003254	Mover Lever	1
151	11003212	Mover Shoe	1
152	$\frac{1}{8}$ " x $\frac{3}{16}$ "	'Spirol' Pin	1
153	$\frac{1}{8}$ " FX $\frac{1}{8}$ "	(Whit) Hollow Set Screw $\frac{1}{2}$ Dog Point	1
155	11003294	Dimple Plate	1
156	2BA FY $\frac{1}{8}$ "	Socket Head Cap Screw	1
157	$\frac{1}{8}$ " PG $\frac{3}{16}$ "	Grooved Pin	1
158	11003284	Lever Boss, Left Hand	1
159	11003283	Lever Boss, Right Hand	1
160	SB3	Steel Ball $\frac{1}{4}$ " Dia	4
161	SG5	Spring	4
162	$\frac{3}{16}$ " FX $\frac{1}{8}$ "	(Whit) Hollow Set Screw, Flat Point	4
163	11003300	Handle	2
164	D134	Knob	2
165	11003286	Plastic Cover	2
166	11003297	Shaft	2
167	11003202	Bush	1
168	2BA FX $\frac{1}{8}$ "	Hollow Set Screw Cup Point	2
169	11003209	Spacer	2
170	11003203	Locking Quadrant	2
171	11003290	Mover Shoe Left Hand	1
172	11003213	Mover Shoe Right Hand	1
173	$\frac{1}{8}$ " x $\frac{3}{16}$ "	'Spirol' Pin	2
174	$\frac{1}{8}$ " FX $\frac{1}{8}$ "	(Whit) Hollow Set Screw $\frac{1}{2}$ Dog Point	2
175	11003293	Dimple Plate	2
176	2BA FY $\frac{1}{8}$ "	Socket Head Cap Screw	2
177	$\frac{1}{8}$ " PG $\frac{3}{16}$ "	Grooved Pin	2
178	11003283	Lever Boss, Reverse	1
179	SB3	Steel Ball $\frac{1}{4}$ " Dia	2
180	SG5	Spring	2
181	$\frac{3}{16}$ " FX $\frac{1}{8}$ "	(Whit) Hollow Set Screw Flat Point	2
182	11003285	Handle	1
183	D134	Knob	1

Item No.	Part No.	Description	No. Off
184	11003286	Plastic Cover	1
185	11003299	Shaft	1
186	4-006	'Nu-Lip' Ring	1
187	11003069	Bush	1
188	11003273	Mover Lever	1
189	11003274	Mover Shoe	1
190	$\frac{1}{8}$ " x $\frac{3}{16}$ "	'Spirol' Pin	1
191	$\frac{1}{8}$ " FX $\frac{1}{8}$ "	(Whit) Hollow Set Screw $\frac{1}{2}$ Dog Point	1
192	11003296	Dimple Plate	1
193	2BA FY $\frac{1}{8}$ "	Socket Head Cap Screw	1
194	$\frac{1}{8}$ " PG $\frac{3}{16}$ "	Grooved Pin	1
195	581	Name Plate	1
196	$\frac{3}{16}$ " x $\frac{1}{8}$ "	Self Tapping Rivets	4
197	11003303	Lubrication Tray	1
198	2BA FV $\frac{5}{16}$ "	Countersunk Hollow Set Screw	2
199	$\frac{7}{16}$ " FX $\frac{3}{16}$ "	(Whit) Hollow Set Screw Cup Point	2

Saddle and Slides Assembly *(illustrated on page 45)*

Item No.	Part No.	Description	No. Off
		Alternative Topslide (Geared)	
122	13005009	Top Slide	1
123	13005014	Top Slide Screw	1
124	11005050	16T Gear	2
125	$\frac{1}{8}$ " KS $\frac{1}{8}$ "	Key	2
126	SKF51101	Thrust Bearing	2
127	11005047	Bearing Housing	1
128	H4146	Hydraulic Nipple, Straight $\frac{1}{4}$ " Whit.	1
129	$\frac{1}{2}$ " FY $1\frac{1}{4}$ " (Whit.)	Socket Head Cap Screw	2
130	$\frac{1}{8}$ " FW	Washer	1
131	PP/V.166	Simmonds Locknut	1
132	11005051	Shaft, Top Slide Handle	1
133	1400- $\frac{1}{2}$ "	External Circlip	1
134	L5-5-39	Micrometer Dial	1
135	L5-5-15	Die	2
136	SG290	Spring	2
137	$\frac{1}{8}$ " FX $\frac{1}{4}$ " (Whit.)	Hollow Set Screw, Flat Point	2
138	L5-5-55	Spacer	1
139	L5-5-57A	Ball Handle	} Supplied Integral
140	L5-570	Handle	
141	$\frac{1}{8}$ " PT 1"	Taper Pin	1
142	13005005	Cover	1
143	4BA FY $1\frac{1}{4}$ "	Socket Head Cap Screw	2
144	H4146	Hydraulic Nipple, Straight $\frac{1}{4}$ " Whit.	1
145	C300	Hydraulic Nipple, Cup Type Drive IN	2
		American Type Toolpost	
146	L5-5-25	Toolpost	1
147	L5-5-24	Tool Plate	1
148	L5-5-23	Ring	1
149	L5-5-26	Clamp Plate	1
150	$\frac{1}{2}$ " FZ $2\frac{1}{2}$ " (Whit.)	Square Head Set Screw	1
151	WR10	Wrench	1

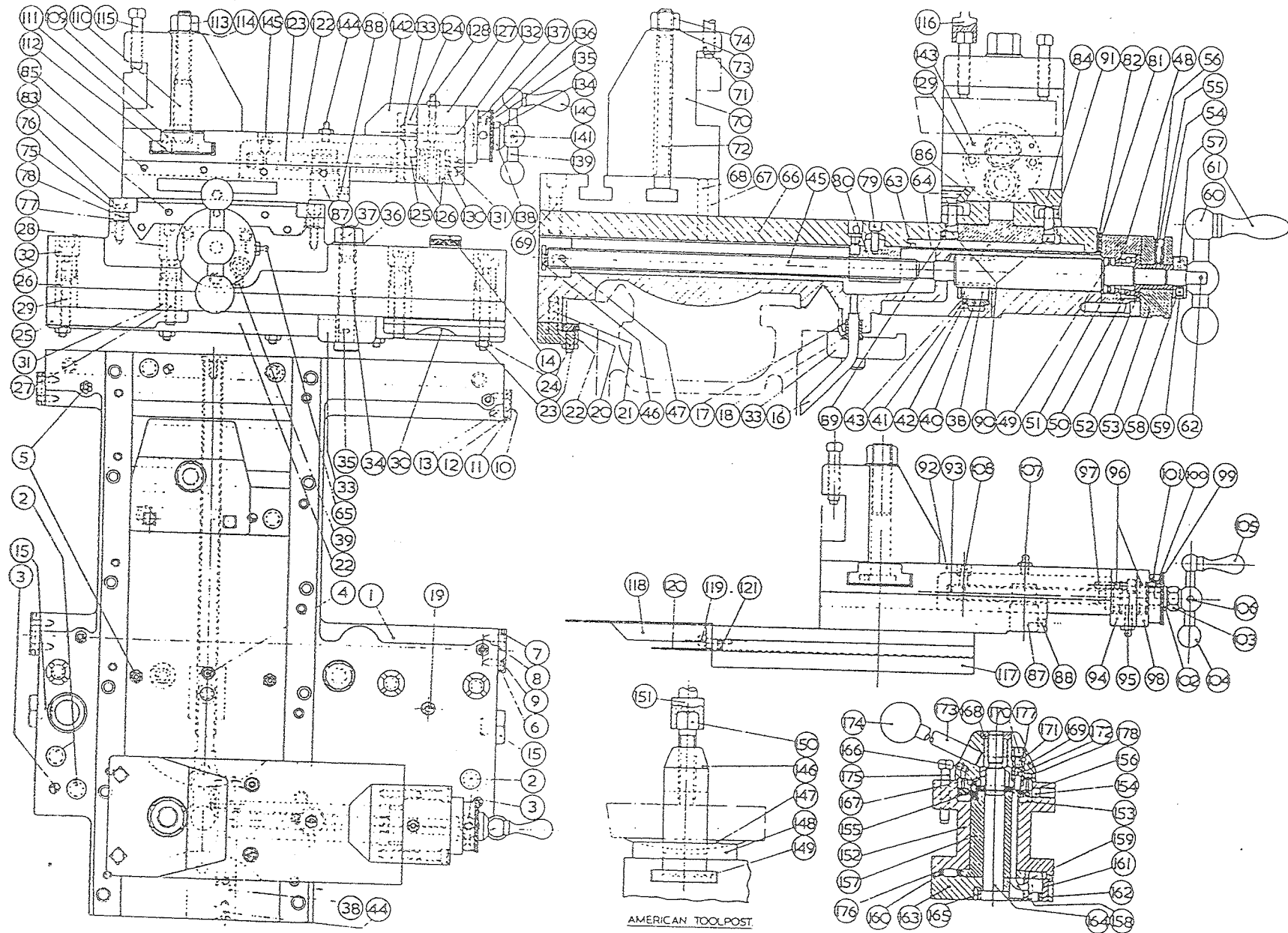
Item No.	Part No.	Description	No. Off
		Four Way Toolpost	
152	L16-10-80	Square Turret	1
153	L16-10-90A	Pivot Ring	1
154	$\frac{3}{4}$ " FX $\frac{1}{2}$ "	Hollow Set Screw Dog Point 'Wedglok'	1
155	L16-10-156	Spacer	1
156	L16-10-93	Rocker Piece	4
157	L16-10-83	Sleeve	1
158	L16-10-94	Rod, Plunger	1
159	L16-10-85	Plunger	1
160	L16-10-84	Bush, Turret	4
161	L16-10-86	Bush, Tee-piece	1
162	SG 250	Spring	1
163	L16-10-81	Tee-piece	1
164	L16-10-82	Stud, Centre	1
165	$\frac{1}{4}$ " FX $\frac{1}{2}$ " (Whit.)	Hollow Set Screw Flat Point	1
166		$\frac{1}{8}$ " Ball, Spring Oiler	1
167	L16-10-143	Locknut	2
168	L16-10-91	Setting Bush	1
169	L16-10-128A	Tightening Boss	1
170	$\frac{1}{8}$ " FX $\frac{1}{4}$ " (Whit.)	Hollow Set Screw Flat Point	1
171	SG 251	Spring	1
172	L16-10-130	Plunger, Boss	1
173	L16-10-95	Lever, Boss	1
174	BB.5.	'Bakelite' Ball	1
175	$\frac{1}{2}$ " FZ $1\frac{1}{2}$ " (Whit.)	Square Head Set Bolts	12
176	L16-10-98	Dust Ring	1
177	L16-10-129	Bush	1
178	4BA FX $\frac{1}{4}$ "	Hollow Set Screw, Cup Point	1
	L16-10-135	Extractor Key (Not Illustrated)	1
	L16-10-138	Box Key (Not Illustrated)	1

Saddle and Slides Assembly (illustrated on page 45)

Item No.	Part No.	Description	No. Off
63	11005027	Stop Pin	1
64	11005026	Sliding Cover	1
65	H4146	Hydraulic Nipple Straight 1/4" Whit.	1
66	13005006	Extended Cross Slide	1
67	13005017	Block, Rear Tool Post	1
68	3/8" PG 1 1/2"	Grooved Pin	2
69	3/8" FY 1 1/2"	(Whit.)	4
70	13005007	Socket Head Cap Screw	1
71	3/8" FZ 2"	Rear Tool Post	2
72	13005023	Square Head Set Screw	1
73	1/2" FW	Stud, Rear Tool Post	1
74	L5-5-69	Washer	1
75	13005010	Nut	1
76	1/4" FY 1/2"	Cross Slide Strip	2
77	(Whit.)	Socket Head Cap Screw	12
78	13005011	Jacking Strip	2
79	1/4" FX 1/2"	(Whit.)	12
80	1/4" FY 3/4"	Hollow Set Screw Dog Point	1
81	(Whit.)	Socket Head Cap Screw	1
82	11005035	Cross Slide Nut (11005057 Metric)	1
83	11005030	(11005037 Single Start)	1
84	11005029	Wiper Cover	1
85	4BA FY 3/4"	Wiper, Neoprene	1
86	L5-26B/N	Countersunk Hollow Set Screw	5
87	1/4" FX 1/2"	Swivel Slide	1
88	(Whit.)	Hollow Set Screw Dog Point	4
89	L5-91	Strip	1
90	L5-92	Nut (L5-811 Metric) (L6-5-7 for U.S.A.)	1
91	1/4" FX 3/4"	(Whit.)	1
92	L5-572A	Hollow Set Screw, Cup Point	1
93	L5-573A	Swivel Plate	1
94	3/8" FX (Whit.)	Stud, Swivel Plate	2
95	13005003	Hexagonal Nut	2
96	13005018	Top Slide	1
97		Top Slide Screw (13005019 Metric)	1

Item No.	Part No.	Description	No. Off
94	13005020	Fixed Collar	1
95	H4146	Hydraulic Nipple Straight 1/4" Whit.	1
96	SKF51101	Thrust Bearing	2
97	1/2" FY 1"	(Whit.)	2
98	L5-5-39	Socket Head Cap Screw	1
99	L5-5-15	Micrometer Dial (L5-5-44 Metric)	2
100	SG 290	Die	2
101	3/8" FX 1/2"	Spring	2
102	(Whit.)	Hollow Set Screw Flat Point	2
103	L5-5-55A	Bush	1
104	NP/V/126/11/2	'Simmonds' Locknut	1
105	L5-5-57A	Ball Handle	1
106	L5-570	Handle	1
107	1/4" PT 1"	Supplied Integral	1
108	H4146	Taper Pin	1
109	H4120	Hydraulic Nipple Straight 1/4" Whit.	1
110	13005013	Hydraulic Nipple Straight Drive Type	2
111	L16-5-29	Tool-Holder	1
112	L16-5-30	Stud	1
113	3/8" FX 1/2"	Tee Piece	1
114	3/8" FB	Hollow Set Screw Cup Point	1
115	3/8" FW	B.S.F. Hexagonal Nut	1
116	3/8" FZ 1 1/2"	Washer	1
117	(Whit.)	Square Head Screw	2
118	WR7	Wrench	1
119	13005001	Alternative Cross Slide	1
120	13005028	Standard Cross Slide	1
121	2BA FY 3/4"	Cross Slide Cover	3
122	11005020	Socket Head Cap Screw	1
123	4BA FV 1/2"	Cover Strip	1
124	13005026	Countersunk Hollow Set Screw	2
125	13005026A	Coolant Cover Left Hand (Not Illustrated)	1
126	4BA FY 1/2"	Coolant Cover Right Hand (Not Illustrated)	1
127	(Whit.)	Socket Head Cap Screws (Not Illustrated)	8
128	1/4" x 1/2"	Rubber Strip (Not Illustrated)	2

Saddle and Slides Assembly

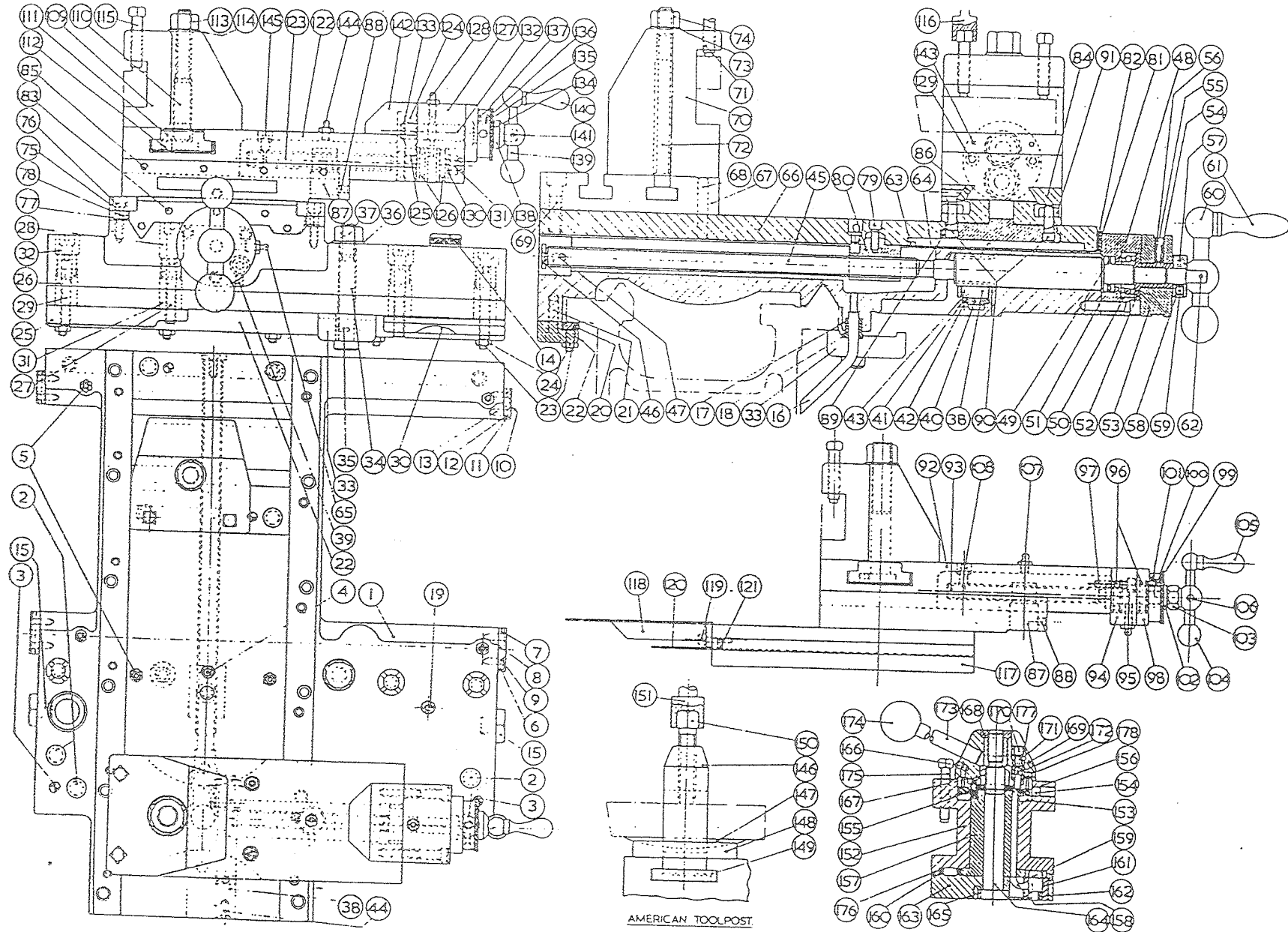


Saddle and Slides Assembly (illustrated on page 45)

