OPERATOR'S HANDBOOK

HARRISON

HORIZONTAL

MILLING MACHINES

STANDARD AND UNIVERSAL

PRICE £1.50

AND SPARE PARTS LIST

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AND SPARE PARTS LIST

HARRISON

HORIZONTAL MILLING MACHINES

STANDARD AND UNIVERSAL MODELS

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INSTRUCTIONS FOR ORDERING SPARES

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

which is stamped on the front of the knee bracket.

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 MACHINE NUMBER, which is stamped on the front of the knee bracket.
Attention has been drawn to a few points which may be of use to the purchaser of a HARRISON Milling Machine, the observance of which will ensure satisfactory service.
New developments and modifications resulting in improved performance may be incorporated from time to time on them and the right is reserved to modify the specification as may be required.

INSTALLATION

Slinging
An eyebolt is provided in the over-arm for slinging purposes.

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

Levelling
To ensure accurate production it is important that the machine be on a solid floor and correctly levelled. This should be checked with a sensitive spirit level, as follows :
Test longitudinally by placing a spirit level along the length of the table.
Test transversely by placing a spirit level across the table at each end. If correction is necessary, packing should be inserted under the low corner(s) of the base.
Being of rigid design and construction it is unnecessary to bolt the base to the floor. After levelling, the machine is ready for use.

If it is essential that the machine is bolted down on to concrete, pack the base level under the support points with foundation bolts in position. Run concrete under and around the base and allow it to solidify. The nuts should then be tightened on to spring washers sufficiently firmly to prevent them working loose and a final level check made.

Electrical Connections
The internal wiring is complete and connection of the supply wires to the isolator switch (line switch) on the right-hand side of the cabinet is all that is necessary.

LUBRICATION
Complete lubrication is essential before running a new machine and light running for a short period is recommended. Daily lubrication will reduce wear and ensure trouble-free running. All oil nipples are easily visible and an oil gun is provided. The column and table feed gearbox oil levels should be maintained at the height shown on the sight glasses.

RECOMMENDED LUBRICANTS

	MOBIL	SHELL	ESSO	POWER	REGENT TEXACO	CASTROL
Column Gearbox, Feed Gearbox and Vertical Milling Attachment	Vactra oil extra heavy	Vitrea oil 72	Esstic 65	B.P. Energol HP.60	Regal Oil G R. & O.	Alpha 617
Slideways, Oil Holes and Nipples	Vactra oil heavy	Vitrea oil 41	Esstic 65	B.P. Energol HP.30	URSA P.30	Magna XH
Motor Grease Cups and Vertical Milling Attachment Spindle Bearings	Mobilplex 48	Alvania grease 3	Beacon 3	Energrease LS.3	Regal Starfak Premium 3	Spheerol AP.3

AVAILABLE THROUGHOUT THE WORLD

SPECIFICATION AND LEADING DIMENSIONS

TABLE

Working surface	30″ × 8″ (760 mm. × 205 mm.)
Number of T slots	3
Width of T slots	½″ (12·7 mm.)
Pitch of T slots	1⅞″ (48 mm.)

TRAVERSE AND FEEDS

Longitudinal traverse (hand and automatic)	15″ (380 mm.)
Cross traverse (hand only)	6½″ (165 mm.)
Vertical traverse (hand only)	11″ (280 mm.)
Number of automatic longitudinal feeds	8
Range of automatic longitudinal feeds	·89″ – 12·6″ per min. (22·6 mm. – 320 mm.) (60 cycle machines ·71″ – 10″)
Automatic longitudinal fast traverse (forward and reverse)	280″ (7 m.) per min.

SPINDLE

Spindle nose	International Standard No. 30
Diameter of hole through spindle	⅜″ (15·8 mm.)
Number of spindle speeds	8
Range of spindle speeds (r.p.m.)	45 – 1,000 or 67 – 1,500

DRIVE

Motor	2 h.p.
Push-button starter (standard equipment)	

DIMENSIONS AND WEIGHT

Overall height	57″ (1,450 mm.)
Overall width	36½″ (930 mm.)
Overall depth	40¾″ (1,035 mm.)
Case dimensions	43″ × 45″ × 58″ (1,092 mm. × 1,143 mm. × 1,473 mm.)
Weight of case	1 cwt. (51 kilograms)
Approximate net weight	9¾ cwts. (495 kilograms)

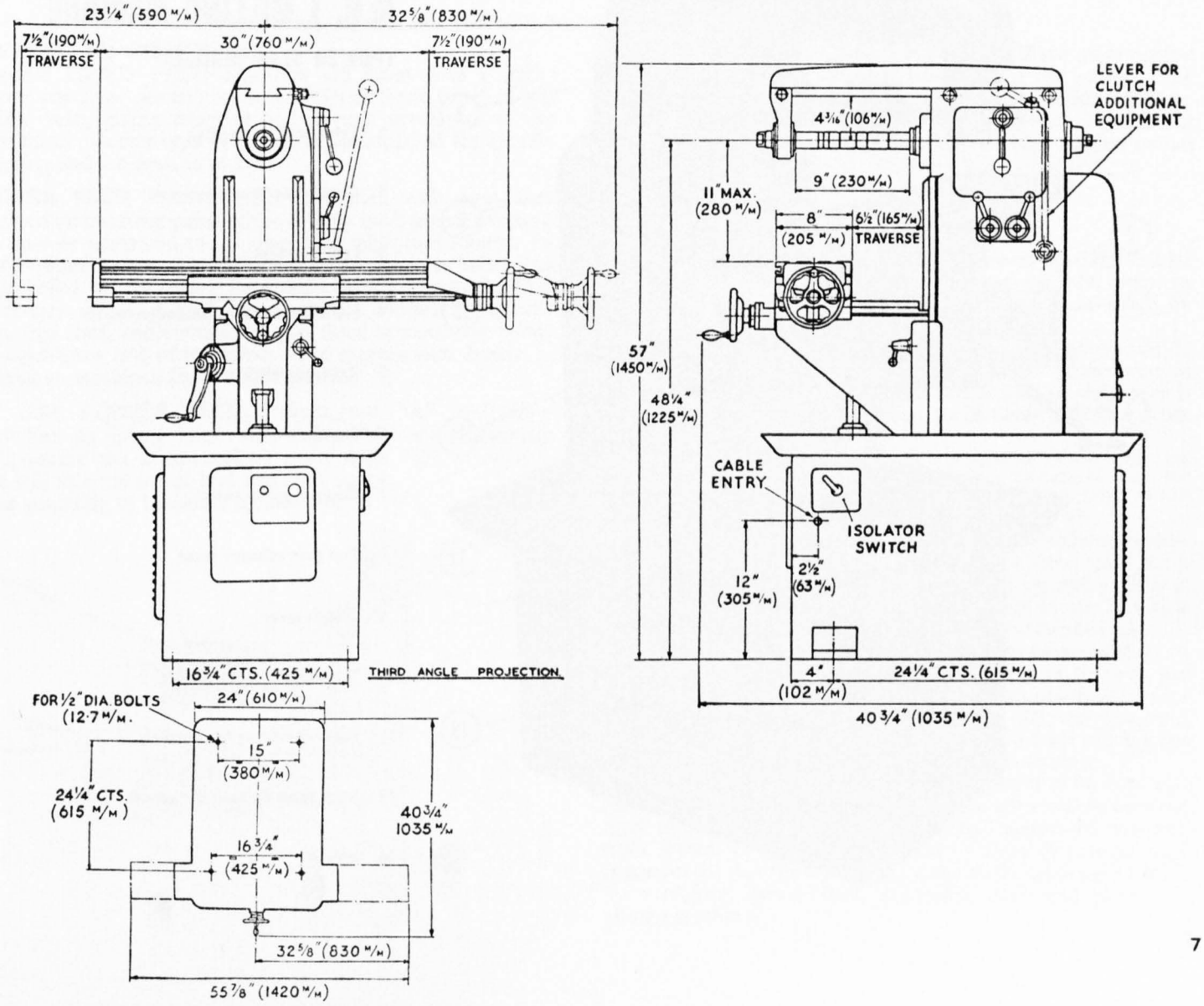
VERTICAL MILLING ATTACHMENT

Spindle Nose	International Standard No. 30
Spindle speeds on 45 – 1,000 r.p.m. machine	15 – 1,000 r.p.m. or 82 – 1,830 r.p.m.
Spindle speeds on 67 – 1,500 r.p.m. machine	67 – 1,500 r.p.m. or 123 – 2,750 r.p.m.
Swivels, either side of centre line	45°
Diameter of hole through spindle	17/32″ (13·5 mm.)

EXTRA EQUIPMENT AVAILABLE

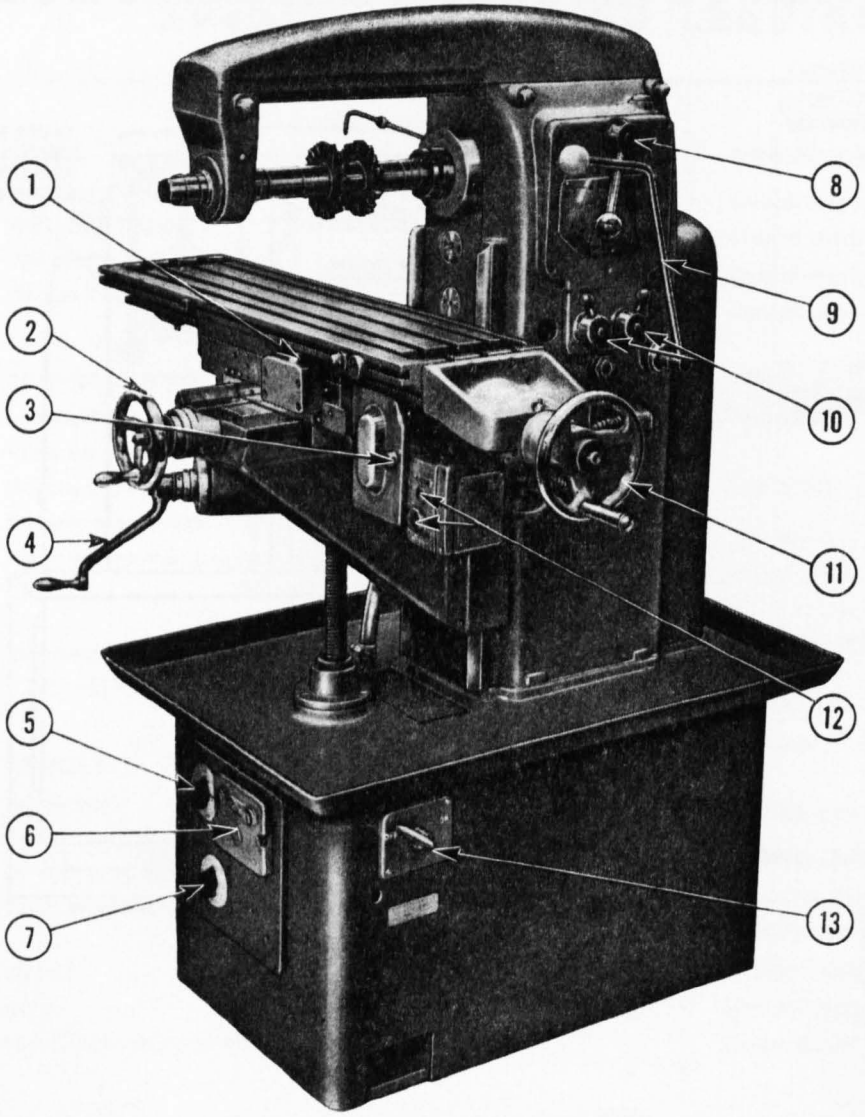
1″ or 1¼″ Cutter Arbors	Dividing Head
22 mm. or 27 mm. Cutter Arbors	Rotary Table
Multi-disc Friction Clutch	Slotting Attachment
Electric Coolant Pump and Fittings	Vertical Attachment
Low Voltage Lighting	Vices
Cutter Guard	

SPECIFICATION – STANDARD HORIZONTAL MODEL



CONTROLS ON MODEL M.H. I MILLING MACHINE

(POWER FEED MODEL)



1 Table feed trip switch

2 Cross slide handwheel

3 Feed gearbox

4 Hand lever for vertical adjustment

5 Reverse switch

6 Starter

7 Coolant pump switch

8 Top gear selector lever

9 Clutch lever

10 Twin gear selector levers

11 Table operating handwheel

12 Stop, start buttons for power feed

13 Isolator

CONTROLS

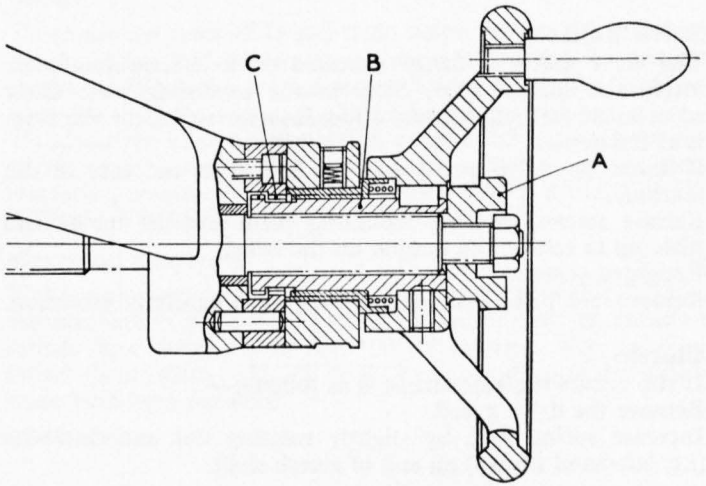
All control levers, handwheels and push-buttons are shown on the illustration on page 8.

ELECTRICAL CONTROLS

Standard HAND FEED machines are fitted with a push-button contactor starter, mounted on the front panel of the cabinet base, giving overload and no-volt protection to the drive motor. Rotary type switches can be included for spindle reversing and for coolant pump.

POWER FEED MACHINES are fitted with contactors mounted on the front panel of the cabinet base, giving overload and no-volt protection to the drive and table feed motors. As on the Standard model additional rotary type switches can be included on the panel for spindle or feed reversing and for coolant pump. A push-button station comprising spindle start, feed start, and common stop is fitted immediately below the right-hand end of the table. (The spindle start button is omitted on machines fitted with a clutch.)

TO USE POWER FEED. Release nut "A" and allow handwheel to spring back with sleeve "B", simultaneously manipulating the handwheel to assist dogs "C" to engage. This will lock the handwheel and table screw.
When reverting to handfeed tighten nut "A".



ON AUTOMATIC CYCLE MACHINES the main control panel is mounted on the right-hand side of the cabinet. The push-button stations are mounted in the same position as those for the power feed and comprise start, stop, inch forward and inch reverse. For "setting up" purposes a rotary selector switch is incorporated in the push-button station giving :—
Position 1. Spindle run only.
Position 2. Automatic cycle.
Position 3. Table traverse only.

SPINDLE Speed changes should only be made when the spindle is stationary. When a clutch is incorporated the lever is on the right-hand side of the column and engagement is made by rotating anti-clockwise.
The change gear levers are also mounted on the right-hand side of the column gearbox and by using the top selector lever in conjunction with the lower twin levers a total of eight speeds can be obtained. A direct reading speed chart assists in quick changing.
N.B. On machines fitted with a clutch it is essential to ensure that the clutch is fully engaged when running or fully disengaged when the spindle is stopped. Partial engagement allows the clutch plates to rub together generating excessive heat with subsequent damage.

