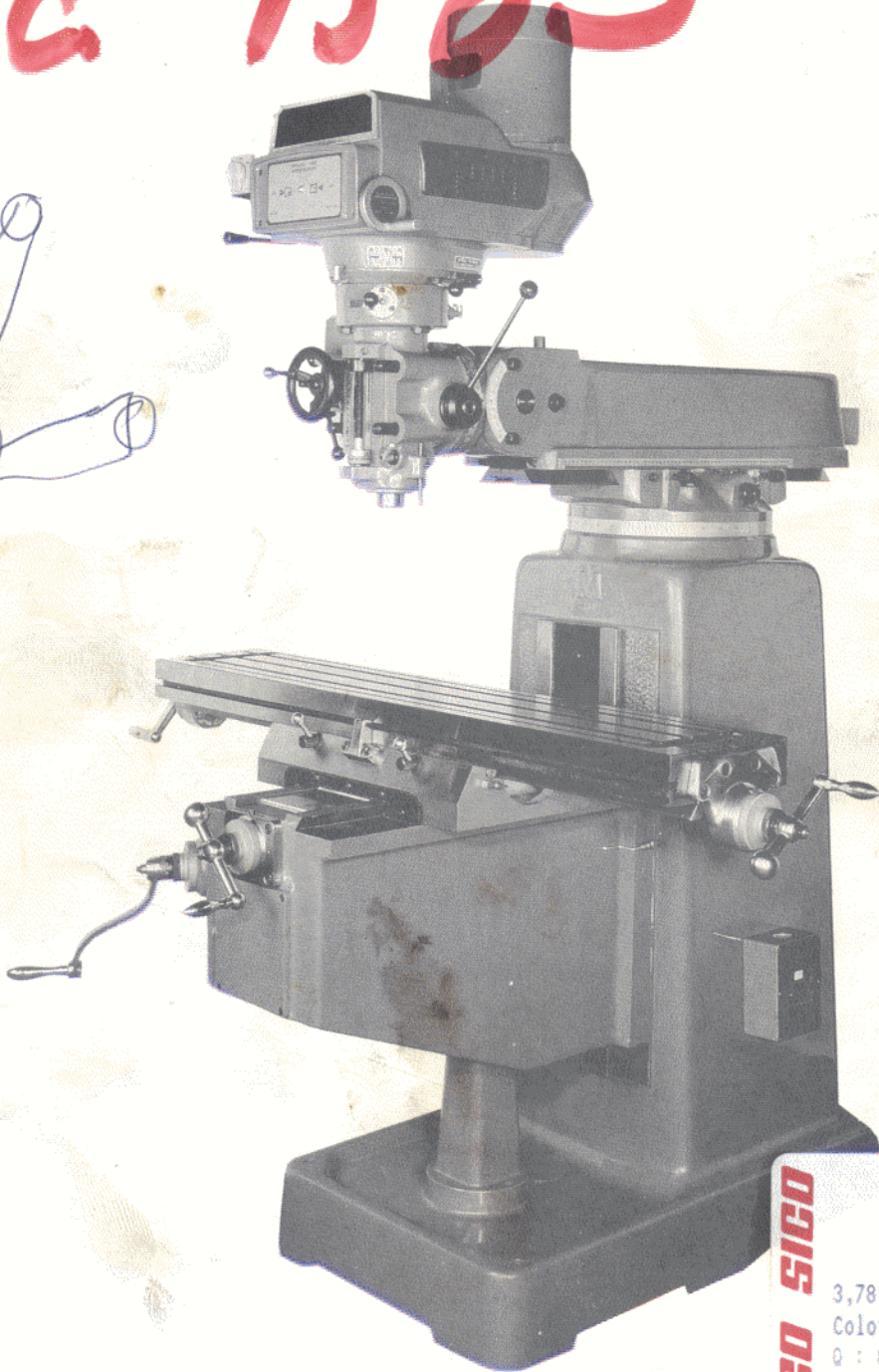
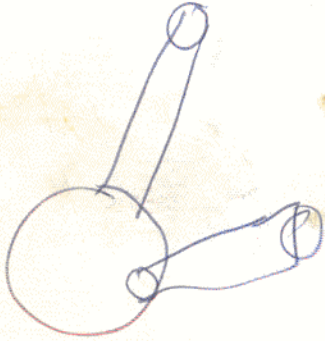


OPERATION MANUAL

TURRET MILLING MACHINE

Boc 1583



MODEL 3VK

SICO SICO SICO

3,78	FORMULA -	SUPREME
Colorant		Oz 48 96
Q : 837-610		0 4 0
X : 837-940		0 14 0
Y : 837-930		1 10 0

Base pastel : ~~711-100~~
ILL: Incandescent

30/05/03

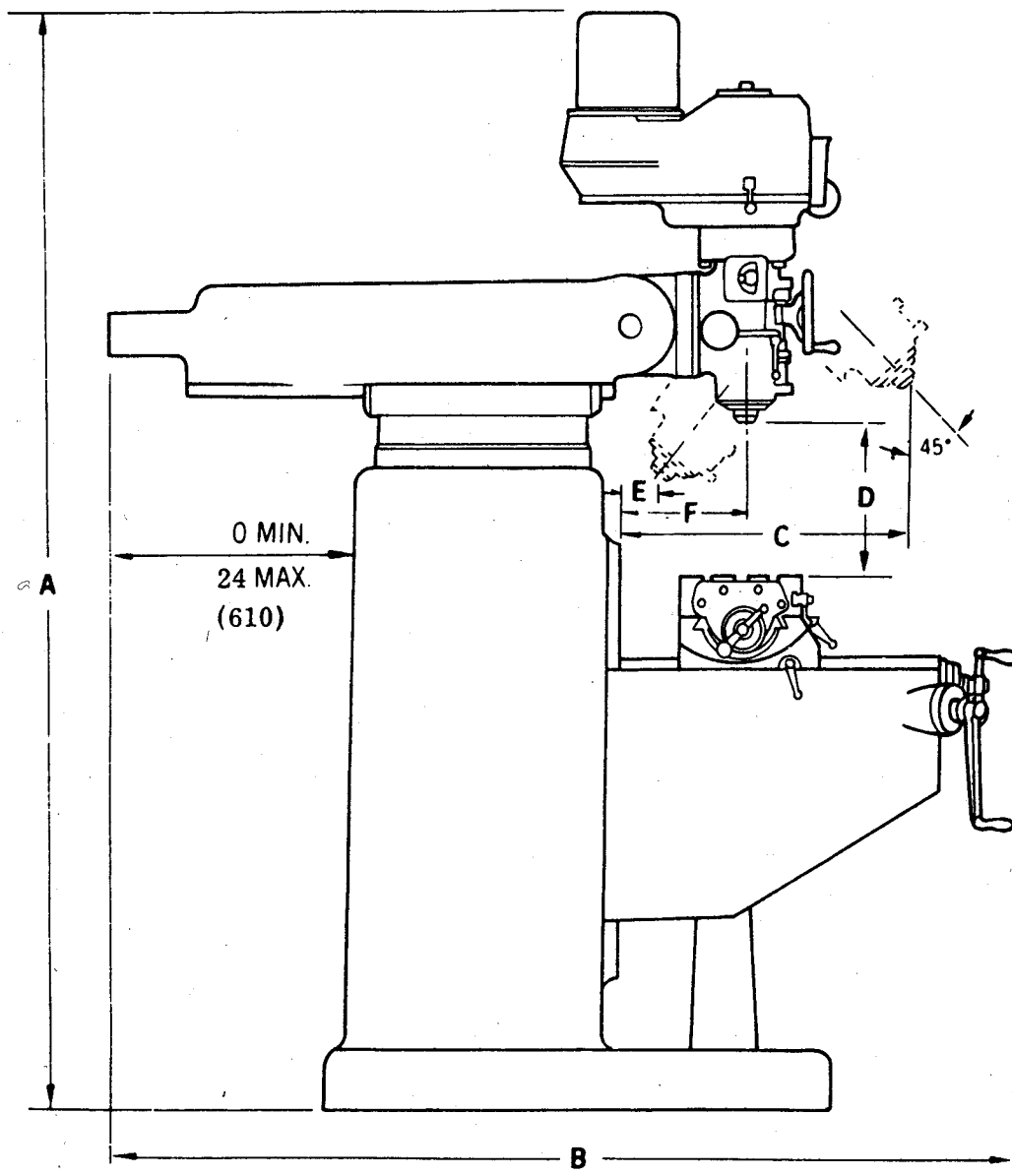
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*Specifications subject to change without prior notice



		LONGITUDINAL TRAVEL		TABLE LENGTH		
		30 in. (762mm)		42 in. (1067mm)		
		36 in. (914mm)		50 in. (1270 mm)		
	A	B	C	D	E	F
MIN.		56(1422)	11-1/4(285)	0	0	4-1/4(108)
MAX.	82-3/16" (2088m/m)	78" (1981m/m)	35-1/4" (895m/m)	18-1/2" (470m/m)	21" (533m/m)	28-1/4" (717m/m)

Figure 1. Basic Dimensions

BASIC MACHINE SPECIFICATIONS

Range

Table travel (X-axis)	30 in. (762mm) (42" table)	36 in. (914mm) (50" table)
Saddle travel (Y-axis)	16 in. (406mm)	
Quill travel	5 in. (127mm)	
Knee travel (Z-axis manual)	16 in. (406mm)	
Ram travel	24 in. (610mm)	
Throat distance (min.)	4-1/4 in. (171mm)	
(max.)	28-1/4 in. (476mm)	
Table to spindle nose gage line (min.)	2-1/2 in. (64mm)	
Max. weight of workpiece	850 lbs. (386 kg.)	

Table

Overall sizes	9 x 42 in. (229 x 1067mm)	10 x 50 in. (254 x 1270mm)
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)	

Space and weight

Floor area	7 x 10 ft. (2.1 x 3.1m)
Height	82-3/16 in. (2088mm)
Net weight	2420 lbs. (1100kg)
Shipping weight	2684 lbs. (1220kg)

Power

Electrical supply-60 Hz., 3 phase 220/230/380/415/440/460/575V

Color

Standard Machine : Gray

MILLING HEAD SPECIFICATIONS

MODEL	HEAD (STEP SPEED)	HEAD (TWO STEPS SPEED)	HEAD (VARIABLE SPEED)
Power	2.0HP or 3.0HP	2.0 HP or 3.0HP	2.0 HP or 3.0HP
Motor R.P.M.	1800 RPM	3600 RPM	1800 RPM
Speed Ranges - RPM LOW HIGH	8 Steps 80 - 325 660 - 2720	16 Steps 160 - 660 1320 - 5440	Stepless 60 - 500 500 - 4200
Quill Travel Quill Diameter	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 Taper	R-8 NST 30	R-8 NST 30	R-8 NST 30
Spindle Diameter	1.811 in (46 mm) 2.677 in (68 mm)	1.811 in (46 mm) 2.677 in (68 mm)	1.811 in (46 mm) 2.677 in (68 mm)
Spindle Feed Rate	.0015/Rev (.038 mm) .003/Rev (.076 mm) .006/Rev (.152 mm)	.0015/Rev (.038 mm) .003/Rev (.076 mm) .006/Rev (.152 mm)	.0015/Rev (.038 mm) .003/Rev (.076 mm) .006/Rev (.152 mm)
Drilling Capacity -Manual Drilling Capacity -Power	.75 in (19 mm) dia. .37 in (9.4 mm) dia.	.75 in (19 mm) dia. .37 in (9.4 mm) dia.	.75 in (22 mm) dia. .37 in (9.4 mm) dia.
Boring Capacity	6.0 in (152.4 mm) dia.	6.0 in (152.4 mm) dia.	6.0 in (152.4 mm) dia.
Milling Capacity	1.5 in ³ /min (24cc/min)	1.5 in ³ /min (24cc/min)	2.0 in ³ /min (32cc/min)
Spindle to Column-Minimum Spindle to Column-Maximum	4¼ in (108 mm) 28¼ in (717 mm)	4¼ in (108 mm) 28¼ in (717 mm)	4¼ in (108 mm) 28¼ in (717 mm)

UNCRATING:

Carefully remove protective crating so machine and parts are not marred or damaged. In the event of damage in transit, IMMEDIATELY notify the distributor from whom the machine was purchased, as well as the transportation company making delivery.

SHORTAGES:

Check shipment carefully, against the itemized packing list. In case of shortages, report them IMMEDIATELY to the distributor from whom the machine was purchased.

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.

