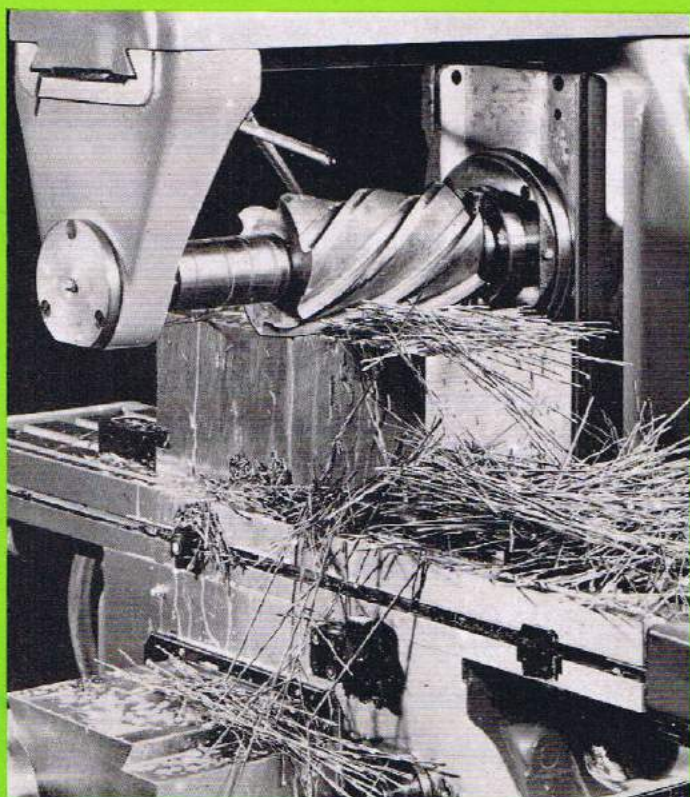


ADCOCK-SHIPLEY
TEXTRON



1ES
horizontal
milling
machines
by
ADCOCK-SHIPLEY

1ES

horizontal milling machines

The Adcock-Shipley range of 1ES Milling Machines comprises four models of the same basic design, but employing different feed arrangements – manual, automatic, mechanical automatic cycle and air-operated automatic cycle.

The Model 1ES-G automatic feed machine has proved to be immensely popular for education and training purposes and an asset in many toolroom applications with the extraordinary rigid construction permitting a wide variety of work to be undertaken with simplicity of setting and operation. The other Models suit varying types of production requirements and the 345 mm (13½") longitudinal traverse provides sufficient capacity for the majority of milling operations.

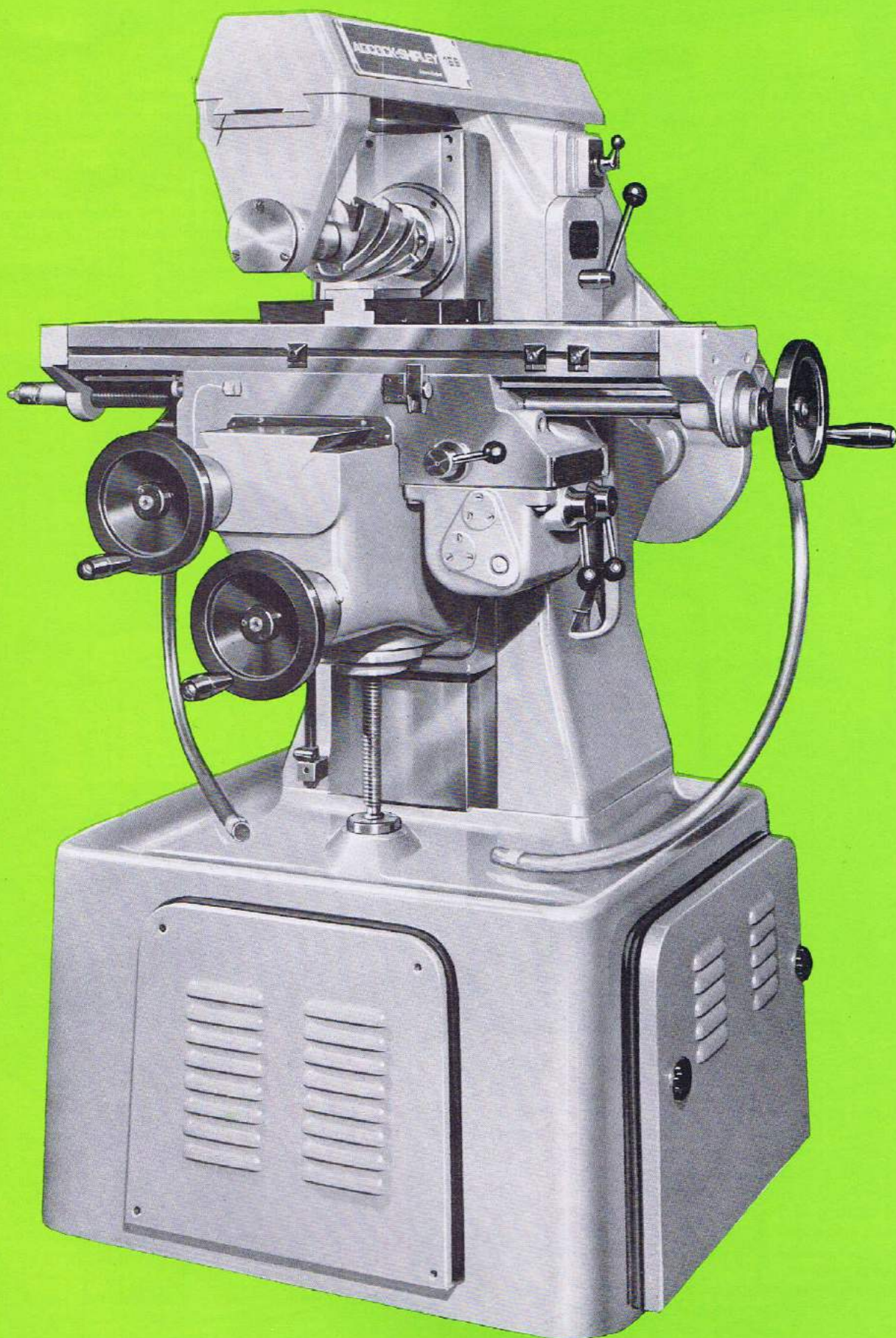
Scientifically designed ribbed castings accord maximum stiffness and contributes to the enviable cutting performance of the machine. Rigidity and reliability under heavy cutting conditions is provided by the wide back-fitting knee and efficient clamping mechanism, and the special bearing arrangement for the No. 40 International Taper Spindle provides for chatter-free cutting and a high quality finish for the work-piece.

A continuously rated 2 h.p. motor mounted on an adjustable plate in the base provides the drive for a totally enclosed Vee-belt arrangement producing optimum power at the spindle nose.

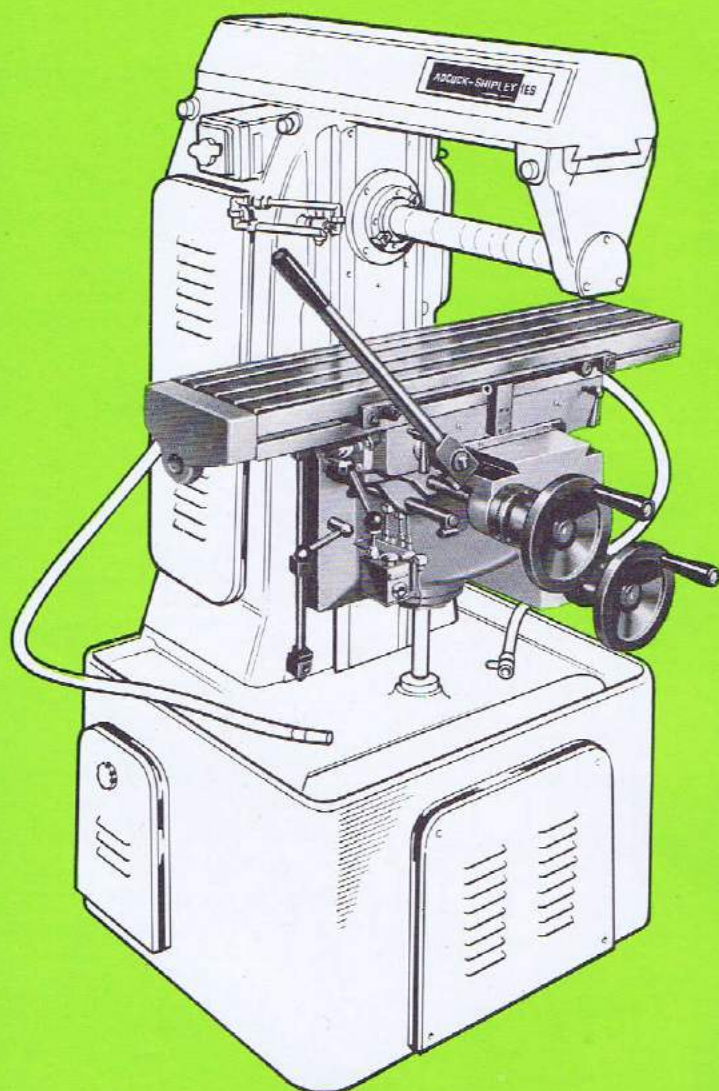
Provision of a ball-bearing Style 'A' Arbor Bracket permits a high and wide range of 18 spindle speeds from 50 to 2500 rpm (except Model 1ES-AH with 12 spindle speeds from 250 to 2500 rpm) and enables the machining of both conventional and modern materials. A Middle Arbor Support using a phosphor bronze bearing can be supplied as original equipment (at extra cost) for gang milling and when slow speeds are to be used for extra heavy cutting. Electrical equipment including no-volt control thermal overload protection, isolator and fuses is housed in a self-contained unit mounted at the rear of the machine. The coolant pump and tank (where specified) are enclosed in the base of the machine with the tank readily detachable for easy cleaning. Details of other features are given on the appropriate pages.

A wide range of equipment and accessories is available to further extend the operational capability, but the 1ES machine itself remains of simple construction and the lack of unnecessary complication provides maximum reliability and easy servicing.

Good design, up-to-date production methods and flow-line assembly techniques enable Adcock-Shipley to market the 1ES range at real value-for-money prices and with the intention of providing profit for the user for a very long period.



For certain photographs in this brochure the cutter guard (as standard equipment) has been removed to present the application with a greater degree of clarity.



1ES-M

1ES-M

Certain types of work are best suited to a hand feed machine to achieve the most economical and effective method of production. This requirement is met by the Model 1ES-M, which has a sturdy lever feed to the table providing the operator with rapid, easy and confident control of the cutting cycle. The screw feeds to the cross and vertical movement and the clearly graduated micrometer dials provide for accurate and easy adjustment.

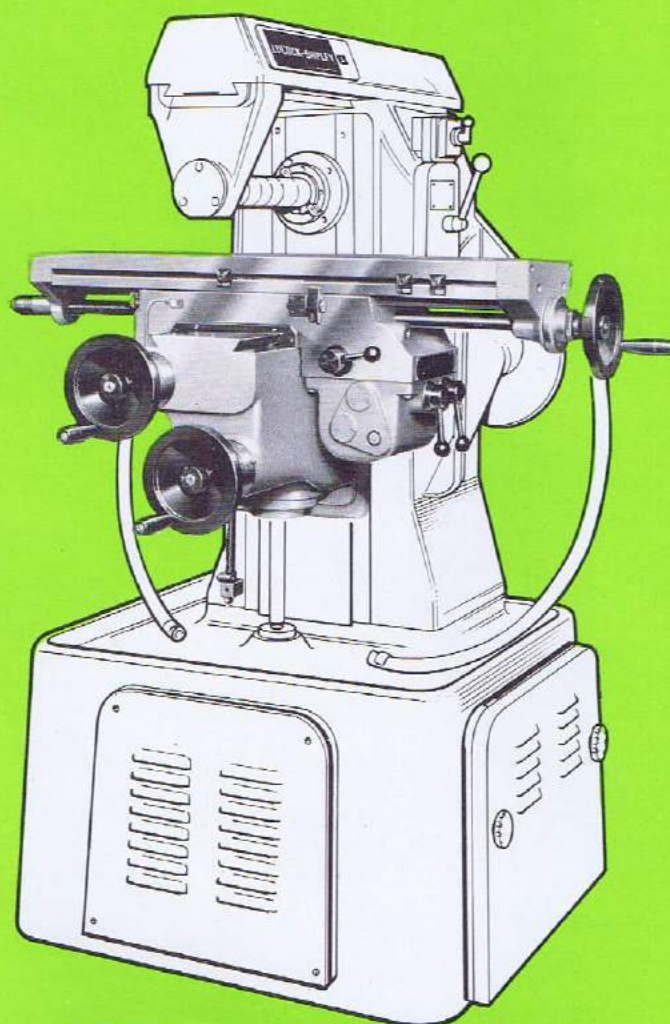
A common deployment of this machine is the milling of slots, keyways and various parting-off operations.

1ES-G

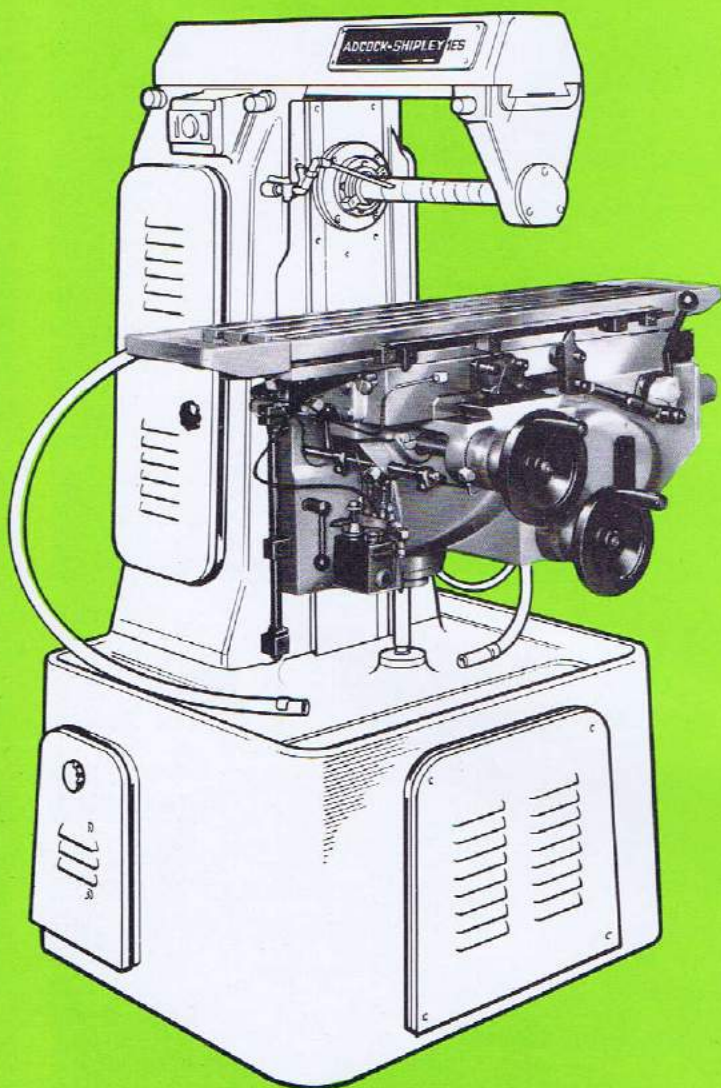
The totally enclosed gearbox of the Model 1ES-G provides six rates of automatic feed through movement of the two selector levers.