SLIDES The vertical slide operated by a hand lever has a traverse of 11 in., and the cross slide operated by a handwheel has a traverse of 6½ in. Both slides have a micrometer dial graduated in divisions of ·001 in. or alternatively 0·02 mm. On the Standard model the longitudinal traverse is operated by handwheel.
The power feed has a range of eight feeds, from 0·80 in. to 12·6 in. (22·6mm. to 320mm.) per minute (0·71 in. to 10 in. per minute on 60 cycle models). Feed changes are obtained by pick off gears in a feed box which is adjacent to the control switch under the right-hand end of the table. An adjustable trip dog can be set to stop the table at any point along its traverse.
The automatic cycle provides a fast longitudinal forward and reverse traverse of 280 ins. per minute in conjunction with the eight power feeds. The cycle gives rapid approach, feed and rapid return. It is closely controlled by three adjustable dogs. It is essential that the fixed safety stops on the table are NEVER removed from power feed, automatic cycle and pendulum milling machines.

FITTING AND USE OF ATTACHMENTS – MAINTENANCE

A Vertical Milling Attachment will greatly extend the versatility of the machine. It is ideal where insufficient work is available to justify the provision of a vertical milling machine. The spindle nose dimensions are identical with those of the horizontal spindle. Cutters can be bolted to the spindle for rigidity or can be used on short arbors or collet chucks when milling keyways or slots. Angular milling can be carried out by swivelling the head to the required angle.
Before the head can be swivelled the taper pin, item 42 (refer to page 39), must be withdrawn by tightening the nut, item 44, until the pin is released from the tapered hole and can be removed. Release the tee bolt nuts, item 39, and swivel the head to the required angle, and lock in position with the tee bolt nuts. When the head is returned to the vertical position it is essential to locate by replacing the taper pin. Unscrew the nut, item 44, until it overhangs the thread on the pin thus protecting the thread, knock the pin into the hole until it is correctly seated on the taper, and finger tighten the nut. Finally tighten the tee bolt nuts.

The Slotting Attachment is readily adaptable for key seating and slotting work. The stroke length is variable up to $2\frac{3}{4}$" (70 mm.) and the tool slide which will accept tool shanks of $\frac{5}{8}$" dia. (15·8 mm.) can be set at any angle through 180° against a graduated scale. Before the slide can be swivelled the tapered locating pin must be removed using the same procedure as for the vertical attachment.
To fit the Vertical and Slotting Attachments: remove the spherical nut and seating from the end of the arbor. Release the locking nut on the over-arm bracket and remove the bracket by sliding off the arm and arbor. Release the draw-bolt at the rear of the main spindle and remove the arbor.
Slacken the nuts securing the over-arm and slide the arm back until the front is level with the front of the column, retighten the locking nuts.
Ensure the dogs in the main horizontal spindle, and the slots in the attachment are both in the horizontal position. Lift the attachment into position making sure the driving dogs engage the slots and the locating pin engages the hole.
When the attachment is in position, fix with the four cap head screws.

It is necessary when fitting a vertical attachment to simultaneously screw the horizontal draw-bolt into the arbor. (If the attachment is being fitted by one person, it is advisable to remove the cap from the rear of the machine body and withdraw the draw-bolt). Always release the draw-bolt before removing the attachment.

A Circular Table can be used for horizontal or vertical milling. When used in conjunction with the vertical milling attachment a number of unusual milling operations can be achieved without the use of expensive cutters.
The circular table is placed in the required position on the machine table and secured by tee-bolts in the tee-slots.

A Dividing Head will permit the milling of spur gears, bevel gears, clutches and splines. Like the circular table the dividing head is bolted in the required position on the machine table.

MAINTENANCE

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

Drive Belts:
The drive motor is flange mounted on to a mounting plate inside the cabinet base. Slots in the mounting plate allow adjustment for belt tension. Procedure for replacing vee belts is as follows:—
Remove the drive guard and the louvre at the rear of the machine.
Release screws securing mounting plate and lift motor and plate up to release the tension on the belts.
Retighten screws.
Remove old belts and replace with new; carefully retension.

Clutch:
If slip occurs the adjustment is as follows:—
Remove the drive guard.
Increase spring load by slightly rotating nut anti-clockwise (i.e. left-hand 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.
Release outer nut on operating linkage one complete turn and relock with inner nut. The clutch should be dismantled at six-monthly intervals and any lubricant on the driving faces removed by washing in paraffin.

Main Spindle Bearings

Adjustment for wear on the "Timken" taper roller bearings at the front of the main spindle, is as follows :—
Remove the top change gear lever from its shaft and remove cover plate.
Release nut on spindle by turning anti-clockwise (i.e. right-hand thread) and rotate adjusting nut clockwise sufficiently to obviate play, then retighten lock nut.
It must be emphasized that this operation requires the utmost care as over tightening can seriously impair the life of the bearings.
When replacing the cover plate make sure the gasket is not damaged and that the plate is screwed down tightly.

Slides

To adjust the cross slide and table strips, release the lock nuts on the strips and adjust the headless set screws by turning clockwise. When the correct setting has been achieved, to eliminate lift and give a smooth sliding fit, re-lock the lock nuts.
To adjust the knee bracket strips, release the caphead screws which secure the adjusting screws and rotate the latter anti-clockwise, re-clamp the caphead screws. CARE SHOULD BE TAKEN TO AVOID OVER ADJUSTMENT.

Electrical Controls

If it is necessary to remove any of the electrical controls from the machine 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.

MILLING MACHINE PRACTICE

Cutting Speeds

Fixed rates for cutting speeds when milling cannot be exactly stated owing to the variations in conditions which are encountered. The effective speed must be selected to give the best compromise between maximum production and maximum life of the cutter. The speeds given below are suitable for the HARRISON miller under optimum conditions of stability, accuracy of arbor and cutters and the ability of the arbor to maintain stability under cut.

The operator should see that the arbor is running truly concentric to ensure the even loading of all the cutter teeth in operation. It is much more harmful for cutter teeth to rub on the work than to cut a reasonable depth of metal, and while it is necessary not to overload the teeth, it is definitely necessary to see that each tooth is cutting.

To find the number of revolutions required for a given cutting speed in feet per minute, the following formula can be used :—
Multiply the given speed "C" by 12 and divide the product by the circumference in inches :

$$N = \frac{C \times 12}{3{\cdot}14 \times D}$$ where N = r.p.m. and D = cutter dia. in inches.

Cutting Speeds of Milling Cutters

(Feet per min.)

Material	*High Speed Steel*	*Stellite*	*Cemented Carbide*
Cast iron	60	100	200
Malleable iron	65	80	200
Mild steel	60	80	200
Annealed tool steel	45	60	150
Brass	120	250	400
Bronze	120	250	400
Aluminium	600	1,000	2,000

Feed Rate

The rate at which the work passes the cutter determines the production, but the selection of the feed rate involves many variables such as cutter material, work material, depth and breadth of cut, finish required, limitations of the machine, or fragile work.

The permissible feed per tooth for milling cutters of high speed steel is :—

Cast Iron 0·018, Malleable iron 0·012, Mild steel 0·016. Annealed tool steel 0·010, Steel castings 0·015, Brass 0·020, Bronze 0·017, Aluminium 0·020 (inches). From these figures, multiplied by the number of teeth cutting per minute, the feed rate can be estimated.

Cemented Carbide and Stellite Cutters

For cutters of these materials the recommended feed per tooth is :—

Material	*Feed Per Tooth* *Cemented Carbide*	*Stellite*
Cast iron	0·005 – 0·015	0·005 – 0·020
Steel, high tensile	0·004 – 0·008	0·005 – 0·010
Mild steel	0·005 – 0·015	0·006 – 0·015

Safety Precautions

To comply with factory regulations, all milling machines must carry a guard which should enclose as much of the revolving cutter as possible. (*Factory Act Bulletin.*) It is the duty of the operator to see that the guard is always in position on the machine and adjust to suit the cutter and operation.

Accidents on milling machines are usually caused by one of the following :—

(a) Attempts to remove swarf using a spanner, steel rule, or similar implement near the cutter in motion.

(b) Adjusting pipes for coolants in the vicinity of a moving cutter.

(c) The use of rags for cleaning parts of a machine near cutters, and on occasions the trapping of swarf brushes or loose clothing.

(d) The removal of work from a vice or fixture which has not been withdrawn to a safe distance from cutters.

(e) Guard not adequate to prevent cuttings from flying and causing eye injuries, particularly when milling light metals at high speed.

(f) Attempting to measure the workpiece with the cutter running and with the feed motion in operation.

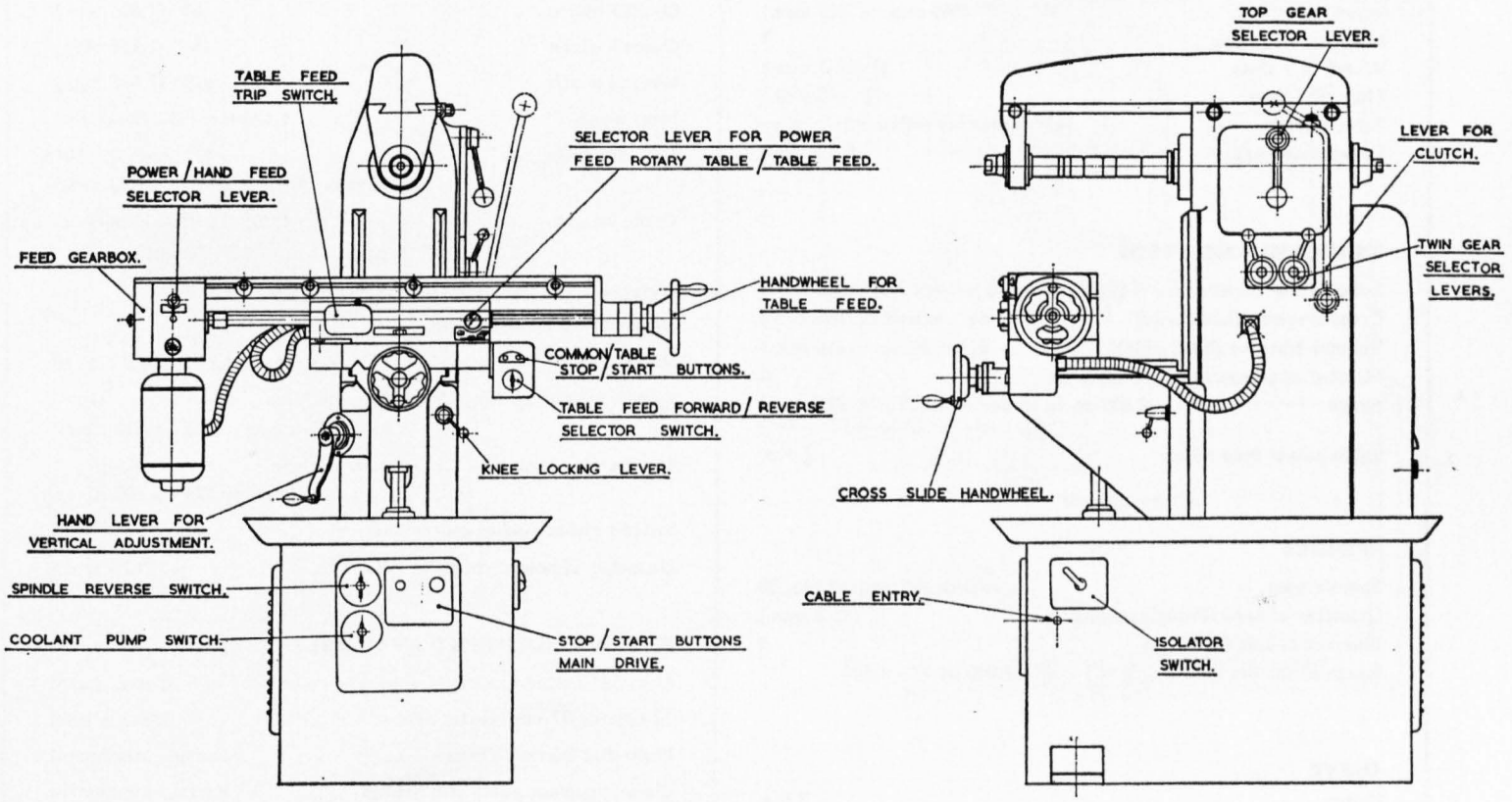
(g) Failure to see that all clamps are tight before commencing cutting.

The cutter used for vertical milling is not as convenient to guard as a cutter mounted horizontally, nevertheless as one-fifth of all reportable milling machine cutter accidents occur on vertical machines, or vertical attachments. Consideration should be given to fitting a guard. In general, peripheral guards enclosing the cutter can be fitted without undue difficulty if proper allowance is made for the removal of swarf and the application of coolants.

The modern milling machine is not dangerous in itself, all mechanism being adequately enclosed and protected, and observance of the recommendations (a) to (g) will ensure safety of operation.

A book *Milling Machine Practice* by H. C. Town, M.I.MECH.E., M.I.P.E., F.R.S.A., is available. Price 6/6d.

CONTROLS – UNIVERSAL MODEL



SPECIFICATION AND LEADING DIMENSIONS

TABLE

Working surface	30″ × 8″ (760 mm. × 205 mm.)
Number of T slots	3
Width of T slots	½″ (12·7 mm.)
Pitch of T slots	1⅞″ (48 mm.)
Table swivel	45° maximum either side of zero
Swivel markings	1° divisions

TRAVERSE AND FEEDS

Longitudinal traverse at any angle (hand and power)	15¼″ (387 mm.)
Cross traverse (hand only)	6½″ maximum (165 mm.)
Vertical traverse (hand only)	8½″ maximum (216 mm.)
Number of power longitudinal feeds	8
Range	0·89″ to 12·6″ per min. (22·6 to 320 mm.) (60 cycle machines 0·71″ – 10″)
Table power feed motor	⅛ h.p.