Item No.	Part No.	Description	No. Off
63	11005027	Stop Pin	1
64	11005026	Sliding Cover	1
65	H4146	Hydraulic Nipple Straight 1/4" Whit.	1
66	13005006	Extended Cross Slide	1
67	13005017	Block, Rear Tool Post	1
68	3/8" PG 1 1/2"	Grooved Pin	2
69	3/8" FY 1 1/2"	(Whit.)	4
70	13005007	Socket Head Cap Screw	1
71	3/8" FZ 2"	Rear Tool Post	2
72	13005023	Square Head Set Screw	1
73	1/2" FW	Stud, Rear Tool Post	1
74	L5-5-69	Washer	1
75	13005010	Nut	1
76	1/4" FY 1/2"	Cross Slide Strip	2
77	(Whit.)	Socket Head Cap Screw	12
78	13005011	Jacking Strip	2
79	1/4" FX 1/2"	(Whit.)	12
80	1/4" FY 3/4"	Hollow Set Screw Dog Point	1
81	(Whit.)	Socket Head Cap Screw	1
82	11005035	Cross Slide Nut (11005057 Metric)	1
83	11005030	(11005037 Single Start)	1
84	11005029	Wiper Cover	1
85	4BA FY 3/4"	Wiper, Neoprene	1
86	L5-26B/N	Countersunk Hollow Set Screw	5
87	1/2" FX 1/2"	Swivel Slide	1
88	(Whit.)	Hollow Set Screw Dog Point	4
89	L5-91	Strip	1
90	L5-92	Nut (L5-811 Metric) (L6-5-7 for U.S.A.)	1
91	1/4" FX 3/4"	(Whit.)	1
92	L5-572A	Hollow Set Screw, Cup Point	1
93	L5-573A	Swivel Plate	1
94	3/8" FX (Whit.)	Stud, Swivel Plate	2
95	13005003	Hexagonal Nut	2
96	13005018	Top Slide	1
97		Top Slide Screw (13005019 Metric)	1

Item No.	Part No.	Description	No. Off
94	13005020	Fixed Collar	1
95	H4146	Hydraulic Nipple Straight 1/4" Whit.	1
96	SKF51101	Thrust Bearing	2
97	1/2" FY 1"	(Whit.)	2
98	L5-5-39	Socket Head Cap Screw	1
99	L5-5-15	Micrometer Dial (L5-5-44 Metric)	2
100	SG 290	Die	2
101	3/8" FX 1/2"	Spring	2
102	(Whit.)	Hollow Set Screw Flat Point	2
103	L5-5-55A	Bush	1
104	NP/V/126/11/2	'Simmonds' Locknut	1
105	L5-5-57A	Ball Handle	1
106	L5-570	Handle	1
107	1/4" PT 1"	Supplied Integral	1
108	H4146	Taper Pin	1
109	H4120	Hydraulic Nipple Straight 1/4" Whit.	1
110	13005013	Hydraulic Nipple Straight Drive Type	2
111	L16-5-29	Tool-Holder	1
112	L16-5-30	Stud	1
113	3/8" FX 1/2"	Tee Piece	1
114	3/8" FB	Hollow Set Screw Cup Point	1
115	3/8" FW	B.S.F. Hexagonal Nut	1
116	3/8" FZ 1 1/2"	Washer	1
117	(Whit.)	Square Head Screw	2
118	WR7	Wrench	1
119	13005001	Alternative Cross Slide	1
120	13005028	Standard Cross Slide	1
121	2BA FY 3/4"	Cross Slide Cover	3
122	11005020	Socket Head Cap Screw	1
123	4BA FV 1/2"	Cover Strip	1
124	13005026	Countersunk Hollow Set Screw	2
125	13005026A	Coolant Cover Left Hand (Not Illustrated)	1
126	4BA FY 1/2"	Coolant Cover Right Hand (Not Illustrated)	1
127	(Whit.)	Socket Head Cap Screws (Not Illustrated)	8
128	1/4" x 1/2"	Rubber Strip (Not Illustrated)	2

Saddle and Slides Assembly



Saddle and Slides Assembly *(illustrated opposite)*

Item No.	Part No.	Description	No. Off
1	11005001A	Saddle	
2	$\frac{3}{4}$ " FY $1\frac{1}{2}$ " (Whit.)	Socket Head Cap Screw	1
3	$\frac{3}{4}$ " PG 2"	Grooved Pin	4
4	H4120	Hydraulic Nipple Straight $\frac{1}{4}$ " drive in type	2
5	H4146	Hydraulic Nipple Straight $\frac{1}{4}$ " Whit. (Not fitted with one shot lubrication)	1
6	L16-5-9	Wiper Box, Front	4
7	L16-5-13	Wiper, Neoprene	2
8	L16-5-12	Wiper, Felt	2
9	4BA FV $\frac{3}{4}$ "	Countersunk Hollow Set Screw	2
10	L5-5-17	Wiper Box, Rear	4
11	L5-5-8	Wiper, Neoprene	2
12	L5-5-10	Wiper, Felt	2
13	4BA FV $\frac{3}{4}$ "	Countersunk Hollow Set Screw	2
14	11003132	Filler Plug	4
15	11005002	Stop Button	1
16	11005004	Drain Pipe	2
17	Z404	Sleeve	1
18	Z18	Tubing Nut	1
19	H4146	Hydraulic Nipple Straight $\frac{1}{4}$ " Whit. (Not fitted with one shot lubrication)	1
20	11005005	Rear Saddle Strip Support	1
21	$\frac{3}{4}$ " FY $\frac{3}{4}$ " (Whit.)	Socket Head Cap Screw	1
22	11005006	Rear Saddle Strip	3
23	$\frac{1}{2}$ " FX $\frac{3}{4}$ " (Whit.)	Hollow Set Screw, Dog Point	1
24	$\frac{1}{4}$ " FL (Whit.)	Locknut	5
25	11005007	Saddle Strip Front, Left Hand	5
26	L6-5-73	Adjusting Screw	1
27	$\frac{3}{4}$ " FY $2\frac{1}{2}$ " (Whit.)	Socket Head Cap Screw	1
28	11005008	Locking Piece	1
29	$\frac{3}{4}$ " FY $2\frac{1}{2}$ " (Whit.)	Socket Head Cap Screw	1
30	11005009	Saddle Strip Front, Right Hand	5
31	L6-5-73	Adjusting Screw	1

Item No.	Part No.	Description	No. Off
32	L5-5-94	Locking Piece	
33	11005010	Saddle Clamp	3
34	L16-5-21	Stud	1
35	$\frac{1}{2}$ " PG $\frac{3}{4}$ "	Grooved Pin	1
36	$\frac{1}{2}$ " FW	Washer	1
37	$\frac{1}{2}$ " FN (Whit.)	Hexagonal Nut (Hardened)	1
38	11005014	Idler Stud	1
39	$\frac{1}{4}$ " FX $\frac{1}{2}$ " (Whit.)	Hollow Set Screw Nylock	1
40	11005015	Idler Pinion	1
41	11005016	Washer	1
42	$\frac{1}{2}$ " PG $\frac{1}{2}$ "	Grooved Pin	1
43	1400- $\frac{1}{2}$ "	External Circlip	1
44	$\frac{1}{2}$ " FV $\frac{1}{2}$ " (Whit.)	Countersunk Hollow Set Screw	1
45	11005034	Cross Slide Screw (11005056 Metric) (11005036 for Single Start)	1
46	L16-5-26	Stop Washer	1
47	$\frac{1}{4}$ " FV $\frac{1}{2}$ " (Whit.)	Countersunk Hollow Set Screw	1
48	11005038	Fixed Collar (11005040 for Single Start)	1
49	SKF51102	Thrust Bearing	1
50	LJT.15	Angular Contact Bearing	1
51	$\frac{1}{2}$ " FY $1\frac{1}{2}$ " (Whit.)	Socket Head Cap Screw	1
52	11005071	Micrometer Dial Mount	3
53	MH1-4-81	Micrometer Dial (MH1-4-81C Metric)	1
54	L5-5-15	Die	1
55	SG 290	Spring	2
56	$\frac{3}{4}$ " FX $\frac{1}{2}$ " (Whit.)	Hollow Set Screw Flat Point	2
57	11005072	Micrometer Dial Nut	1
58	L5-10-143	Die	1
59	$\frac{1}{2}$ " FX $\frac{1}{2}$ " (Whit.)	Hollow Set Screw Dog Point	1
60	L16-5-102	Ball Handle	1
61	L17-5-42	Handle	1
62	$\frac{3}{4}$ " PT $1\frac{1}{2}$ "	Taper Pin	1

Apron Assembly *(illustrated on page 41)*

Item No.	Part No.	Description	No. Off
67	11002033	Hand Knob	1
68	L16-4-6	Clip Bar	1
69	¾" FY ½"	Socket Head Cap Screw	2
	(Whit.)		
70	11004037	Shaft for Nut Box	1
71	L5-4-20	Bottom Half, Nut Slide (L5-4-20A Metric)	1
72	L5-4-19	Top Half, Nut Slide (L5-4-19A Metric)	1
73	L5-539	Short Pin	1
74	L5-538	Long Pin	1
75	L16-4-19A	Retaining Plate, Nut Slides	1
76	¾" FY ½"	Socket Head Cap Screw	2
77	L5-4-31	Bearing Pad	1
78	¾" WS	¾" Dia. Double Coil Spring Washer	1
79	L5-4-34	Interlocking Quadrant	1
80	¾" FX ¾"	Hollow Set Screw Half Dog Point	1
81	11004038	Bearing	1
82	¾" FX ¾"	Hollow Set Screw Half Dog Point	1
	(Whit.)		
83	L5-4-17A	Leadscrew Engaging Boss	1
84	¾" FX ¾"	Hollow Set Screw Half Dog Point	1
	(Whit.)		
85	L5-4-16	Lever	1
86	11007012	Hand Knob	1
87	Z413	Olive	1
88	Z29	Tubing Nut	1
89	11004043	Overflow Pipe	1
90	L16-4-14	Indicator Dial (L16-4-14A Metric)	1
91	11004031A	Boss	1
92	11004046	Stud	1
93	2BA FX ¾"	Hollow Set Screw Cup Point	1
94	11004040A	Sealing Bush	1
95	11004045	Bush	1
96	¾" FX ¾"	Hollow Set Screw Half Dog Point	1
	(Whit.)		
97	L16-4-13	Pinion (11004047 Metric Machines)	1
98	¾" PT 1"	Taper Pin	1
99	H4120	Hydraulic Nipple, Straight ¾" drive in type	1
100	11004032	Cover Leadscrew	1

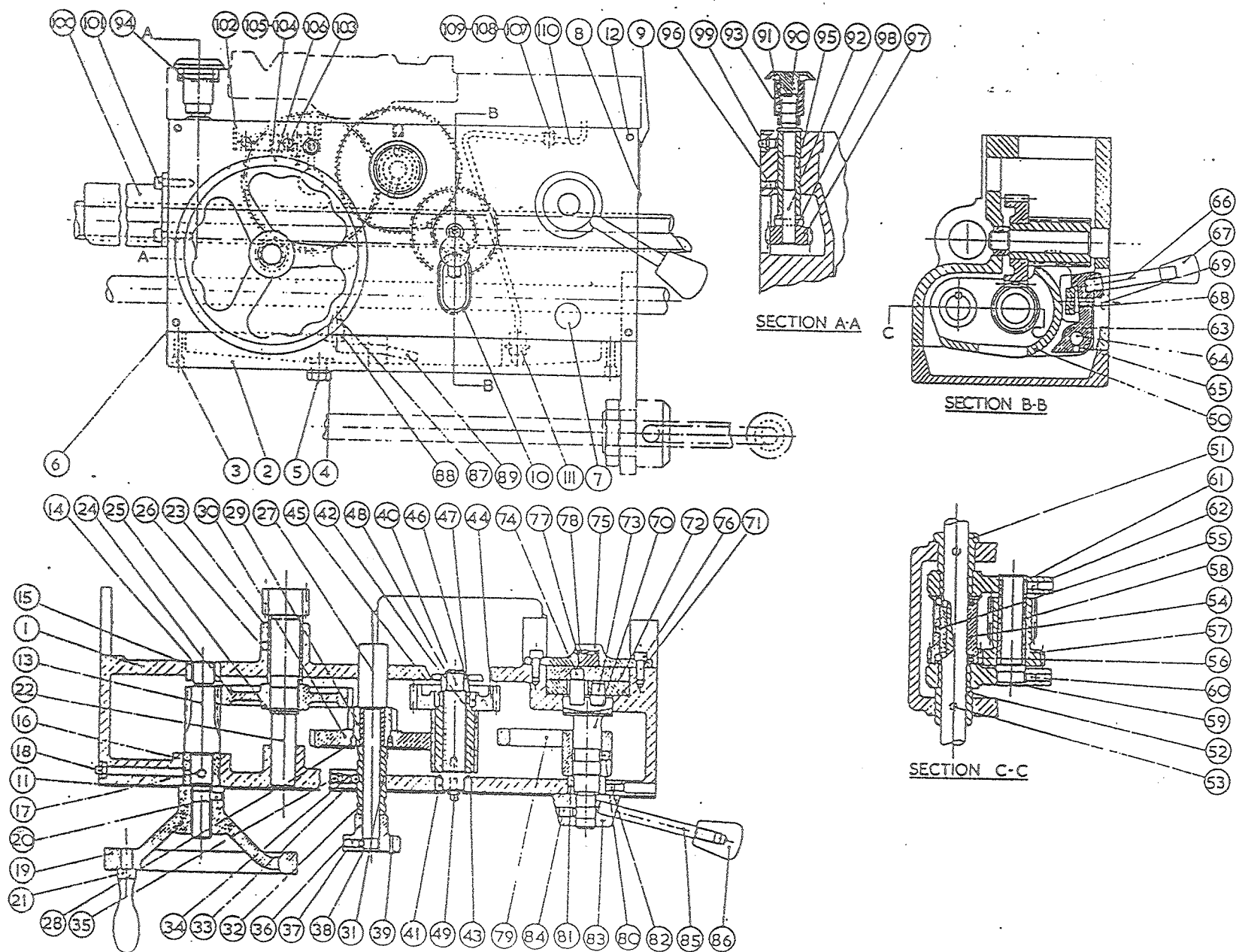
Item No.	Part No.	Description	No. Off
101	¾" FY ½"	Socket Head Cap Screw	3
102	11004057	Tray	1
103	2BA FY ¾"	Socket Head Cap Screw	2
104	Z15	Tubing Nut	4
105	Z1	Olive	4
106		1" Dia. Bundy Tubing	As Req'd.
107	X113A	Single Pipe Clip	1
108	¾" FW	Washer	2
109	2BA FY ¾"	Socket Head Cap Screw	1
110	¾" Dia. x 7½" L	Nylon Tube	1
111	11005085	Non Return Valve	1

Apron Assembly (illustrated on page 41)

Item No.	Part No.	Description	No. Off.
1	11004001	Apron	1
2	11004003	Main Cover Plate	1
3	2BA FY 1"	Socket Head Cap Screw	8
4	11002005	Washer, Nylon or Fibre	1
5	11002004	Plug	1
6	11004002	Gasket	1
7	DW4064/A	Oil Level Indicator $\frac{1}{2}$ " Dia.	1
8	378	Thread Indicator Chart (326 Metric)	1
9	$\frac{1}{2}$ " x $\frac{1}{4}$ "	Rivet	4
10	11004015	Seal	1
11	483	Feed Engagement Plate	1
12	$\frac{1}{2}$ " x $\frac{1}{4}$ "	Rivet	6
13	11004016	Hand Motion Pinion	1
14	11004017	Bearing	1
15	11004041	Bush	1
16	L5-4-42	Bush	1
17	$\frac{1}{4}$ " FX $\frac{1}{2}$ " (Whit.)	Hollow Set Screw Half Dog Point	1
18	H4120	Hydraulic Nipple, Straight $\frac{1}{4}$ " drive in type	1
19	11004018	Handwheel	1
20	$\frac{1}{4}$ " FX $\frac{1}{2}$ " (Whit.)	'Wedglok' Hollow Set Screw, Half Dog Point	1
21	1507018	Handle	1
22	11004020	Rack Pinion (11004020A for machines fitted with Profiling Unit)	1
23	L5-4-4	Bush	1
24	11004021	Rack Pinion Wheel	1
25	5100/87	'Truarc' $\frac{1}{4}$ " Dia. Retainer (External)	1
26	$\frac{1}{4}$ " FX $\frac{1}{2}$ " (Whit.)	Hollow Set Screw Half Dog Point	1
27	11004035	Sliding Wheel Shaft	1
28	11004036	Bush	1
29	11004023	Sliding Intermediate Pinion	1
30	11004022	Sliding Intermediate Gear	1
31	2BA FX $\frac{1}{2}$ "	Hollow Set Screw Cup Point	3
32	11004042	Sliding Sleeve	1
33	SB 3	Steel Ball	1
34	SG5	Spring	1

