M-105H

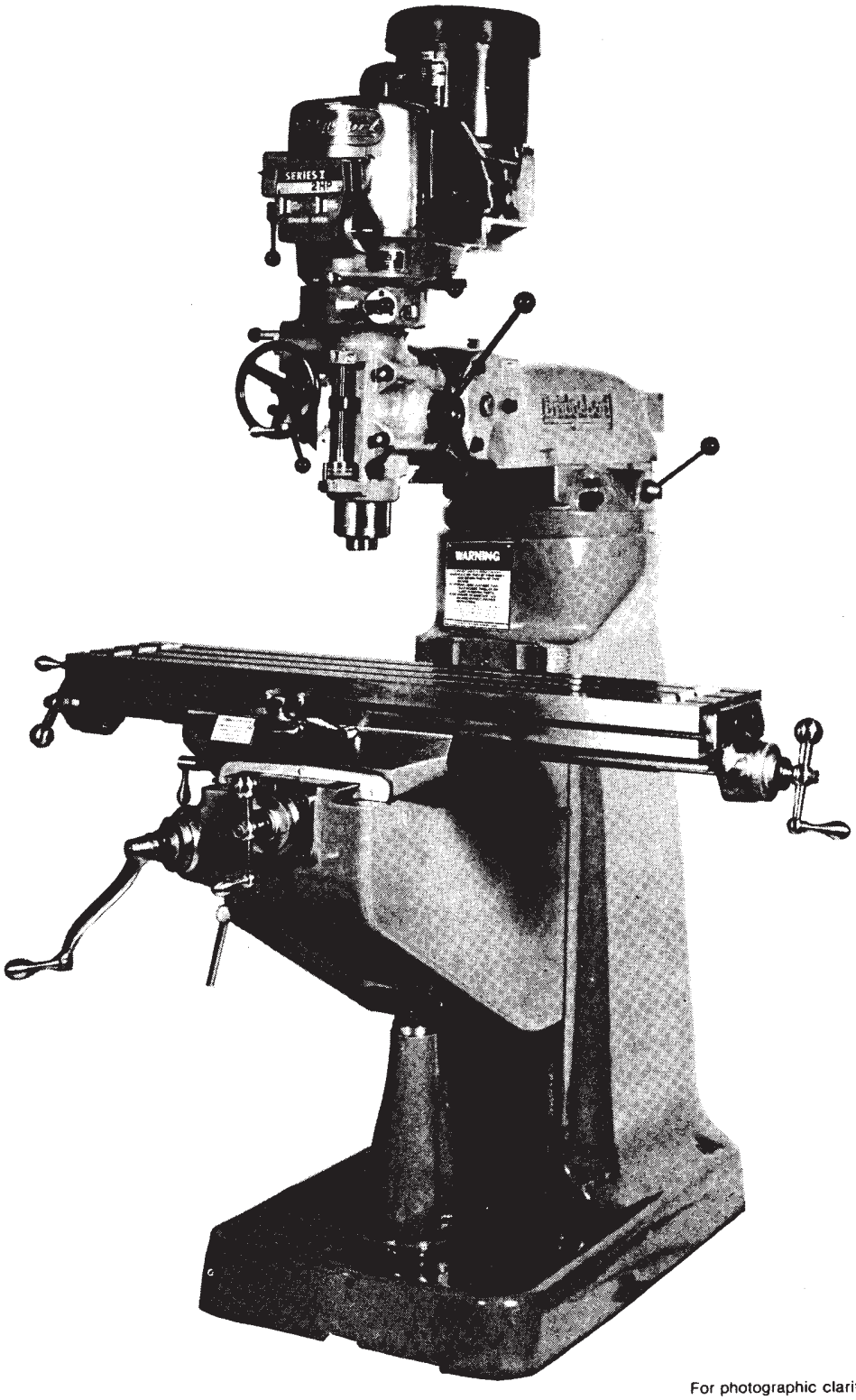
BRIDGEPORT SERIES I MILLING MACHINE

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.



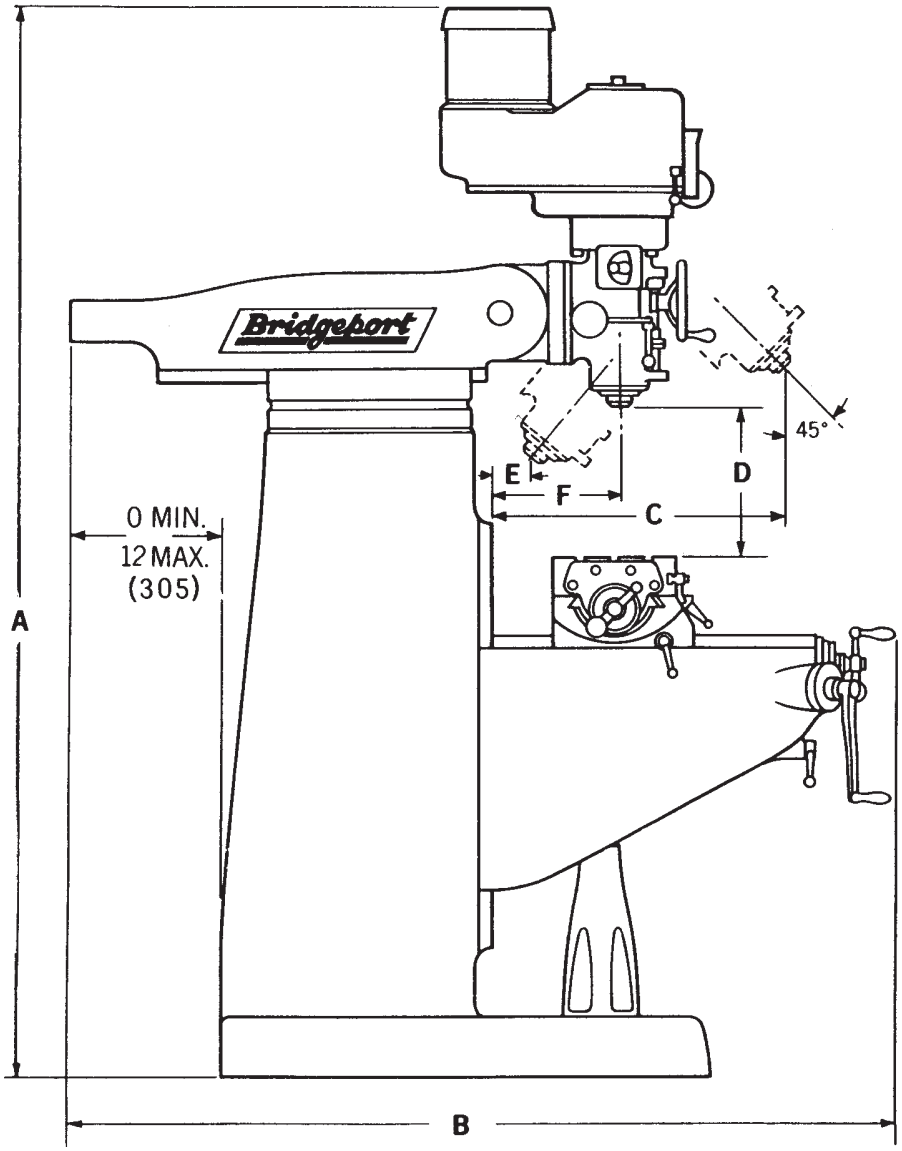
For photographic clarity, machine is shown without point of operation guarding.

BRIDGEPORT SERIES I TURRET MILLER MODEL BR2J

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

LIST OF ILLUSTRATIONS



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

	Std. Power Feed	High Torque Power Feed
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)

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.

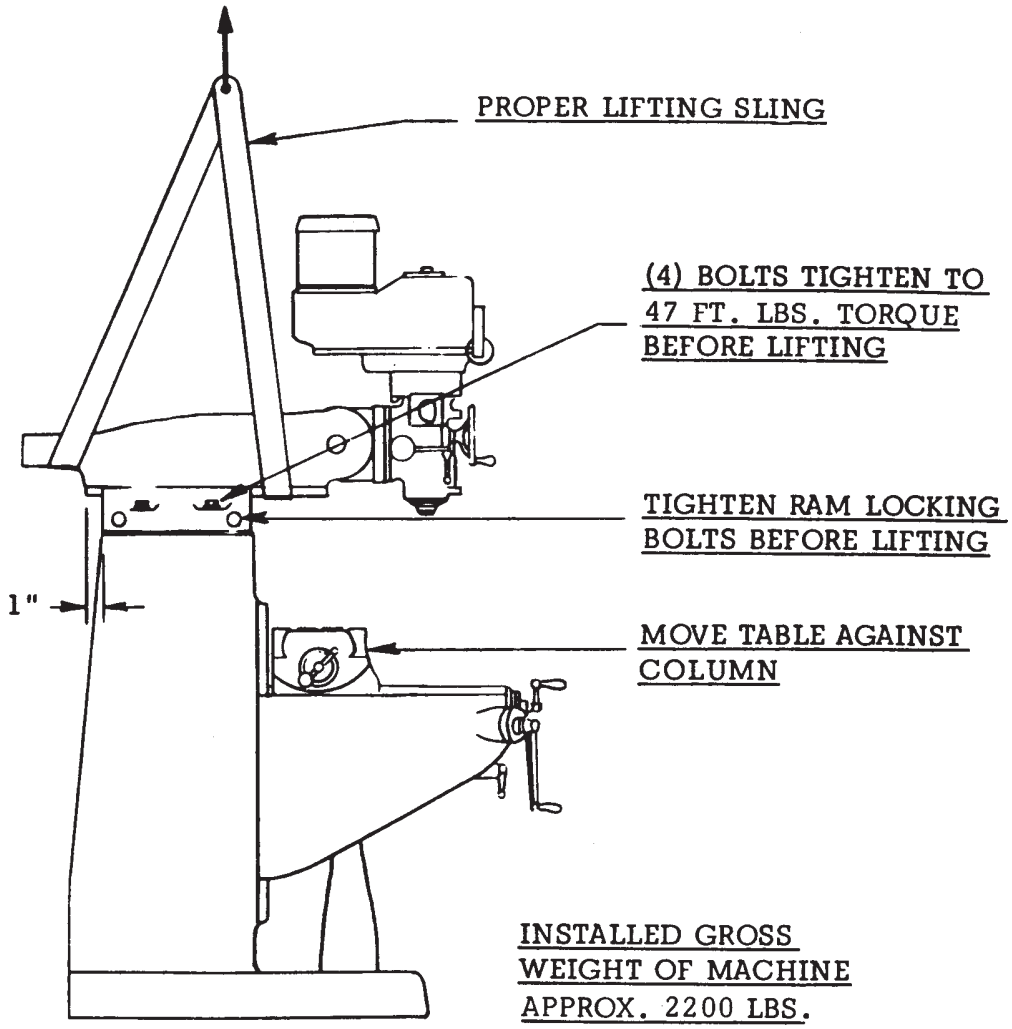
WARNING
IT IS NOT RECOMMENDED THAT GASOLINE OR ANY OTHER HIGHLY INFLAMMABLE CLEANING AGENT BE USED.

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.

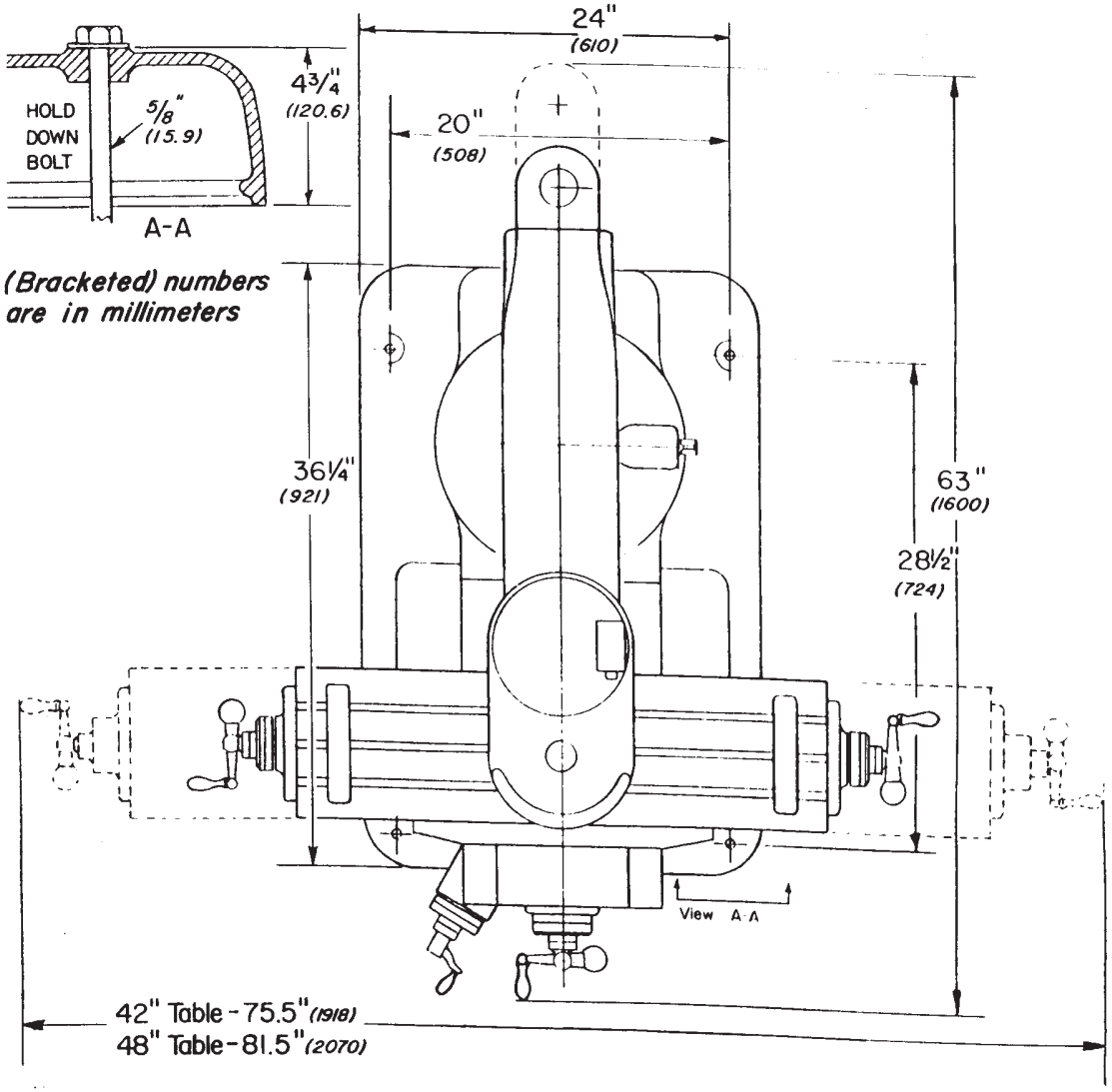


Figure 2, Installation Layout

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".