The drive to the table feed is directly proportional to the spindle speed allowing low feeds and speeds for machining tough steels and high speeds and feeds for soft materials such as aluminium. The table feed stops simultaneously with the spindle to provide a safety feature protecting the investment in tooling, components and machine and to provide a safeguard for the operator.

The rigid design provides a cutting performance normally associated with a No. 2 size miller.



1ES-G



1ES-J

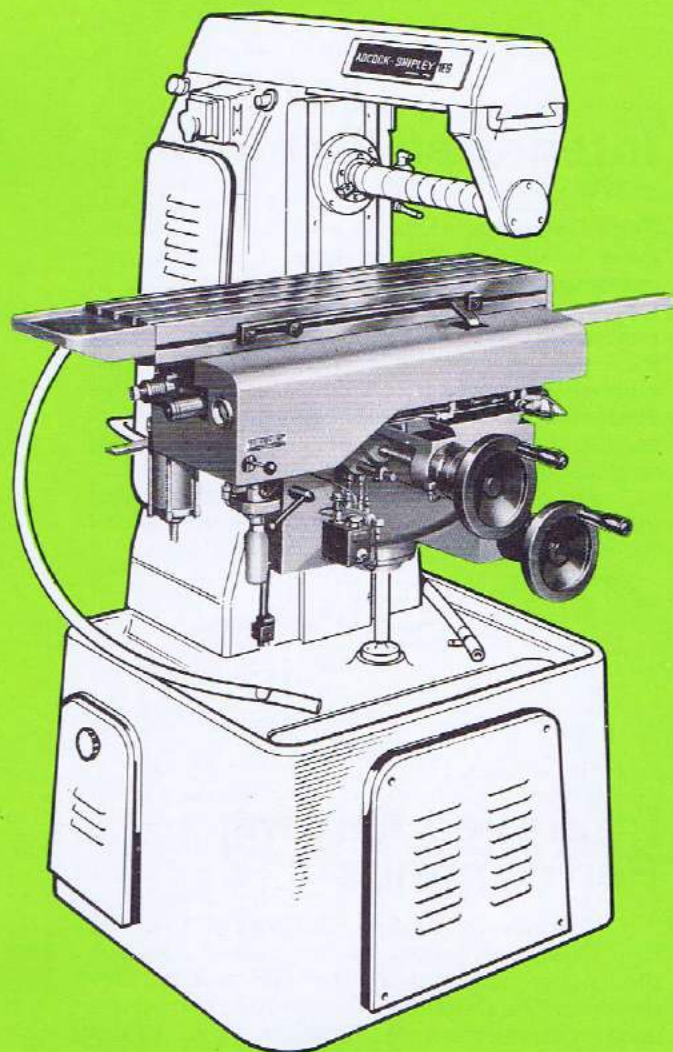
1ES-J

Widely used for production work, the 1ES-J with mechanical automatic cycle is easy to set and operate and therefore accommodates small batch and large scale production effectively and economically. The rapid traverse of 5.6 m (220") per minute is supplied by a separate motor. Simple changing of pick-off gears provide twelve feed rates from 0.13 mm (0.005") to 1.12 mm (0.044") per revolution of the spindle.

A single lever movement initiates the automatic longitudinal cycle and a safety device prevents actuation during setting.

1ES-AH

The 1ES-AH caters for high rate component production with extremely fast cycle times for light cuts and the high spindle speeds are particularly useful for non-ferrous materials. Twin air cylinders connected to the workshop air supply provide the rapid traverse of 10 m (400") per minute. A hydraulic cylinder controls the feed under cut and the rate is infinitely variable between 6.4 mm ($\frac{1}{4}$ ") and 3.08 m (120") per minute. An air-operated vice or fixture can be integrated in the machine cycle to provide automatic clamping and unclamping of the work-piece.

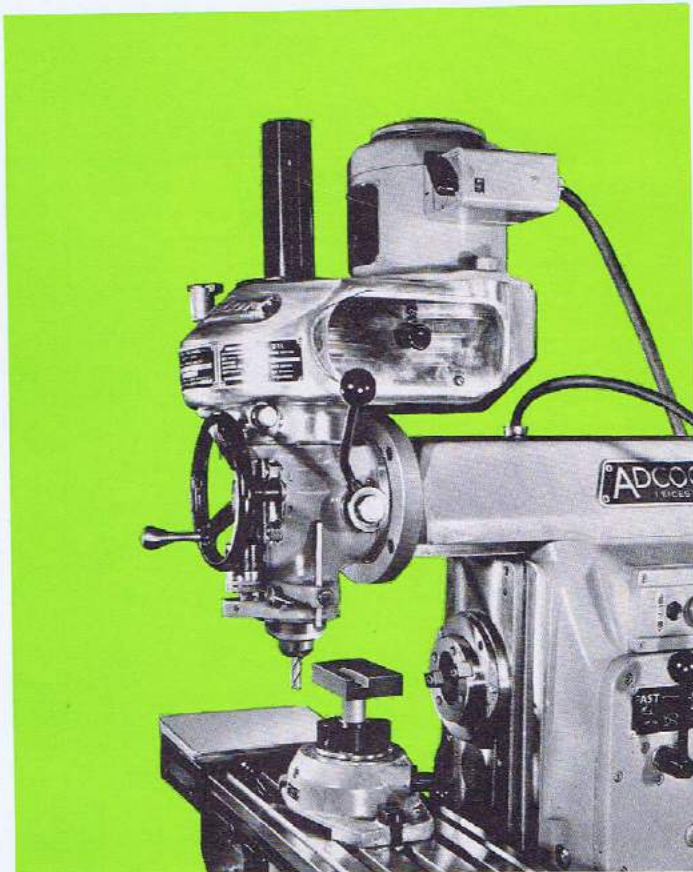


1ES-AH

Bridgeport Head

The versatility of the Model 1ES range can be further extended with the option of the Bridgeport type 'M' milling, drilling and boring head mounted on an overarm adaptor plate which must be specified as part of the machine order.

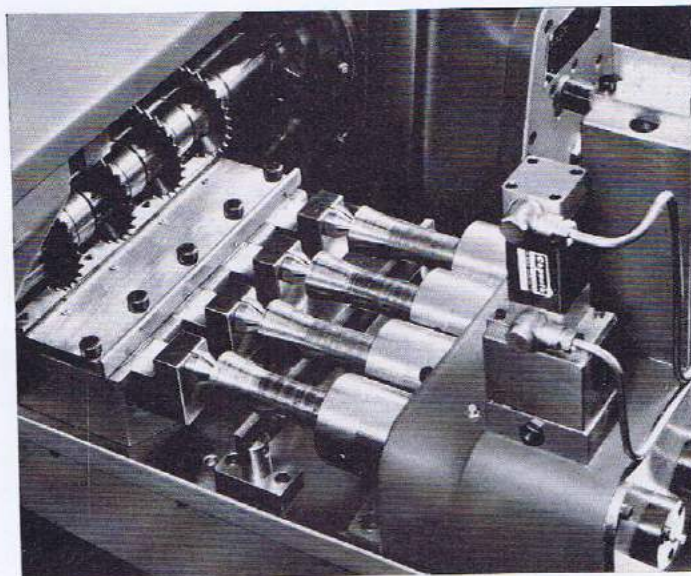
The type 'M' head has an independent $\frac{3}{4}$ h.p. motor providing 6 spindle speeds from 330-5100 r.p.m. The counterbalanced quill is hard chrome plated and the maximum quill movement (hand feed only) is 88 mm ($3\frac{1}{2}$ "). A positive clamping arrangement ensures maximum rigidity of the spindle and the high precision bearing arrangement provides outstanding accuracy.



Integrated Fixtures

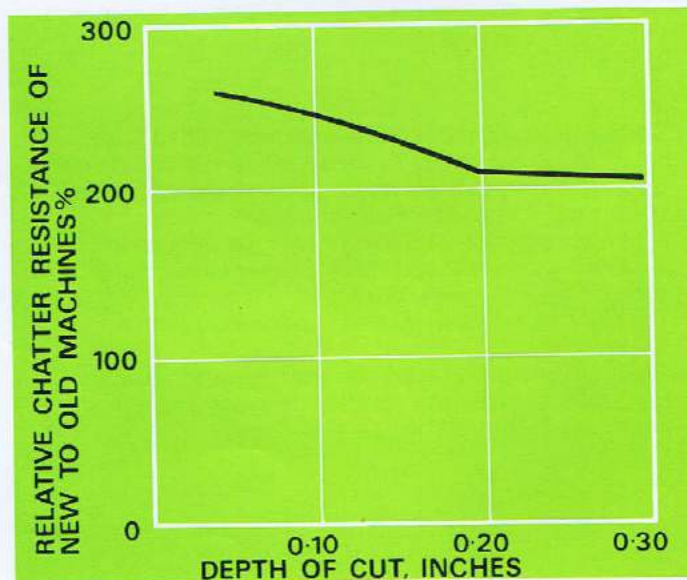
The 1ES-J can accommodate an air-operated fixture integrated with the mechanical automatic cycle for use on varying types of slotting and indexing operations. Illustrated is the slotting of the Adcock-Shipley Bridgeport R-8 collet. A pneumatic controlled cylinder and micro-switches may also be fitted to provide a predetermined number of cycles or for continuous cycling. This controlled production method ensures maximum output, prolongs cutter life and considerably reduces operator fatigue.

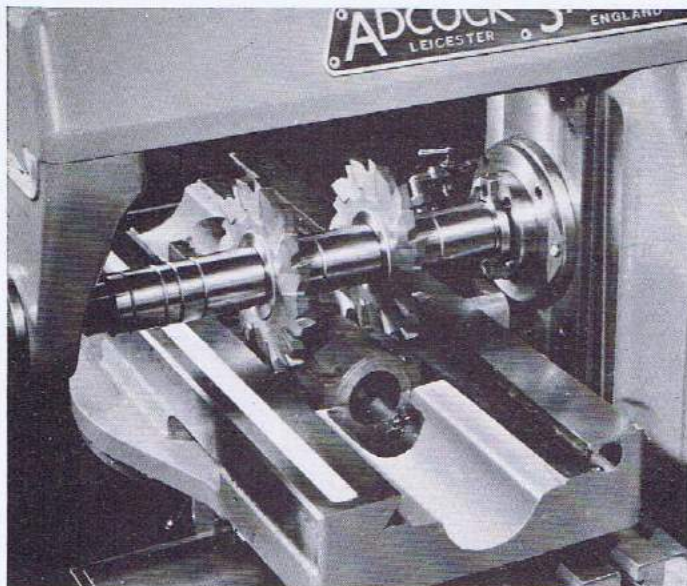
Air operated fixtures, vices and indexing equipment may also be integrated into the cycle of the model 1ES-AH.



Improved Cutting Performance

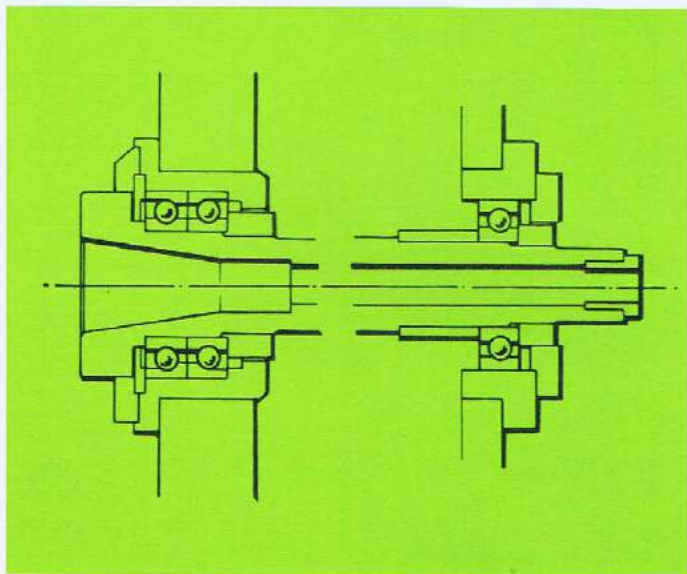
The illustrated graph, prepared at Birmingham University, shows the comparison between the chatter behaviour of the 1ES and its predecessor. The Dynamic vibration tests carried out under the direction of Professor S. A. Tobias proved the 1ES range to be far superior with an improvement of over 100% in cutting performance.





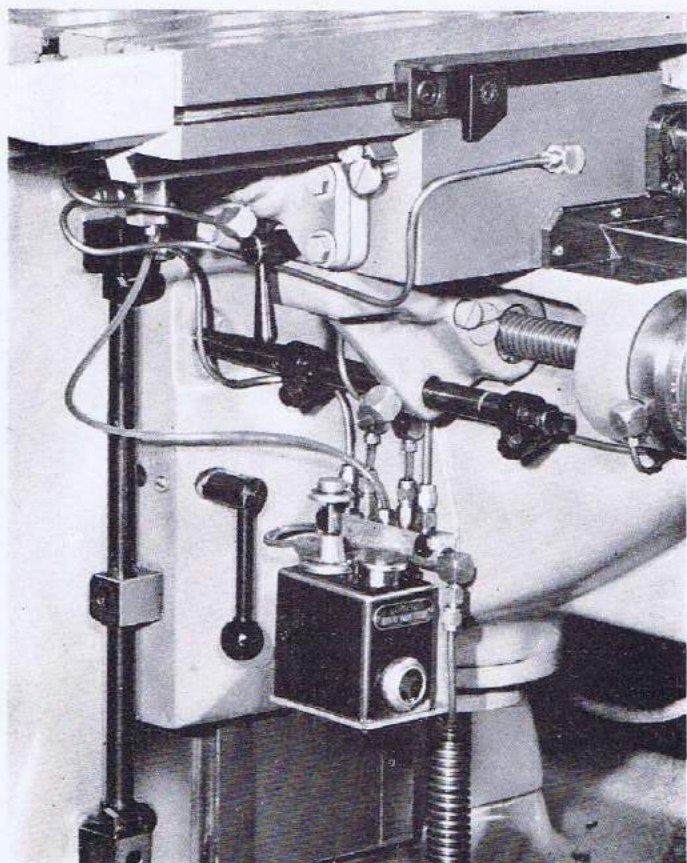
Large Capacity

No matter how large the component, most horizontal milling operations require a cut less than 330 mm (13") in length. The remarkable metal removal rate of the 1ES plus the 345 mm (13½") of longitudinal traverse means it will mill components previously thought to require larger machines.