Item No.	Part No.	Description	No. Off.
35	$\frac{1}{4}$ " FX $\frac{1}{2}$ " (Whit.)	Hollow Set Screw Cup Point	1
36	11004034	Sliding Knob	1
37	$\frac{1}{4}$ " FX $\frac{1}{2}$ " (Whit.)	Wedglok Hollow Set Screw	1
38	25	Instruction Plate	1
39	$\frac{1}{2}$ " x $\frac{1}{4}$ "	Rivet	2
40	11004024	Worm Wheel Shaft	1
41	$\frac{1}{4}$ " FX $\frac{1}{2}$ " (Whit.)	Hollow Set Screw Cup Point	1
42	11004017	Bearing	2
43	11004026	Broad Pinion	1
44	11004039	Worm Wheel	1
45	2BA FX $\frac{1}{2}$ "	Hollow Set Screw Cup Point	2
46	$\frac{1}{4}$ " x $\frac{1}{2}$ "	Spirol Pin	1
47	11004025	Bearing	1
48	1400- $\frac{1}{2}$ "	External Circlip	1
49	H4146	Hydraulic Nipple, Straight $\frac{1}{4}$ " Whit.	1
50	L16-4-2	Worm Box	1
51	L16-4-8A	Worm Box Bush Right Hand	1
52	L16-4-8B	Worm Box Bush Left Hand	1
53	$\frac{1}{4}$ " FX $\frac{1}{2}$ " (Whit.)	Hollow Set Screw Cup Point	2
54	L16-4-7A	Gear 25T	1
55	SK20	Key	1
56	G22-30-4	Ina Needle Bearing Seals	2
57	L16-4-12	Worm & 31T Gear	1
58	L16-4-11	Bush	1
59	L16-4-9	Worm Stud	1
60	$\frac{1}{4}$ " FX $\frac{1}{2}$ " (Whit.)	Hollow Set Screw Half Dog Point	1
61	L16-4-10	Spacer Bush	1
62	$\frac{1}{4}$ " FX $\frac{1}{2}$ " (Whit.)	Hollow Set Screw Half Dog Point	1
63	L16-4-4A	Clip	1
64	L5-4-11	Pin	1
65	2BA FX $\frac{1}{2}$ "	Hollow Set Screw Half Dog Point	1
66	1504004	Lever	1

Apron Assembly



Feed Gearbox Metric (illustrated on page 38)

Item No.	Part No.	Description	No. Off
148	11003298	Shaft	
149	11003069	Bush	1
150	2BA FX $\frac{1}{8}$ "	Hollow Set Screw Cup Point	1
151	11003254	Mover Lever	2
152	11003212	Mover Shoe	1
153	$\frac{1}{8}$ " x $\frac{1}{4}$ "	'Spirol' Pin	1
154	$\frac{1}{8}$ " FX $\frac{1}{8}$ " (Whit)	Hollow Set Screw $\frac{1}{2}$ Dog Point	1
155	11003295	Dimple Plate	1
156	2BA FY $\frac{3}{8}$ "	Socket Head Cap Screw	1
157	$\frac{3}{16}$ " PG $\frac{3}{8}$ "	Grooved Pin	1
158	11003284	Lever Boss, Left Hand	1
159	11003283	Lever Boss, Right Hand	1
160	SB3	Steel Ball $\frac{1}{4}$ " Dia	1
161	SG5	Spring	4
162	$\frac{3}{16}$ " FX $\frac{1}{8}$ " (Whit)	Hollow Set Screw Flat Point	4
163	11003300	Handle	2
164	D134	Knob	2
165	11003286	Plastic Cover	2
166	11003297	Shaft	2
167	11003202	Bush	2
168	2BA FX $\frac{3}{8}$ "	Hollow Set Screw Cup Point	2
169	11003203	Locking Quadrant	4
170	11003290	Mover Shoe, Left Hand	2
171	11003213A	Mover Shoe, Right Hand	1
172	$\frac{1}{8}$ " x $\frac{1}{4}$ "	'Spirol' Pin	1
173	$\frac{1}{8}$ " FX $\frac{1}{8}$ " (Whit)	Hollow Set Screw $\frac{1}{2}$ Dog Point	2
174	11003293	Dimple Plate	2
175	2BA FY $\frac{3}{8}$ "	Socket Head Cap Screw	2
176	$\frac{3}{16}$ " PG $\frac{3}{8}$ "	Grooved Pin	2
177	11003283	Lever Boss, Reverse	2
178	SB3	Steel Ball $\frac{1}{4}$ " Dia	1
179	SG5	Spring	2
180	$\frac{3}{16}$ " FX $\frac{1}{8}$ " (Whit)	Hollow Set Screw Flat Point	2
181	11003285	Handle	1
182	D134	Knob	1
183	11003286	Plastic Cover	1
184	11003299	Shaft	1
185	4-006	'Nu-Lip' Ring	1

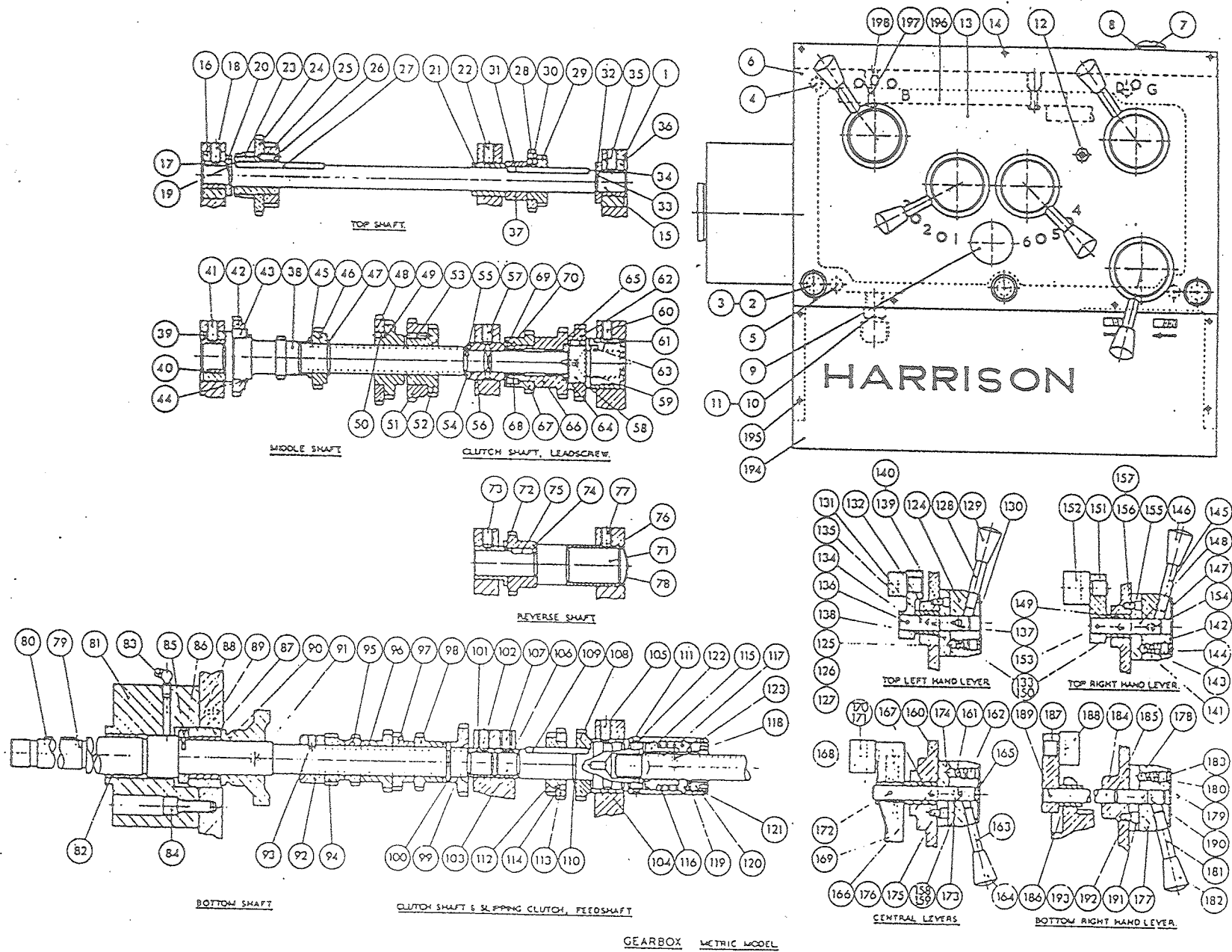
Item No.	Part No.	Description	No. Off
186	11003069	Bush	
187	11003273	Mover Lever	1
188	11003274	Mover Shoe	1
189	$\frac{1}{8}$ " x $\frac{1}{4}$ "	'Spirol' Pin	1
190	$\frac{1}{8}$ " FX $\frac{1}{8}$ " (Whit)	Hollow Set Screw $\frac{1}{2}$ Dog Point	1
191	11003296	Dimple Plate	1
192	2BA FY $\frac{3}{8}$ "	Socket Head Cap Screw	1
193	$\frac{3}{16}$ " PG $\frac{3}{8}$ "	Grooved Pin	1
194	584	Name Plate	1
195	$\frac{3}{16}$ " x $\frac{1}{4}$ "	Self Tapping Rivets	4
196	11003303	Lubrication Tray	1
197	2BA FV $\frac{3}{8}$ "	Countersunk Hollow Set Screw	2
198	$\frac{3}{16}$ " FX $\frac{1}{8}$ " (Whit)	Hollow Set Screw Cup Point	2

Feed Gearbox Metric *(illustrated opposite)*

Item No.	Part No.	Description	No. Off
76	11003307	Bearing	1
77	$\frac{1}{16}$ " FX $\frac{1}{8}$ " (Whit)	Hollow Set Screw $\frac{1}{2}$ Dog Point	1
78	$1\frac{1}{4}$ " Dia	Expanding Plug	1
79	11003231	Bottom Shaft	1
80	$\frac{1}{2}$ " KS $1\frac{1}{2}$ "	Square Key	1
81	11003119A	Bearing Block	1
82	11003158	Bearing	1
83	NA5794/1	Hydraulic Nipple, Angled $67\frac{1}{2}^\circ$ $\frac{1}{8}$ " Whit	1
84	$\frac{3}{8}$ " FY 1" (Whit)	Socket Head Cap Screw	3
85	11003155	Thrust Collar	1
86	$\frac{1}{8}$ " PG $\frac{1}{2}$ "	Grooved Pin	1
87	11003156	Sleeve	1
88	11003117	Bearing	1
89	$\frac{5}{16}$ " FX $\frac{5}{8}$ " (Whit)	Hollow Set Screw $\frac{1}{2}$ Dog Point	1
90	11003305	Oil Flinger	1
91	$\frac{1}{4}$ " FX $\frac{1}{2}$ " (Whit)	Hollow Set Screw $\frac{1}{2}$ Dog Point	1
92	11003233	Collar	1
93	$\frac{1}{8}$ " FX $\frac{3}{4}$ " (Whit)	Hollow Set Screw $\frac{1}{2}$ Dog Point	1
94	11003219	16T Gear	1
95	11003220	18T Gear	1
96	11003227	24T Gear	1
97	11003228	22T Gear	1
98	11003229	20T Gear	1
99	11003224	28T Gear	1
100	$\frac{1}{8}$ " PG $1\frac{1}{2}$ "	Grooved Pin	1
101	11003039	Bearing Centre	1
102	$\frac{5}{16}$ " FX $\frac{5}{8}$ " (Whit)	Hollow Set Screw $\frac{1}{2}$ Dog Point	1
103	11003263	Clutch Spindle, Feedshaft	1
104	11003264	Bearing	1
105	$\frac{5}{16}$ " FX $\frac{5}{8}$ " (Whit)	Hollow Set Screw $\frac{1}{2}$ Dog Point	1
106	11003039	Bearing Centre	1
107	$\frac{5}{16}$ " FX $\frac{5}{8}$ " (Whit)	Hollow Set Screw $\frac{1}{2}$ Dog Point	1
108	11003265	24T Driver Gear	1
109	$\frac{1}{2}$ " KS $1\frac{7}{8}$ "	Square Key	1

Item No.	Part No.	Description	No. Off
110	510387	External Circlip	1
111	L5-3-50	Bearing	1
112	11003266	20T Sliding Reverse Gear	1
113	11003272	25T Gear	1
114	2BA FX $\frac{1}{8}$ "	Hollow Set Screw, Cup Point	2
115	L5-3-32	Slipping Clutch	1
116	SG266	Spring	1
117	$\frac{3}{8}$ " KS $1\frac{1}{2}$ "	Square Key	1
118	$\frac{1}{8}$ " PG $\frac{1}{2}$ "	Grooved Pin	1
119	L5-3-34	Washer	1
120	L5-3-33	Adjusting Nut	1
121	L5-3-35	Sleeve	1
122	2BA FV $\frac{1}{8}$ "	Countersunk Hollow Set Screw	2
123	$\frac{3}{16}$ " FX $\frac{3}{8}$ " (Whit)	Hollow Set Screw, Cup Point	1
124	11003283	Lever Boss	1
125	SB3	Steel Ball $\frac{1}{4}$ " Dia	2
126	SG5	Spring	2
127	$\frac{3}{16}$ " FX $\frac{1}{2}$ " (Whit)	Hollow Set Screw Flat Point	2
128	11003285	Handle	1
129	D134	Knob	1
130	11003286	Plastic Cover	1
131	11003298	Shaft	1
132	11003069	Bush	1
133	2BA FX $\frac{1}{8}$ "	Hollow Set Screw Cup Point	2
134	11003247	Mover Lever	1
135	11003248	Mover Shoe	1
136	$\frac{1}{8}$ " x $\frac{1}{2}$ "	'Spirol' Pin	1
137	$\frac{1}{4}$ " FX $\frac{1}{2}$ " (Whit)	Hollow Set Screw $\frac{1}{2}$ Dog Point	1
138	11003292	Dimple Plate	1
139	2BA FY $\frac{1}{8}$ "	Socket Head Cap Screw	1
140	$\frac{1}{8}$ " PG $\frac{1}{2}$ "	Grooved Pin	1
141	11003284	Lever Boss	1
142	SB3	Steel Ball $\frac{1}{4}$ " Dia	2
143	SG5	Spring	2
144	$\frac{5}{16}$ " FX $\frac{1}{2}$ " (Whit)	Hollow Set Screw Flat Point	2
145	11003285	Handle	1
146	D134	Knob	1
147	11003286	Plastic Cover	1

Feed Gearbox Metric



Electrical Equipment* (not illustrated)

Item No.	Part No.	Description	No. Off
	662	Legend Plate, Coolant	1
	663	Legend Plate, Profile	1
	600	For U.S.A.	
	622	Electrical Reference Plate	1
	3/4" x 1/4"	Electrical Reference Plate for U/L Spec. only	1
		Self Tapping Screws	8
	337	For Canada	
	3/4" x 1/4"	Instruction Plate	1
		Self Tapping Screws	2
		Control Panels	
		English Markets	
	EK69/35	Control Panel 400/420v 3ph 50 cycles (2 Speed)	1
	EK69/36	Control Panel 400/420v 3ph 50 cycles (Single Speed)	1
		American Market	
	EK69/39	Control Panel 230/460v 3ph 60 cycles (2 Speed)	1
	EK69/40	Control Panel 230/460v 3ph 60 cycles (Single Speed)	1
		Canadian Market	
	EK69/43	Control Panel 208/550v 3ph 60 cycles (2 Speed)	1
	EK69/44	Control Panel 208/550v 3ph 60 cycles (Single Speed)	1
		Continental Market	
	EK69/47	Control Panel 380v 3ph 50 cycles (2 Speed)	1
	EK69/48	Control Panel 380v 3ph 50 cycles (Single Speed)	1
	EK69/51	Control Panel 220v 3ph 50 cycles (2 Speed)	1
	EK69/52	Control Panel 220v 3 ph50 cycles (Single Speed)	1

Item No.	Part No.	Description	No. Off
	13001007	Spacer	4
	3/4" FY 3/4"	Socket Head Cap Screw (3/4" FY 1 1/4" for U.S.A. & Canada 2 Speed)	4
	(U.N.C.)	Washer	4
	3/4" FW	Hexagonal Nut	4
	3/4" FN (U.N.C.)	Cover (English & Continental 2 Speed)	1
	MH1-1-6A	Cover (American & Canadian 2 Speed)	1
	13001006	Cover (English & Continental Single Speed)	1
	13001005	Cover (American & Canadian Single Speed)	1
	3/4" FY 1/2"	Socket Head Cap Screw (2 Speed)	4
	(U.N.C.)	Socket Head Cap Screw (Single Speed)	4
	3/4" FY 3/4"	Washer	4
	(U.N.C.)	Hexagonal Nut	4
	3/4" FW	Form Rubber	1 strip
	3/4" FN (U.N.C.)	All Markets Except Canadian	
	3SE2-020-2	Micro-Switch, Electrical Third Shaft	1
		Canadian Market	
	3SE2-020-2/Z Can.	Micro-Switch, Electrical Third Shaft	1

One Shot Lubrication

Item No.	Part No.	Description	No. Off
1	Z29	Tubing Nut	4
2	Z413	Tubing Olive	3
3	3/4" o.d. x 18 1/2"	Nylon Tube	1
4	3/4" o.d. x 4 1/2"	Nylon Tube	1
5	3/4" o.d. x 8 1/2"	Nylon Tube	1
6	3/4" o.d. x 10 1/2"	Nylon Tube	1
7	1/4" FX 1"		
	(Whit.)	Hollow Set Screw 'W' Point	2
8	11005087	Connector	1
9	L6-5-89	Plunger	1
10	L6-5-90	Knob	1
11	PAO 250	'O' Ring	2
12	L6-5-88A	Non Return Valve Complete	1
13	11005083	Cover	1
14	2BA FV 1"	Countersunk Hollow Set Screw	2
15	SG327	Spring	1
16	1" BSP	Plug	2
17	11005084	Plug Stud	1
18	7541	Tee Connector	2
19	Z222	Male Adaptor	1
20	7573/5	Relief Valve	1
21	Z311	Adaptor	1
22	X101A	Pipe Clip	3
23	NX4	Pipe Clip	1
24	X103A	Pipe Clip	1
25	2BA FY 1"	Socket Head Screw Cap	4
26	3/4" o.d. x	Nylon Tube	1
27	Z24	Tubing Nut	1
28	Z402	Tubing Olive	1
29	ACL 2034	Connector	1