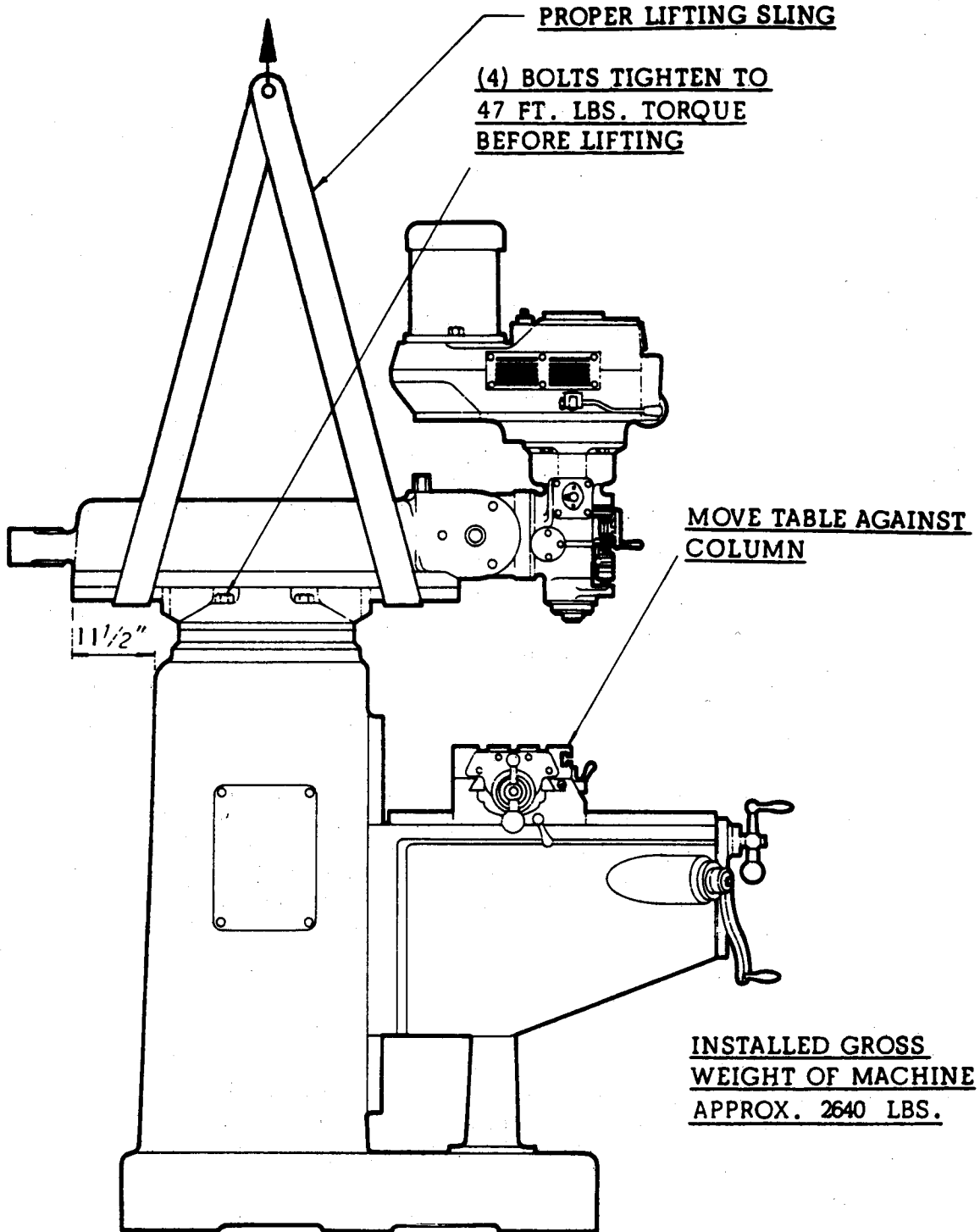
Do not move the table, knee, saddle or ram until all ways have been well cleaned and lubricated. Then, by hand, move table, saddle, and knee to limit stop in one direction. Clean and lubricate exposed ways and then move each unit to the opposite limit stop and similarly clean and lubricate the exposed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

POSITIONING HEAD UPRIGHT:

Loosen four locknuts (#162 page 35), out to detent and rotate head to vertical position. Proceed with alignment of head as described on page 9. Tighten nuts evenly, using normal pressure. Care should be taken to avoid excessive tightening 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.



LIFTING AND PLACING ON SOLID FOUNDATION:

Machine should be lifted by placing a sling under the ram as illustrated on page 6.

The column and base are a one piece casting. 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 is uneven, shims should be used to correct this condition. 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 all four corners are making contact with floor or shims, after machine is leveled. If this is not done, it is possible to twist the column and put a bind in the ways.

LEVELING MACHINE:

Set machine by leveling the work table lengthwise and crosswise with a precision level.

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 power have a qualified electrician proceed as follows:

1. Check motor wiring to ensure it is compatible with power supply.
2. Connect machine wiring to power supply making sure connection complies to all local electrical code.
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.

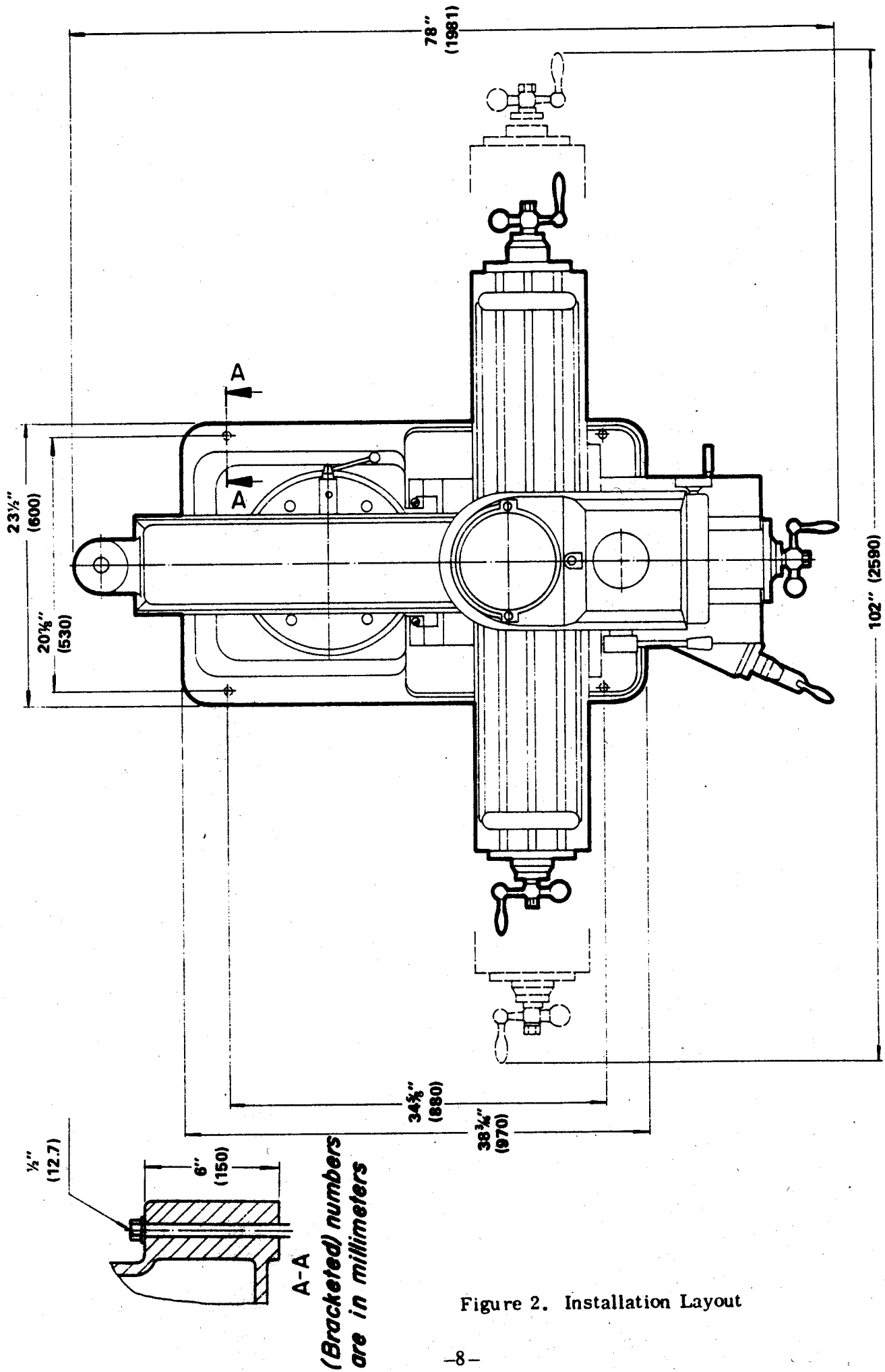


Figure 2. Installation Layout

ALIGNMENT OF HEAD:

In case of precision work where it is necessary to have head perfectly square with the table, use method described below. To set head square with table, see Figures 3 & 4. This must 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 (#162, page 35), but leave some drag on them 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".

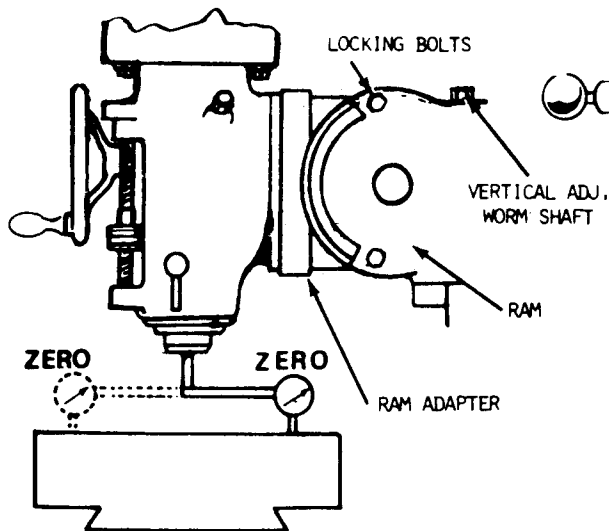


Figure 3. Head Alignment Y Axis

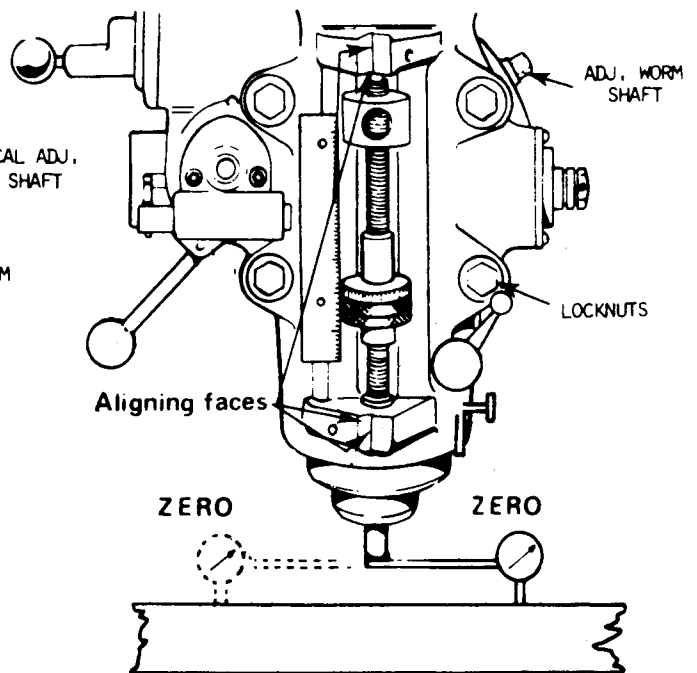


Figure 4. Head Alignment X Axis

LUBRICATION:

Do not operate until properly lubricated:

- (A) Way surfaces and lead screws
MELCOTE 87X OR EQUIVALENT. ONE PUMP DAILY.
- (B) Milling Heads (Spindle Bearings)
LGIT 2 OR EQUIVALENT, WEEKLY.
- (C) Motors are greased for life of bearings.

ADJUSTMENT OF TABLE GIB.

The table is provided with a full length tapered gib (#46 page 26) in the saddle, and an adjusting screw on the left side. To take up gib, tighten gib adjusting screw (#44 page 26) slightly and repeat until a slight drag is felt when moving the table by hand.