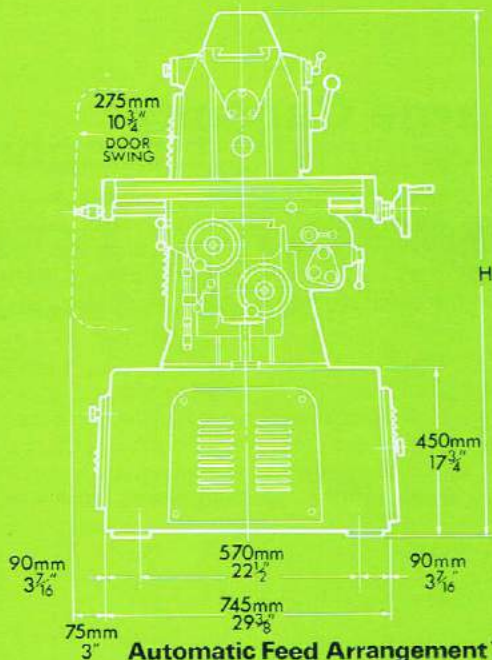
Spindle Design

The Model 1ES spindle has an excellent three-bearing arrangement. Mounted directly behind the spindle nose are a pair of precision angular contact ball bearings capable of taking journal and thrust loads. When tightly clamped together a set pre-load is applied to them, improving the damping and allowing heavy cuts to be taken without vibration. A single plain ball bearing at the rear of the spindle is free to float axially and prevents variations caused by thermal expansion.

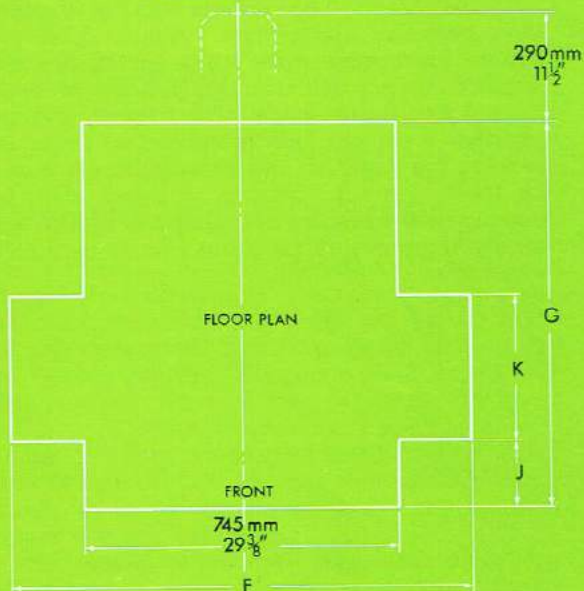


Centralised Lubrication

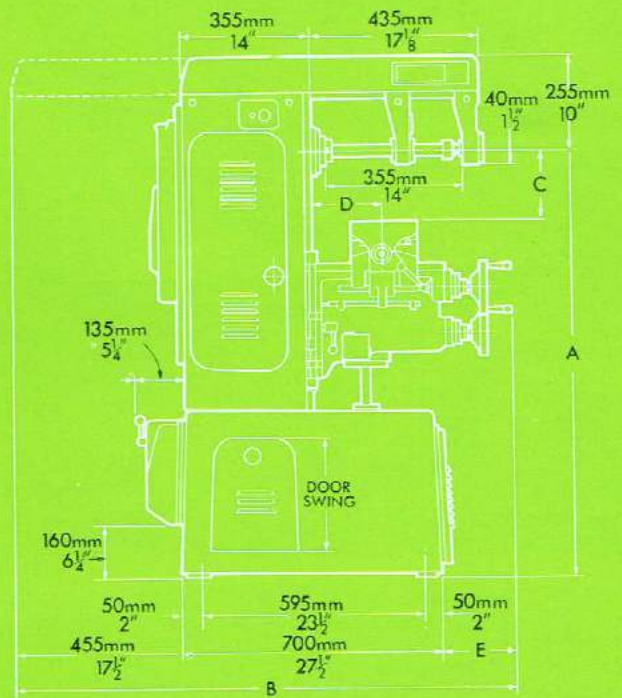
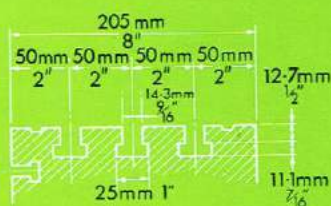
A centralised lubrication system provides correct lubrication for all important sliding surfaces by single lever movement. The simplicity of operation encourages use and reduces unnecessary and expensive wear.



Automatic Feed Arrangement 'G'
Common Knee For All Types
Except Arrangement 'M'

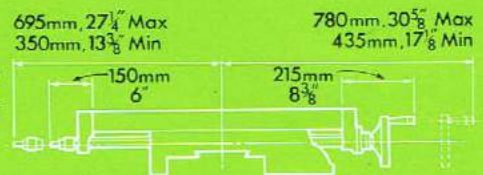


**Common
Table For
All Feeds**

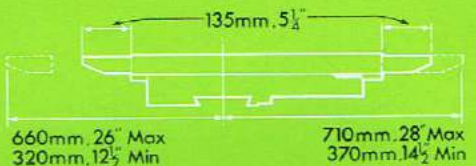


	'M'		'G' and 'J'		'AH'	
KEY	m m	ins.	m m	ins.	m m	ins.
A	1155	45 ¹ / ₂	1155	45 ¹ / ₂	1230	48 ¹ / ₂
B	1415	55 ³ / ₄	1390	54 ³ / ₄	1390	54 ³ / ₄
C Max	265	10 ¹ / ₂	265	10 ¹ / ₂	265	10 ¹ / ₂
Min	13	1/2	13	1/2	13	1/2
D Max	275	10 ³ / ₄	275	10 ³ / ₄	265	10 ¹ / ₂
Min	120	4 ³ / ₈	120	4 ³ / ₈	145	5 ³ / ₈
E	275	10 ³ / ₄	250	9 ³ / ₄	250	9 ³ / ₄
F	1200	47 ¹ / ₄	'G' 1470 'J' 1370	57 ⁷ / ₈ 54	1670	65 ³ / ₄
G	1090	43	1065	42	1065	42
H	1410	55 ¹ / ₂	1410	55 ¹ / ₂	1485	58 ¹ / ₂
J	230	9	205	8	205	8
K	370	14 ¹ / ₂	370	14 ¹ / ₂	325	12 ³ / ₄

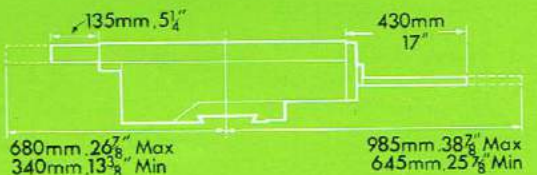
**Automatic
Feed Table
Arrangement 'G'**



**Automatic
Cycle Table
Arrangement 'J'**

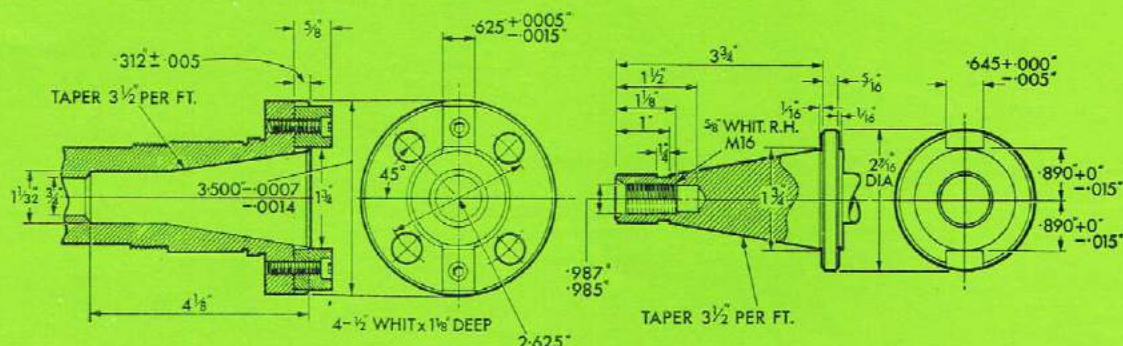


**Automatic
Cycle Table
Arrangement 'AH'**



**Lever Feed Table
Arrangement 'M'**





Specification

Table

Working Surface Overall	760 × 205	30" × 8"	760 × 205	30" × 8"	760 × 205	30" × 8"
Longitudinal Traverse	345	13 $\frac{1}{2}$ "	345	13 $\frac{1}{2}$ "	345	13 $\frac{1}{2}$ "
Cross Traverse	150	6"	150	6"	124	4 $\frac{7}{8}$ "
Vertical Traverse	255	10"	255	10"	255	10"
No. of Tee Slots	3	3	3	3	3	3
Width of Tee Slots	14.3	$\frac{9}{16}$ "	14.3	$\frac{9}{16}$ "	14.3	$\frac{9}{16}$ "
Centres of Tee Slots	50	2"	50	2"	50	2"

Spindle

Bored International Standard	No.40	No.40	No.40	No.40	No.40	No.40
Centre to Underside of Overarm	140	5 $\frac{1}{2}$ "	140	5 $\frac{1}{2}$ "	140	5 $\frac{1}{2}$ "
Centre to Table Top	10-267	^{10 1/2"} 10 $\frac{1}{2}$ "	10-267	^{10 1/2"} 10 $\frac{1}{2}$ "	10-267	^{10 1/2"} 10 $\frac{1}{2}$ "
Maximum Arbor Length	305	12"	305	12"	305	12"
Motor H.P.	2	2	2	2	2	2

Shipping Particulars

Space Occupied	1.9 cu.m.	67 cu.ft.	2.12 cu.m.	75 cu.ft.	2.52 cu.m.	89 cu.ft.
Gross Weight	870 kg.	1920 lb.	936 kg.	2065 lb.	860 kg.	1900 lb.
Nett Weight	740 kg.	1630 lb.	711 kg.	1570 lb.	635 kg.	1400 lb.

Spindle Speeds (rpm)

1ES: M, G & J

50	100	200	400	790	1590
64	125	250	510	1000	2000
79	157	312	630	1250	2500

1ES-AH (for machines with 50 cycle electrics)

250	460	870	1700
315	575	1050	2060
390	710	1370	2500

1ES-AH (for machines with 60 cycle electrics)

200	370	680	1340
250	450	830	1620
300	560	1080	1960

Table Feeds (per revolution of spindle)

1ES-G

Metric	Metric	English	English
.08	.36	.003"	.014"
.16	.62	.006"	.024"
.24	1.00	.009"	.039"

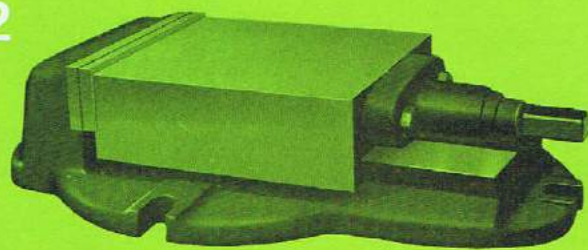
1ES-J

Metric	Metric	English	English
.13	.41	.005"	.016"
.17	.48	.007"	.019"
.20	.57	.008"	.022"
.25	.69	.010"	.027"
.30	.89	.012"	.035"
.36	1.12	.014"	.044"

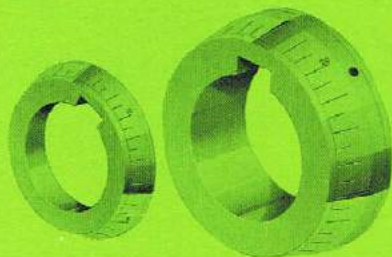
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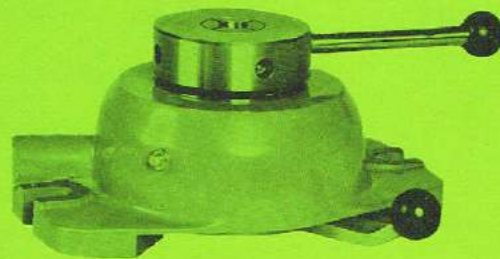
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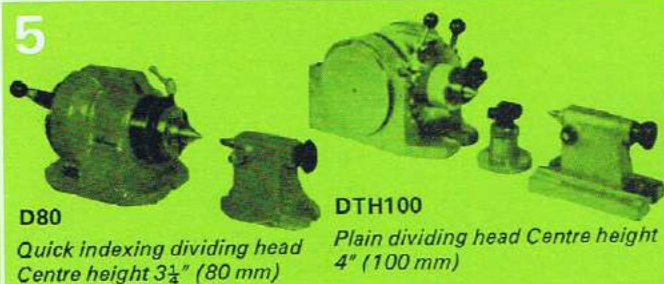
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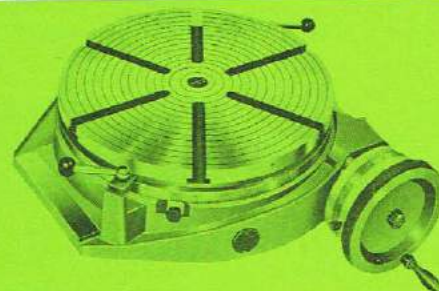
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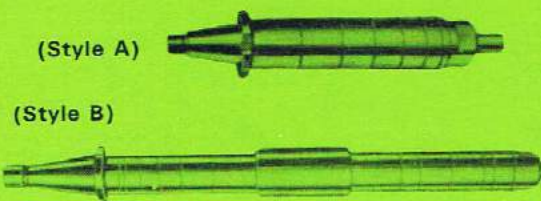
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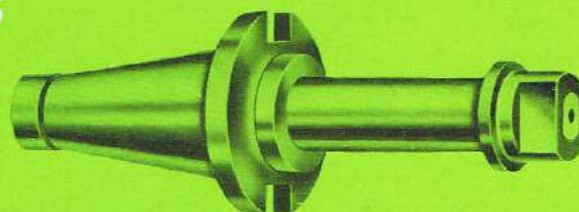
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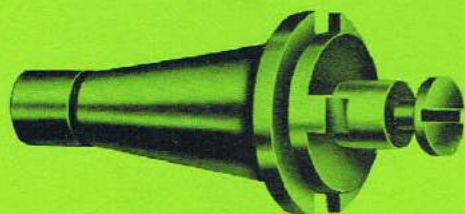
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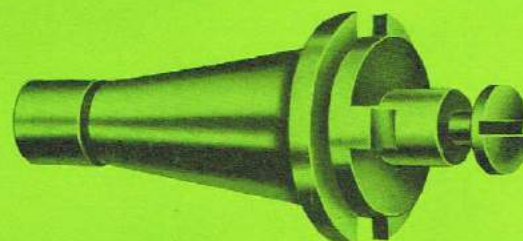
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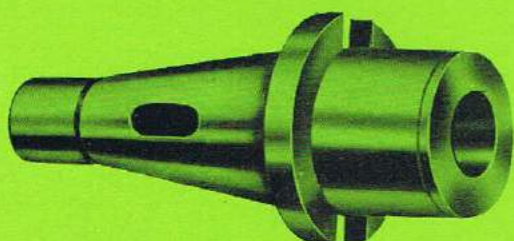
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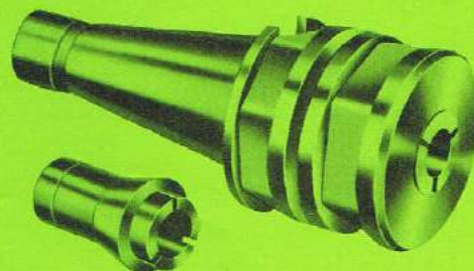
10



11



12



extra equipment

1

Vertical Milling Attachment

Computer No. 4507700

The head swivels 90° either side of the vertical centre line and has a throat dimension of 203 mm (8"). The spindle nose and spindle speeds are the same as the machine with a distance from the spindle centre to spindle nose of 56 mm ($2\frac{1}{8}$ ") leaving a maximum clearance to the table top of 217 mm ($8\frac{5}{8}$ "). A drawbar is provided.