Item No.	Part No.	Description	No. Off

Electrical Equipment *(not illustrated)*

Item No.	Part No.	Description	No. Off
	1104010	Collar	1
	2BA FX 1/4"	Hollow Set Screw, Cup Point	1
	SB2	Steel Ball 1/4" Dia.	1
	SG142	Spring	1
	1/4" FX 1/4"		
	(Whit.)	Hollow Set Screw, Cup Point	1
	11014012	Disc	1
		Change Wheel Guard Door Cut Out Switch (when fitted)	
	3BR MS	Micro Switch	1
	13001008	Bracket Switch	1
	4BA FY 1 1/4"	Socket Head Cap Screw	2
	4BA FL	Locknut	2
	2BA FY 1"	Socket Head Cap Screw	2
	L5-1-197	Bracket, Striker	1
	1/4" FR 1"	Round Head Set Screw	2
	1/4" FH 1"	Hexagonal Head Set Screw	1
	1/4" FL	Locknut	1
		Main Motor Control Electrical Third Shaft (No Coolant or Profile Unit)	
	650	Switch Mounting Plate (2 Speed)	1
	655	Switch Mounting Plate (Single Speed)	1
	11014020	Gasket	1
	2BA FV 1/2"	Countersunk Hollow Set Screw	10
	PT/2/AK	Emergency Stop Push Button With Plate	1
	DT/103/AK	Inch Push Button With Plate	1
	Sond 123e	Main Start/Stop Push Buttons with Plates	1
	664	Legend Plate	1
	T2b-1-15441/e	Forward, Fast/Slow Selector with Plate	1
	T2b-1-15441/e	Reverse, Fast/Slow Selector with Plate	1
	4BA FV 1/2"	Countersunk Hollow Set Screw	8
	4BA FN	Hexagonal Nut	8
	4BA FW	Washer	8
		Coolant/Profiling	
	651	Switch Mounting Plate (2 Speed)	1
	656	Switch Mounting Plate (Single Speed)	1

Item No.	Part No.	Description	No. Off
	1PA47/319P	Rotary Switch (Coolant/Profile)	1
	1PA44/31P	Rotary Switch (Coolant Only)	1
	2BA FV 1"	Countersunk Hollow Set Screw	2
	2BA FN	Hexagonal Nut	2
	2BA FW	Washer	2
	660	Legend Plate Coolant/Profile	1
	1/4" x 1/4"	Self Tapping Rivets	4
	110014015	Spacer	2
	702	Legend Plate "Coolant"	1
		American & Canadian Markets (No Coolant or Profile Unit)	
	652	Switch Mounting Plate (2 Speed)	1
	657	Switch Mounting Plate (Single Speed)	1
	11014020	Gasket	1
	2BA FV 1"	Countersunk Hollow Set Screw	10
	PT32AK/NA	Emergency Stop Push Button With Plate	1
	DT49AK/NA	Inch Push Button with Plate	1
	Sond123eCDN	Main Start/Stop Push Buttons with Plates	1
	664	Legend Plate	1
	T2b-1-15441/e		
	CDN	Forward Fast/Slow Selector With Plate	1
	T2B-1-15441/e		
	CDN	Reverse Fast/Slow Selector With Plate	1
	2BA FV 1/2"	Countersunk Hollow Set Screw	4
	2BA FN	Hexagonal Nut	4
	2BA FW	Washer	4
		Coolant/Profiling	
	653	Switch Mounting Plate 2 Speed (coolant only)	1
	654	Switch Mounting Plate 2 Speed (coolant and profiling)	1
	658	Switch Mounting Plate Single Speed (coolant only)	1
	659	Switch Mounting Plate Single Speed (coolant and Profiling)	1
	80461H	Starter for Coolant	1
	80461H	Starter for Profiling	1

Electrical Equipment *(not illustrated)*

Item No.	Part No.	Description	No. Off
	11014018	Rotary Switch Boss	1
	11003068	Handle	1
	11002033	Knob	1
	4BA FX ¼"	Hollow Set Screw 'W' Point	1
	11014019	Gasket	1
	2BA FV 1"	Countersunk Hollow Set Screw	4
		Canadian Market	
	80461H	"Ministart" Starter	1
	469	Mounting and Instruction Plate	1
	4BA FV 1"	Countersunk Hollow Set Screw	2
	11014019	Gasket	1
	2BA FV 1"	Countersunk Hollow Set Screw	4
		American Market	
	498	Mounting Plate	1
	27900U	Arrow Push Button	1
	27903U	Arrow Push Button	1
	L16-14-45	Push Button Gasket	1
	4BA FY 1½"	Countersunk Hollow Set Screw	4
	4BA FW	Washer	4
	4BA FN	Hexagonal Nut	4
	11014027	Adaptor Plate	1
	362203U/100/		
	60c/s	Arrow Starter 220v	1
	361103U/100/		
	60c/s	Arrow Starter 440v	1
	¼" FR ½"	Round Head Set Screw	3
	¼" FW	Washer	3
	¼" FN	Hexagonal Nut	3
	11014026	Spacer	2
	2BA FV ½"	Countersunk Hollow Set Screw	4
	11014019	Gasket	1
	2BA FV 1"	Countersunk Hollow Set Screw	4

Item No.	Part No.	Description	No. Off
		Low Voltage Lighting Unit	
		"Lo-Vo Lite Unit"	1
	L5-10-225	Mounting Bracket	1
	¼" FR ½"		
	(Whit.)	Round Head Set Screws	3
	¼" FH ½"		
	(Whit.)	Hexagonal Head Set Screws	3
		Henley's ¾" Screwed Nipple	1
		Henley's 2 Core Metalflex	2 yds
		Switching Unit for Rotary Switches & Two Speed Motors	
		All Markets	
	11014002	Guard Ring	1
	11014003	Bearing Block	1
	¼" FY ¾"		
	(Whit.)	Socket Head Cap Screw	3
	11014004	Adaptor Plate	1
	2BA FV ½"	Countersunk Hollow Set Screw	2
	BZ-2RW82255		
	A2	Micro Switch	1
	No. 6 FY 1"		
	(U.N.C.)	Socket Head Cap Screw	2
	No. 6 U.N.C.		
	No. 6 FW	Washer	2
	11014005	Change Speed Dial (for Two Speed, Forward & Reverse, European Market)	1
	11014005A	Change Speed Dial (for Two Speed, Forward & Reverse, Home, American & Canadian Markets)	1
	11014009	Spindle	1
	2BA FX 1"	Hollow Set Screw, Cup Point	2
	11014006	Push Rod Sleeve	4
	11014008	Operating Rod	4
	SG251	Spring	4
	11014007	Change Speed Knob	4
	11014011	Switch Sealing Ring	1

Electrical Equipment *(not illustrated)*

Item No.	Part No.	Description	No. Off
	11014016	Spacer	2
	3/4" FV 1/2"	(Whit.) Countersunk Hollow Set Screw	2
	3/4" FW	Washer	2
	3/4" FN (Whit.)	Hexagonal Nut	2
	11014018	Rotary Switch Boss	1
	11003068	Handle	1
	11002033	Knob	1
	4BA FX 1/2"	Hollow Set Screw 'W' Point	1
	11014019	Gasket	1
	2BA FV 1"	Countersunk Hollow Set Screw	4
		Canadian Market (Hydraulic Only)	
	80461H	"Ministart" Starter	1
	470	Mounting and Instruction Plate	1
	4BA FV 1"	Countersunk Hollow Set Screw	2
	11014019	Gasket	1
	2BA FV 1"	Countersunk Hollow Set Screw	4
		American Market	
	499	Mounting Plate	1
	27900U	Arrow Push Button	2
	27903U	Arrow Push Button	2
	L16-14-45	Push Button Gasket	4
	4BA FV 1 1/2"	Countersunk Hollow Set Screw	8
	4BA FW	Washer	8
	4BA FN	Hexagonal Nut	8
	11014027	Adaptor Plate	1
	362203U/100/		
	60c/s	Arrow Starter 220v	1
	361103U/100/		
	60c/s	Arrow Starter 440v	1
	1/2" FR 1/2"	Round Head Set Screw	3
	1/2" FW	Washer	3
	1/2" FN	Hexagonal Nut	3

Item No.	Part No.	Description	No. Off
	11014026	Spacer	2
	2BA FR 1/2"	Round Head Set Screw	2
	2BA FV 1/2"	Countersunk Hollow Set Screw	2
	11014019	Gasket	1
	2BA FV 1"	Countersunk Hollow Set Screw	4
	11014028	Electrical Equipment Mounting Plate	1
	362203U/100/		
	60c/s	Arrow Starter 220v	1
	AT1223	'Arrowtrip' Overload 220v	1
	361103U/100/		
	60c/s	Arrow Starter 440v	1
	AT1224	'Arrowtrip' Overload 440v	1
	1/2" FR 1/2"	Round Head Set Screw	3
	1/2" FW	Washer	3
	1/2" FN	Hexagonal Nut	3
	2BA FY 1"	Socket Set Screw Cap Head	2
	2BA FW	Washer	6
	2BA FN	Hexagonal Nut	6
		1/2" Whit Dome Head Socket Set Screw	4
	1/2" FW	Washer	4
	1/2" FN	Hexagonal Nut	4
		3/4" Dia. Male Bakelite Bush	3
		3/4" Locknut	3
		Suds Control	
		Home Market	
	1PA44/31P	"Diamond H" Rotary Switch	1
	452	Mounting and Instruction Plate	
		(Home and European Markets Only)	1
	11014016	Spacer	2
	3/4" FV 1/2"	(Whit.) Countersunk Hollow Set Screw	2
	3/4" FW	Washer	2
	3/4" FN (Whit.)	Hexagonal Nut	2

Electrical Equipment *(not illustrated)*

Item No.	Part No.	Description	No. Off
	P3P1/1674	Two Speed Reversing Switch "Arrow" Rotary Switch (All Markets except Canadian)	1
	P3AP1/1674	"Arrow" Rotary Switch (Canadian Market)	1
	11014015	Spacer	2
	2BA FY 1"	Socket Head Cap Screw	2
	2BA FW	Washer	2
		For Single Speed Motor	
		American & Canadian Markets	
	PT32AK/NA	Emergency Stop Button	1
	DT78AK/NA	Start Button	1
		Reversing Switch	
	P2P1/0905	"Arrow" Rotary Switch (All Markets except U.S.A. & Canada)	1
	P5AP1/17008	"Arrow" Rotary Switch (American & Canadian Markets)	1
	11014016	Spacer	2
	☆" FV 1"		
	(Whit.)	Countersunk Hollow Set Screw	2
	☆" FW	Washer	2
	☆" FN (Whit.)	Hexagonal Nut	2
	11014025	Rotary Switch Boss	1
	11003068	Handle	1
	11002033	Knob	1
	2BA FX 1/4"	Hollow Set Screw 'W' Point	1
		Control Panels	
		Home Market	
	482	Control Panel (with "Ministart" only) for Single Speed Motor	1
	11014020	Gasket	1
	2BA FV 1"	Countersunk Hollow Set Screw	10
	488	Control Panel (with "Ministart" & Forward- Reverse Switch) for Single Speed Motor	1
	481	Control Panel for Two Speed Motor	1

Item No.	Part No.	Description	No. Off
	11014020	Gasket	1
	2BA FV 1"	Countersunk Hollow Set Screw	10
		American & Canadian	
	732	Control Panel (with Arrow Starter with Forward & Reverse & Push Buttons) for Single Speed Motor	1
	481A	Control Panel for Two Speed Motor	1
	11014020	Gasket	1
	2BA FV 1"	Countersunk Hollow Set Screw	10
	337	Instruction Plate (Canadian Machines Only)	1
	☆" x 1/4"	Rivets	2
		Emergency Stop (Two Speed Motors Only)	
	OB2AK	"Arrow" Stop Button	1
		Isolating Switch (Line Switch)	
		All Markets Except Canadian	
	RP1242	"Arrow" Isolating Switch	1
	451	Mounting & Instruction Plate (not fitted to American Machines)	1
	497	Mounting & Instruction Plate (American Machines Only)	1
	11014019	Gasket	1
	2BA FV 1"	Countersunk Hollow Set Screw	4
	11002033	Knob	1
	11003068	Handle	1
	4BA FY 1/4"	Hollow Set Screw 'W' Point	1
		Canadian Market	
	SP683	Connection Box	1
		Hydraulic & Suds Control	
		Home Market	
	1PA47/319P	"Diamond H" Rotary Switch	1
	471	Mounting and Instruction Plate (Home and European Markets Only)	1

Electrical Equipment *(not illustrated)*

Item No.	Part No.	Description	No. Off
	C213	Main Motors	
	D112M	Motor, 5/2½ h.p. 3 ph 50 cycles 3000/1500 r.p.m. Drip Proof, Continuous Rated (1750 r.p.m. Top Spindle Speed)	1
	C164	Motor, 5.5/4.2 h.p. 3 ph 50 cycles 3000/1500 r.p.m. T.E.F.C. Continuous Rated (1750 r.p.m. Top Spindle Speed)	1
		Motor, 3 h.p. 3 ph 50 cycles 3000 r.p.m. Drip Proof, Machine Tool Rated (1250 r.p.m. Top Spindle Speed)	1
	K184T	American Market (Nema Motors) Canadian Market (Cema Motors) Motor, 5/2½ h.p. 3 ph 60 cycles 3600/1800 r.p.m. Drip Proof, Continuous Rated (1750 r.p.m. Top Spindle Speed)	1
	K145T	Motor 3 h.p. 3 ph 60 cycles 3600 r.p.m. Drip Proof, Continuous Rated (1250 r.p.m. Top Spindle Speed)	1
	T8	Hydraulic Pump Motors ½ h.p. 1000 r.p.m. 3 ph 50 cycles Totally Enclosed Fan Cooled Continuous Rated Flange Mounted	1
	T8	American & Canadian Markets ½ h.p. 1200 r.p.m. 3 ph 60 cycles Totally Enclosed Fan Cooled Continuous Rated, Flange Mounted	1
	AQ3/2	Suds Pump Electro Suds Pump 3 ph 50 cycles	1
	AQ3/2	American Market with thermal O/L device Electro Suds Pump 3 ph 60 cycles	1
	AQ3/2/CSA	Canadian Market Electro Suds Pump 3 ph 60 cycles	1

Item No.	Part No.	Description	No. Off
		MAIN MOTOR CONTROL Mechanical Third Shaft	
	80461H	For Single Speed Motors Home Market only "Ministart" Starter	1
	4BA FV 1"	Countersunk Hollow Set Screw	2
	CT10	For Two Speed Motors, All Markets except American and Canadian Markets "Danfoss" Starter, up to 10 amps	1
	CT16	"Danfoss" Starter, over 10 amps up to 16 amps	1
	½" FV ¼"	(Whit.) Countersunk Hollow Set Screw	2
	365503U/100	For Single & Two Speed Motors, American and Canadian Markets "Arrow" Starter for 550 volts & "Arrotrip" Overload	1
	361103U/100	"Arrow" Starter for 440 volts & "Arrotrip" Overload	1
	363803U/100	"Arrow" Starter for 380 volts & "Arrotrip" Overload	1
	362203U/100	"Arrow" Starter for 220 volts & "Arrotrip" Overload	1
	362083U/100	"Arrow" Starter for 208 volts & "Arrotrip" Overload	1
	½" FV ½"	(Whit.) Countersunk Hollow Set Screw	3
	½" FV 1"	(Whit.) Countersunk Hollow Set Screw	2
	½" FW	Washer	5
	½" FN	Hexagonal Nut	5
	UFBD	Transformer for 110V on 440 volts supply (American Market)	1

Profile Copying Attachment Miscellaneous Accessories *(illustrated on page 72)*

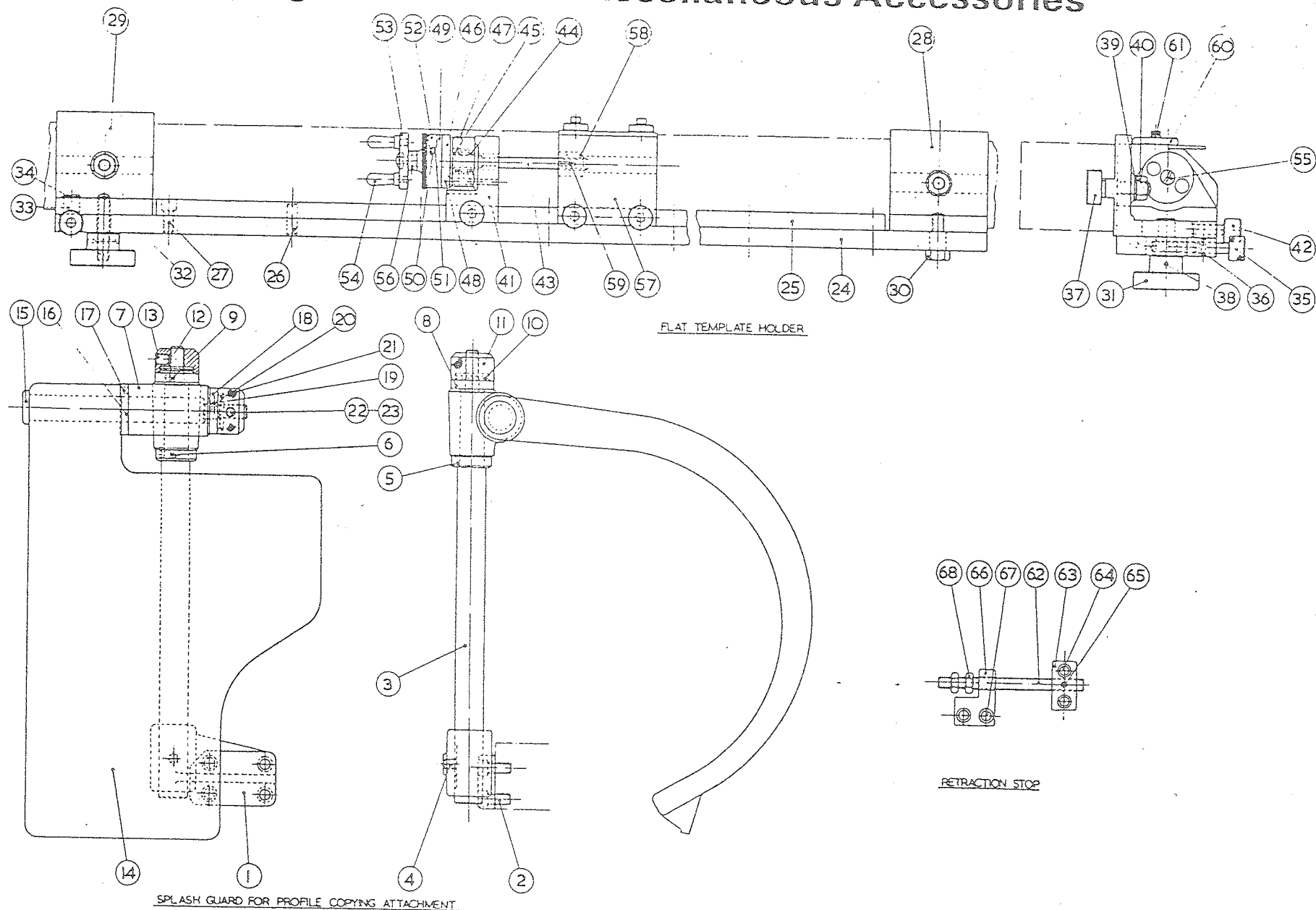
Item No.	Part No.	Description	No. Off
66	L5-16-112	Stop Piece	
67	3/4" FY 1" (Whit.)	Socket Head Cap Screw	1
68	3/4" FL (Whit.)	Lock Nuts	2
			2

