

M-105H

BRIDGEPORT SERIES I
MILLING MACHINE

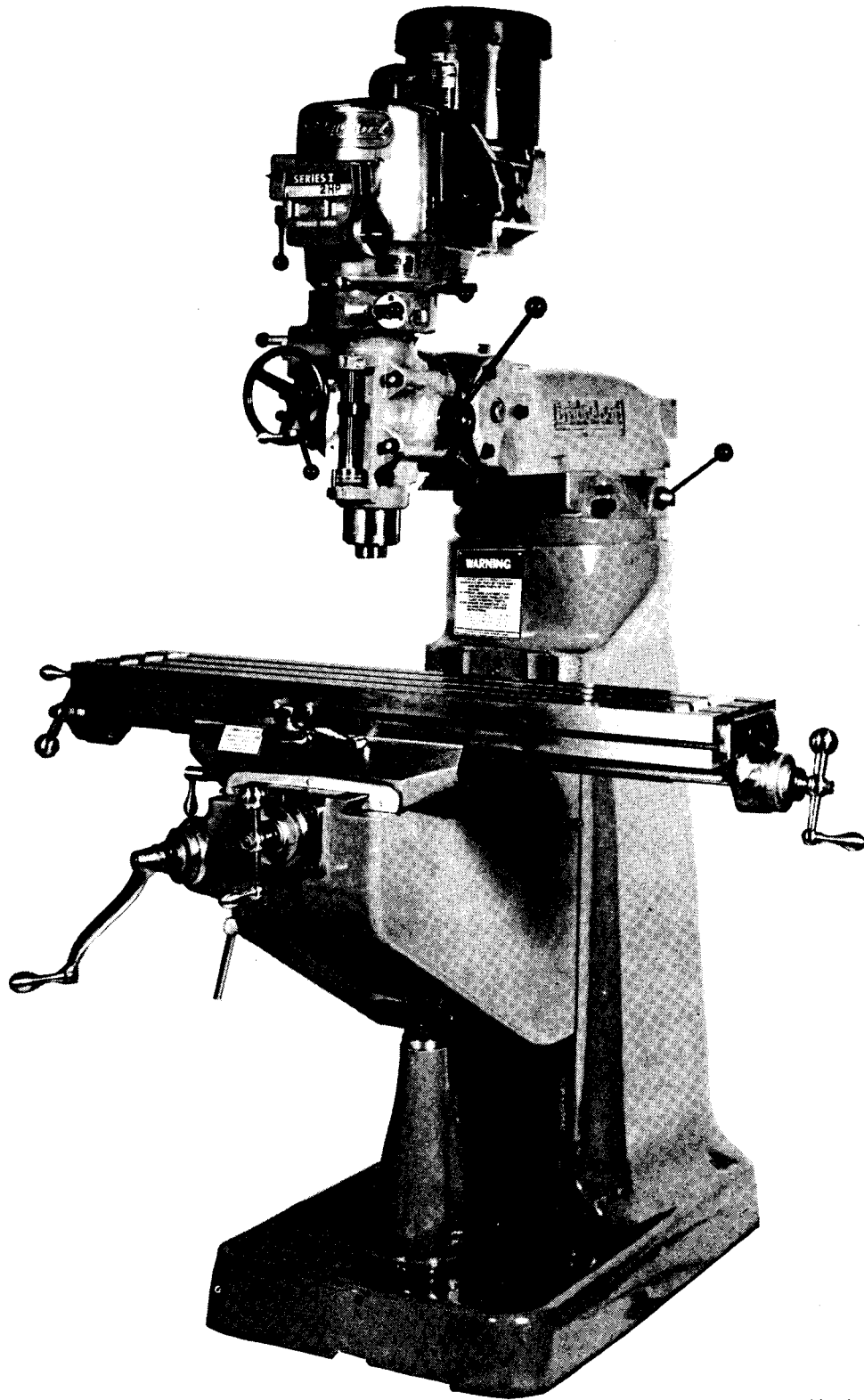
APRIL 1981

INSTALLATION, OPERATION
AND
MAINTENANCE

This manual carries additional safety precautions and warnings. Read and observe the entire procedures contained in this manual.

Bridgeport® **TEXTRON**

Bridgeport Machines Division of Textron Inc.



For photographic clarity, machine is shown
without point of operation guarding.

BRIDGEPORT SERIES I TURRET MILLER MODEL BR2J

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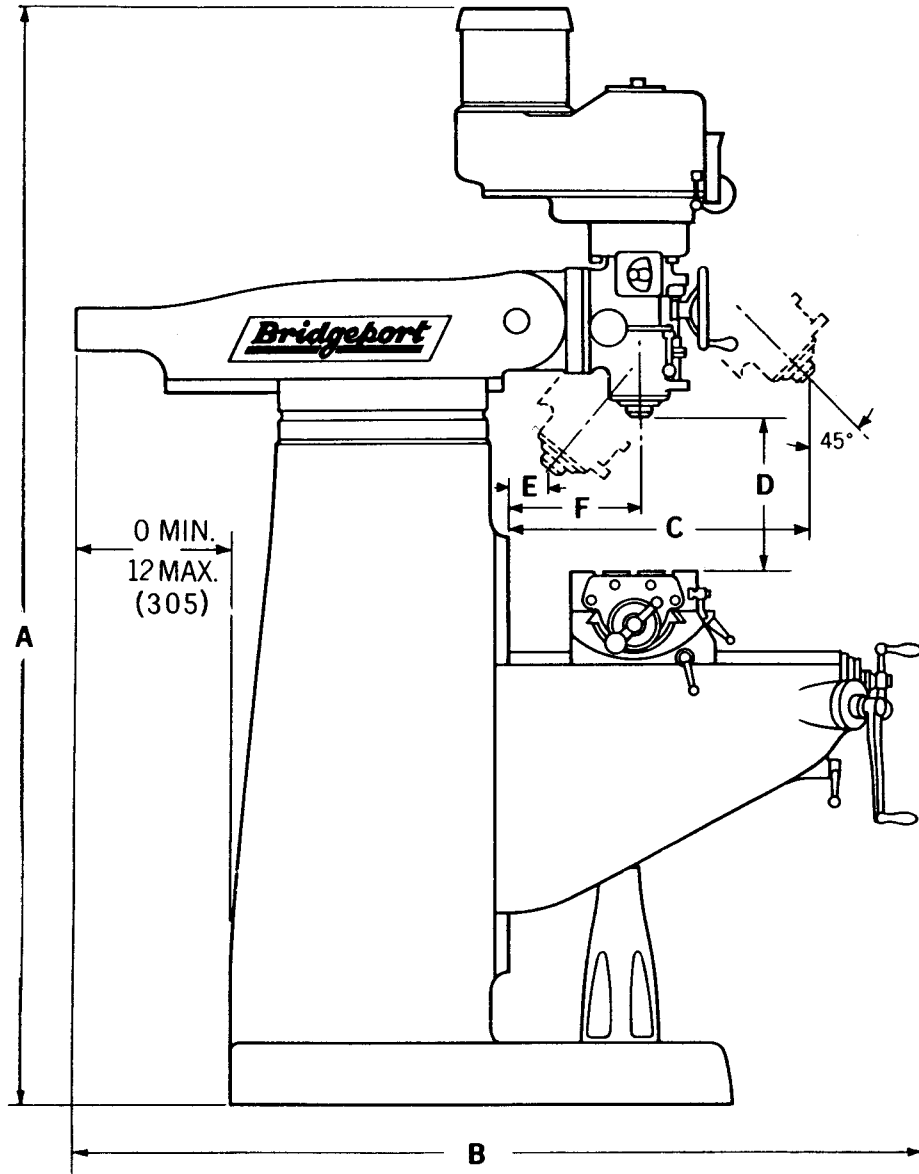
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		LONGITUDINAL TRAVEL		TABLE LENGTH		
		30 in. (762mm)		42 in. (1067mm)		
		36 in. (914mm)		48 in. (1219mm)		
	A	B	C	D	E	F
MIN.	82 3/16(2088)	51(1295)	8 3/4(222)	0	0	6 3/4(171)
MAX.	82 3/16(2088)	63(1600)	20 3/4(527)	18-1/2(470)	12(305)	18 3/4(476)

NOTE: Metric specifications in parenthesis

Figure 1. Principal Dimensions

MACHINE SPECIFICATIONS

Range

Table travel (X-axis)	30 in. (762mm) (42" table)	36 in. (914mm) (48" table)
Saddle travel (Y-axis)	12 in. (305mm)	
Quill travel	5 in. (127mm)	
Knee travel (Z-axis manual)	16 in. (406mm)	
Ram travel	12 in. (305mm)	
Throat distance (min.)	6-3/4 in. (171mm)	
(max.)	18-3/4 in. (476mm)	
Table to spindle nose gage line (min.)	2-1/2 in. (64mm)	
Max. weight of workpiece	750 lbs. (340 kg.)	

Table

Overall sizes	9 x 42 in. (229 x 1067mm)	9 x 48 in. (229 x 1219mm)
T-Slots	3 on 2-1/2 in. (64mm) centers	
T-Slot size	5/8 in. (16mm)	
Height above floor (max.)	47-1/4 in. (1200mm)	

Milling

	<u>Std. Power Feed</u>	<u>High Torque Power Feed</u>
Feed rate*	(X) 3/4-35 ipm (19-889mm/min.)	(X) 3/8-15 ipm (9.5-381mm/min.)

Space and weight

Floor area	7 x 10 ft. (2.1 x 3.1m)
Height	82-1/16 in. (2088mm)
Net weight	1988 lbs. (900 kg)
Shipping weight	2180 lbs. (989 kg)

Power

Electrical supply-60 Hz., 3 phase	208/230/460/575V
--------------------------------------	------------------

Color

Standard - Bridgeport Gray

*Power optional

MILLING HEAD SPECIFICATIONS

MODEL	"M" HEAD	"J" HEAD	"J" HEAD Hi Speed	"2J" (Before 1977)	"2J" After 1977
Power	.5 HP	1.0 HP	1.5 HP	1.5 HP	2.0 HP
Motor RPM	1200 RPM	1800 RPM	3600 RPM	1800 RPM	1800 RPM
Speed Ranges - RPM LOW HIGH	6 Steps 275 - 4550	8 Steps 80 - 325 660 - 2720	8 Steps 160 - 660 1320 - 5440	Stepless 60 - 500 500 - 4200	Stepless 60 - 500 500 - 4200
Quill Travel Quill Diameter	3.5 in (88.9 mm) 2.562 in (65 mm)	5.0 in (127 mm) 3.375 in (86mm)	5.0 in (127 mm) 3.375 in (86 mm)	5.0 in (127 mm) 3.375 in (86 mm)	5.0 in (127 mm) 3.375 in (86 mm)
Spindle Tapers:	#2 Morse #7 B&S B-3	R-8 #30 Q.C. #40	R-8 #30 Q.C. #40	R-8 #30 Q.C. #40	R-8 #30 Q.C. #40
Spindle Diameter	1.437 in (36.5mm)	1.875 in (48 mm)	1.875 in (48 mm)	1.875 in (48 mm)	1.875 in (48 mm)
Spindle Feed Rate	Manual	.0015/Rev (.038mm) .003/Rev (.076mm) .006/Rev (.152mm)	.0015/Rev (.038mm) .003/Rev (.076mm) .006/Rev (.152mm)	.0015/Rev (.038mm) .003/Rev (.076mm) .006/Rev (.152mm)	.0015/Rev (.038mm) .003/Rev (.076mm) .006/Rev (.152mm)
Drilling Capacity -Manual Drilling Capacity -Power	.50 in (12.7mm)dia.	.75 in (19 mm) dia. .37 in (9.4mm)dia.	.75 in (19 mm) dia. .37 in (9.4 mm) dia.	.75 in (19mm) dia. .37 in (9.4mm) dia.	.87 in (22mm) dia. .37 in (9.4mm) dia.
Boring Capacity	1.50 in (38mm)dia.	6.0 in (152.4mm)dia.	6.0 in (152.4mm)dia.	6.0 in (152.4mm)dia.	6.0 in (152.4mm)dia.
Milling Capacity	1.0 in ³ /min (16cc/min)	1.5 in ³ /min (24cc/min)	1.5 in ³ /min (24cc/min)	2.0 in ³ /min (32cc/min)	2.0 in ³ /min (32cc/min)
Spindle to Column-Minimum Maximum	7.5 in (190.5 mm) 19 in (483 mm)	6.0 in (152mm) 23.00 in (584mm)	6.0 in (152mm) 23.00 in (584mm)	6.0 in (152mm) 23.00 in (584mm)	6.0 in (152mm) 23.00 in (584mm)

BRIDGEPORT SERIES I MILLING MACHINE

UNCRATING

Carefully remove protective crating and skids so that the machine and parts are not marred, scratched or impaired. In the event of damage in transit, communicate AT ONCE with our representative and the transportation company making delivery.

Machine should be lifted by placing a sling under the ram as illustrated on page 5.

SHORTAGES Check shipment carefully, against the itemized packing list which is included in the parts box. In case of shortages, report them IMMEDIATELY to the representative from whom the machine was purchased, indicating parts not received which have been checked on the packing list.

CLEANING Thoroughly clean protective coating from machine with suitable cleaning solution.

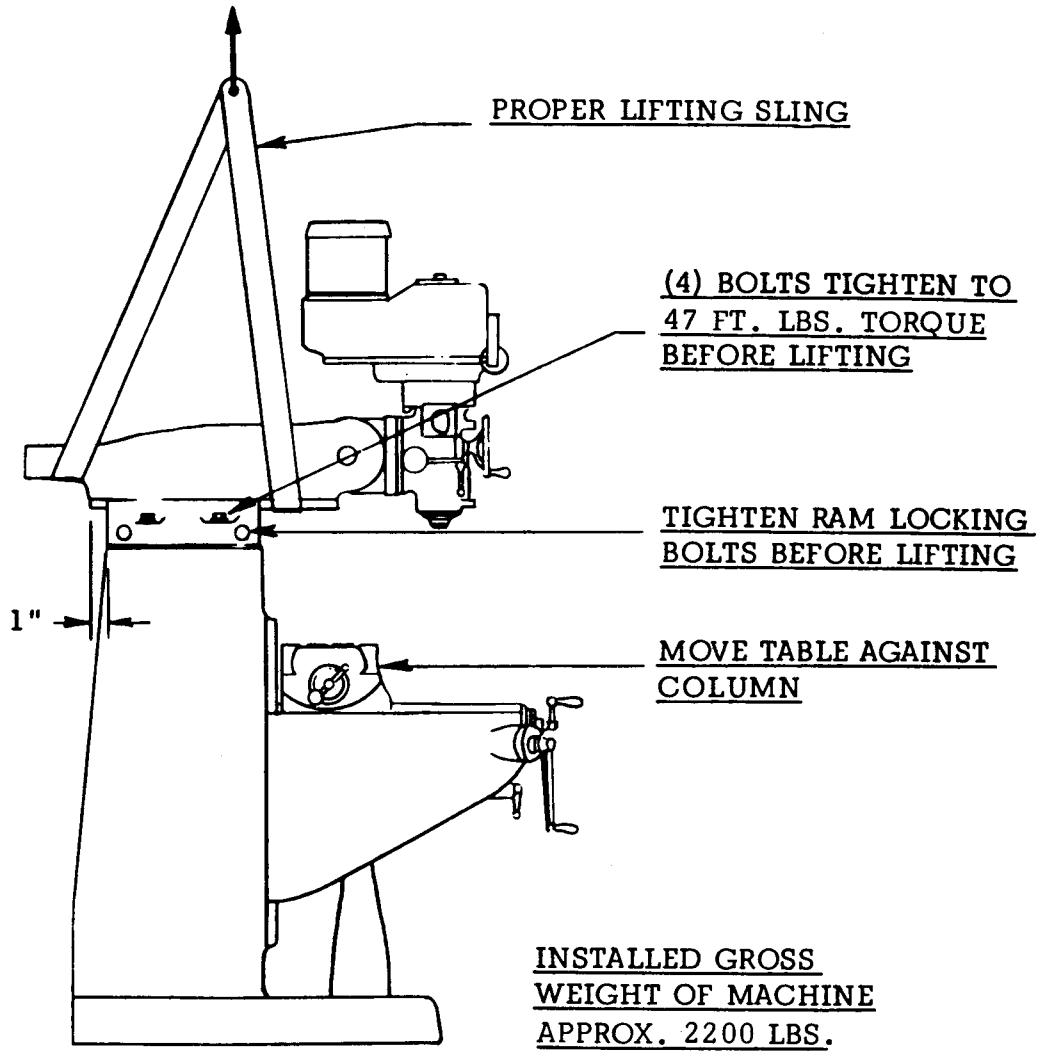
WARNING
IT IS NOT RECOMMENDED THAT GASOLINE OR ANY OTHER HIGHLY INFLAMMABLE CLEANING AGENT BE USED.

Do not move the table, saddle, knee or any moveable part until all ways have been well cleaned and lubricated. Then, by hand, move table, saddle and knee to limit stop in one direction. Clean and lubricate exposed ways and then move each unit to the opposite limit stop and similarly clean and lubricate the exposed ways. Loosen bolts to unlock the ram, and move it forward and backward to the full length in order to clean and lubricate.

POSITIONING HEAD UPRIGHT Loosen four locknuts (#157 page 35), pull stop pin (#133 page 26), out to detent and rotate head to vertical position. Proceed with alignment of head as described on page 8. Tighten nuts evenly, using normal pressure. Care should be taken to avoid excessive pressure since this will cause distortion in the quill. Tighten all nuts to 25 ft. lbs. torque—then repeat to 50 ft. lbs.

LIFTING THE MACHINE

Note position of ram and table when lifting with sling.



PLACING ON SOLID FOUNDATION

The column and base are cast in one piece. When setting machine on a concrete foundation, it is advisable to use a little grout (thin mortar) to take care of any unevenness in the concrete as well as to provide a solid foundation at all points.

When setting machine on a floor that has any surface irregularities, shims should be used to correct this condition to the greatest extent possible. See Figure 2 for installation layout.

NOTE

IT IS RECOMMENDED THAT THE MACHINE BE SECURED TO THE FLOOR TO PREVENT MOVEMENT OR TIPPING DUE TO OFF-CENTER LOADING.