The maximum recommended spindle speed for this attachment is 1500 r.p.m.

2

Machine Vices

Tool steel jaws of 40 mm ($1\frac{5}{8}$ ") depth run on long vee slides and have a maximum opening of 69 mm ($2\frac{3}{4}$ "). The body is made of meehanite with a totally enclosed screw and phosphor bronze nut.

Computer No. 4010504 - 4" Type 'A' Plain

4010505 - 4" Type 'B' Swivel

3

Graduated Expanding Spacing Collars

These are ideal for rapid and accurate setting up with two or more cutters. Micro-adjustments to 0.013 mm (0.0005") can easily be made. Metric or English versions are available.

Computer

No.	Width	Bore	Diameter
4010300	6.35 mm $\frac{3}{16}$ "	25.4 mm 1"	44.45 mm $1\frac{3}{4}$ "
4010301	11.1 mm $\frac{7}{16}$ "	25.4 mm 1"	44.45 mm $1\frac{3}{4}$ "
4010302	6.35 mm $\frac{1}{4}$ "	31.75 mm $1\frac{1}{4}$ "	54.0 mm $2\frac{1}{8}$ "
4010303	11.1 mm $\frac{7}{16}$ "	31.75 mm $1\frac{1}{4}$ "	54.0 mm $2\frac{1}{8}$ "

4

Vertical Collet Chuck Attachments

These attachments are fitted with a quick indexing arrangement. Movement of one lever to a stop and back indexes the collet by a pre-determined amount.

Computer No.	4001100	4001101	4001102	4001103	4001104
Collet - mm	3-26	3-36	3-42	10-60	15-75
ins	$\frac{1}{8}$ -1	$\frac{1}{8}$ - $1\frac{3}{8}$	$\frac{1}{8}$ - $1\frac{7}{8}$	$\frac{7}{16}$ - $2\frac{3}{8}$	$\frac{5}{8}$ -3

5

Dividing Heads

A wide range of dividing heads can be supplied with centre heights varying from 80 mm ($3\frac{1}{8}$ ") to 350 mm (14"). Type UTH Universal Dividing Head can facilitate a direct dividing plate with 24 notches and by indirect indexing, all divisions up to 50 and many above can be carried out, while divisions beyond the indirect indexing range are obtained by using the differential system which gives all divisions up to 1000. Type HTH facilitates both direct and indirect indexing while, the Type DTH is suitable for direct indexing with divisions down to a minimum indexing angle of 10°.

Computer No.

4000003 - UTH 100 mm (4") Universal with fixed tailstock.

4000103 - HTH 100 mm (4") Semi-universal with fixed tailstock.

4000202 - DTH 100 mm (4") Plain with fixed tailstock.

6

Rotary Table

Hand-operated rotary tables can be fitted simply with a ball handle and micrometer dial to give accurate positioning, or alternatively with an indirect indexing arrangement. The Model RH is provided with a micrometer dial which allows accurate angular setting in degrees, minutes and seconds. A hole plate fixture also can be adapted for indirect dividing work on the model RHI. The Model R is provided with a micrometer dial graduated in degrees, minutes, seconds and indirect indexing with a holed plate fixture may be utilized on the Model RI.

Computer No.

4000900 - Model RH20. 200 mm (8") diameter with handwheel and micrometer dial.

4000902 - Model RHI 20. 200 mm (8") diameter with dividing plate having 14-49 holes.

4000904 - Model R250. 250 mm (10") diameter arranged with 360° scale, micrometer dial and ball handle.

4000909 - Model RI 250. 250 mm (10") diameter arranged with 360° scale with dividing plate having 14-49 holes.

Details of other models are available on request.

7

Standard Arbors with collars

Style A

Computer No.	4500013	22 mm × 9"	1" × 9"
	4500015	22 mm × 12"	1" × 12"
	4500035	27 mm × 9"	$1\frac{1}{4}$ " × 9"
	4500037	27 mm × 12"	$1\frac{1}{4}$ " × 12"

Style B

Computer No.	4500220	22 mm × 12"	1" × 12"
	4500246	27 mm × 12"	$1\frac{1}{4}$ " × 12"

8

Short Arbors without collars

Computer No.	4500211	22 mm × 3"	1" × 3"
	4500212	22 mm × 4"	1" × 4"
	4500238	27 mm × 4"	$1\frac{1}{4}$ " × 4"
	4500263	32 mm × 4"	$1\frac{1}{2}$ " × 4"

9

Face Cutter Arbors To B.S.S. 122/1938

Computer No.	4010100	22 mm × 19 mm	$\frac{3}{8}$ " × $\frac{5}{8}$ "
	4010101	27 mm × 21 mm	$1\frac{1}{8}$ " × $1\frac{1}{16}$ "
	4010102	32 mm × 21 mm	$1\frac{1}{2}$ " × $1\frac{1}{4}$ "

10

Shell End Mill Arbors To B.S.S. 122/1938

Computer No.	4010002	22 mm × 40 mm	$\frac{3}{8}$ " × $1\frac{1}{2}$ "
	4010004	32 mm × 60 mm	1" × $1\frac{5}{8}$ "

Shell end mill arbors to B.S.S. 122/1953 can be supplied if necessary. All taper ends on arbors to suit machine spindle and drawbar.

11

Screwed Tool Adaptors

Computer No.	4010200	Internal taper: No. 2MT
	4010202	Internal taper: No. 3MT

External tapers to suit machine spindle.

12

Collet Chuck

Collets, supplied as extras, are quickly interchangeable in the chuck. Spanners are supplied with the chuck for locking collets.

Chuck Capacity	Computer No.
16 mm	4012501
$\frac{5}{8}$ " BSW	4012500

Collets	Computer No.
2-20 mm × 1 mm (Set of 19)	4008114
$\frac{1}{16}$ "- $\frac{3}{4}$ " × $\frac{1}{16}$ " (Set of 10)	4008100

Also available:

Micro Switches - 4502500
Middle Arbor Support - 4512500
Splash Tray for Table - 4512700
Splash Tray for Base - 4512800
Low Volt Lighting

ADCOCK-SHIPLEY

TEXTRON

Adcock-Shipley Division of Textron Limited

P.O. Box 22, Forest Road, Leicester, LE5 0FJ, England
Telephone: 0533 531122 Telex: 34598

Adcock-Shipley policy is one of continuous improvement and the right is reserved to amend this specification without notice.

1ES

**horizontal
milling machine**

MAINTENANCE MANUAL

FOR

NO. 1 HORIZONTAL MILLING MACHINES.

: INTRODUCTION :

Throughout the manufacture of this machine, from the machining of individual components to final assembly, great care has been taken to ensure that the finished product when installed would give accuracy and finish of excellent quality, combined with a long and successful period of life.

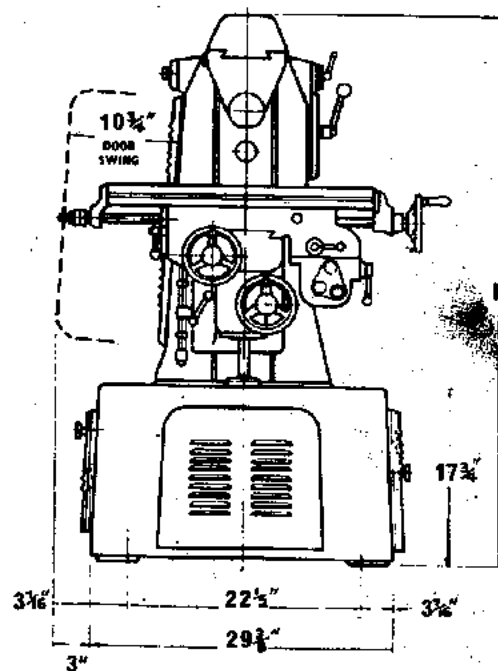
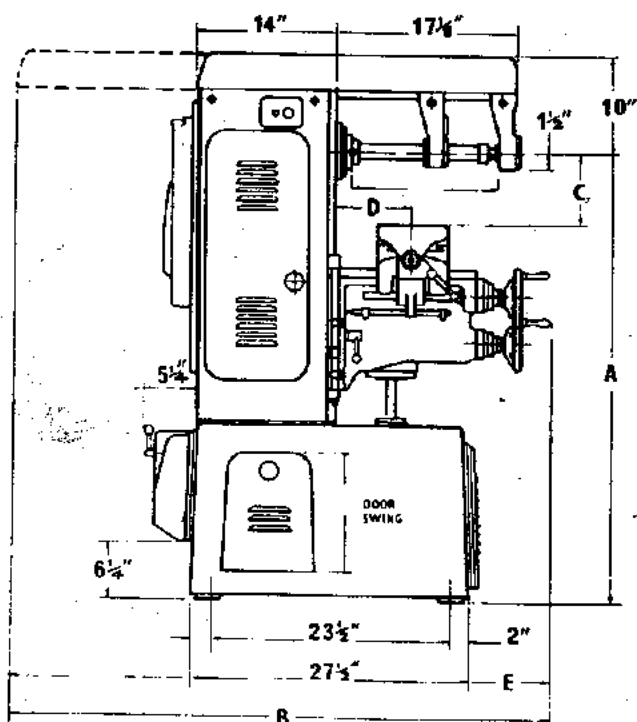
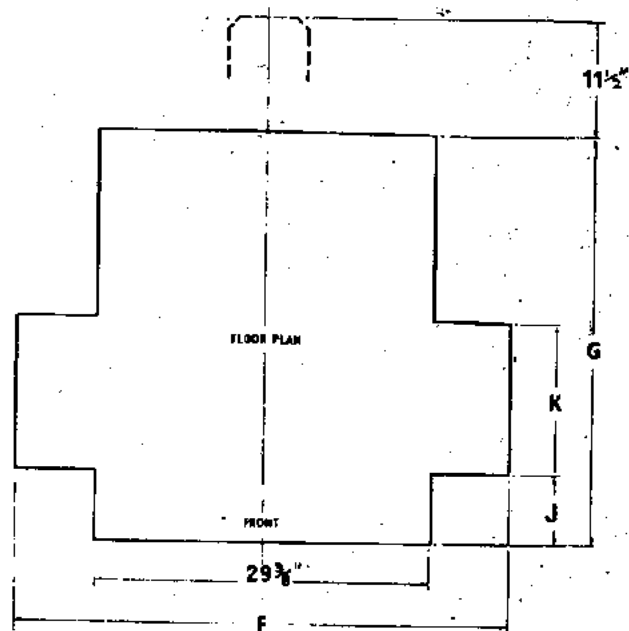
We feel sure it will be realised that these qualities can only be maintained provided the machine is given care in operation, and attention in the form of regular maintenance. To assist, we have carefully compiled this manual and suggest that it is kept in a safe place adjacent to the machine, readily available to those responsible for operating and servicing.

We suggest the book be passed around the works to the people concerned in the following order:-

- | | |
|----------------------|--|
| 1st. Plant Engineer. | (or whoever is responsible for the installation.) |
| 2nd. Electricians. | (for checking over and understanding the electrical side.) |
| 3rd. Foreman. | (or Chargehand.) |
| 4th. Operator. | |

ADCOCK & SHIPLEY LTD.

KEY	'M'	'G' & 'J'	'AH'
A	45½	45½	48½
B	55½	54½	54½
C Max	10½	10½	10½
Min	½	½	½
D Max	10½	10½	10½
Min	4½	4½	5½
E	10½	9½	9½
F	44½	56	61½
G	43	42	42
H	55½	55½	58½
J	9	8	8
K	14½	14½	12½



AUTOMATIC FEED ARRANGEMENT G
(COMMON WHEEL FOR ALL TYPES
EXCEPT ARRANGEMENT 'M')

FIG. 1

Specification

	Hand feed machines. Arrangement 'M'		Mechanical auto feed and auto cycle machines. Arrangement 'G' and 'J'		Air hydraulic auto cycle machines. Arrangement 'AH'	
Table	English	Metric	English	Metric	English	Metric
Working Surface Overall	30 x 8	762 x 203	30 x 8	762 x 203	30 x 8	762 x 203
Working Surface Inside Suds Wells	22½ x 8	572 x 203	22½ x 8	572 x 203	22½ x 8	572 x 203
Longitudinal Traverse	13½	343	13½	343	13½	343
Cross Traverse	6	152	6	152	4½	114
Vertical Traverse	10	254	10	254	10	254
No. of Tee slots	3	—	3	—	3	—
Width of Tee slots	⅞" for ½"	14 (actual)	⅞" for ½"	14 (actual)	⅞" for ½"	14 (actual)
Centres of Tee slots	1½"	48	1½"	48	1½"	48
Spindle						
Bored British Std.	No. 40	—	No. 40	—	No. 40	—
Centre to Underside of Overarm	5½"	140	5½"	140	5½"	140
Horse power of motor	2	—	2	—	2	—
Shipping particulars						
Space Occupied	67 cu.ft.	1.9 cu.m.	75 cu.ft.	2.12 cu.m.	89 cu.ft.	2.52 cu.m.
Gross Weight	1830 lb.	870 kilos	1970 lb.	936 kilos	1810 lb.	820 kilos
Nett Weight	1350 lb.	640 kilos	1500 lb.	711 kilos	1340 lb.	603 kilos

Spindle speeds (rpm)

1ES-M, G & J

50	100	200	400	790	1590
64	125	250	510	1000	2000
79	157	312	630	1250	2500

1ES-AH

250	460	870	1700
315	575	1050	2060
380	710	1370	2500

Table feeds (per revolution of spindle)

1ES-G

English	Metric	English	Metric
.004	.09	.018	.37
.008	.16	.031	.61
.012	.25	.050	1.00

1ES-J

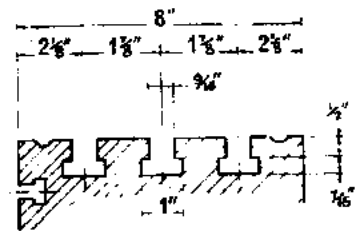
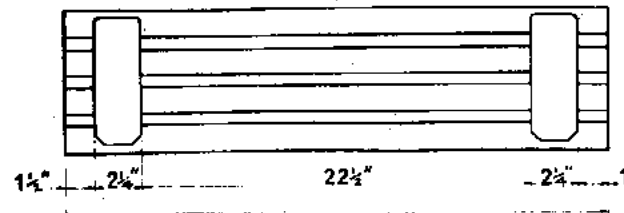
English	Metric	English	Metric	English	Metric
.005	.13	.012	.30	.0225	.57
.0065	.17	.014	.36	.027	.69
.008	.20	.016	.41	.035	.89
.010	.25	.019	.48	.044	1.12

AUTOMATIC FEED TABLE ARRANGEMENT 'G'

AUTOMATIC CYCLE TABLE ARRANGEMENT T

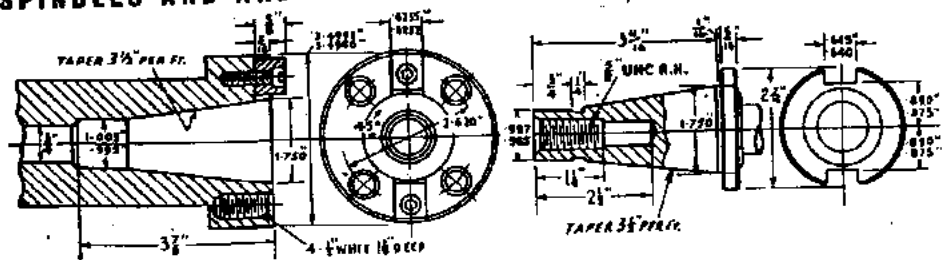
AUTOMATIC CYCLE TABLE ARRANGEMENT 'AH'

LEVER FEED TABLE ARRANGEMENT "M"



COMMON TABLE FOR ALL FEEDS

SPINDLES AND ARBOR ENDS



B.S.S. NOMINAL TAPER No. 40

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INSTALLATION PROCEDURE.