Profile Copying Attachment Miscellaneous Accessories *(illustrated opposite)*

Item No.	Part No.	Description	No. Off
1	L16-13-85	Support Bracket	1
2	1/4" FY 3/4" (Whit.)	Socket Head Cap Screw	4
3	L16-13-84	Support Pillar	1
4	3/8" FX 3/4" (Whit.)	Hollow Set Screw, 'W' Point	1
5	L16-13-82	Swivel Washer	1
6	3/8" PG 1/2"	Grooved Pin	1
7	L16-13-78	Hinge Boss	1
8	L16-13-81	Washer	1
9	3/8" PG 1/4"	Grooved Pin	1
10	Z10	Disc Spring	3
11	L16-13-80	Clamp Nut	1
12	L5-5-15	Die Piece	1
13	3/8" FX 3/4" (Whit.)	Hollow Set Screw, 'W' Point	1
14	L16-13-77	Splash Guard	1
15	L16-13-79	Hinge Stud	1
16	L16-13-83	Washer	1
17	3/8" PG 1/2"	Grooved Pin	1
18	L16-13-81	Washer	1
19	1" PG 1/4"	Grooved Pin	1
20	Z10	Disc Spring	3
21	L16-13-80	Clamp Nut	1
22	L5-5-15	Die Piece	1
23	3/8" FX 3/4" (Whit.)	Hollow Set Screw, 'W' Point	1
		Flat Template Holder	
24	L5-16-164	Bottom Rail	1
25	L5-16-166	Top Rail	1
26	3/8" PG 3/4"	Grooved Pin	3
27	3/8" FY 3/4" (Whit.)	Socket Head Cap Screw	7
28	L5-16-168	Right Hand Angle Bracket	1
29	L5-16-169	Left Hand Angle Bracket	1
30	L5-16-187	Pivot Screw	1
31	L5-16-182	Locking Screw	1

Item No.	Part No.	Description	No. Off
32	L5-16-184	Stud	1
33	L5-16-181	Alignment Pivot	1
34		1/2" Dia. External Circlip	1
35	L17-10-72	Alignment Screw	1
36	L5-16-185	Pin	1
37	L17-10-75	Tee Bolt	2
38	3/2" x 1"	Spirol Pin	1
39	3/8" FW	Washer	2
40	3/8" FN (U.N.C.)	Hexagonal Nut	2
41	L5-16-171	Adjustable Bracket	1
42	L17-10-64	Thumb Screw	3
43	L5-16-179	Leadscrew (L5-16-179A Metric)	1
44	E.1306	Thrust Race	2
45	Z8	Disc Spring	1
46	L5-16-172	Fixed Collar	1
47	B.S.O. 1/2"	1/2" Dia. Drive Fit Ball, Spring Oiler	1
48	2BA FY 1 1/2"	Socket Head Cap Screw	2
49	L5-16-173	Dial (L5-16-173A Metric)	1
50	L5-16-190	Die Piece	2
51	SG-309	Spring	2
52	1/4" FX 1/4" (Whit.)	Hollow Set Screw, Cup Point	2
53	L5-16-174	Handwheel	1
54	L17-10-82	Knob Handle	2
55	L5-16-175	Lock Nut	1
56	3/8" PT 3/4"	Taper Pin	1
57	L5-16-170	Template Holder	1
58	L5-16-178A	Leadscrew Nut (L5-16-178B Metric)	1
59	2BA FX 1/2"	Hollow Set Screw	2
60	L17-10-65	Locking Plate	2
61	2BA FY 1/2"	Socket Head Cap Screw	2
		Retraction Stop	
62	L5-16-110	Screw	1
63	L5-16-111	End Support	1
64	3/8" FY 1" (Whit.)	Socket Head Cap Screw	2
65	2BA FX 3/4"	Hollow Set Screw, Cup Point	1

Profile Copying Attachment Miscellaneous Accessories

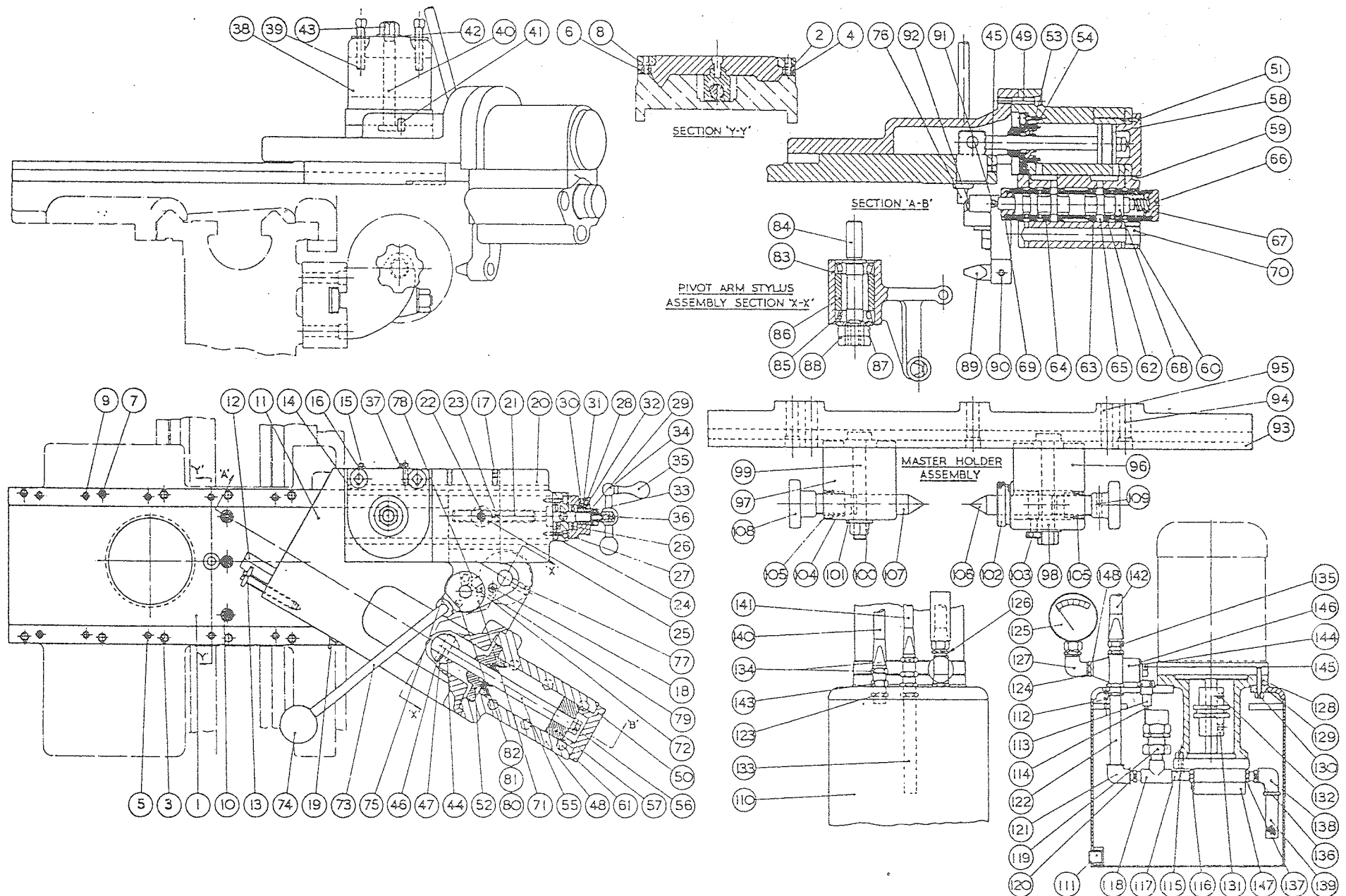


42

Item No.	Part No.	Description	No. Off
131	FIG70/CAX	'Picador' Flexible Coupling	1
132	$\frac{3}{8}$ " FX $\frac{3}{8}$ " (Whit.)	Hollow Set Screw 'W' Point	2
133	L5-16-58	Oil Return Pipe	1
134		$\frac{3}{8}$ " BSP Female Coupling	2
135	105341	Hexagonal Nipple $\frac{3}{8}$ " BSP	2
136	L16-13-89	Reducing Bush $\frac{1}{2}$ " - $\frac{3}{8}$ " BSP	1
137	L16-13-90	Hexagonal Nipple $\frac{3}{8}$ " BSP	1
138	L16-13-88	Elbow $\frac{3}{8}$ " BSP	1
139	SP-148	Gauze Filter	1
140	SK106104	High Pressure Nylon Hose 66" x $\frac{3}{8}$ " Bore	1
141	SK106105	High Pressure Nylon Hose 67" x $\frac{3}{8}$ " Bore	1
142	SK106106	High Pressure Nylon Hose 69" x $\frac{3}{8}$ " Bore	1
143	105341	Hexagonal Nipple $\frac{3}{8}$ " BSP	1
144	L5-16-140	Housing, Magnetic Plug	1
145	7734/05	Magnetic Filter Plug	1
146	SP41	Fiber Washer	1
147	L5-16B	Hydraulic Pump	1
148	$\frac{3}{8}$ " Dia.	Fibre Washer	1

[illegible]

Profile Copying Attachment



Item No.	Part No.	Description	No. Off
1	13013001	Cross Slide	1
2	13013002	Strip (Short)	1
3	1/4" FY 1/4"	(Whit.)	
4	13013003	Socket Head Cap Screw	4
5	1/4" FX 1/2"	Jacking Strip (Short)	1
6	(Whit.)	Hollow Set Screw Half Dog Point	4
7	13005011	Strip	1
8	1/4" FY 1/4"	(Whit.)	
9	13005010	Socket Head Cap Screw	6
10	1/4" FX 1/2"	Jacking Strip (Long)	1
11	(Whit.)	Hollow Set Screw Half Dog Point	6
12	H4210	Hydraulic Nipple, Straight Drive Type	3
13	L16-13-4	Hydraulic Slide	1
14	L5-16-38	Strip	1
15	L5-16-39	Adjusting Screw	1
16	L16-13-5	Strip, Top Slide	1
17	1/4" FX 1/4"	(Whit.)	
18	1/2" FL (Whit.)	Hollow Set Screw Full Dog Point	2
19	1/4" FX 1/2"	Locknut	2
20	(Whit.)	Hollow Set Screw Half Dog Point	2
21	H4146	Hydraulic Nipple Straight 1/4" Whit.	1
22	H4210	Hydraulic Nipple Straight Drive Type	1
23	L16-13-2	Top Slide	1
24	L5-5-47B	Top Slide Screw (L5-5-49B Metric)	1
25	L5-92A	Nut (L5-811 Metric)	1
26	1/4" FX 1/4"	(Whit.)	
27	L5-5-40C	Hollow Set Screw 'W' Point	1
28	H4146	Fixed collar (L5-5-40D for U.S.A.)	1
29	SKF51101	Hydraulic Nipple, Straight 1/4" Whit.	1
30	3/8" FY 3/8"	Thrust Race	2
31	(Whit.)	Socket Head Cap Screw	2
32	L5-5-39	Graduated Collar (L5-5-39D for U.S.A. (L5-5-44 Metric)	1
33	L5-5-55A	Bush	1

Item No.	Part No.	Description	No. Off
30	SG290	Spring	2
31	3/8" FX 1/4"	(Whit.)	
32	L5-5-15	Hollow Set Screw Flat Point	2
33	NP/V126/11/2	Die	2
34	L5-5-57A	'Simmonds' Locknut (1/4" Whit.)	1
35	L5-570	Ball Handle	1
36	1/4" PT 1"	Handle } Supplied Integral	1
37	H4146	Taper Pin	1
38	L16-5-28	Hydraulic Nipple Straight (1/4" Whit.)	1
39	1/4" FZ 1 1/4"	Tool Holder	1
40	(Whit.)	Square Headed Set Screw (Half Dog Point)	2
41	L16-13-3	Pivot Stud	1
42	1/4" FX 1/2"	(Whit.)	
43	1/4" FW	Hollow Set Screw Cup Point	1
44	1/4" FB (BSF)	Washer	1
45	L5-16-20	Hexagonal Nut (Hardened)	1
46	1/4" FX 1/4"	Connecting End Piston Rod	1
47	(Whit.)	Hollow Set Screw 'W' Point	1
48	L5-16-23	Pin	1
49	4BA FX 1/4"	Hollow Set Screw 'W' Point	1
50	L5-16-3	Cylinder	1
51	1/4" FY 1"	(Whit.)	
52	L5-16-5	Socket Head Cap Screw	5
53	2BA FY 1/2"	End Cover, Right Hand	1
54	L5-16-6	Socket Head Cap Screw	5
55	2BA FY 1/2"	End Cover Left Hand	1
56	L5-16-22	Socket Head Cap Screw	5
57	3/8" FL (Whit.)	'U' Leather 1 3/8" o.d. 1/2" i.d.	1
58	L5-16-21	Piston Rod	1
59	L5-16-123	Lock nut	2
60	L5-16-60	Piston	1
61	1/4" FY 2 1/2"	Piston Ring	2
62	(Whit.)	Gasket	1
	L5-16-31	Valve Block	1
		Socket Head Cap Screw	6
		Valve Bush Right Hand	1

Profile Copying Attachment *(illustrated on page 70)*

Item No.	Part No.	Description	No. Off
63	L5-16-29	Valve Bush Centre	1
64	L5-16-28	Valve Bush Left Hand	1
65	L5-16-121A	Spacing Ring	2
66	L5-16-61	Valve Plug Right Hand	1
67	SG321	Spring	1
68	L5-16-64	Valve	1
69	L5-16-62	Valve Plug Left Hand	1
70	S222	Hexagonal Nipple $\frac{1}{8}$ " BSP	3
71	1513004	Boss Control Lever	1
72	$\frac{1}{8}$ " FX $\frac{1}{8}$ " (Whit.)	Hollow Set Screw, Wedglock Cup Point	1
73	1513005	Control Lever	1
74	BB2	Bakelite Ball $\frac{1}{2}$ " Dia.	1
75	$\frac{1}{8}$ " PT 1"	Taper Pin	1
76	L5-16-9	Eccentric Stud	1
77	$\frac{1}{8}$ " FX $\frac{1}{2}$ " (U.N.C.)	Hollow Set Screw, Cup Point	1
78	L5-16-24	Stop Piece	1
79	2BA FY $\frac{1}{8}$ "	Socket Head Cap Screw	2
80	$\frac{1}{8}$ " FX $\frac{1}{4}$ " (Whit.)	Hollow Set Screw, Flat Point	1
81	SB3	$\frac{1}{4}$ " Dia. Steel Ball	1
82	SG274	Spring	1
83	L5-16-51	Pivot Arm, Stylus	1
84	L5-16-54	Swivel Stud	1
85	A6075, A6157	Timken Taper Roller Bearing	2
86	L5-16-55	Spacer	1
87	L5-16-56	Washer	1
88	L5-16-57	Locknuts	2
89	L16-13-110	Stylus	1
90	$\frac{1}{4}$ " FX $\frac{1}{4}$ " (Whit.)	Hollow Set Screw 'W' Point	1
91	L5-16-11	Contact Pin	1
92	$\frac{1}{8}$ " FN (Whit.)	Hexagonal Nut	1
93	L5-16-92	Support Block	1
94	$\frac{1}{8}$ " FY 2" (Whit.)	Socket Head Cap Screw	10
95	L5-16-122	Dowel	2

Item No.	Part No.	Description	No. Off
96	L5-16-78	Head, Right Hand Master Holder	1
97	L5-16-79	Head, Left Hand Master Holder	1
98	L5-16-75	Locking Stud	1
99	L5-16-76	Locking stud	1
100	L5-5-69	Lock Nut (U.N.C.)	2
101	$\frac{1}{2}$ " FW	Washer	2
102	L5-16-67	Eccentric Bush	1
103	L5-16-148	Locking Screw	1
104	L5-16-70	Nut	2
105	$\frac{1}{8}$ " FX $\frac{1}{8}$ "	Hollow Set Screw 'W' Point	4
106	L5-16-68	Centre Right Hand	1
107	L5-16-17	Centre Left Hand	1
108	SP-110	Handwheel	2
109	$\frac{1}{8}$ " PT 1"	Taper Pin	1
110	L5-16-40	Oil Container	1
111		$\frac{1}{4}$ " BSP Plug	1
112	$\frac{1}{4}$ " FY 1" (Whit.)	Socket Head Cap Screw	4
113	L5-16-65	Plug Dipstick	1
114	L5-16-66	Dipstick	1
115	$\frac{1}{8}$ " FY 1 $\frac{1}{4}$ " (Whit.)	Socket Head Cap Screw	4
116	L16-13-89	Reducing Bush $\frac{1}{2}$ " - $\frac{1}{8}$ " BSP	1
117	L5-16-81	Oil Supply Pipe	1
118	L16-13-87	Tee Piece $\frac{1}{8}$ " BSP	1
119		Relief Valve	1
120	L16-13-90	Hexagonal Nipple $\frac{1}{8}$ " BSP	1
121	L16-13-88	Elbow $\frac{1}{8}$ " BSP	1
122	L5-16-59	Oil Supply Pipe	1
123		Lock Nut $\frac{1}{8}$ " BSP	2
124	L16-13-90	Hexagonal Nipple $\frac{1}{8}$ " BSP	1
125		3" Pressure Gauge	1
126		Locknut $\frac{1}{8}$ " BSP	1
127		Elbow $\frac{1}{8}$ " BSP	1
128	L5-16-50A	Adaptor	1
129	L5-16-52	Cover, Oil Container	1
130	$\frac{1}{8}$ " FH 1 $\frac{1}{4}$ " (U.N.C.)	Hexagonal Head Set Screw	4