SPINDLE

Spindle nose	International Standard No. 30
Diameter of hole through spindle	⅝″ (15·8 mm.)
Number of spindle speeds	8
Range of spindle speeds (r.p.m.)	45 – 1,000 or 67 – 1,500

DRIVE

Motor	2 h.p
Push-button starter (standard equipment)	

DIMENSIONS AND WEIGHTS

Overall height	60″ (1,524 mm.)
Overall width	45½″ (1,156 mm.)
Overall depth	40¾″ (1,035 mm.)
Nett weight	1,176 lbs. (530 kilograms)
Case dimensions	43″ × 45″ × 58″ (1,092 mm. × 1,143 mm. × 1,473 mm.)
Gross weight	1,288 lbs. (580 kilograms)

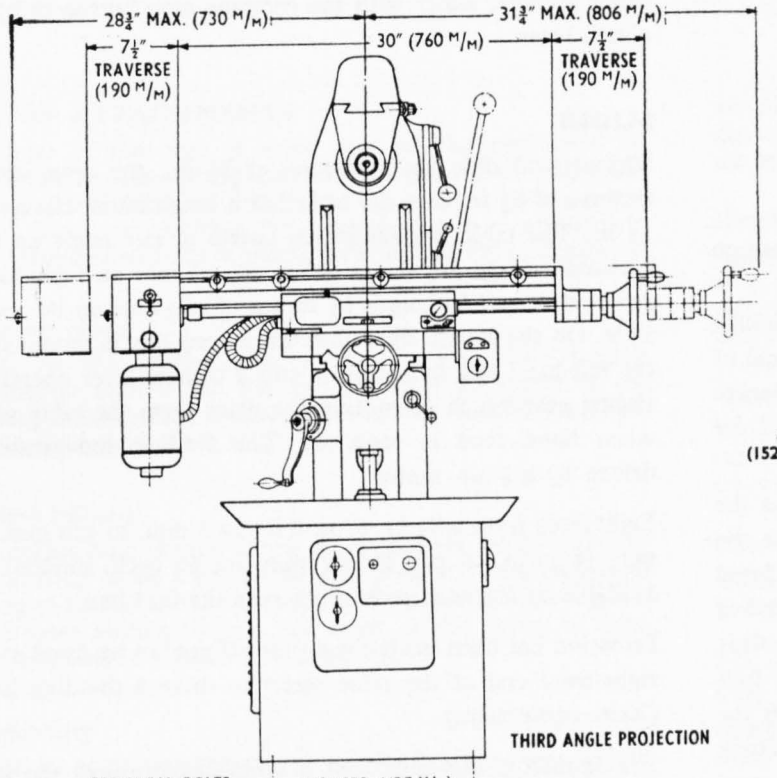
VERTICAL MILLING ATTACHMENT (Additional Equipment)

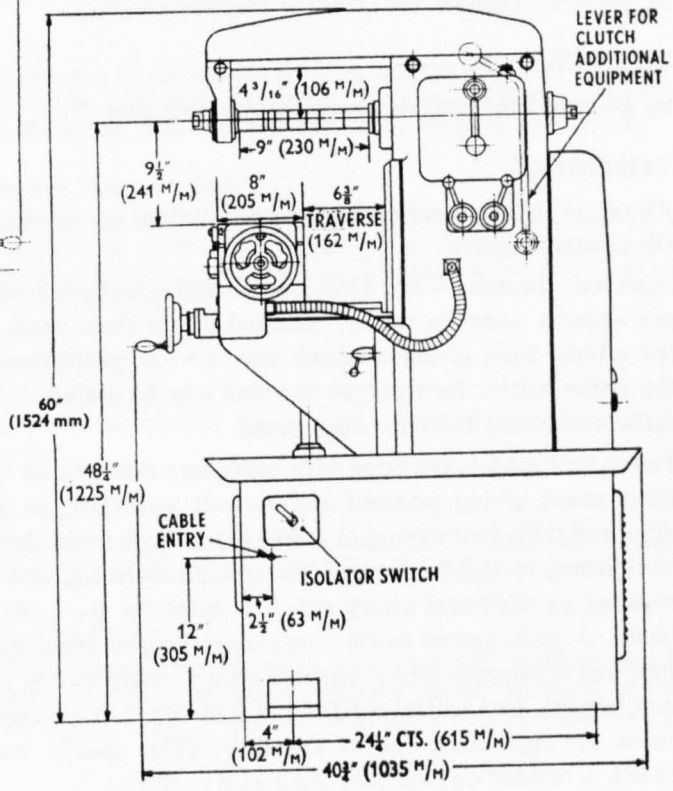
Spindle nose	International Standard No. 30
Spindle speeds on 45 – 1,000 r.p.m. machine	45 – 1,000 r.p.m. or 82 – 1,830 r.p.m.
Spindle speeds on 67 – 1,500 r.p.m. machine	67 – 1,500 r.p.m. or 123 – 2,750 r.p.m.
Swivels either side of centre line	90°
Diameter of hole through spindle	17/32″ (13·5 mm.)

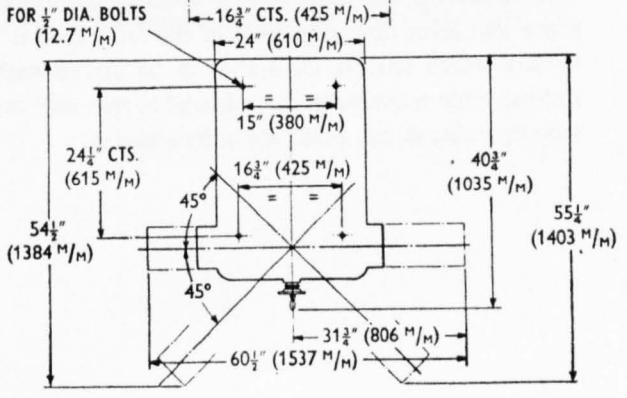
EXTRA EQUIPMENT AVAILABLE

1″ or 1¼″ cutter arbors	Cutter guard
22 mm. or 27 mm. cutter arbors	Dividing head
Multi-disc friction clutch	Slotting attachment
Electric coolant pump and fittings	Vertical attachment
Low voltage lighting	Vices

SPECIFICATION - UNIVERSAL MODEL







UNIVERSAL MILLING MACHINE

INSTALLATION

As given in handbook for Standard Machine (page 5).

LUBRICATION

As given in handbook for Standard Machine (page 5).

CONTROLS

All control levers, handwheels and push-buttons are shown on the illustration. (1)

Electrical Controls :—The hand feed machines are fitted with a push-button contactor starter, mounted on the front panel of the cabinet base, giving overload and no-volt protection to the drive motor. Rotary type switches can be included for spindle reversing and for coolant pump.

Power feed models are fitted with contactors mounted on the front panel, giving overload and no-volt protection to the drive and table feed motors. A rotary type switch is also fitted as standard to the front panel for spindle reversing, and if required an additional rotary switch is fitted for the coolant pump. A push-button station comprising spindle start, feed start and a common stop ; together with a rotary switch for feed forward, feed reverse and feed off is mounted immediately below the right-hand end of the table. (The spindle start button is omitted on machines fitted with a clutch.)

The table feed can be stopped, leaving the cutter spindle revolving but the table feed is automatically stopped with the cutter spindle, either with the common stop button or by the clutch lever.

SLIDES

The vertical slide has a traverse of 8½ in., the cross slide a traverse of 6½ in. and the table has a longitudinal traverse of 15 in. The table is arranged to swivel to any angle up to a maximum of 45 degrees at either side of zero on a graduated swivel slide and locking is by means of two nuts on the swivel slide. On the Power Feed machine a feed box is mounted on the left-hand end of the table and a control lever operates a sliding gear which disengages the drive from the table screw when hand feed is required. The feed is independently driven by a ⅛ h.p. motor.

Eight feeds from 0·89 in. to 12·6 in. 22·6 mm. to 320 mm. per min. (1·07 in. to 15·1 in. per min. on 60 cycle models) are available by means of pick off gears in the feed box.

Provision has been made for a pick off gear to be fitted at the right-hand end of the table screw to drive a dividing head. (Extra equipment.)

For spiralling, the table feed is controlled through the lead-screw but lever disengagement of the table feed is an integral feature which enables auxiliaries to be driven without longitudinal table movement. An adjustable trip dog can be set to stop the table at any point along its traverse.

USE OF ATTACHMENTS

USE OF ATTACHMENTS

Examples of the type of work that can be performed on HARRISON plain milling machines are given in the handbook *Milling Machine Practice*, but by the use of various attachments on the Universal machine, these examples can be extended to more complicated work of which the following are examples :—

Dividing Head

By the use of a dividing head, not only can simple and angular indexing be carried out, but by connecting up a gear on the dividing head spindle to one on the worm shaft of the head, differential indexing can be performed.

Helical Milling

By incorporating change wheels connecting the table screw and the dividing head, a power drive is obtained enabling helical milling to be performed. This allows the cutting of spiral gears, spiral tooth milling cutters, end mills, or the fluting of twist drills and similar tools to be carried out.

Graduating

By the use of gearing connecting the dividing head spindle and the table screw, very accurate graduating of flat scales or verniers can be done using a fly cutter. Alternatively, a circular dial can be graduated by the use of a slotting attachment with the workpiece held and indexed in the dividing head chuck.

Slotting Attachment

Although mentioned above, the main purpose of the attachment is to perform work with a single-point cutting tool as in the cutting of keyways, grooves, and for opening out the bores of dies or boring bars.

Cam Milling

Using a vertical head and a power drive to the dividing head, cams with a constant rise can be machined to any required contour.

Bevel Gears

Using a dividing head and a combined angular and offset movement, bevel gears can be cut using a formed gear cutter.

Circular Milling

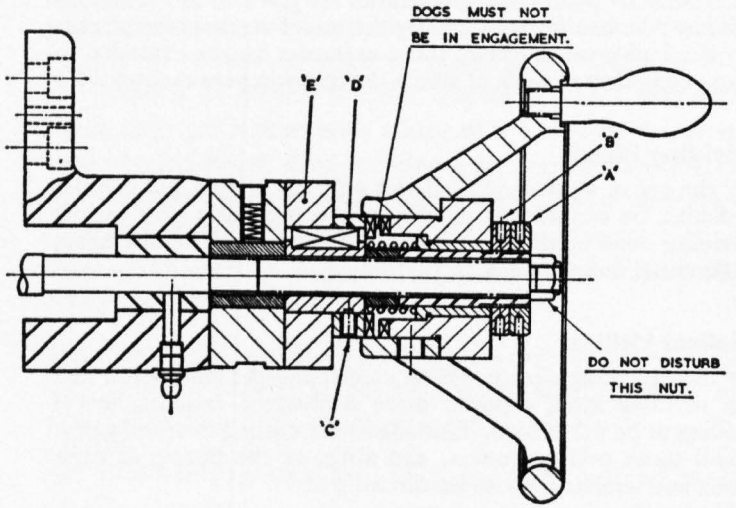
Using a rotary table by means of an end mill in the machine spindle nose, circular faces or grooves can be machined, or by using a vertical head, circular tee-slots or ring-sections can be cut.

FITTING OF POWER DRIVEN UNIVERSAL DIVIDING HEAD

To fit a power driven dividing head, it is necessary to replace collar 'E' with the pick off gear. As shown on the illustration (2).

This necessitates the following :

1. Remove locknuts 'A' and 'B' and remove handwheel assembly.
2. Release grub screw 'C' and remove dog clutch 'D'.
3. Remove collar 'E' and replace with pick off gear. (Supplied with the dividing head.)
4. Replace dog clutch 'D' and secure with grub screw 'C'.
5. Replace handwheel assembly ensuring the dogs are not in engagement and position with locknuts.
6. Fit the dividing head on to the machine table ensuring the gear train lines up with pick off gear.



NOTE.—The pick off gear is one of the gears supplied with the attachment and the appropriate gear is determined by the required reduction in the end train. (This information is obtained from the chart supplied with the dividing head.)

HARRISON MILLING MACHINE

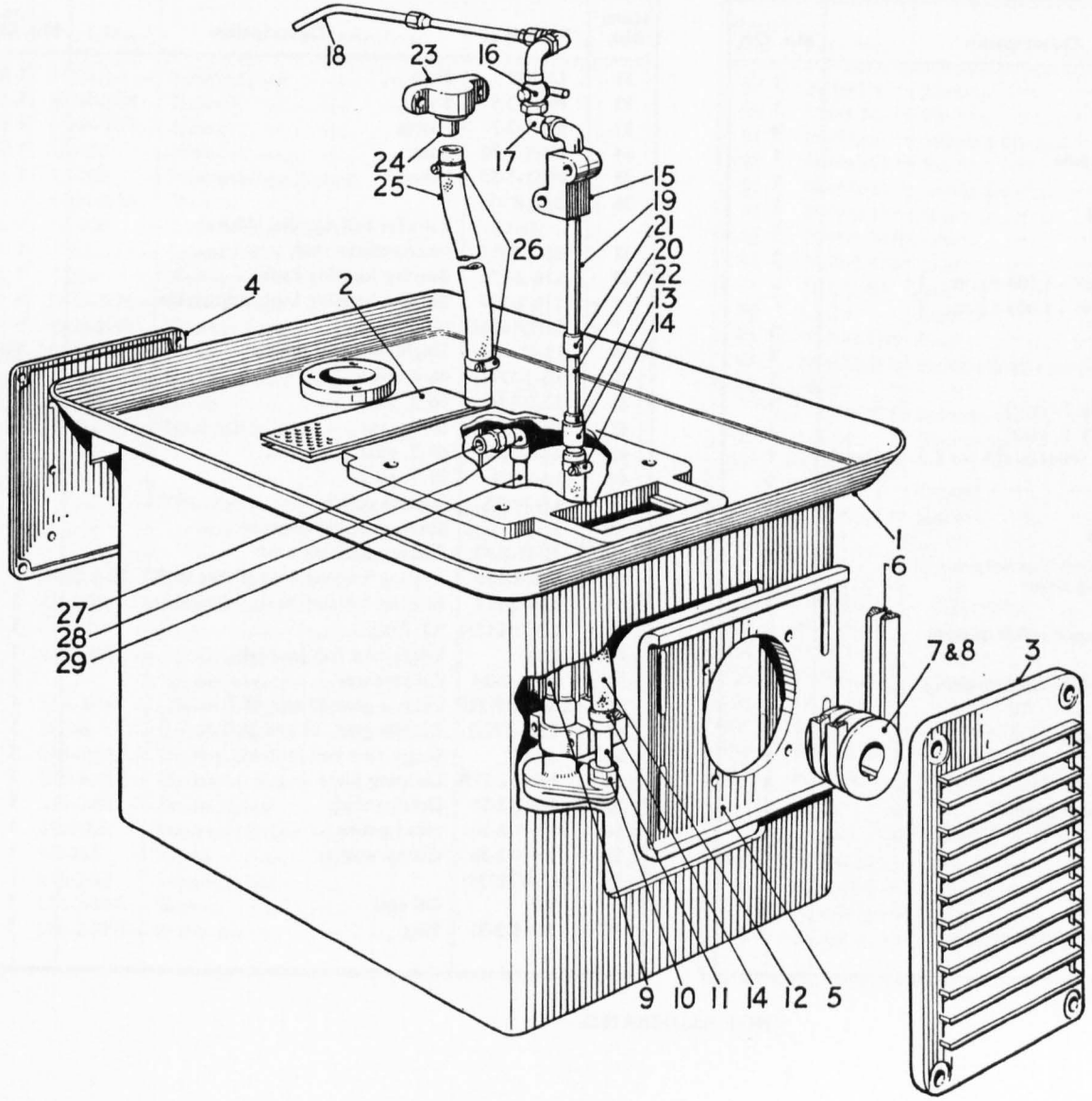
BASE, MOTOR DRIVE AND COOLANT PUMP ASSEMBLIES

Item No.	Part No.	Description	No. Off
1	MH1-1-1	Cabinet base (MH1-1-1A Cast Iron Base)	1
2	MH1-1-1A	Filter plate (MH1-1-12 for C.I. Base) ...	1 for C.I. 2
3	L16-1-32	Louvre	2
4	MH1-1-8	Control panel	1
5	MH1-1-2A	Mounting plate for motor...	1
6	A-76	Vee belts (A-78 for C.I. Base)	2
		For 1500 r.p.m. Top Speed	
7	MH1-1-4A L16-1-14A	Motor pulley (50 cycles supply) Motor pulley (60 cycles supply) ...	1
		For 1,000 r.p.m. Top Speed	
8	MH1-1-5A L16-1-29A	Motor pulley (50 cycles supply) Motor pulley (60 cycles supply) ...	1
*	BS.66A	"Brook" protected cage type motor, machine tool rated. 2 h.p. flange mounted (for 1,500 r.p.m. top speed)†	1
*	BS.66B	"Brook" protected cage type motor, continuous maximum rated. 2 h.p. flange mounted (for 1,000 r.p.m. top speed)†	1
		†When ordering please state voltage, phase and frequency.	