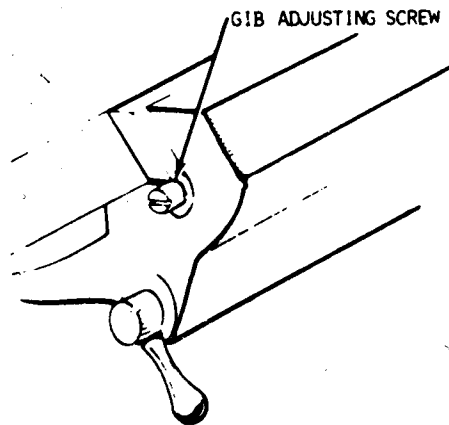


Figure 5. Saddle/Table Gib.
(#46 page 26)

ADJUSTMENT OF SADDLE GIB.

A tapered gib (#48, page 26) is used for adjusting the saddle bearing on the knee. This forms a guide for the saddle. To tighten gib, remove chip wiper and use the same method as described above. Replace chip wiper after gib has been adjusted.

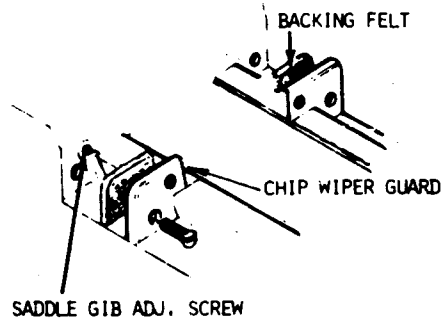


Figure 6. Saddle Knee Gib
(#48 page 26)

ADJUSTMENT OF KNEE GIB.

Remove chip wiper and adjust screw until smooth movement is attained. Replace chip wiper.

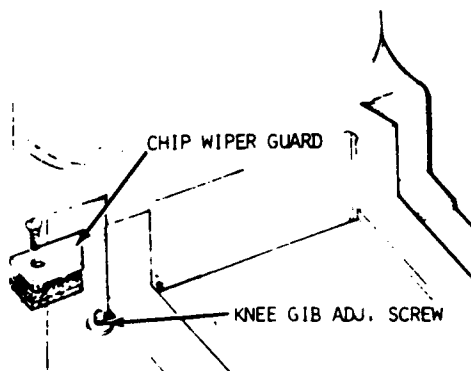
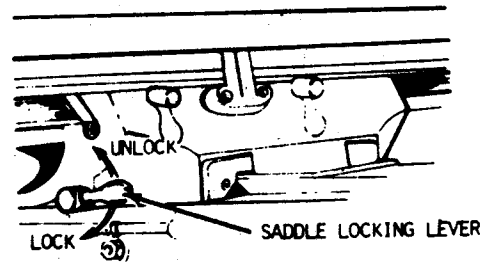


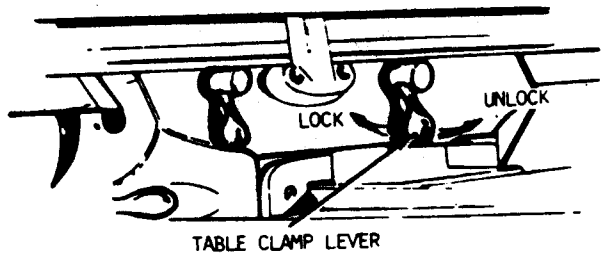
Figure 7. Knee-Column Gib
(#61 page 26)

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.

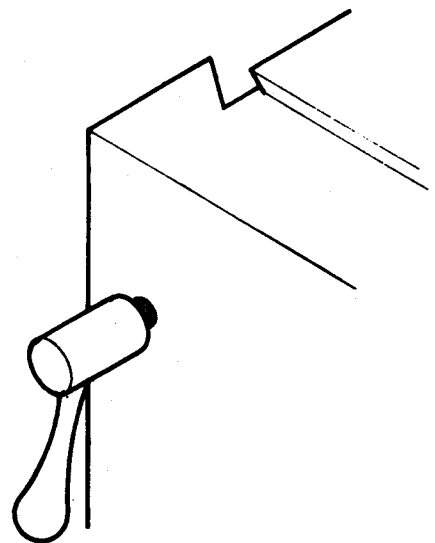
Excessive pressure can cause slight table bind. Use moderate clamping pressure, as this will hold saddle sufficiently.



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



The two clamps on the left rear of the knee should only be used when the knee will not be moved.



REMOVING TABLE:

Remove the following: ball crank, handles, dial holders and bearing brackets. Turn the lead screw all the way out and slide the table from the saddle. See Fig. 8.

REMOVING SADDLE:

Follow the same procedures as removing table; however, it is necessary to remove the entire front bracket assembly. Next, remove the cross feed nut bracket which can only be done by removing the table. See Fig. 8.

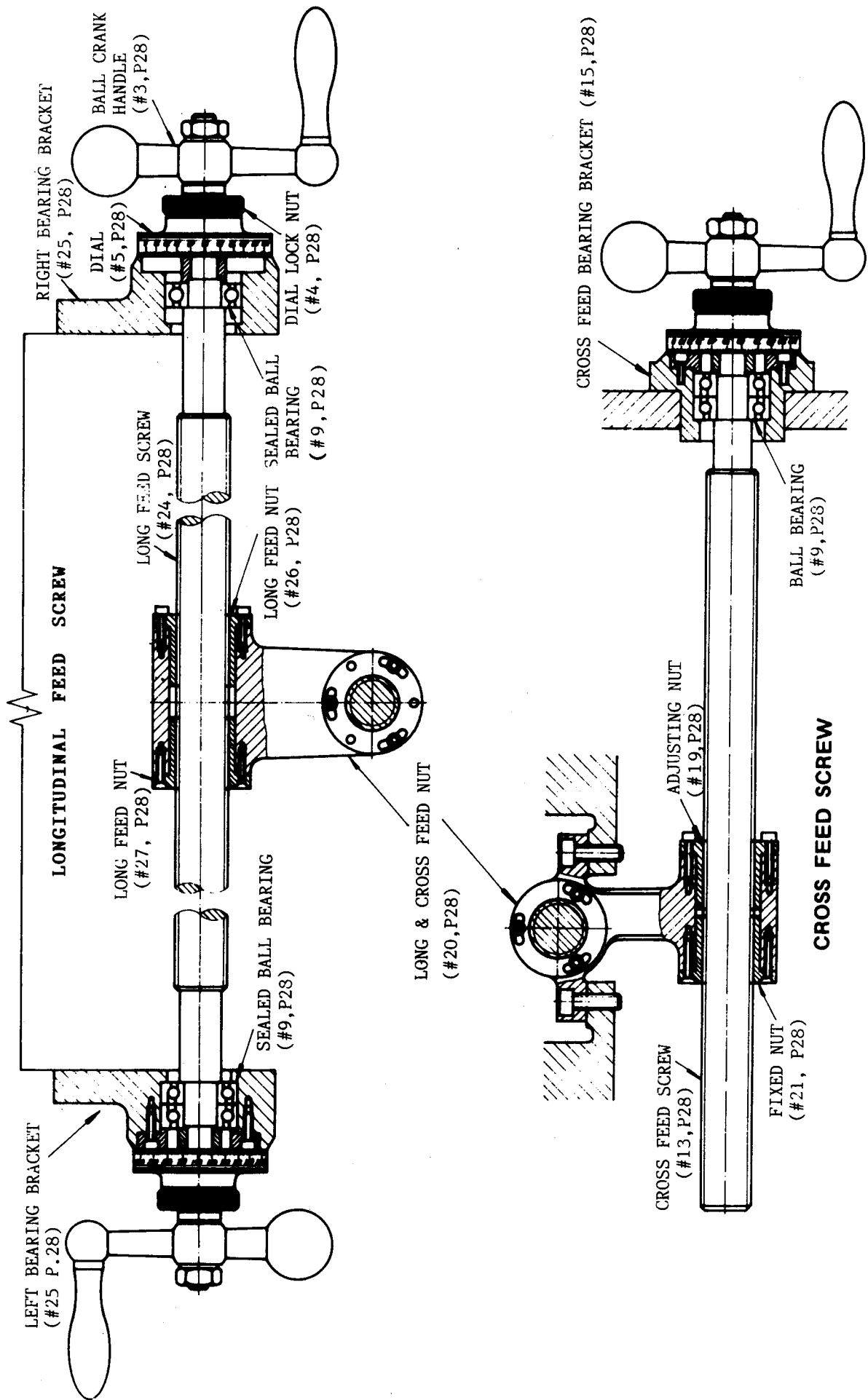


Figure 8. Longitudinal and Cross Feed Assembly

**ASSEMBLY INSTRUCTIONS
FOR MOUNTING 2VK, 3VK, 4VK VARIDRIVE HEAD TO RAM ADAPTOR**

Insert the four (4) tee bolts into the ram adaptor and position them to match the bolt holes in the head.

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

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

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

LUBRICATION :

The useful life of the 3VK Head will be determined to a large extent by whether proper lubrication methods are followed. Carefully follow the lube plate recommendations and avoid substitutions.

OPERATING INSTRUCTIONS :

SPEED CHANGE HANDWHEEL (16, Figure 9) :

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 do this, use the spindle brake (3) which is located on the left side of the belt housing, turning it either right or left until it binds. Make sure the quill is raised all the way.

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

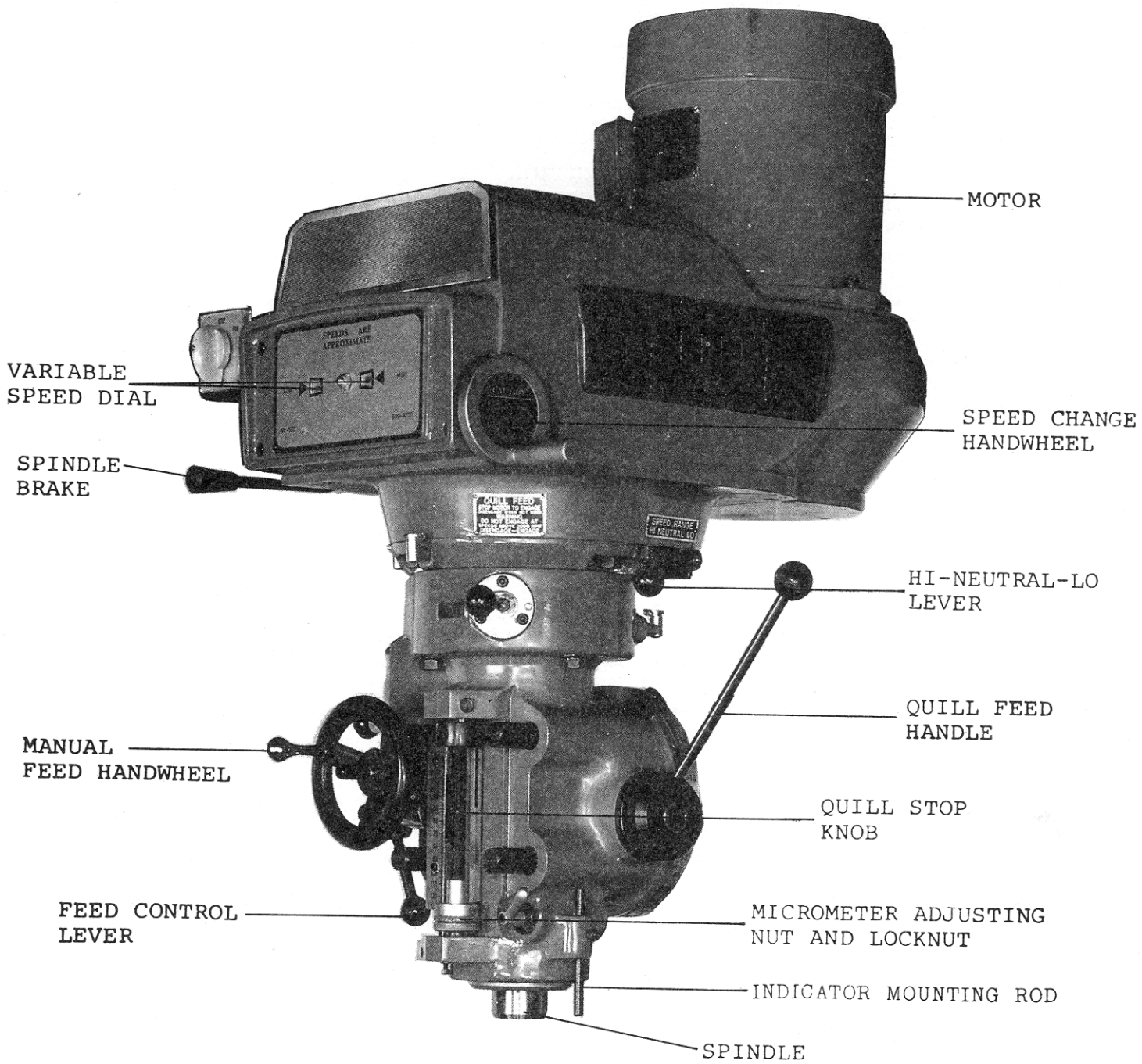


Figure 9. Vari-Speed Milling Head

SPINDLE BRAKE (3, Figure 9):

Brake lever can be moved in either direction to stop spindle. When locking spindle, lever should be moved right or left and then raised. There are no adjustments on brake so it must be replaced when worn out.