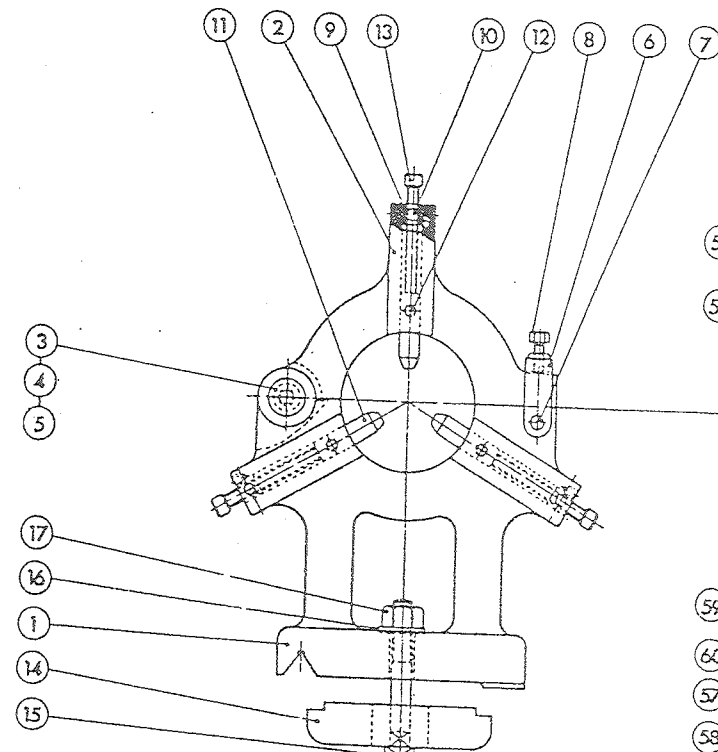
Miscellaneous Accessories

(illustrated opposite)

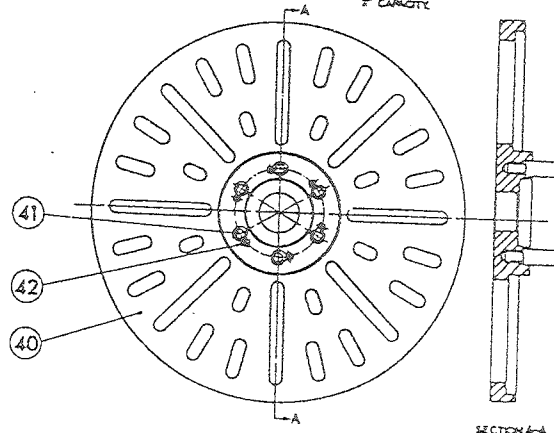
Item No.	Part No.	Description	No. Off
1	L16-10-1	Stationary Steady (3" Capacity)	
2	L5-10-49	Base	1
3	L5-521	Top	1
4	½" FN (Whit.)	Swivel Stud	1
5	½" FW	Hexagonal Nut	1
6	L5-95	Washer	1
7	L5-640	Clip	1
8	¼" FH ½"	Pin	1
	(Whit.)	Hexagonal Head Set Screw	1
9	L5-522	Nut	3
10	¼" FX ¼"		
	(Whit.)	Hollow Set Screw, Cup Point	3
11	L5-10-50	Pin	3
12	¼" FX ½"		
	(Whit.)	Hollow Set Screw, Cup Point	3
13	¾" FY 2 ½"		
	(Whit.)	Socket Head Cap Screw (Screwed to head)	3
14	L16-10-2	Holding Down Plate	1
15	½" BC 3 ½"		
	(Whit.)	Square, Square Head Bolt	1
16	½" FW	Washer	1
17	½" FN (Whit.)	Hexagonal Nut	1
		Micrometer Saddle Stop	
18	L16-10-3B	Body (L16-10-3C Metric)	1
19	L5-10-33	Screw (L5-10-59 Metric)	1
20	¾" KS ½"	Square Key	1
21	L5-10-32	Micrometer Collar (L5-10-60A Metric)	1
22	L5-10-35	Die Piece	1
23	¼" FX ¾"		
	(Whit.)	Hollow Set Screw ½ Dog Point	1
24	L5-10-36	Knurled Screw	1
25	L5-10-34	Clamp Plate	1
26	½" FY 2 ½"		
	(Whit.)	Socket Head Cap Screw	2
	WIOL	Wrench (Not Illustrated)	1
		4 Position Saddle Stop	
27	L16-10-124A	Body	1
28	L16-10-125	Clamp Plate	1
29	½" FH 1"		
	(Whit.)	Hexagonal Head Set Screw High Tensile	2

Item No.	Part No.	Description	No. Off
30	L5-10-120	Bush	1
31	L5-10-121	End Plate	1
32	L5-10-122	Stop Screw	4
33	L5-10-143	Slug	4
34	¼" FY ¾"		
	(Whit.)	Socket Head Cap Screw	2
35	¼" FX ¾"		
	(Whit.)	Hollow Set Screw, Cup Point	4
36	SB3	Steel Ball ¼" Dia.	1
37	SG5	Spring	1
38	¾" FX ¾"		
	(Whit.)	Hollow Set Screw, Cup Point	1
39	H4146	Hydraulic Nipple, Straight, ¼" Whit.	1
		Faceplates	
40	1301001	18" Dia. faceplate	1
41		Camlock Stud	4
42	¼" FY ¾"		
	(UNC)	Socket Head Cap Screw	4
		Stationary Steady (7" Capacity)	
43	L16-10-142	Base	1
44	1510057	Top	1
45	1510007	Hinge Pin	1
46	¼" FX ¼"		
	(Whit.)	Hollow Set Screw 'W' Point	1
47	1510008	Eye Bolt	1
48	½" FN (Whit.)	Hexagonal Nut	1
49	½" FW	Washer	1
50	1510007	Hinge Pin	1
51	¼" FX ½"		
	(Whit.)	Hollow Set Screw 'W' Point	1
52	1509002	Adjusting Screw	3
53	1509003	Nut	3
54	¼" FX ¾"		
	(Whit.)	Hollow Set Screw 'W' Point	3
55	1509004	Steady Pin	3
56	¾" FX ¾"		
	(Whit.)	Hollow Set Screw 'W' Point	3
57	1510011	Stud	1
58	1510010	Holding Down Plate	1
59	¾" FN (Whit.)	Hexagonal Nut	1
60	¾" FW	Washer	1

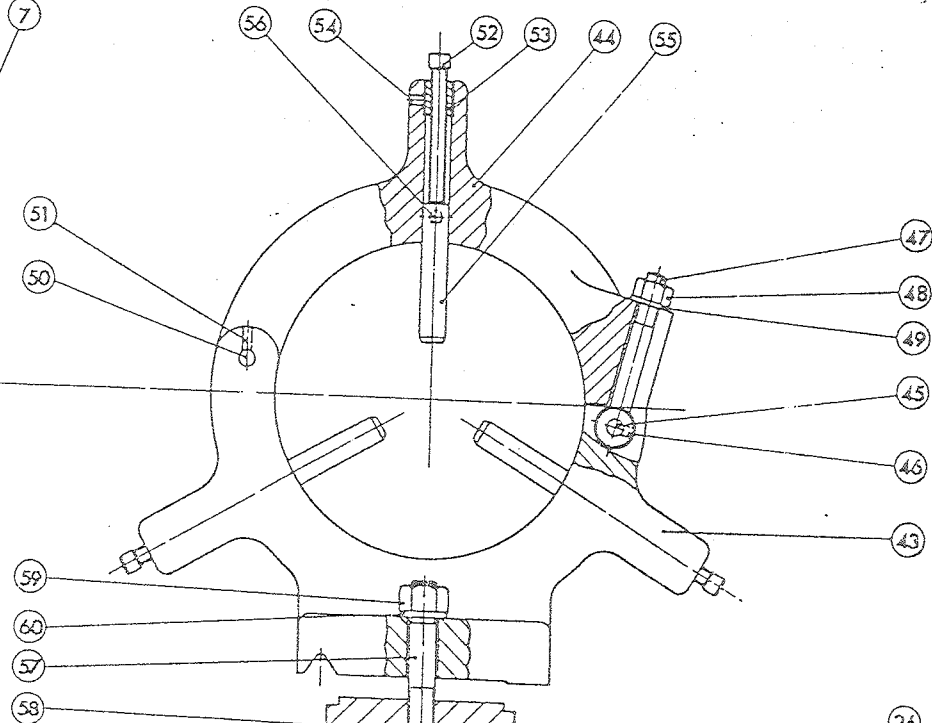
Miscellaneous Accessories



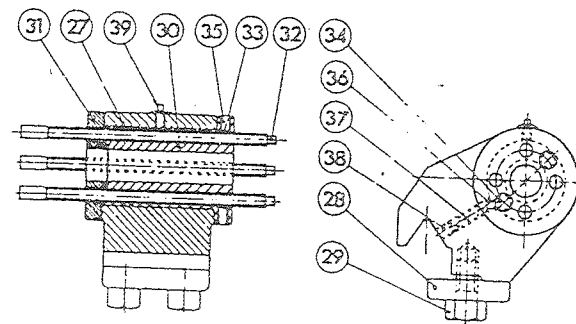
STATIONARY STEADY
2" CAPACITY



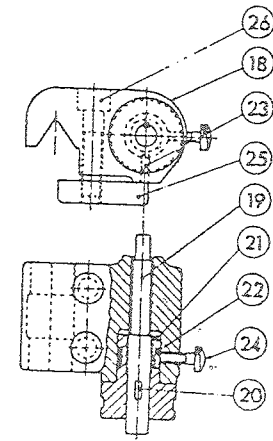
15" DIA. FACEPLATE D 15" CAMLOCK



STATIONARY STEADY
7" CAPACITY



FOUR POSITION SADDLE STOP



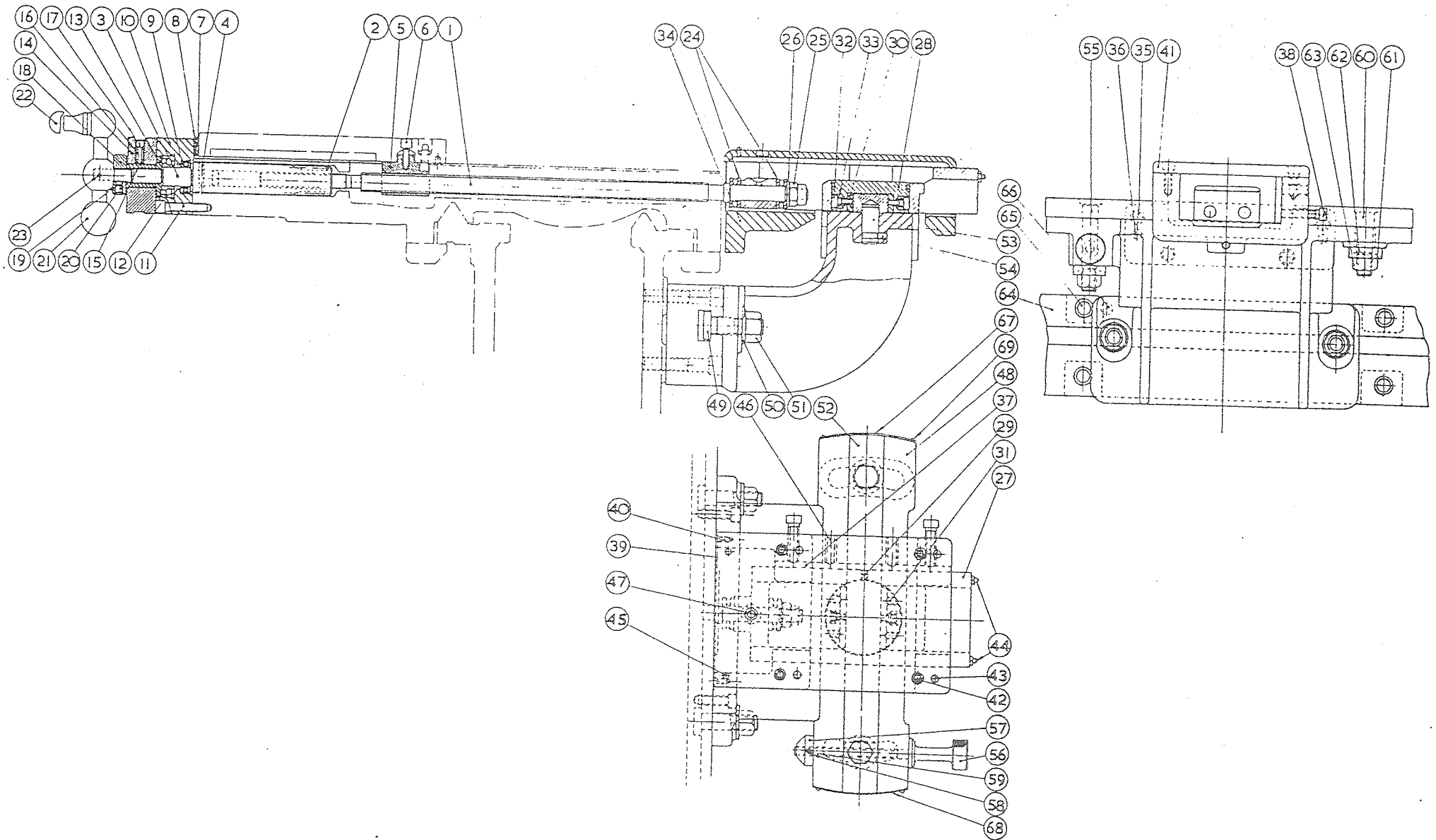
MICROMETER SADDLE STOP

Taper Turning Attachment *(illustrated opposite)*

Item No.	Part No.	Description	No. Off
63	½" FN	Hexagonal Nut	2
64	L5-16-85	Block for Bed	1
65	1" FY 2"	Socket Head Cap Screw	10
66	L5-16-122	Dowel	2
67	461	Index Plate (462 Metric)	1
68	460	Index Plate	1
69	⅜" x ¼"	Rivets	4

Item No.	Part No.	Description	No. Off

Taper Turning Attachment

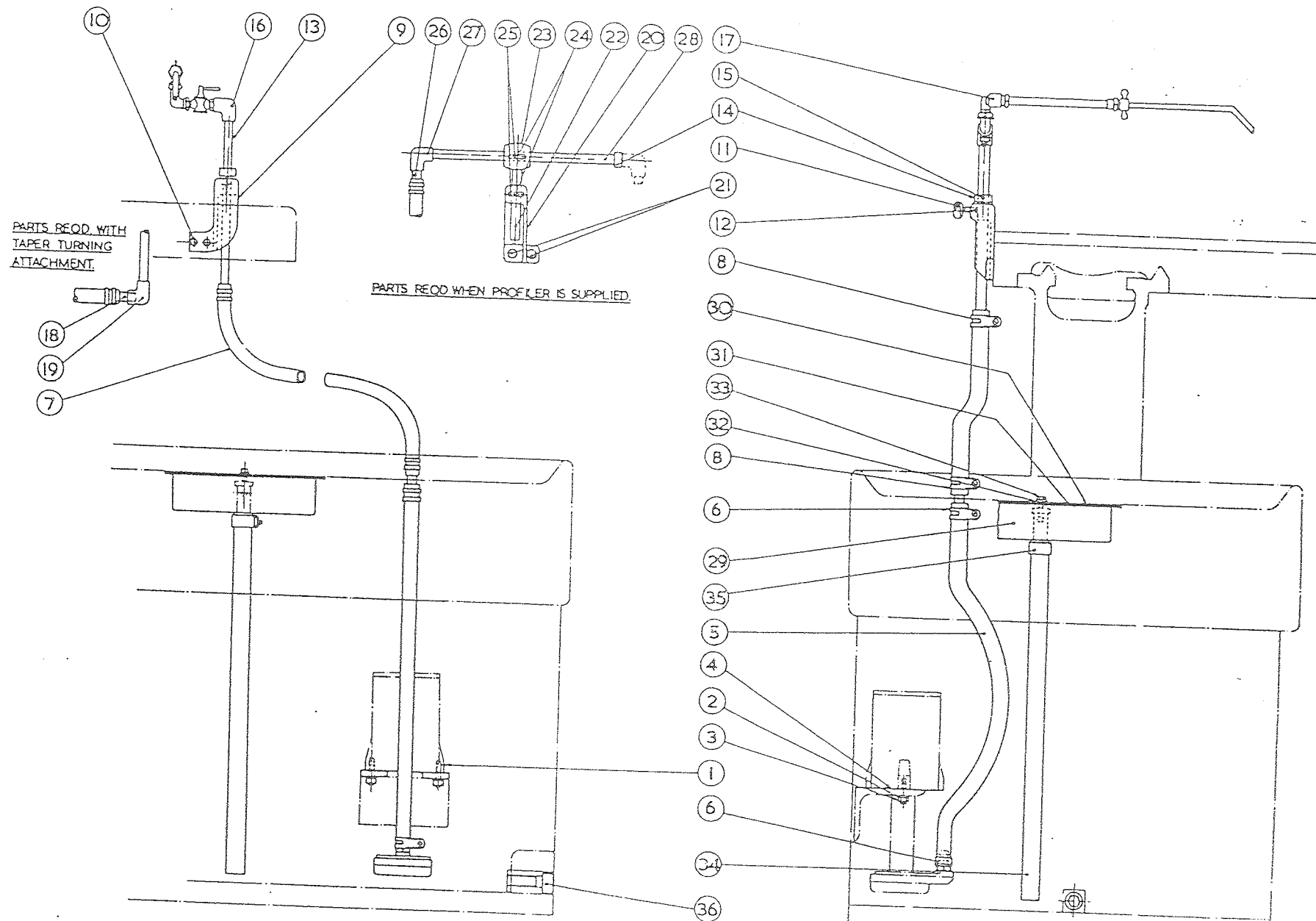


Taper Turning Attachment *(illustrated on page 64)*

Item No.	Part No.	Description	No. Off
1	L16-12-1	Cross Slide Screw (L16-12-23 Metric) (1512004 Single Start)	1
2	13012004	Pinion	1
3	13012005	Shaft	1
4	¾" PT 1"	Taper Pin	1
5	11005035	Cross Slide Nut (11005057 Metric) (11005037 Single Start)	1
6	¼" FY ¾" (Whit.)	Socket Head Cap Screw	1
7	11005029	Wiper	1
8	11005030	Wiper Cover	1
9	SKF51102	Thrust Bearing	1
10	11005038	Fixed Collar (11005040 Single Start)	1
11	¼" FY 1½" (Whit.)	Socket Head Cap Screw	3
12	LJT15	Angular Contact Bearing	1
13	11005071	Micrometer Dial Mount	1
14	MH1-4-81	Micrometer Dial (MH1-4-81C Metric)	1
15	L5-5-15	Die	2
16	SG290	Spring	2
17	¾" FX ½" (Whit.)	Hollow Set Screw, Flat Point	2
18	11005072	Micrometer Dial Nut.	1
19	L5-10-143	Pad	1
20	¼" FX ¼" (Whit.)	Hollow Set Screw, Dog point	1
21	L16-5-102	Ball Handle	1
22	L17-5-42	Handle	1
23	¾" PT 1½"	Taper Pin	1
24	SKF51101	Thrust Bearing	2
25	PT/F146/11/201	Locknut ¾" B.S.F.	1
26	¾" FW	Washer	1
27	L5-14-10B	Slide Block	1
28	L5-14-40A	Top Slide	1
29	2BA FX ¾"	Hollow Set Screw ½ Dog Point	1
30	L5-14-20	Strip	2
31	¼" FX ¾" (Whit.)	Hollow Set Screw ½ Dog Point	4