Item No.	Part No.	Description	No. Off
		COOLANT PUMP ASSEMBLY	
9		Electro-suds pump (clamp fixing) ...	1
10	L21-19-7	$\frac{1}{2}$" – $\frac{3}{8}$" B.S.P. reducing bush	1
11	L16-11-13	Connecting pipe, bottom	1
12		Rubber hose $\frac{3}{8}$" bore × 11" long ...	1
13	MH1-8-4	Connecting pipe, top	1
14	No. 0	"Jubilee" pipe clip	2
15	MH1-8-3	Support bracket	1
16	LP.204	Tap with universal swivel	1
17	LP.185	Universal swivel	1
18	LP.186B	Telescopic nozzle	1
19	MH1-8-6	Coolant pipe (long)	1
20	MH1-8-7	Coolant pipe (short)	1
21		$\frac{1}{4}$" B.S.P. union	1
22	MH1-8-8	$\frac{3}{8}$" – $\frac{1}{4}$" B.S.P. reducing bush	1
23	MH1-8-1	Connector, coolant return	1
24	L17-9-4	Connecting pipe, return	2
25	H.81	"Griflex" unreinforced P.V.C. hose $\frac{3}{4}$" b. × 1" o.d. × 3 ′ 0" l.	1
26	No. 0	"Jubilee" pipe clip	2
27	L16-13-90	$\frac{3}{8}$" B.S.P. hexagonal nipple (Early Models)	1
28	L16-13-88	$\frac{3}{8}$" B.S.P. elbow (Early Models)	1
29	L5-16-58	Return pipe	1

* NOT ILLUSTRATED

BASE, MOTOR DRIVE AND COOLANT PUMP ASSEMBLIES



MILLING MACHINE BODY ASSEMBLY

Item No.	Part No.	Description	No. Off
1	MH1-2-1A	Body	1
*	MH1-2-50	Gasket	1
*	MH1-2-67	Washer	4
2	IC-4612	Oil level window	1
3	L5-2-123	Reducer	1
4	¾" B.S.P.	Pressure plug	1
5	L16-3-12	Filler plug	1
*	MH1-2-31	Plug	1
6	247	Speed plate 67 – 1,500 r.p.m. ...	1
	313	Speed plate 45 – 1,000 r.p.m.	
7	MH1-2-3	Cover plate	1
8	MH1-2-37	Gasket	1
9	MH1-2-39	Oil trap	1
10	MH1-2-40	Feed pipe (56 T. gear)	1
11	MH1-2-41	Feed pipe (71 T. gear)	1
12	MH1-2-6B	Drive guard (MH1-2-49A for C.I. Cabinet)	1
13	MH1-2-25	Stud	1
14	MH1-2-26	Nut	1
15	MH1-2-60	Main spindle	1
16	MH1-2-30	Key	2
17	MH1-2-27A	Front bearing cover	1
*	L5-2-158	Gasket	1
18	355-354B	"Timken" taper roller bearing	1
19	L5-233	Spacer	1
20	355-354A	"Timken" taper roller bearing	1
21	L5-2-39	Lock nut	2
22	L5-2-195A/G	Main spindle gear	1
23	SB3	Steel ball ¼" dia.	1
24	SG-292	Spring	1
25	LJ-1¼"	Single row ball journal	1
26	L5-203	Sealing ring	1
27	MH1-2-10	Spacer	1
28	L5-652	Lock nut	1
29	MH1-2-29	Rear cover	1
30	L5-210B	Selector lever, main spindle	1

Item No.	Part No.	Description	No. Off
31	L5-220	Shoe	1
32	MH1-2-8	Shaft	1
33	MH1-2-7	Sleeve	1
34	MH1-2-32	Boss	1
35	MH1-2-33	Lever...	1
36	BB2(⅜"-16 UNC)	Bakelite ball 1½" dia. White)	1
37	L6-2-131G	Intermediate shaft	1
38	L16-2-176	Bearing locating bush	1
*	L16-2-177	Bearing locating bush, adjustable... ...	1
*	131D1615M	'O' Ring	1
39	LJ-¾"	Single row ball journal	1
40	L5-2-177G	46 T. gear	1
41	L5-2-12G	56 T. gear	1
42	L5-2-176G	56 T. gear	1
43	L5-2-10G	65 T. gear	1
44	L5-2-9G	71 T. gear	1
45	L6-2-10A	Spacing collar	1
46	LJ-¾"	Single row ball journal	1
47	MH1-2-42	Bearing locating bush	1
48	L16-2-176	Bearing locating bush (Drive shaft) ...	1
*	L16-2-177	Bearing locating bush, adjustable... ...	1
*	131D1615M	'O' Ring	1
49	LJ-¾"	Single row ball journal	1
50	MH1-2-24	Oil thrower	1
51	L5-2-219/220	Double gear 35 and 45 T.	1
52	L5-2-173G	Double gear, 20 and 26 T....	1
53	LJ-1⅛"	Single row ball journal	1
54	MH1-2-11A	Locating plate	1
55	MH1-2-51	Driving shaft	1
56	MH1-2-56	Head pulley	1
57	MH1-2-36	Clamp washer	1
58	W.18711237/R4	Oil seal	1
59	MH1-2-31	Plug	1

* NOT ILLUSTRATED

MILLING MACHINE BODY ASSEMBLY

Item No.	Part No.	Description	No. Off
60	MH1-2-2	Selector plate	1
61	MH1-2-38	Gasket	1
62	MH1-2-13	Sleeve	2
63	L5-221	Shoe	1
64	L5-205	Interlocking quadrant	1
65	MH1-2-14	Shoe	1
66	L5-206	Interlocking quadrant	1
67	MH1-2-17	Selector stud	2
68	4-009	Nu-Lip ring	2
69	MH1-2-16	Selector boss	2
70	MH1-2-43	Selector lever	2
70A	BB4 ($\frac{5}{16}$"-18UNC)	Bakelite ball $\frac{3}{4}$" dia. (white)	2
71	SG-293	Spring	2
71A	SB-3	Steel ball $\frac{1}{4}$" dia.	2
		The following components are for machines fitted with a clutch	
72	MH1-2-52	Driving shaft	1
73	L6-2-29	Head pulley	1
74	LJ-1$\frac{3}{8}$"	Single row ball journal	1
75	L6-2-126	Clutch plate, inner	1
76		1$\frac{3}{8}$" dia. external circlip	1
77	L16-2-110	Clutch plate, centre	1
78	DC-8	Clutch disc	2
79	L16-2-182	Driving pin	6
80	L16-2-21A	Operating sleeve	1
81	L16-2-82	Braking plate	1
82	5100/237	External retainer	1
83	SG-216	Spring	1
84	L16-2-22	Adjusting nut	1
85	L16-2-43A	Shoe	1
86	L16-2-77A	Brake disc	1

Item No.	Part No.	Description	No. Off
87	MH1-2-4	Fork	1
88	L16-2-76	Pin	2
89	MH1-2-5	Support bracket	1
90	MH1-2-23	Pin	1
91	MH1-2-21	Swivel pin	1
92	MH1-2-22	Nut	1
93	MH1-2-20A	Link	1
94	MH1-2-19B	Stud	1
*	MH1-2-66	Bearing	1
95	L5-2-6	Bush	1
96	MH1-2-18A	Boss	1
97	MH1-2-44A	Lever, clutch operating	1
98	BB2- ($\frac{3}{8}$"-16 UNC)	Bakelite ball 1$\frac{1}{2}$" dia. (red)	1
99	L5-2-4	Stop piece	1
100	W.18713731/R4	Oil seal	1
101	MH1-2-65	Spacer	1
		Over-arm and bracket assembly	
102	MH1-5-19	Over-arm	1
103	MH1-5-3A	Clamp stud	2
104	MH1-5-20	Spacer	2
105	MH1-5-2A	Over arm bracket	1
106	MH1-5-4	Clamp stud	1
107	W.F.29	Felt washer	2
108	MH1-5-23	Bearing locating plate	2
109	MH1-5-25	Needle roller bearing	1
		1" ARBOR ASSEMBLY	
110	MH1-5-26	1" dia. arbor	1
111	MH1-5-71	Bearing collar	1
112	MH1-5-28	Spherical nut	1
113	MH1-5-29	Spherical seating	1

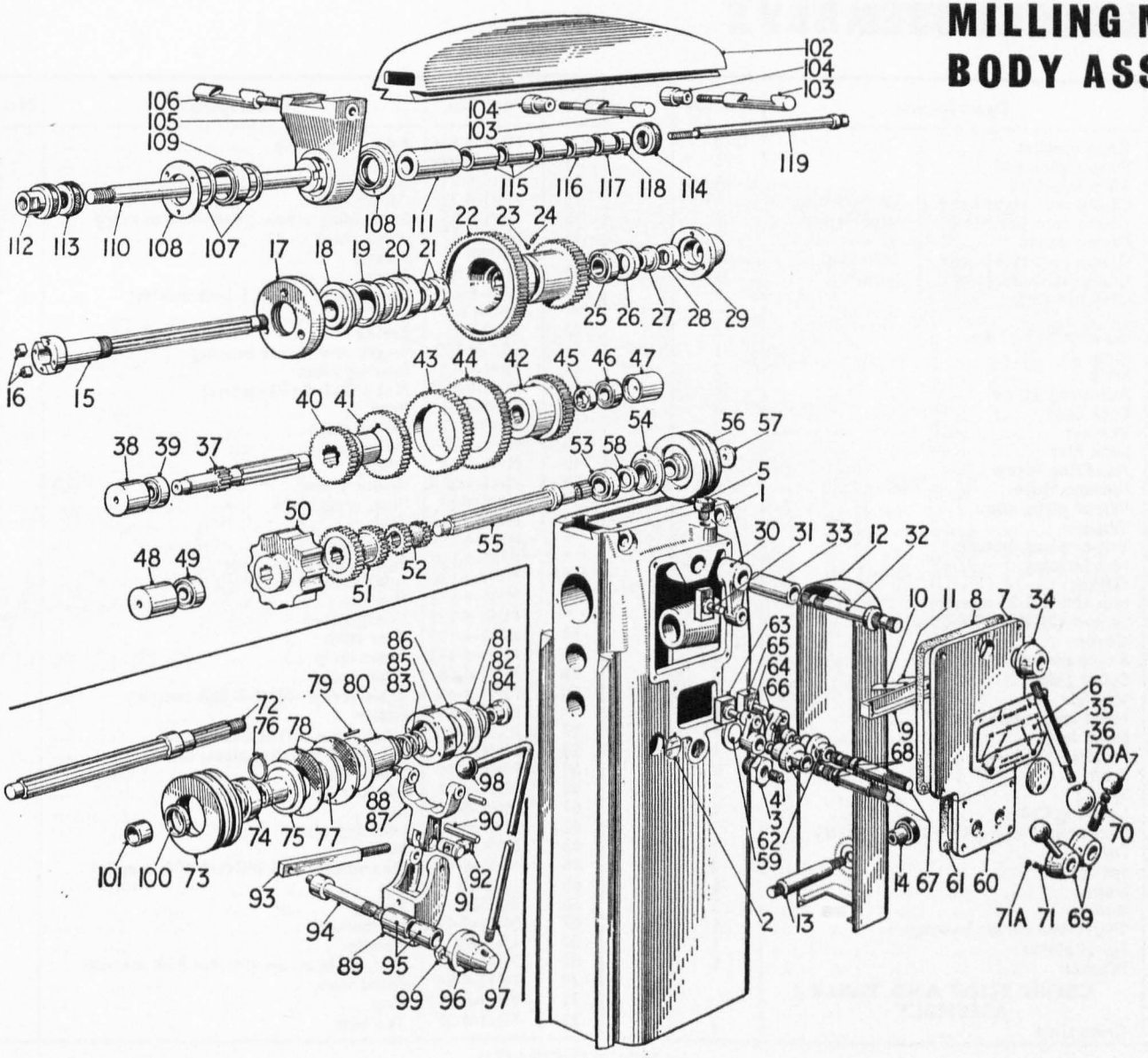
MILLING MACHINE BODY ASSEMBLY

Item No.	Part No.	Description	No. Off
114	MH1-5-30	Back collar	1
115	MH1-5-31	2″ spacing collar	3
116	MH1-5-32	1½″ Spacing collar	1
117	MH1-5-33	1″ Spacing collar	1
118	MH1-5-34	½″ Spacing collar	1
		1¼″ ARBOR ASSEMBLY	
110	MH1-5-35	1¼″ dia. arbor	1
111	MH1-5-72	Bearing collar	1
112	MH1-5-37	Spherical nut	1
113	MH1-5-38	Spherical seating	1
114	MH1-5-39	Back collar	1
115	MH1-5-40	2″ Spacing collar...	3
116	MH1-5-41	1½″ Spacing collar	1
117	MH1-5-42	1″ Spacing collar	1
118	MH1-5-43	½″ Spacing collar	1
		22 mm. Dia. ARBOR ASSEMBLY	
110	MH1-5-44	22 mm. arbor	1
111	MH1-5-45	Bearing collar	1
112	MH1-5-46	Spherical nut	1
113	MH1-5-47	Spherical seating	1
114	MH1-5-48	Back collar	1

Item No.	Part No.	Description	No. Off
115	MH1-5-49	60 mm. Spacing collar	3
116	MH1-5-50	30 mm. Spacing collar	1
117	MH1-5-51	20 mm. Spacing collar	1
118	MH1-5-52	10 mm. Spacing collar	1
*	MH1-5-53	6 mm. Spacing collar	1
		27 mm. Dia. ARBOR ASSEMBLY	
110	MH1-5-54	27 mm. dia. arbor	1
111	MH1-5-55	Bearing collar	1
112	MH1-5-56	Spherical nut	1
113	MH1-5-57	Spherical seating	1
114	MH1-5-58	Back collar	1
115	MH1-5-59	60 mm. Spacing collar	3
116	MH1-5-60	30 mm. Spacing collar	1
117	MH1-5-61	20 mm. Spacing collar	1
118	MH1-5-62	10 mm. Spacing collar	1
*	MH1-5-63	6 mm. Spacing collar	1
119	MH1-5-12	Draw bolt (MH1-5-12B metric) ...	1