Before securing machine to floor (i.e. tightening hold down bolts), make certain that all four corners are making contact with the floor after machine is leveled. If above condition is not met, it is possible to twist the column and put a bind into the ways.

LEVELING MACHINE Set machine by leveling the work table lengthwise and crosswise with a precision instrument. After leveling machine, lower the knee and remove protective material from between head and table.

HANDLES When crating, the three ball crank handles are sometimes turned to face the machine. In these cases the handles should be reversed before operating.

CONNECTING POWER SUPPLY To connect the machine to the plant supply, have qualified electrician proceed as follows:

1. Check required machine voltage against power supply to ensure that they are compatible.
2. Connect machine wiring to power supply making sure connection is in compliance with local safety regulations.
3. Check for correct spindle rotation. In the HIGH SPEED range, the spindle should rotate clockwise when viewed from the top of the machine.

NOTE

DRUM SWITCH AND HI-NEUTRAL-LO LEVER MUST BE IN HI RANGE.

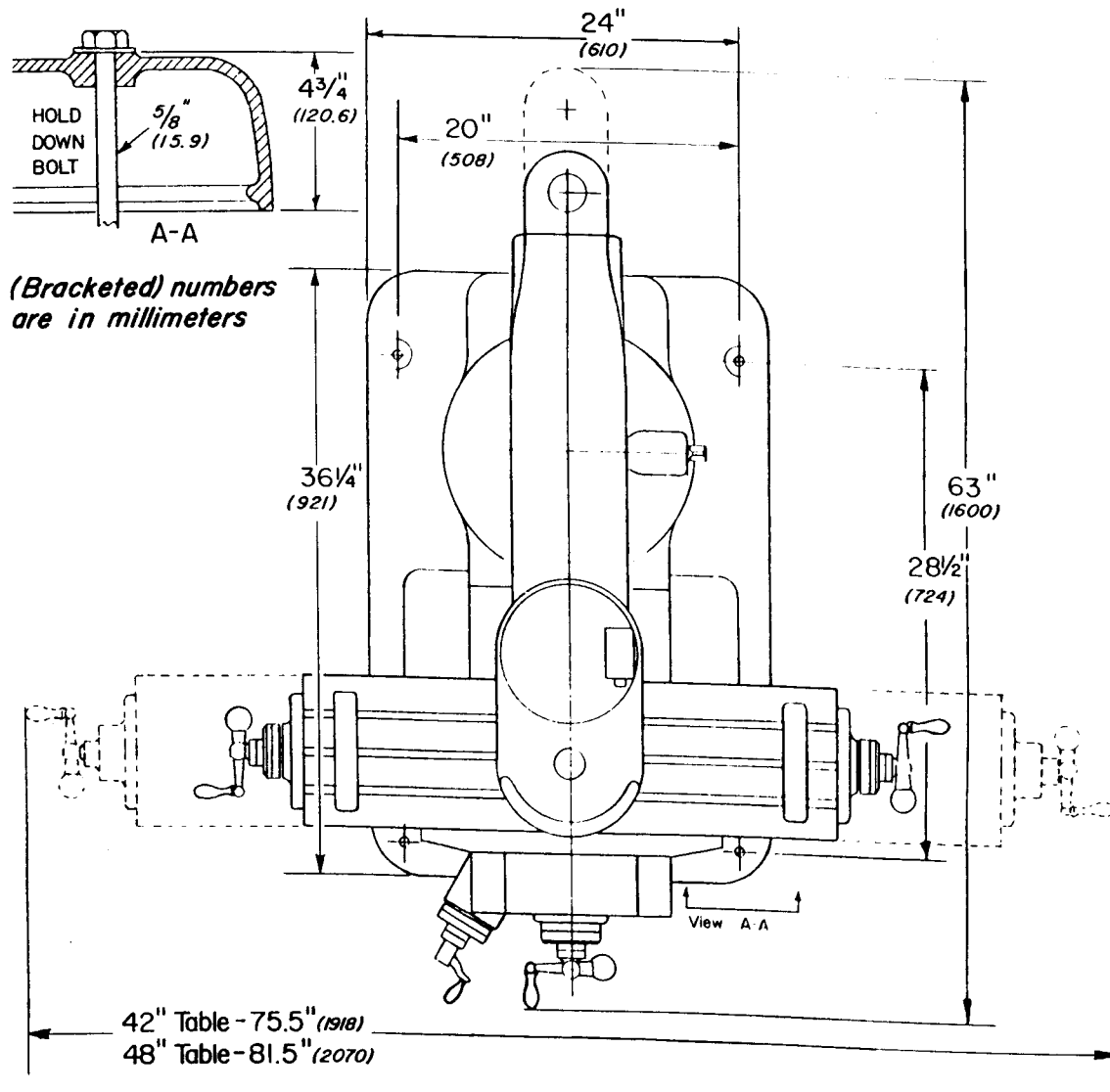


Figure 2, Installation Layout

ALIGNMENT OF HEAD

In case of precision boring or work of that nature, where it is necessary to have head perfectly square with the table, use method prescribed below. For general milling use, graduations provided on the head are close enough. To set head perfectly square with table, see Figures 3 and 4. This may be done with Ram adapter (#2 page 26) on Ram (#10 page 26), by adjusting Ram adapter through vertical adjusting worm shaft (#8 page 26). Loosen four locknuts (#157 page 34) but leave drag on same for fine adjustment. To square head to table in the longitudinal axis, mount indicator as shown in Figure 4.

NOTE
WHEN INDICATING AS IN FIGURE 3, IT SHOULD BE NOTED THAT THE TABLE IS FITTED TO BE SLIGHTLY HIGHER IN FRONT, USUALLY ABOUT .0005".

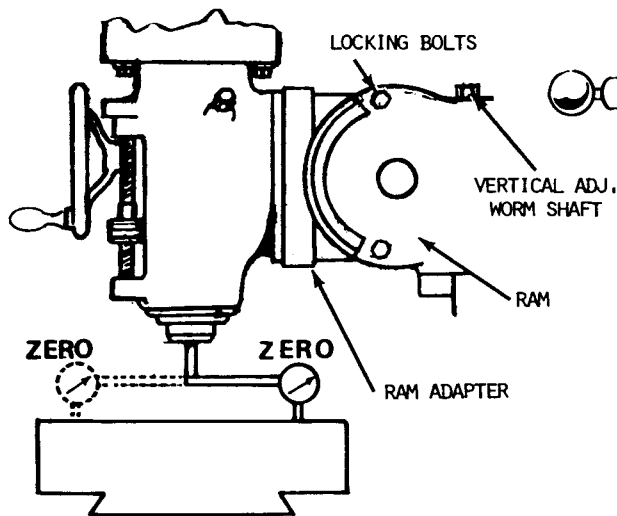


Figure 3. Head Alignment Y Axis

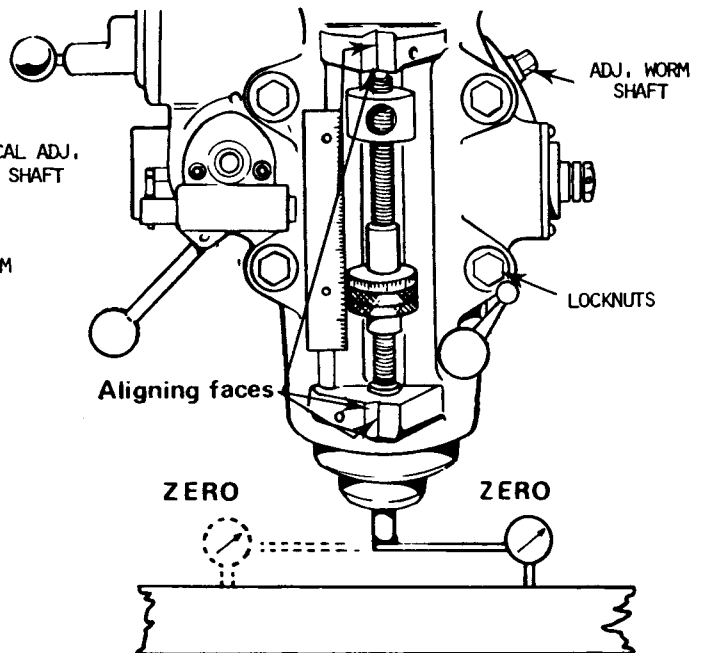
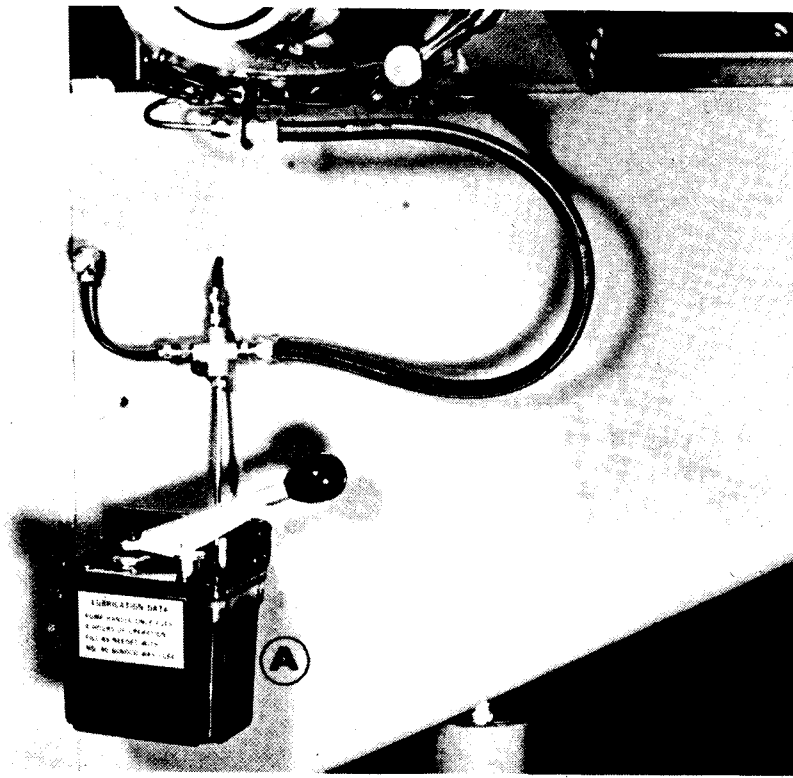


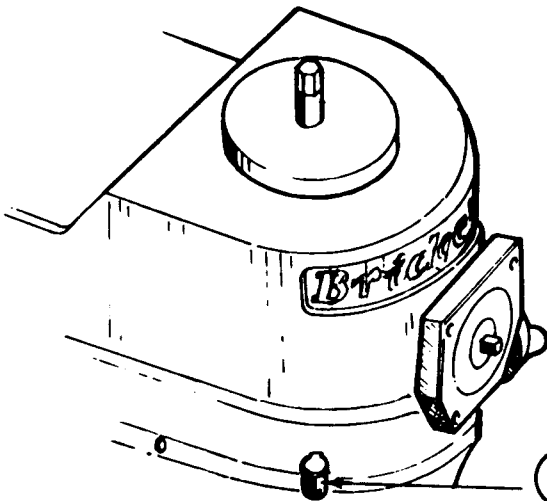
Figure 4. Head Alignment X Axis

LUBRICATION

Do not operate machine until properly lubricated. Follow the instructions given in Figure 5.

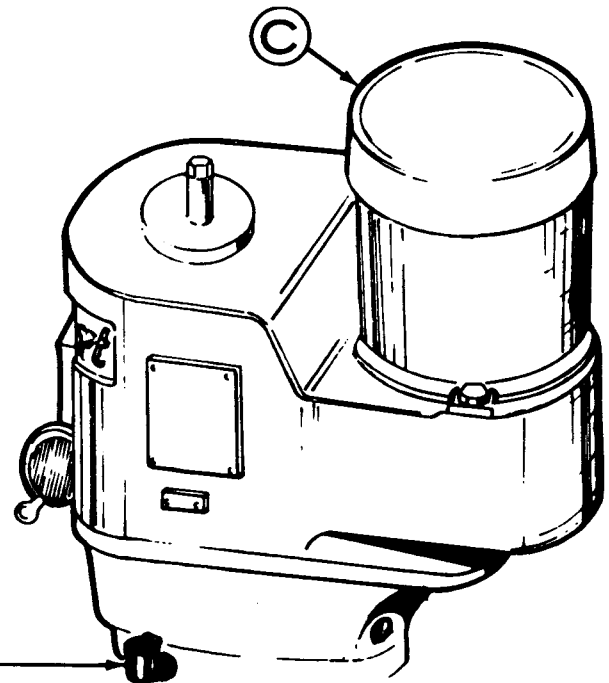


(A) FILL RESERVOIR
AS REQUIRED



(B)

FEW DROPS TWICE DAILY



(C)

Figure 5. Recommended Lubrication

- (A)** Way Surfaces – Lead Screws
"Sunoco" Waylube #80
or equivalent
- (B)** Milling Heads (Spindle Bearings)
S.A.E. 10 or 10W Light Oil
(none on grease packed heads)
- (C)** Motors are greased for life of bearings

ATTACHMENTS: POWER FEED

Oil to sight level with
Mobilube No. 46 S.A.E. 140

SHAPING ATTACHMENT

Shell Nassa Oil J78 or K79
Socony Gargoyle Vactra
Oil (Heavy Medium)

SHAPING ATTACHMENT (Worm drive)

Shell Nassa Oil J78 or K79
Socony Cylinder Oil 600W

ADJUSTMENT OF TABLE GIB. The table is provided with a full length tapered gib (#43 page 26) in the saddle, and an adjusting screw on the left side. To take up gib, tighten gib adjusting screw (#41 page 26) slightly and repeat until a slight drag is felt when moving the table by hand.

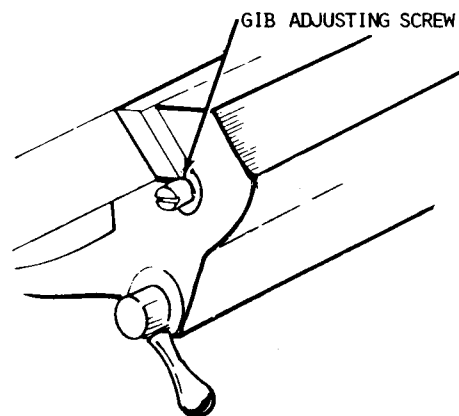


Figure 6. Saddle/Table Gib.
(#43 page 26)

ADJUSTMENT OF SADDLE AND KNEE GIBS. A tapered gib (#49 page 26) is used for adjusting the saddle bearing on the knee. This forms a guide for the saddle. To tighten gib, the same principal as described above is used; however, the chip wiper has to be removed first.

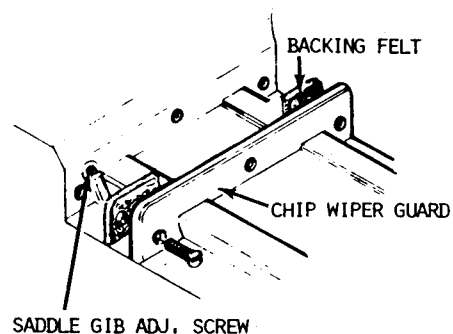


Figure 7. Saddle-Knee Gib
(#49 page 26)

ADJUSTMENT OF KNEE GIB. Remove chip wiper and adjust screw until smooth movement is attained.

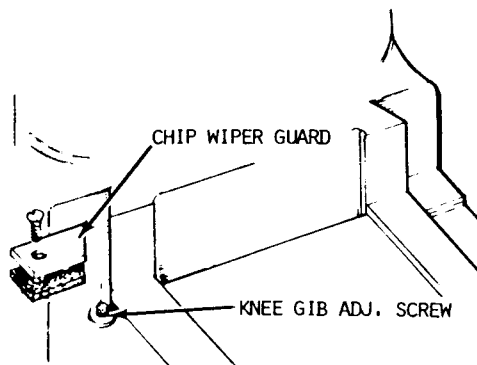
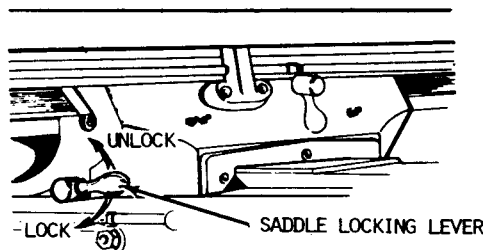


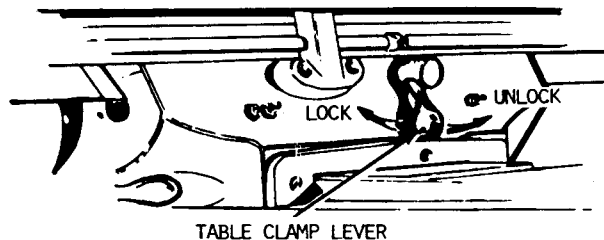
Figure 8. Knee-Column Gib
(#55 page 26)

CLAMPING TABLE, SADDLE AND KNEE.
When milling with longitudinal table feed only, it is advisable to clamp the knee to the column and the saddle to the knee to add rigidity to these members and provide for heavier cuts with a minimum of vibration. The saddle locking lever is located on the left-hand side of saddle.

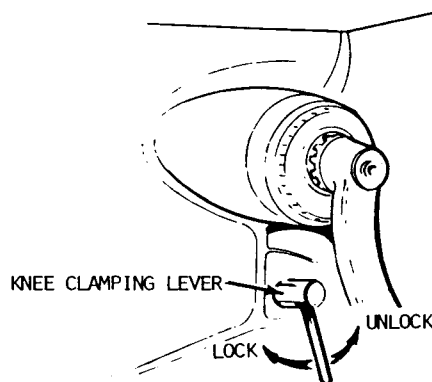
Excessive pressure can cause slight table bind. Use moderate clamping pressure, as this will hold saddle sufficiently.



The table clamp lever is located on front of saddle and should always be clamped when longitudinal movement is not required.



The knee clamping lever is at the left side of the knee and should be drawn upward to clamp the knee. This is only a tension brake and will not lock the knee completely. Leave clamped at all times unless using knee in operation.



REMOVING TABLE. Remove as follows: ball crank handles, dial holders, bearing brackets. Lead screw will then turn all the way out so it can be removed. When this is accomplished, the table can easily be taken off by sliding it from the saddle. See Figure 9.

REMOVING SADDLE. Follow along the same lines as removing table; however, it is necessary to remove the entire front bracket assembly. Next, remove the cross feed nut bracket which is made accessible by removal of the table. See Figure 9.