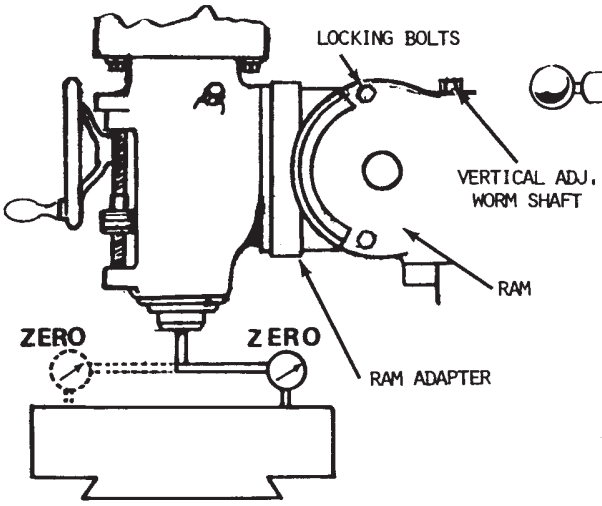


Figure 3. Head Alignment Y Axis

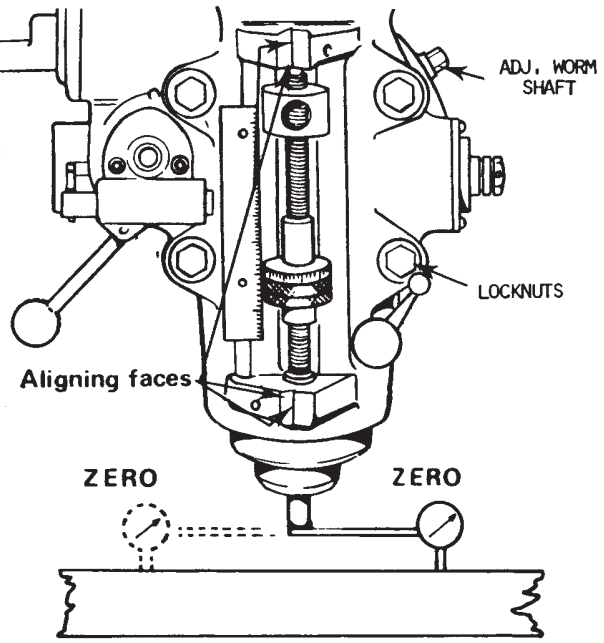


Figure 4. Head Alignment X Axis

LUBRICATION

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

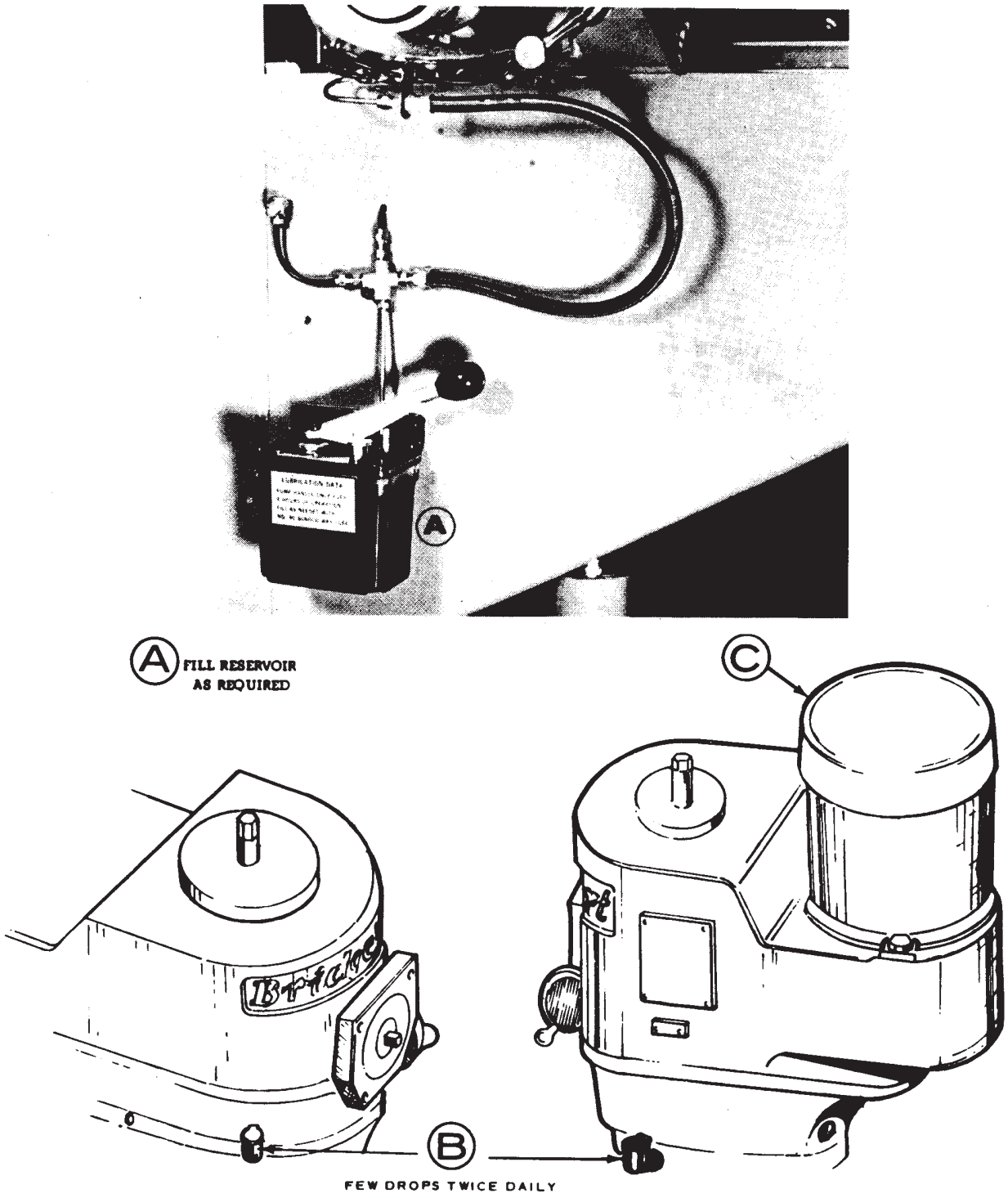


Figure 5. Recommended Lubrication

(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.

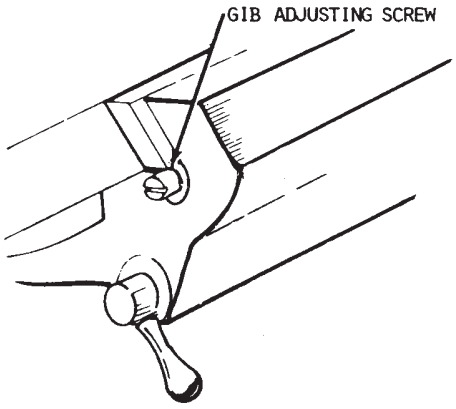


Figure 6. Saddle/Table Gib (#43 page 26)

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.

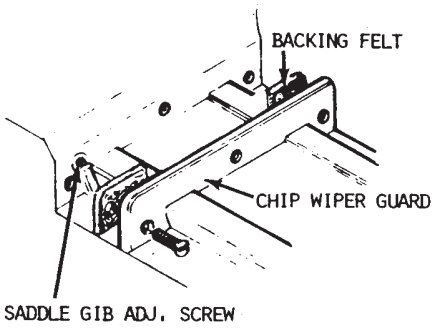


Figure 7. Saddle-Knee Gib (#49 page 26)

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

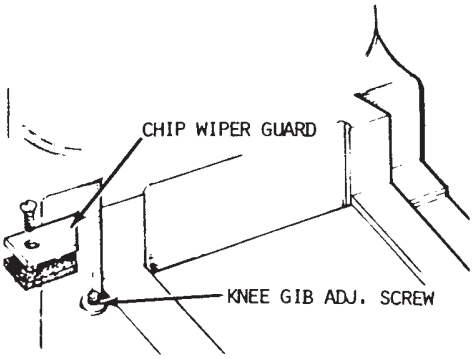
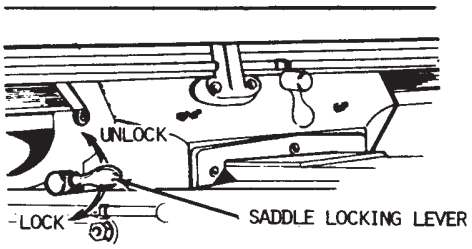


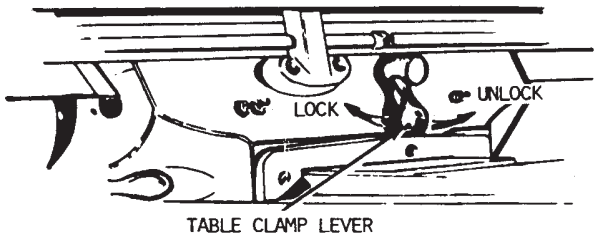
Figure 8. Knee-Column Gib (#55 page 26)

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.

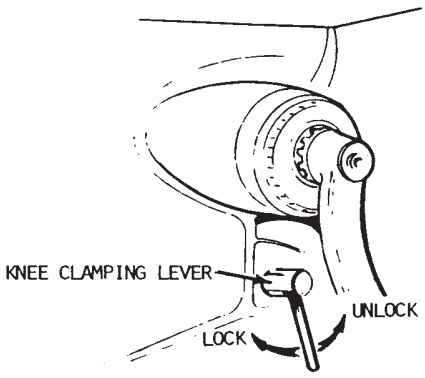


Excessive pressure can cause slight table bind. Use moderate clamping pressure, as this will hold saddle sufficiently.

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.

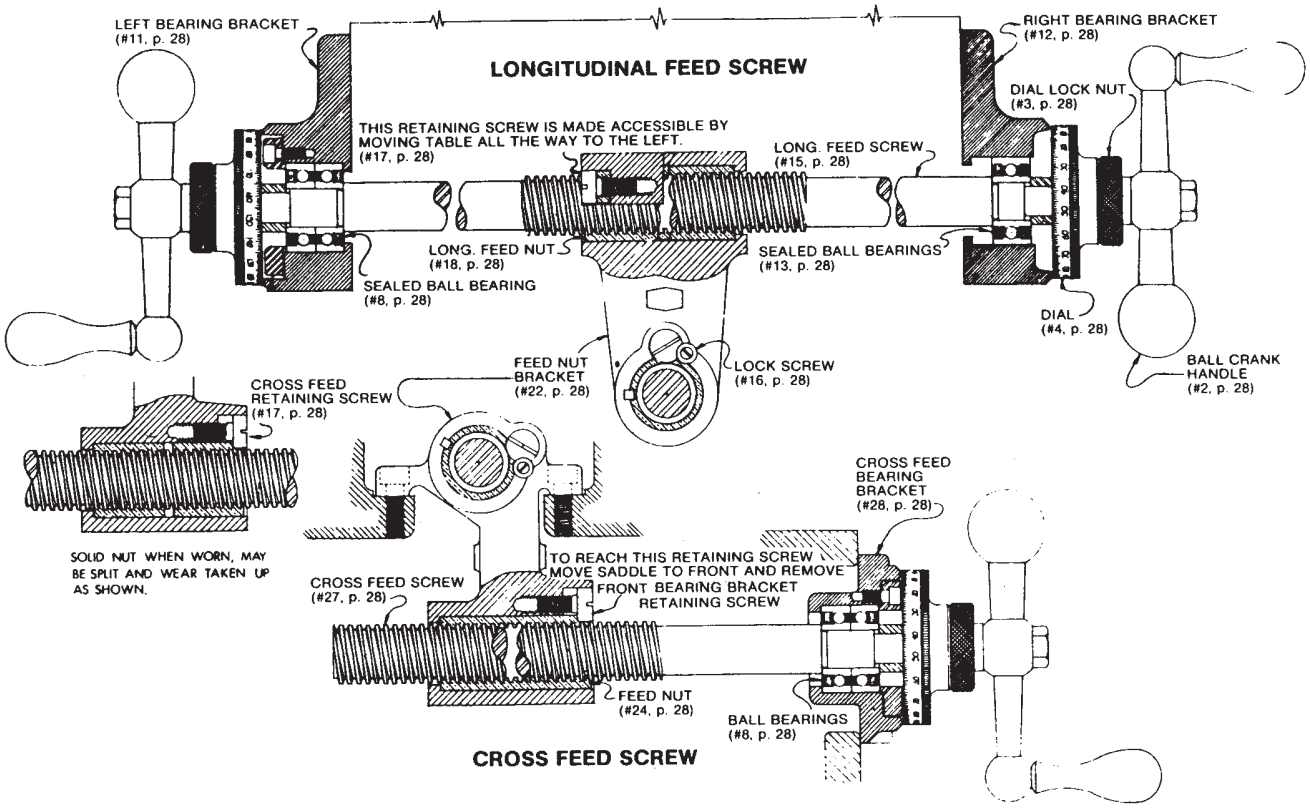


Figure 9, Longitudinal and Crossfeed Assembly

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.

> CAUTION
> IMPROPER TIGHTENING OF THESE COULD CAUSE
> A CHOPPY QUILL MOVEMENT

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.

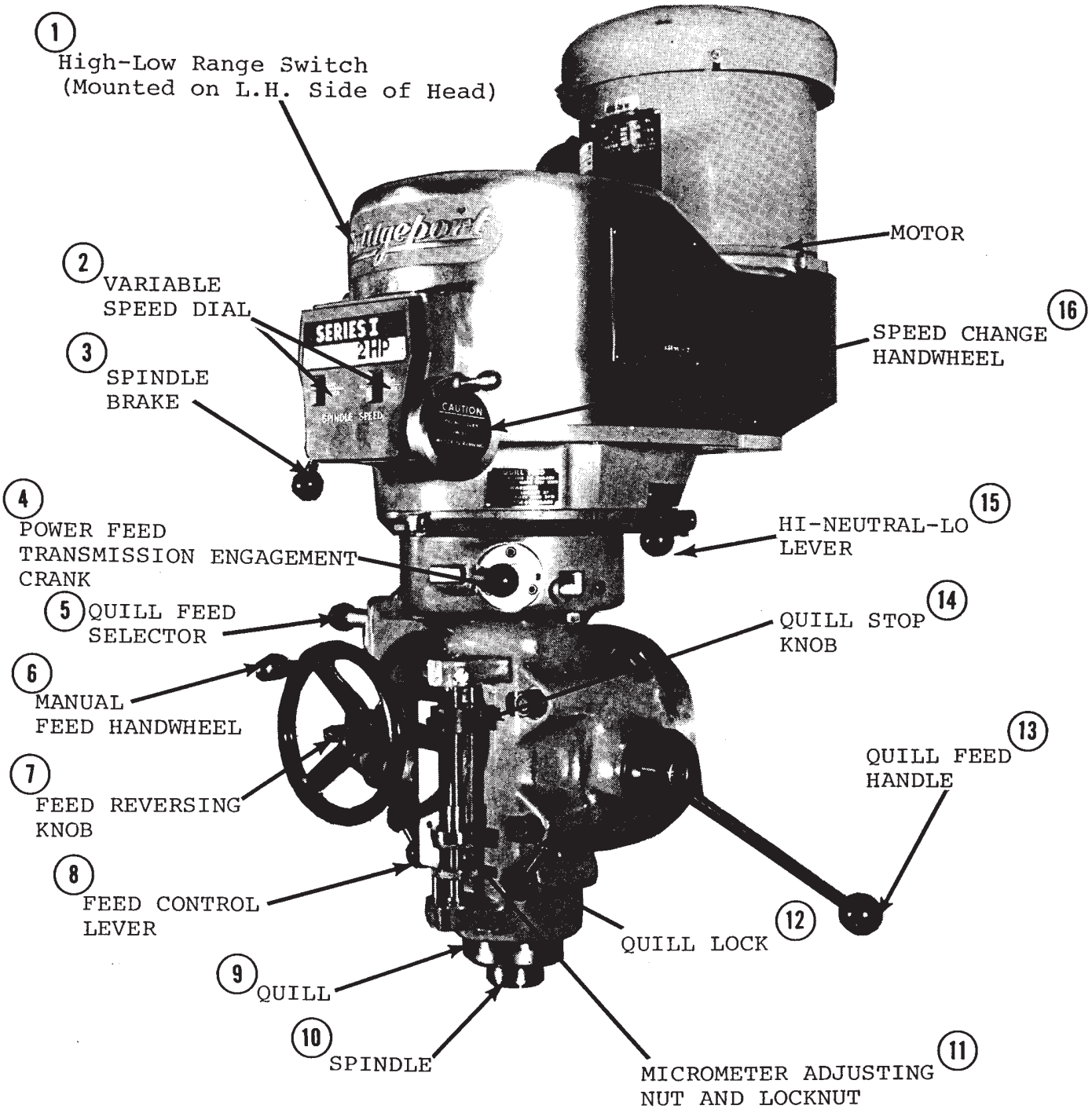


Figure 10. 2J Milling Attachment

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 ship 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.

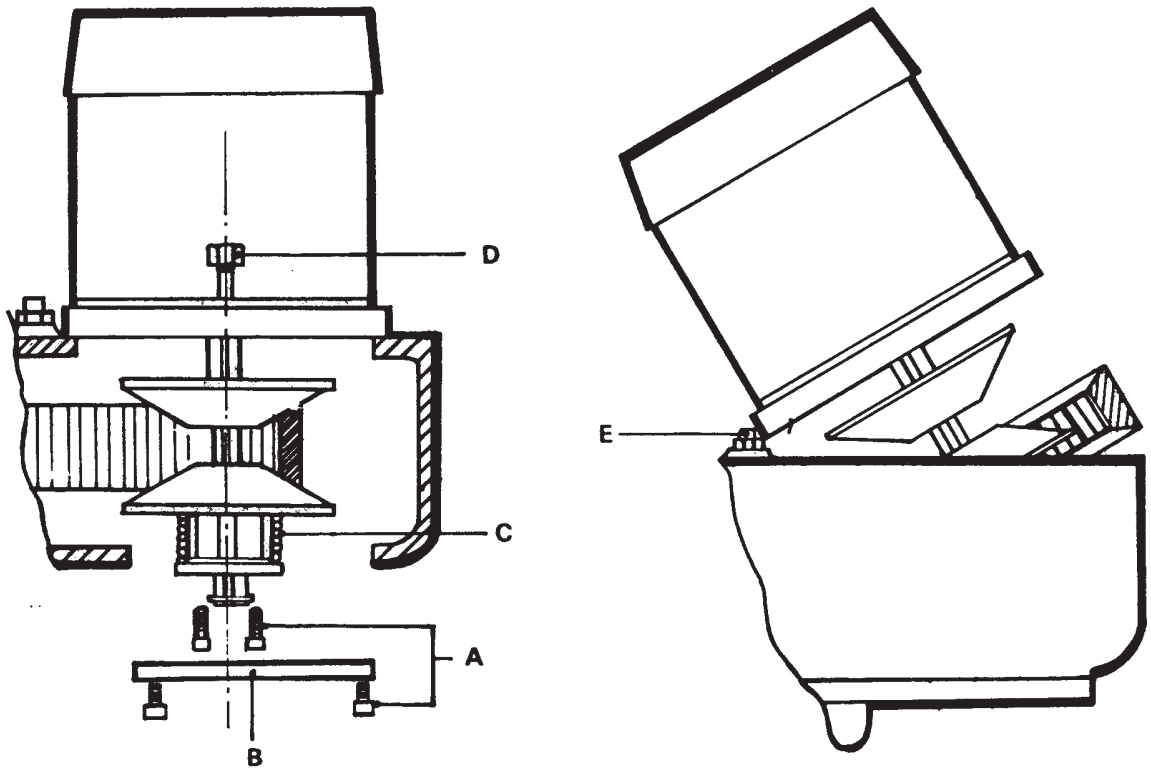


Figure 11. Removing the Motor (Side View)

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.