UNPACKING.

Carefully remove outside casing, internal braces and skids so that the machine is not scratched or damaged in any way. Should any damage have been caused in transit, inform the Hauliers, Railway or Shippers and ourselves (or our local representative) stating the full extent of the damage incurred. The packing materials must be kept until the Insurance Company's Assessors have inspected the machine.

CHECKING.

Check the whole of the equipment with the packing sheet or delivery note. Should any shortage be evident or suspected, report to us (or our local representative) immediately.

LIFTING.

Under no circumstances must chain, or wire rope, be used to lift the machine. Manilla rope slings are best and should be at least $1\frac{1}{2}$ " diameter (or tested for 2 ton capacity.) Before raising off the ground, test for balance. The diagram opposite clearly depicts the method of slinging.

FOUNDATIONS, LEVELLING AND CLEANING.

When installing a machine, careful laying and levelling well repays itself in the life of the machine. The base of the machine has been machined to ensure its being level when placed on a flat surface. When a concrete foundation is used, we recommend the machine to be 'grouted' in to provide an even and solid foundation. On upper floors it is advisable to place the machine over a girder, near a wall or other position at which building vibration is at its minimum. To level the machine correctly the table should be central on the cross-slide and the cross-slide central on the knee. Insert a taper wedge at each corner of the base and check with a spirit level placed first lengthwise and then crosswise on the table, tapping the wedges until the spirit level gives an accurate reading both ways. Additional wedges may then be inserted and the machine bolted down and 'grouted' in. When the concrete has settled the machine should be cleaned down. Bright parts, protected for

transit with rust preventative, should be wiped off with a rag, if necessary, first brushing over with paraffin or other solvent. On no account should the preservative be scratched off the metal. Overarm and slides should then be oiled and traversed by hand to give free movement and prevent corrosion.

MACHINES
SHIPPED
ABROAD.

Exported machines, subjected to varying atmospheric conditions during the shipment, have to be specially treated against corrosion particularly the gears and bearings. We use preservative soluble in oil for the gears and bearings and therefore every machine before it is packed, is run for a short time using the preservative instead of oil as a lubricant, and is then drained. Since it is soluble in oil it is therefore unnecessary to remove the preservative remaining in the gear boxes. All that is required is to refill the boxes with the recommended oil. Bright metal parts are coated with either varnish or grease to B.S. Specification which should be removed with the aid of a solvent such as paraffin, etc., if necessary.

OPERATIONAL INFORMATION.

FITTING ARBORS AND ADAPTORS.

In order to maintain accuracy and alignment always ensure that the arbor or adaptor shanks and spindle bore are quite clean before assembly. This rule also applies to the fitting of COLLARS AND CUTTERS to arbors.

PROCEDURE.

Revolve spindle until driving keys are horizontal, the slots in the arbor flange will then support the arbor until it is pulled right home by the drawbar. The arbor should then be held by hand until the drawbar has picked up a few threads, thus preventing the arbor falling and causing damage.

After placing cutter and collars, etc., in position, tighten arbor nut by hand only, until arbor support is in place, then tighten with spanner.

SPEED CHANGES.

These are obtained by manual changing of the vee belts over the pulleys, access to which is gained by the door, opening on the left hand side of the column. Before moving belt, decide which pulley will have the belt running on a smaller groove, after the change has been made. Move belt on this pulley first, as it will then slacken the belt, ready for moving the belt on the other pulley.

Additionally, there is a 'Slow-Fast' Back Gear operated by lever on the right hand side of the column, giving a speed change in addition to those obtained by the pulley drive. Machine must be stopped before any changes are made. (EXCLUDING MODEL AH.)

BELT ADJUSTMENT.

Belt adjustment can be made by adjustment of the swing-plate, backing the intermediate pulley, which is easily moved after slackening the nuts holding it to the column and raising or lowering it as required. To adjust the lower belt use the screw adjustment fitted to the Motor Platform, readily accessible through a door in the left hand side of the base.

Should neither of these methods prove sufficient, the belts should be slacked off and links removed or added as required.

MAINTENANCE: SPINDLE BEARINGS.

SPINDLE BEARING ADJUSTMENT.

We strongly advise against adjustment being made to these bearings, as they are supplied to us by the bearing manufacturer as a paired set, having the necessary pre-load.

Therefore, there is no provision for further adjustment.

If after some time unsatisfactory results are being obtained which seem to indicate slack bearings, then the most likely reason is that the bearings need replacing by a new pair.

REPLACEMENT PROCEDURE.

REF. DRAWING FIG.4 - AIR HYDRAULIC MODEL.

1. Slacken belt by moving one end onto a smaller groove or, alternatively, unfasten it.
2. Slacken grub screw to loosen pulley UK.82.
3. Remove screws and front and rear bearing caps.
4. Slacken locking screw and remove locknut VAL.2436.
5. Withdraw spindle complete with bearing housing using the two tapped holes provided for extraction in UK.27.
6. Press housing off spindle bearings.
7. Slacken grub screw and remove locknut UK.33.
8. The old bearings can now be removed and the washer UK.28 removed, cleaned and replaced.
9. New bearings, paired set LP.50.BH can now be fitted, making sure that the scribed lines on the inner rings are in line when the bearings are fitted to the spindle and that similar markings on the two outer rings are lined up when UK.27 is fitted.
10. Assemble in the reverse order to the dismantling procedure above.

REF. DRAWING FIG.5. - MODELS 'LSL', 'G' AND 'J'.

1. Slacken belt by moving one end onto a smaller groove or, alternatively, unfasten it.
2. Slacken grub screw and remove Pulley UK.141 (Models LEJ. and LEG.)
3. Remove screws and front and rear bearing caps.
4. Slacken locking screw and remove locknut VAL.2436.
5. Remove gear box side cover plate and slacken grub screw in large gear on spindle.
6. Remove the large rear cover and the pulley UK.137 complete with bearings.
7. Withdraw spindle complete with bearing housing, using the two tapped holes provided for extraction in UK.27;
8. Press housing off spindle bearings.
9. Slacken grub screw and remove locknut UK.33.
10. The old bearings can now be removed and the washer UK.28 removed, cleaned and replaced.
11. New bearings, paired set LP.50.BH can now be fitted making sure that the scribed lines on the inner rings are in line when the bearings are fitted to the spindle and that similar markings on the two outer rings are lined up when UK.27 is fitted.
12. Assemble in the reverse order to the dismantling procedure above, making sure that the large gear UK.139 is back as far as possible and the grub screw locates in the dimple in the spindle. Dismantling of the pulley UK.137 from the bearings LRJ.40 and LJ.40 will facilitate assembly.

MAINTENANCE: LUBRICATION.

The machine should be regularly lubricated, charging oil and grease points weekly. For further instructions and lubrication diagram see drawing opposite.

The OVERARM should be kept clean and lubricated with a film of oil to ease fitting and removal of Arbor Support and also to prevent corrosion. It is also advisable occasionally to pass the overarm through the dovetail to maintain an easy sliding action.

RECOMMENDED LUBRICANTS:

Gears, Bearings, etc:-	Mobil Oil Co's. Vacutra Oil.	Shell Co's. Vitrea Oil 33
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Ball Bearings:-	Mobilux Grease 2.	Shell Alvania Grease 2.
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NOTE:- Where large numbers of operations are carried out, the lubrication should be increased.

COOLANT SYSTEM (When supplied.)

A regular supply of coolant is maintained by the electric centrifugal pump fitted in the base of the machine, the reservoir for which is also in the base. This should be occasionally cleaned of sludge deposit, flushed out with clean warm water and refilled with new coolant.

The pipe line and fittings can also be cleaned by running the pump for a few minutes whilst the reservoir is filled with warm water. The delivering nozzle should be directed into the outlet of the Table during this procedure.

A TAP is provided for regulating the coolant supply and is mounted at the junction of the pipe line and the universal swivel joint which enables the jet to be directed to suit the type of cutter in use.

INFORMATION COVERING 'M. FREE' MACHINES.

LUBRICATION.

All necessary instructions and lubrication diagrams are set out in the drawings. Details of recommended lubricants are on Page 9.

OPERATIONAL CONTROLS.

The spindle is started by means of push button, mounted on one side of the machine column, and a FORWARD/REVERSE switch at the other side. Momentary application of the 'REVERSE' position of the switch will quickly brake the spindle.

TRAVERSES.

The longitudinal traverse is operated by lever through rack and pinion, whilst the cross traverse is operated by screw with hand wheel, fitted with graduated micrometer dial. All motions are hand feed.

STOPS.

The length of the longitudinal traverse can be varied by means of adjustable stops fitted to the slot on the front face of the table and secured by socket screws.

Stops are provided on the left hand side of the Cross-slide and Column for controlling the length of cross and vertical traverse.

LEVER ANGLE ADJUSTMENT.

1. TABLE LEVER.

By slackening the clamping nut at the base of the operating lever, it can be swivelled to any desired angle required by the operator to suit the work involved. Re-clamp tightly after adjustment.

INFORMATION COVERING 'M' MODEL. (CONT'D).

TRAVERSE LOCKS.

TABLE. Can be locked by levers, fitted either end of the Cross-slide front face.

CROSS-SLIDE. Locked by one lever on left hand side of cross slide.

KNEE. Locked by one lever, fitted to the left hand side of the Knee Slide.

PLEASE NOTE. All locking levers are operated in a clockwise direction to lock.

SLIDE ADJUSTMENT.

To maintain accuracy and a good finish, it is essential that all slideways gibs are kept in correct adjustment. Loose 'Gib Strips' create vibration and 'chatter' which results in poor surface finishes.

All slides are fitted with taper 'Gib Strips'. To adjust the cross slide, remove the front and rear wipers, then loosen the screw at the small end of the 'Gib' by one eighth of a turn and tighten the screw at the opposite end by the same amount. Repeat this procedure until the slides can be moved freely in each direction without binding or jumping. The adjustment is correct if a slight 'drag' is felt when operating the traverse by hand.

To adjust the longitudinal slide, use is made of the two screws at the left hand side of the cross slide. The smaller of these screws is screwed directly into the 'Gib' and is first slackened by one eighth of a turn. The larger screw may then be adjusted by a similar amount and the smaller screw re-tightened. This procedure is adopted until the adjustment is correct.

INFORMATION COVERING 'M' MODEL (CONT'D.)

To adjust the vertical slide, remove LH wiper and slacken small lock screw in end of strip by one eighth of a turn. The larger screw may then be adjusted by a similar amount and the smaller screw re-tightened. This procedure is adopted until the adjustment is correct.

INFORMATION COVERING MACHINES WITH FEED ARRANGEMENT 'G'

LUBRICATION.

All necessary instructions and lubrication diagrams are set out in the drawings. Details of recommended lubricants are on page 9

OPERATIONAL CONTROLS.

The spindle is started by means of push button, mounted on one side of the machine column, and a FORWARD/REVERSE switch at the other side. Momentary application of the 'REVERSE' position of the switch will quickly brake the spindle.

AUTOMATIC FEED. (Longitudinal Traverse.)

Engagement and disengagement is made by a conveniently positioned lever on the Right Hand Face of the cross-slide. Adjustment for length of automatic longitudinal traverse is provided by means of one table stop, which on completion of the required length of traverse, actuates the automatic trip mechanism.

Hand traverse is also provided in the form of table screw and nut, with hand wheel and micrometer dial.

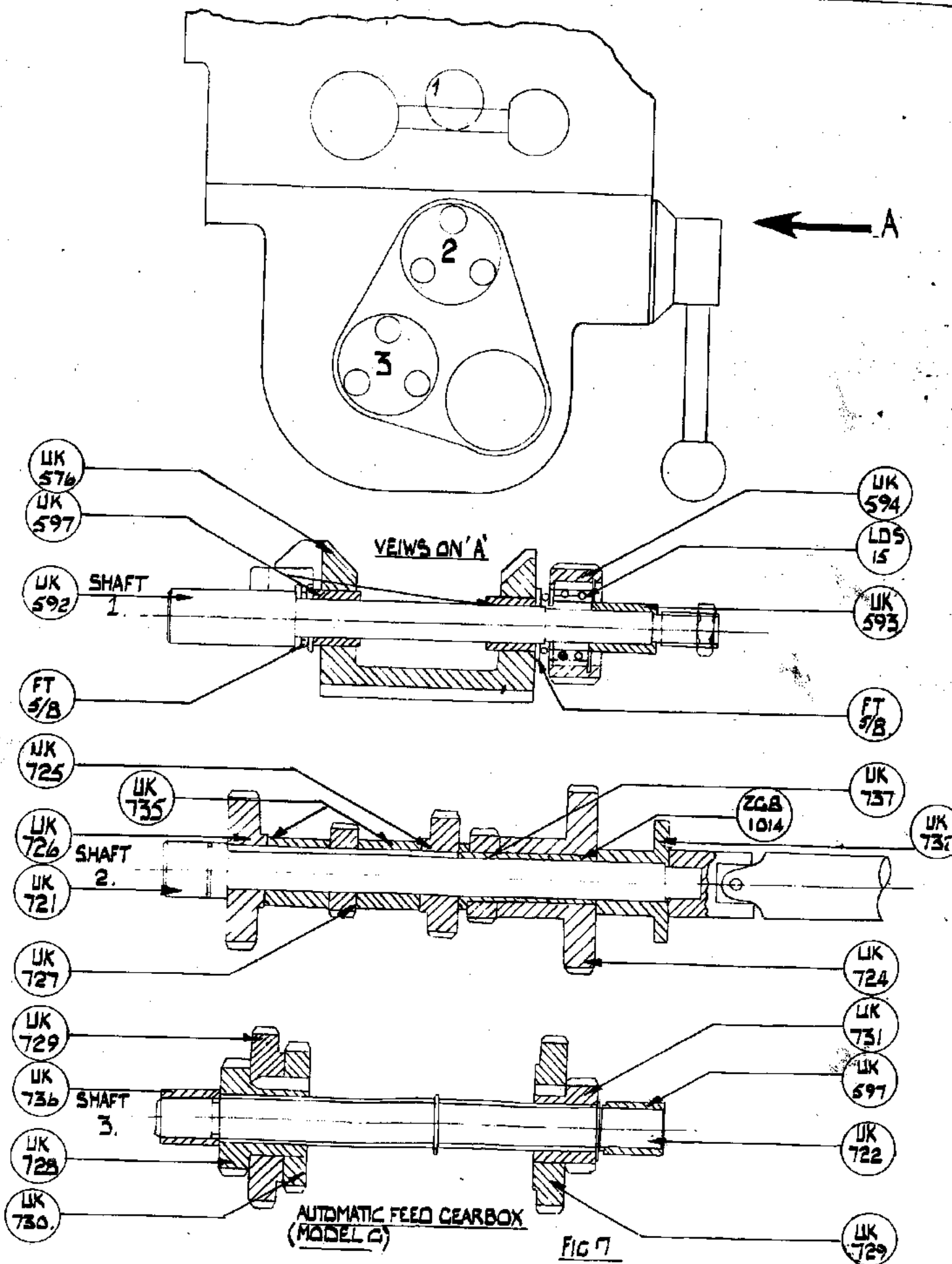
CROSS AND VERTICAL TRAVERSE.