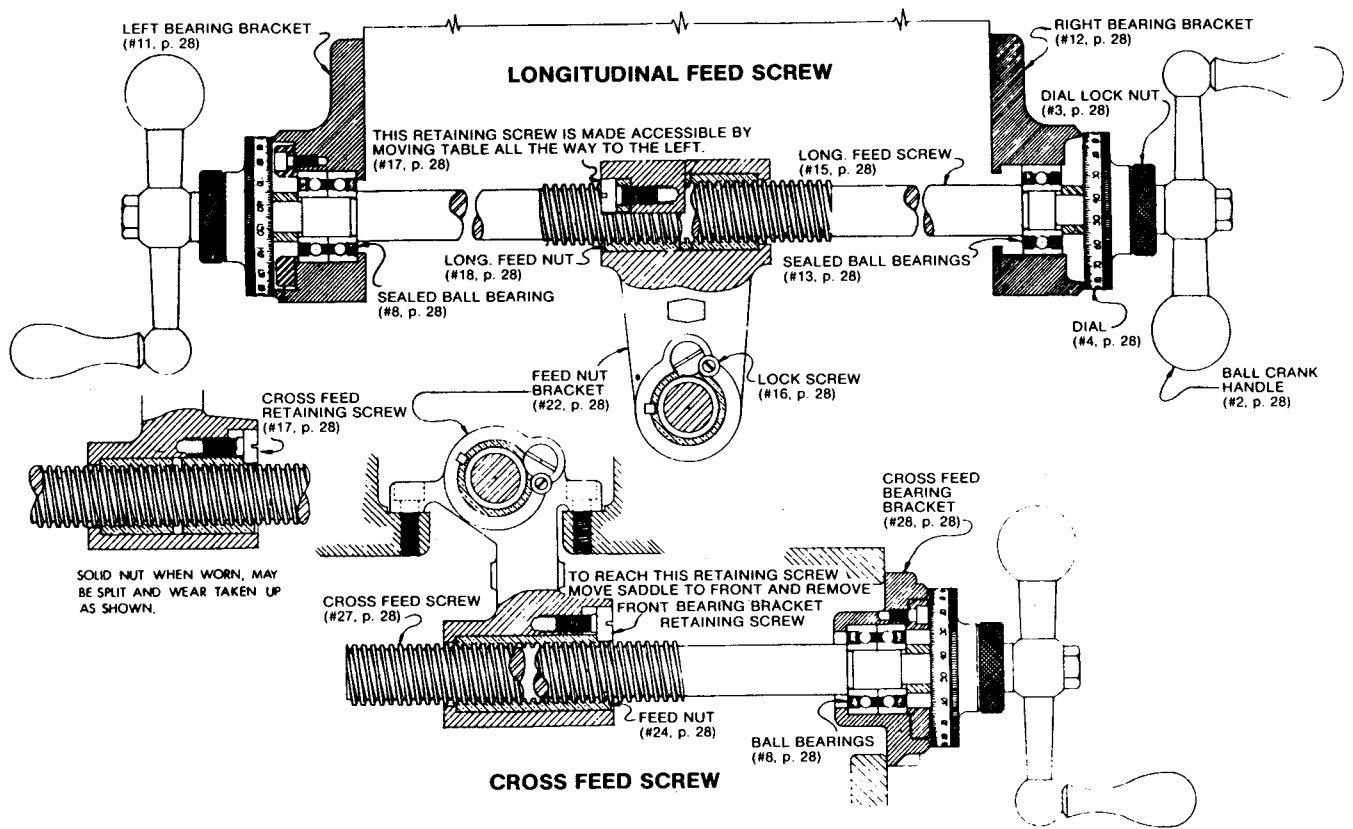


Figure 9, Longitudinal and Crossfeed Assembly

**ASSEMBLY INSTRUCTIONS
FOR MOUNTING 2-J VARIDRIVE ATTACHMENT TO RAM ADAPTER**

Lift the attachment. Insert the four tee bolts into the ram adapter and position them to match the bolt holes in the attachment.

Slide the attachment onto the bolts, insert the spacers and washers and secure with the nuts.

Tighten all the nuts with 25 ft. lbs. of torque, and then repeat with 50 ft. lbs.

<p>CAUTION IMPROPER TIGHTENING OF THESE COULD CAUSE A CHOPPY QUILL MOVEMENT</p>
--

LUBRICATION :

The useful life of this attachment will be determined to a large extent by proper lubrication. Carefully observe the nameplate recommendations and avoid substitutions.

OPERATING INSTRUCTIONS :

SPEED CHANGE HANDWHEEL (16, Figure 10): DO NOT attempt to change spindle RPM unless the motor is running. Dial speeds will only be approximate. Belt wear will cause a slight variation in speeds from what is indicated on the dial.

When tightening or loosening the drawbar (#14 page 38) it is necessary to lock the spindle. To accomplish this, use the spindle brake (3) which is located on the left side of belt housing, turning it either to the right or left until it binds, then raise the quill feed handle (13).

Drawbar (#14 page 38) has 7/16-20 right hand thread and should be tightened with normal amount of pressure using wrench furnished with machine. To loosen collet back off drawbar and if collet does not open immediately give knob on top of drawbar a slight tap. Spindle has non-sticking taper and collet should release readily.

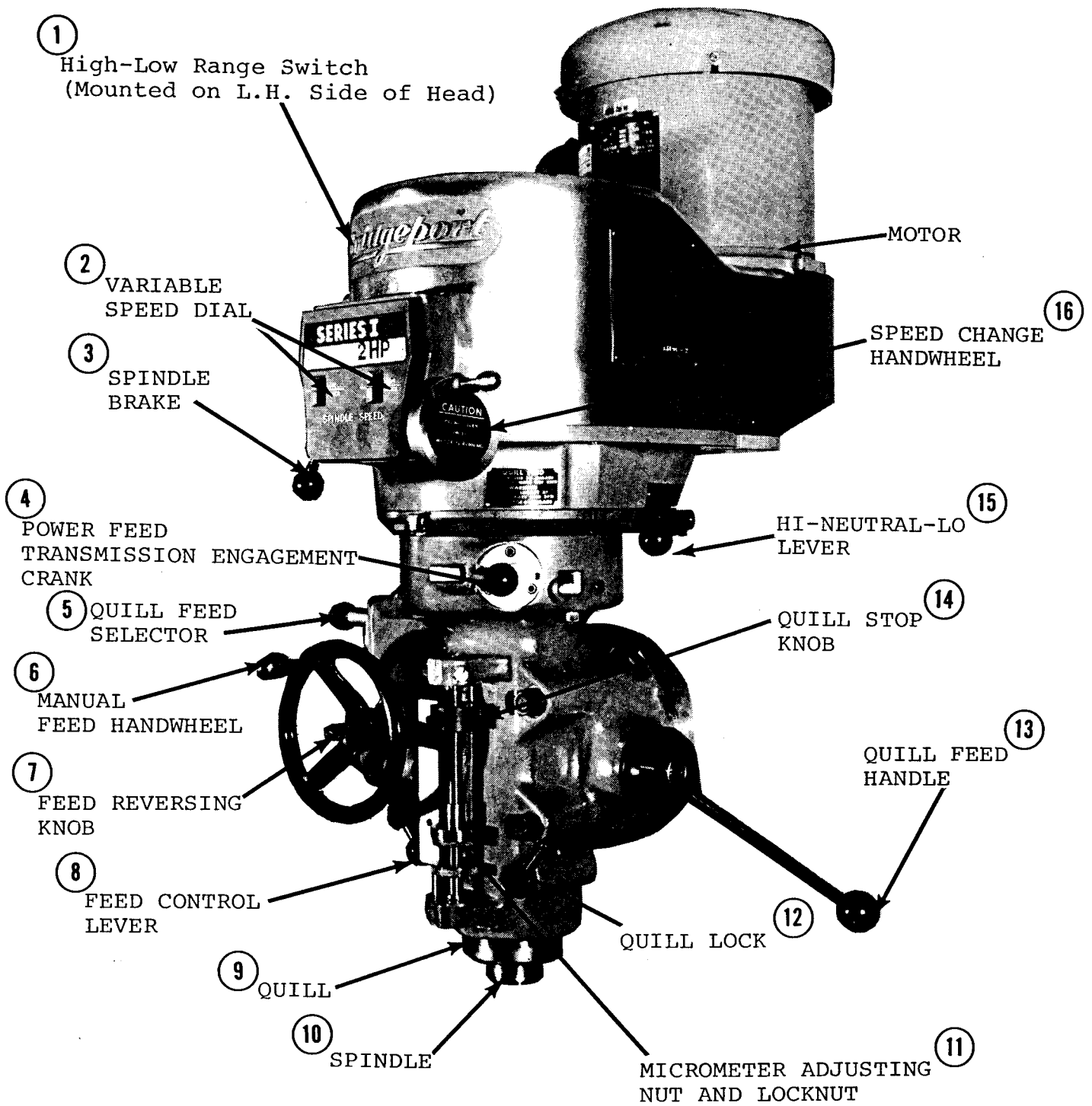


Figure 10. 2J Milling Attachment

SPINDLE BRAKE (3, Figure 10): Brake lever can be moved in either direction to stop spindle; however, when locking spindle, lever should be moved to right or left and then raised. When brake is worn out it has to be replaced. There are no adjustments to be made.

CAUTION

BE CERTAIN THAT THE SPINDLE BRAKE IS RELEASED BEFORE STARTING THE MOTOR. THIS IS IMPORTANT AS THE MOTOR CAN BE DAMAGED IF SWITCH IS TURNED ON WITH BRAKE IN LOCKED POSITION.

HIGH-LOW RANGE SWITCH (1): This is the motor reversing switch. When the attachment is in direct drive (High Speed) the motor and spindle are turning in the same direction. When the attachment is in "Back Gear" (Low Speed) the spindle would run backwards unless the motor direction is reversed.

The back-gear lever is marked Hi-Lo. This will indicate the proper switch position. They should be alike or the spindle will run backwards.

HI-NEUTRAL-LO LEVER (15): This lever is used to put the attachment into either backgear or direct drive. Rotate the spindle by hand to facilitate meshing of clutch or gears.

Neutral can also be obtained at mid-way position. After a long period of use, the neutral position may cause noise (in neutral only) by allowing the clutch teeth to rub each other.

This can be corrected by loosening set screw (#64 page 36) and reversing the position of the detent plate (#65 page 36).

Neutral is provided to permit free spindle rotation for indicating and set-up work.

In the high speed position (direct drive) the spindle is driven by tapered clutch teeth. If the clutch is not meshed tightly, clutch rattle will be heard. This can be avoided by moving the detent plate upward as the clutches wear. This is also the reason for possible loss of neutral, requiring the reversal of the detent plate.

CAUTION

DO NOT shift Hi-Lo Lever while motor is running.

POWER FEED TRANSMISSION ENGAGEMENT CRANK (4, Figure 10): Engages power feed worm gear. When lever is in right hand hole, the power feed worm gear is engaged. To disengage worm gear, pull knob out and crank handle in clockwise or down direction and move to opposite position.

NOTE
CRANK CANNOT BE SWUNG AROUND IN COUNTER CLOCKWISE DIRECTION; HOWEVER, NO DAMAGE WILL OCCUR IF MOVED IN THIS DIRECTION. TO ENGAGE THE WORM A CLOCKWISE MOVEMENT IS REQUIRED.

CAUTION
POWER FEED WORM GEAR MAY BE ENGAGED WHEN SPINDLE IS ROTATING, HOWEVER, IT SHOULD BE ENGAGED GENTLY TO AVOID DAMAGE TO WORM GEAR. THE WORM GEAR MAY BE DISENGAGED AT ANY TIME. DO NOT USE POWER FEED AT SPEEDS ABOVE 3000 RPM.

IMPORTANT : It is recommended that the Power Feed worm gear be disengaged whenever the power feed is not required. This will avoid unnecessary wear on power feed worm gear.

QUILL FEED SELECTOR (5): This crank is used for selecting the three feeds; .0015", .003" and .006" per revolution. It is shifted by pulling knob out and turning from one position to the other. Feeds are stamped on cover below indentation hole. Feed is more readily engaged when spindle is running.

FEED REVERSE KNOB (7): Position of this knob depends upon direction of spindle rotation. If boring with right hand cutting tools, pull feed handle towards operator until clutch becomes engaged.

Neutral position is between forward and reverse position. It is recommended that the handle be left in neutral position when not in use.

MANUAL FEED HANDWHEEL (6): Feed reversing knob should be in neutral position and feed control lever (8) engaged. Clockwise rotation of handwheel moves quill down. The Manual Feed Handwheel and the Quill Feed Handle may be disengaged by moving them outward about 1/8".

NOTE

The feed control lever must be engaged in order to use manual feed controls. The Quill Feed Handle and Manual Feed Handwheel may be taken off when not in use.

FEED CONTROL LEVER (8): Engages over-load clutch on pinion shaft when positioned left and will stay engaged until either quill stop comes in contact with micrometer adjusting nut, forcing feed control lever to drop out automatically, or released manually by engaging lever to right.

NOTE

The Feed Control Lever is carefully set at plant to disengage automatically when quill stop goes against micrometer adjusting nut or against throw out pin at top. However, if this should go out of adjustment, it may easily be brought back by regulating the socket set screw located at bottom of tripping rod (item no. 144 page 35).

CAUTION

WHEN ADJUSTING THE SOCKET SET SCREW, CHECK AUTOMATIC DISENGAGEMENT IN BOTH DIRECTIONS; THAT IS WITH QUILL-STOP NUT (#161 PAGE 35) AGAINST THE FEED TRIP LEVER (#145 PAGE 35) FOR DOWN POSITION, AND AGAINST REVERSE TRIP BALL LEVER (#183 PAGE 35) FOR THE UP POSITION.

QUILL FEED HANDLE (13): May be removed by simply pulling handle off. It is recommended that handle be disengaged when using power feed.

QUILL STOP KNOB (14): Is used to disengage automatic feed in either direction as well as the setting point for working to given depths.

MICROMETER NUT (11): This nut is used for setting of depths. Each graduation on nut indicates .001" of depth, it reads directly to scale mounted along side of it. Depths may be obtained by setting micrometer nut in conjunction with quill stop.

QUILL LOCK (12): This is a friction quill lock to be used when quill is in stationary position such as milling operations. It is recommended that this lock be used whenever quill movement is not desired.

POSITION OF RAM: Can be regulated by loosening two Ram Lock Studs (#119 page 26) on turret (#124 page 26) and pulling the ram (#10 page 26) in or out to desired position.

CAUTION
CARE SHOULD BE TAKEN TO LOCK RAM
SECURELY AFTER SETTING.

NOTE
It is recommended that on heavy milling work, head should be kept as close to column as possible, where maximum rigidity is obtained.

RECOMMENDATIONS :

Use 2, 3, or 4 flute end mills. Eight flute end mills are usually not as satisfactory for general milling. When using shell mills, face mills or any other tooling, proper machining practice should be observed.

Power feed can be used for drills up to 3/8" in diameter. Use manual feed for drills larger than 3/8".

Overload clutch is set at factory to hold up to 200 lbs. down pressure on quill, which will accommodate drills up to 3/8" diameter in mild tool steel.

CAUTION
THIS CLUTCH SHOULD NOT BE TAMPERED
WITH IN THE FIELD.

OPERATING INSTRUCTIONS

CAUTION
DO NOT TRY TO CHANGE SPEED POSITION
UNTIL MOTOR IS RUNNING. THIS COULD
CAUSE BREAKAGE OF PARTS.

Spindle Speeds are adjusted by turning speed change handwheel (#21 page 36) on the front of the belt housing. There are two ranges shown; 60 to 500 and 500 to 4200.

60 to 500 is obtained through the back-gear drive and is referred to as the low range. To engage the back-gears, use the lever marked Hi-Neutral-Lo on the right rear side of the attachment. Move this lever to the "LO" position and use the low range on the down switch.

When shifting to "LO," **DO NOT FORCE THE LEVER** if the back gears do not mesh. Hold the lever so that the gears are clear of one another, rotate the spindle nose by hand until the gears line up, then put the unit in "LO" (back gear)

500 to 4200 is obtained through direct drive and is the high range. The same lever and switch as above are used; selecting the "HI" range.

When shifting to "Hi," do not force the lever if the clutch teeth do not mesh. It is a simple matter to engage the brake and rotate the spindle nose by hand until the clutches engage.

Wear on the vari-drive belt will cause a slight change in the speeds to that shown in windows (#22 page 36) on the dial. This can be corrected as follows. Crank the speed change handwheel (#16, Figure 10) snugly against the high speed stop. (This will be near the 4200 reading on the dial.) Use a tachometer to determine the spindle speed, then turn the pivot stud (#16 page 38), after loosening the jam nut (Item #7 page 38) until the spindle speed registers 4200 on the tachometer; tighten jam nut.

Now reposition the speed dial plate to match the tachometer reading. This is done by loosening the Hex nut (#1 page 36) until the spindle speed registers 4200 on the tachometer; tighten jam nut.

CAUTION
TRY TO AVOID SHIFTING THE HI-LO LEVER
WHEN THE FEED WORM IS ENGAGED.

DO NOT LOOSEN the 3 hex nuts (#61 page 36) on the upper part of the Quill Housing (#192 page 34). These are set at the factory and are used only for alignment.

SWIVELING THE VARI-DRIVE may be accomplished by loosening the lower 3 hex nuts (#47 page 36) attaching the Vari-Drive unit to the quill housing and then swiveling to any desired position. See arrangement of T-Bolts (#45 page 36) in Gear Housing (#44 page 36) for this purpose.

WARNING
CARE MUST BE TAKEN TO SECURE THE NUTS
(#47 page 36) WHEN THE ATTACHMENT IS IN
POSITION, BEFORE THE MOTOR IS TURNED ON.

REMOVING THE MOTOR (See Figure 11): Run the attachment to the bottom of either speed range and shut off the motor. This puts the vari-drive belt in the best position for disassembly.