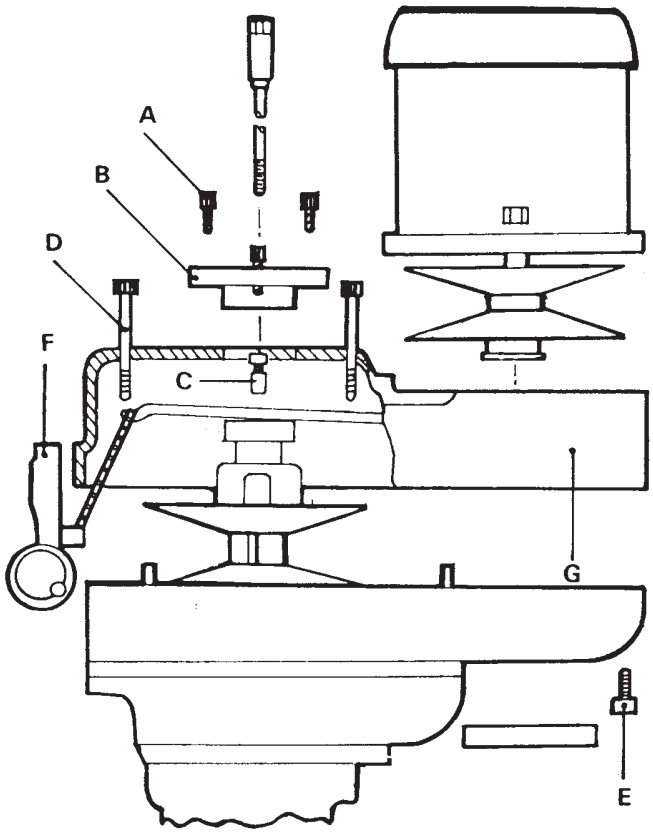


Figure 12. Removing the Vari-Drive Belt

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

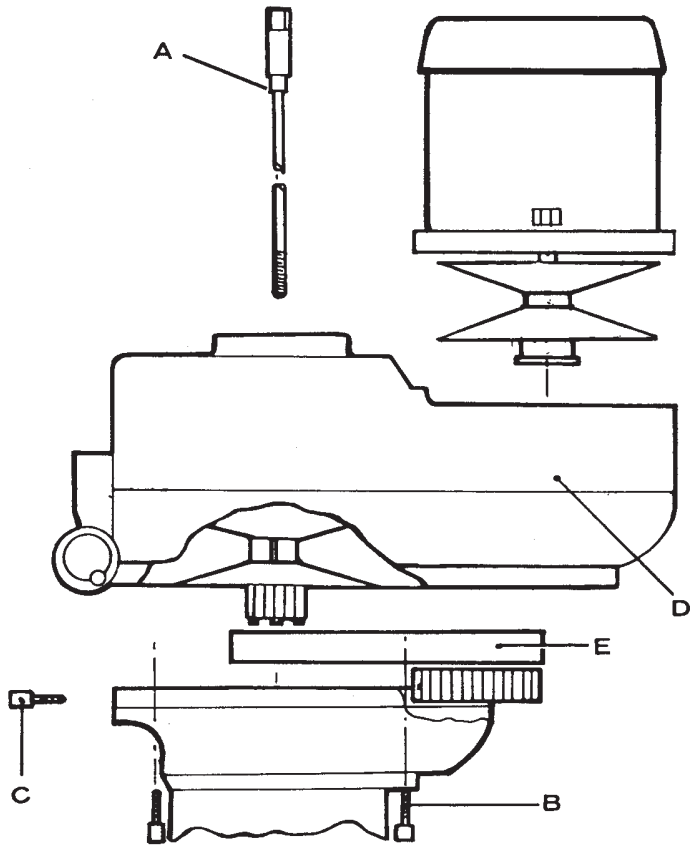


Figure 13. Removing Timing Belt

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.

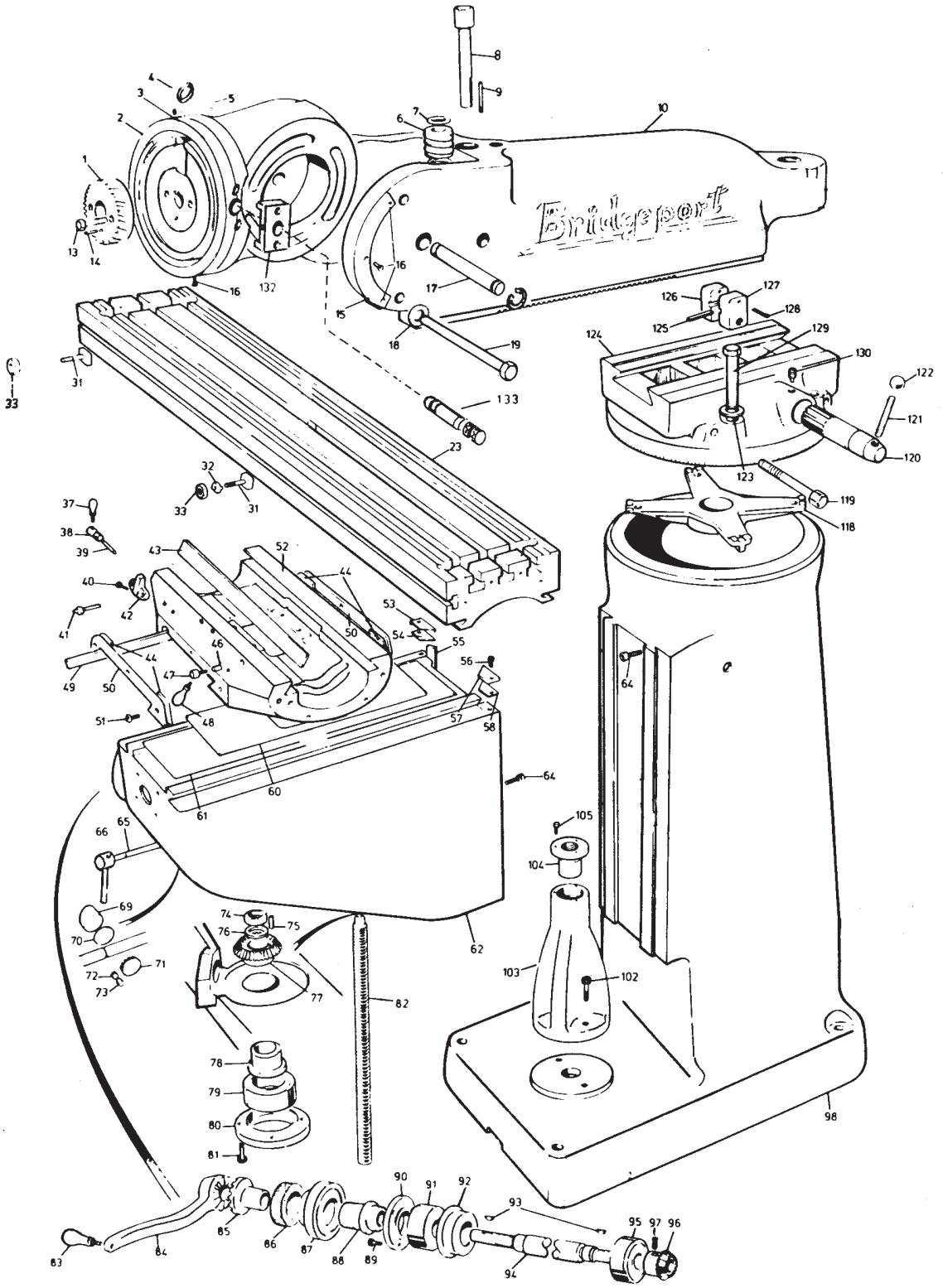
GENERAL SPEED RECOMMENDATIONS

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

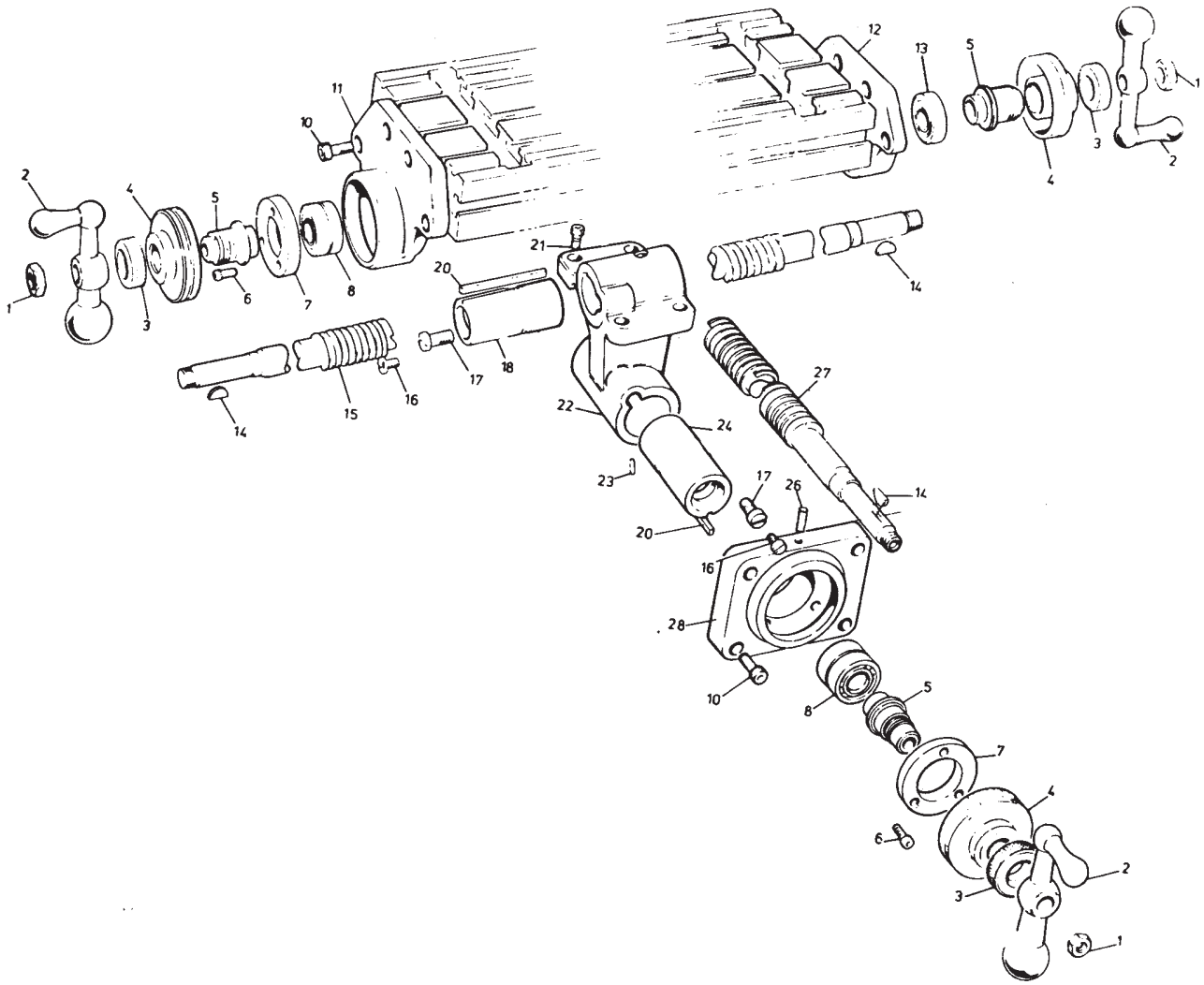
Feet Per Minute	15	20	25	30	40	50	60	70	80	90	100
Diameter, Inches	Revolutions Per Minute										
1/16"	917	1222	1528	1833	2445	3056	3667	4278	4889	5500	6112
1/8"	458	611	764	917	1222	1528	1833	2139	2445	2750	3056
3/16"	306	407	509	611	815	1019	1222	1426	1630	1833	2037
1/4"	229	306	382	458	611	764	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


Bridgeport

BASIC MACHINE

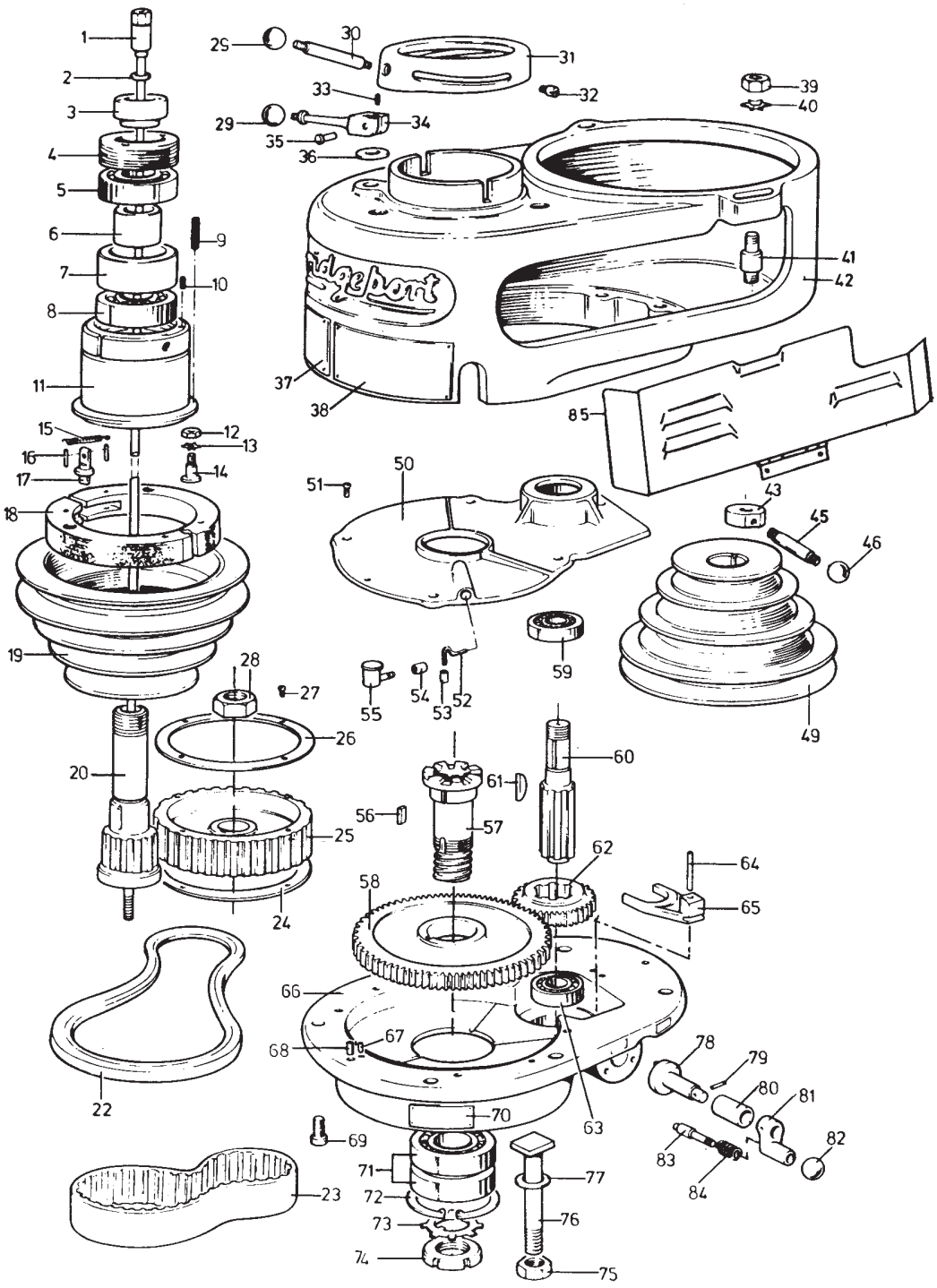
ITEM NO.	CODE NO.	DESCRIPTION
1	2193500	Quill Housing ADJ. Gear
2	2060129	Ram Adapter
4	1060892	Snap Ring
5	1011216	Socket Set Screw (2 Req.)
6	1062206	Vertical Adjusting Worm
7	2060135	Worm Thrust Washer (2 Req.)
8	2060130	Vertical Adjusting Worm Shaft
9	2060138	Worm Key
10	2060128	Ram
13	1011035	Socket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


1
2
3
4
5
6
7
8
10
11
12
13
14
15
16
17
18
20
21
22
23
24
26
27
28

LEADSCREW ASSEMBLY

(See pages 48 thru 50 for Metric Kits)