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.

OBSOLETE FORWARD REVERSE SWITCH (#1, Fig. 9):

This is the motor reversing switch. When the head is in direct drive (High Range), the motor and spindle are turning the same direction. When the head is in "Back Gear"(Low Range), the spindle runs backwards unless the motor direction is reversed.

HI-NEUTRAL-LO LEVER (#15, Fig. 9):

The lever is used to put the head into either direct drive or backgear. Rotate the spindle by hand to facilitate meshing of clutch or gears.

Neutral can be obtained at mid-way position, and is provided to permit free spindle rotation for indicating and set-up.

After an extended period of use, the neutral position may cause noise 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).

In high speed (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 corrected by moving the detent plate upward as the clutch wears. 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.

OBSOLETE

POWER FEED ENGAGEMENT CRANK (#4, Fig.9):

Engages power feed worm gear. When lever is in right hand hole, power feed is engaged. To disengage, pull knob out and turn crank in clockwise or down direction and move to opposite position.

NOTE

HANDLE MUST BE MOVED IN CLOCKWISE DIRECTION TO ENGAGE OR DISENGAGE POWER FEED. IF HANDLE IS MOVED COUNTER-CLOCKWISE NO DAMAGE WILL BE DONE, BUT NOTHING WILL HAPPEN.

CAUTION

POWER FEED GEAR MAY BE ENGAGED WHILE SPINDLE IS TURNING, HOWEVER, IT SHOULD BE ENGAGED SLOWLY TO AVOID DAMAGE TO THE WORM GEAR. THE GEAR MAY BE DISENGAGED AT ANY TIME. DO NOT USE POWER FEED AT SPEED 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.

OBSOLETE

QUILL FEED SELECTOR (#5, Fig. 9):

This crank is used to select the feed rate to be used. It is shifted by pulling knob out and turning from one position to another. Feed rates are stamped on cover below each hole. Feed is more readily engaged with spindle running.

OBSOLETE

FEED REVERSE KNOB (#7, Fig. 9):

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.

OBSOLETE

MANUAL FEED HANDWHEEL (#6, Fig. 9):

Feed reversing knob should be in neutral position and feed control lever (#8, Fig. 9) engaged. Clockwise rotation of handwheel moves quill down. Manual Feed Handwheel and quill feed handwheel may be disengaged by moving them outward approximately 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.

OBSOLETE FEED CONTROL LEVER (#8, Fig. 9):

Engages clutch on pinion shaft when moved left and will stay engaged until either quill stop comes in contact with micrometer adjusting nut forcing feed control lever to disengage automatically, or released manually by moving 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, Fig. 9):

May be removed by simply pulling handle off. It is recommended that handle be disengaged when using power feed.

OBSOLETE QUILL STOP KNOB (#14, Fig. 9):

It used to disengage power feed in either direction as well as acting as a depth stop when working to a given depth.

OBSOLETE MICROMETER NUT (#11, Fig. 9):

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

This is a friction lock to be used when quill is in stationary position such as for milling. It is recommended this lock be used whenever quill movement is not desired.

RAM POSITION

Ram can be moved by loosening two ram lock studs (# 35 , page 26) on turret (# 23 page 26) and moving 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" diameter in mild tool steel. Overload clutch is preset to hold up to 200 lbs. down pressure on quill. Use manual feed for drills over 3/8".

CAUTION

THIS CLUTCH SHOULD NOT BE TAMPERED WITH IN THE FIELD.

OPERATING INSTRUCTIONS

CAUTION

DO NOT TRY TO CHANGE SPINDLE SPEED ON VARI-DRIVE HEAD UNTIL MOTOR IS RUNNING. THIS COULD CAUSE PARTS BREAKAGE.

Spindle Feeds 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.

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

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).

500-4200 RPM is direct drive and is the high range. The same procedure as previously described is used to select this range except the Hi-Neutral-Lo lever is set in the Hi position.

Wear on the vari-drive belt will cause a slight change in the speeds to that shown in windows (#23, page 36) on the dial. This can be corrected as follows. Crank the speed change handwheel (#16, Figure 9) 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
DO NOT SHIFT THE HI-NEUTRAL-LO LEVER WHEN
THE FEED GEAR 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 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 Fig. 10):

Run the head to the lowest speed of either 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 (#54,page 38) (B . Figure 10) at the lower end of the motor shaft. Use two cover screws (#55,page 38) (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 9) 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.

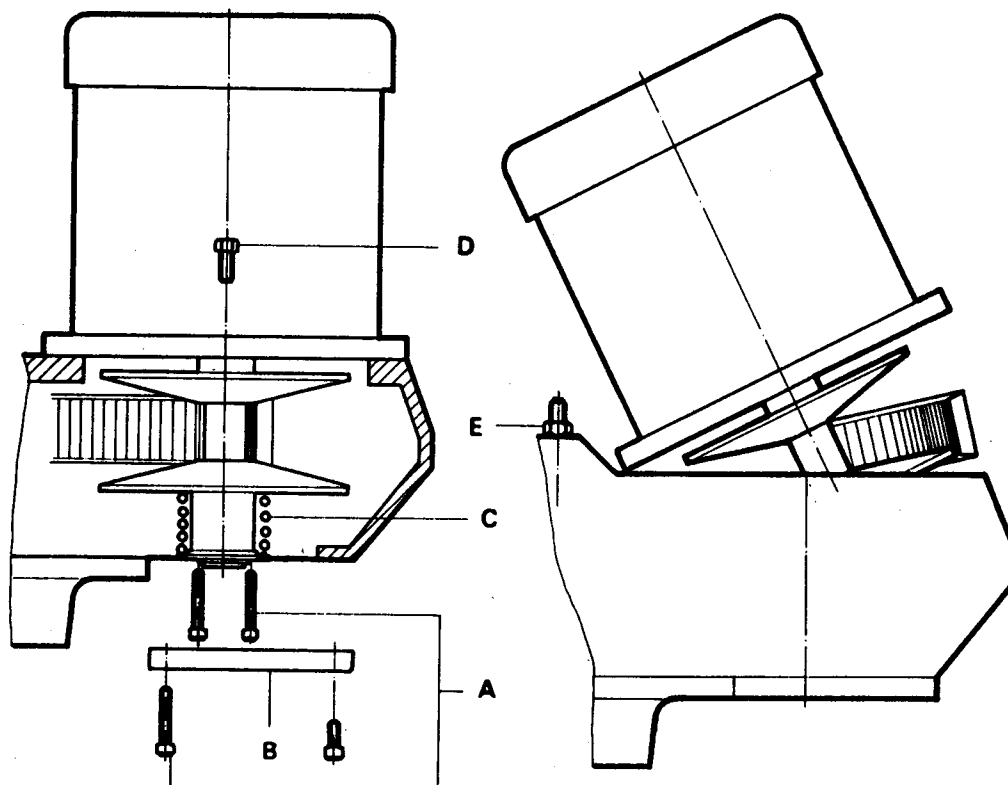


Figure 10. Removing the Motor (Side View)

CHANGING VARI-DRIVE BELT (Figure 11)

Complete the previous procedures for removing the motor, then remove the three screws (#1,page 38) (A. Fig. 11) and lift out the top bearing cap (#13,page36) (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 six screws (#64,page 38) (D), then holding the belt housing (E) to the base (#63,page 38).

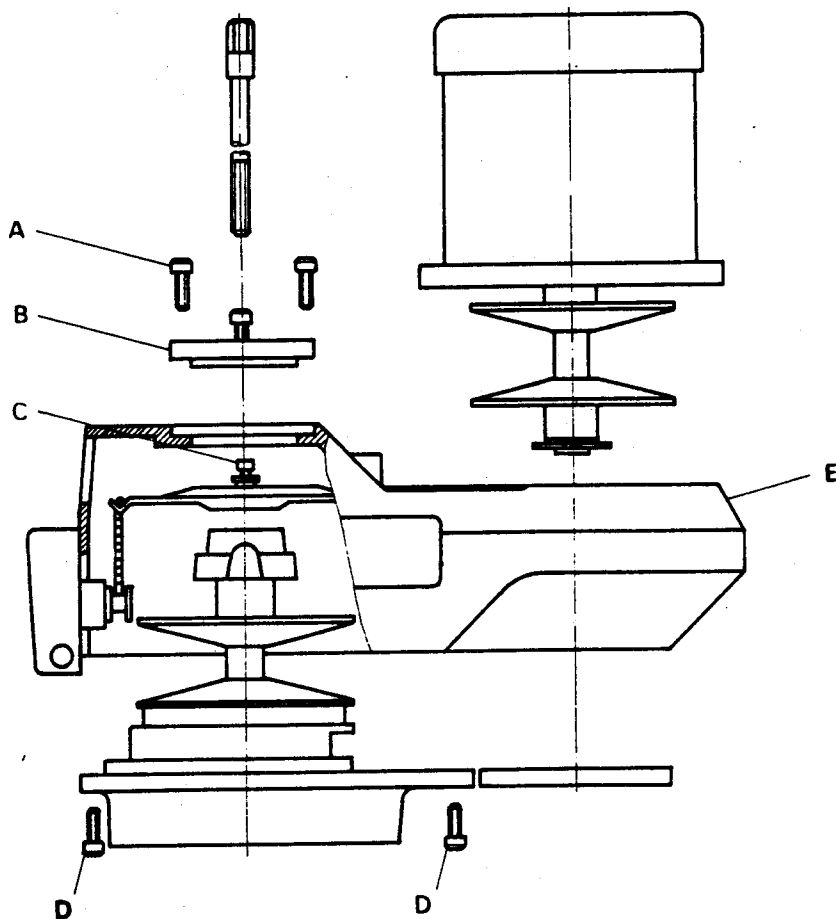


Figure 11. Removing the Vari-Drive Belt

Remove the old belt (#27,page 38) and replace it with a new belt. Do not use a substitute belt purchased from other than Bando Variable Belt 875vc. Vibration and heat could result from the use of the wrong belt.

CHANGING TIMING BELT (Figure 12)

Complete the operation for removing the motor. Then put the Hi-Neutral-Lo lever (#15, Figure 9) in the Lo position, remove the drawbar (#14, page 38) (A, Figure 12) 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.

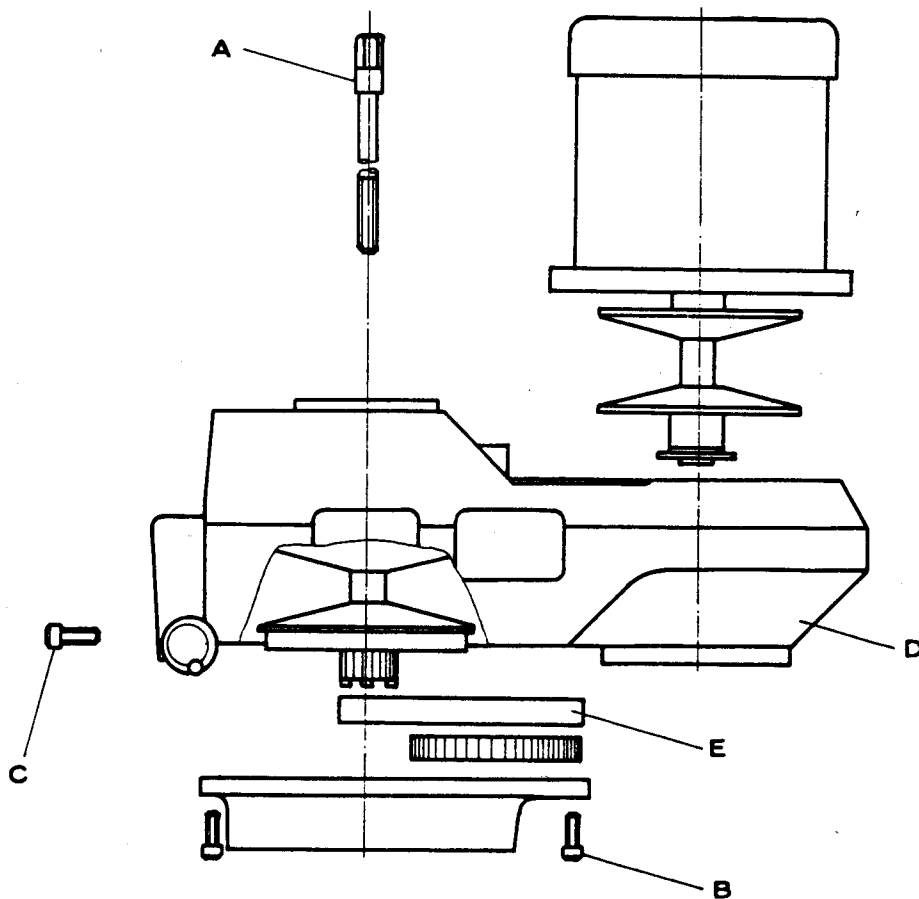


Figure 12. Removing Timing Belt

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 (E) (#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