1. DISCONNECT THE POWER and then remove the switch from the side of the belt housing.

2. Remove the cover (#76 page 36) (B, Figure 11) at the lower end of the motor shaft. Use two cover screws (#75 page 36) (A) to fasten the spring (#44 page 38) (C) on the lower end of the motor shaft, to the lower motor vari-drive pulley (#43 page 38). This will reduce the hazard of personal injury that is always present when a heavy spring is under compression. When the pulley, spring retainer (#45 page 38) and spring are securely fastened as a single unit, crank the speed change handwheel (#16 Figure 10) to top speed position.
3. Now remove the screws (#9 page 38) (D) that fasten the motor to the belt housing. The motor should be lifted slightly and pulled firmly away from the spindle and toward the rear of the belt housing. This will pull the vari-drive belt (#27 page 38) deeply into the spindle pulley (#25 page 38), providing the slack needed to slip the belt over the motor pulley (#43 page 38).
4. Now lift the motor high enough to rest the motor base GENTLY on the adjusting screw (#16 page 38) (E) seen directly in front of the motor flange. The belt can now be slipped over the lower pulley and the motor removed from the housing.

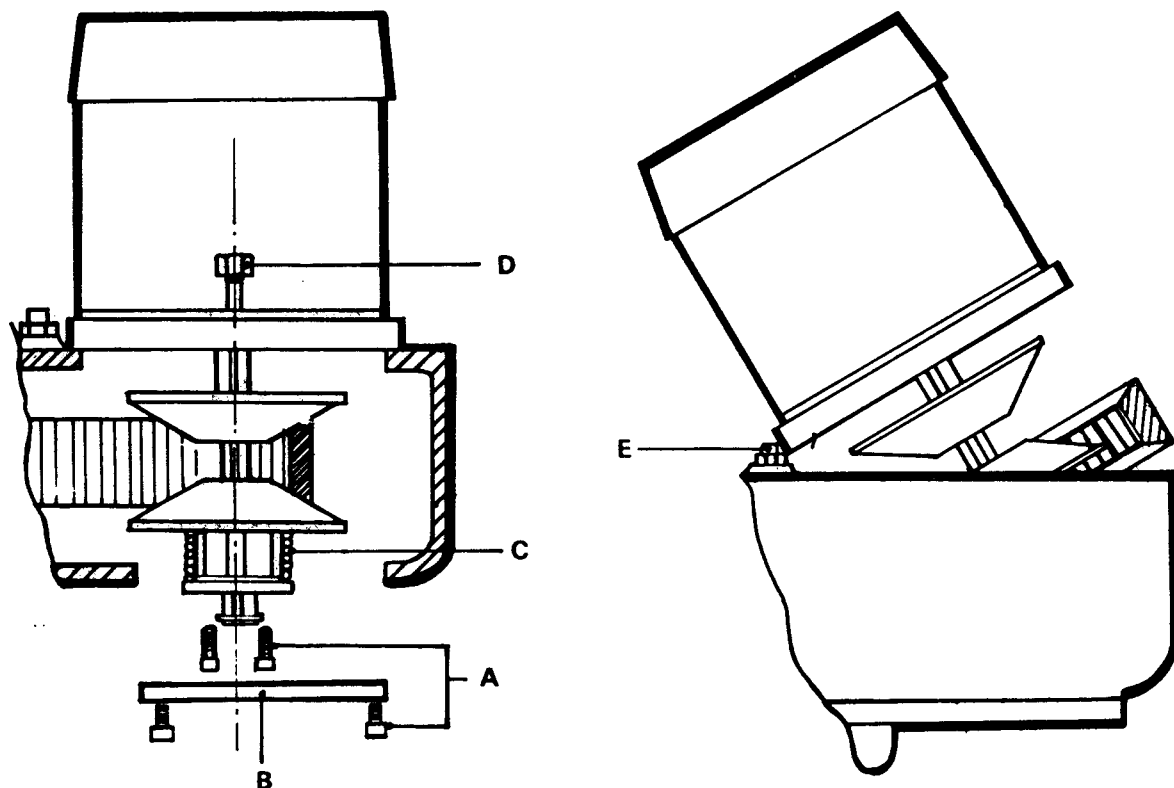


Figure 11. Removing the Motor (Side View)

CHANGING VARI-DRIVE BELT (Figure 12)

Complete the above procedures for removing the motor, then remove the three screws (#1 page 38) (A, Figure 12) and lift out the top bearing cap (#2 page 38) (B). Looking down inside of the housing, locate and remove two socket head cap screws (#17 page 38) and sleeves (#19 page 38) (C). Next, remove the four screws (#6 page 38) (D) and the screw (#55 page 38) (E) holding the belt housing (G) to the base (#53 page 38). Unscrew and remove the two lower screws (#25 page 36) in the speed changer bracket just below the speed dial (#2 page 36) (F).

NOTE

On Models with plastic face plate (#27 page 36) remove screws (#23 page 36) first.

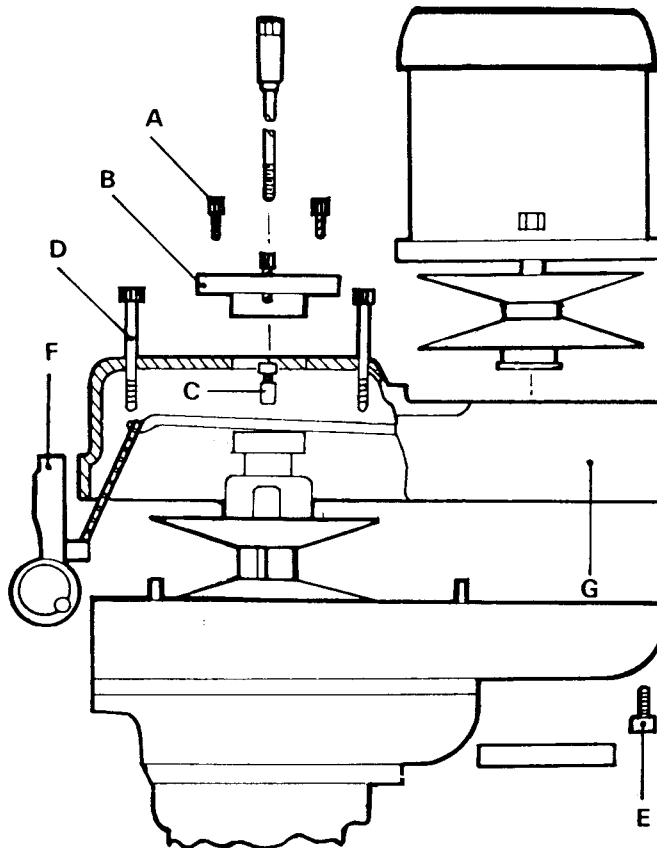


Figure 12. Removing the Vari-Drive Belt

The belt housing, complete with speed changer bracket, is now removed from its belt housing base (#53 page 38). A slight blow under the speed changer bracket (#5 page 36) may be needed to separate the belt housing (#10 page 38) from the belt housing base (#53 page 38).

Remove the old belt (#27 page 38) and replace it with a new belt. **DO NOT** use a substitute belt purchased from other than a Bridgeport Dealer. Vibration and heat could result from the use of the wrong belt.

CHANGING TIMING BELT (Figure 13)

Complete the operation for removing the motor. Then put the Hi-Neutral-Lo lever (#15, Figure 10) in the Lo position, remove the drawbar (#14 page 38) (A, Figure 13) and lower the spindle.

Remove screws (#55 page 38) (B) holding the upper and lower housings (#63 page 38) together, including the two lower screws (C) in speed changer bracket just below the speed dial.

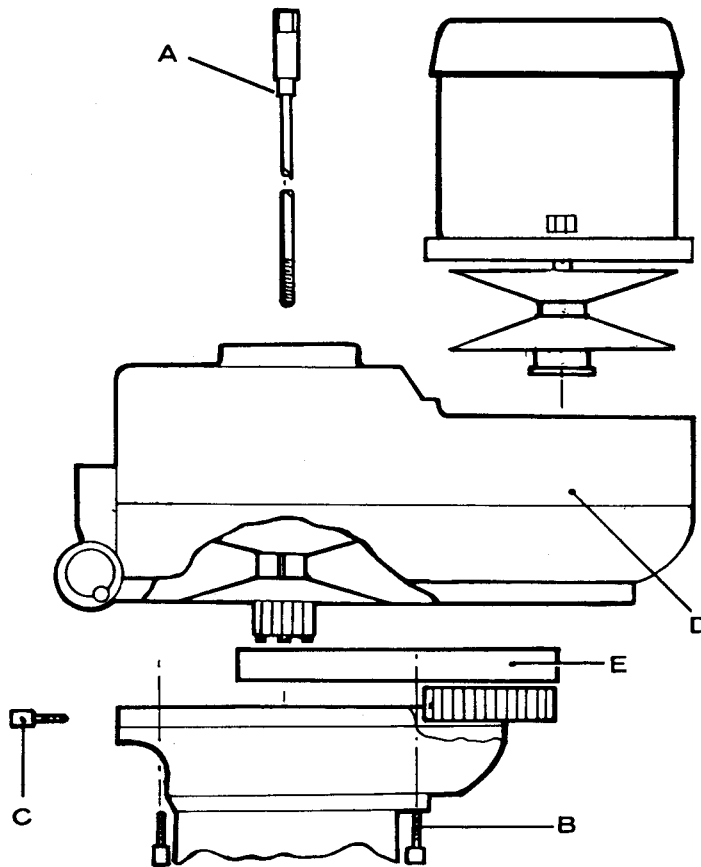


Figure 13. Removing Timing Belt

A slight blow under the speed changer bracket (#5 page 36) may be needed to separate the upper housing (D) from its base.

As the housings are being separated, the HTD belt (D) (#36 page 36) still connects them, resisting the separating movement. The separation can be assisted by gently pushing the belt off the large pulley (#86 page 36) as the upper housing is being raised.

Remove the old belt and replace with a new belt.

GENERAL SPEED RECOMMENDATIONS

Material to be Cut	Feet Per Minute		
	Rough Cut	Rough and Finish	Light and Finish Cut
Cast Iron-Soft-(Under 200 Brinnell)	70	80-90	120
Cast Iron-Med.-(200-300 Brinnell)	55	60-70	90
Cast Iron-Hard-(Over 200 Brinnell)	40	50-60	70
Steel (Chrome Nickel 40-45 Shore)	30	40	50
Steel (Stainless)	60	80	90
Steel (Low Carbon)	80	90	140
Steel (High Carbon)	40	50	70
Bronze (Medium)	90	120	150
Bronze (Hard)	65	90	130
Brass (Hard)	100	150	200
Copper	150	200	300
Duraluminum	400	----	600
Aluminum	600	----	1000

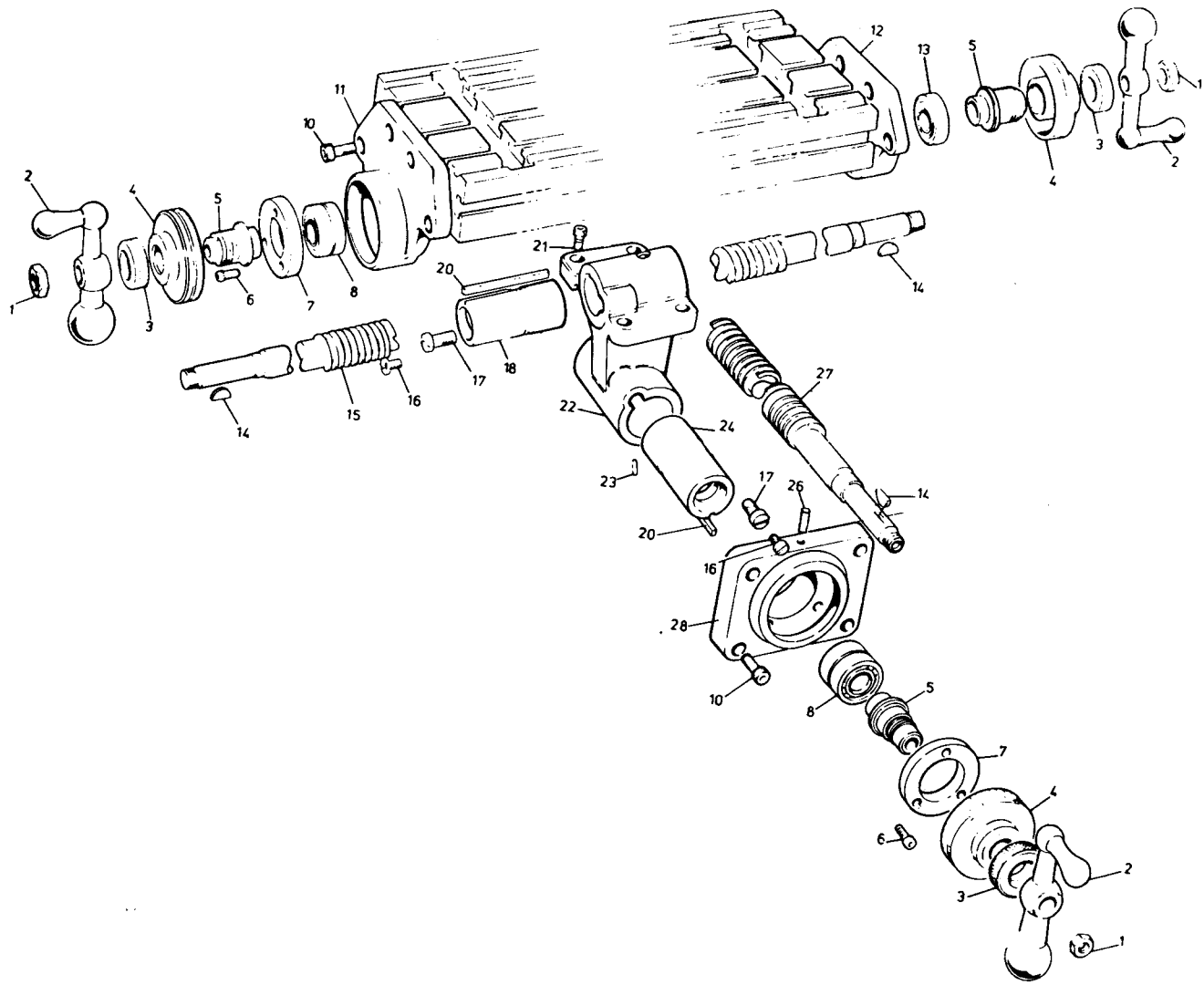
TABLE OF CUTTING SPEEDS AND FEEDS

Feet Per Minute	Revolutions Per Minute											
	15	20	25	30	40	50	60	70	80	90	100	
Diameter, Inches												
1/16"	917	1222	1528	1833	2445	3056	3667	4278	4889	5500	6112	
1/8"	458	611	764	917	1222	1528	1833	2139	2445	2750	3056	
3/16"	306	407	509	611	815	1019	1222	1426	1630	1833	2037	
1/4"	229	306	382	458	611	764	917	1070	1375	1375	1528	
5/16"	183	244	306	367	489	611	733	856	978	1100	1222	
3/8"	153	204	255	306	407	509	611	713	815	917	1019	
7/16"	131	175	218	262	349	437	524	611	698	786	873	
1/2"	115	153	191	229	306	382	458	535	611	688	764	
5/8"	91	122	153	183	244	306	367	428	489	550	611	
3/4"	76	102	127	153	204	255	306	357	407	458	509	
7/8"	65	87	109	131	175	218	262	306	349	393	437	
1"	57	76	95	115	153	191	229	267	306	344	382	
1 1/8"	50	67	84	102	136	170	204	238	272	306	340	
1 1/4"	45	61	76	91	122	153	183	214	244	275	306	
1 3/8"	41	55	69	83	111	139	167	194	222	250	278	
1 1/2"	38	50	63	76	102	127	153	178	204	229	255	
1 5/8"	35	47	58	70	94	118	141	165	188	212	235	
1 3/4"	32	43	54	65	87	109	131	153	175	196	218	
1 7/8"	30	40	50	61	81	102	122	143	163	183	204	
2"	28	38	47	57	76	95	115	134	153	172	191	