* NOT ILLUSTRATED

MILLING MACHINE
BODY ASSEMBLY



KNEE BRACKET ASSEMBLY

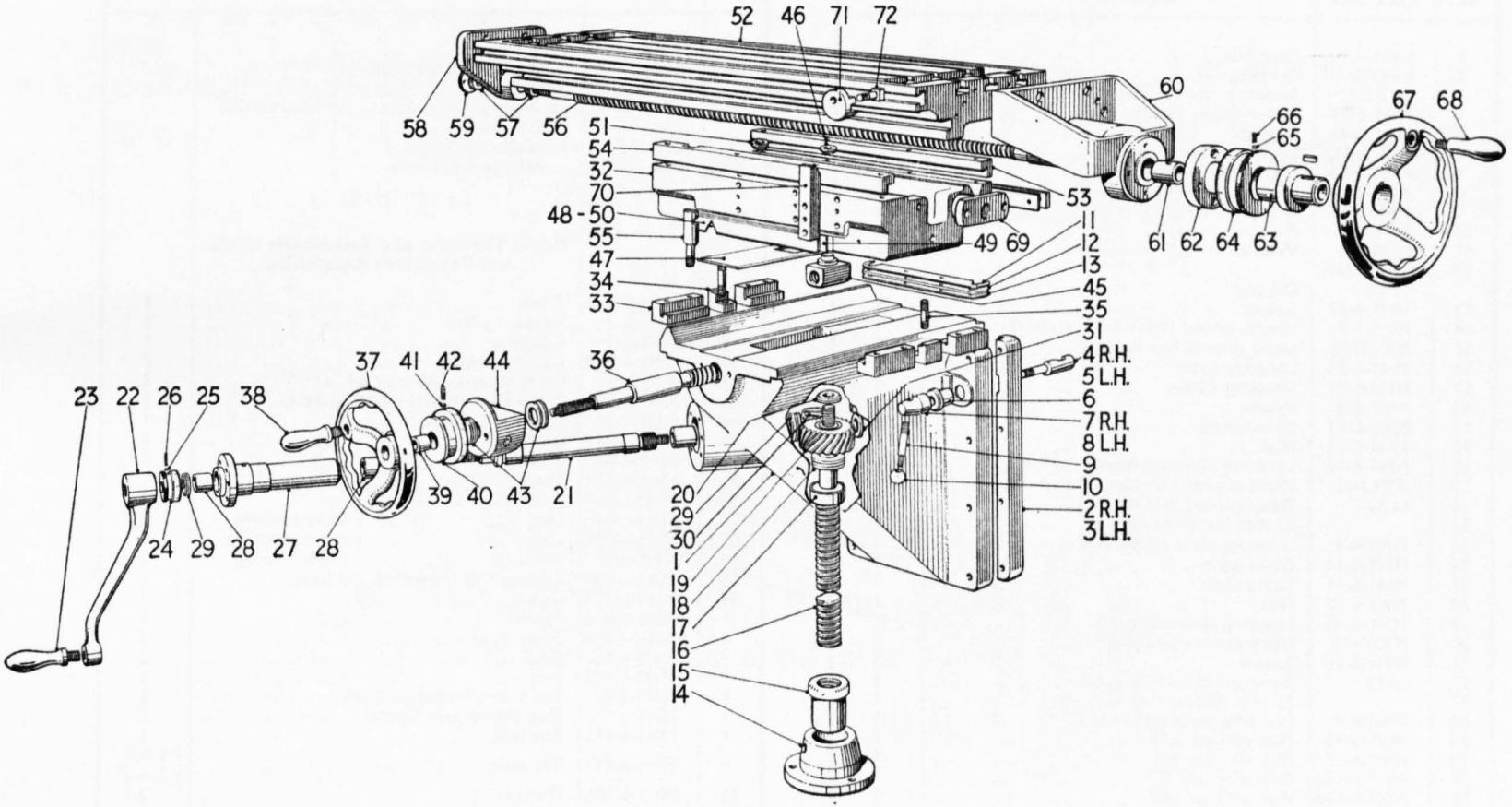
Item No.	Part No.	Description	No. Off
1	MH1-3-1A	Knee bracket ...	1
2	MH1-3-2	Strip right-hand ...	1
3	MH1-3-2A	Strip left-hand ...	1
4	MH1-3-3	Clamp stud right-hand	1
5	MH1-3-3A	Clamp stud left-hand	1
6	MH1-3-4	Clamp sleeve ...	2
7	MH1-3-5	Clamp boss right-hand	1
8	MH1-3-5A	Clamp boss left-hand	1
9	MH1-3-6	Clamp lever ...	2
10	BB4 ($\frac{5}{16}$"-18UNC)	Bakelite ball $\frac{3}{4}$" dia.	2
*	MH1-3-33	Strip	2
*	MH1-3-34	Strip	2
*	MH1-3-35	Adjusting Screw	2
*	MH1-3-37	Lock Stud	2
*	MH1-3-38	Washer	2
*	MH1-3-39	Lock Nut	2
*	MH1-3-36	Adjusting Screw	6
*	L5-5-94	Locking Piece	6
11	MH1-3-17	Wiper plate, top	1
12	MH1-3-19	Wiper	1
13	MH1-3-18	Wiper plate, bottom	1
14	MH1-3-12	Nut housing...	1
*	MH1-3-22	Gasket	1
15	MH1-3-11	Nut (MH1-3-21 metric)	1
16	MH1-3-10	Screws (MH1-3-20 metric)	1
17	L16-6-3	Cover	1
18	SKF-51104	Single row thrust bearing	2
19	MH1-3-7	Spiral gear	1
20	L5-13-18	Washer	1
21	MH1-3-28	Hand lever shaft	1
22	MH1-3-29A	Hand lever	1
23	L17-5-42	Handle	1
*	MH1-3-30	Stud	1
*	SG.289	Spring	1
*	MH1-3-26	Locating Collar	1
24	MH1-3-32	Micrometer dial (MH1-3-32B Metric) ...	1
25	L5-5-15	Die	2
26	SG.290	Spring	2
27	MH1-3-27	Sleeve	1
28	MH1-3-15	Bush	2
29	SKF-51104	Single row thrust bearing...	2
30	MH1-3-8	Spiral pinion	1
31	MH1-13-18	Washer	1
		CROSS SLIDE AND TABLE ASSEMBLY	
32	MH1-4-126	Cross slide	1

Early Models superseded by the following 8 items

Item No.	Part No.	Description	No. Off
*	MH1-4-116	Adjustable Strip	4
33	MH1-4-5	Strip	4
34	MH1-4-21	Clamp	2
35	MH1-4-22	Clamp stud	2
36	MH1-4-15	Cross slide screw (MH1-4-30 metric) ...	1
37	MH1-4-17	Handwheel	1
38	L5-598	Handle	1
39	MH1-4-14	Spacer	1
40	L5-5-42	Micrometer dial (L5-5-45 metric) ...	1
41	L5-5-15	Die	2
42	SG-289	Spring	2
43	SKF-51102	Single row thrust bearing	2
44	MH1-4-13	Bearing plate	1
45	MH1-4-119	Nut (MH1-4-120 metric)	1
46	MH1-4-67	Bush	1
47	MH1-4-12	Cover plate	1
48	MH1-4-20	Wiper plate...	1
49	MH1-4-19	Wiper	2
50	MH1-4-20A	Wiper plate...	1
51	MH1-4-24	Plug, cross slide	1
52	MH1-4-128	Table...	1
*	MH1-4-55A	Filter...	1
*	MH1-4-131	Adjustable strip, Rear	1
*	MH1-4-130	Adjustable strip, Front	1
*	MH1-4-153	Plunger	10
*	MH1-4-135	Wedgepiece...	10
53	MH1-4-133	Rear strip	1
54	MH1-4-132	Front strip	1
55	MH1-4-48	Clamp stud	1
56	MH1-4-45	Table screw (MH1-4-45A metric) ...	1
*	MH1-4-155	Collar	1
57	SKF-51101	Single row thrust bearing...	2
58	MH1-4-44	Left-hand locating plate, table screw ...	1
59	MH1-4-46	Cover disc	1
60	MH1-4-34	Support bracket right-hand	1
61	MH1-4-47	Bush	1
62	MH1-4-38	Locating plate	1
63	MH1-4-53	Sleeve	1
64	MH1-4-40	Micrometer dial (MH1-4-40A metric) ...	1
65	L5-5-15	Die	2
66	SG-289	Spring	2
67	MH1-4-43A	Handwheel	1
68	L5-5-60	Handle	1
69	MH1-4-50	Nut, table screw (MH1-4-50A metric) ...	1
70	MH1-4-54	Fixed stop	1
71	MH1-6-31	Dog	2
72	MH1-4-27	Tee bolt	2

* NOT ILLUSTRATED

KNEE BRACKET ASSEMBLY



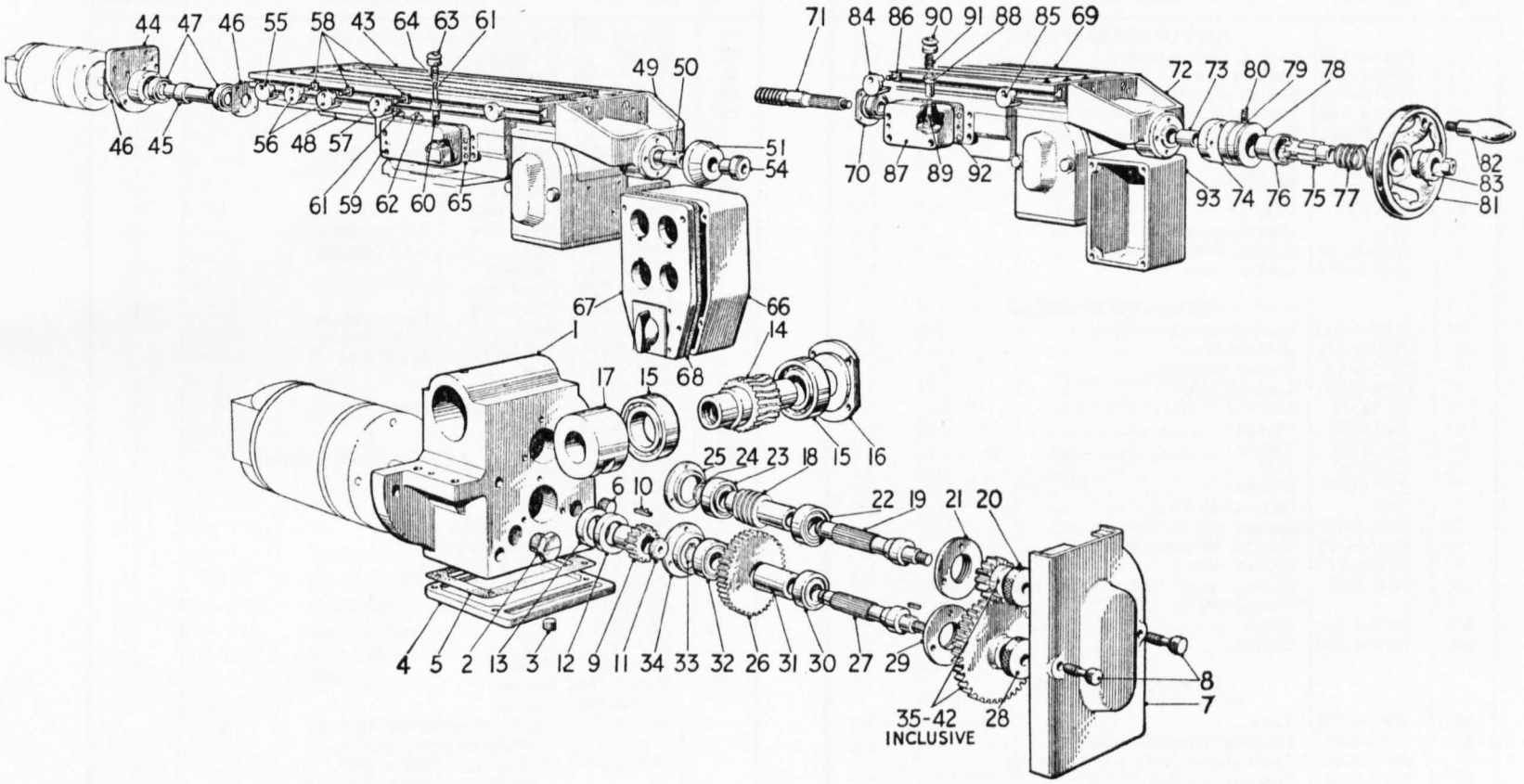
FEED GEARBOX ASSEMBLY

Item No.	Part No.	Description	No. Off
1	MH1-6-1	Feed box	1
2	BW.656	Oil gauge plug	1
3	$\frac{3}{8}$" B.S.P.	Socket pressure plug	1
4	MH1-6-27	Cover plate, bottom	1
5	MH1-6-45	Gasket	1
6	$\frac{1}{4}$" B.S.P.	Socket pressure plug	1
7	MH1-6-26	Cover plate, front	1
8	MH1-6-28	Clamp screw	2
9	MH1-6-13	Drive pinion	1
10	SK-19	Key	1
11	MH1-6-6	Washer	1
12	W.11207525/R4	Oil seal	1
13	MH1-6-37	Spacer	1
14	MH1-6-7	Worm wheel (MH1-6-7A metric)	1
15	XXLJT25	Deep groove ball journal	2
16	MH1-6-25	Locating plate	1
17	MH1-6-91	Locating sleeve	1
18	MH1-6-8	Worm	1
19	MH1-6-11	Drive shaft	1
20	MH1-6-12	Nut	1
21	MH1-6-10	Locating plate left-hand	1
22	XXLJ-15	Deep groove ball journal	1
23	LJ.12	Deep groove ball journal	1
24		12 mm. external circlip	1
25	MH1-6-9	Locating plate right-hand	1
26	MH1-6-14	Drive gear	1
27	MH1-6-11	Drive shaft	1
28	MH1-6-12	Nut	1
29	MH1-6-10	Locating plate left-hand	1
30	XXLJ-15	Deep groove ball journal	1
31	MH1-6-15	Spacer	1
32	LJ.12	Deep groove ball journal	1
33		12 mm. External circlip	1
34	MH1-6-9	Locating plate right-hand	1
35	MH1-6-16	Pick off gear 17T	1
36	MH1-6-17	Pick off gear 22T	1
37	MH1-6-18	Pick off gear 29T	1
38	MH1-6-19A	Pick off gear 38T	1
39	MH1-6-20A	Pick off gear 43T	1
40	MH1-6-21	Pick off gear 52T	1
41	MH1-6-22	Pick off gear 59T	1
42	MH1-6-23	Pick off gear 64T	1