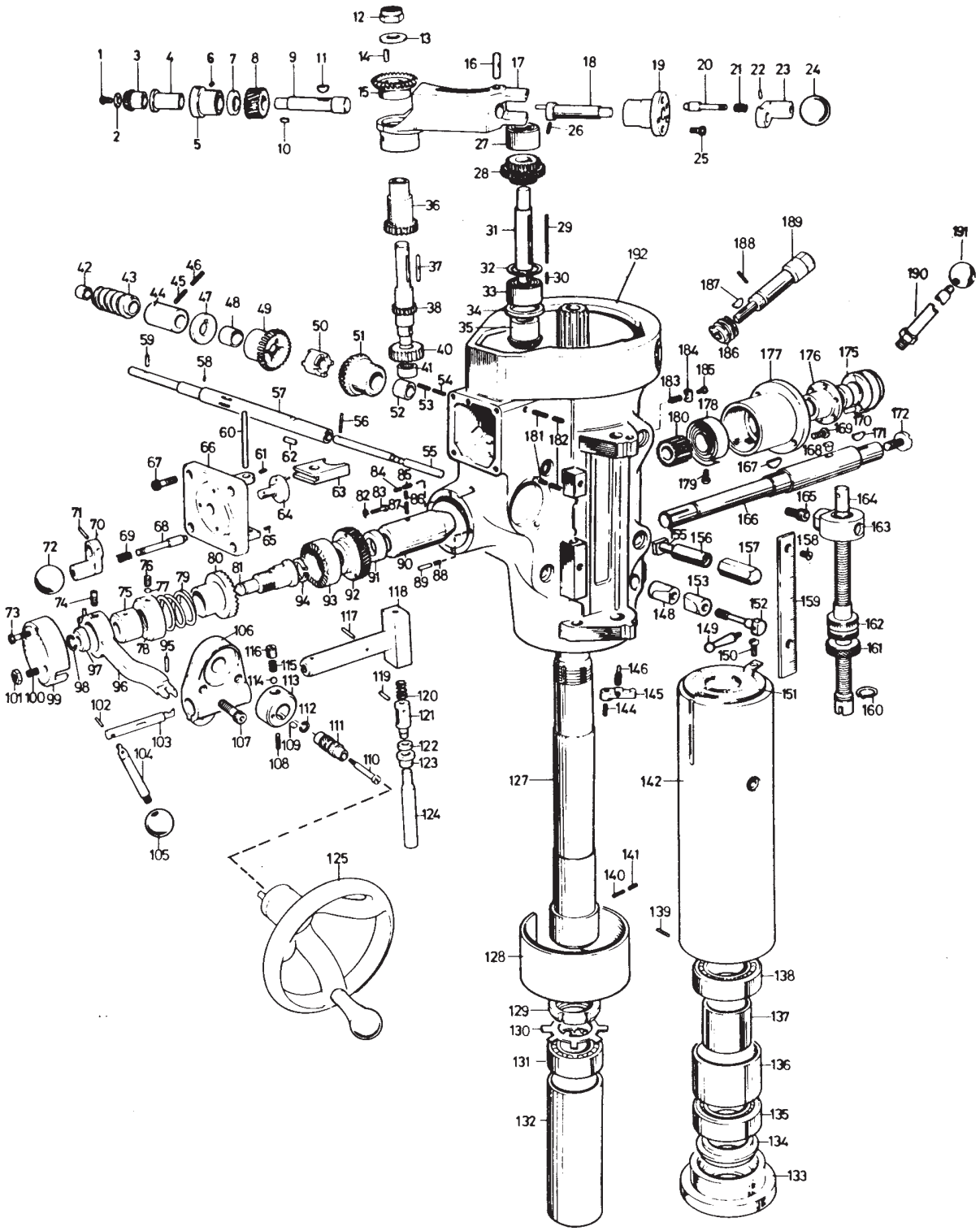
ITEM NO.	CODE NO.	DESCRIPTION
1	1011755	Jam Nut (3 Req.)
2	2060085	Ball Crank Handle (3 Req.)
3	2060078	Dial Lock Nut (3 Req.)
4	2060083	Dial with 200 Graduations (3 Req.)
5	2060084	Dial Holder (3 Req.)
6	1011030	Socket Cap Screw (6 Req.)
7	2060075	Bearing Retainer Ring (2 Req.)
8	1060203	Grease Sealed 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


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
45
46
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85

J HEAD TOP HOUSING

ITEM NO.	CODE NO.	DESCRIPTION
1	2193502	Drawbar for R.8 Collet
2	2190183	Drawbar Washer
3	2190126	Upper Bearing Locknut
4	2190125	Bearing Sleeve Locknut
5	1190232	Ball Bearing
6	2193506	Upper Bearing Spacer (small)
7	2193506	Upper Bearing Spacer (large)
8	1190232	Ball Bearing
9	1192032	Compression Spring (4 Req.)
10	1011258	Socket Set Screw (2 Req.)
11	2193512	Spindle Pulley Bearing Sleeve
12	1011743	Jam Nut
13	1191965	External Lock Washer
14	2193516	Brake Ring Screw (3 Req.)
15	1192084	Spring (2 Req.)
16	1010507	Roll Pin (4 Req.)
17	2190131	Brake Lock Stud
18	2193477	Brake Assembly
19	2190055	Spindle Pulley
20	2193478	Spindle Pulley Hub
22	1192101	'V' Belt
23	1182106	Timing Belt
24	2190058	Timing Belt Pulley Flange
25	2193509	Timing Belt Pulley
26	2190058	Timing Belt Pulley Flange
27	1011506	Flat Head Screw
28	1191738	Hex Jam Nut
29	1192151	Black Plastic Ball Handle (2 Req.)
30	2190128	Spindle Clutch Lever
31	2190127	Cam Ring
32	2190129	Cam Ring Pin (2 Req.)
33	1011215	Socket Set Screw
34	2190133	Brake Lock Handle
35	2190134	Brake Lock Pin
36	2190132	Brake Lock Washer
37	1192830	Spindle Speed Plate
38	1192832	Operating Instruction Plate
39	1191796	Hex Jam Nut (2 Req.)
40	1191922	Lock Washer
41	2190173	Motor Mounting Studs (2 Req.)

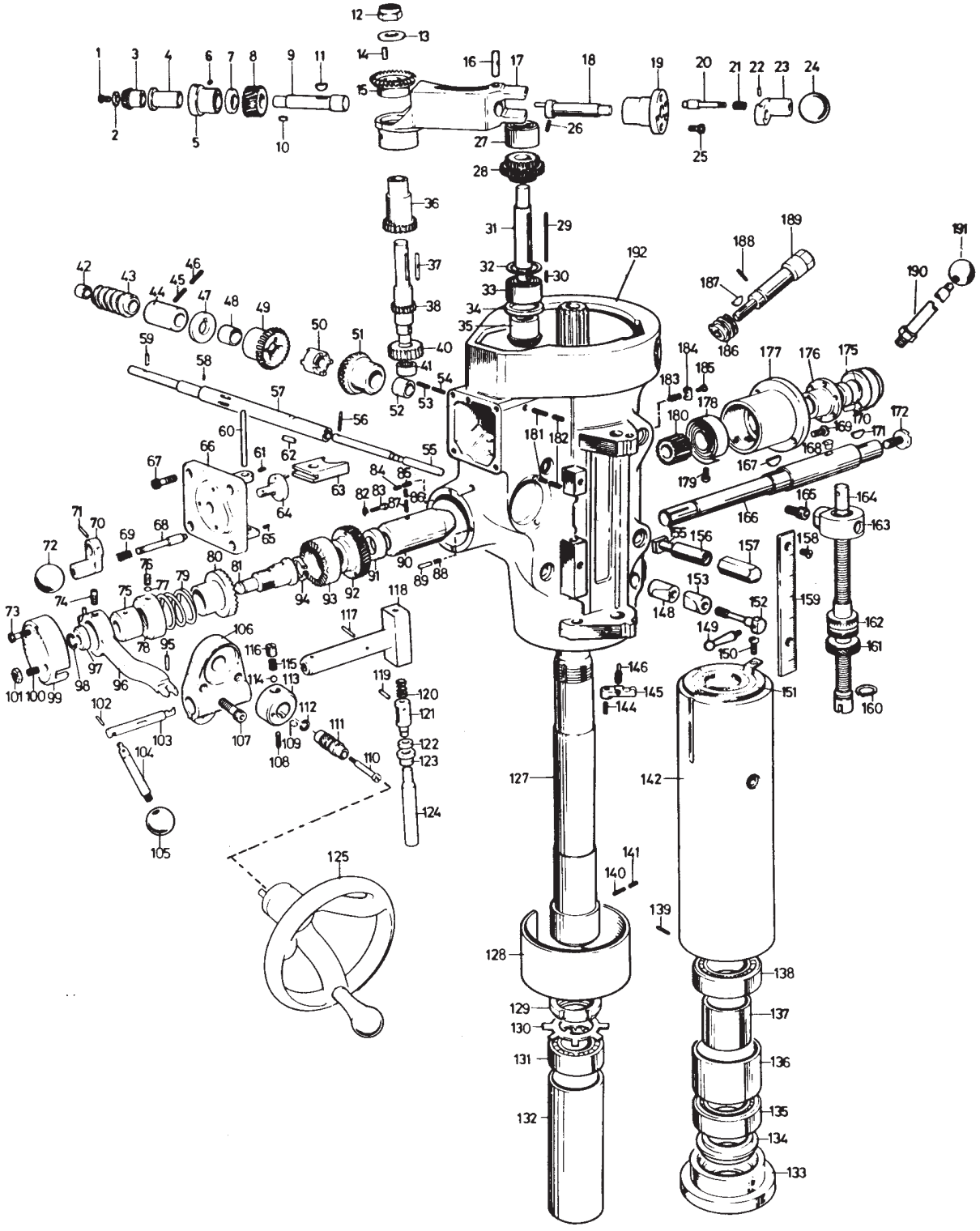
ITEM NO.	CODE NO.	DESCRIPTION
42	2193507	Belt Housing
43	2193541	Motor Locknut (2 Req.)
45	2190172	Motor Locknut Handle (2 Req.)
46	1192151	Black Plastic Ball (2 Req.)
49	2193508	Motor Pulley
50	2193452	Gear Housing Cover
51	1011455	Round HD Screw (5 Req.)
52	1195720	Wick
53	2190120	Oiler Tube
54	2190121	Oiler Plug
55	1193105	Oil Cup
56	2190116	Bull Gear Key
57	2190115	Splined Gear Hub
58	2193548	Spindle Bull Gear Assembly
59	1180235	Bearing
60	2190136	Countershaft
61	1013079	Key
62	2190137	Countershaft Gear
63	1180235	Bearing
64	1010747	Dowel Pin
65	2190062	Back Gear Shifter Fork
66	2193505	Gear Housing
67	1010540	Dowel Pin (2 Req.)
68	1010555	Roll Pins (2 Req.)
69	1011104	Socket Cap Screw (6 Req.)
71	1190230	Ball Bearing
72	1190806	Snap Ring
73	1191944	Lockwasher
74	1191793	Bearing Locknut
75	1011718	Hex Nut Hardened (3 Req.)
76	2193515	Vertical Tee Bolt (3 Req.)
77	2190114	Vertical Bolt Washer (3 Req.)
78	2193545	Back Gear Shift Crank
79	1010517	Roll Pin
80	2190186	Back Gear Shift Bushing
81	2193443	Shift Crank
82	1192151	Black Plastic Ball 1" Dia.
83	2190138	Gearshift Plunger
84	1192052	Compression Spring
85	2190040	Belt Guard Assembly



J H E A D

(See page 48 for Metric Kit)

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

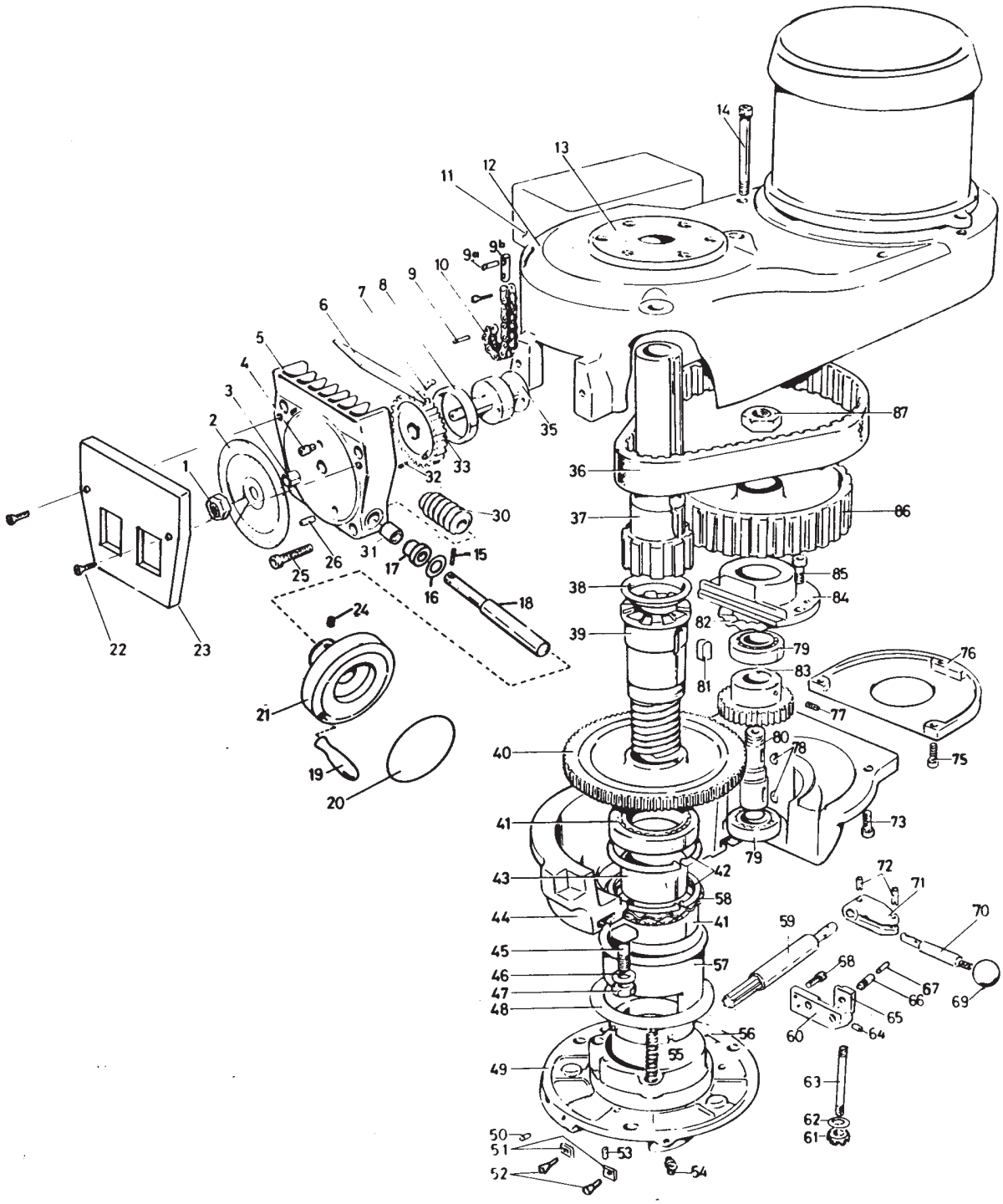


J HEAD (CONTINUED)

(SEE PAGE 48 FOR METRIC KIT)

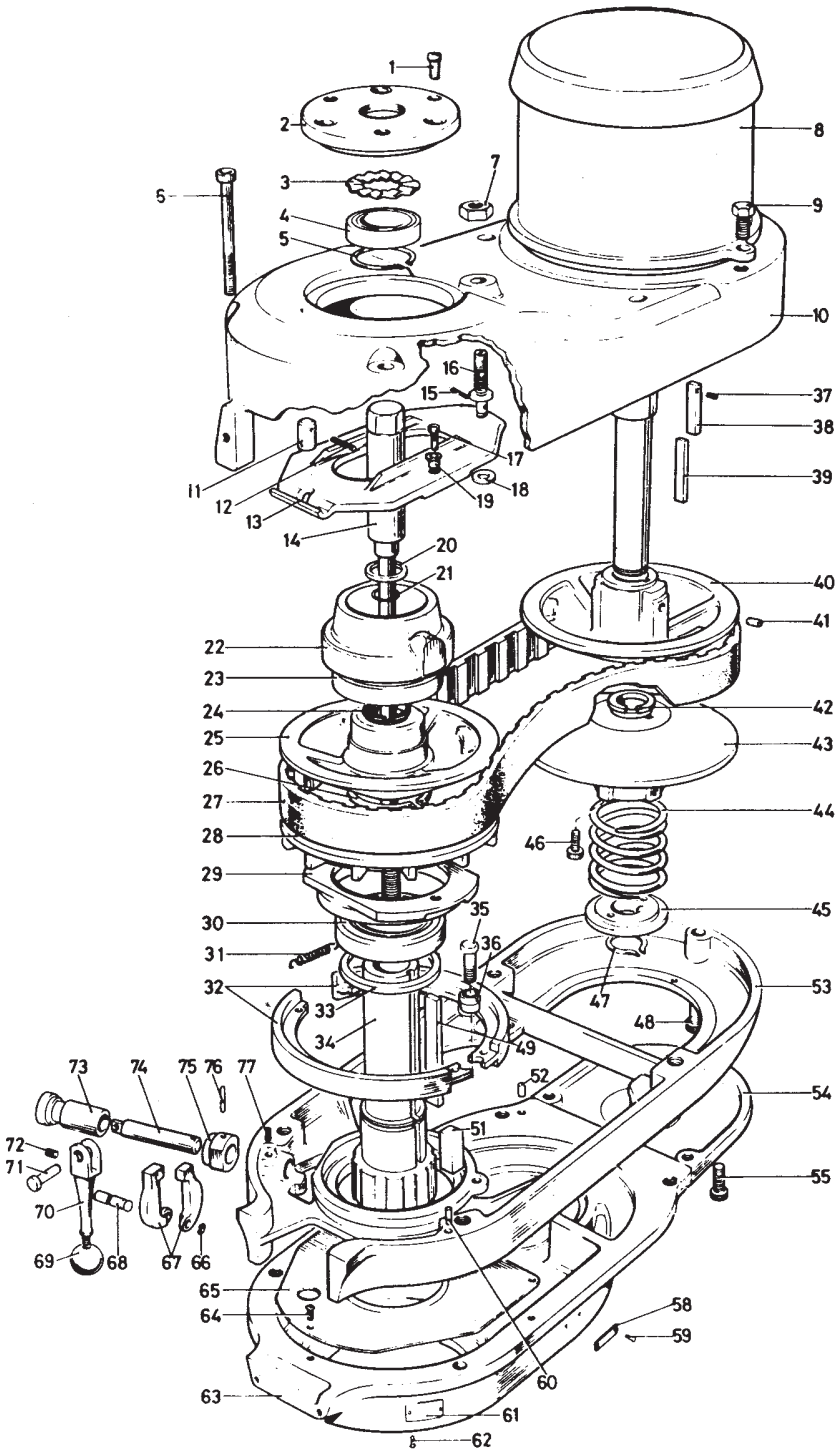
ITEM NO.	CODE NO.	DESCRIPTION
115	1192054	Compression Spring
116	2190154	Handwheel Clutch Spring Screw
117	1010515	Roll Pin
118	2190093	Cam Rod Sleeve Assy.
119	1010513	Roll Pin
120	1192053	Compression Spring
121	2193456	Trip Plunger
122	2190092	Feed Trip Plunger Bushing
123	2190090	Trip Plunger Bushing
124	2190089	Feed Trip Plunger
125	2193503	Handwheel
127	2193511	Spindle
128	2190081	Quill Skirt
129	1191790	Locknut
130	1191942	Lockwasher
131	1190237	Bearing
132	2190197	Sleeve
133	2190196	Nose-piece
134	2190193	Spindle Dirt Shield
135	1190239	Bearing
136	2193513	(Bearing Spacer - Large
137		(Bearing Spacer - Small
138	1190239	Bearing
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.)