PARTS IDENTIFICATION

B A S I C M A C H I N E

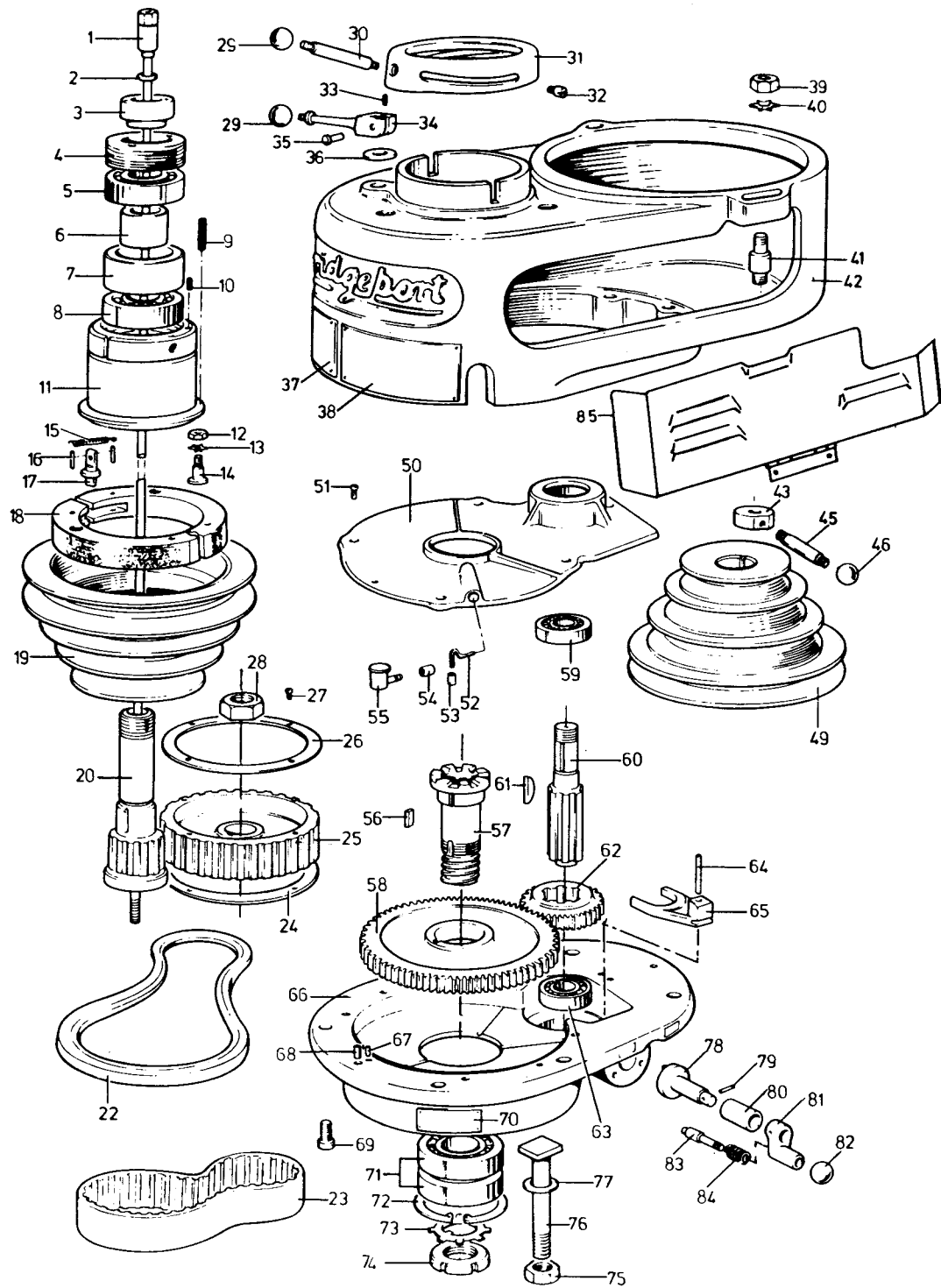
ITEM NO.	CODE NO.	DESCRIPTION	ITEM NO.	CODE NO.	DESCRIPTION
1	2193500	Quill Housing ADJ. Gear	70	1111912	Washer
2	2060129	Ram Adapter	71	1010786	Knee Binder Plug (Plastic)
4	1060892	Snap Ring	72	1011375	Dog Point Set Screw
5	1011216	Socket Set Screw (2 Req.)	73	1011270	Set Screw
6	1062206	Vertical Adjusting Worm	74	1011755	Jam Nut
7	2060135	Worm Thrust Washer (2 Req.)	75	2060071	Key
8	2060130	Vertical Adjusting Worm Shaft	76	2060072	Washer
9	2060138	Worm Key	77	1062204	Bevel Gear
10	2060128	Ram	79	1060205	Sealed Ball Bearing
13	1011035	Socket Cap Screw (2 Req.)	80	2060070	Bearing Retainer Ring
14	1010590	Roll Dowel Pin	81	1011030	Socket Head Cap Screw
15	1062826	Angle Plate	82	2061238	Elevating Screw Assembly
16	1011555	Round HD Drive Screw (5 Req.)	83	2060060	Handle
17	2061028	Adapter Pivot Pin	84	2060080	Elevating Crank
18	2200109	Chamfered & Hardened Washer (7 Req.)	85	2060079	Gearshaft Clutch Insert
19	1061180	Adapter Locking Bolt (3 Req.)	86	2060078	Dial Lock Nut
23	2060021	Table 36" (2060022 - 42" - 2060023 - 48")	87	2060076	Dial with 100 Graduations
31	1061602	Stop Piece T-Bolt (3 Req.)	88	2060077	Dial Holder
32	1062301	Table Stop Piece (2 Req.)	89	1011030	Socket Head Cap Screw
33	1011720	Hex Nut (3 Req.)	90	2060210	Bearing Retaining Ring
37	2060120	Table Lock Bolt Handle	91	1060204	Grease Sealed Bearing
38	2060126	Saddle Lock Bolt	92	2060074	Bearing Cap
39	2060125	Saddle Lock Plunger	93	1013078	Key
40	1011071	Socket HD Cap Screw (2 Req.)	94	2060147	Elevating Shaft for 12" Knee
41	2060088	Gib Adjusting Screw (3 Req.)	95	1060204	Grease Sealed Bearing
42	2060121	Table Stop Bracket	96	1062205	Bevel Pinion
43	2060117	Saddle/Table Gib	97	1011220	Set Screw
44	1062406	Felt Wipers (4 Req.)	98	2060209	Column
46	2060118	Table Lock Plunger	102	1011074	Socket Head Cap Screw
47	2060119	Table Lock Bolt	103	2060207	Pedestal
48	2060120	Table Lock Bolt Handle	104	2060051	Elevating Screw Nut
49	2060124	Saddle/Knee Gib	105	1011033	Socket Head Cap Screw
50	2060123	Saddle Knee Wiper Plate (2 Req.)	118	2060144	Spider
51	1011580	Oval Head Screw (6 Req.)	119	2060133	Ram Lock Stud
52	2060097	Saddle	120	2060134	Ram Pinion
53	2060093	Left Hand Column Wiper Holder	121	2060139	Ram Pinion Handle
54	1062405	Knee Wiper Felt	122	1192150	Plastic Ball
55	2060146	Knee/Column Gib	123	2200109	Chamfered x Hardened Washer
56	1011035	Allen Cap Screw (2 Req.)	124	2060143	Turret
57	2060094	Right Hand Column Wiper Holder	125	2060137	Ram Clamp Bar
58	1062405	Knee Wiper Felt	126	2060141	Ram Clamp Untapped
60	1060152	Chip Guards - Upper	127	2060136	Ram Clamp Tapped
61	1060153	Chip Guards - Lower	128	1010770	Split Pin
62	2060206	Knee 12"	129	1061178	Locking Bolt
64	2060095	Stop Screw	130	2060140	Ram Pinion Screw
65	2061230	Knee Lock Shaft Assembly	131	1113051	Wrench
69	2060089	Knee Lock Plunger	132	2650180	Stop Bracket
			133	2069999	Stop Pin



LEADSCREW ASSEMBLY

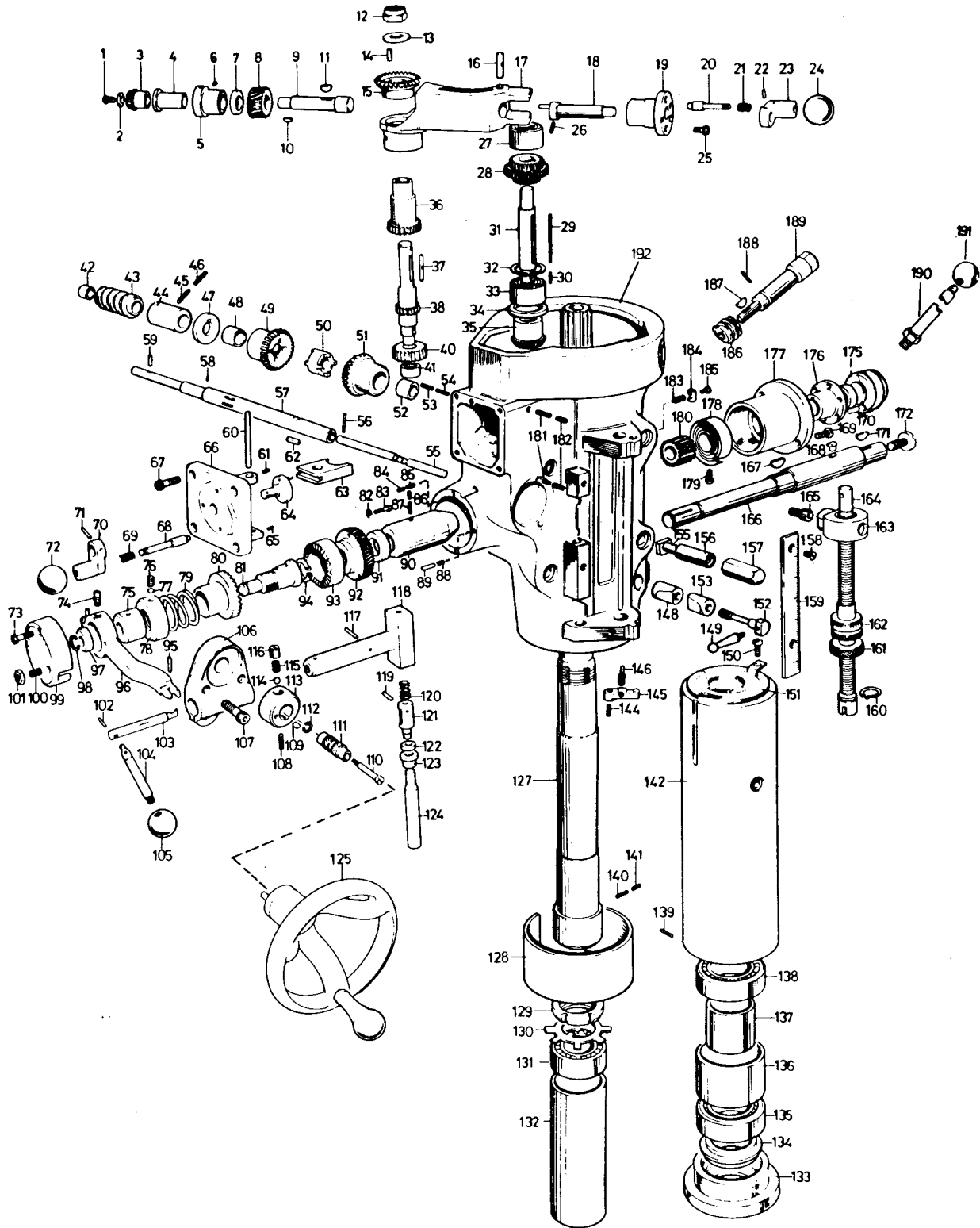
(See pages 48 thru 50 for Metric Kits)

ITEM NO.	CODE NO.	DESCRIPTION
1	1011755	Jam Nut (3 Req.)
2	2060085	Ball Crank Handle (3 Req.)
3	2060078	Dial Lock Nut (3 Req.)
4	2060083	Dial with 200 Graduations (3 Req.)
5	2060084	Dial Holder (3 Req.)
6	1011030	Socket Cap Screw (6 Req.)
7	2060075	Bearing Retainer Ring (2 Req.)
8	1060203	Grease Sealed Ball Bearings (2 Req.)
10	1011074	Socket Cap Screw (12 Req.)
11	2060116	Right Bearing Bracket
12	2060115	Left Bearing Bracket
13	1060204	Grease Seal Ball Bearing
14	1013078	No. 7 Woodruff Key (3 Req.)
15	2061222	Longitudinal Feed Screw 42" (48" also available 2061223)
16	1011592	Washer Head Screw (2 Req.)
17	2060100	Cross Feed Nut Retaining Screw (2 Req.)
18	2060102	Longitudinal Feed Nut
20	2060099	Key (2 Req.)
21	1011074	Socket Cap Screw (4 Req.)
22	2061250	Feed Nut Bracket
23	2060096	Key Pin
24	2060098	Cross Feed Nut
26	2190188	Stop Pin
27	2061233	Cross Feed Screw for 12" Knee
28	2060082	Cross Feed Bearing Bracket



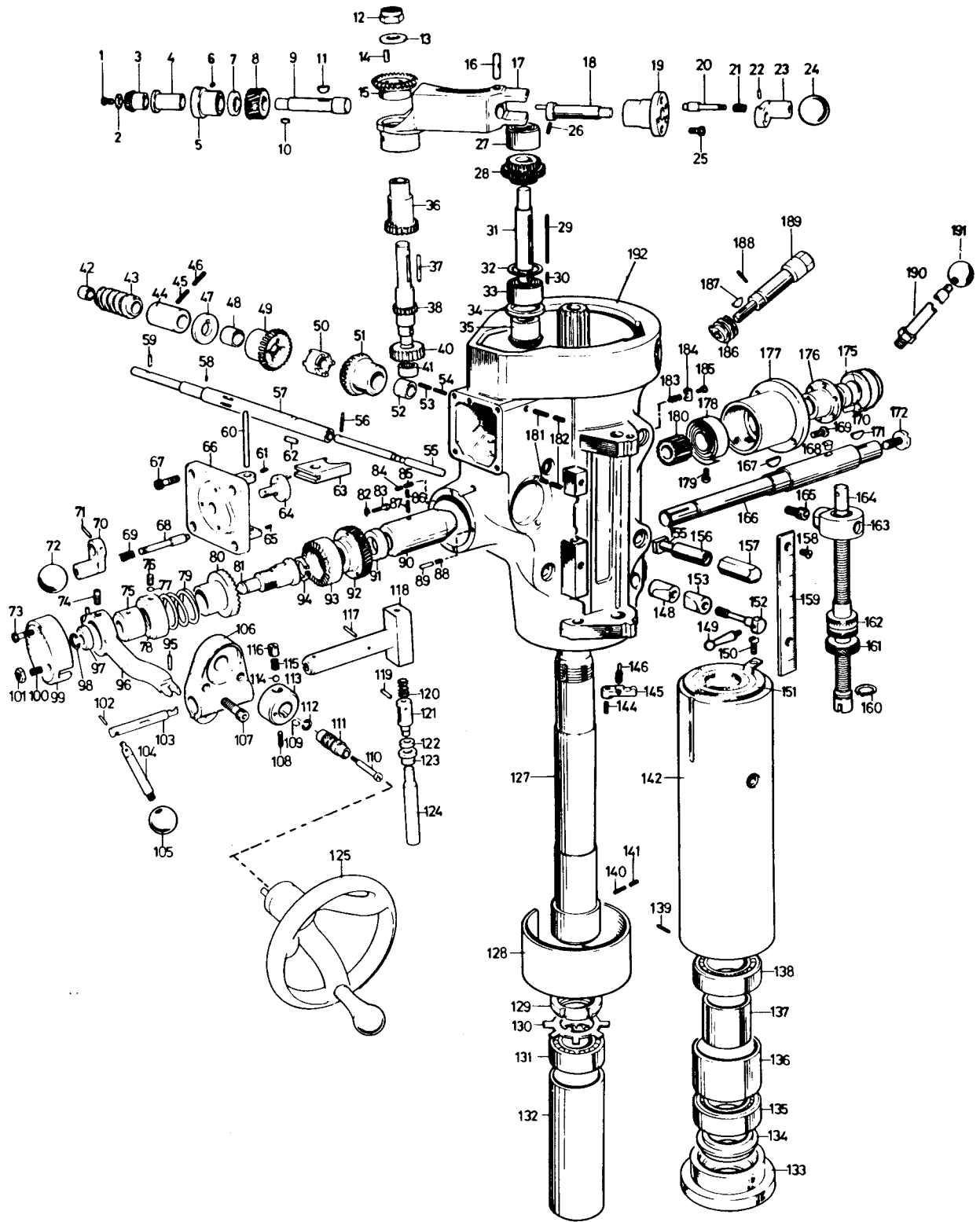
J HEAD TOP HOUSING

ITEM NO.	CODE NO.	DESCRIPTION	ITEM NO.	CODE NO.	DESCRIPTION
1	2193502	Drawbar for R.8 Collet	42	2193507	Belt Housing
2	2190183	Drawbar Washer	43	2193541	Motor Locknut (2 Req.)
3	2190126	Upper Bearing Locknut	45	2190172	Motor Locknut Handle (2 Req.)
4	2190125	Bearing Sleeve Locknut	46	1192151	Black Plastic Ball (2 Req.)
5	1190232	Ball Bearing	49	2193508	Motor Pulley
6	2193506	Upper Bearing Spacer (small)	50	2193452	Gear Housing Cover
7	2193506	Upper Bearing Spacer (large)	51	1011455	Round HD Screw (5 Req.)
8	1190232	Ball Bearing	52	1195720	Wick
9	1192032	Compression Spring (4 Req.)	53	2190120	Oiler Tube
10	1011258	Socket Set Screw (2 Req.)	54	2190121	Oiler Plug
11	2193512	Spindle Pulley Bearing Sleeve	55	1193105	Oil Cup
12	1011743	Jam Nut	56	2190116	Bull Gear Key
13	1191965	External Lock Washer	57	2190115	Splined Gear Hub
14	2193516	Brake Ring Screw (3 Req.)	58	2193548	Spindle Bull Gear Assembly
15	1192084	Spring (2 Req.)	59	1180235	Bearing
16	1010507	Roll Pin (4 Req.)	60	2190136	Countershaft
17	2190131	Brake Lock Stud	61	1013079	Key
18	2193477	Brake Assembly	62	2190137	Countershaft Gear
19	2190055	Spindle Pulley	63	1180235	Bearing
20	2193478	Spindle Pulley Hub	64	1010747	Dowel Pin
22	1192101	'V' Belt	65	2190062	Back Gear Shifter Fork
23	1182106	Timing Belt	66	2193505	Gear Housing
24	2190058	Timing Belt Pulley Flange	67	1010540	Dowel Pin (2 Req.)
25	2193509	Timing Belt Pulley	68	1010555	Roll Pins (2 Req.)
26	2190058	Timing Belt Pulley Flange	69	1011104	Socket Cap Screw (6 Req.)
27	1011506	Flat Head Screw	71	1190230	Ball Bearing
28	1191738	Hex Jam Nut	72	1190806	Snap Ring
29	1192151	Black Plastic Ball Handle (2 Req.)	73	1191944	Lockwasher
30	2190128	Spindle Clutch Lever	74	1191793	Bearing Locknut
31	2190127	Cam Ring	75	1011718	Hex Nut Hardened (3 Req.)
32	2190129	Cam Ring Pin (2 Req.)	76	2193515	Vertical Tee Bolt (3 Req.)
33	1011215	Socket Set Screw	77	2190114	Vertical Bolt Washer (3 Req.)
34	2190133	Brake Lock Handle	78	2193545	Back Gear Shift Crank
35	2190134	Brake Lock Pin	79	1010517	Roll Pin
36	2190132	Brake Lock Washer	80	2190186	Back Gear Shift Bushing
37	1192830	Spindle Speed Plate	81	2193443	Shift Crank
38	1192832	Operating Instruction Plate	82	1192151	Black Plastic Ball 1" Dia.
39	1191796	Hex Jam Nut (2 Req.)	83	2190138	Gearshift Plunger
40	1191922	Lock Washer	84	1192052	Compression Spring
41	2190173	Motor Mounting Studs (2 Req.)	85	2190040	Belt Guard Assembly



J H E A D
(SEE PAGE 48 FOR METRIC KIT)