Both cross traverse of the table and vertical traverse of the knee are made by individual screw and nut, each provided with hand wheel and micrometer dial.

TRAVERSE LOCKS.

A lever handle is provided for locking the Cross-slide and is located under the Left Hand side and operated in a clockwise direction to lock.

A similar lever is provided on the Knee Slide.



MAINTENANCE INSTRUCTIONS FOR MACHINES WITH FEED ARRANGEMENT 'G'

These machines are very simple and require a minimum of attention.

SLIDE ADJUSTMENTS.

To maintain accuracy and a good finish, it is essential that all slideways gibs are kept in correct adjustment. Loose 'Gib Strips' create vibration and 'chatter' which results in poor surface finishes.

Both the longitudinal and cross-slides are fitted with taper 'Gib Strips'. To adjust the cross slide, remove the front and rear wipers, then loosen the screw at the small end of the 'Gib' by one eighth of a turn and tighten the screw at the opposite end by the same amount. Repeat this procedure until the slides can be moved freely in each direction without binding or jumping. The adjustment is correct if a slight 'drag' is felt when operating the traverse by hand.

To adjust the longitudinal slide, use is made of the two screws at the left hand side of the cross slide. The smaller of these screws is screwed directly into the 'Gib' and is first slackened by one eighth of a turn. The larger screw may then be adjusted by a similar amount and the smaller screw re-tightened. This procedure is adopted until the adjustment is correct.

To adjust the vertical slide, first slacken the four locknuts in the left hand side of the knee and slacken slightly the 4 socket screws. Then tighten the adjusting screws clockwise with a screwdriver, thereby pressing the Gib tighter on to the Column Slide. When adjustment is correct, re-tighten the locknuts.

AUTOMATIC FEED GEAR BOX.

Gear changes are made in the box attached to the bottom half of the cross-slide.

This box is retained on the cross-slide by five 5/16" hexagon screws and located by two dowels. Removal of the five screws enables the box to be dropped down and examined. Since it is a simple sliding gear arrangement having only two shafts, any faults are readily seen and the dismantling procedure is obvious.

MAINTENANCE INSTRUCTIONS FOR MACHINES WITH FEED ARRANGEMENT 'G'
Cont'

The Wormwheel and Drop Worm Bracket are carried in the cross-slide and to work on these it is preferable to take the cross-slide and table off the knee as a complete unit.

To do this, the bracket which carries the cross-slide locking lever and incorporates the cross traverse nut should be removed. This is held on by Allen Screws and located by dowels.

When dowels and screws have been removed the locknuts on the cross-screws should be unscrewed allowing the cross-screw to be withdrawn and the bracket taken completely off.

The Gib Strip can now be slackened to allow easy removal of the cross-slide.

It will be seen that feed engagement and disengagement is by Drop Worm Bracket with a simple trigger mechanism to engage and disengage the feed.

One spring controls the trigger mechanism whilst a second spring is provided to assist gravity in disengaging the Worm Drop Bracket from the Worm when the feed has tripped. Here again the dismantling procedure is so obvious that explanations are unnecessary.

INFORMATION COVERING MACHINES WITH FEED ARRANGEMENT 'J'

LUBRICATION.

All necessary instructions and lubrication diagrams are set out in the drawings, details of recommended lubricants are on page 9

OPERATIONAL CONTROLS.

Spindle is started by means of push button, mounted on one side of the machine column, and a FORWARD/REVERSE switch at the other side. Momentary application of the 'REVERSE' position of the switch will quickly brake the spindle.

AUTOMATIC CYCLE.

Machines equipped with Feed Arrangement 'J' are provided with an automatic table cycle comprising:-

1. Quick approach to work.
2. Feed at predetermined rate.
3. Quick return to starting point after completion of cut.

The drive for the quick approach and return is provided by a separate electric motor mounted behind the feed gear box, while the cutting feed is obtained through a universally jointed telescopic drive shaft from the main drive.

The Automatic Cycle is controlled by a lever on the front of the table gear box and the operation is as follows:-

There are three adjustable trip dogs on the front of the table. The cycle is initiated by moving the control lever in a clockwise direction, to engage the forward drive from the rapid traverse motor. When the middle stop strikes the trip mechanism, the rapid forward drive is de-clutched.

At the same time, the feed from the universal drive shaft is engaged. At the end of the cutting cycle, the right-hand dog strikes the trip mechanism, disengages the feed and engages the reverse drive from the rapid traverse motor, to return the table rapidly to the right. When the table returns to the starting position, the left-hand dog strikes the trip mechanism, the motor is de-clutched and the control lever is automatically located in neutral.

MAINTENANCE INSTRUCTIONS FOR MACHINES WITH FEED ARRANGEMENT
(Cont'd.)

Release the socket-head screws retaining the cover and remove the cover from the cross-slide at the top right-hand end of the box. After making sure that the box is well supported, remove the 5 socket-head screws in the slide which hold the box in position. If the knee is now raised the gearbox and motor will be left on the support. The gearbox can then be test run and inspected for indication of incorrect working. After this test the motor can be detached by removing the four hexagonal nuts round the flange and the gearbox removed to a bench for convenience if desired.

To dismantle the box, remove the handle and linkage by slackening the nut locating the handle in its bracket.

Shaft No.1. Slacken the socket screws which clamp the clutch operating lever and link UK.803 and UK.804 respectively (see Fig.10.) Remove the bearing retaining cap UK.822 and the shaft UK.823 may then be withdrawn whilst holding the clutch operating levers.

Shaft No.2 may be removed after loosening the grub screw at the front of the box above the shaft, and also the grub screw retaining the clutch operating levers. The shaft may then be withdrawn from the rear of the box. The linkage which interconnects the two clutches is thus free and dismantling is straightforward.

Shaft No.7. Remove end caps UK.910, UK.872 and UK.806, which also draws bearing UK.889 with it. Remove the external circlip from the opposite end of the shaft and the paired bearings complete with housing. Remove the clutch sleeve, thus revealing a circlip which is also to be removed.

The complete shaft may then be withdrawn whilst holding the gear UK.895 complete with clutch assembly.

Removal of the remaining components from the shaft is then straightforward.

MAINTENANCE INSTRUCTIONS FOR MACHINES WITH FEED ARRANGEMENT 'J'

(Cont'd.)

The drive motor and remaining shafts Nos. 3, 4, 5, 6 and 8, and detent plunger assembly, may be readily dismantled, the method of doing this being obvious and straightforward. (NOTE:- Shafts 3, 4 and 5, may be removed without prior removal of any other shafts.)

To dismantle the freewheel, remove the screws round the wormwheel. If wear has taken place the unit should be replaced completely. (Sprag Clutch Renold No. 648252.) NOTE:- direction of rotation of this clutch prior to dismantling.

After replacement of worn or damaged parts, re-assemble by reversing the above procedure.

AUTOMATIC CYCLE CONTROL LINKAGE.

A. INTERNAL LINK.

If, during dismantling, the adjustment of the internal link in the gearbox is lost, it may be re-set by the following procedure:-

Move the control lever to the rapid approach position and check that the rapid approach clutch is in full engagement for the commencement of the cycle. In this position adjust the length of the internal link to give the following conditions:-

1. The spring and plunger inside the link should hold the feed clutch in full engagement.
2. Manual attempts to disengage the feed clutch must give NOT MORE THAN 0.025" movement out of full engagement of the feed clutch before the pin touches the end of the slot in the link.
3. If more than the above 0.025" is obtainable, the link must be lengthened accordingly.
(NOTE:- One half turn of the link gives 0.025" movement at the clutch.)

The adjustment of the screw at the end of the link must then be set as follows:-

Hold the control lever at the position where feed withdrawal should just occur (i.e., where the roller is about to descend the long slope of the cam.) The screw should then be adjusted so that the feed clutch just commences to withdraw at this point.

MAINTENANCE INSTRUCTIONS FOR MACHINES WITH FEED ARRANGEMENT 'J'
(Cont'd.)

B. EXTERNAL LINK.

To take up wear on the cam operated by the trip dogs on the table, a simple screw adjustment is provided on the link outside the gearbox. Movement of the sleeve in the centre of the link reveals this adjustment.

The link should be adjusted so that when the feed dog operates the cam, the latter just clears the underside of the feed dog.

INFORMATION COVERING KNEES, TABLES,
AND CROSS-SLIDE OF 'AH' FEED MACHINES.

LUBRICATION.

All necessary instructions and lubrication diagrams are set out in the drawings. Details of recommended lubricants are on page 9

OPERATIONAL CONTROLS.

The spindle is started by means of push button, mounted on one side of the machine column, and a FORWARD/REVERSE switch at the other side.

Momentary application of the 'REVERSE' position of the switch will quickly brake the spindle.

IMPORTANT: The spindle 'REVERSE' position should only be used for braking and end milling. These machines are NOT suitable for climb or down cut milling.

ALWAYS ENSURE before commencing operation of this machine that the air supply is clean, lubricated and at an even pressure of 80 lbs. per sq. inch. (5.6 K.g. per Sq. C.m).

Operation of the Vertical and Cross-slide movements is by hand by means of screws operated by hand wheels and equipped with graduated micrometer dials.

TRAVERSE LOCKS.

A lever handle is provided for locking the Cross-slide, and is located under the Left Hand side and operated in a clockwise direction to lock.

A similar lever is provided on the Knee Slide.

The Automatic Cycle of the Table movement consists of rapid traverse of the work to the cutter, changing down to a cut feed rate at a predetermined point. At the completion of the feed traverse the table rapidly returns to its starting position.

Referring to the drawings (FIG. 12 & 13) the main Air Cylinders (AC) that provide the movements and the Hydraulic Control Unit (HC) that controls the rate and length of the cut feed, are built into the cross-slide.

11

INFORMATION COVERING KNEES, TABLES,
AND CROSS-SLIDE OF 'AH' FEED MACHINES. (Cont'd.)

TO START the automatic cycle of the table, simultaneous operation of the lever (A) and control button (B) is necessary. This is so arranged to ensure that both of the operator's hands are occupied when table cycle starts. Lifting the lever (A) and depressing the control button (B) fully home, starts the cycle when the table rapid traverses until the table end plate (TP) contacts the adjustable nuts (L) on the piston rod of the Hydraulic Control Unit.

(When commencing the Automatic Cycle ensure that the control button 'B' is pressed entirely home. Failure to ensure this will result in erratic operation of the table)

At this point the Cut Feed Rate of the table is controlled by the piston of the check unit, which being moved and displacing oil through an adjustable metering valve (MV) slows down the feed to the required rate. The adjustment of the valve is used to give an infinitely variable cut feed rate. Screwing in knurled thumb screw reduces feed, screwing out increases it.

The Table feeds at cut feed rate until the Adjustable Trip Dog (T) engages the Trip Lever (TL) and operates a pilot air valve. This valve controls an air cylinder that returns the main double acting air valve (AV) to its original position, reversing the air supply to the main cylinder and returning the Table rapidly to the loading position. During the return movement the table end plate engages the fixed nut on the hydraulic piston rod and returns the piston to its original position.

The oil displaced by this movement is allowed to flow freely from one side of the piston to the other, through a one way valve which is incorporated in the design of the piston.

The Table can be returned to the loading position at any time during the feed period by the manual operation of the Trip Lever (TL).

CONSUMPTION OF AIR.

The consumption of air of these machines is one cu. ft. per cycle assuming that the table makes its full stroke.

A shorter stroke would require a reduced amount of air in direct proportion to the reduction in stroke.

MAINTENANCE INSTRUCTION FOR MACHINES WITH FEED ARRANGEMENT 'A'

These machines are very simple and require a minimum of attention.

SLIDE ADJUSTMENTS.

To maintain accuracy and a good finish, it is essential that all slideway gibs are kept in correct adjustment. Loose 'Gib Strips' create vibration and 'chatter' which results in poor surface finishes.

Both the longitudinal and cross-slides are fitted with taper 'Gib Strips'. To adjust the cross-slide, remove the front and rear wipers, then loosen the screw at the small end of the 'Gib' by one eighth of a turn and tighten the screw at the opposite end by the same amount. Repeat this procedure until the slides can be moved freely in each direction without binding or jumping. The adjustment is correct if a slight 'drag' is felt when operating the traverse by hand.

To adjust the longitudinal slide, use is made of the two screws at the left hand side of the cross-slide. The smaller of these screws is screwed directly into the 'Gib' and is first slackened by one eighth of a turn. The larger screw may then be adjusted by a similar amount and the smaller screw re-tightened. This procedure is adopted until the adjustment is correct.

To adjust the vertical slide, first slacken the four locknuts in the left hand side of the knee and slacken slightly the 4 socket screws. Then tighten the adjusting screws clockwise with a screwdriver, thereby pressing the Gib tighter on to the Column Slide. When adjustment is correct, re-tighten the locknuts.

INSTRUCTIONS FOR THE MAINTENANCE
OF THE BENTON & STONE OILREIN UNIT.

Check that the Oilrein unit is charged with oil. The indicator rod moves in and out of the recuperator as the piston rod of the unit moves in and out. If the unit is correctly charged with oil, when the piston rod is as far into the unit as it will go, either one or two grooves should be visible on the indicator rod. If no groove is visible unit requires filling. Fill until second groove is visible, although unit cannot be damaged by overfilling as any excess oil will escape through the holes in the recuperator wall.

To charge the unit with oil, unscrew the end cap to obtain access to the charging nipple. It is recommended that a "Topping-up" unit should be used.

Should the oil level be allowed to fall too far, air may enter the unit and result in an intermittent checking action. If this happens it is advisable to remove the unit and proceed as follows:-

With the piston rod pushed as far into the unit as it will go, fill the unit through the oiling nipple until the second groove is showing. Hold unit with piston rod upwards and sloping at 45°, slacken off the hexagon socket plug in the uppermost face of the unit front cap and allow all the air to escape before re-tightening. Carefully reverse position of unit so that piston rod points downwards at 45° and recuperator also points downwards.

Slacken hexagon socket plug in uppermost face of rear cap and allow all air to escape before re-tightening.

It may be necessary to top up the oil during this process depending upon the quantity of oil lost.

Re-check that the unit is charged with oil as per the first paragraph, after which unit is ready for use.

Reconditioned units are available for the air hydraulic model and it is recommended that these be fitted rather than attempts be made to service the units individually.

AIR OPERATED VICE. (OPTIONAL EXTRA.)