Item No.	Part No.	Description	No. Off
*	373	Feed chart (Alternatives)	1
*	377	Feed chart (for 60 cycle machines) (Alternatives)	
*	376	Feed chart (for metric machines) (Alternatives)	
*	673	Feed chart (for metric 60 cycle machines) (Alternatives)	
		Rapid Traverse and Automatic Cycle and Pendulum Assemblies	
43	MH1-4-128	Table	1
44	MH1-6-2	Support plate	1
45	MH1-6-3	Coupling	1
46	MH1-6-25A	Locating plate	2
47	XXLJ-25	Deep groove ball journal	2
48	MH1-4-35	Table screw (MH1-4-35B metric)	1
49	MH1-4-34	Support bracket	1
50	MH1-4-36	Bush	1
51	MH1-4-64	Collar	1
54	MH1-4-37	Spacer	1
55	MH1-6-51A	Fixed stop (Early models superseded by the following 8 items)	2
56	MH1-6-31	Dog (Early models superseded by the following 8 items)	2
57	MH1-6-30	Dog (Early models superseded by the following 8 items)	1
58	MH1-4-27	Tee bolt (Early models superseded by the following 8 items)	3
59	MH1-6-106	Casing, limit switches (Early models superseded by the following 8 items)	1
60	MH1-6-103	Sleeve (Early models superseded by the following 8 items)	3
*	MH1-6-81A	Spacer	1
*	MH1-6-150A	Fixed stop	2
*	MH1-6-150	Dog	2
*	MH1-6-152	Dog	1
*	MH1-4-27	Tee bolt (Pendulum Cycle)	1
*	MH1-6-151	Dog (Pendulum Cycle)	1
*	MH1-4-112	Tee bolt	1
*	MH1-4-113	Tee bolt	1 P.C. 2 A.C.
61	MH1-6-105	Plunger (Early models)	2
62	MH1-6-104	Plunger (Early models)	1
63	PD.2850-1271	Bellows (Early models)	3
64	SG.256	Spring (Early models)	3
65	MH1-6-49A	Gasket (Early models)	1

*NOT ILLUSTRATED

FEED GEARBOX ASSEMBLY



FEED GEARBOX ASSEMBLY

Item No.	Part No.	Description	No. Off
		AUTOMATIC CYCLE	
*	MH1-6-159	Casing, limit switch	1
*	MH1-6-146	Bottom cover	1
*	MH1-6-147	Switch mounting	1
*	MH1-6-148	Locking stud	2
*	XS.12938	Pin	3
*	XS.13002	Plunger	3
*	XS.12359	Spring	3
*	XS.12942	Seal	3
*	XS.11387	Washer	3
*	404	Instruction plate	1
*	MH1-6-170	Gasket, Bottom cover	1
*	MH1-6-174	Gasket, Rear	1
		PENDULUM CYCLE	
*	MH1-6-145	Casing, limit switch	1
*	MH1-6-146	Bottom cover	1
*	MH1-6-147	Switch mounting	1
*	MH1-6-148	Locking stud	2
*	XS.12938	Pin	4
*	XS.13002	Plunger	4
*	XS.12359	Spring	4
*	XS.12942	Seal	4
*	XS.11387	Washer	4
*	380	Instruction Plate	1
*	MH1-6-149	Spacer	1
*	MH1-6-170	Gasket, bottom cover	1
*	MH1-6-174	Gasket, rear...	1
66	MH1-6-57	Casing, push buttons (4 stations and selector)	1
67	MH1-6-56	Cover	1
68	MH1-6-58	Gasket	1
		Power Feed Assembly	
69	MH1-4-128	Table...	1
70	MH1-4-44	Locating plate left-hand	1
71	MH1-4-45	Table screw (MH1-4-45A metric) ...	1
72	MH1-4-34	Support bracket	1
73	MH1-4-47	Bush	1
74	MH1-4-38	Locating plate	1
75	MH1-4-41	Sleeve coupling	1
76	MH1-4-39	Spacer	1
77	SG.253	Compression spring	1
78	MH1-4-40	Micrometer dial (MH1-4-40B metric) ...	1

Item No.	Part No.	Description	No. Off
79	L5-5-15	Die	2
80	SG.289	Spring	2
81	MH1-4-43A	Handwheel	1
82	L5-5-60	Handle	1
83	MH1-4-42	Lock nut	1
*	MH1-6-180	Fixed stop	1
84	MH1-6-51B	Fixed stop — For machines without reverse	2
85	MH1-6-182	Dog ... — For machines without reverse	1
86	MH1-4-141	Tee bolt — For machines without reverse	1
*	MH1-6-185	Fixed stop — For machines without reverse	1
*	MH1-6-180	Fixed stop — For machines with reverse	1
*	MH1-6-182	Dog ... — For machines with reverse	2
*	MH1-6-141	Tee bolt — For machines with reverse	2
*	MH1-6-179	Fixed stop — For machines with reverse	1
*	MH1-6-180	Fixed stop — For machines with reverse	1
*	MH1-6-182	Dog ... — For machines with reverse	1
*	MH1-6-141	Tee Bolt — For machines with reverse	1
*	MH1-6-151	Dog ... — For U.S.A.	1
*	MH1-4-27	Tee bolt — For U.S.A.	1
87	MH1-6-107	Casing, limit switch — Early models	1
88	MH1-6-103	Sleeve ... — Early models	1
89	MH1-6-105	Plunger ... — Early models	1
90	PD.2850-1271	Bellows ... — Early models	1
91	SG.256	Spring ... — Early models	1
92	MH1-6-48A	Gasket ... — Early models	1
*	MH1-6-181	Casing, limit switch	1
*	MH1-6-172	Bottom cover	1
*	MH1-6-169	Switch mounting	1
*	XS.12938	Pin	1
*	XS.13002	Plunger	1
*	XS.12359	Spring	1
*	XS.12942	Seal	1
*	XS.11387	Washer	1
*	MH1-6-168	Gasket	1
*	MH1-6-186	Gasket	1
93	MH1-6-50	Casing, push button (for machines with clutch) — Alternatives	
	MH1-6-55	Casing, push button (for machines without clutch) — Alternatives	1
	MH1-6-53	Casing, push button (for machines with clutch and reverse to table — Alternatives	
	MH1-6-60	Casing, push button (for machines without clutch and reverse to table) — Alternatives	

TABLE AND GEARBOX ASSEMBLY—UNIVERSAL MODEL

Item No.	Part No.	Description	No. Off
		SHAFT ASSEMBLY, VERTICAL TRAVERSE	
1	MH1-3-38	Shaft	1
2	MH1-3-29A	Hand lever	1
3	L17-5-42	Handle	1
4	MH1-3-30	Stud	1
5	SG.289	Spring	1
	5/16" FX 1/4" (UNC)	Hollow set screw. Flat point	1
6	MH1-3-26	Locating collar	1
7	1/4" FX 3/8" (UNC)	Hollow set screw. Cup point	1
8	MH1-3-32	Micrometer dial. (metric MH1-3-32B)	1
9	L5-5-15	Die	2
	SG.290	Spring	2
	5/16" FO 1/4" (UNC)	Headless set screw. Flat point	2
10	SKF51104	Single row thrust bearing	2
11	MH1-3-27	Sleeve	1
12	1/4" FY 1/2" (UNC)	Socket head cap screw	4
13	1/4" PG 1"	Grooved pin	2
14	MH1-3-15	Bush, sleeve	1
15	MH1-3-15	Bush, sleeve	1
16	MH1-3-8	Spiral pinion	1
17	L5-13-18	Washer	1
18	NP/N166/ 11/2	"Simmonds" lock nut 1/2" UNC... ...	1
19	H.4105	Hydraulic nipple angled 67 1/2° (1/4" UNF)	1
		Cross Slide and Table Assembly	
20	MH1-4-68	Cross slide	1
21	MH1-4-5	Strip	4
22	5/16" FY 1 1/4" (UNC)	Socket head cap screw	8

Item No.	Part No.	Description	No. Off
23	MH1-4-21	Clamp	2
24	MH1-4-22	Clamp, stud	2
25	1/2" FW	Washer	2
26	1/2" FN (UNC)	Hexagonal nut	2
27	H.421	Hydraulic nipple straight (1/4" dia.) ...	5
28	1/4" FX 3/8" (UNC)	Hollow set screw. Cup point	3
29	MH1-4-12	Cover plate	1
30	SB.3	Steel ball 1/4" dia.	2
31	SG.5	Spring	2
32	5/16" FX 5/8" (UNC)	Hollow set screw. Cup point	2
33	MH1-4-119	Nut (MH1-4-120 metric)	1
34	1/4" FY 2" (UNC)	Socket head cap screw	1
35	1/4" W.S.	Single coil spring Washer	1
36	MH1-4-20	Front wiper plate	1
	MH1-4-20A	Rear wiper plate...	1
37	MH1-4-19	Wiper	2
38	No. 6 FV 1/2" (UNC)	Countersunk hollow set screw ...	8
39	MH1-4-24	Plug, cross slide	2
40	No. 10 FV 3/4" (UNC)	Countersunk hollow set screw ...	2
41	MH1-4-127	Swivel slide	1
42	MH1-4-106	Spigot	1
43	5/16" FY 1" (UNC)	Socket head cap screw	3
44	MH1-4-91	Tee bolt	2
45	1/2" FW	Washer	2
46	1/2" FN (UNC)	Hexagonal nut	2
47	MH1-4-123	Nut box housing	1
48	MH1-4-70	End cover	1
49	5/16" FY 1/2" (UNC)	Socket head cap screw	2
50	1/4" PG 3/4"	Grooved pin	2

TABLE AND GEARBOX ASSEMBLY – UNIVERSAL MODEL

Item No.	Part No.	Description	No. Off
		Shaft Assembly, Vertical Traverse (contd.)	
51	¼″ FY ⅜″ (UNC)	Socket head cap screw	3
52	H.421	Hydraulic nipple straight (¼″ dia.) ...	1
53	XXLJ.25	Deep groove ball bearing	1
54	MH1-4-121	Bearing sleeve	1
55	No. 4 FV 5/16″ (UNC)	Countersunk hollow set screw ...	2
56	MH1-4-73	Nut (MH1-4-73A metric) (Alternatives)	1
	MH1-6-88A	Nut, recirculating ball (Alternatives)	1
*	⅛″ S.B.	Steel balls ... ... (Alternatives)	110
57	MH1-4-122	Nut, housing	1
58	MH1-6-92	Shims	As req'd.
59	MH1-6-165	Bearing sleeve	1
60	No. 4 FV 5/16″ (UNC)	Countersunk hollow set screw	2
61	XXLJ25	Deep groove ball bearing	1
62	MH1-4-125	Bearing housing	1
63	¼″ FO ½″ (UNC)	Headless set screw. Flat point	1
64	MH1-4-108	Support sleeve	1
65	MH1-4-109	Plunger	1
66	SG.303	Spring	1
67	MH1-4-110	Locking cap	1
68	No. 6 FV ½″ (UNC)	Countersunk hollow set screw ...	3
69	3/16″ PD 1″	Dowel	1
70	MH1-4-111	Handle	1
71	¼″ FO ¼″ (UNC)	Headless set screw. Flat point	2
72	No. 374	Indicator plate	1
73	3/32″ × ¼″	Rivets	3
74	No. 371	Instruction plate	1

Item No.	Part No.	Description	No. Off
75	MH1-4-103	Table screw (MH1-4-103A metric) ... ... (Alternatives)	1
	MH1-4-104	Table screw recirculating ball (Alternatives)	1
	MH1-4-107	Table screw (MH1-4-107A metric) hand feed (Alternatives)	1
77	MH1-4-102	Coupling	1
78	¼″ × 1½″	"Spirol" pins	2
79	MH1-4-85	Handwheel	1
80	L5-5-60	Handle	1
81	NP/N126/ 11/2	"Simmonds" lock nut ⅜″ UNC	1
82	MH1-4-137	Spacer	1
83	MH1-4-90	Locking nut	1
84	MH1-4-87	Bush, handwheel	1
85	MH1-4-86	Driving clutch, handwheel	1
86	5/16″ FX ¼″ (UNC)	Hollow set screw. Cup point	1
87	MH1-4-88	Spacer (Early models)	1
88	SG.291	Spring	1
89	MH1-4-83	Spacer bush (Early models)	1
90	MH1-4-84A	Drive clutch	1
91	No. 10 FX ⅜″ (UNC)	Hollow set screw. Dog point	1
92	MH1-4-136A	Rectangular key	1
93	MH1-4-94A	Spacing collar	1
94	MH1-4-138	Spacing sleeve	1
95	MH1-4-140	Micrometer dial (MH1-4-140B metric)	1
96	L5-5-15	Die	2
	SG.290	Spring	2
	5/16″ FO ¼″ (UNC)	Headless set screw. Flat point	2
97	MH1-4-139	Bush	1
98	MH1-4-95A	Locating plate	1
99	H.413	Hydraulic nipple straight (¼″ UNF) ...	1
100	5/16″ FY ¾″ (UNC)	Socket head cap screw	4

* NOT ILLUSTRATED

TABLE AND GEARBOX ASSEMBLY – UNIVERSAL MODEL

Item No.	Part No.	Description	No. Off
101	¼″ PG ¾″	Grooved pin	2
102	MH1-4-128	Table	1
103	MH1-4-133	Strip, rear	1
	MH1-4-132	Strip, front	1
104	¼″ FY 1″ (UNC)	Socket head cap screw	8
105	MH1-4-92	Clamp stud	1
106	⅜″ FW	Washer	1
107	⅜″ FN (UNC)	Hexagonal nut	1
108	MH1-4-55A	Filter	1
109	MH1-4-99	Cover (Early models)	1
110	MH1-4-100	Gasket (Early models)	1
111	¼″ FV ½″ (UNC)	Countersunk hollow set screw (Early models)	2
112	MH1-4-44	Locating plate left-hand ...	1
113	5/16″ FY ⅝″ (UNC)	Socket head cap screw ...	4
114	¼″ PG ¾″	Grooved pin	2
115	H.450	Hydraulic nipple 90° (¼″ UNF)	1
116	MH1-4-46	Cover disc	1
117	No. 6 FV ⅜″ (UNC)	Countersunk hollow set screw	2
118	NP/N126/ 11/2	"Simmonds" locknut ⅜″ UNC	1
119	SKF.51101	Single row thrust bearing	2
120	¼″ FX ½″ (B.S.P.)	Socket head gas plug ...	1

For hand feed models only

Power Feed Assembly

Item No.	Part No.	Description	No. Off
121	MH1-6-136	Feed gear box	1
122	MH1-6-142	Gasket	1
123	5/16″ FY ¾″ (UNC)	Socket head cap screw	4
124	¼″ PG ¾″	Grooved pin	2
125	IC4612	Oil level indicator	1
126	¼″ FX ½″ (B.S.P.)	Socket head gas plug	1
127	MH1-6-137	Lid	1
128	MH1-6-139	Gasket	1
129	¼″ FY ½″ (UNC)	Socket head cap screw	4
130	MH1-6-138	Front cover	1
131	MH1-6-129	Clamp screw	2
132	MH1-6-140	Cartridge	1
133	MH1-6-127	Plunger	1
134	SG.290	Spring	1
135	5/16″ FX ¼″ (UNC)	Hollow set screw. Cup point	1
136	L17-9-4	Supply pipe (Early models)	1
137	OX	"Jubilee" clip (Early models)	1
138	T.42	⅛″ h.p. 1,500 r.p.m. 50 cycles. Totally enclosed flange mounted motor	Alternatives 1
	T.42	⅛″ h.p. 1,800 r.p.m. 60 cycles. Totally enclosed flange mounted motor	1
*	No. 201	¾″ Screwed inspection elbow	1
*	MH1-1-15	Coupling	1
*		"Titeflex" ⅜″ bore single braided flexible hose nominal o.d. ·59″ 1 length 3′ 9″... 2 lengths 2′ 6″	
139	¼″ FH ¾″ (UNC)	Hexagon head bolts	4
140	¼″ W.S.	Single coil spring washer	4
141	MH1-6-154	Spacer, oil seals	1
142	W.11207525/ R4	Oil seal	1
143	MH1-6-113	Worm	1
144	5/32″ KS 1″	Square key	1