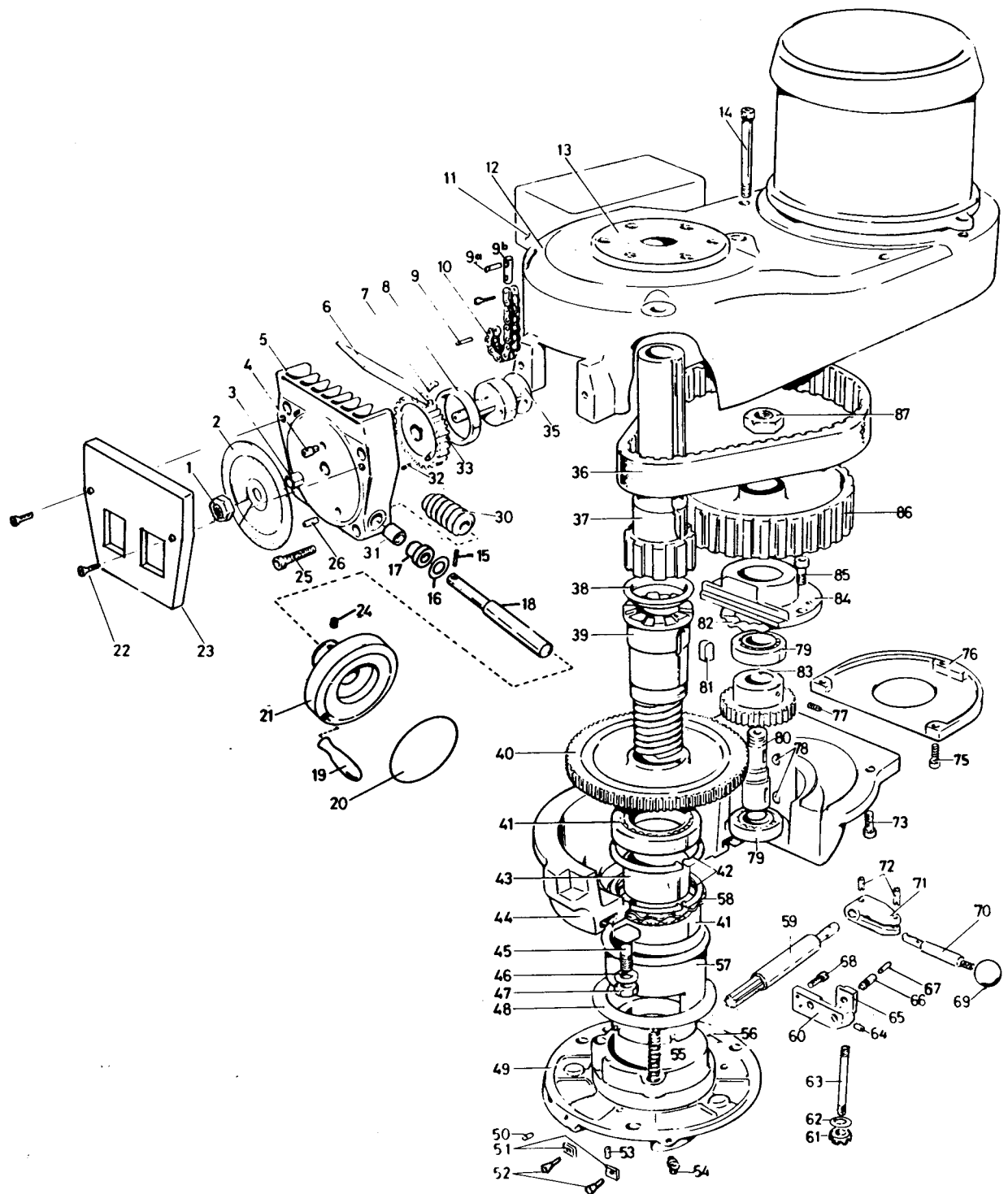
ITEM NO.	CODE NO.	DESCRIPTION	ITEM NO.	CODE NO.	DESCRIPTION
1	1011445	RD. HD. Screw	59	2190201	Pin
2	2190163	Bevel Pinion Washer	60	2190179	Feed Shift Rod
3	2190203	Feed Bevel Pinion	61	1011260	KP. Set Screw
4	2190164	Feed Worm Gear Shaft Sleeve	62	2190162	Key
5	1192303	Worm Cradle Bushing	63	2190061	Feed Gear Shift Fork
6	1011287	Setscrew	64	2193446	Cluster Gear Shift Crank
7	2190165	Worm Gear Spacer (4 Req.)	65	1011270	Socket Set Screw
8	2190166	Feed Drive Worm Gear	66	2190065	Cluster Gear Cover
9	2190167	Feed Drive Worm Gear Shaft	67	1011010	Cap Screw (4 Req.)
10	2190162	Worm Shaft Key	68	2190138	Gear Shift Plunger
11	1013078	Key	69	1192052	Compression Spring
12	1011771	Locknut	70	2193443	Shift Crank
13	2190199	Washer	71	1010517	Roll Pin
14	2190176	Cluster Gear Key	72	1192151	Black Plastic Ball
15	1192209	Feed Reverse Bevel Gear	73	1011014	Cap Screw (2 Req.)
16	2190168	Feed Engage Pin	74	2190188	Clutch Ring Pin (2 Req.)
17	2190059	Worm Gear Cradle	75	2190098	Clutch Ring
18	2190169	Worm Gear Cradle Throw-out	76	1011265	Socket Set Screw
19	2190170	Shift Sleeve	77	2200110	Brass Plug
20	2190138	Gearshift Plunger	78	2190105	Overload Clutch Locknut
21	1192052	Compression Spring	79	1192055	Safety Clutch Spring
22	1010517	Roll Pin	80	1192302	Overload Clutch
23	2193443	Shift Crank	81	2193549	Overload Clutch Sleeve
24	1192151	Black Plastic Ball	82	1191920	Single Spring Washer (3 Req.)
25	1011010	Cap Screw (3 Req.)	83	1011431	Round Head Screw (3 Req.)
26	1011258	Set Screw	84	1011542	Mock-it Lockscrew
27	2190181	Cluster Gear Shaft Upper Bearing	85	1011268	Socket Set Screw
28	2193504	Cluster Gears Assembly	86	1011542	Lockscrew
29	2190175	Cluster Gear Key	87	1011268	Socket Set Screw
30	2190148	Round End Key	88	1192032	Compression Spring
31	2193517	Cluster Gear Shaft	89	2190096	Overload Clutch Lever Spring Plunger
32	1190836	Snap Ring	90	2190106	Quill Pinion Shaft Bushing
33	2190149	Bevel Gear Bearing	91	2190104	Pinion Shaft Worm Gear Spacer
34	2190150	Bevel Gear Thrust Spacer	92	2190103	Overload Clutch Worm Gear
35	2193544	Feed Reverse Bevel Pinion	93	2190102	Overload Clutch Ring
36	2190146	Feed Driving Gear	94	1190870	Snap Ring
37	2190176	Key	95	1010717	Dowel Pin
38	2193440	Cluster Gear Input Shaft	96	2193427	Overload Clutch Trip Lever
40	2193440	Feed Drive Gear	97	2190097	Overload Clutch Washer
41	1190310	Needle Bearing	98	1190822	Snap Ring
42	1193637	Bushing	99	2190068	Clutch Arm Cover
43	1192208	Worm	100	1011308	Socket Set Screw
44	2190155	Feed Worm Shaft Bushing	101	1011740	Chem Blacked Locknut
45	1011268	Socket Set Screw	103	2190094	Cam Rod
46	1011542	Mock-it Lockscrew	104	2190095	Trip Handle
47	2190152	Feed Worm Shaft Thrust Washer	105	1192151	Black Plastic Ball
48	1193635	Bushing	106	2190067	Feed Trip Bracket
49	2193432	Feed Reverse Bevel Gear	107	1011035	Cap Screw (2 Req.)
50	2190153	Feed Reverse Clutch	108	1011222	Socket Set Screw
51	2193432	Feed Reverse Bevel Gear	109	2190162	Key
52	1193635	Bushing	110	2193547	Feed Reverse Knob Stud
53	1011547	Socket Set Screw	111	2193433	Reverse Knob
54	1011375	Socket Set Screw	112	1180818	Snap Ring
55	2190157	Reverse Clutch Rod	113	2193518	Handwheel Clutch
56	1010509	Roll Pin	114	1192165	Steel Ball
57	2190198	Feed Worm Shaft			
58	2190200	Pin			

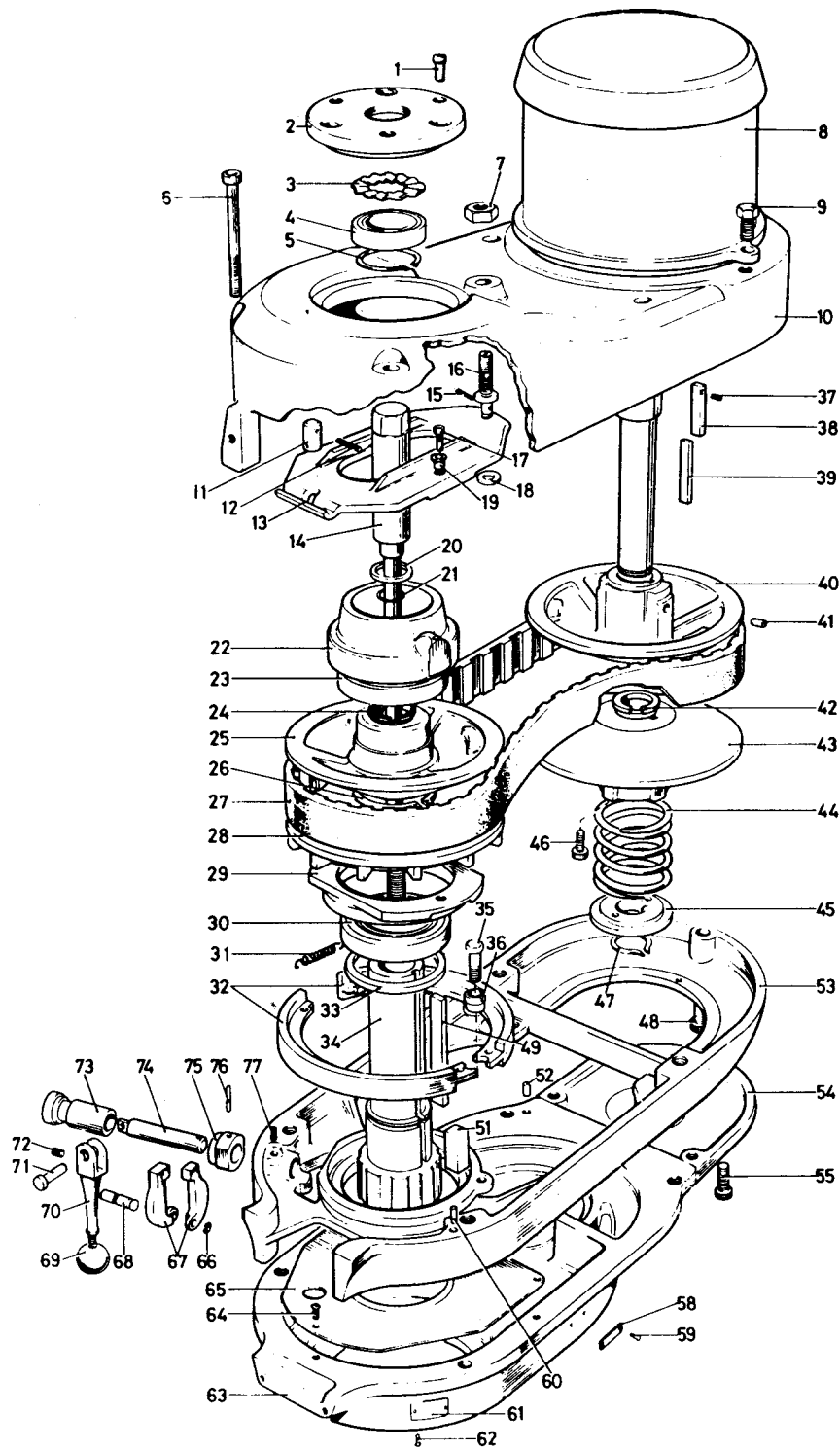


J HEAD (CONTINUED)

(SEE PAGE 48 FOR METRIC KIT)

ITEM NO.	CODE NO.	DESCRIPTION	ITEM NO.	CODE NO.	DESCRIPTION
115	1192054	Compression Spring	170	1010717	Roll Pin
116	2190154	Handwheel Clutch Spring Screw	171	1013076	Key
117	1010515	Roll Pin	172	2190182	Pinion Shaft Hub Screw
118	2190093	Cam Rod Sleeve Assy.	173	1192165	Steel Ball
119	1010513	Roll Pin	174	1192033	Compression Spring
120	1192053	Compression Spring	175	2201031	Rack Feed Handle Hub
121	2193456	Trip Plunger	176	2190079	Pinion Shaft Hub Sleeve
122	2190092	Feed Trip Plunger Bushing	177	2193436	Spring Cover
123	2190090	Trip Plunger Bushing	178	1192020	Clock Spring (Clock Spring Assy. 2193437)
124	2190089	Feed Trip Plunger	179	2190184	Outside Spring Pin
125	2193503	Handwheel	180	2190108	Quill Pinion
127	2193511	Spindle	181	1011268	Socket Set Screw
128	2190081	Quill Skirt	182	1011542	Lockscrew
129	1191790	Locknut	183	2190085	Reverse Trip Ball Lever
130	1191942	Lockwasher	184	2190086	Feed Reverse Trip Plunger
131	1190237	Bearing	185	2190087	Reverse Trip Ball Lever Screw
132	2190197	Sleeve	186	1192207	Worm Gear
133	2190196	Nose-piece	187	1013077	Key
134	2190193	Spindle Dirt Shield	188	1011370	Socket Set Screw
135	1190239	Bearing	189	2190177	ADJ Worm Shaft
136	2193513	(Bearing Spacer - Large	190	2201032	Pinion Shaft Hub Handle
137		(Bearing Spacer - Small	191	1202170	Black Plastic Ball Handles
138	1190239	Bearing	192	2193514	Quill Housing
140	1011545	Special Socket Set Screw			
141	2193540	Collet Alignment Screw			
142	2190192	Quill (O.D. Within .0001")			
144	1011303	Socket Set Screw			
145	2193498	Feed Trip Lever			
146	2190185	Trip Lever Pin			
148	2190110	Quill Lock Sleeve			
149	2200098	Lock Handle			
151	1192403	Felt Washer			
152	2190111	Quick Lock Bolt			
153	2190109	Quill Lock Sleeve Tapped			
155	2193546	T-Bolt Assy.			
156	2190135	Lower Clamping Bolt Spacer (2 Req.)			
157	1191736	Locknut			
158	1011411	Chem Blacked RD.HD. Screws (2 Req.)			
159	1195306	Micrometer Scale			
160	1190836	Snap Ring			
161	2190190	Quill Micro-stop Nut			
162	2190084	Micrometer Nut			
163	2190082	Quill Stop Knob			
164	2190083	Quill Stop Micro-screw			
165	1011090	Screw			
166	2193501	Quill Pinion Shaft			
167	1013078	Key			
168	2200111	Spring Pin			
169	1011445	RD. Head Screw (2 Req.)			



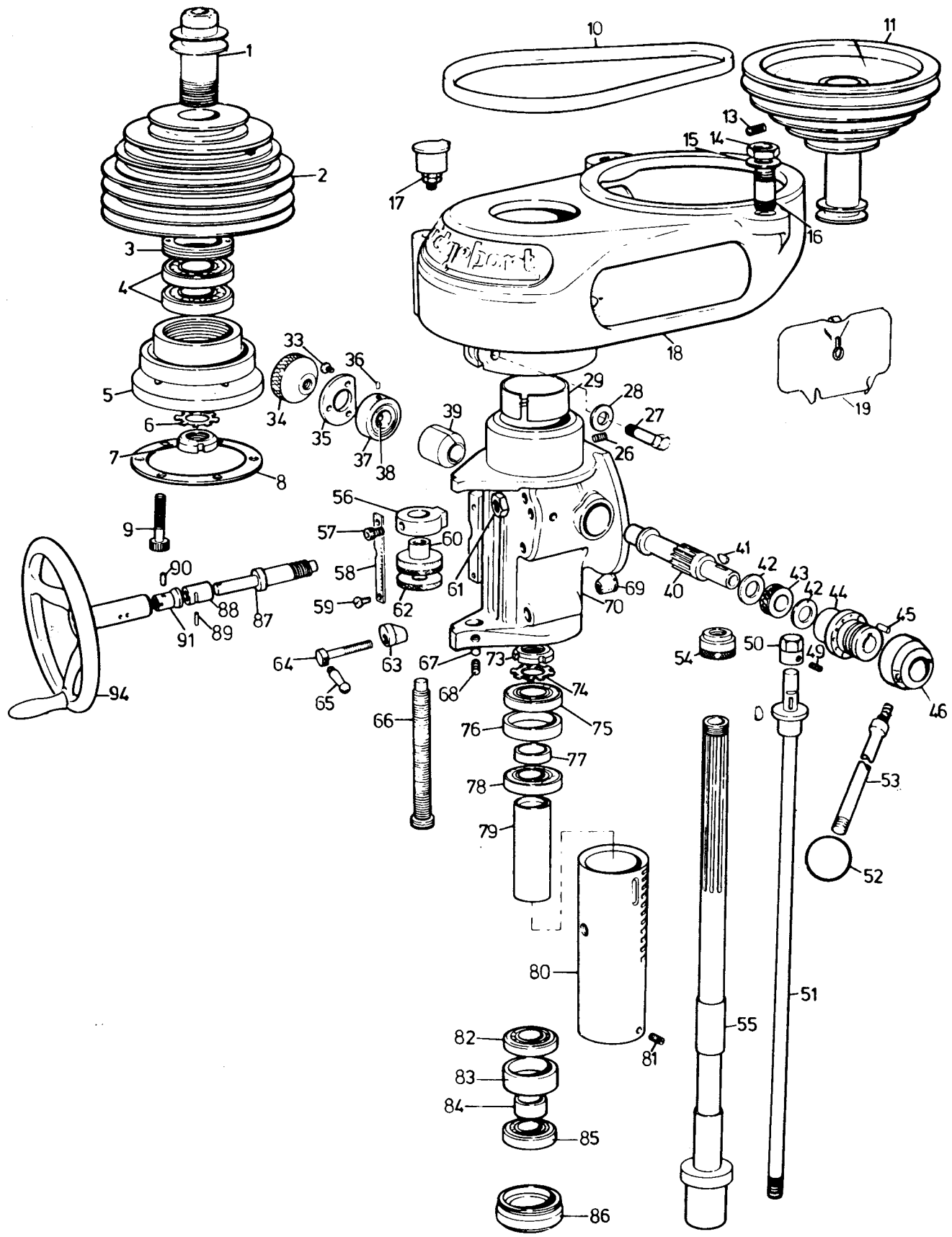


2J HEAD ASSEMBLY

(SEE PAGE 48 FOR METRIC KIT)