Item No.	Part No.	Description	No. Off
32	2BA FY ½"	Socket Head Cap Screw	2
33	SG119	Spring	2
34	L5-14-12B	Support Bracket, Slide Block	1
35	¾" FY 1" (Whit.)	Socket Head Cap Screw	4
36	¾" PG 1"	Grooved Pins	2
37	L5-14-21	Strip	1
38	¾" FY 1½" (Whit.)	Socket Head Cap Screw	2
39	13012003	Cover Strip	1
40	2BA FV ¾"	Countersunk Hollow Set Screw	2
41	13012002	Cover Plate	1
42	¼" FY ½" (Whit.)	Socket Head Cap Screw	4
43	¼" PG 1"	Grooved Pin	4
44	H4146	Hydraulic Nipple Straight ¼" Whit.	2
45	¾" x ¼"	Rivet	2
46	¾" FX ¾" (Whit.)	Hollow Set Screw ½ dog Point, Wedgelok	4
47	Type F No. 4	Self Sealing Lubricator	1
48	13012008	Support Bracket Swivel Slide (13012008A Metric)	1
49	L5-822	Tee Bolt	2
50	½" FW	Washer	2
51	L5-5-69	Locking Nuts	2
52	L5-14-41A	Swivel Slide	1
53	L5-14-36A	Swivel Pin	1
54	¼" FX ¾" (Whit.)	Hollow Set Screw, Cup Point	1
55	L5-14-25	Stud, Taper Setting	1
56	L5-14-24	Screw	1
57	L5-14-26	Collar	1
58	L5-14-32	Die Piece	1
59	2BA FX ¾"	Hollow Set Screw, Cup Point	1
60	L5-14-37	Locking Stud	1
61	L5-14-38	Spherical Washer, Male	2
62	L5-14-39	Spherical Washer, Female	2

Electric Pump and Fittings

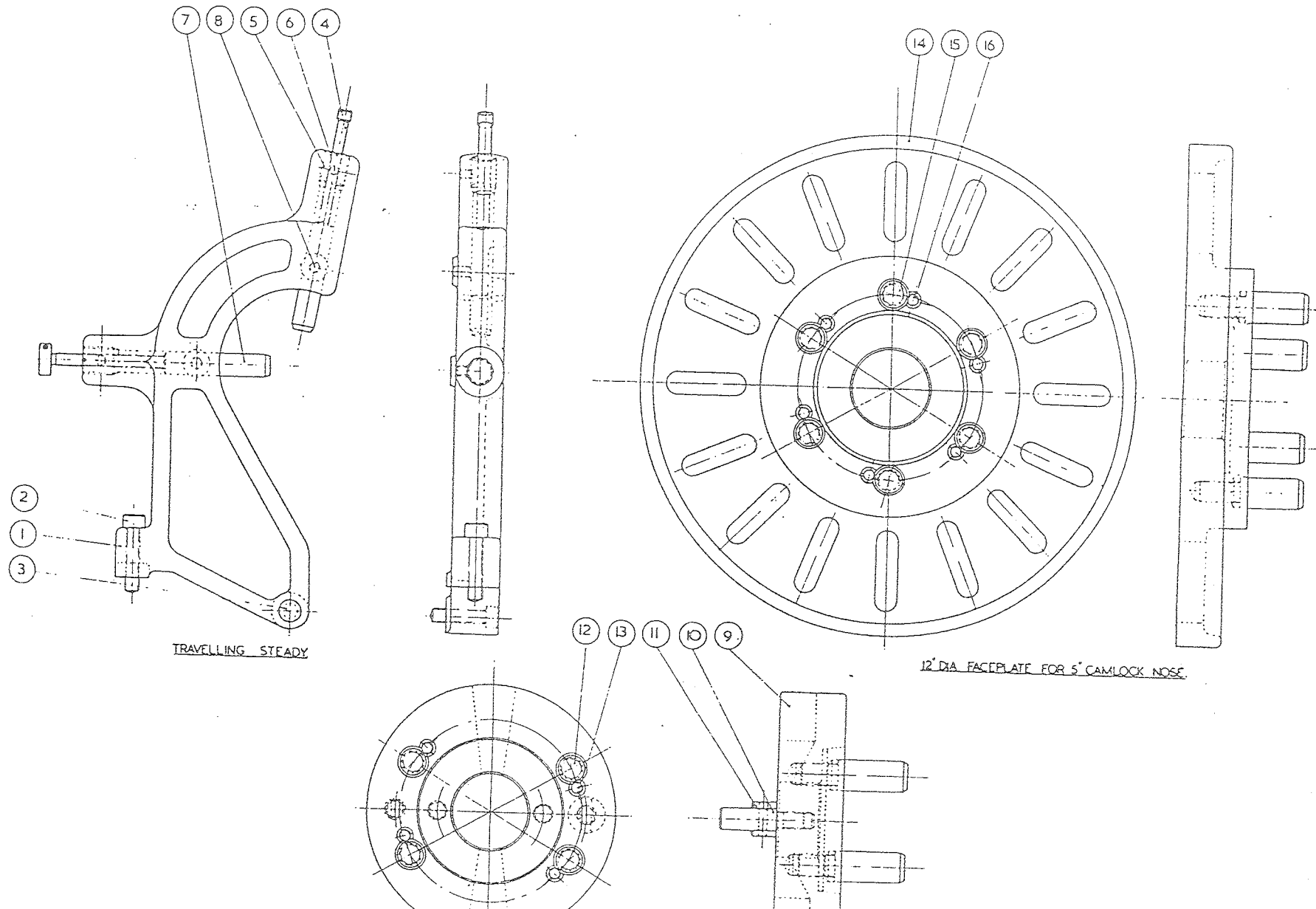


Electric Pump and Fittings *(illustrated on page 62)*

Item No.	Part No.	Description	No. Off
1	11011001	Stud for Pump	2
2	WS ½"	Single Coil Spring Washer	2
3	½" FN' (UNC)	Hexagonal Nut	2
4	11011002	Vibration Pad	1
5		Plastic Hose ½" Bore x 20" Long	1
6	11001031	½" Dia. Beacon Hose Clip	2
7		Plastic Hose ½" Bore x 4' 6" Long	1
8	11001031	½" Dia. Beacon Hose Clip	2
9	L5-12-13	Stand Pipe Bracket	1
10	¾" FY ½" (Whit.)	Socket Head Cap Screw	2
11	L5-12-8A	Thumb Screw	1
12	L5-5-15	Die	1
13	L5-12-6	Stand Pipe	1
14	L5-12-7	Collar	1
15	2BA FX ¾"	Hollow Set Screw ½ Dog Point	1
16	G14-98	Elbow ¼" B.S.P.	1
17	LP.198	Coolant Fitting complete with Swivel & Tap	1
18	L5-12-17	Extras for Taper Turning Attachment	
19	G14-98	Connecting Pipe	1
		Elbow ¼" B.S.P.	1
20	L5-12-37	Alternative for Profile Copy Lathes	
21	¾" FY ¾" (Whit.)	Stand Pipe Bracket	1
22	L5-16-82	Socket Head Cap Screw	2
23	L5-16-108	Support Arm } Supplied	1
24	L5-5-15	Boss, Support Arm } Integral	1
25	L5-12-8A	Die	2
26	L5-12-17	Thumb Screw	2
27	G14-98	Connecting Pipe	1
28	L5-12-6	Elbow ¼" B.S.P.	2
29	11001037	Stand Pipe	1
30	11001026	Settling Tank	1
31	11001027	Filter Plate	1
		Gasket	1

Item No.	Part No.	Description	No. Off
32	¾" FW	Washer	
33	¾" FH 1" (Whit.)	Hexagonal Head Set Screw	1
34		Nylon Tube 1" O.D. x ¾" I.D. x 18½" Long	1
35	11001032	1" Dia. Beacon Hose Clip	1
36	¾" Gas	Socket Plug	1

Standard Accessories



Standard Accessories *(illustrated on page 60)*

Item No.	Part No.	Description	No. Off
1	L16-9-6	Travelling Steady	1
2	½" FY 1½" (Whit.)	Socket Head Cap Screw	1
3	½" FY 1½" (Whit.)	Socket Head Cap Screw	1
4	¾" FY 1¾" (Whit.)	Socket Head Cap Screw (Screwed to Head)	2
5	L5-522	Nut	2
6	¾" FX ¼" (Whit.)	Hollow Set Screw Cup Point	2
7	L5-69	Pin	2
8	¾" FX ½" (Whit.)	Hollow Set Screw, Cup Point	2
9	13009001	Driver Plate	1
10	L16-9-4	Driver Pin	1
11	L16-9-5	Balance Peg	1
12		Camlock Stud	4
13	¼" FY ¾" (UNC)	Socket Head Cap Screw	4
14	13009002	12" Diameter Face Plate	1
15		Camlock Stud	6
16	¼" FY ¾" (UNC)	Socket Head Cap Screw	6

Item No.	Part No.	Description	No. Off

Change Wheel Assembly

Item No.	Part No.	Description	No. Off
	CHANGE WHEELS FOR METRIC GEARBOX		
		(6mm Pitch Leadscrew)	
•	L5-51B	120T Change Wheel	1
•	L5-51K	60T Change Wheel	1
•	L5-51W	45T Change Wheel	1
•	551	Screwcutting Chart	1
	CHANGE WHEELS FOR ENGLISH THREADS		
		(6mm Pitch Leadscrew)	
•	L5-51A	127T Change Wheel	1
•	L5-51WWW	38T Change Wheel	1
•	L5-51VVV	33T Change Wheel	1
•	L5-51UUU	32T Change Wheel	1
•	L5-51DD	30T Change Wheel	1
•	L5-51EE	28T Change Wheel	1
•	L5-51TTT	27T Change Wheel	1
•	L5-51XX	26T Change Wheel	1
•	552	Screwcutting Chart	1
	CHANGE WHEELS FOR DIAMETRICAL PITCHES		
		(6mm Pitch Leadscrew)	
•	L5-51R	36T Change Wheel	1
•	L5-51CCC	42T Change Wheel	1
•	L5-51QQQ	44T Change Wheel	1
•	L5-51H	66T Change Wheel	1
•	L5-51UU	78T Change Wheel	1
•	L5-51AA	105T Change Wheel	1
•	L5-51A	127T Change Wheel	1
•	671	Screwcutting Chart	1
	CHANGE WHEELS FOR MODULE PITCHES		
		(6mm Pitch Leadscrew)	
•	L5-51FF	24T Change Wheel	1
•	L5-51QQQ	44T Change Wheel	1
•	L5-51AA	105T Change Wheel	1
•	L5-51B	120T Change Wheel	1
•	671	Screwcutting Chart	1

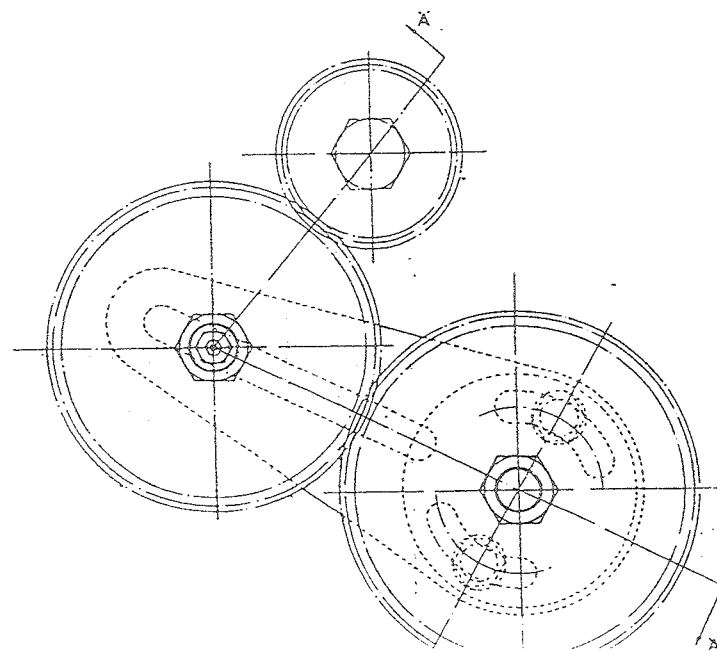
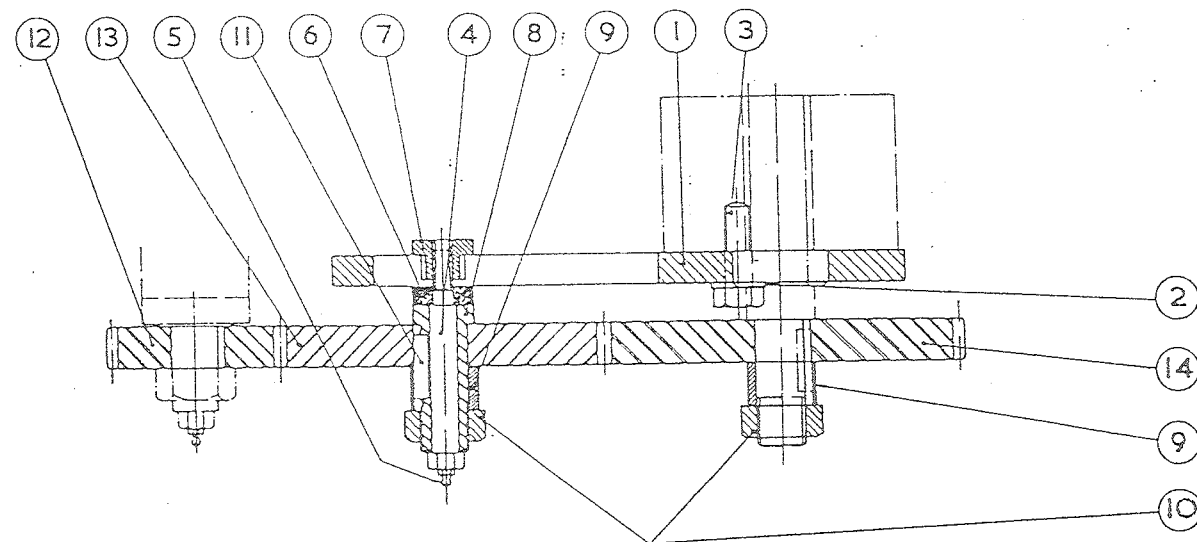
Item No.	Part No.	Description	No. Off

Change Wheel Assembly (illustrated on page 56)