SETTING INSTRUCTIONS.

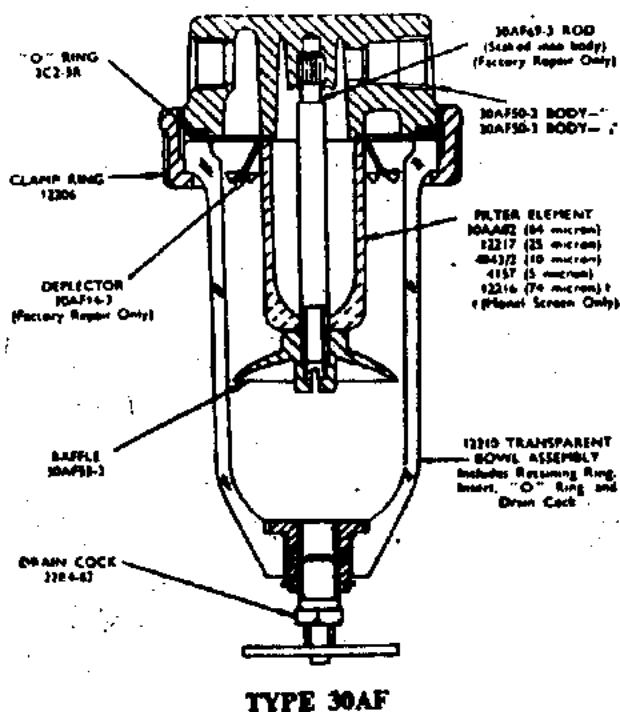
1. Fig.14 opposite shows the general arrangement.
2. Locate thrust block in the required groove in the slideway face and slide adjustable jaw over it.
3. Air operated jaw brought forward under air pressure.
4. Insert workpiece between jaws.
5. Slide adjustable jaw forward to workpiece by means of knurled headed screw.
6. Remove workpiece and measure distance between jaw faces.
7. Reduce distance between jaw faces $1/32"$ MAX. by means of knurled headed screw.
8. Lock down adjustable jaw with square headed bolt.
9. Lock the nut on knurled headed screw.

The vice can only be operated by hand when the table is in the loading position.

The vice will close automatically on commencement of the table traverse if not already closed by hand.

The vice will automatically unclamp on completion of the table cycle irrespective of being hand or automatic clamped.

INSTALLATION, OPERATION AND MAINTENANCE OF REPLACEABLE TRANSPARENT AND METAL BOWL AIR LINE FILTERS



MAINTENANCE

Since there are no moving parts in these air filters, maintenance is simple. Filters may be equipped with either a sintered metal type or a screen type filter. Unless otherwise specified, the 64-micron sintered metal type is provided, except Type 30AM, which has screen type filter with porous P.V.C. outer screen. Bowls may easily be removed for cleaning when necessary by unscrewing ribbed clamp ring. **CAUTION:** Do not attempt to remove clamp ring until line pressure to filter has been shut off.

TO CLEAN TRANSPARENT BOWLS RINSE IN A PETROLEUM SOLVENT SUCH AS PARAFFIN. DO NOT USE ACETONE, ETHYL ACETATE, ETHYLENE DICHLORIDE, TOLUENE, THINNERS OR SIMILAR SOLVENTS. AS THESE SUBSTANCES WILL DESTROY THE BOWL.

TYPES 30AD, 30AD-N (1" and 1 1/2" sizes), 30AF, 30AF-N, E30AH. To remove internal parts for cleaning, unscrew baffle or nut to release filter element. Clean all parts thoroughly. To clean filter element wash in solvent and blow out with compressed air. Keep this filter element clean for best performance and lowest pressure drop.

Before assembling, inspect "O" ring in body for nicks or cuts. If "O" ring is damaged in any way it should be replaced. Reassemble, making sure the "O" ring is properly placed in the "O" ring groove in body, and clamp ring is firmly tightened (hand tight is sufficient).

NOTE:—

Type 30AF-N is similar to Type 30AF except it has metal bowl, including drain cock, Part No. 30AD-67.

Models 30AD-N2 and 30AD-N3 have metal bowl but omit deflector and baffle. Nut, Part No. 30AB09 secures filter element. Models 30AD-2 and 30AD-3 have transparent bowl, otherwise as Models 30AD-N2 and 30AD-N3.

If there is a leak between replaceable bowl and body:

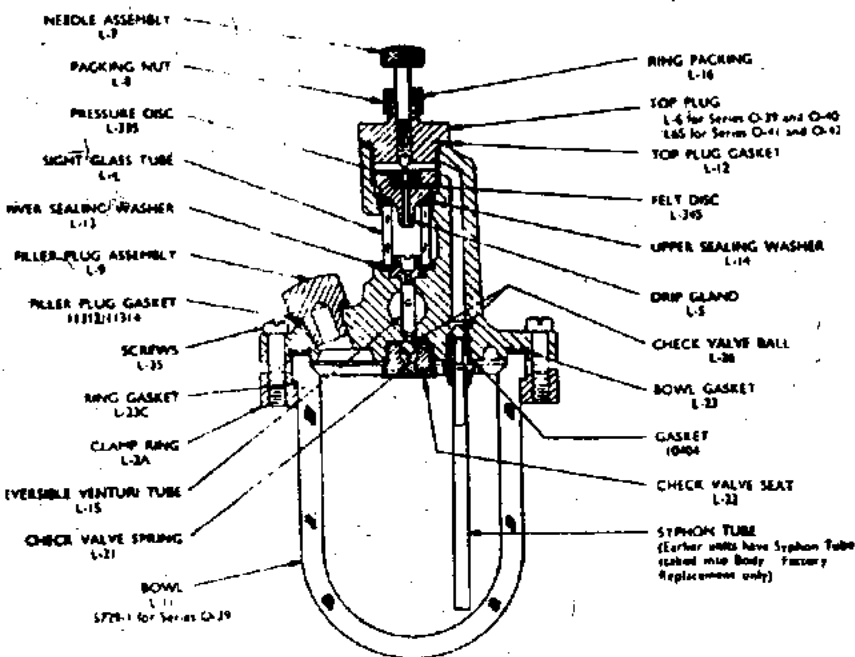
(0-41 and 0-42 Series)

- Make sure screws in clamp ring are firmly and evenly tightened.
- If leaks persist, remove the bowl and inspect gasket, making sure it is in good condition and properly assembled. Replace, if necessary, with a new gasket. When re-assembling, make sure the bowl gasket as well as the clamp ring gasket are in place. If the clamp ring gasket is not in place, the uneven distribution of pressure may crack the bowl.

Tighten the screws evenly to avoid unnecessary concentrated stress on the bowl flange.

IF NECESSARY TO CLEAN TRANSPARENT BOWL, REMOVE AND WASH IN PARAFFIN. DO NOT USE ACETONE, ETHYL ACETATE, ETHYLENE DICHLORIDE, TOLUENE, THINNERS OR SIMILAR SOLVENTS, AS THESE FLUIDS WILL DESTROY THE BOWL. THOROUGHLY DRY BEFORE PLACING WITH CLEAN OIL.

WHEN ORDERING PARTS, the model number of the unit for which the part is intended should always precede the part number: such as, Part No. 0-41-2-L12.



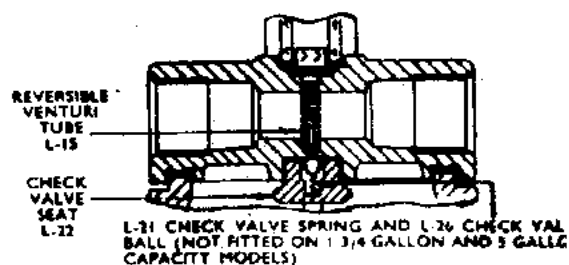
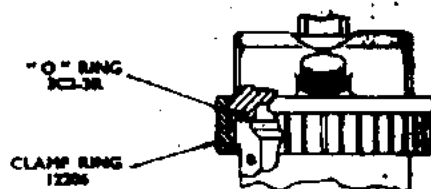
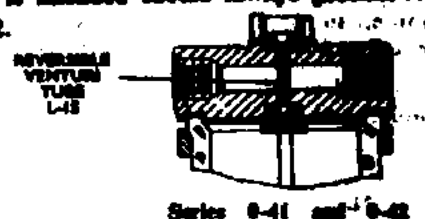
Standard Replacement Bowl Types

(0-39 and 0-40 Series)

- Make sure internally threaded clamp ring is firmly tightened (hand tight is sufficient).
- If leaks persist, remove bowl and inspect "O" ring, making sure it is in good condition. Replace, if necessary, with new "O" ring. When re-assembling, make sure the "O" ring is placed properly in the "O" ring groove in body. Replace bowl and clamp ring and tighten clamp ring firmly.

(Large Capacity Lubricators)

- Make sure bowl or reservoir securing screws are firmly and evenly tightened.
- If leak persists, remove bowl and inspect bowl gasket making sure it is in good condition. Replace if necessary with new gasket.



Large Capacity Lubricators 1/4"-1" pipe size

INSTALLATION, OPERATION AND MAINTENANCE OF OIL-FOG LUBRICATORS

Standard and Reversible Types with Replaceable Transparent Bowls, Replaceable Metal Bowls
or Permanent Metal Bowls

All series Lubricators are now supplied as Reversible Type only except Models S406-10 and S406-12

INSTALLATION

Transparent bowl types and large capacity metal bowl types for air pressures up to 150 p.s.i. and for temperatures up to 120° F. $\frac{1}{2}$ pt. and $\frac{1}{4}$ pt. metal bowl types for air pressures up to 250 p.s.i. and for temperatures up to 300° F.

Install the lubricator as close to the air device as possible, downstream from filter and pressure regulators. An arrow on the lubricator body indicates the direction in which the air must flow. **REVERSIBLE TYPES**—Arrows on collar of reversible venturi tube, indicating direction of flow, can be seen through sight glass tube at the bottom of the chamber. To reverse the direction of flow, remove top plug and drip gland and insert screwdriver into slot on top of reversible venturi tube, rotating the tube 180°. Lubricator is factory assembled for left-to-right flow unless otherwise specified.



Replaceable
Bowl Type

Piping between the lubricator and device being lubricated should have as few valves, elbows and other restrictions as possible. We do not recommend lubrication of more than two devices with one lubricator.

Where Oil-Fog Lubricators are used with soluble oils or liquids containing additives such as Graphites or Molybdenum Disulphide, it is advisable to remove the felt disc L-34S, but the pressure disc L-33S must be retained in the lubricator. On re-assembly ensure male cone of pressure disc is on the lower side. (Felt discs are not fitted to 'Mistcool' units).

Fill lubricator with oil through the filler plug. On the 3 fl. oz., $\frac{1}{4}$ pt., $\frac{1}{2}$ pt. and 1 qt. sizes only of the replaceable bowl series Oil Fog Lubricators, filling may be done while the air pressure is on.

LUBRICANT SPECIFICATION

Normal operating temperature 60° F. to 100° F.

A list of oils recommended for use in these lubricators is available. It is best to consult the manufacturer of the device to be lubricated to ensure correct oil is used. Compound oils containing graphite, soap, fillers, etc., are not recommended.

OPERATION

Before starting lubricator for the first time, close the needle valve completely. After the air is flowing, open needle valve and adjust for the desired number of drops per minute. Usually 3 to 5 drops per minute is sufficient. Note, when the lubricator is used for the "Mistcool" system of cutting tool lubrication the drip rate must be increased to between 30 to 60 drops per minute according to conditions of lubrication and cooling required.

To lock needle and prevent leakage, tighten packing gland nut after adjustment.

MAINTENANCE

If service is necessary, the following points may be helpful in locating the source of trouble:

1. oil fails to flow:

- First, make sure the lubricator is the right size for the device to be lubricated (see air flow requirement chart in catalogue), and that the direction of air flow corresponds with the arrow on body of reversible venturi tube.
- Permanent Bowl Types**—Remove top plug and drip gland and inspect for impurities in the oil passage and on top of and in the drip gland. Clean parts thoroughly, washing in paraffin and blowing out with compressed air, if necessary.
- Replaceable Bowl Types**—First clean out oil passages as in "b." If this does not establish the flow of oil, examine check valve on lower face of body. This check valve is threaded into body and may be removed after removing the bowl. Dirt in the ball valve may prevent air from entering bowl. Wash out with paraffin. (Ball valve and spring not fitted on 1 3/4 gallon and 5 gallon capacity models).
- Reversible Types**—First clean out oil passages as in "b." If this does not establish the flow of oil, remove reversible venturi tube and

clean thoroughly with paraffin and compressed air.

NOTE: The arrows on the Reversible Venturi Tube must be in the direction of flow. In order to prevent rotation of the Venturi Tube, coat the upper and lower Sight Glass Tube Washers with oil before assembly, and hold the Sight Glass Tube while tightening the Drip Gland.

2. If oil or air leaks around the sight glass tube:

- Remove top plug and tighten drip gland by means of a wide screwdriver, or on some models a $\frac{1}{8}$ " across flats hexagon wrench.
- If this doesn't remedy the leak, unscrew drip gland and inspect washers on top and bottom of sight glass tube. Replace washers if necessary. Reassemble, tightening drip gland firmly but carefully.

3. If there is a leak around the needle valve:

- Tighten needle valve packing nut.
- If this does not remedy the leak, unscrew needle valve packing nut and inspect packing. Replace if necessary.

ELECTRICAL EQUIPMENT.

MAINS ISOLATOR

is mounted on a panel together with the motor contactors and the complete unit is housed in a recess formed in the rear base of the machine, and protected by a hinged cover, held closed by two captive screws. The Isolator Lever is interlocked to this cover.

SPINDLE MOTOR CONTACTOR

is mounted on the right hand of the panel and is of the 15 amp. air-break type, fitted silver tipped contacts.

PUMP MOTOR CONTACTOR

is mounted on the left hand side of the panel and is of the same type as the above.

The contact life of the contactors is approximately 250,000 operations, and should not be tampered with unless they become badly pitted, in which case they should be levelled off with a smooth file or abrasive material.

When fitting new fixed or moving contacts it is important that the faces of the contacts are adjusted in alignment with each other.

On Model No.1 A.J., Quick Approach Motor Contactor is mounted in the centre of the panel (same type as above).

OVERLOAD PROTECTION.

is provided to the Spindle, Quick Approach and Pump Motors and is of the thermal self re-setting type, integral with the contactors. They are set to work at an ambient temperature of 15° C. The indicator is set at full load current of the motor, the trip operating at approximately 20% overload.

FUSE PROTECTION.

is also provided in the form of 15 amp. H.R.C. Cartridge held by spring clips. When applying for replacements quote:- 15 amp. A.D.B. Cartridge Fuses.

ELECTRICAL EQUIPMENT, CONT'D.

CONTACTOR CONTROLS.

Operation of the contactors is by means of 'START' and 'STOP' push buttons mounted on top of the machine column. A drum type switch is mounted on the opposite side of the column for reversing or braking the Spindle motor. A separate switch for the pump motor is fitted at the rear of the base.

CONTACT REPLACEMENT.

To replace the moving contacts, unscrew the two screws on the Red moving contact holder, lift upwards, (watch the contact pressure springs do not fly out), withdraw the contacts upwards with the springs and replace with new contacts, re-attach the springs to top of the contacts and screw the Red moving contact holder down hard.