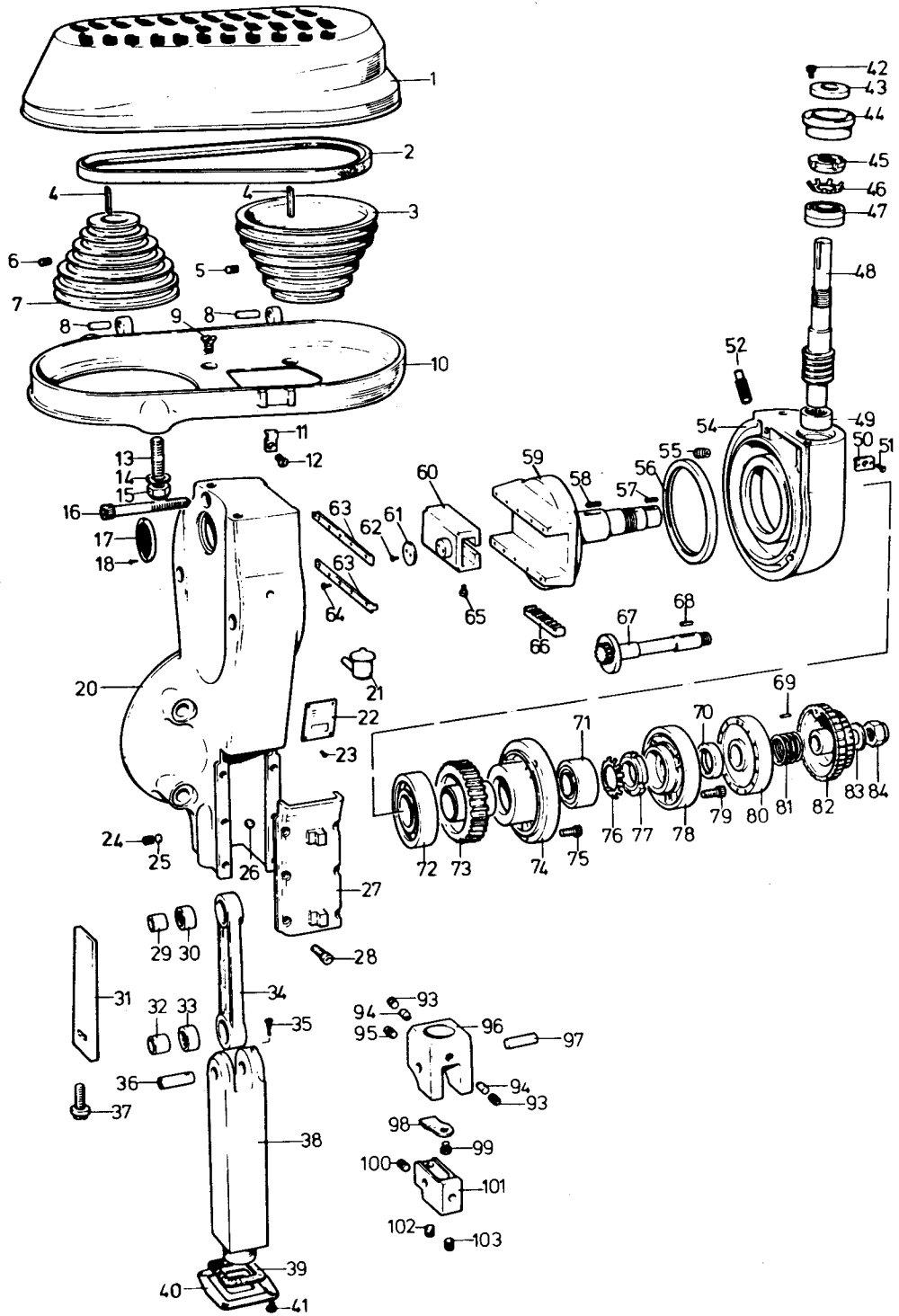
ITEM NO.	CODE NO.	DESCRIPTION	ITEM NO.	CODE NO.	DESCRIPTION
1	1011033	Socket Cap Screw (3 Req.)	42	1182123	Plastic Insert (2 Req.)
2	2180094	Top Bearing Cap	43	2183931	Adjustable Motor Varidisc Assembly
3	1181977	Spring Washer	44	1182083	Spring for Varidisc Motor Shaft
4	1180252	Ball Bearing	45	1182305	Adjustable Varidisc Spring Collar
5	1180848	Snap Ring No.	46	1011065	Socket HD Cap Screw (2 Req.)
6	1011069	Socket HD Cap Screw (2 Req.)	47	1180860	Ret. Ring
7	1011745	Hex Jam Nut	48	1011052	Socket Cap Screw
8	2015171	Motor 1 1/2 HP (complete unit) 230/460 3/60	49	1182122	Plastic Key
8a	1550001	2 HP Motor	51	2180084	Key
8b	2550019	2 HP Motor Assembly	52	2180107	Taper Pin
9	1011148	Hex HD Screw (2 Req.)	53	2183923	Belt Housing Base
10	2183923	Belt Housing	54	2180088	Motor Pulley Cover
11	2180066	Speed Change Chain Stud	55	1011012	Socket Cap Screw
12	1010534	Roll Pin	56	1011552	Drive Screw (4 Req.)
13	2180058	Speed Change Plate	58	1182893	HI-LOW Range Nameplate
14	2183920	Drawbar	59	1011552	Drive Screw (4 Req.)
15	1010604	Cotter Pin	60	2180107	Taper Pin (2 Req.)
16	2180074	Speed Change Plate Pivot Stud	61	1182894	Quill Feed Nameplate
17	1011125	Socket HD Cap Screw (2 Req.)	62	1011552	Rivets (4 Req.)
18	2180095	Washer	63	2180053	Gear Housing
19	2180089	Pivot Sleeve (2 Req.)	64	1011443	Round HD. Machine Screw (3 Req.)
20	2180093	Draw Bar Washer	65	1185030	Gear Housing Plate
21	1180915	"O" Ring	66	1180818	Snap Ring
22	2180056	Spindle Pulley Bearing Sliding Housing	67	2180083	Brake Finger Pivot Stud
23	1180253	Ball Bearing	68	2180072	Brake Operating Finger
24	1182124	Plastic Insert (2 Req.)	69	1192151	Bakelite Ball Handle
25	2183934	Adjustable - Driven Varidisc	70	2190133	Brake Lock Handle
26	1180855	Snap Ring No.	71	2190134	Brake Lock Pin
27	1182120	Belt	72	1011215	Socket Set Screw
28	2180082	Stationary Driven Varidisc	73	2180104	Sleeve for Brake Lock Shaft
29	2180057	Brake Bearing Cap	74	2180070	Brake Lock Shaft
30	1180253	Ball Bearing	75	2180069	Brake Lock Cam
31	1182081	Brake Spring (2 Req.)	76	1010534	Roll Pin
32	2180073	Brake Shoe Assembly (2 Req.)	77	1011287	Socket Set Screw
33	2180078	Spindle Pulley Spacer			
34	2180060	Spindle Pulley Hub			
35	1011140	Hex HD. Screw	38	2550007	Key
36	2180071	Brake Shoe Pivot Sleeve	39	2550004	Key
37	1010501	Roll Dowel Pin	40	2550006	Stationary Varidisc
38	2180102	Drive Key	42	1182126	Plastic Insert (2 Req.)
39	1182121	Key for ADJ Varidisc Motor Shaft	43	2550005	Adjustable Varidisc Assembly
40	2180080	Stationary Motor Varidisc	43A	2550023	Adjustable Varidisc Assembly
41	1011287	Socket Set Screw	44	1182083	Spring
			45	2550003	Spring Collar
			47	1170865	Ret. Ring

FOR 2 HP HEAD, SUBSTITUTE THE FOLLOWING:



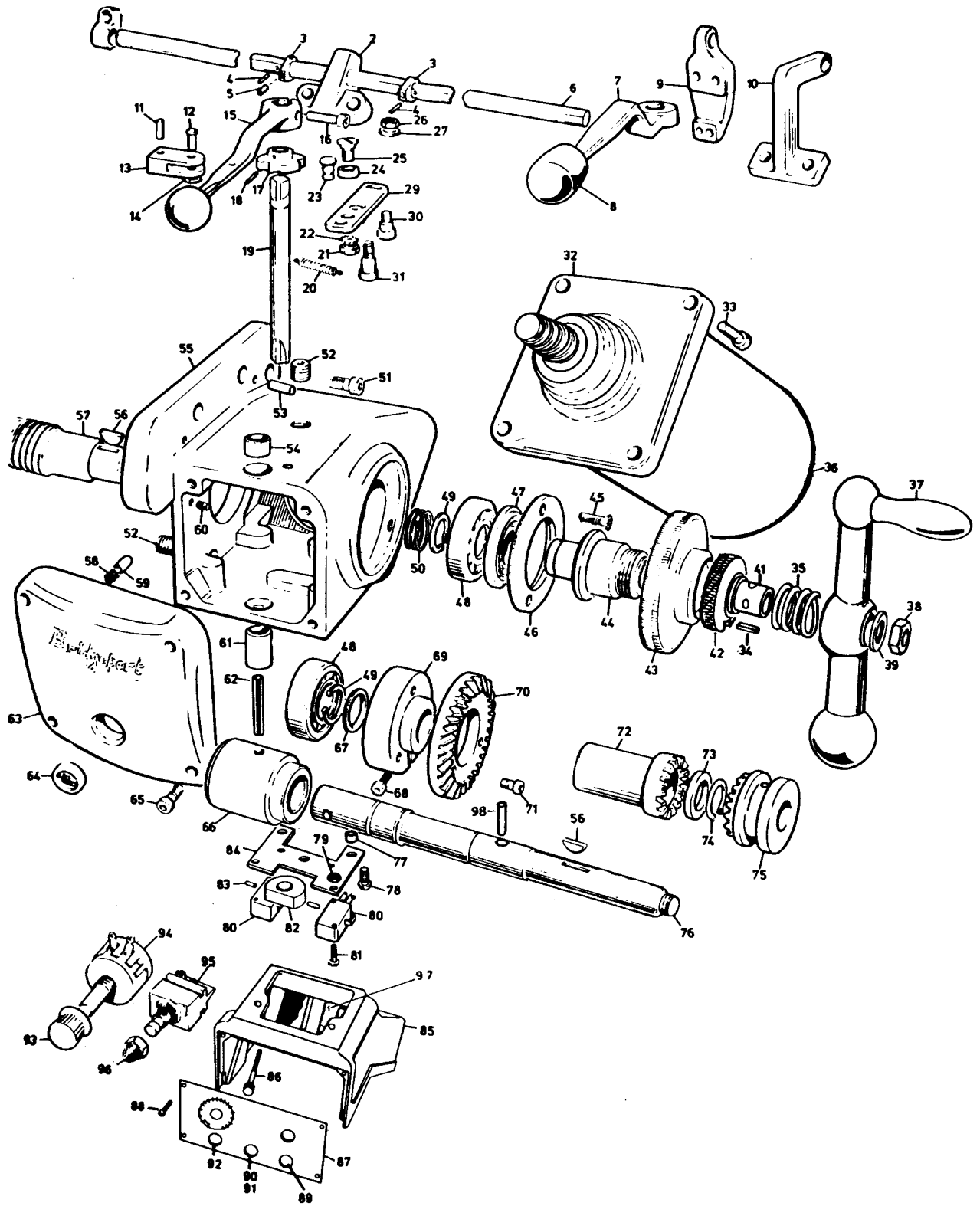
M H E A D
(SEE PAGE 48 FOR METRIC KIT)

ITEM NO.	CODE NO.	DESCRIPTION	ITEM NO.	CODE NO.	DESCRIPTION
1	2204826	Spindle Pulley Hub, Single Belt Drive	57	1011116	Cap Screw
2	2200069	Spindle Pulley, Single Belt Drive	58	1202845	Micrometer Scale
3	2200072	Bearing Retainer Ring	59	1011411	Flat Head Screw (2 Req.)
4	1200202	Ball Bearings (2 Req.)	60	2190084	Micrometer Nut
5	2204834	Bearing Housing	61	1011720	Hex Nut (4 Req.)
6	1241940	Bearing Lock Washer	62	2200076	Micrometer Lock Nut
7	1241786	Bearing Lock Nut	63	2200100	Quill Lock Sleeve, Drilled
8	1202450	Paper Gasket	64	2200099	Quill Lock Bolt
9	1011040	Cap Screw (6 Req.)	65	2200098	Quill Lock Bolt Handle
10	1202102	V Belt	66	2200077	Micrometer Screw
11	2204847	Motor Pulley, Single Drive	67	2200110	Brass Plug
13	1011240	Set Screw	68	1011265	Set Screw
14	1011715	Hex Nut (2 Req.)	69	2200101	Quill Lock Sleeve, Tapped
15	2200109	Chamfered & Hardened Washer	70	2204832	Quill Housing
16	1011855	Motor Mounting Ring Stud (2 Req.)	73	1201788	Bearing Lock Nut
17	1203108	Oil Cup	74	1191942	Bearing Lock Washer
18	2204833	Belt Housing, Single Belt Drive, 60 Cycle	75	1200201	Ball Bearing (4 Req.)
19	2204854	Belt Guard Assembly	76	2204840	Outside Bearing Spacer)
26	1011236	Set Screw	77		Inside Bearing Spacer) Machined as unit
27	1011170	Hex Head Screw	78	1200201	Ball Bearing (4 Req.)
28	2200109	Chamfered & Hardened Washer	79	2200064	Long Spacer aligner spring plunger assembly
29	2200106	Brass Quill Skirt	80	2200053	Quill
33	1011455	Round Head Screw (3 Req.)	81	1011265	Set Screw
34	2200093	Quill Feed Clutch Knob	82	1200201	Ball Bearing (4 Req.)
35	2200092	Spring Cover	83	2204842	Outside Bearing Spacer)
36	2200108	Outside Spring Pin	84		Inside Bearing Spacer) Machined as unit
37	1202021	Clock Spring	85	1200201	Ball Bearing (4 Req.)
38	2200111	Pinion Spring Pin	86	2200060	Nosepiece
39	2200091	Split Bushing	87	2200097	Quill Feed Worm
40	2204837	Quill Feed Pinion	88	1633638	Bronze Bearing
41	1013076	Pinion Key	89	2200107	Straight Pin
42	1202452	Fibre Washer (2 Req.)	90	2200112	Straight Pin
43	2200090	Quill Feed Worm Wheel	91	2200096	Quill Feed Worm Hub
44	2204836	Quill Feed Clutch Hub	94	2204849	Quill Worm Feed Handwheel Assembly
45	1010541	Roll Pin			
46	2201031	Hub			
49	1011265	Set Screw			
50	2204835	Drawbar Knob			
51A	2204845	Drawbar, Single Drive #2 MT & #7 B & S Taper			
51B	2204846	Drawbar, Single Drive B-3 Taper			
52	1202170	Ball			
53	2203466	Rack Feed Handle			
54	2201032	Drawbar Nut			
55A	2204820	Spindle, Single Belt #2 MT Taper			
55B	2204821	Spindle, Single Belt #7 B & S Taper			
55C	2204822	Spindle, Single Belt B-3 Taper			
56	2200073	Micrometer Stop			



S H A P I N G A T T A C H M E N T

ITEM NO.	CODE NO.	DESCRIPTION	ITEM NO.	CODE NO.	DESCRIPTION
1	2240061	Belt Cover	56	1243180	Oilseal
2	1242104	Belt	57	2240082	Key
3	2240814	Worm Shaft Pulley	58	2240085	Key
4	2240087	Key	59	2240063	Crank & Shaft
5	1011240	Set Screw	60	2240064	Crankpin Block
6	1011239	Set Screw	61	2240074	Bearing Retaining Washer
7	2240811	Motor Pulley	62	1011502	Round Head Screw
8	2240086	Pin (2 Req.)	63	2240070	Crankpin Block Hold-Down
9	1011530	Flat Screw (4 Req.)	64	1011515	Flat Head Screw (10 Req.)
10	2240059	Belt Housing	65	1011427	Round Head Screw (3 Req.)
11	2240090	Belt Cover Clip	66	2240069	Rack
12	1011590	Washer Head Screw	67	2240080	Pinion Gear & Shaft
13	1011850	Motor Mounting Ring Stud (2 Req.)	68	2240084	Key
14	2060122	Washer	69	2240083	Pin
15	1011720	Hex Head Nut	70	1243181	Oilseal
16	1011061	Cap Screw (3 Req.)	71	1240216	Ball Bearing
17	2240079	Air Vent Cover	72	1240214	Ball Bearing
18	1011592	Washer Head Screw (2 Req.)	73	2240071	Worm Gear
20	2240810	Ram Housing	74	2240106	Gear Housing Cover
21	1243107	Oil Cup	75	1011030	Cap Screw (3 Req.)
22	1242808	Nameplate	76	1241940	Lockwasher
23	1011552	Drive Screws	77	1241786	Locknut
24	1011265	Set Screw	78	2240068	Crank Bearing Cover
25	2240150	Brass Plug	79	1011033	Cap Screw (3 Req.)
26	1242402	Felt Plug	80	2240066	Stroke Adjustment Plate
27	2240056	Ram Cover	81	1242050	Dial Spring
28	1011030	Cap Screw	82	2240055	Stroke Adjustment Dial
29	1240303	Inner Race	83	2240088	Washer
30	1240302	Bearing	84	2240089	Acorn Nut
31	2240057	Gib	93	1011270	Set Screw
32	1240305	Inner Race	94	2240077	Clapper Box Clamp Shoe (2 Req.)
33	1240304	Bearing	95	1011214	Set Screw
34	2240067	Connecting Rod	96	2240813	Clapper Box
35	1011450	Ram Crankpin Lockscrew	97	1010748	Pin
36	2240072	Ram Crankpin	98	2240062	Clapper Spring
37	2060088	Gib Screw	99	1011427	Round Head Screw
38	2240065	Ram	100	1011239	Set Screw
39	1242404	Wiper Felt	101	2240076	Clapper
40	2240078	Wiper Plate	102	1011214	Set Screw
41	1011407	Round Head Screw (4 Req.)	103	1011237	Set Screw
42	1011009	Cap Screw (3 Req.)			
43	1243182	Oilseal			<u>AVAILABLE TOOLING</u>
44	2240073	Worm Bearing Cover	1245250	#1 Shaping Tool	
45	1241784	Locknut	1245251	#2 Shaping Tool	
46	1241932	Lockwasher	1245252	#3 Shaping Tool	
47	1240217	Ball Bearing	1245253	#4 Shaping Tool	
48	2240058	Worm & Shaft	1245254	#5 Shaping Tool	
49	1240306	Bearing	1245255	#6 Shaping Tool	
50	1242805	Rotation Nameplate	1245256	#7 Shaping Tool	
51	1011552	Drive Screw	2240128	High Speed Cutters	
52	2240091	Vent Plug	2240129	Tools with cutting edge unground	
54	2240051	Gear Housing	2240094	Complete Shaping Tools	
55	1010782	Pipe Plug	1245440	Tool Bit. 3/16" Sq. x 2" for Shaper	