ITEM NO.	CODE NO.	DESCRIPTION
170	1010717	Roll Pin
171	1013076	Key
172	2190182	Pinion Shaft Hub Screw
173	1192165	Steel Ball
174	1192033	Compression Spring
175	2201031	Rack Feed Handle Hub
176	2190079	Pinion Shaft Hub Sleeve
177	2193436	Spring Cover
178	1192020	Clock Spring (Clock Spring Assy. 2193437)
179	2190184	Outside Spring Pin
180	2190108	Quill Pinion
181	1011268	Socket Set Screw
182	1011542	Lockscrew
183	2190085	Reverse Trip Ball Lever
184	2190086	Feed Reverse Trip Plunger
185	2190087	Reverse Trip Ball Lever Screw
186	1192207	Worm Gear
187	1013077	Key
188	1011370	Socket Set Screw
189	2190177	ADJ Worm Shaft
190	2201032	Pinion Shaft Hub Handle
191	1202170	Black Plastic Ball Handles
192	2193514	Quill Housing


1
2
3
4
5
6
7
8
9
9a
9b
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
30
31
32
33
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
75
76
77
78
79
80
81
82
83
84
85
86
87

2J HEAD TOP HOUSING

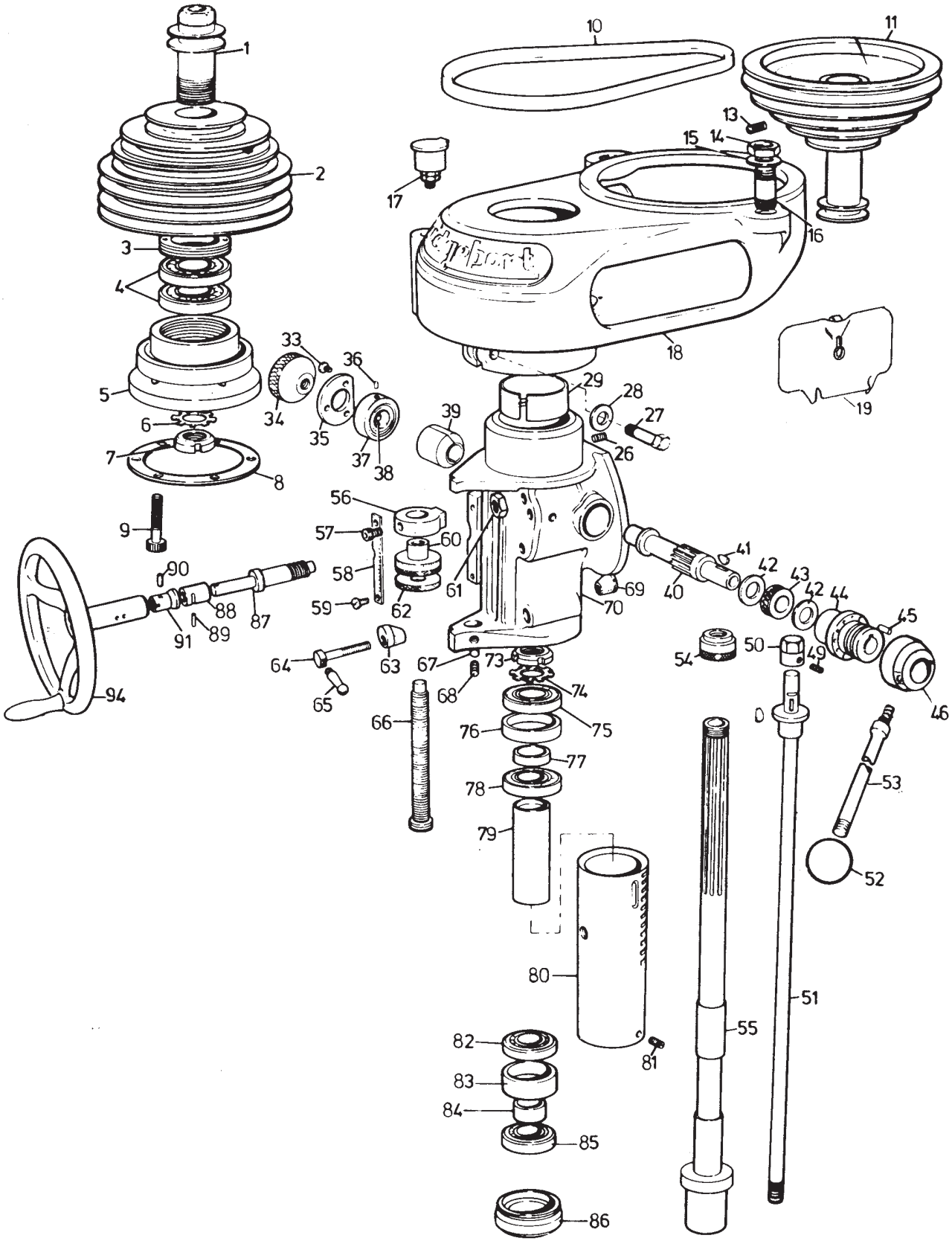
ITEM NO.	CODE NO.	DESCRIPTION
1	1011743	Hex Cap Nut
2	1180033	Vari-Speed Dial
3	1183646	Bronze Bearing
4	1011380	Full Dog Socket Set Screw
5	2180055	Speed Changer Housing
6	1185325	Speed Changer Chip Shield
7	1011420	Machine Screws (2 Req.)
8	1183655	Bearing
9	1010520	Roll Pin
9a	1010534	Roll Pin
9b	2180066	Speed Change Stud
10	1183720	Speed Changer Chain
11	1182655	Drum Switch
12	2183923	Belt Housing Assembly
13	2180094	Top Bearing Cap
14	1011065	Soc HD Cap Screw (2 Req.)
15	2190201	Roll Pin
16	1181923	Spring
17	1180214	Bearing
18	2182002	Speed Change Shaft
19	1182178	Handle
20	1182892	Caution Plate
21	2182001	Speed Change Handwheel
22	1011133	Flat Hd. Cap Screw (2 Req.)
23	1182901	Plastic Face Plate
24	1181233	Set Screw
25	1011037	Socket HD Cap Screw (4 Req.)
26	1011287	Socket Set Screw
27	1183645	Bronze Bearing
28	2190201	Pin
29	2180087	Speed Control Shaft
30	1192208	Worm Gear
31	1183636	Bearing
33	2180090	Speed Changer Spur Gear
35	2180065	Speed Change Chain Drum
36	1182106	Belt
37	2180060	Spindle Pulley Hub
38	2180064	Timing Pulley Clutch Sleeve
39	2180059	Splined Gear Hub
40	2183933	Spindle Bull Gear Assembly
41	1180254	Ball Bearing (2 Req.)
42	2180092	Snap Ring (2 Req.)
43	2180063	Bull Gear Bearing Spacer
44	2180053	Gear Housing
45	1181650	Vert. Tee Bolts (3 Req.)
46	1181906	Steel Washer (3 Req.)
47	1011750	Hex Jam Nut - Finished HDN. (3 Req.)
48	1181986	Ball Bearing Gear Sleeve Washer
49	2180054	Fixed Clutch Bracket
50	1011246	Socket Set Screw
51	2180105	Guide for Clutch Bracket
52	1011016	Flat HD Socket Cap Screw (2 Req.)
53	1010511	Dowel Pin
54	1183104	Oil Cup
55	1182071	Compression Spring (3 Req.)
56	1181794	Bearing Locknut
57	2180061	Bearing Sleeve
58	1181977	Wave Spring Washer
59	2180067	Bull Gear Shift Pinion
60	2180097	HI-LOW Detent Plate
61	1181732	Hex Nut (3 Req.)
62	1181910	Lock Washer (3 Req.)
63	2180085	Studs (3 Req.)
64	1011284	Socket Set Screw
65	2180098	Adjustable Plate
66	2180100	HI-LOW Detent Plunger
67	1182072	Spring
68	1011017	Socket Cap Screw (2 Req.)
69	1192151	Bakelite Ball Handle
70	2180099	HI-LOW Shift Crank
71	2180096	HI-LOW Pinion Block
72	1010516	Roll Pin (2 Req.)
73	1011052	Socket Cap Screw (4 Req.)
75	1011012	Socket HD Cap Screw
76	2180088	Motor Pulley Cover
77	1011287	Socket Set Screw
78	1013079	Key (2 Req.)
79	1180235	Ball Bearing (2 Req.)
80	2180075	Bull Gear Pinion Counter Shaft
81	2180103	Key
82	1181975	Wave Spring Washer
83	2183933	Bull Gear Pinion
84	2180076	Bull Gear Pinion Bearing Cap
85	1011011	Socket HD Cap Screw (2 Req.)
86	2550016	Timing Belt Pulley
87	1191738	Jam Nut
		FOR 2 HP HEAD, SUBSTITUTE THE FOLLOWING:
36	1552106	Belt
37	2550012	Pulley Hub
38	2550013	Clutch Sleeve
86	2180091	Pulley


1
2
3
4
5
5
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
51
52
53
54
55
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77

2J HEAD ASSEMBLY

(SEE PAGE 48 FOR METRIC KIT)

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

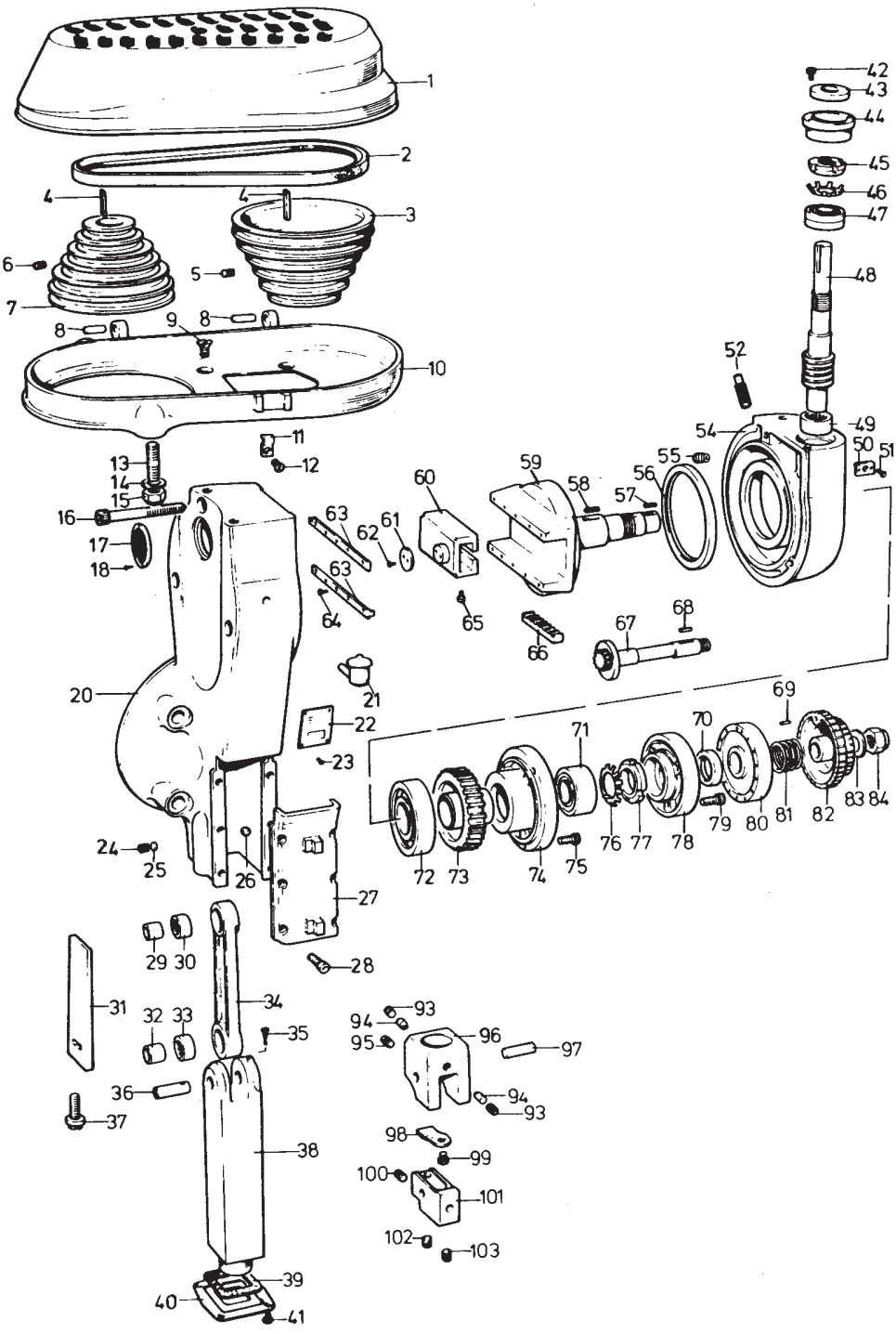

1
2
3
4
5
6
7
8
9
10
11
13
14
15
16
17
18
19
26
27
28
29
33
34
35
36
37
38
39
40
41
42
43
44
45
46
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
94

M H E A D

(See page 48 for Metric Kit)

ITEM NO.	CODE NO.	DESCRIPTION
1	2204826	Spindle Pulley Hub, Single Belt Drive
2	2200069	Spindle Pulley, Single Belt Drive
3	2200072	Bearing Retainer Ring
4	1200202	Ball Bearings (2 Req.)
5	2204834	Bearing Housing
6	1241940	Bearing Lock Washer
7	1241786	Bearing Lock Nut
8	1202450	Paper Gasket
9	1011040	Cap Screw (6 Req.)
10	1202102	V Belt
11	2204847	Motor Pulley, Single Drive
13	1011240	Set Screw
14	1011715	Hex Nut (2 Req.)
15	2200109	Chamfered & Hardened Washer
16	1011855	Motor Mounting Ring Stud (2 Req.)
17	1203108	Oil Cup
18	2204833	Belt Housing, Single Belt Drive, 60 Cycle
19	2204854	Belt Guard Assembly
26	1011236	Set Screw
27	1011170	Hex Head Screw
28	2200109	Chamfered & Hardened Washer
29	2200106	Brass Quill Skirt
33	1011455	Round Head Screw (3 Req.)
34	2200093	Quill Feed Clutch Knob
35	2200092	Spring Cover
36	2200108	Outside Spring Pin
37	1202021	Clock Spring
38	2200111	Pinion Spring Pin
39	2200091	Split Bushing
40	2204837	Quill Feed Pinion
41	1013076	Pinion Key
42	1202452	Fibre Washer (2 Req.)
43	2200090	Quill Feed Worm Wheel
44	2204836	Quill Feed Clutch Hub
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

ITEM NO.	CODE NO.	DESCRIPTION
57	1011116	Cap Screw
58	1202845	Micrometer Scale
59	1011411	Flat Head Screw (2 Req.)
60	2190084	Micrometer Nut
61	1011720	Hex Nut (4 Req.)
62	2200076	Micrometer Lock Nut
63	2200100	Quill Lock Sleeve, Drilled
64	2200099	Quill Lock Bolt
65	2200098	Quill Lock Bolt Handle
66	2200077	Micrometer Screw
67	2200110	Brass Plug
68	1011265	Set Screw
69	2200101	Quill Lock Sleeve, Tapped
70	2204832	Quill Housing
73	1201788	Bearing Lock Nut
74	1191942	Bearing Lock Washer
75	1200201	Ball Bearing (4 Req.)
76	2204840	Outside Bearing Spacer)
77		Inside Bearing Spacer) Machined as unit
78	1200201	Ball Bearing (4 Req.)
79	2200064	Long Spacer aligner spring plunger assembly
80	2200053	Quill
81	1011265	Set Screw
82	1200201	Ball Bearing (4 Req.)
83	2204842	Outside Bearing Spacer)
84		Inside Bearing Spacer) Machined as unit
85	1200201	Ball Bearing (4 Req.)
86	2200060	Nosepiece
87	2200097	Quill Feed Worm
88	1633638	Bronze Bearing
89	2200107	Straight Pin
90	2200112	Straight Pin
91	2200096	Quill Feed Worm Hub
94	2204849	Quill Worm Feed Handwheel Assembly


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
93
94
95
96
97
98
99
100
101
102
103