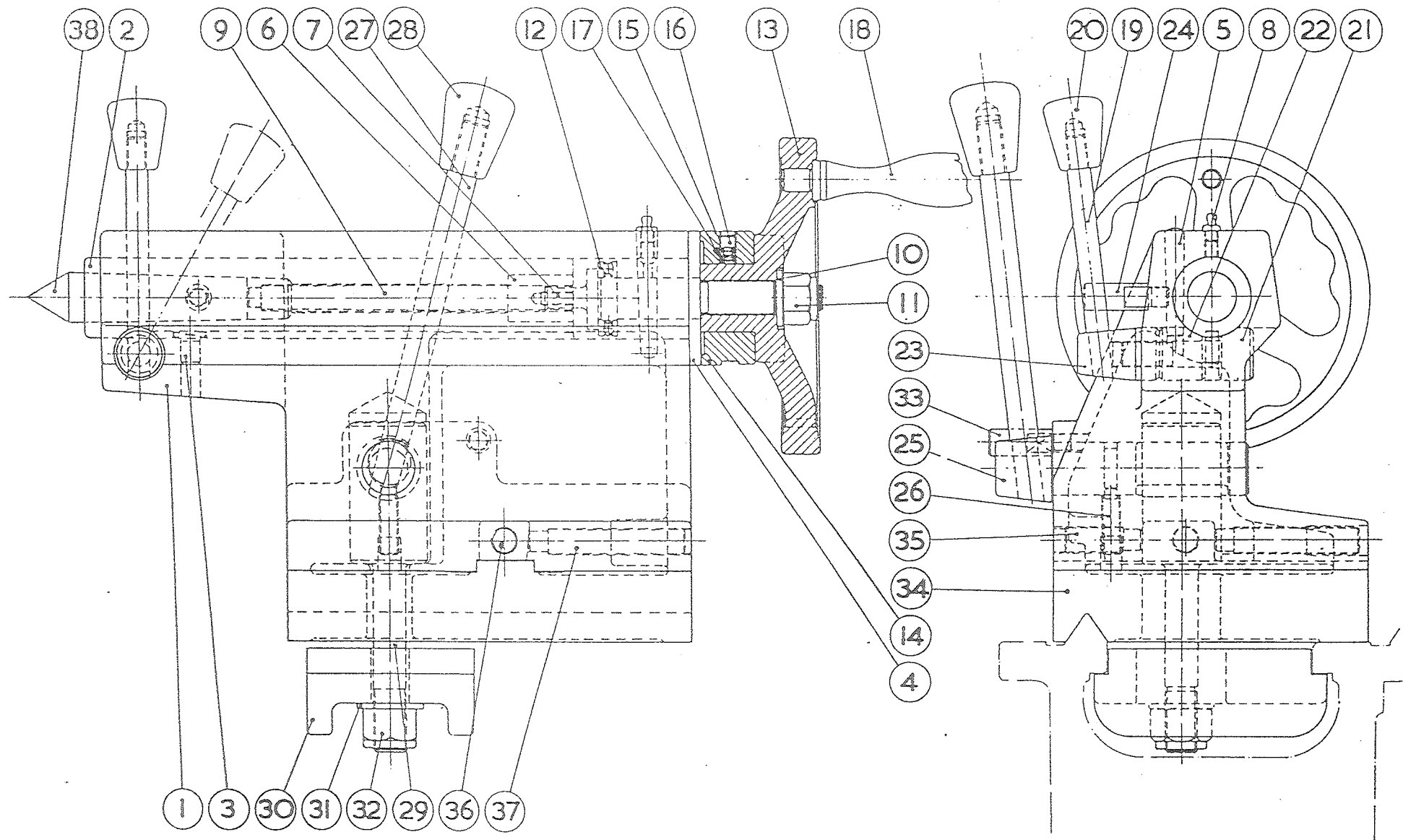
Item No.	Part No.	Description	No. Off
1	11008001	Banjo Plate	1
2	L5-13-18	Lock Washer	2
3	½" FH 1½" (Whit.)	Hexagonal Head Set Screw	2
4	L5-196	Change Wheel Stud	1
5	H4146	Hydraulic Nipple, Straight, ¼" Whit.	1
6	L5-198	Socket Stud Collar	1
7	L5-197	Socket Nut	1
8	L5-505	Socket	1
9	L5-502	Change Wheel Collar	2
10	½" FB	Hexagonal Nut 12 T.P.I.	2
11	¾" KS 1½"	Square Key	1
*	L16-8-8	Spacing Collar	1
CHANGE WHEELS FOR ENGLISH & AMERICAN GEARBOXES (¼" Pitch Leadscrew)			
12	L5-51DD	30T Change Wheel	1
13	L5-51K	60T Change Wheel	1
14	L5-51A	127T Change Wheel	1
*	547	Screwcutting Chart (English)	1
*	548	Screwcutting Chart (American)	1
CHANGE WHEELS FOR METRIC THREADS (¼" Pitch Leadscrew)			
*	L5-51NN	135T Change Wheel	1
*	L5-51A	127T Change Wheel	1
*	L5-51V	63T Change Wheel	1
*	L5-51K	60T Change Wheel	1
*	L5-51BB	35T Change Wheel	1
*	L5-51EE	28T Change Wheel	1
*	549	Screwcutting Chart	1
CHANGE WHEELS FOR DIAMETRAL PITCHES (¼" Pitch Leadscrew)			
*	L5-51QQQ	44T Change Wheel	1
*	L5-51K	60T Change Wheel	1
*	L5-51K	60T Change Wheel	1

Item No.	Part No.	Description	No. Off
CHANGE WHEELS FOR MODULE PITCHES (¼" Pitch Leadscrew)			
*	L5-51M	55T Change Wheel	1
*	L5-51NNN	56T Change Wheel	1
*	L5-51B	120T Change Wheel	1
*	L5-51XXX	126T Change Wheel	1
*	L5-51A	127T Change Wheel	1
*	669	Screwcutting Chart	1
CHANGE WHEELS FOR METRIC THREADS (6mm Pitch Leadscrew)			
*	L5-51XXX	126T Change Wheel	1
*	L5-51B	120T Change Wheel	1
*	L5-51NNN	56T Change Wheel	1
*	L5-51BB	35T Change Wheel	1
*	L5-51EE	28T Change Wheel	1
Extra to above for English Threads			
*	L5-51A	127T Change Wheel	1
*	550	Screwcutting Chart	1
CHANGE WHEELS FOR DIAMETRAL PITCHES (6mm Pitch Leadscrew)			
*	L5-51QQQ	44T Change Wheel	1
*	L5-51KKK	64T Change Wheel	1
*	L5-51AA	105T Change Wheel	1
*	L5-51A	127T Change Wheel	1
*	670	Screwcutting Chart	1
CHANGE WHEELS FOR MODULE PITCHES (6mm Pitch Leadscrew)			
*	L5-51Q	40T Change Wheel	1
*	L5-51CCC	42T Change Wheel	1
*	L5-51QQQ	44T Change Wheel	1
*	L5-51AAA	75T Change Wheel	1
*	L5-51E	80T Change Wheel	1
*	670	Screwcutting Chart	1

Change Wheel Assembly



Tailstock Assembly

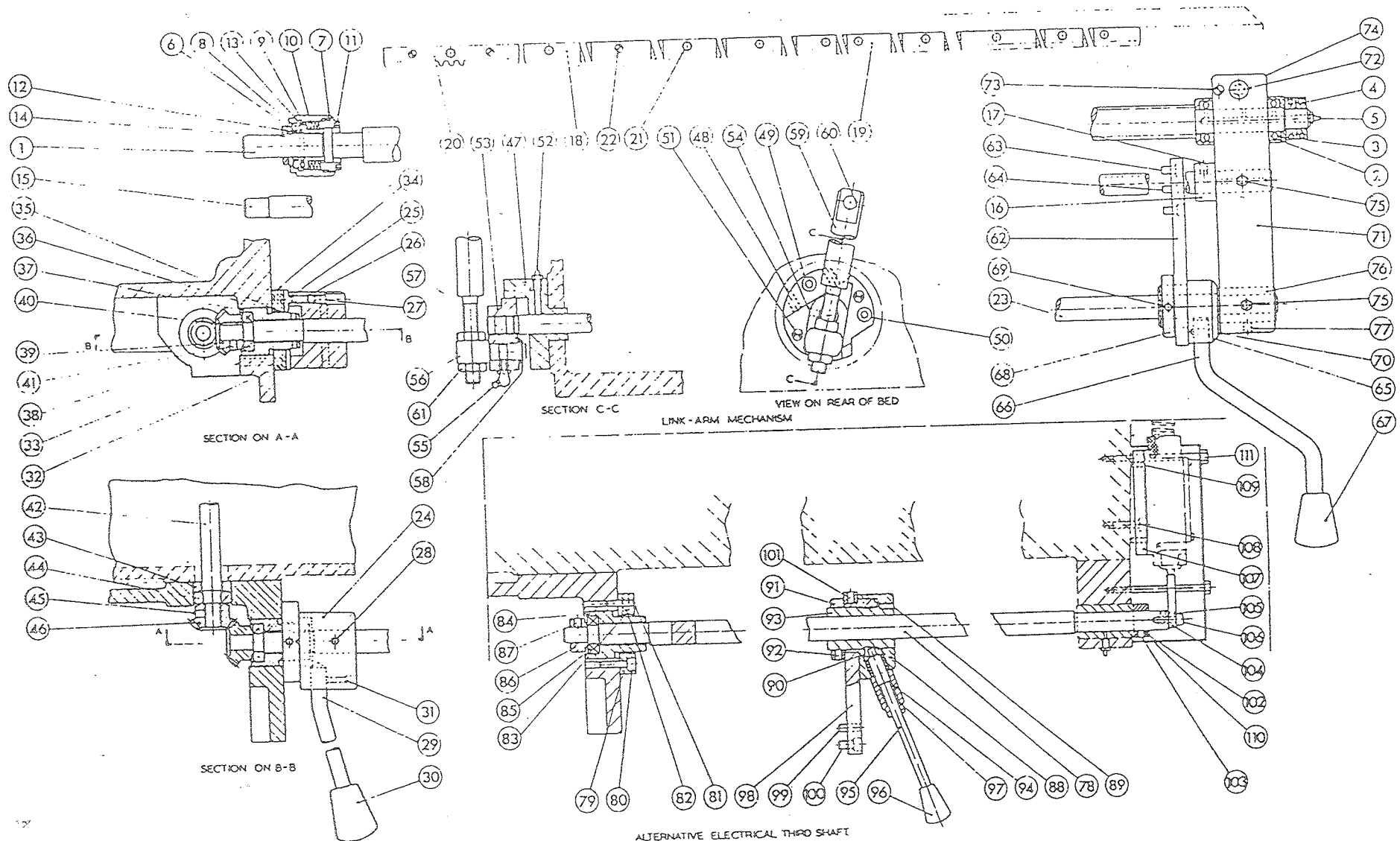


Tailstock Assembly *(illustrated on page 54)*

Item No.	Part No.	Description	No. Off
1	13007001	Tailstock	1
2	11007003	Quill (11007027 Metric)	1
3	L5-94	Key	1
4	11007004	Bush	1
5	¾" PT 2"	Taper Pin	1
6	L5-96	Nut (11007025 Metric)	1
7	¾" FX ¾"	Hollow Set Screw	2
	(Whit.)		
8	H4146	Hydraulic Nipple Straight. ¼" Whit.	2
9	11007005	Screw (11007023 Metric)	1
10	½" FW	Washer	1
11		'Simmonds' Locknut ½" Whit.	1
12	SKF51104	Thrust Bearing	1
13	11007006	Handwheel	1
14	11007008	Micrometer Dial (11007024 Metric)	1
15	SG 289	Spring	2
16	¾" FX ¾"	Hollow Set Screw Flat Point	2
	(Whit.)		
17	L5-5-15	Die	2
18	1507018	Handle	1
19	11007011	Locking Handle for Quill	1
20	11007012	Hand Knob (Black)	1
21	11007013	Nipping Stud	1
22	11007014	Nipping Bush	1
23	11007015	Locking Nut For Quill	1
24	L6-7-41	Stop Pin	1
25	11007017	Eccentric Lock Stud	1
26	¾" FX 1¼"	Hollow Set Screw ½ Dog Point	1
	(Whit.)		
27	L5-7-9	Locking Lever	1
28	11007019	Hand Knob (Black)	1
29	L16-7-5	Locking Eye Bolt	1
30	L16-7-3	Holding Down Plate	1
31	¾" FW	Washer	1
32		'Simmonds' Locknut ¾" Whit.	1
33	L6-7-41	Stop Pin	1
34	11007022	Base	1

Item No.	Part No.	Description	No. Off
35	½" FX 1¼"	Hollow Set Screw, Cup Point	1
	(B.S.F.)		
36	½" FX 2¼"	Hollow Set Screw Cup Point	1
	(B.S.F.)		
37	½" FX 3"	Hollow Set Screw Cup Point	1
	(B.S.F.)		
38	L5-585A	Centre	1

Leadscrew, Feed Shaft, Third Shaft, Rack and Bracket Assembly



Leadscrew, Feed Shaft, Third Shaft, Rack and Bracket Assembly

(illustrated opposite)

Item No.	Part No.	Description	No. Off
1	11006002	Leadscrew (11006002A Metric)	1
2	L16-6-3	Cover, Thrust Bearing	2
3	SKF51104	Thrust Bearing	2
4	L5-540	Nut	2
5	H4146	Hydraulic Nipple, Straight 1/4" Whit.	1
6	L5-10-259	Body, Torque Limiter	1
7	4BA FX 1"	Hollow Set Screw Dog Point	2
8	SB3	Steel Ball 1/4" Dia.	2
9	L5-10-234B	Sleeve	1
10	39.6mm x 25.5mm x 5mm	Schnorr Disc Spring	15
11	L5-10-258B	Adjusting Nut	1
12	L5-10-242	Spacer	1
13	L5-10-281	Plate	1
14	SK24	Key	1
15	11006004	Feedshaft	1
16	L5-645	Collar	1
17	1/4" FX 1/4" (Whit.)	Hollow Set Screw 1/2 Dog Point	1
18	L6-6-4	Rack (L6-6-4B Profile Lathe)	1
19	11006030	Rack (11006031 Profile Lathe)	1
20	L6-6-4A	Rack, Gap Piece (L6-6-4C Profile Lathe)	1
21	3/8" FY 3/4" (Whit.)	Socket Head Cap Screw	6
22	3/8" PG 3/4"	Grooved Pin	7
23	11006058	Third Shaft	1
24	11006020A	Boss, Clutch Lever	1
25	SB3	1/4" Dia. Steel Ball	1
26	SG5	Spring	1
27	1/2" FX 1/2" (Whit.)	Hollow Set Screw 'W' Point	1
28	1/4" FX 1/4" (Whit.)	Hollow Set Screw 'W' Point	2
29	11006021	Clutch Lever	1
30	11007019	Hand Knob	1
31	2BA FX 1/4"	Hollow Set Screw 'W' Point	1
32	11006056	Nut Plate	1
33	1/4" FY 1/2" (Whit.)	Socket Head Cap Screw	2

Item No.	Part No.	Description	No. Off
34	1/2" FX 1/2" (Whit.)	Hollow Set Screw 'W' Point	2
35	L5-10-143	Brass Die	2
36	3/8" PG 1 1/4"	Grooved Pin	2
37	11006055	Bearing Mount and Thrust Collar	1
38	XXLJ15WSRR	Ball Journal	1
39	11006032	Bevel Gear	1
40	3/8" KS 1/2"	Square Key	1
41	1/2" FX 1/4" (Whit.)	Hollow Set Screw 'W' Point	1
42	11006010	Shaft	1
43	11006037	Spacer Bush	1
44	XXLJ15WSRR	Ball Journal	1
45	1/4" FX 3/4" (Whit.)	Hollow Set Screw 'W' Point	1
46	11006014A	Bevel Gear	1
47	11006011A	Bush Rear	1
48	1/2" FX 1/2" (Whit.)	Hollow Set Screw 'W' Point	2
49	3/8" FY 1 1/2" (Whit.)	Socket Head Cap Screw	1
50	3/8" FY 3/4" (Whit.)	Socket Head Cap Screw	2
51	3/8" PG 1 1/4"	Grooved Pin	2
52	H4146	Hydraulic Nipple, Straight 1/4" (Whit.)	1
53	11006033	Link	1
54	1/4" FX 1/2" (Whit.)	Hollow Set Screw 'W' Point	1
55	H4176	Hydraulic Nipple 67 1/2°, 1/4" (Whit.)	1
56	11006008	Stud	1
57	11006009	Washer	1
58	1400-1/4"	External Circlip	1
59	11006007	Link Arm	1
60	2BA FX 1/4"	Hollow Set Screw 'W' Point	1
61	1/2" FL (Whit.)	Lock Nut	2
62	11006022	Clutch Operating Bracket	1
63	1/4" FY 1/2" (Whit.)	Socket Head Cap Screw	4
64	1/4" PG 3/4"	Grooved Pin	2

Leadscrew, Feed Shaft, Third Shaft, Rack and Bracket Assembly

(illustrated on page 51)

Item No.	Part No.	Description	No. Off
65	11006024	Boss, Clutch Lever	1
66	1510027	Clutch Lever	1
67	11007019	Hand Knob	1
68	11006023	Collar	1
69	¼" FX ¼"		1
	(Whit.)		
70	¾" PG ¾"	Hollow Set Screw ½ Dog Point	1
71	11006005	Grooved Pin	1
72	¾" FY 3"	End Bracket	1
	(Whit.)		
73	¼" PG 1"	Socket Head Cap Screw	2
		Grooved Pin	2
74	11006006	Shim	2
75	H4146	Hydraulic Nipple, Straight ¼" Whit.	As
76	11006026	Bush	Reqd.
77	¼" FX ½"		2
	(Whit.)		1
		Hollow Set Screw 'W' Point	1
		ALTERNATIVE ELECTRICAL CONTROL THIRD SHAFT	
78	11006054	Third Shaft	1
79	11006057	Nut Plate	1
80	¼" FY ¾"		1
	(Whit.)		
81	¾" PG ¾"	Socket Head Cap Screw	2
82	¼" FX ¾"	Grooved Pin	2
	(Whit.)		
83	L5-10-143	Hollow Set Screw	2
84	11006055	Brass Die	2
85	XXLJ15WSRR	Bearing Mount	1
86	11006062	Ball Journal	1
87	¾" FX ¼"	Collar	1
	(Whit.)		
88	11006047	Hollow Set Screw 'W' Point	1
89	¾" FX ½"	Lever Boss	1
	(Whit.)		
90	11006052	Hollow Set Screw 'W' Point	2
91	11006023	Locating Collar	1
		Collar	1

Item No.	Part No.	Description	No. Off
92	¼" FX ¼"		
	(Whit.)		
93	11006051	Hollow Set Screw ½ Dog Point	1
94	11006048	Centre for Boss	1
95	11006049	Extension Boss	1
96	11002033	Plunger	1
97	SG45	Knob	1
98	11006022A	Spring	1
99	¼" PG ¾"	Clutch Operating Bracket	1
100	¼" FY ½"	Grooved Pin	2
	(Whit.)		
101	¼" FX ¾"	Socket Head Cap Screw	4
	(Whit.)		
102	11006066	Hollow Set Screw 'W' Point	1
103	¼" FX ¼"	Collar	1
	(Whit.)		
104	L16-10-178	Hollow Set Screw 'W' Point	1
105	¾" PG ¾"	Cam	1
106	¼" FY ¾"	Grooved Pin	1
	(Whit.)		
107	11006067	Socket Head Cap Screw	1
108	¼" FY ¾"	Switch Mount	1
	(Whit.)		
109	2BA FX ¾"	Socket Head Cap Screw	2
110	11006053	Hollow Set Screw 'W' Point	3
111	2BA FH 3"	Cover, Limit Switch	1
		Hexagonal Head Set Screw	2

One Shot Lubrication