* NOT ILLUSTRATED

TABLE AND GEARBOX ASSEMBLY – UNIVERSAL MODEL

Item No.	Part No.	Description	No. Off
145	MH1-6-6	Washer	1
146	No. 10 FY $\frac{3}{4}$" (UNC)	Socket head cap screw	1
147	MH1-6-114	Worm wheel	1
148	MH1-6-143	Drive shaft	1
149	MH1-6-12	Nut	1
150	$\frac{5}{32}$" KS $\frac{7}{16}$"	Square key	1
151	MH1-6-10	Locating plate left hand	1
152	No. 6 FV $\frac{1}{2}$" (UNC)	Countersunk hollow set screw	3
153	XXLJ.15	Deep groove ball journal	1
154	MH1-6-144	Spacing collar	1
155	LJ.12	Deep groove ball journal	1
156	12 mm.	External circlip	1
157	MH1-6-115	End plug	1
158	$\frac{1}{4}$" FO $\frac{3}{8}$" (UNC)	Headless set screw. Flat point	1
159	MH1-6-116	Intermediate shaft gear	1
160	MH1-6-143	Drive shaft	1
161	MH1-6-12	Nut	1
162	$\frac{5}{32}$" KS $\frac{7}{16}$"	Square key	1
163	MH1-6-10	Locating plate left hand	1
164	No. 6 FV $\frac{1}{2}$" (UNC)	Countersunk hollow set screw	3
165	XXLJ.15	Deep groove ball journal	1
166	MH1-6-15	Spacer	1
167	LJ.12	Deep groove ball journal	1
168	12 mm.	External circlip	1
169	MH1-6-115	End plug	1
170	$\frac{1}{4}$" FO $\frac{3}{8}$" (UNC)	Headless set screw. Flat point	1
171	MH1-6-141	Drive shaft	1
172	NP/N126/ 11/2	"Simmonds" locknut $\frac{3}{8}$" UNC	1
173	MH1-6-123	End cover left-hand	1

Item No.	Part No.	Description	No. Off
174	No. 6 FV $\frac{1}{2}$" (UNC)	Countersunk hollow set screw	3
175	MH1-6-124	Spacer	1
176	MJT.12	Deep groove ball bearing	1
177	MH1-6-121	Splined sleeve	1
178	MH1-6-122	Boss, sliding gear	1
179	MH1-6-119	Sliding gear (Supplied Integral)	1
180	$\frac{1}{4}$" FV $\frac{3}{8}$" (UNC)	Countersunk hollow set screw (Supplied Integral)	2
181	MH1-6-144	Spacing collar	1
182	MJT.15	Deep groove ball bearing	1
183	MH1-6-117	End cover	1
184	$\frac{1}{4}$" FY $\frac{1}{2}$" (UNC)	Socket head cap screw	3
185	MH1-6-112	Gear mover	1
186	MH1-6-126	Shoe	1
187	MH1-6-125	Gear mover shaft	1
188	$\frac{1}{4}$" FX $\frac{1}{4}$" (UNC)	Hollow set screw. Dog point	2
189	MH1-6-128	Handle	1
190	BB.1	Bakelite ball 1" dia.	1
	BN.O37037	Star tolerance ring	1
191	No. 370	Instruction plate	1
192	$\frac{3}{32}$" × $\frac{1}{4}$"	Rivets	2
193	MH1-6-16	Pick off gear 17 T.	1
	MH1-6-17	Pick off gear. 22 T.	1
	MH1-6-18	Pick off gear. 29 T.	1
	MH1-6-19A	Pick off gear. 38 T.	1
	MH1-6-20A	Pick off gear. 43 T.	1
	MH1-6-21	Pick off gear. 52 T.	1
	MH1-6-22	Pick off gear. 59 T.	1
	MH1-6-23	Pick off gear. 64 T.	1
194	373	Feed chart (1,500 r.p.m. motor) English	1
	376	Feed chart (1,500 r.p.m. motor) metric	1
	377	Feed chart (1,800 r.p.m. motor)	1
195	$\frac{3}{32}$" × $\frac{1}{4}$"	Rivets	4

TABLE AND GEARBOX ASSEMBLY – UNIVERSAL MODEL

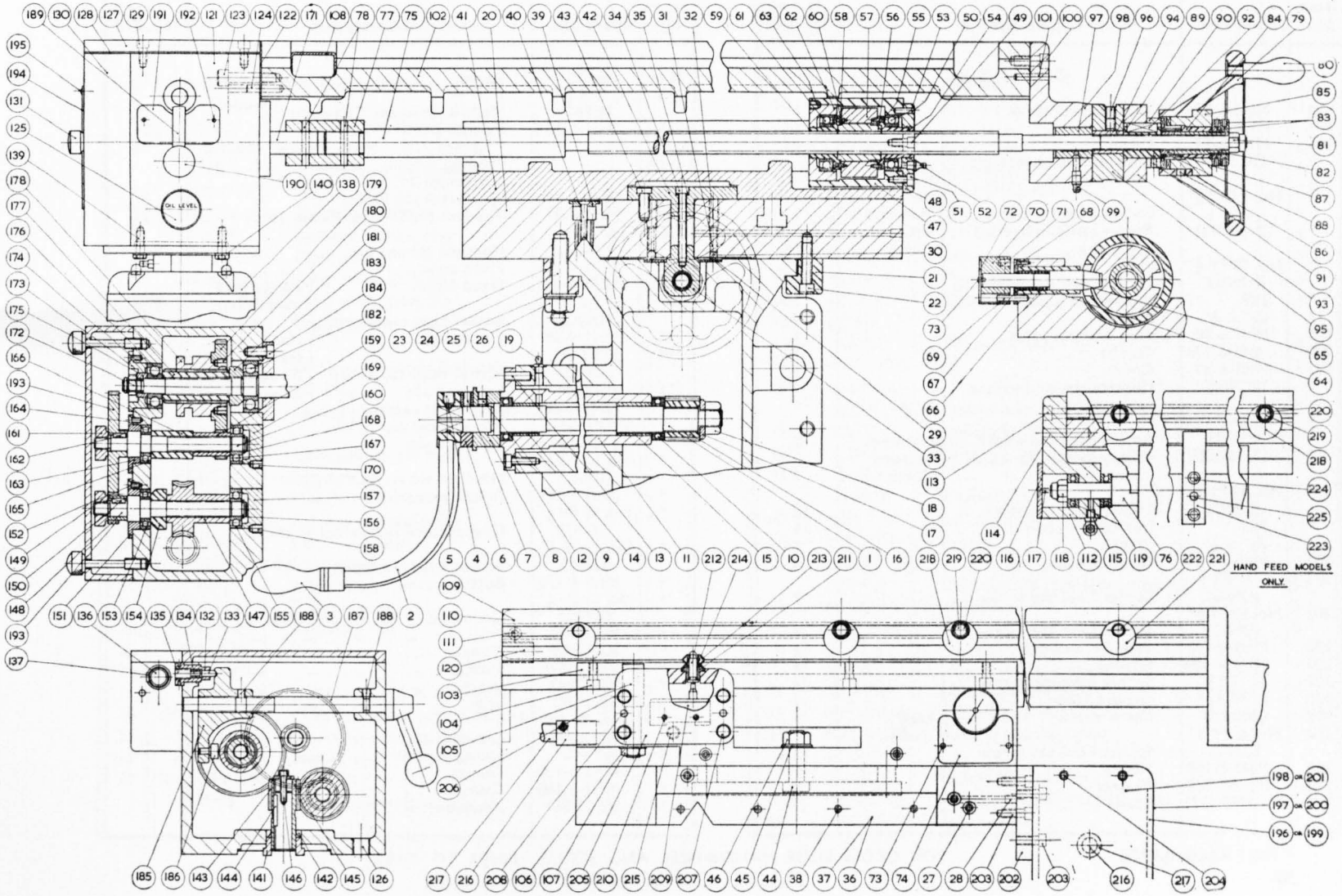


TABLE AND GEARBOX ASSEMBLY – UNIVERSAL MODEL

Item No.	Part No.	Description		No. Off
		Control Gear		
196	MH1-6-53	Casing, control panel ...		1
197	MH1-6-90	Gasket		1
198	MH1-6-54	Cover		1
*	2SC/INT	Control station interior (Stop-start)	Fitted to machines with clutch	1
*	No. 8 FY 1¼" (UNC)	Socket head cap screw ...		2
*	L5-10-27D	Rotary switch (forward reverse)		1
*	No. 10 FY ¾" (UNC)	Socket head cap screw ...		2
*	369	Instruction plate		1
*	3/32" × ¼"	Rivets		4
199	MH1-6-60	Casing, control panel ...		1
200	MH1-6-133	Gasket		1
201	MH1-6-59	Cover		1
*	3SC/INT	Control station interior (3 station)	Fitted to machines without clutch	1
*	No. 8 FY 1¼" (UNC)	Socket head cap screw ...		2
*	L5-10-27D	Rotary switch (forward-reverse)...		1
*	No. 10 FY ¾" (UNC)	Socket head cap screw ...		2
*	375	Instruction plate		1
*	3/32" × ¼"	Rivets		4
202	MH1-6-134	Adaptor plate		1
203	¼" FY ½" (UNC)	Socket head cap screw		7
204	No. 10 FY ⅜" (UNC)	Socket head cap screw		4
205	MH1-6-107	Casing, limit switch ...		1
206	MH1-6-48A	Gasket		1
207	¼" FY 1¼"	Socket head cap screw ...		4
208	¼" PR 1¼"	Grooved pin		2
209	CRS-330	Micro switch	Early models	1
210	No. 6 FY 1" (UNC)	Socket head cap screw ...		2
211	MH1-6-103	Sleeve		1
212	MH1-6-105	Plunger		1
213	PD.2850·1271	Bellows		1

Item No.	Part No.	Description		No. Off
214	SG.256	Spring	Early models	1
215	½" FX ¾" (UNC)	Hollow set screw. Cup point	Early models	1
216	MH1-1-15	Coupling		2
217		"Titeflex" ⅜" bore. Single braided. Flexible hose. Nominal o.d. ·59" 1 length 24" and 1 length 27" ...		
218	MH1-6-31	Dog (MH1-6-182 Power feed)		2
219	MH1-4-27	Tee bolt (MH1-4-141 Power feed) ...		2
220	5/16" DN (UNC)	Hexagon domed nut		2
221	MH1-6-180	Fixed stop... ...	Power feed models only	1
	MH1-6-185	Fixed stop... ...		1
222	¼" FY 1" (UNC)	Socket head cap screws		2
223	MH1-4-54	Fixed stop... ...	Hand feed models only	1
224	¼" FY ⅞" (UNC)	Socket head cap screw		2
225	¼" PG 1"	Grooved pin ...		1
*	MH1-6-181	Casing, limit switch		1
*	¼"FY2"UNC	Socket head cap screw		4
*	¼"PG 1¼"	Grooved pin		2
*	No. 10 FO ¼" (UNC)	Headless set screw, flat point		1
*	MH1-6-169	Switch mounting		1
*	No. 10 FV ½" (UNC)	Countersunk hollow set screw... ...		2
*	No. 6 FY ⅞" (UNC)	Socket head cap screw		2
*	MH1-6-172	Bottom cover		1
*	No. 10 FV ½" (UNC)	Countersunk hollow set screw... ...		4
*	XS.12938	Pin		1
*	XS.13002	Plunger		1
*	XS.12359	Spring		1
*	XS.12942	Washer		1
*	XS.11387	Seal		1
*	No. 6 FN (UNC/P)	Cleveloc nut		2
*	5/32" WS	Spring washer		4
*	MH1-6-168	Gasket		1
*	MH1-6-186	Gasket		1
*	BZ-2RS55	Micro switch		1

* NOT ILLUSTRATED

FOR CROSS SLIDE HANDWHEEL AND SCREW, REFER TO KNEE BRACKET ASSEMBLY (STANDARD MACHINE)

Item No.	Part No.	Description	No. Off
1	MH1-7-40	Main body casting	1
2	$\frac{7}{16}$" FY 1" (UNC)	Socket head cap screw	2
3	$\frac{7}{16}$" FY 1$\frac{1}{2}$" (UNC)	Socket head cap screw	2
4	MH1-7-70	Dowel	1
5	BW.656	Oil gauge plug	1
6	$\frac{1}{8}$" B.S.P.	Socket pressure plug	1
7	L16-3-12	Filler plug...	1
8	MH1-7-45	Driving arbor (English)	1
9	MH1-7-45C	Driving arbor (metric)	1
10	MH1-7-47A	Sealing plate	1
11	$\frac{1}{4}$" FX $\frac{1}{2}$" (UNC)	Hollow set screw. Dog point	1
12	46212/6735	'O' Ring	1
13	MH1-7-46	Sealing plate	1
14	No. 6 FV $\frac{3}{8}$" (UNC)	Countersunk set screw	3
15	$\frac{1}{4}$" KS $\frac{1}{2}$"	Square key	1
16	SC.1812	Needle roller bearing	1
17	MH1-7-49	Bearing removal plate	1
18	5102-125	External retainer	1
19	MH1-7-39	Spiral bevel pinion	1
20	$\frac{1}{4}$" KS $\frac{1}{2}$"	Square key	1
21	5102-125	External retainer...	1
22	MH1-7-62	Adjusting nut	1
23	MH1-7-69	Brass die	3
24	$\frac{1}{4}$" FX $\frac{5}{16}$" (UNC)	Hollow set screw. Cup point	3
25	28150-28315B	"Timken" taper roller bearing ...	2
26	MH1-7-56	Bearing cover	1
27	MH1-7-57	Gasket	1
28	No. 10/FY 1$\frac{1}{2}$" (UNC)	Socket head cap screw	3