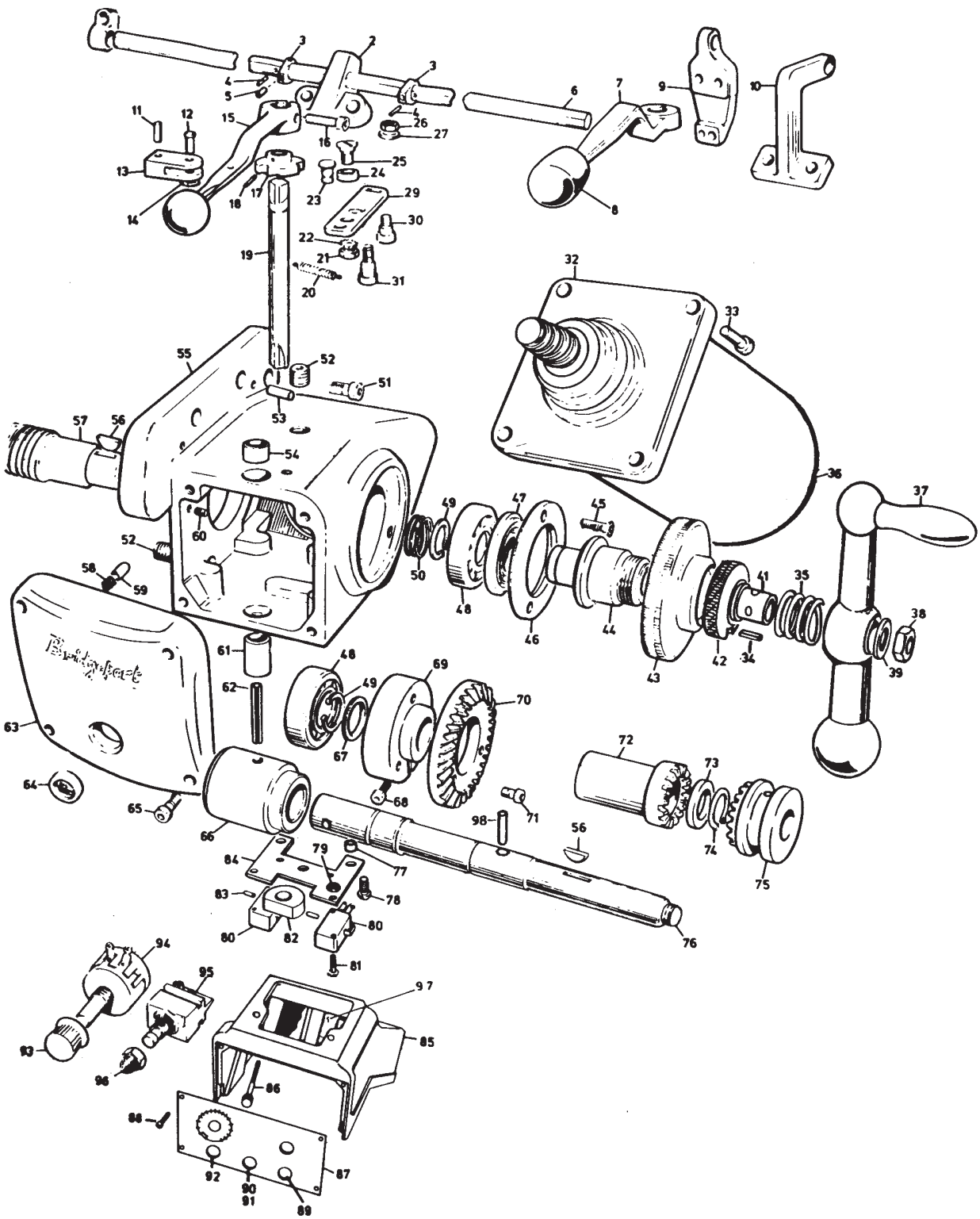
SHAPING ATTACHMENT

ITEM NO.	CODE NO.	DESCRIPTION
1	2240061	Belt Cover
2	1242104	Belt
3	2240814	Worm Shaft Pulley
4	2240087	Key
5	1011240	Set Screw
6	1011239	Set Screw
7	2240811	Motor Pulley
8	2240086	Pin (2 Req.)
9	1011530	Flat Screw (4 Req.)
10	2240059	Belt Housing
11	2240090	Belt Cover Clip
12	1011590	Washer Head Screw
13	1011850	Motor Mounting Ring Stud (2 Req.)
14	2060122	Washer
15	1011720	Hex Head Nut
16	1011061	Cap Screw (3 Req.)
17	2240079	Air Vent Cover
18	1011592	Washer Head Screw (2 Req.)
20	2240810	Ram Housing
21	1243107	Oil Cup
22	1242808	Nameplate
23	1011552	Drive Screws
24	1011265	Set Screw
25	2240150	Brass Plug
26	1242402	Felt Plug
27	2240056	Ram Cover
28	1011030	Cap Screw
29	1240303	Inner Race
30	1240302	Bearing
31	2240057	Gib
32	1240305	Inner Race
33	1240304	Bearing
34	2240067	Connecting Rod
35	1011450	Ram Crankpin Lockscrew
36	2240072	Ram Crankpin
37	2060088	Gib Screw
38	2240065	Ram
39	1242404	Wiper Felt
40	2240078	Wiper Plate
41	1011407	Round Head Screw (4 Req.)
42	1011009	Cap Screw (3 Req.)
43	1243182	Oilseal
44	2240073	Worm Bearing Cover
45	1241784	Locknut
46	1241932	Lockwasher
47	1240217	Ball Bearing
48	2240058	Worm & Shaft
49	1240306	Bearing
50	1242805	Rotation Nameplate
51	1011552	Drive Screw
52	2240091	Vent Plug
54	2240051	Gear Housing
55	1010782	Pipe Plug

ITEM NO.	CODE NO.	DESCRIPTION
56	1243180	Oilseal
57	2240082	Key
58	2240085	Key
59	2240063	Crank & Shaft
60	2240064	Crankpin Block
61	2240074	Bearing Retaining Washer
62	1011502	Round Head Screw
63	2240070	Crankpin Block Hold-Down
64	1011515	Flat Head Screw (10 Req.)
65	1011427	Round Head Screw (3 Req.)
66	2240069	Rack
67	2240080	Pinion Gear & Shaft
68	2240084	Key
69	2240083	Pin
70	1243181	Oilseal
71	1240216	Ball Bearing
72	1240214	Ball Bearing
73	2240071	Worm Gear
74	2240106	Gear Housing Cover
75	1011030	Cap Screw (3 Req.)
76	1241940	Lockwasher
77	1241786	Locknut
78	2240068	Crank Bearing Cover
79	1011033	Cap Screw (3 Req.)
80	2240066	Stroke Adjustment Plate
81	1242050	Dial Spring
82	2240055	Stroke Adjustment Dial
83	2240088	Washer
84	2240089	Acorn Nut
93	1011270	Set Screw
94	2240077	Clapper Box Clamp Shoe (2 Req.)
95	1011214	Set Screw
96	2240813	Clapper Box
97	1010748	Pin
98	2240062	Clapper Spring
99	1011427	Round Head Screw
100	1011239	Set Screw
101	2240076	Clapper
102	1011214	Set Screw
103	1011237	Set Screw

AVAILABLE TOOLING

1245250	#1 Shaping Tool
1245251	#2 Shaping Tool
1245252	#3 Shaping Tool
1245253	#4 Shaping Tool
1245254	#5 Shaping Tool
1245255	#6 Shaping Tool
1245256	#7 Shaping Tool
2240128	High Speed Cutters
2240129	Tools with cutting edge unground
2240094	Complete Shaping Tools
1245440	Tool Bit. 3/16" Sq. x 2" for Shaper



6F LONGITUDINAL POWER FEED ASSEMBLY

ITEM NO.	CODE NO.	DESCRIPTION
1	2430097	Stop Rod Clamp
2	2060300	Bracket
3	1632304	Stop Collar
4	1010507	Roll Dowel
5	1011265	Socket Set Screw
6A	2631054	Stop Rod - 42" Table
6B	2631055	Stop Rod - 48" Table
7	2630065	Control Lever
8	1632152	Ball
9	2270093	Stop Rod Clamp - Optics
10	2270088	Bracket - Optics
11	1010516	Roll Dowel
12	2430101	Fork Pin
13	2630071	Stop Rod Fork
14	1630890	Retaining Ring
15	2630065	Control Lever
16	1011277	Set Screw
17	2630072	Clutch Detent Cam
18	1010516	Roll Pin
19	2630054	Control Lever Shaft
20	1632005	Clutch Arm Spring
21	1011740	Locknut
22	1631925	Lockwasher
23	2630076	Clutch Arm Spring Pin
24	2630074	Detent Roller
25	2630087	Roller Pin
26	1011705	Hex Nut
27	1631925	Lockwasher
29	2630073	Clutch Arm
30	1630320	Bearing
31	1011575	Shoulder Screw
32	2631051	Motor Assembly
32A	2636423	Motor Assembly (Hi Torque)
33	1011033	Socket Cap Screw (4 Req.)
34	2630094	Roll Pin
35	1632006	Spring
36	1633728	Motor Cap
37	2630081	Handle Assembly
38	1011755	Jam Nut
39	2200109	Washer
41	1633653	Bushing
42	2060078	Dial Locknut
43A	2060083	Dial - Inch
43B	2069016	Dial - Metric
44	2630064	Dial Holder
45	1011011	Socket Hd Screw
46	2630089	Take-up Cap
47	2630067	Lead Screw Seal
48	1630261	Bearing
49	1630814	Retaining Ring

ITEM NO.	CODE NO.	DESCRIPTION
50	1632074	Clutch Spring
51	1011074	Socket Hd Cap Screw
52	1635040	Taper Plug
53	1010543	Dowel Pin
54	1633638	Bronze Bushing
55	2630051	Main Housing
56	1013078	Woodruff Key (4 Req.)
57A	2630084	Longitudinal Lead Screw - 42"
57B	2630085	Longitudinal Lead Screw - 48"
58	1632073	Spring
59	2630068	Detent Pin
60	2630075	Pin
61	1633650	Bronze Bearing
62	1010411	Taper Pin
63	2630053	Side Cover
64	1633112	Oil Sight
65	1011011	10 - 24 x 5/8" Socket Cap Screw
66	2630060	Coupling
67	2630091	Thrust Washer
68	1011128	Socket Hd Screw
69	2630069	Gear Mounting Hub
70	1632216	Gear (Spiroid)
70A	1632218	Gear (Spiroid) (Hi Torque)
71	1011016	Socket Hd Cap Screw
72	2630062	Clutch - Driving
73	2630070	Thrust Bearing
74	1630838	Retaining Ring
75	2630063	Clutch - Driven
76	2630092	Drive Shaft
77	2630066	Spacer
78	1011447	Pan Hd Machine Screw
79	1011701	Hex Nut (4 Req.)
80	1632658	Limit Switch
81	1011404	Rd Head Machine Screw
82	2630058	Switch Actuator Housing
83	2630059	Switch Actuator Pin
84	1632610	Switch Mounting Plate
85	2630052	Control Box
86	1011046	Socket Hd Cap Screw (2 Req.)
87	1632576	Power Feed Control Plate
88	1011190	Button Hd Socket Screw (4 Req.)
89	1632659	Switch
90	1632607	Fuse Socket
91	1632606	Fuse
92	1632593	Pilot Light
93	1632153	Knob
94	1632618	Potentiometer
95	1632620	Pushbutton Switch
96	1632628	Boot
97	1632568	PC Board
98	1010545	Roll Pin

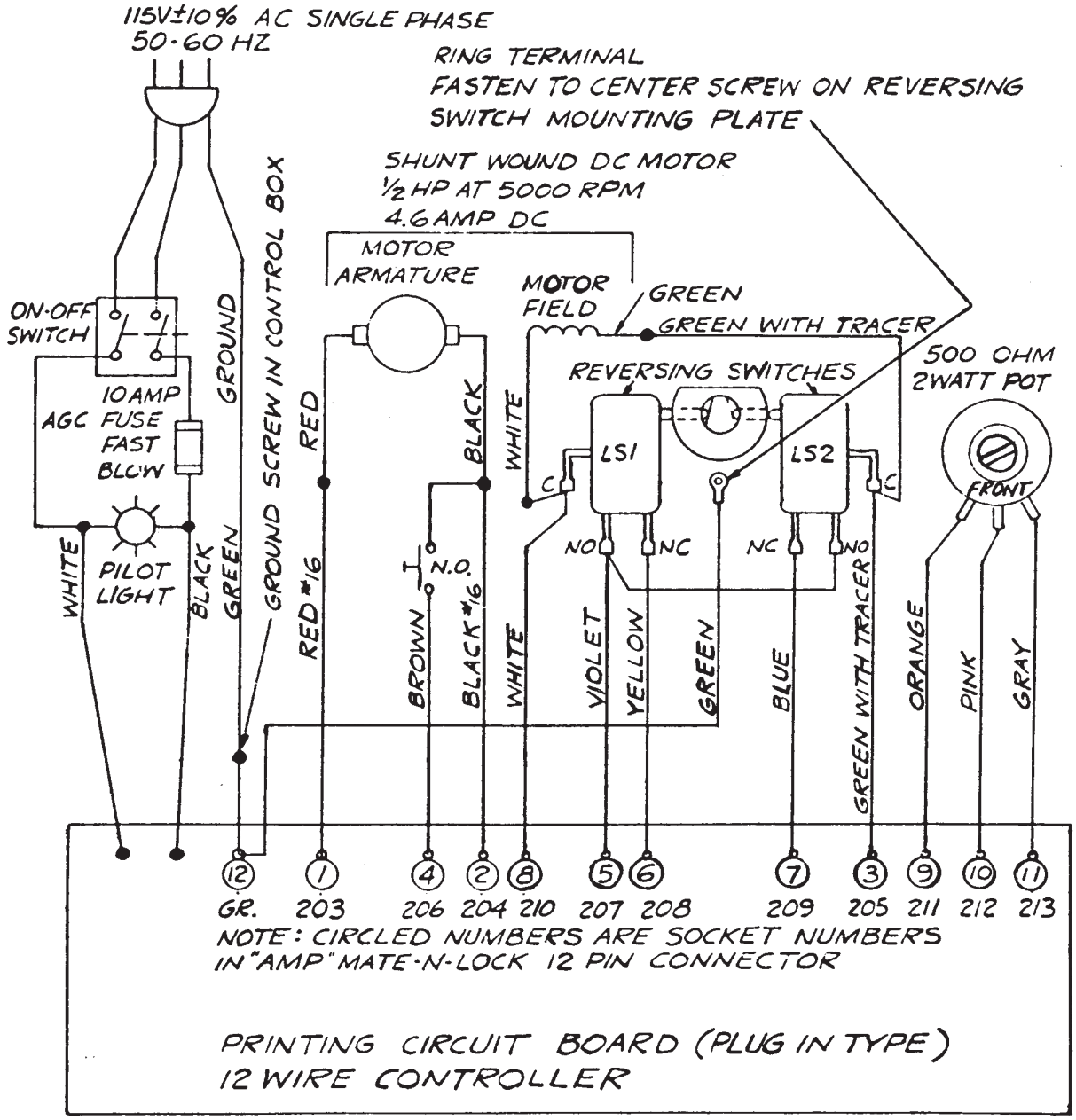


Figure 11. Circuit Diagram - Motors

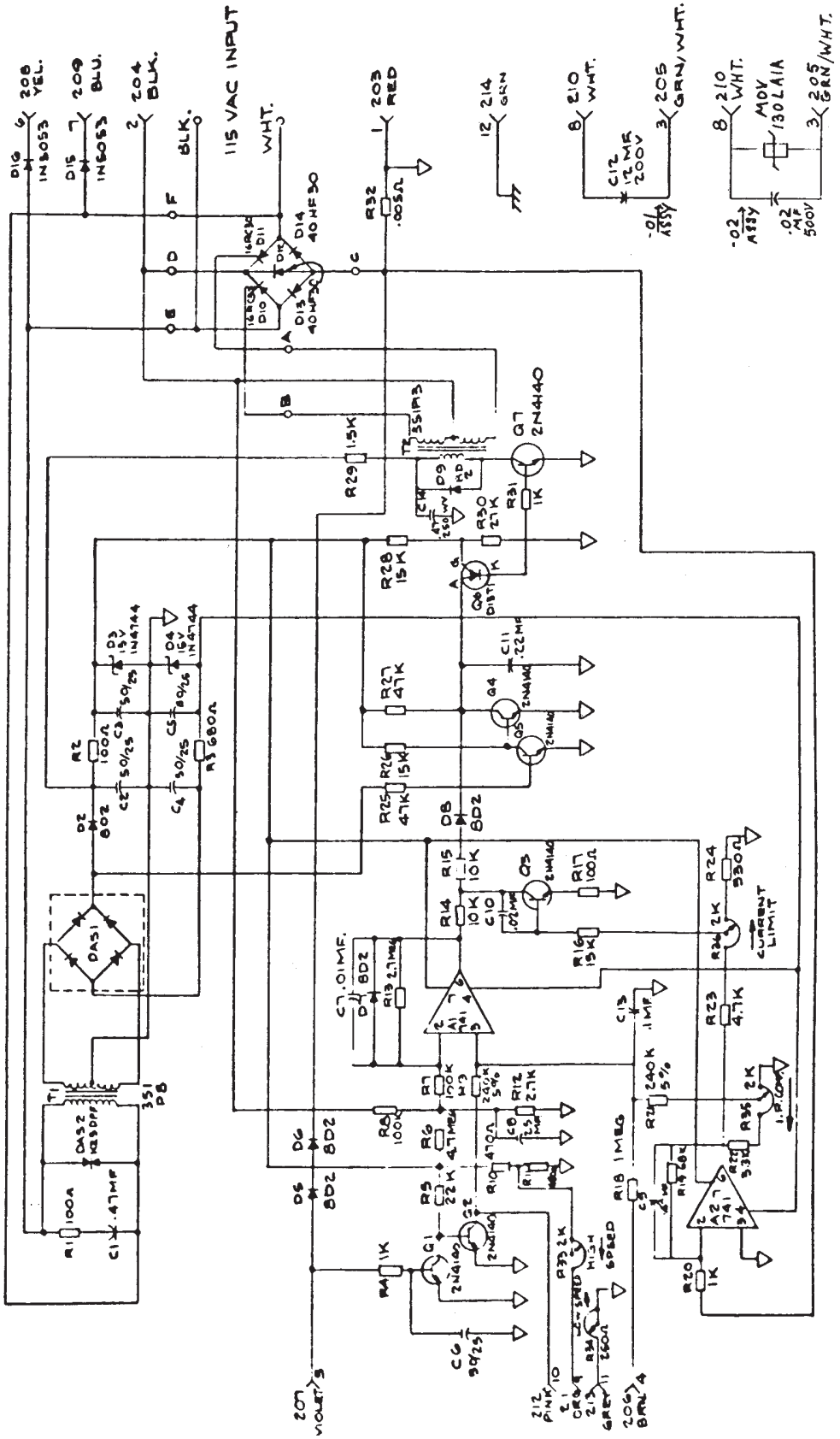


Figure 15. Circuit Diagram - Power Feed

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

These are tricks or tips I use when working on a Mill

These are intended for informational purposes only and not responsible for any injury or damage to the machine

Removal of motor on a variable speed head

Turn the spindle on and crank the RPM's down to the lowest RPM
Shut off the spindle **disconnect the power to the machine**
Remove the drum switch from the left side of the machine
Underneath the motor is a half moon shaped cover. Take out the
three 10-32 screws that hold the cover on.
Looking up in the opening you will see a collar with a spring above
Using two of the 10-32 screws stick them through the two holes in the collar
and thread them into the varipulley. This secures the compressed spring.
(If you cannot thread them this means that the key in the varipulley is broken
and you will have to carefully force the belt off the pulley)
Now crank the spindle RPM handle to the highest RPM. This loosens the spindle varipulley
Remove the two bolts that hold the motor onto the housing and lift motor up and tilting
it slightly. This loosens the belt on the spindle varipulley. I usually rest the motor
on the adjusting screw sticking up through the housing. This now gives you enough room
to slip the belt off the motor pulley and remove the motor.