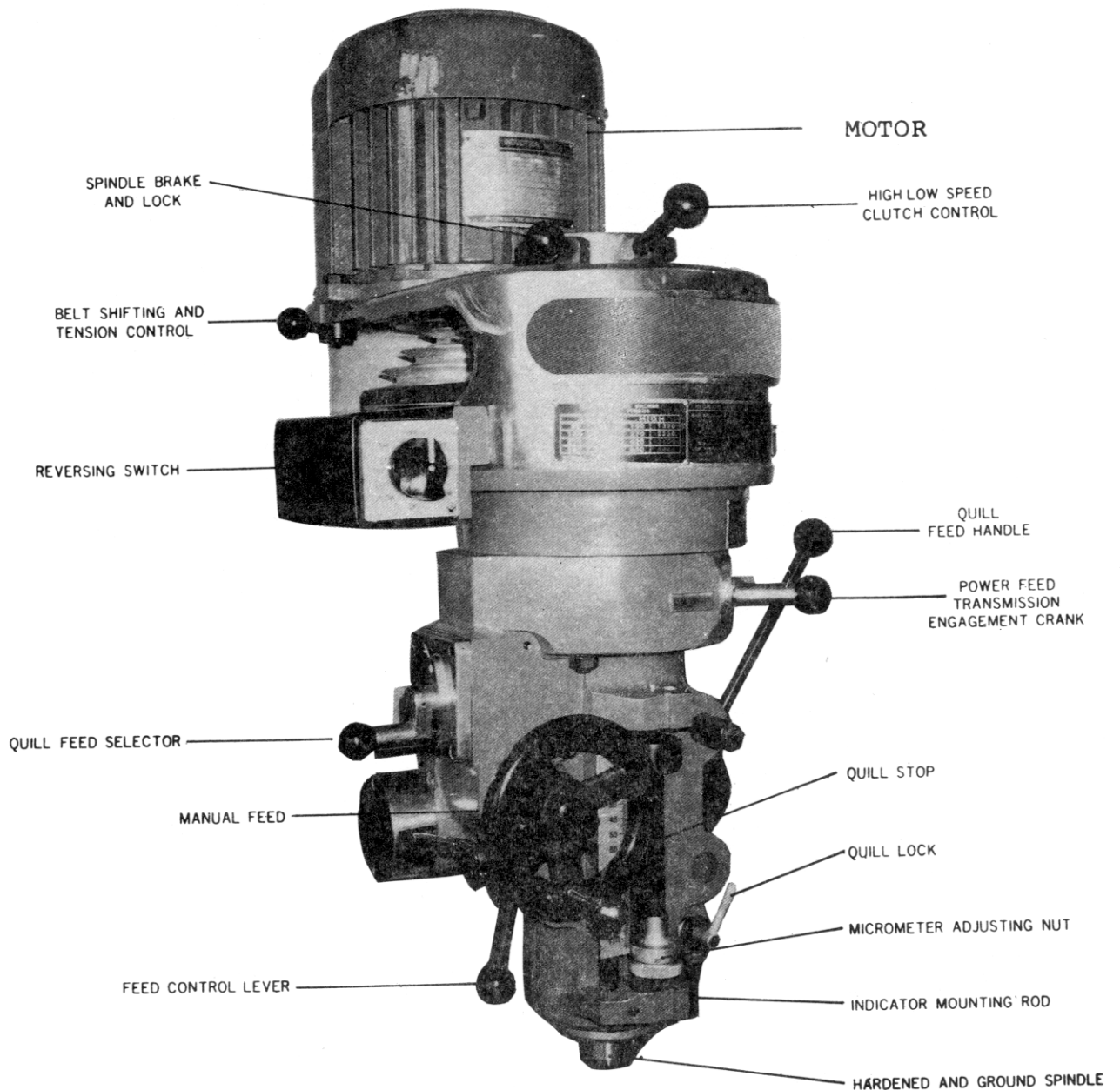


Figure 13. Step Speed Milling Head

① **REVERSING SWITCH** is used to obtain clockwise or counter clockwise rotation of spindle.

Note: Due to back gear construction, when machine is running in low speed range, spindle rotation is opposite to that of high speed range. Therefore forward on your reversing switch becomes reverse switch in low speed range.

② **SPINDLE BRAKE**

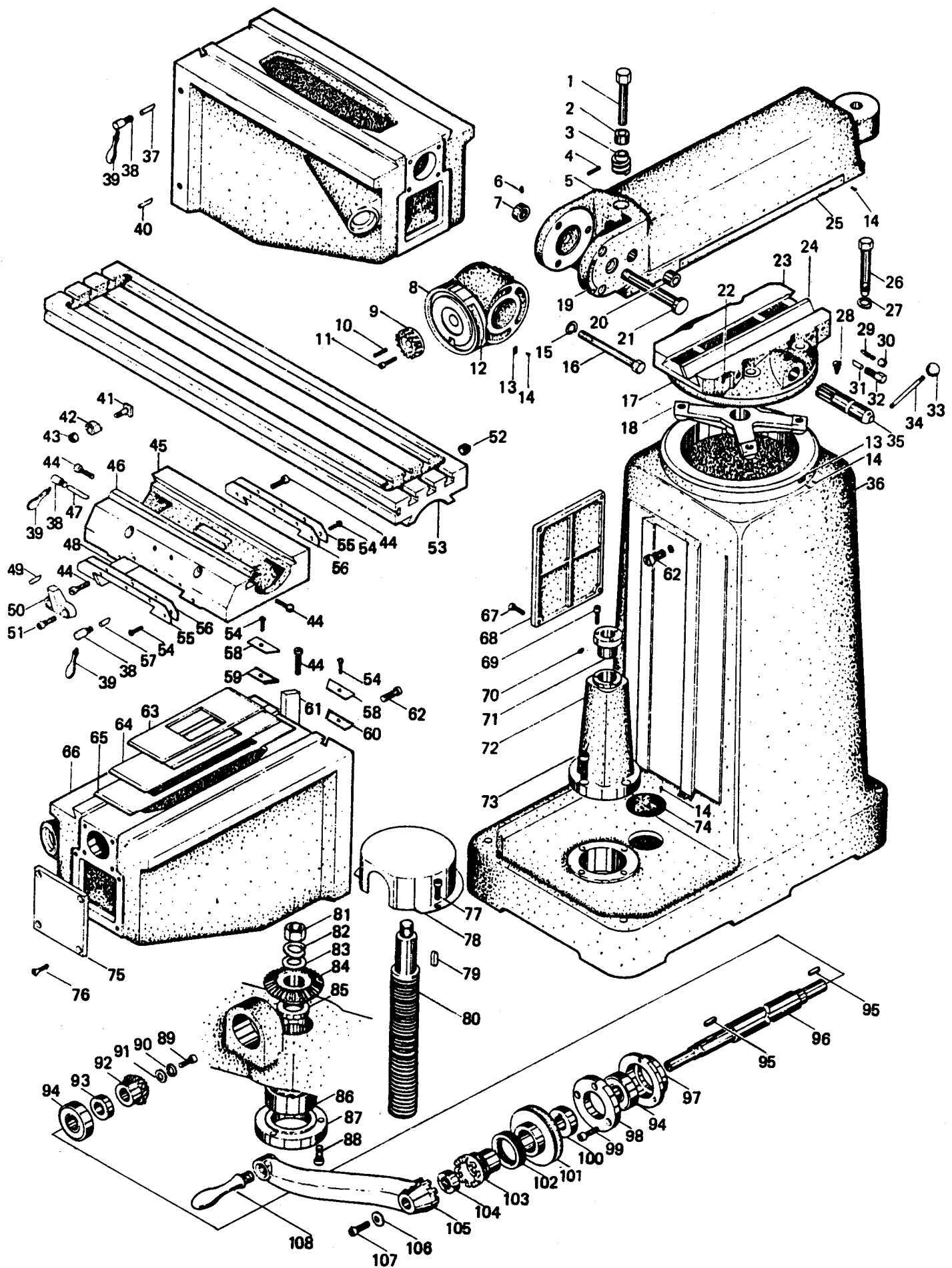
Lever can be moved in either direction to stop spindle; however, when locking spindle, lever should be moved to right or left and then raised.

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 left on with brake in locked position.

③ **HIGH LOW SPEED CLUTCH CONTROL** is directly in front of motor. When knob is in position, as shown on picture, clutch is in high speed position. To put clutch into low speed position turn lever to the extreme right. It is necessary to rotate spindle while engaging high speed clutch. This can be accomplished by either turning spindle nose by hand or by turning drawbar knob using wrench, providing drawbar is pulled up tightly.

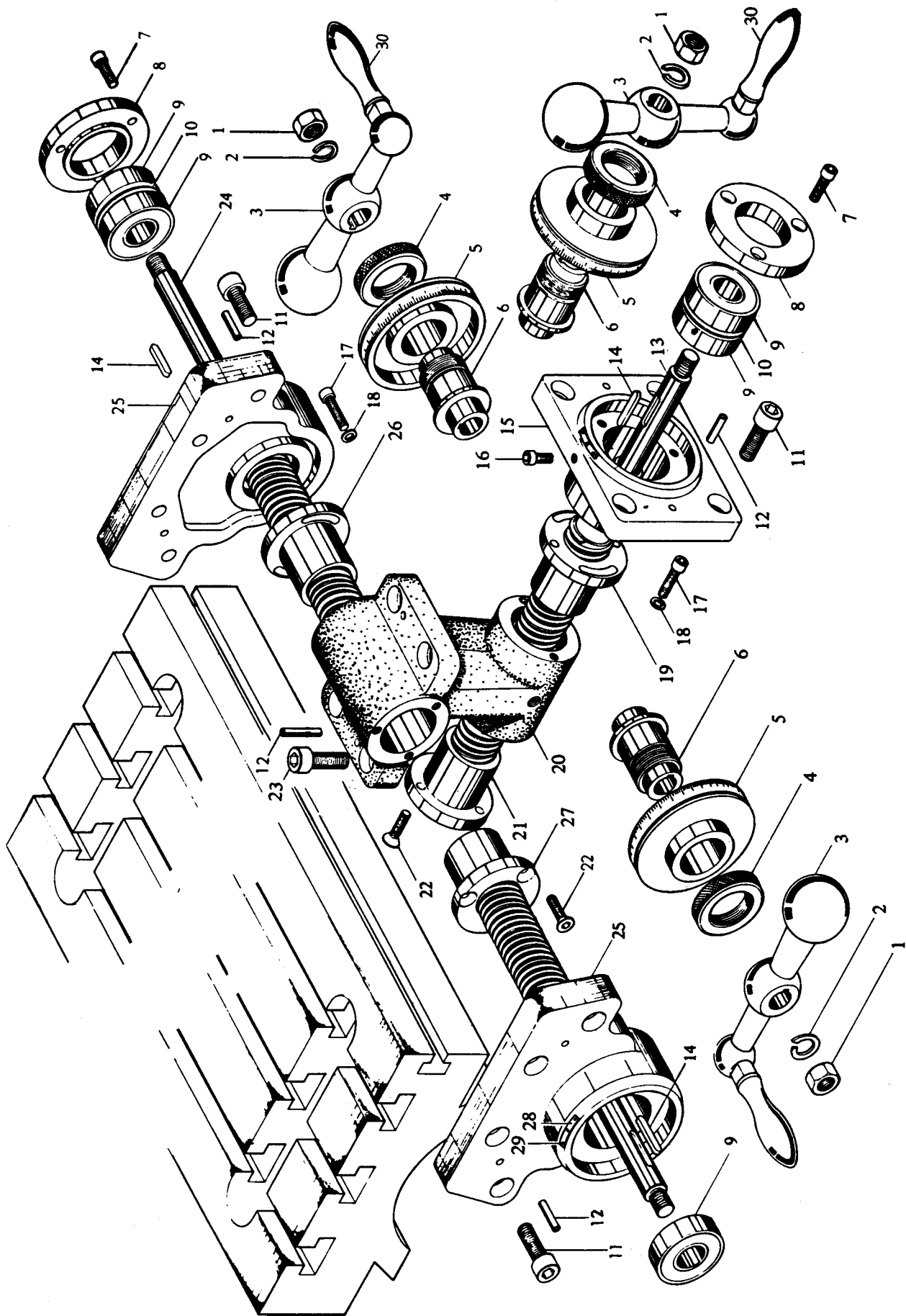
CAUTION: Do not shift clutch while motor is running.