To replace the fixed contacts, unscrew and lift the contacts, replace in the reverse direction with new fixed contacts.

To replace magnet coils, unscrew the two back screws of the contactor platform until it will swing outwards, then unscrew the two screws holding the contactor to the platform, lift the bottom base plate with the lower magnet away, and disconnect the magnet coil from its terminals when it can be withdrawn and replaced with a new coil, assembling in the reverse direction.

The overload coils are replaced when the contactor is in the outwards position as described above, by unscrewing the two screws which hold the thermal strip to the contactor and the screw which holds the wire to the out-going terminal.

IMPORTANT NOTE:- On Automatic Feed Model 1E-J, it is imperative that the electrician checks the direction of spindle rotation (anti-clockwise) immediately after connecting up, as serious damage can be done to the feed mechanism if it is run in the wrong direction.

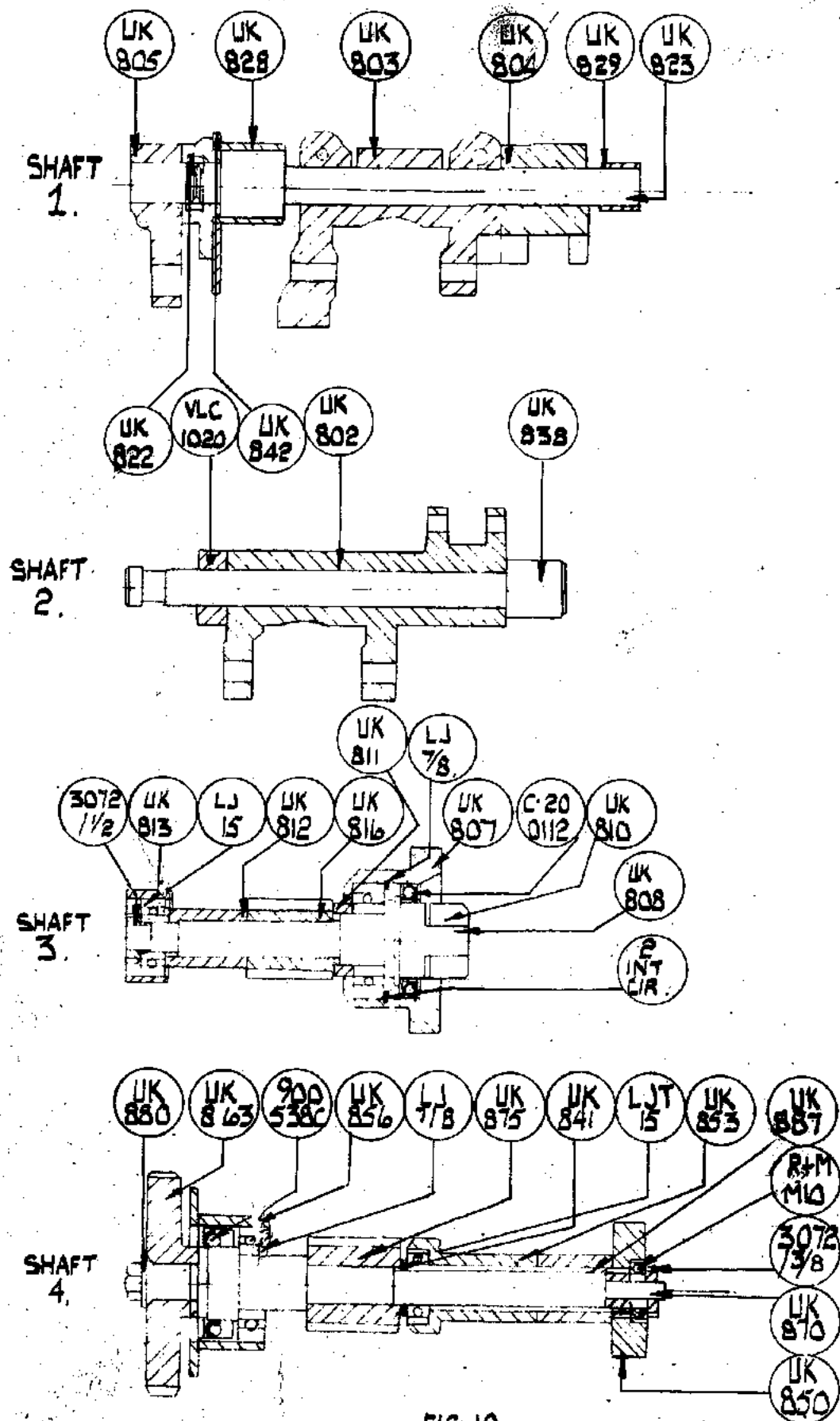
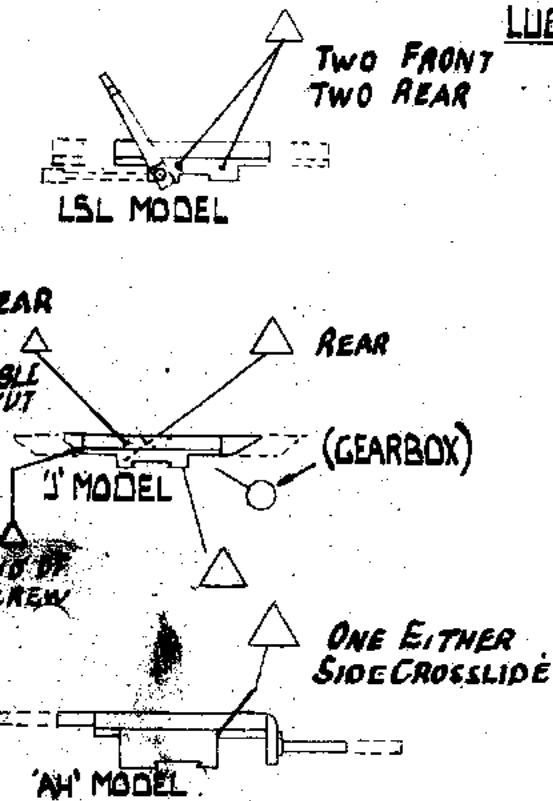


FIG 10.

LUBRICATION CHART.



○ OIL WEEKLY. △ OIL DAILY.

◇ GREASE WEEKLY.

□ OIL MONTHLY.

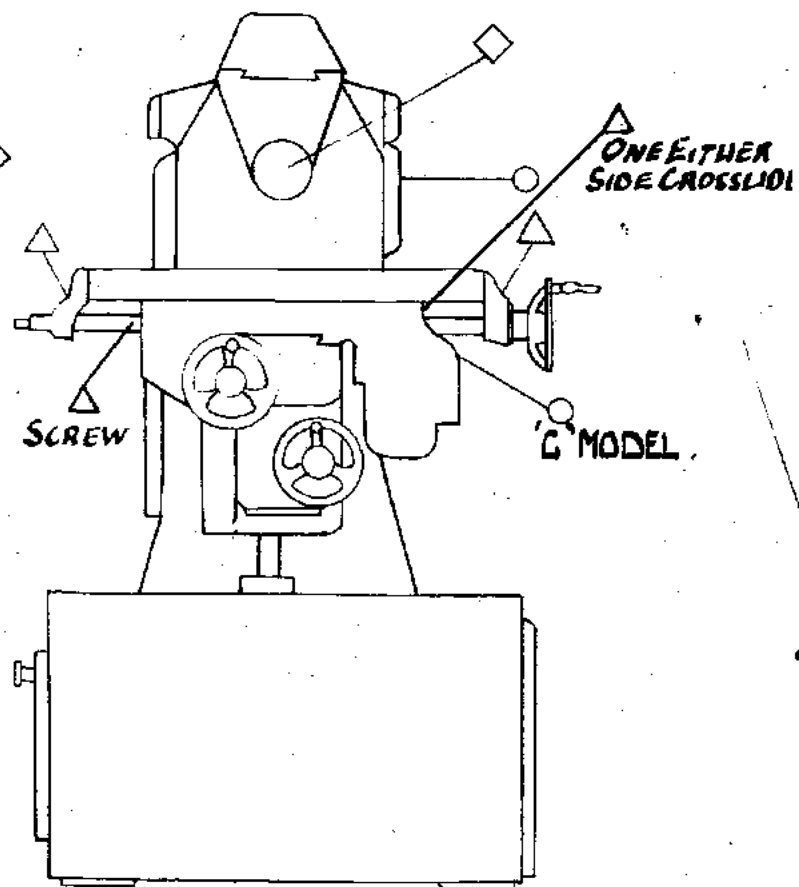
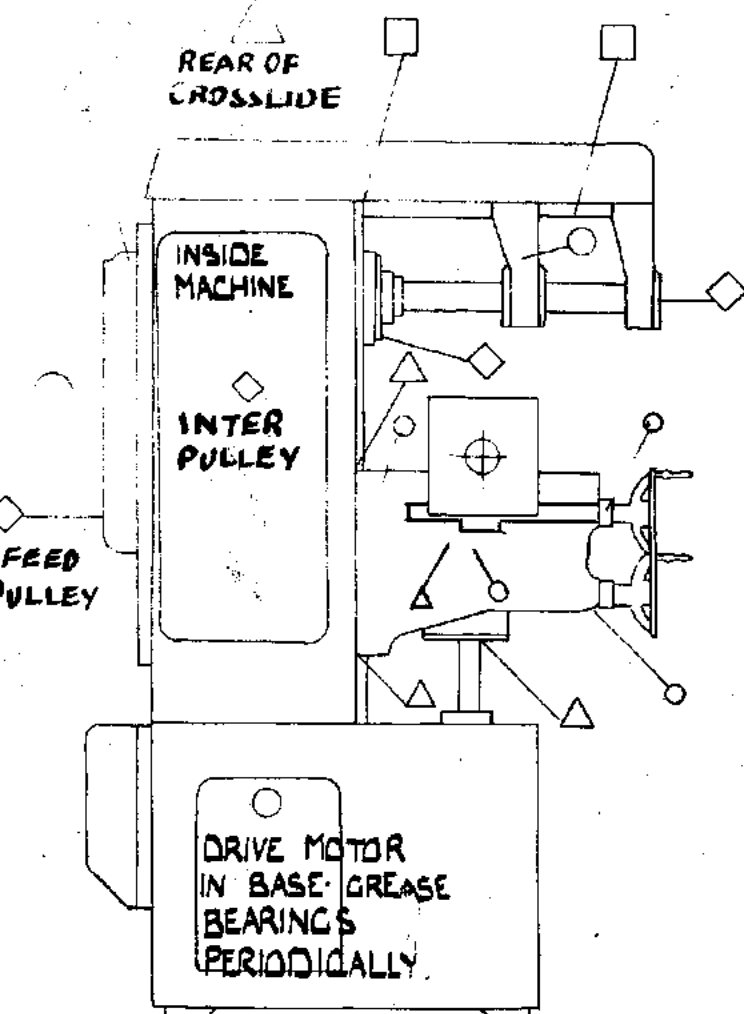
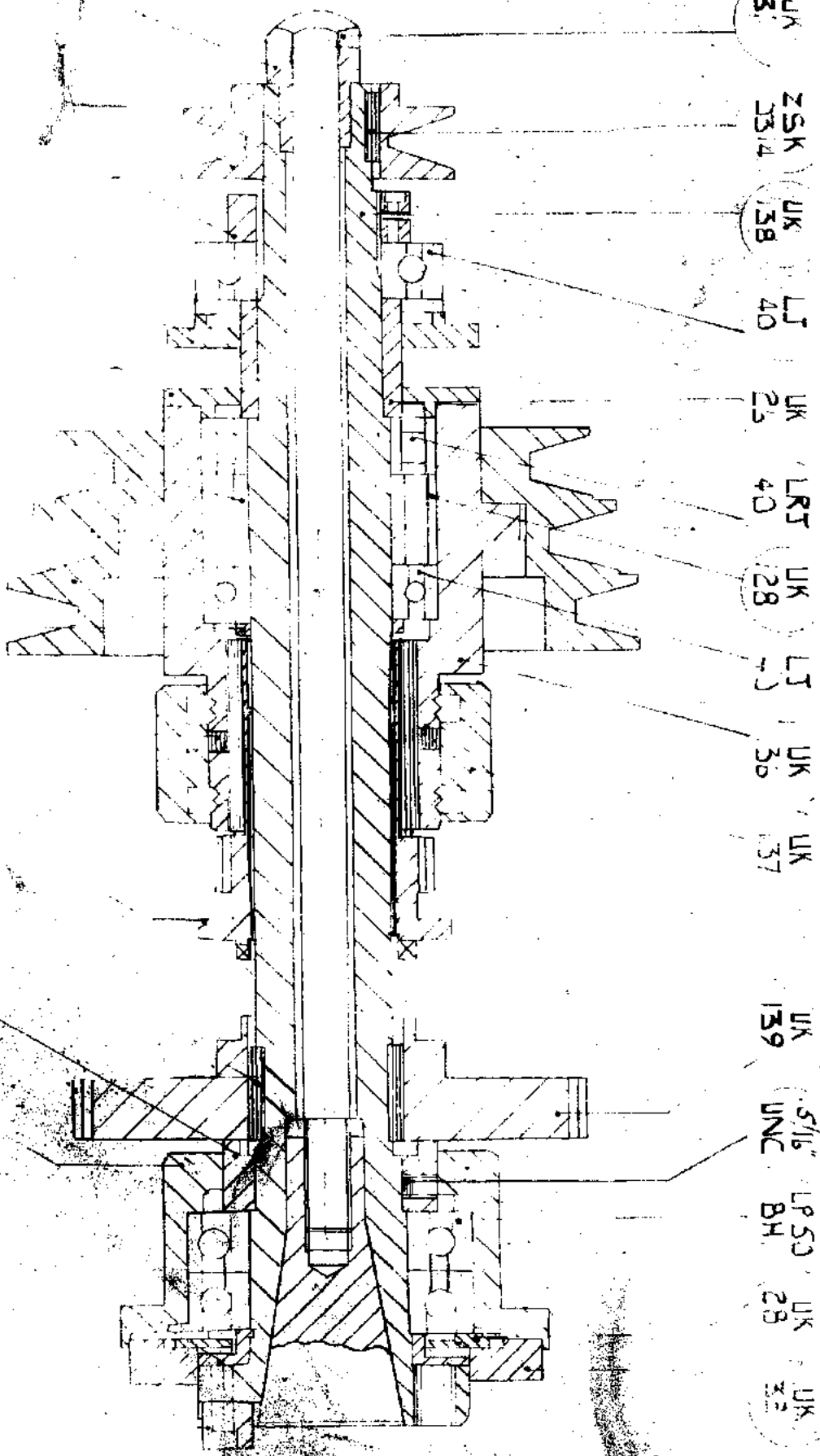


FIG. 6.

FIG. 5



UK 3

ZSK 23.14

UK 1.38

LJ 40

UK 2.5

LRT 40

UK 1.28

LJ 1.7

UK 3.6

UK 1.37

UK 1.39

5/16 UNC

LP50 8H

UK 28

UK 3.2

UK 3.2

UK 1.38

VAL 1.38

UK 1.38

UK 20

UK 2.5

UK 2.5

UK 3.2

UK 1.28

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