6 F L O N G I T U D I N A L P O W E R F E E D A S S E M B L Y

ITEM NO.	CODE NO.	DESCRIPTION	ITEM NO.	CODE NO.	DESCRIPTION
1	2430097	Stop Rod Clamp	50	1632074	Clutch Spring
2	2060300	Bracket	51	1011074	Socket Hd Cap Screw
3	1632304	Stop Collar	52	1635040	Taper Plug
4	1010507	Roll Dowel	53	1010543	Dowel Pin
5	1011265	Socket Set Screw	54	1633638	Bronze Bushing
6A	2631054	Stop Rod - 42" Table	55	2630051	Main Housing
6B	2631055	Stop Rod - 48" Table	56	1013078	Woodruff Key (4 Req.)
7	2630065	Control Lever	57A	2630084	Longitudinal Lead Screw - 42"
8	1632152	Ball	57B	2630085	Longitudinal Lead Screw - 48"
9	2270093	Stop Rod Clamp - Optics	58	1632073	Spring
10	2270088	Bracket - Optics	59	2630068	Detent Pin
11	1010516	Roll Dowel	60	2630075	Pin
12	2430101	Fork Pin	61	1633650	Bronze Bearing
13	2630071	Stop Rod Fork	62	1010411	Taper Pin
14	1630890	Retaining Ring	63	2630053	Side Cover
15	2630065	Control Lever	64	1633112	Oil Sight
16	1011277	Set Screw	65	1011011	10 - 24 x 5/8" Socket Cap Screw
17	2630072	Clutch Detent Cam	66	2630060	Coupling
18	1010516	Roll Pin	67	2630091	Thrust Washer
19	2630054	Control Lever Shaft	68	1011128	Socket Hd Screw
20	1632005	Clutch Arm Spring	69	2630069	Gear Mounting Hub
21	1011740	Locknut	70	1632216	Gear (Spiroid)
22	1631925	Lockwasher	70A	1632218	Gear (Spiroid) (Hi Torque)
23	2630076	Clutch Arm Spring Pin	71	1011016	Socket Hd Cap Screw
24	2630074	Detent Roller	72	2630062	Clutch - Driving
25	2630087	Roller Pin	73	2630070	Thrust Bearing
26	1011705	Hex Nut	74	1630838	Retaining Ring
27	1631925	Lockwasher	75	2630063	Clutch - Driven
29	2630073	Clutch Arm	76	2630092	Drive Shaft
30	1630320	Bearing	77	2630066	Spacer
31	1011575	Shoulder Screw	78	1011447	Pan Hd Machine Screw
32	2631051	Motor Assembly	79	1011701	Hex Nut (4 Req.)
32A	2636423	Motor Assembly (Hi Torque)	80	1632658	Limit Switch
33	1011033	Socket Cap Screw (4 Req.)	81	1011404	Rd Head Machine Screw
34	2630094	Roll Pin	82	2630058	Switch Actuator Housing
35	1632006	Spring	83	2630059	Switch Actuator Pin
36	1633728	Motor Cap	84	1632610	Switch Mounting Plate
37	2630081	Handle Assembly	85	2630052	Control Box
38	1011755	Jam Nut	86	1011046	Socket Hd Cap Screw (2 Req.)
39	2200109	Washer	87	1632576	Power Feed Control Plate
41	1633653	Bushing	88	1011190	Button Hd Socket Screw (4 Req.)
42	2060078	Dial Locknut	89	1632659	Switch
43A	2060083	Dial - Inch	90	1632607	Fuse Socket
43B	2069016	Dial - Metric	91	1632606	Fuse
44	2630064	Dial Holder	92	1632593	Pilot Light
45	1011011	Socket Hd Screw	93	1632153	Knob
46	2630089	Take-up Cap	94	1632618	Potentiometer
47	2630067	Lead Screw Seal	95	1632620	Pushbutton Switch
48	1630261	Bearing	96	1632628	Boot
49	1630814	Retaining Ring	97	1632568	PC Board
			98	1010545	Roll Pin

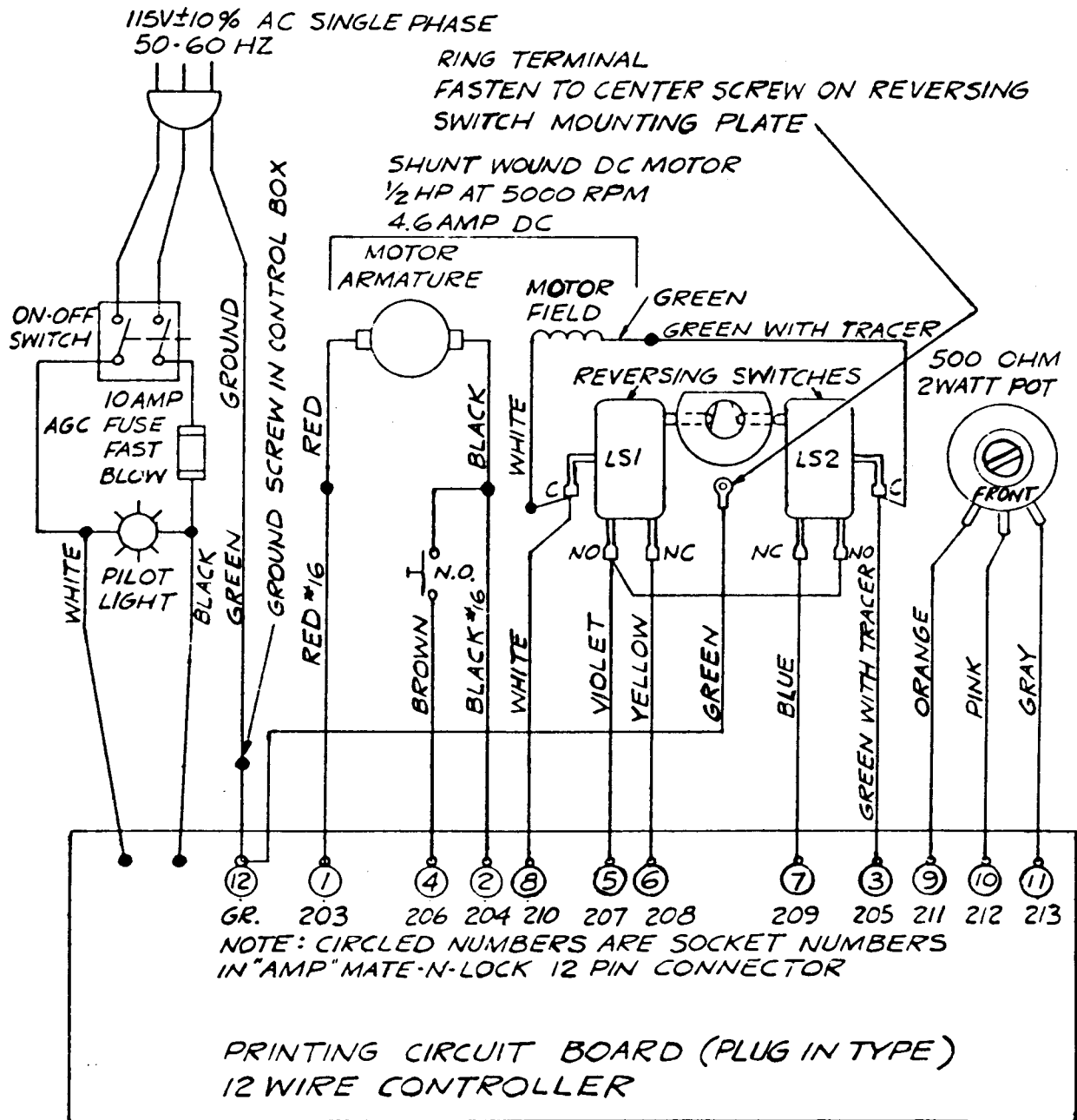


Figure 11. Circuit Diagram - Motors

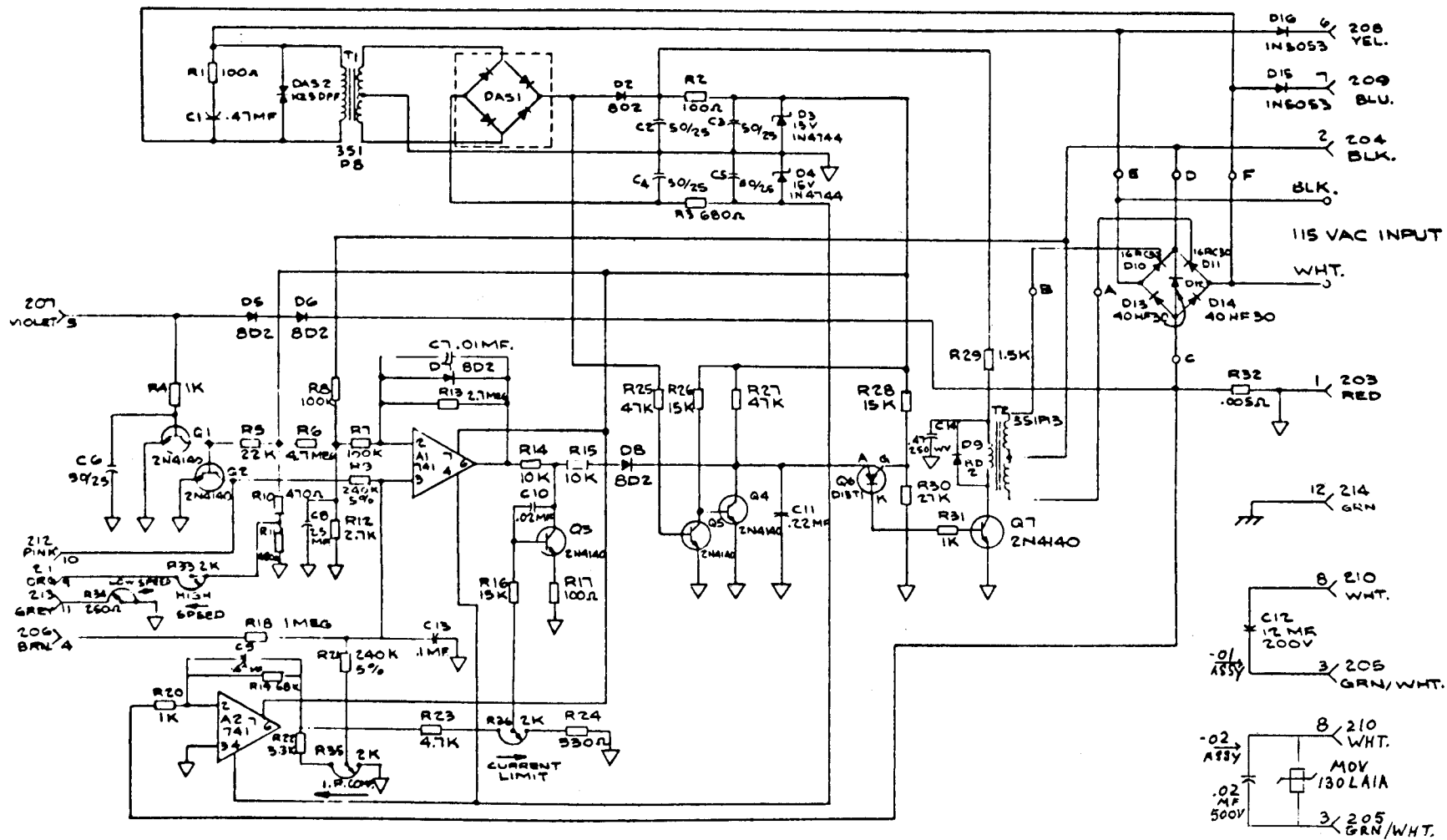


Figure 15. Circuit Diagram - Power Feed

METRIC CONVERSION KITS

The following metric conversion kits are available:

CODE NO. 2204000 - "M" HEAD, METRIC CONVERSION KIT

Consisting Of:

1202846 - Scale
2209002 - Stop Screw
2199002 - Micro Nut
2199005 - Stop Nut

CODE NO. 2184000 - "J" & "2J" HEAD, METRIC CONVERSION KIT

Consisting Of:

1195307 - Scale
2199001 - Stop Screw
2199002 - Micro Nut
2199005 - Stop Nut

CODE NO. 2064001 - METRIC CONVERSION KITS
FOR HANDFEED MACHINES WITH 36" TABLES.

Consisting Of:

2060175 - Table Leadscrew
2060183 - Elevating Leadscrew
2060172 - Table Feed Nut
2060171 - Saddle Feed Nut
2060170 - Elevating Nut
2069016 - Table & Saddle Dial (3)
2069015 - Elevating Screw Dial (1)
2060182 - Saddle Leadscrew

CODE NO. 2064002 - METRIC CONVERSION KITS
FOR HANDFEED MACHINES WITH 42" TABLES.

Consisting Of:

- 2060177 - Table Leadscrew
- 2060183 - Elevating Screw
- 2060172 - Table Feed Nut
- 2060171 - Saddle Feed Nut
- 2060170 - Elevating Nut
- 2069016 - Table & Saddle Dial (3)
- 2069015 - Elevating Screw Dial (1)
- 2060182 - 12" Saddle Feed Screw

CODE NO. 2064003 - METRIC CONVERSION KIT
FOR HANDFEED MACHINES WITH 48" TABLES.

Consisting Of:

- 2060179 - Leadscrew
- 2060183 - Elevating Screw
- 2060172 - Table Feed Nut
- 2060171 - Saddle Feed Nut
- 2060170 - Elevating Nut
- 2069016 - Table & Saddle Dial (3)
- 2069015 - Elevating Screw Dial (1)
- 2060182 - 12" Saddle Feed Screw

CODE NO. 2064004 - METRIC CONVERSION KIT
36" TABLE W/POWER FEED

Consisting Of:

- 2630096 - 36" Table Leadscrew
- 2060183 - Metric Elevating Screw
- 2060172 - Metric Table Feed Nut
- 2060171 - Metric Saddle Feed Nut
- 2060170 - Metric Elevating Nut
- 2069016 - Metric Table & Saddle Dial (3)
- 2069015 - Metric Elevating Screw Dial (1)
- 2060182 - Metric 12" Saddle Feed Dial

CODE NO. 2064005 - METRIC CONVERSION KIT
42" TABLE W/POWER FEED

Consisting Of:

- 2630097 - 42" Table Leadscrew
- 2060183 - Metric Elevating Screw
- 2060172 - Metric Table Feed Nut
- 2060171 - Metric Saddle Feed Nut
- 2060170 - Metric Elevating Nut
- 2069016 - Metric Table & Saddle Dial (3)
- 2069015 - Metric Elevating Screw Dial (1)
- 2060182 - Metric 12" Saddle Feed Screw

CODE NO. 2064006 - METRIC CONVERSION KIT
48" TABLE W/POWER FEED

Consisting Of:

- 2630098 - 48" Table Leadscrew
- 2060183 - Metric Elevating Screw
- 2060172 - Metric Table Feed Nut
- 2060171 - Metric Saddle Feed Nut
- 2060170 - Metric Elevating Nut
- 2069016 - Metric Table & Saddle Dial (3)
- 2069015 - Metric Elevating Screw Dial (1)
- 2060182 - Metric 12" Saddle Feed Screw

SPARE PARTS KITS

CODE NO. 2062000 - SERIES I STANDARD MACHINES
SPARE PARTS KIT

Consisting Of:

- 1062405 - Way Wiper, Knee/Column (2)
- 1062406 - Way Wiper, Knee/Column (4)
- 2060098 - Leadscrew Nut Cross Feed (1)
- 2060102 - Leadscrew Nut Long. Feed (1)

CODE NO. 2203000 - "M" MILLING HEAD - SPARE PARTS KIT

Consisting Of:

1202102 - Drive Belt
1202021 - Clockspring
1200202 - Spindle Bearings (4)
1191942 - Lockwasher (2)

CODE NO. 2193000 - "J" MILLING HEAD - SPARE PARTS KIT

Consisting Of:

1182120 - Drive Belt (1)
1182106 - Timing Belt (1)
2193477 - Brake Shoes (2)
1192084 - Brake Springs (2)
2193437 - Clocksprings Assy. (1)
2180117 - Gear Lube (1)
1190239 - Spindle Bearings (Pair)
1190237 - Spindle Bearing (1)
1192403 - Felt Wipers (2)
1191942 - Lockwashers (2)
1011392 - Collet Aligning Screws (6)

CODE NO. 2183000 - "2J" MILLING HEAD (1 1/2 H.P.) - SPARE PARTS KIT

Consisting Of:

1182120 - Drive Belt (1)
1182106 - Timing Belt (1)
2180073 - Brake Shoes (Set)
1182081 - Brake Springs (1)
1182121 - Key, Motor (1)
1182122 - Key, Driven (1)
2193437 - Clockspring Assembly (1)
2180117 - Gear Lubricant (1)
1183147 - Lubriplate (1)
1190240 - Spindle Bearings (Pair)
1190237 - Spindle Bearing (1)
1192403 - Wiper, Felt (2)
1191942 - Lockwasher (2)
2193540 - Collet Alignment Screw (6)

CODE NO. 2553000 - "2J" MILLING HEAD (2 H.P.) - SPARE PARTS KIT

Same as above except:

1552106 - Timing Belt
1552121 - Key, Motor
1552122 - Key, Driven