④ **BACK GEAR CONTROL** is used in conjunction with the high low speed clutch control above back gear control handle is stamped IN and OUT. When back gear control handle is in OUT position, which is the position furthest from face of machine, then HIGH LOW speed clutch control should be located as illustrated in photograph. With these controls in position as explained, head is set for operation in high speed range (660-2720 RPM). When back gear control lever moved to IN position and HIGH LOW speed clutch control moved to extreme right then the head is ready for operation in the low speed range (80-325 RPM)



BASIC MACHINE

ITEM NO.	PARTS NO.	DESCRIPTION	ITEM NO.	PARTS NO.	DESCRIPTION
1	H5021	Vertical Adjusting Worm Shaft	58	3H4028-2	Lelf Hand Column Wiper Holder (2 Req.)
2	5022	Worm Thrust Washer	59	3H4028	Knee Wiper Felt
3	5020	Vertical Adjusting Worm	60	3H4028-1	Knee Wiper Felt
4	5023	Roll. Pin	61	4038	Knee/Column Gib
5	H5018	Ram	62	1001-1	Stop screw (2Req.)
6	5027-1	Set Screw	63	3040	Chip Guards
7	5027	Nut	64	H3039-1	Chip Guards
8	5019	Ram Adapter	65	H3039	Chip Guards
9	5033	Quill Housing ADJ. Gear	66	3H4001	Knee
10	5034	Roll Pin	67	H1003	Socket Head Cap Screw (4 Req.)
11	5035	Socket Head Cap Screw(2 Req.)	68	H1002	Column Cover
12	5016	Ram Adapter Plate	69	4025	Socket Head Cap Screw (3 Req.)
13	5031	Plate (2 Req.)	70	4024-1	Grease Nipple
14	5032	Round HD Drive Screw(28 Req.)	71	4024	Elevating Screw Nut
15	5029	Spring Washer (3 Req.)	72	H4026	Pedestal
16	H5028	Adapter Locking Bolt (3 Req.)	73	4027	Socket Head Cap Screw (4Req.)
17	5030	Turret Plate	74	H1004	Filter
18	5003	Spider	75	3B1005	Knee Cover
19	5043	Angle Plate	76	1006	Flat Head Socket Screw (4Req.)
20	5028-1	Adapter Locking Bolt Washer	77	4036	Socket Head Cap Screw (2 Req.)
21	5026	Adapter Pivot Pin	78	4034	Bevel Gear Cover
22	5016-1	Plate (3 Req.)	79	4020	Key
23	H5001	Turret	80	4021	Elevating Screw Assembly
24	H5002	Ram/Turret Gib	81	4023	Jam Nut
25	H5044	Ram Plate	82	4023-1	Spring Washer
26	H5004	Locking Bolt (4 Req.)	83	4023-2	Washer
27	5005	Spring Washer (4 Req.)	84	4019	Bevel Gear
28	5015	Ram Pinion Screw	85	4022	Washer
29	H5007	Gib Screw (2Req.)	86	4040	Sealed Ball Bearing 5305#
30	H5007-1	Gib Screw Nut (2 Req.)	87	4039	Bearing Retainer Ring
31	H5006	Ram Lock Plunger (2 Req.)	88	4041	Socket Head Cap Screw (3Req.)
32	H5010	Ram Lock Stud (2 Req.)	89	4042	Socket Head Cap Screw
33	5014	Plastic Ball	90	4042-1	Spring Washer
34	5013	Ram Pinion Handle	91	4017-1	Washer
35	5012	Ram Pinion	92	4014	Bevel Pinion
36	H1001	Column	93	4014-1	Washer
37	H4043	Knee Lock Plunger	94	2008	Grease Sealed Bearing 6204# (2 Req.)
38	3031	Lock Bolt (5 Req.,)	95	4015	Key
39	3030	Lock Bolt Handle (5 Req.)	96	3H4017	Elevating Shaft for 13 $\frac{3}{4}$ " Knee
40	H4044	Knee Lock Plunger	97	4006	Bearing Cap
41	2031	Stop Piece T-Bolt (2 Req.)	98	2011	Bearing Retaining Ring
42	2030	Table Stop Bracket (2 Req.)	99	4009	Socket Head Cap Screw (3Req.)
43	2032	Hex Nut (2 Req.)	100	4011	Dial Holder
44	3028	Gib Adjusting Screw (6 Req.)	101	4010	Dial With 100 Graduations
45	3H3001	Saddle	102	4016	Dial Lock Nut
46	3026	Saddle/Table Gib	103	4013	Gearshaft Clutch Insert
47	H3032	Saddle Lock Plunger	104	4012	Fix Gearshaft Clutch Nut
48	3027	Saddle/Knee Gib	105	4002	Elevating Screw Assembly
49	H3029-1	Table Lock Plunger	106	4004	Washer
50	3035	Table Stop Bracket	107	4005	Socket Head Cap Screw
51	3036	Socket Head Cap Screw(2 Req.)	108	4003	Handle
52	2035	Plug (2 Req.)			
53	2001-50	Table "50"			
54	3038	Oval Head Screw (12 Req.)			
55	3H3037-1	Saddle Knee Wiper Plate(2 Req.)			
56	3H3037	Felt Wipers (2 Req.)			
57	H3029	Table Lock Plunger			



LEADSCREW ASSEMBLY

ITEM NO.	PARTS NO.	DESCRIPTION	ITEM NO.	PARTS NO.	DESCRIPTION
1	2004	Jam Nut (3 Req.)	16	3005-1	Stop Screw (4 Req.)
2	2004-1	Spring Washer (3 Req.)	17	3025-2	Socket Screw (4 Req.)
3	H2018	Ball Crank Handle (3 Req.)	18	3025-3	Washer (4 Req.)
4	2016	Dial Lock Nut (3 Req.)	19	3020-2A	Cross Feed Nut
5	2012	Dial with 200 Graduations (3 Req.)	20	H3025	Feed Nut Bracket
6	2014	Dial Holder (3 Req.)	21	3020-2B	Cross Feed Nut
7	2036	Socket Cap Screw (6 Req.)	22	3025-1	Flat Head Socket Screw (6 Req.)
8	2011	Bearing Retainer Ring (2 Req.)	23	3024	Socket Cap Screw (4 Req.)
9	2008	Grease Seal Ball Bearing 6204# (5 Req.)	24	2002	Longitudinal Feed Screw 50"
10	2010	Washer (2 Req.)	25	2006	Bearing Bracket (2 Req.)
11	2026	Socket Cap Screw (12 Req.)	26	3020-1A	Long Feed Nut
12	2027	Roll Pin (8 Req.)	27	3020-1B	Long Feed Nut
13	H3002	Cross Feed Screw for 13 $\frac{3}{4}$ " Knee	28	5016-1	Plate (3 Req.)
14	2003	Key (3 Req.)	29	5032	Round HD Drive Screw (6 Req.)
15	3005	Cross Feed Bearing Bracket	30	H2018 -1	Ball Crank Handle Grip (3 Req.)

Notes:

The machine is different than that shown on p. 28. In particular to the X-axis, some of the differences are (expect similar changes in the Y-axis):

Item 20 is actually a support for ball nuts. (As such related components are absent.)

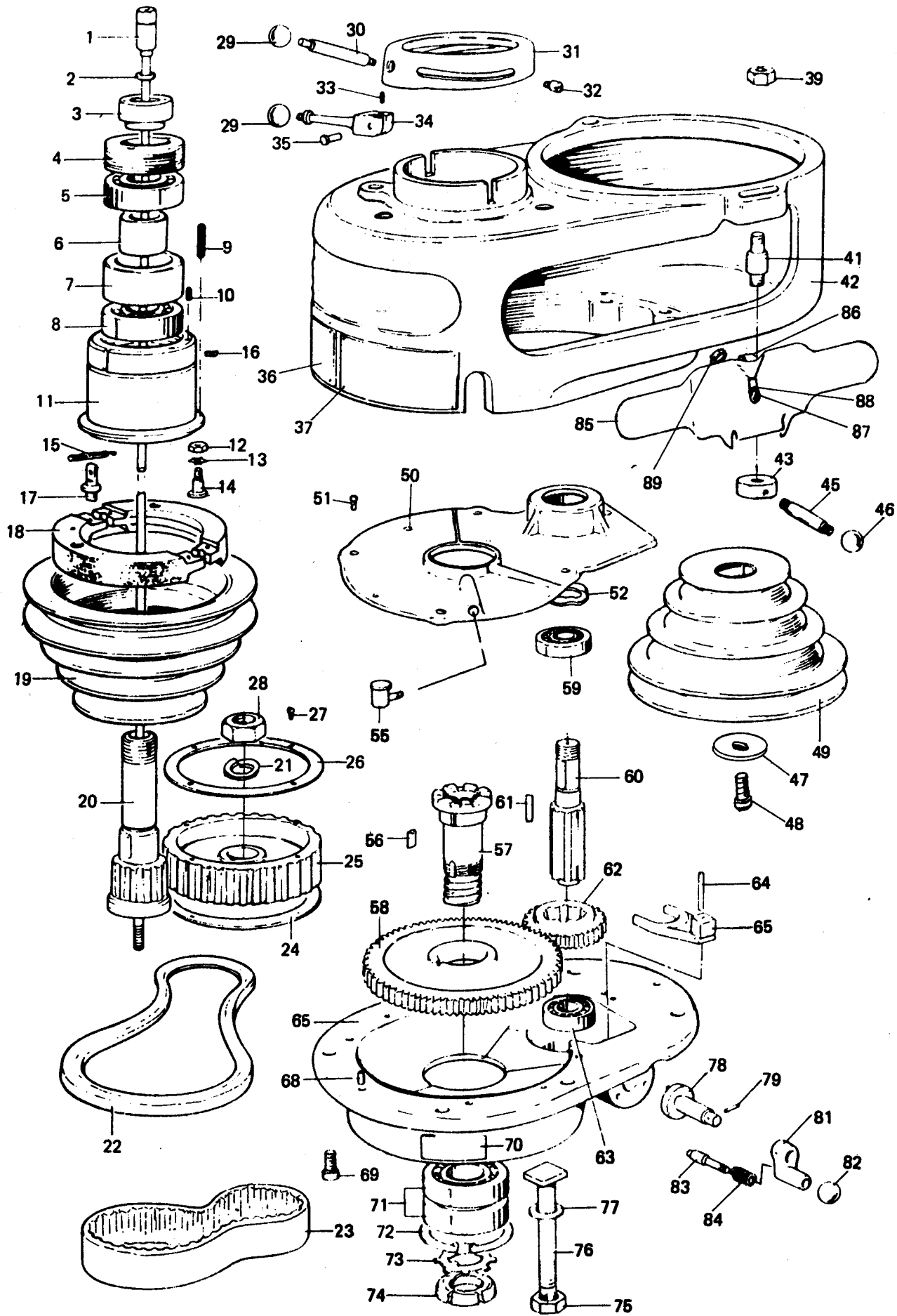
Items 13 and 24 are ball screws.

Items 4, 5 and 6 on the right hand side (RHS) have been replaced with a gear pulley and motor drive assembly.

Item 9 (2 Req.) on the RHS are ball angular thrust bearings for ball screw support; item 10 is absent.