Easy removal of the head T-bolts or head tilt adjusting Screw

Put and clamp a vise onto the table (If you have a riser block
on the machine you may have to block up the vise)
Now crank the knee all the way up to the bottom of the head.
Position the table with X and Y cranks so the spindle nose goes into the vise jaws
Crank the knee up so the bottom of the spindle sets inside the vise jaws
Clamp the vise jaws onto the bottom of the spindle. You will see that there is
small flat spot underneath the Micrometer rod. I clamp the vise there.
You may want to use blocks of Aluminum or wood inside the vise jaws to clamp with.
At this point you can loosen the four head T-bolt nuts. Now carefully crank the Y-axis handle
and the whole head assembly will go straight out and straight back in again.
Be carefull the head assembly is top heavy you may need assistance to balance the head.
With it out you can replace the T-bolts (part# 1431), Head tilt adjusting Screw (part# 1097)
Head tilt worm gear (part# 1096), on page quill housing
You can also replace Quill housing adjusting gear (part# 1186) on page base machine assembly

Replacing bushings and keys inside Motor Varipulley

With the Spring collapsed on the motor varipulley, I put the varipulley in an Arbor Press.
Holding the spring collapsed with the Press (You may need a block to access the bolts)
Take out the two 10-32 screws and slowly release the press and the spring
Be careful the spring wants to fly up the press handle.
Take the spring and the collar off the assembly
Take the old Plastic Bushings and key out of the varipulley
The bushings should be black, if they are green they cannot be replaced and you have
to buy a new Pulley assembly. (part# 1036 for a 2 HP and part# 1037 for a 1 1/2 HP)
The pulleys I supply have the replaceable bushings and keys.
You will notice inside the bore of the varipulley that there will be some glue left inside
This needs to be removed. I use a Dremel type grinder with a drum sander and a Keyway cutter
to grind away the glue. The keyway cutter removes the glue inside the groove of the varipulley
I clean out the keyway with a screwdriver blade and then run a file in it.

Once I've cleaned up the bore, I put the new bushings and key inside the pulley and set it on the motor shaft to see how it fits. If too tight, grind some more glue out. It should be a snug fit. If it fits way to loose the bore may be wallowed out and the pulley replaced
Mix up some epoxy (I prefer JB weld the five Minute type)
Spread the epoxy on the Bushings and key and set them into the varipulley
No need to glue in the 2HP varipulley key it is held in with a 10-32 screw
Quickly set the pulley on the motor shaft and let the epoxy set-up
Put the asembly back in the Arbor press and collapse the Spring and collar
thread in the two 10-32 screws back on the varipulley so the spring stays collapsed. Put the assembly back on the motor.
On the 2HP varipulley there is a small bore for the 10-32 screw that holds in the key. If it is broken out I countersink a larger bore and put a washer behind the 10-32 screw and reassemble.
All parts can be found on page variable speed upper housing

Replacing Collet Alignment screw inside spindle

Bring the quill down about two inches
Look on the back side of the quill and you will see a small set screw. Remove it
This holds in the nosepiece on the bottom of the quill
With set screw removed you can unscrew the nosepiece. I use an adjustable spanner wrench
You will find two holes on the bottom of the nosepiece for this. You may need to use a punch and hammer to get it started.
Right hand thread for Bridgeport mill, left hand thread for Imports.
If the nosepiece does not unscrew this means the threads of the nosepiece are bad
You may never get it off without damaging the nosepiece and or quill. It can be very expensive to replace both nosepiece and quill. At this point most people live without the Collet screw and just put it back together
With the nosepiece removed you can get to the Collet Alignment screw (part# 1137) and special socket set screw (part# 1424). You may need to tap on the drawbar to bring the spindle down a bit farther so you can access the Collet screw.
Replace the Collet screw and may need to replace the Special Socket set screw
I put an R-8 collet in the spindle and adjust the collet screw by screwing the alignment screw in until it touches the R-8 collet and then back it off so the R-8 collet slides out of the spindle without hanging up.
I use blue Loctite on the collet screw and Special set screw just for insurance
Then I tap the spindle back into the quill with a rubber hammer and thread the nosepiece back on. Making sure it is up tight.
There should be a small gap between top of the nosepiece and the bottom of the quill anywhere from .003" to .010". This insures the spindle bearings are seated in the quill. If not check out how to reseat spindle bearings below
Before replacing the set screw in the back of the quill, drill a setpoint into the set screw hole.(I use a handrill and a #8 drill) This puts a dimple in the threads of the nosepiece. If you don't you will smash the threads and never be able to get the nosepiece off again. It also allows the set screw to in farther and not stick out catching on the quill housing.

Spindle Runout

Use the same disassembly instructions as replacing the Collet Alignment Screw above.
When you get the nosepiece off. Take the Drawbar out of the top and put at least a foot long rod about an inch in diameter in place of the drawbar.
Tap on the rod at the top and the complete spindle assembly falls out of the quill.
I put a block of wood on the table so when it falls out it bangs on the wood and not the table

Now crank the knee down and Y-axis back so you can get the spindle out.
At this point keep everything clean, don't get dirt into the bearings
Looking at the spindle assembly you will see that there is a pair of precision
thrust bearings with a two inch spacer in between, then there is a long spacer with
another precision bearing, on top of that there is a spider washer and a spanner nut.
If the short spacer is loose between the thrust bearings you will have runout.
To tighten, find a tab on the spider washer that is bent into the spanner nut.
bend it back down and out of the way. I clamp the spindle at the splines in a bench vise
I use blocks of Aluminum or wood to clamp on in the vise jaws so not to crush the splines
Tighten the spanner nut on top of the spindle. I use an adjustable spanner wrench or you
can use a punch and hammer. Tighten until it will tighten no more.
Adjust or tap with a hammer the small spacer between the thrust bearings so that it
will align between the two thrust bearings exactly. I use a six ruler to check the
concentricity. If the spacer sticks out to one side or another you'll still have runout.
Once you have adjusted the spacer then bend the spider washer tab back into the spanner nut
Before putting the spindle back in the quill look up into the quill and you will see
a felt washer (part# 1164) in the top part of the quill. The spindle has to go back up
through the hole in that felt washer. Be sure to get it through the hole or it will
damage the felt washer. The washer is there to keep dirt from getting into the spindle.
Now replace the spindle into the quill. After the spindle goes through the felt washer
you will feel the splines of the spindle engage the splined gear hub. Just move the spindle
around until they mesh together and the spindle goes all the way up.
I have found that sometimes the top of the spindle has mushroomed out from years of use of the
the drawbar being tigthened. If that is the case you may need to clean up the splines with a
file at the top of the spindle. It may also be difficult to get the spindle out because of this
Tap on the spindle with a rubber hammer until the nosepiece engages the quill. Tighten the
nosepiece with the same instructions as assembling the collet screw above.

Adjusting the quill downfeed

After years of use your quill downfeed lacks power and slips. You hear a clicking noise
On the left side of the quill you see a round cover. It has a black "S" shaped arm out of it
Take out the two long 10-32 screws that holds this round cover in place
There you have the quill downfeed clutch assembly. You notice there is a spring with a collar
You are suppose to tighten the spring to adjust the clutch but this rarely works
What I do is take out the two small pins that holds the "S" shaped black arm on the clutch assembly.
The "S" shaped black arm is made of brass. The less "S" there is, the tighter the quill feed is
I put the "S" arm in a vise and gently clamp on the brass arm. This takes some of the "S" out
I usually do a gentle clamp with the vise the first time. Then reassemble the clutch
and try it out. I test it by engaging the quill feed and pulling down on the quill handle.
It should have some give and you will hear some clicking of the clutch but should have power
enough to put a drill into your part. You can be your own judge.
If I still don't have enough power I clamp the "S" arm a second time.
I've had some that did this procedure 10 times until I got the right amount of power.
Things to watch for. If you straigthen it out to much you'll find that you will have
a clicking noise and feel when the quill feed is **not** engaged. Then you have gone to far
Then I put the "S" arm in the vise and clamp on the O part of the arm and use an adjustable wrench
to bend or put more "S" back in it.
Another thing to be careful with is there is two tabs that stick out from one end of
the arm be careful not to bend or brake these off. If all else fails you can purchase a
arm (part# 1388) Overload clutch trip lever - quill housing assembly

Adjusting the quill feed tripout

Adjusting the quill feed that doesn't trip out when engaging the Micrometer stop
Looking at the front of the quill you see a Micrometer rod. At the bottom of it, there is a trip lever (part#1033-02). You have to look under boss that the micrometer rod goes through. On that lever there is a small set screw. Adjusting the set screw gives more or less trip out depending which way you thread in the set screw.
Sometimes you will find the Trip lever all loaded up with chips and you have to take it out and clean it up. There is a small pin that holds it in place.
Make sure the micrometer rod is loose. I spray WD-40 on it.

Replacing a broken Ball trip lever at the top of the Micrometer rod

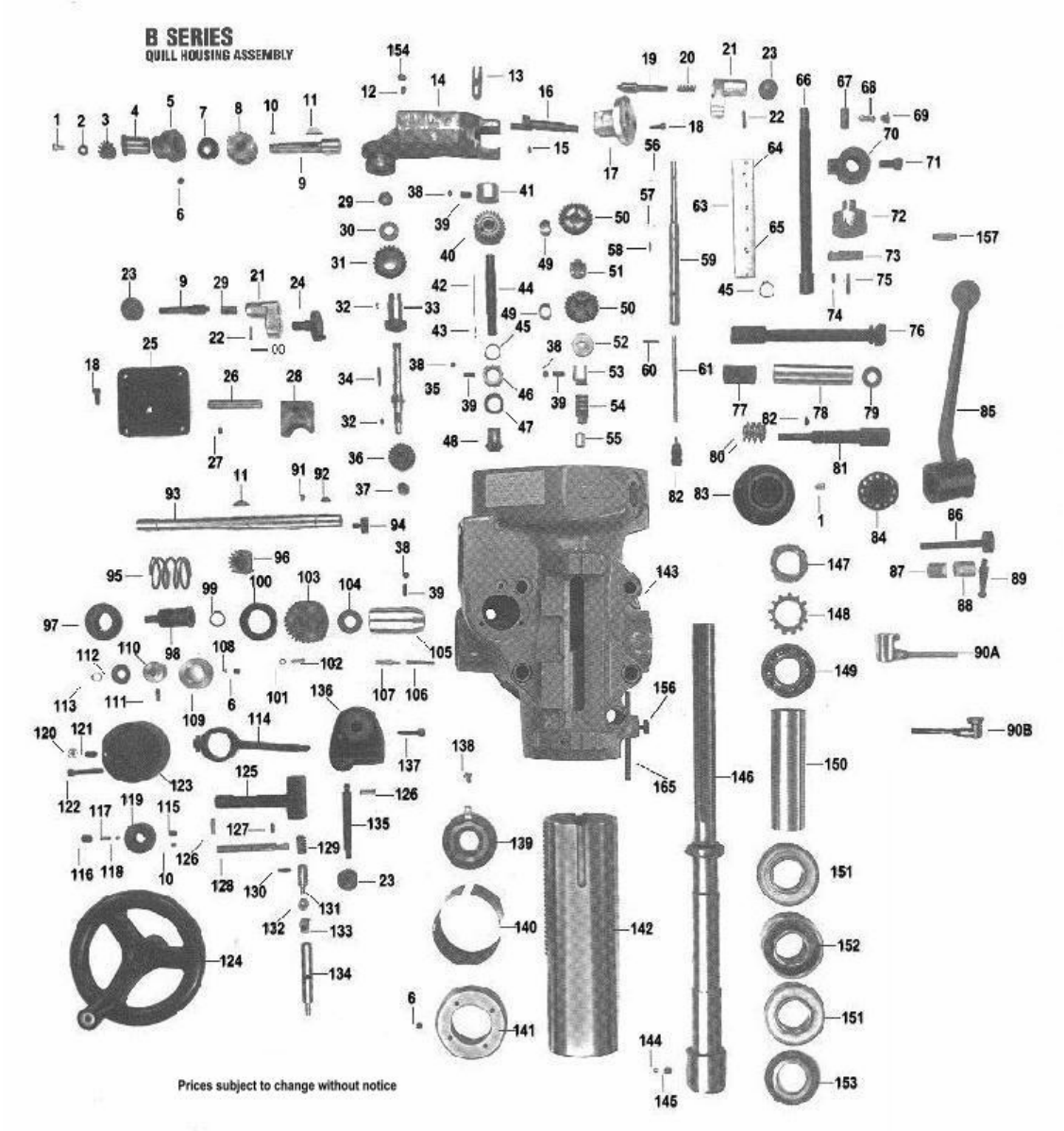
All I can say is good luck!!
The first piece usually comes out easily. I use a small screw or tap and thread into it and pull it out. You will use profanity on the back piece. Sometimes you can use a small magnet to get it out. Usually I get it out by blowing air around the top of Micrometer rod and moving the micrometer rod around at the same time and it pops out. I have worked on some for hours never getting it out and giving up. (part# 1033-03) on page quill housing

Adjusting the clutch arm on a Bridgeport power feed

When you engage the power feed it makes a rattling sound, especially when in rapid and you change directions. Two gears are not engaging and they make the sound.
Take the cover off the front of the power feed gearbox. It usually has the name Bridgeport on it. Be ready there is about a half a cup of oil in it. So have a pan ready to catch it so it's not all over the floor. Also have some shop towels handy.
Looking in the gearbox you will see a spring attached on one end to the gearbox housing and the other end to the clutch arm. Take the spring loose from the clutch arm.
There is a 1/4-20 shoulder bolt that holds that clutch arm in. Undo the bolt and get the arm out. On the clutch arm you will see two roller cams. One on the end that the spring was attached the other back cam engages two gears inside the box. Notice the back cam is in a slot on the clutch arm It usually backs off and doesn't let the two gears mesh in together. I take the back cam off and then mill the slot a little farther to the left so when I reassemble the clutch arm it keeps the the two gears together. I then drill and tap a 6-32 hole in the edge of the clutch arm.
This way when I put the roller cam back on the clutch arm I put the 6-32 set screw in so it pushes the roller cam to the left and never backs off again. Reassemble the clutch arm and put it back in with the shoulder bolt. Attach the spring on the clutch arm and put the cover back on. Put about a half a cup of heavy oil, preferably 90 weight in the gearbox through the set screw in the top.

Replacing Cam Ring Pins on Step Pulley Head

If you have trouble getting a step pulley head to go into back gears.
Most times the Cam Ring Pins (Item #10 part #1109) are stripped and need to be replaced.
There is not much to replacing the pins, but one thing to look for is not only are the Pins stripped but the Spindle Pulley Bearing Sleeve (Item #11 part #1128) that the pins screw into may also have stripped threads. Get up on the machine table and look down at where the Pins screw into the Bearing sleeve. You will see a couple of small set screws that screw into the Cam Ring Pins and hold them in place. Look off around 30 degrees and you will see another set of holes for those set screws. Bridgeport drilled another set of holes in the Pulley sleeve. Just take the old pins out and rotate the pulley sleeve with a spanner wrench or a punch and hammer and put in the new Cam Ring Pins.