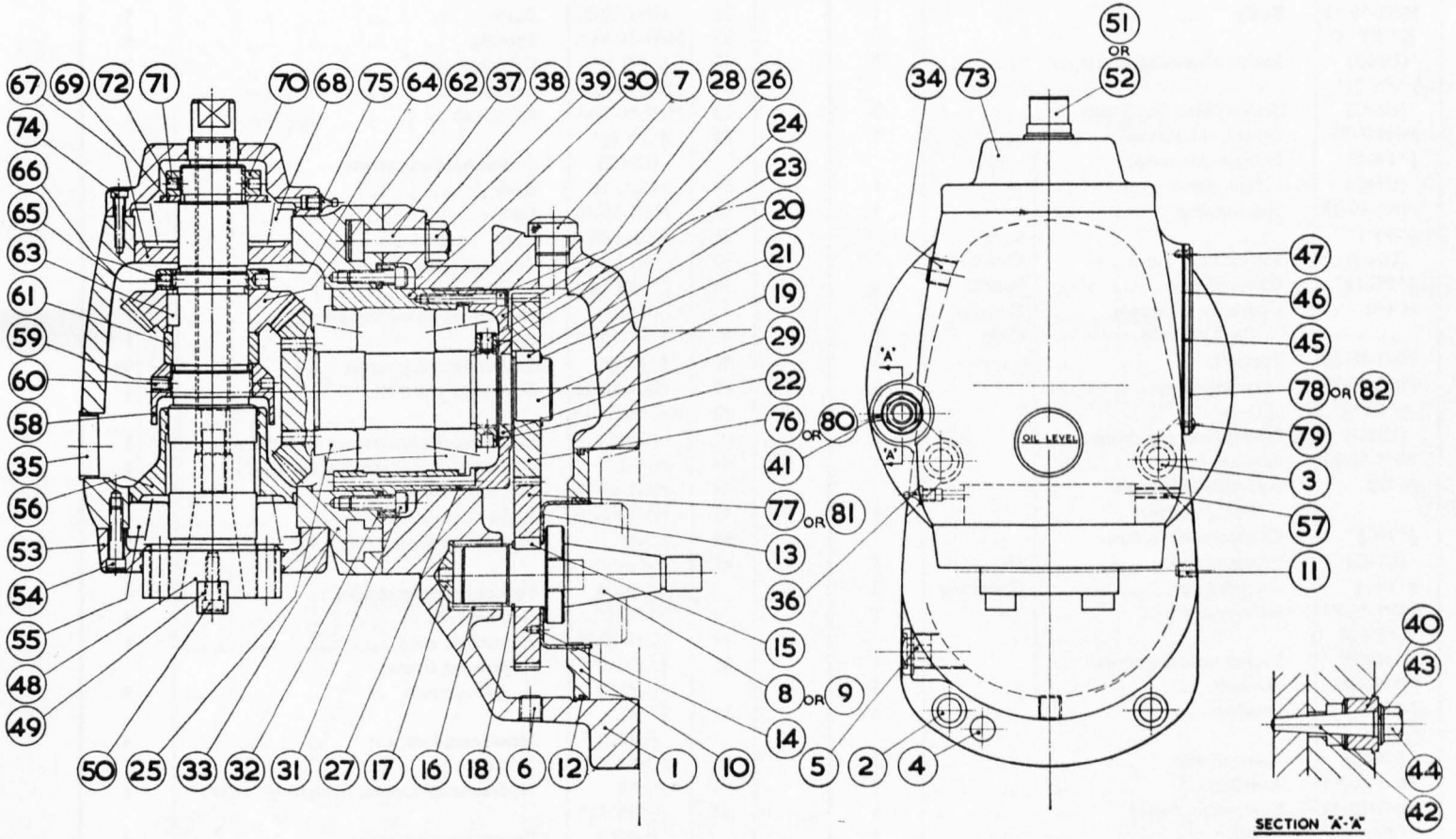
Item No.	Part No.	Description	No. Off
29	137-187-8Z	Oil seal	1
30	MH1-7-54A	Bearing sleeve	1
31	$\frac{3}{4}$" FY 1" (UNC)	Socket head cap screw	6
32	MH1-7-55A	Spacing collar	1
33	MH1-7-41A	Front body casting	1
34	$\frac{1}{4}$" B.S.P.	Socket pressure plug	1
35	IC.4610	1$\frac{1}{4}$" dia. Oil level window	1
36	H.413	Hydraulic nipple ($\frac{1}{4}$" UNF)	1
37	MH1-7-43	Tee bolt	3
38	$\frac{7}{16}$" FW	Washer	3
39	$\frac{7}{16}$" FN (UNC)	Hexagonal nut	3
40	MH1-7-44A	Plug	1
41	No. 6/FX $\frac{1}{4}$" (UNC)	Hollow set screw. Cup point	1
42	MH1-7-68	Removable dowel	1
43	$\frac{3}{8}$" FW	Washer	1
44	$\frac{3}{8}$" FN (UNC)	Hexagonal nut	1
45	MH1-7-42	Cover plate	1
46	MH1-7-72	Gasket	1
47	No. 6/FV $\frac{3}{8}$" (UNC)	Countersunk hollow set screw	5
48	MH1-7-58	Main spindle...	1
49	MH1-2-30	Key	2
50	$\frac{1}{4}$" FY $\frac{3}{4}$" (UNC)	Socket head cap screw	2
51	MH1-7-66	Draw bolt (English)	1
52	MH1-7-66B	Draw bolt (metric)	1
53	MH1-7-67B	Bottom bearing cover	1
54	$\frac{1}{4}$" FY 1" (UNC)	Socket head cap screw	3
55	355X/354B	"Timken" taper roller bearing ...	1
56	MH1-7-59A	Baffle sleeve	1

VERTICAL MILLING ATTACHMENT

Item No.	Part No.	Description	No. Off
57	No. 10/FX $\frac{3}{4}$" (UNC)	Hollow set screw. Cup point	1
58	MH1-7-61	Adjusting nut	1
59	MH1-7-69	Die	3
60	$\frac{1}{4}$" FX $\frac{5}{16}$" (UNC)	Hollow set screw. Cup point	3
61	MH1-7-60	Spacing collar	1
62	MH1-7-38	Spiral bevel wheel	1
63	$\frac{1}{4}$" KS$\frac{5}{8}$"	Square key	1
64	MH1-7-62	Adjusting nut	1
65	MH1-7-69	Die	3
66	$\frac{1}{4}$" FX $\frac{5}{16}$" (UNC)	Hollow set screw. Cup point	3
67	MH1-7-64	Sealing plate	1
68	28137-28315B	"Timken" taper roller bearing	1
69	MH1-7-48	Washer	1
70	MH1-7-63	Adjusting nut	1
71	MH1-7-69	Die	3
72	$\frac{1}{4}$" FX $\frac{5}{16}$" (UNC)	Hollow set screw. Cup point	3
73	MH1-7-65	Top bearing cover	1
74	No. 10/FY $\frac{3}{4}$" (UNC)	Socket head cap screw	3
75	H.413	Hydraulic nipple $\frac{1}{4}$" UNF	1
		Parts for Low Speed Attachment	
76	MH1-7-50	51T. Helical gear (driven)	1
77	MH1-7-51	51T. Helical gear (driver)	1
78	308	Speed and lubrication plate	1
79	No. 4/ANC. $\frac{3}{16}$"	Thread cutting screws	4

Item No.	Part No.	Description	No. Off
		Parts for High Speed Attachment	
80	MH1-7-52	36T. Helical gear (driven)	1
81	MH1-7-53	66T. Helical gear (driver)	1
82	339	Speed and lubrication plate	1

VERTICAL MILLING ATTACHMENT

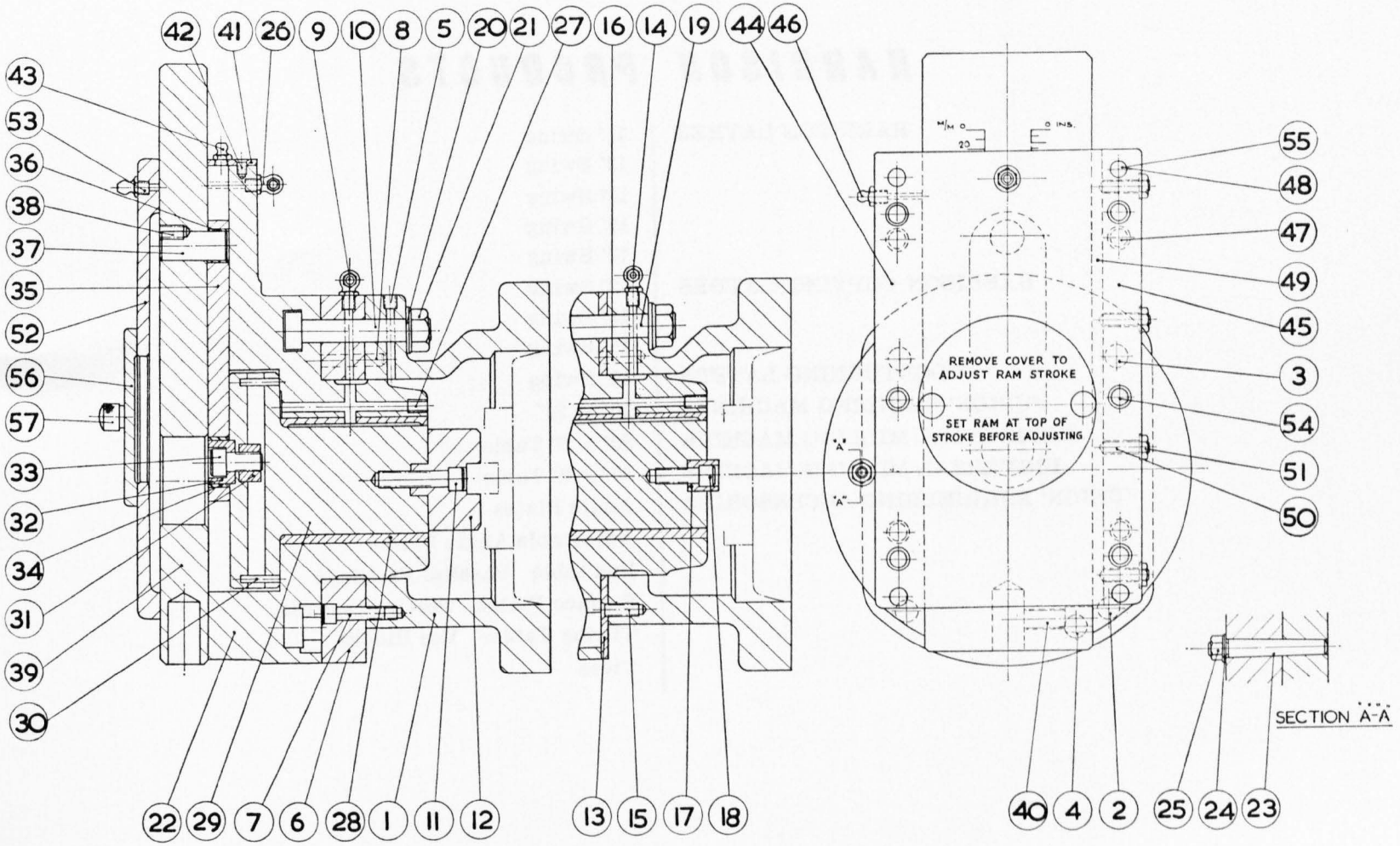


SLOTTING ATTACHMENT

Item No.	Part No.	Description		
1	MH1-10-13	**Body**		1
2	$\frac{7}{16}$" FY 1" (UNC)	Socket Head Cap Screw		2
3	$\frac{7}{16}$" FY 1$\frac{1}{2}$" (UNC)	Socket Head Cap Screw		2
4	MH1-7-70	Dowel — Location		1
5	$\frac{1}{4}$" FX $\frac{1}{2}$" (UNC)	Hollow set screw. Flat point		1
6	MH1-10-29	Spacing ring		1
7	$\frac{1}{4}$" FY 1" (UNC)	Socket head cap screw ...	Long Overhang	3
8	$\frac{1}{4}$" PG 1$\frac{3}{8}$"	Grooved pin	Special	2
9	H.450	Hydraulic oil nipple. 90° ($\frac{1}{4}$" UNF) ...	Orders Only	1
10	MH1-10-30	Tee bolt		3
11	MH1-10-28	Drive coupling		1
12	$\frac{5}{16}$" FY1$\frac{3}{8}$" (UNC)	Socket head cap screw ...		1
13	MH1-10-33	Spacing ring		1
14	H.450	Hydraulic oil nipple. 90° ($\frac{1}{4}$" UNF) ...		1
15	$\frac{1}{4}$" FV $\frac{5}{8}$" (UNC)	Countersunk hollow set screw	Short	3
16	$\frac{1}{4}$" PG $\frac{1}{2}$"	Grooved pin	Overhang	2
17	MH1-10-34	Driving key		1
18	$\frac{5}{16}$" FY $\frac{7}{8}$" (UNC)	Socket head cap screw ...		1
19	MH1-7-43	Tee bolt		3
20	$\frac{7}{16}$" FW	Washer		3
21	$\frac{7}{16}$" FN (UNC)	Hexagon nut		3
22	MH1-10-14	Ram Slide		1
23	MH1-10-40	Removable dowel		1
24	$\frac{1}{4}$" FW	Washer		1
25	$\frac{1}{4}$" FN (UNC)	Hexagon nut		1
26	H.450	Hydraulic oil nipple. 90° ($\frac{1}{4}$" UNF) ...		2
27	$\frac{1}{4}$" FX $\frac{1}{4}$" (UNC)	Hollow set screw. Flat point		1

Item No.	Part No.	Description	
28	MH1-10-21	Bush	1
29	MH1-10-15A	Spindle	1
30	$\frac{1}{8}$" PG $\frac{3}{4}$"	Grooved pin	2
31	MH1-10-25A	Tee nut	1
32	MH1-10-24A	Link bush	1
33	$\frac{3}{8}$" FY $\frac{11}{16}$" (UNC)	Socket head cap screw	1
34	14 DU 16	Bush	1
35	MH1-10-16	Link	1
36	09 DU 08	Bush	1
37	MH1-10-23	Top stud, link	1
38	$\frac{1}{4}$" FX $\frac{3}{8}$" (UNC)	Hollow set screw cup point	1
39	MH1-10-17	Ram	1
40	$\frac{3}{8}$" FY $\frac{7}{8}$"	Socket head cap screw	1
41	MH1-10-26	Top cover plate	1
42	No. 10 FV $\frac{1}{2}$" (UNC)	Countersunk hollow set screw	3
43	H.413	Hydraulic nipple straight ($\frac{1}{4}$" UNF) ...	1
44	MH1-10-18	Left hand, Strip	1
45	MH1-10-19	Right hand, Strip	1
46	H.413	Hydraulic nipple straight ($\frac{1}{4}$" UNF) ...	1
47	$\frac{5}{16}$" FY 1" (UNC)	Socket head cap screws	4
48	$\frac{1}{4}$" PG 1"	Grooved pin	4
49	MH1-10-20	Adjustable strip	1
50	$\frac{1}{4}$" FX 1" (UNC)	Hollow set screw. $\frac{1}{2}$ Dog point	4
51	$\frac{1}{4}$" FL (UNC)	Hexagonal lock nut	4
52	MH1-10-22	Front cover	1
53	H.413	Hydraulic oil nipple, straight ($\frac{1}{4}$" UNF)	1
54	$\frac{5}{16}$" FY 1$\frac{1}{2}$" (UNC)	Socket head cap screw	6
55	$\frac{5}{16}$" PG 1"	Grooved pin	4
56	MH1-10-31	Front cover plate...	1
57	MH1-10-32	Clamp screw	2

SLOTTING ATTACHMENT



ARRANGEMENT WITH LONG OVERHANG

ARRANGEMENT WITH SHORT OVERHANG.

HARRISON PRODUCTS

HARRISON LATHES	11″ Swing
	12″ Swing
	13″ Swing
	15″ Swing
	17″ Swing
HARRISON COPYING LATHES	12″ Swing
	13″ Swing
	15″ Swing
WOODTURNING LATHES	12″ Swing
'UNION' GRINDING MACHINES	10″ to 24″
HORIZONTAL MILLING MACHINE	30″ × 8″ Table
UNIVERSAL MILLING MACHINE	30″ × 8″ Table
'UNION' ENGINEERING ACCESSORIES	Angle Plates
	Adjustable Angle Plates
	Box table Parallel Packings
	Surface Plates Testing Centres
	Tilting Tables Vee Blocks
	Vices

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