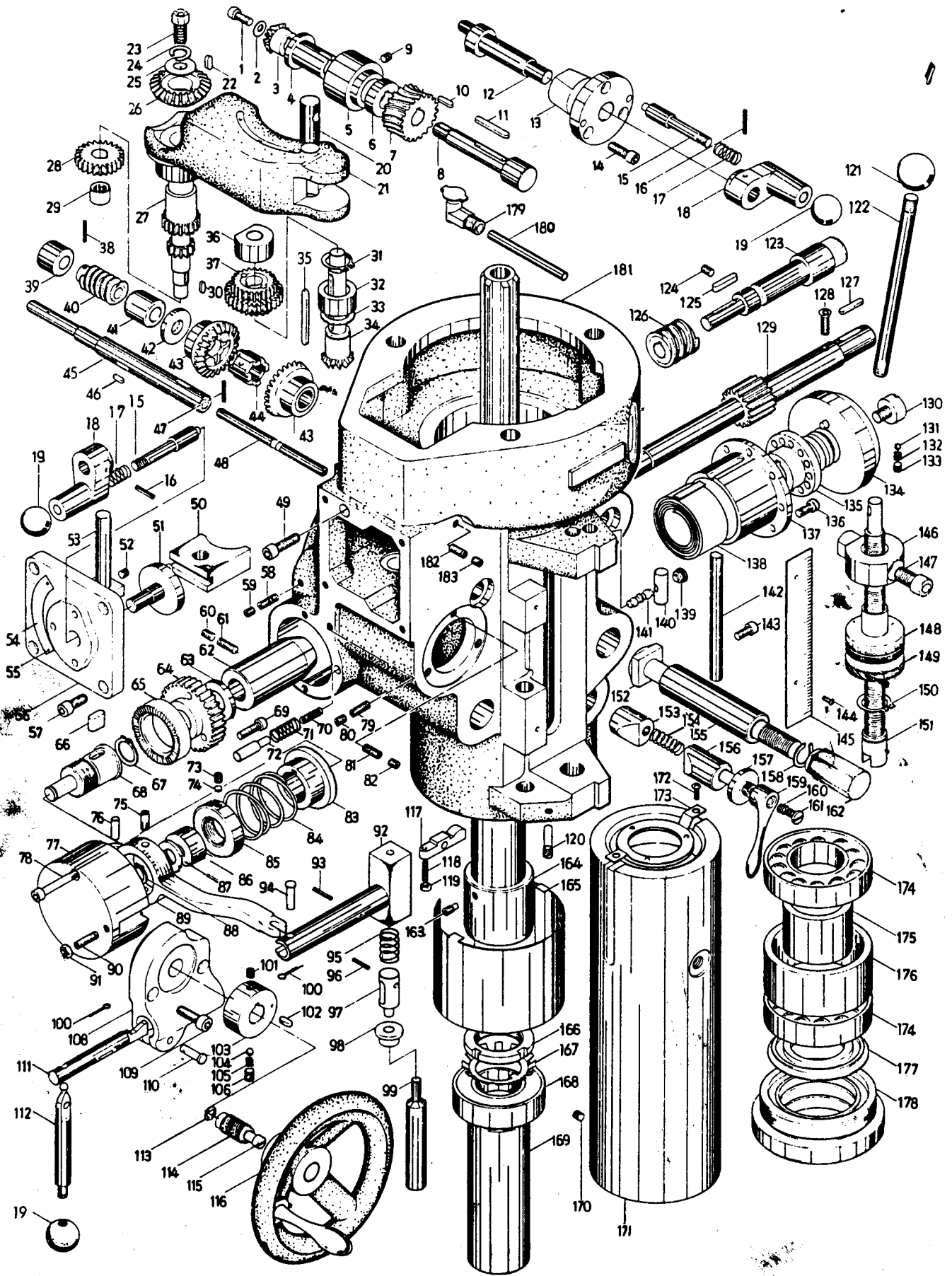
All bearings slip fit onto the ball screw ends.

The ball screw, handle, and gear pulley assemblies on the RHS provide a pre-load on the thrust bearings and fix the ball screw in place.



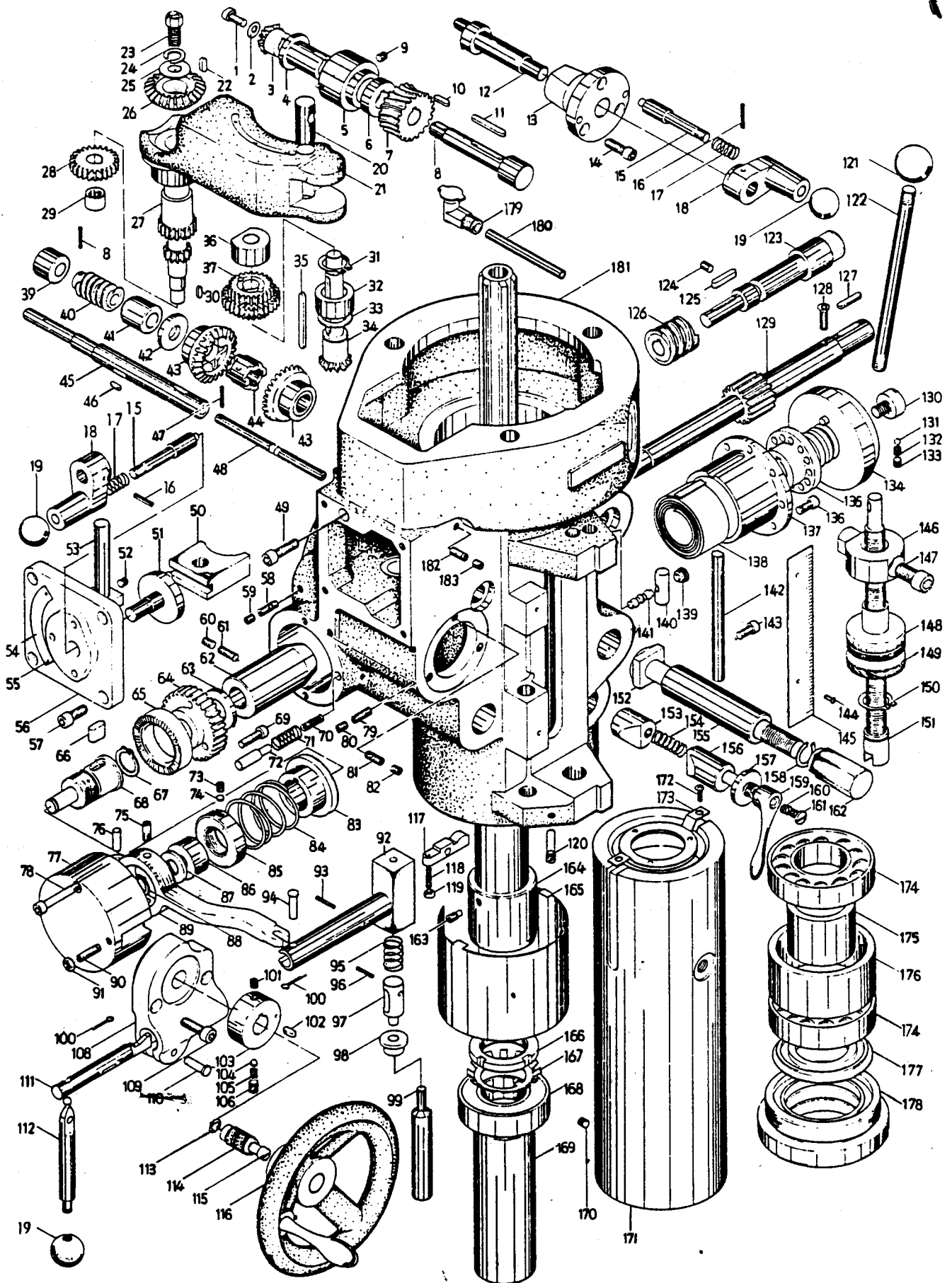
3K HEAD TOP HOUSING

ITEM NO.	PARTS NO.	DESCRIPTION	ITEM NO.	PARTS NO.	DESCRIPTION
1	6031	Drawbar for R 8 Collet	43	6003	Motor Locknut (2 Req.)
2	6032	Drawbar Washer	45	6006	Motor Locknut Handle (2 Req.)
3	6041	Upper Bearing Locknut	46	6007	Black Plastic Ball (2 Req.)
4	6042	Bearing Sleeve Locknut	47	6001-1	Washer
5	6043	Ball Bearing	48	6001-2	Socket Cap Screw
6	6044	Upper Bearing Spacer (small)	49	6009	Motor Pulley
7	6045	Upper Bearing Spacer (large)	50	6078	Gear Housing Cover
8	6043	Ball Bearing	51	6080	Round HD Screw (5 Req.)
9	6049	Compression Spring (4 Req.)	52	6078-1	Wave Spring Washer
10	6047-2	Socket Set Screw (4 Req.)	55	6079	Oil Cup
11	6047	Spindle Pulley Bearing Sleeve	56	6075-1	Bull Gear Key
12	6019	Jam Nut	57	6075	Splined gear Hub
13	6022	External Lock Washer	58	6074	Spindle Bull Gear Assembly
14	6018	Brake Ring Screw (3 Req.)	59	6056	Bearing
15	6024	Spring (2 Req.)	60	6068	Countershaft
16	6047-1	Socket Set Screw (2 Req)	61	6069	Key
17	6020	Brake Lock Stud	62	6067	Countershaft Gear
18	6014	Brake Assembly	63	6056	Bearing
19	6048	Spindle Pulley	64	6066	Dowel Pin
20	6040	Spindle Pulley Hub	65	6065	Back Gear Shifter Fork
21	6070-1	Spring Washer	66	6050	Gear Housing
22	6034	'V' Belt	68	6052	Roll Pin (2 Req.)
23	6035	Timing Belt	69	6057	Socket Cap Screw (6 Req.)
24	6072	Timing Belt Pulley Flange	70	6012	Feed Trip Name Plate
25	6071	Timing Belt Pulley	71	6053	Ball Bearing
26	6072	Timing Belt Pulley Flange	72	6054	Snap Ring
27	6073	Flat Head Screw (12 Req.)	73	6077	Lockwasher
28	6070	Hex Jam Nut	74	6076	Bearing Locknut
29	6038	Black Plastic Ball Handle (2 Req.)	75	6083	Hex Nut Hardened (3 Req.)
30	6037	Spindle Clutch Lever	76	6081	Vertical Tee Bolt (3 Req.)
31	6036	Cam Ring	77	6082	Vertical Bolt Washer (3 Req.)
32	6039	Cam Ring Pin (2 Req.)	78	6060	Back Gear Shift Crank
33	6023	Socket Set Screw	79	6167	Roll Pin
34	6016	Brake Lock Handle	81	6168	Shift Crank
35	6021	Brake Lock Pin	82	6171	Black Plastic Ball 1" Dia.
36	6011	Speed Nameplate	83	6169	Gearshift Plunger
37	6011-1	Drive Screw (10 Req.)	84	6170	Compression Spring
39	6008	Hex Jam Nut (2 Req.)	85	6026	Belt Guard Assembly (2 Req.)
41	6002	Motor Mounting Studs (2 Req.)	86	6027	Plate Pinch (2 Req.)
42	6013	Belt Housing	87	6027-1	Socket Cap Screw (2 Req.)
			88	6027-2	Washer (2 Req)
			89	6027-3	Nut (2 Req)