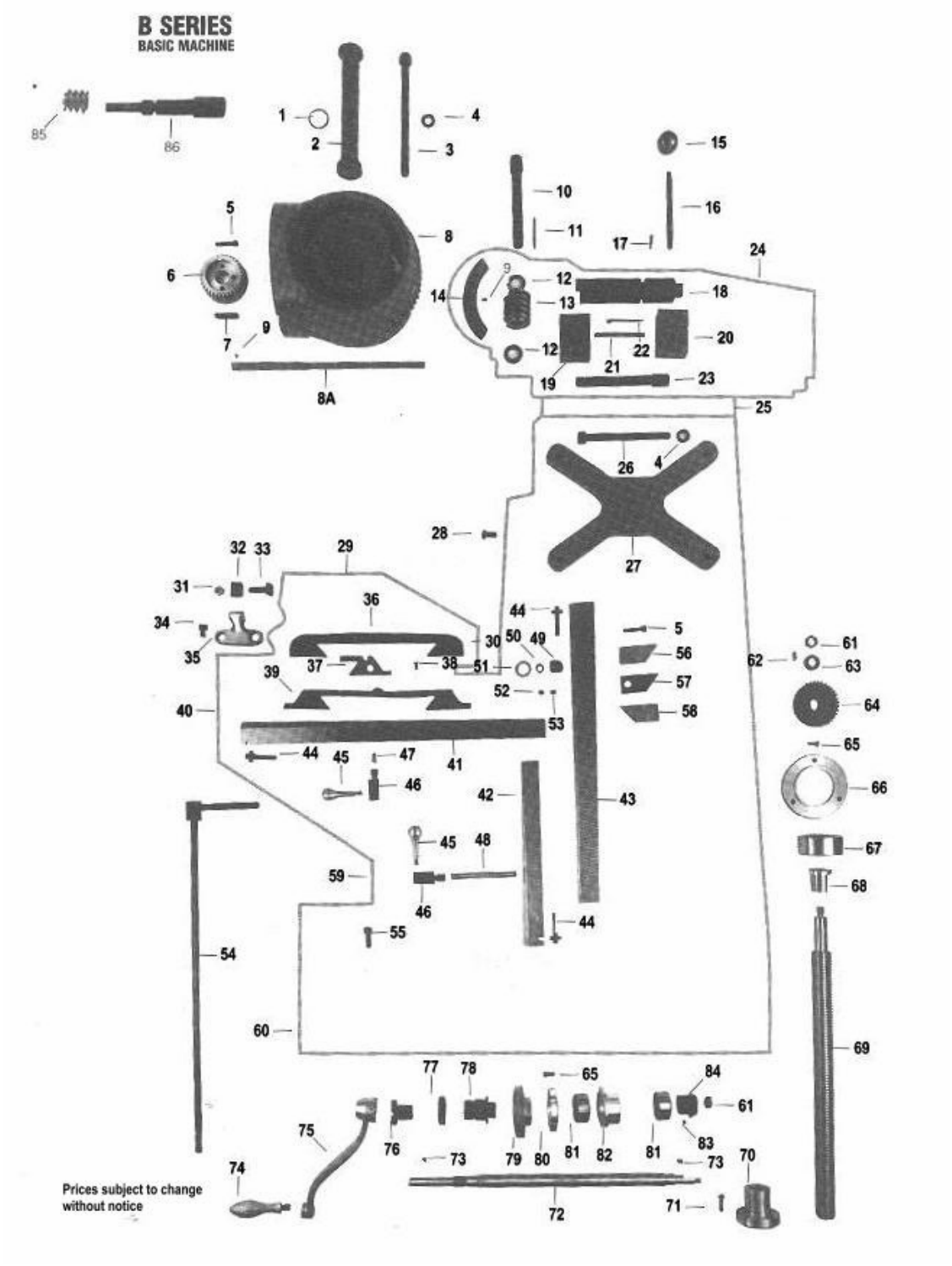
#1 1270- Screw
#2 1303- Washer
#3 1304- Pinion
#4 1305- Shaft Sleeve
#5 1306- Bushing
#6 1307- Set Screw
#7 1308- Spacer
#8 1309- Worm Gear
#9 1310- Worm Shaft
#10 1311- Shaft
#11 1179- Key
#12 1222- Set Screw

#13 1317- Engage Pin
#14 1318- Cradle
#15 1254- Set Screw
#16 1319- Throw-out
#17 1320- Shift Sleeve
#18 1326- CAp Screw
#19 1299- Plunger
#201300 Spring
#21 1297- Shift Crank
#22 1295- Roll Pin
#23 1259- Black Plastic ball
#24 1361- Shift Crank
#25 1363- Cover
#261357- Shift Rod
#27 1358- Set Screw
#28 1360- Shift Fork
#29 1303- Locknut
#30 1314- Washer
#31 1316- Bevel Gear
#32 1315- Key
#33 1337- Feed Gear
#34 1338- Key
#35 1339- Input Shaft
#36 1340- Drive Gear
#37 1341- Bearing
#38 1346- Lockscrew
#391345- Set Screw
#40 1329- Gear Assy
#41 1328- Bearing
#42 1330- Key
#43 1331- Key
#44 1332- Shaft
#45 1333 Snap Ring
#46 1334- Bearing
#47 1335- Spacer
#48 1336- Plunger
#49 1348- Bushing
#50 1349- Rev Bevel Gear
#51 1350- Rev. Clutch
#52 1347- Washer
#53 1344- Bushing
#54 1343- Shaft
#55 1342- Bushing
#56 1356- Pin
#571355 Pin
#58 1359- Key

#59 1354- Worm Shaft
#60 1353- Roll Pin
#61 1120- Clutch Rod $14.10
#62 1030- Knob Assy
#63 1165- Scale
#64 1434A- Upper Screw
#65 1434B- Lower Screw
#66 1033- Microscrew
#67 1451- Plunger
#68 1033-03- Trip Ball Lever
#69 1452- Lever Screw
#70 1438- Stop Knob
#71 1439- Cap Screw
#72 1053- Quick Nut
#73 1033-02- Feed Trip Lever
#74 1426- Key
#75 1427- Trip Lever Pin
#76 1431- T-Bolt Assy
#77 1433- Locknut
#78 1432- Bolt Spacer
#79 1200- Washer
#80 1096- Worm Gear
#81 1097- Adj. Worm Shaft
#82 1453- Set Screw
#83 1112- Clock Spring
#84 1448- Hub Sleeve
#85 1021- Quill Handle
#86 1429- Quill Lock Bolt
#87 1428- Lock (tapped)
#88 1430- Lock (untapped)
#89 1151- Lock Handle
#90A 1272- Oiler Tube
#90B 037-0246- Oil Tube
#91 1442- Spring Pin
#92 1445- Key
#93 1440- Shaft
#94 1124- Hub Screw
#95 1138- Clutch Spring
#96 1449- Pinion Gear
#97 1139- Overld Clutch
#98 1376- Clutch Sleeve
#99 1381- Snap Ring
#100 1140- Clutch Ring
#101 1377- Washer
#1021378- Screw
#103 1386- Worm Gear

#104 1385- Gear Spacer
#1051384- Shaft Bushing
#106 1108- Spring
#107 1383- Spring Plunger
#108 1374- Brass Plug
#109 1375- Clutch locknut
#110 1372- Clutch Ring
#1111371 Clutch Ring Pin
#112 1389- Clutch Washer
#113 1390- Snap Ring
#114 1388- Trip Lever
#115 1399- Set Screw
#116 1404- Spring Screw
#117 1403- Spring
#118 1402- Steel Ball
#119 1401- Handwheel Clutch
#120 1393- Locknut
#121 1392- Set Screw
#122 1370- Cap Screw
#123 1391- Cover
#124 1413- Handwheel
#125 1406- Sleeve
#126 1387- Dowel Pin
#127 1405- RollPin
#128 1394- Cam Rod
#129 1408- Spring
#1301407- RollPin
#131 1409- Trip Plunger
#132 1410- Bushing
#133 1411- Bushing
#134 1412- Trip Plunger
#135 1395- Trip Handle
#1361397 Bracket
#137 1195- Cap Screw
#138 1435- Screw
#139 1164- Felt washer
#140 1415- Quill Skirt
#141 1420- Nose Piece
#142 1425- Quill
#143 1454- Quill hosing N/A
#144 1424- Set Screw
#145 1137- Collet Screw
#146A 1414- R/8 Spindle
#146B 1414A- Spindle Assy
#147 1416 Locknut
#148 1417- Lockwasher

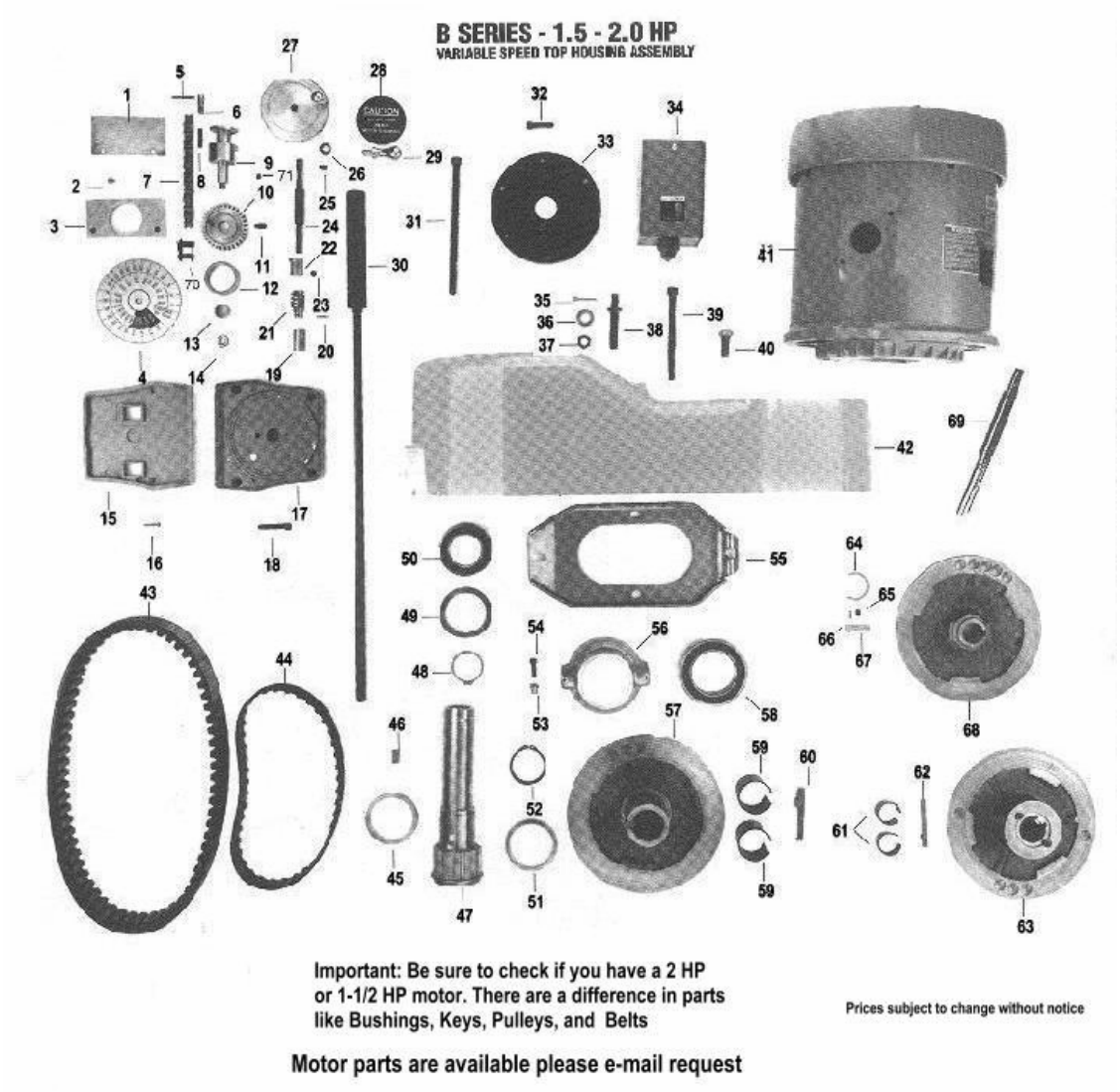
#149 1418- Upper Bearing
#150 1419- Sleeve
#151 1422- Bearing Set
#152 1423- Bearing Spacer
#153 1421- Dirt Shield
#154 1351- Set Screw
#155 037-0248- Indicator Rod
#156 037-0249- Screw
#157 037-0250- Jam Nut



#1 1188- Snap Ring
#2 1199- Pivot Pin
#3 1201- Bolt
#4 1200- Washer

#5 1195- Cap Screw
#6 1186- Gear
#7 1196- Roll Pin
#8 1187- Ram Adapter
#8A 1187A- Scale
1250- Stop Brkt
1251A- Stop Pin
1502- Cap Screw
#9 1198- Rivet Screw
#10 1192- Shaft
#111286-01- Worm Key
#12 1191- Washer
#13 1190- Gear
#141197- Angle Plate
#15 1245- Ball
#16 1159- Handle
#17 1249- Pinion Screw
#18 1244- Pinion
#19 1129-02- Clamp tapped
#201129-01 Clamp Untapped
#21 1129-04- Clamp Bar
#22 1247- Split Pin
#23 1129-03- Stud
#24 1194- Ram N/A
#25 1246- Turret N/A
#261248-Locking Bolt
#27 1243- Spider
#28 1148- Stop Screw
#29 1202- Table N/A
#30 1211- Saddle N/A
#31 1205- Hex Nut
#32 1204- Table Lock
#33 1203- T-Bolt
#34 1208- Cap Screw
#35 1209- Bracket
#36 1153- Wiper Plate
#37 1154- Wipers
#38 1152- Screw
#391602-Full Length Wiper
#40 1217- Knee 12" N/A
#41 1156- X-Gib
#42 1157- Y-Gib
#43 1158- Knee Gib
#44 1106- Gib Screw
#451122 Lock handle
#46 1206- Lock Bolt

#47 1219- Plunger
#48 1207- Plunger
#49 1219- Plunger
#50 1220- washer
#51 1221- Binder Plug
#52 1223- Set Screw
#53 1222- Set Screw
#54 1218- Shaft
#55 1175- cap Screw
#56 1163- Knee Wiper
#571212 Left Holder
#58 1214- Right Holder
#59 1241- Pedestal N/A
#60 1239- Column N/A
#61 1166- Jam Nut
#62 1224- Hex Nut
#63 1225- Washer
#64 1226- Bevel Gear
#65 1171- Cap Screw
#66 1228- Retainer Ring
#67 1227- Bearing
#68 1227A- Bearing Sleeve
#69 1071- Elevating Screw
#70 1072- Elev. Nut
#71 1242- Cap Screw
#72A 1236A- Elev. Shaft
#72B 1236B- Elev. Shaft 9"
#73 1179- Key
#74 1145-02- Crank Handle
#75 1145-01- Elev. Crank
#76 1230- Clutch Insert
#77 1168- Dial Lock
#78 1232- Dial Holder
#79 1231- Dial
#80 1172- Bearing Ring
#81 1178- Bearing
#82 1235- Bearing Cap
#83 1238- Set Screw
#84 1237- Bevel Pinion
1215- Upper Guard
1216- Lower Guard
#85 1096- Worm Gear
#86 1097- Worm Shaft



#1 1459- Chip Shield
#2 1460- Screws
#3 1603- Block
#4A 1455A- 1-1/2HP Dial
#4B 1455A- 2HP Dial
#5 1463- Bushing
#6 1464- Stud
#7 1465- Chain
#8 1462- Roll Pin
#9 1488- Chain Drum

#10 1487- Spur Gear
#11 1457- Set Screw
#12 1461- Bronze bearing
#13 1348- Bronze Bearing
#14 1132-03- Hex Nut
#15 1478- Face Plate
#16 1477- Cap Screw
#17 1458- Housing
#18 1480- Cap Screw
#19 1472- Bronze Bearing
#20 1356 Roll Pin
#21 1343- Worm gear
#22 1472- Bronze Bearing
#23 1307- Set Screw
#24 1473A- Shaft
#25 1479- Set Screw
#26 1471- Wave Washer
#27 1476- Handwheel
#28 1475- Caution Plate
#29 1474- Handle
#30 1026- Drawbar $21.75
#31 1544- Cap Screw
#32 1195- Cap Screw
#33 1468- Bearing Cap
#34 1466- Drum Switch
#35 1552- Cotter Pin
#36 1555- Washer $2.20
#37 1545- Jam Nut
#38 1553- Pivot Stud
#39 1469- Cap Screw
#40 1548- Screw
#41A 1546- Motor 1-1/2 HP
#41B 1547- Motor 2 HP
#42 1467- Belt Housing N/A
#43 1105- VariSpeed Belt
#44A 1115 Timing Belt
#44B 1536- Timing Belt
#45 1564- Spacer
#46 1573- Key
#47A 1117- Hub 1-1/2 HP
#47B 1537- Hub 2 HP
#48 1543- Snap Ring
#49 1508- Wave Washer
#50 1542- Bearing
#51 1489- Pulley Sleeve
#52 1560- Snap Ring
#53 1556- Pivot Sleeve
#54 1554 Cap Screw
#55 1551- Plate
#56 1557- Bearing Housing
#57 1559- Adj. Varidisc
#58 1558- Bearing
#59 1126- Bushing
#60 1095- Key
#61A 1113- Bushing 1-1/2 HP
#61B 1114- Bushing 2 HP
#62A 1035B- 1-1/2 HP Key

#62B 1035A- 2 HP Key
#63A 1037- 1-1/2 HP Varidisc includes key, bushings, spring and collar
#63B 1036- 2 Hp Varidisc includes key, bushings, spring and collar
#64A 1571- Snap Ring 1-1/2HP
#64B 1599- Snap Ring 2HP
#64C 016-0070- Ret. Ring CNC
#65 1307- Set Screw
#66A 1567- Pin (1-1/2 HP Key)
#66B 1407- Pin (2 HP Key)
#67A 1568- 1-1/2 HP Key
#67B 1597- 2 HP Key
#68A 1569- 1-1/2 HP Varidisc
#68B 1598- 2 HP Varidisc
#69A 1546-01- 1-1/2 HP Shaft
#69B 1547-01- 2 HP Shaft
#69C 1547-03- Motor Shaft CNC
#70 037-0113- Link
#71 1311- Key
1582- Lube Data Plate