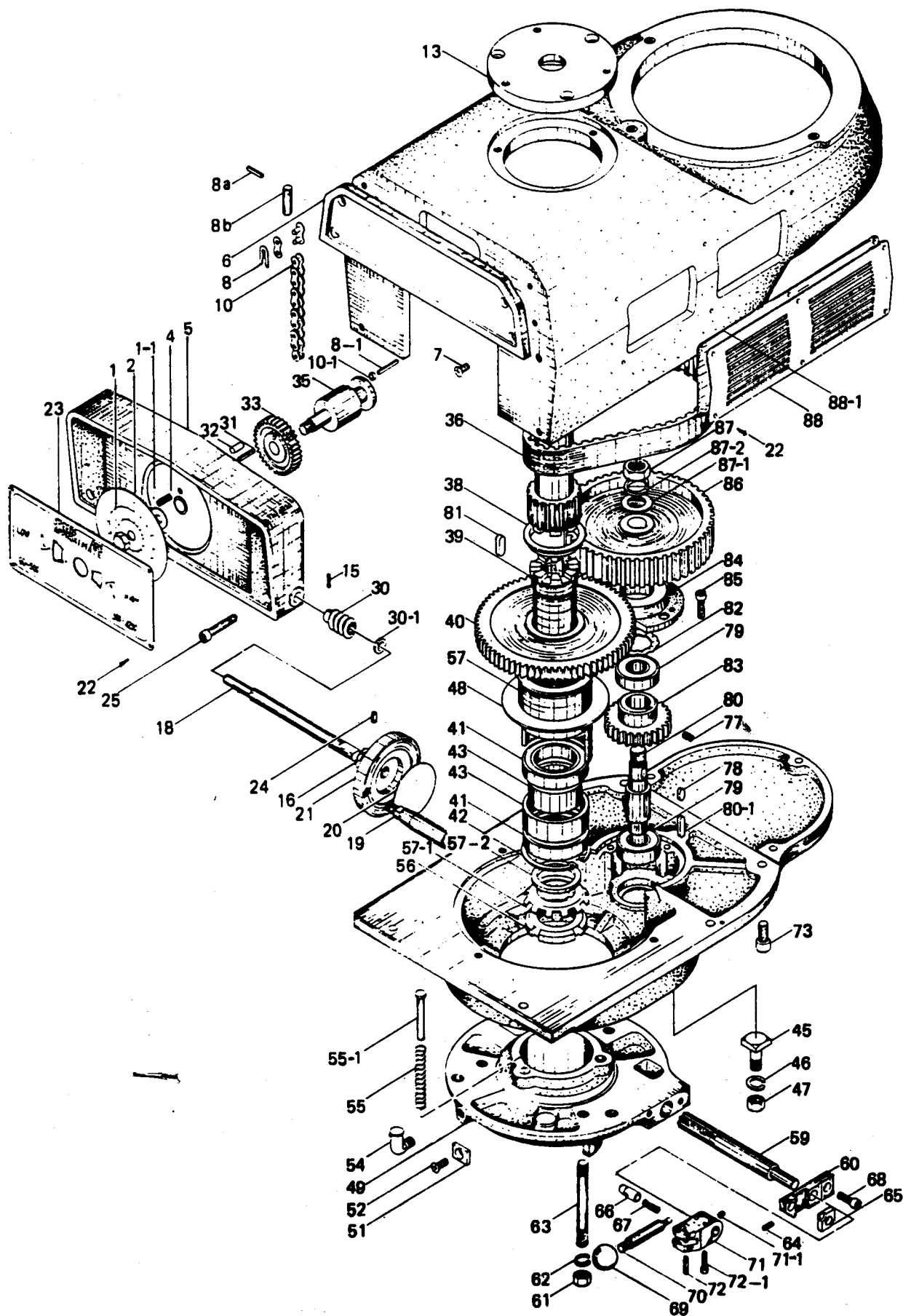


3K/3VK HEAD

ITEM NO.	PARTS NO.	DESCRIPTION	ITEM NO.	PARTS NO.	DESCRIPTION
1	6141	RD, HD, Screw	46	6230	Key
2	6140	Bevel Pinion Washer	47	6217	Roll Pin
3	6139	Feed Bevel Pinion	48	6216	Reverse Clutch Rod
4	6138	Feed Worm Gear Shaft Sleeve	49	6121-1	Cap Screw
5	6137	Worm Cradle Bushing	50	6162	Feed Gear Shift Fork
6	6136	Worm Gear Spacer	51	6166	Cluster Gear Shift Crank
7	6134	Feed Drive Worm Gear	52	6164	Set Screw
8	6133	Feed Drive Worm Gear Shaft	53	6163	Feed Shift Rod
9	6123	Set Screw	54	6256	Vari-Speed Dial
10	6142	Key	55	6256-1	Drive Screw (2 Req.)
11	6135	Key	56	6161	Cluster Gear Cover
12	6126	Worm Gear Cradle Throw-out	57	6165	Cap Screw (4 Req.)
13	6125	Shift Sleeve	58	6227-1	Set Screw
14	6132	Cap Screw (3 Req.)	59	6227-2	Set Screw
15	6169	Gear Shift Plunger (2 Req.)	60	6186-1	Set Screw
16	6128	Roll Pin (2 Req.)	61	6186-2	Set Screw
17	6170	Compression Spring (2 Req.)	62	6186	Quill Pinion Shaft Bushing
18	6168	Shift Crank (2 Req.)	63	6190	Pinion Shaft Worm Gear Spacer
19	6131	Black Plastic Ball (3 Req.)	64	6187	Overload Clutch Worm Gear
20	6122	Feed Engage Pin	65	6188	Overload Clutch Ring
21	6121	Worm Gear Cradle	66	6195-1	Key
22	6147	Cluster Gear Key	67	6188-1	Snap Ring
23	6150	Cap Screw	68	6195	Overload Clutch Sleeve
24	6149-1	Spring Washer	69	6189	Round Head Screw (3 Req.)
25	6149	Washer	70	6191	Compression Spring
26	6148	Feed Reverse Bevel Gear	71	6192	Compression Spring
27	6143	Feed Driving Gear	72	6193	Overload Clutch Lever Spring Plunger
28	6144	Feed Driving Gear			
29	6252	Needle Bearing BA66#	73	6199	Set Screw
30	6145	Key	74	6199-1	Brass Plug
31	6158	Snap Ring	75	6202	Clutch Ring Pin (2 Req.)
32	6156	Bevel Gear Bearing	76	6204	Pin
33	6159	Bevel Gear Thrust Spacer	77	6205	Clutch Arm Cover
34	6151	Cluster Gear Shaft	78	6206	Cap Screw (2 Req.)
35	6160	Cluster Gear Key	79	6224-1	Set Screw
36	6157	Cluster Gear Shaft Upper Bearing	80	6224-2	Set Screw
37	6153	Cluster Gears Assembly	81	6156-1	Set Screw
38	6226	Roll Pin	82	6156-2	Set Screw
39	6227	Bushing	83	6194	Overload Clutch
40	6225	Worm	84	6197	Safety Clutch Spring
41	6224	Feed Worm Shaft Bushing	85	6198	Overload Clutch Locknut
42	6223	Feed Worm Shaft Thrust Washer	86	6200	Clutch Ring
43	6220	Feed Reverse Bevel Gear(2 Req.)	87	6201	Overload Clutch Washer
44	6222	Feed Reverse Clutch	88	6195-1	Snap Ring
45	6209	Feed Worm Shaft	89	6203	Overload Clutch Trip Lever
			90	6207	Socket Set Screw
			91	6208	Chem Blacked Locknut

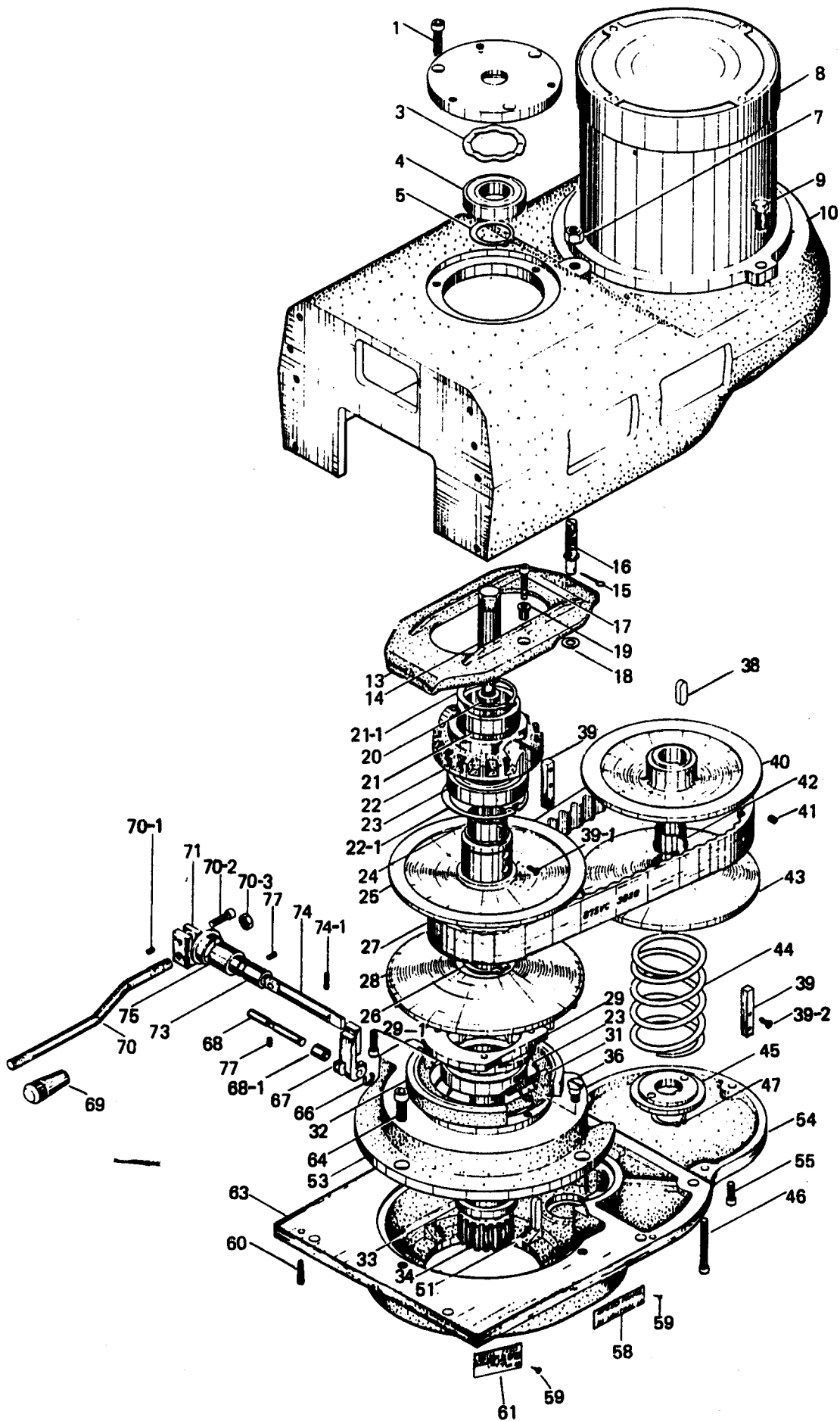


ITEM NO.	PARTS NO.	DESCRIPTION	ITEM NO.	PARTS NO.	DESCRIPTION
92	6236	Cam Rod Sleeve Assy	139	6114	Reverse Trip Ball Lever Screw
93	6237	Roll Pin	140	6109	Feed Reverse Trip plunger
94	6236-1	Dowel Pin	141	6110	Reverse Trip Ball Lever
95	6242	Compression Spring	142	6251	Set Bar
96	6241	Roll Pin	143	6251-1	Cap Screw
97	6240	Trip Plunger	144	6244	Chem Blacked RD. HD. Screw (2 Req.)
98	6118-1	Trip Plunger Bushing	145	6243	Micrometer Scale
99	6118	Feed Trip Plunger	146	6105	Quill stop Knob
100	6257	Cotter Pin (2 Req.)	147	6106	Screw
101	6219	Set Screw	148	6107	Micrometer Nut
102	6229	Key	149	6108	Quill Micro-stop Nut
103	6218	Handwheel Clutch	150	6115	Snap Ring
104	6255	Steel Ball	151	6104	Quill Stop Micro-screw
105	6219-2	Compression Spring	152	5036	T-Bolt Assy (4. Req.)
106	6219-1	Handwheel Clutch Spring Screw	153	6116B	Quill Lock Sleeve
107	6257	Cotter Pin	154	6116-1	Compression Spring
108	6231	Feed Trip Bracket	155	6120	Lower Clamping Bolt Spacer (2 Req.)
109	6232	Cap Screw	156	6116A	Quill Lock Sleeve Tapped
110	6231-1	Dowel Pin	157	6117	Quill Lock Bolt
111	6239	Cam Rod	158	5037	Spring Washer
112	6234	Trip Handle	159	6119	Lock Handle
113	6215	Snap Ring	160	6117-1	Spring
114	6213	Reverse Knob	161	6117-2	Spring Screw
115	6214	Feed Reverse Knob Stud	162	5038	Locknut (4 Req.)
116	6210	Handwheel	163	6253	Special Socket Set Screw
117	6111	Feed Trip Lever	164	6084	Spindle
118	6113	Socket Set Screw	165	6086	Quill Skirt
119	6113-1	Locknut	166	6090	Locknut
120	6112	Trip Lever Pin	167	6091	Lockwasher
121	6173	Black Plastic Ball Handles	168	6092	Bearing
122	6174	Pinion Shaft Hub Handle	169	6094	Sleeve
123	5040	ADJ Worm Shaft	170	6085-1	Set Screw
124	5042	Socket Set Screw	171	6085	Quill
125	5041	Key	172	6088-1	Felt Washer Screw (2 Req.)
126	5039	Worm Gear	173	6088	Felt Washer
127	6184	Key	174	6093	Bearing (2 Req.)
128	6172-1	Cap Screw	175	6096	Bearing Spacer-Large
129	6172	Quill Pinion Shaft	176	6095	Bearing Spacer-Small
130	6183	Pinion Shaft Hub Screw	177	6097	Spindle Dirt Shield
131	6176	Steel Ball	178	6098	Nose-Piece
132	6175	Compression Spring	179	6258	Oil Cap
133	6177	Steel Ball	180	6259	Copper Pipe
134	6178	Rack Feed Handle Hub	181	6101	Quill Housing
135	6182	Pinion Shaft Hub Sleeve	182	6157-1	Set Screw
136	6180-1	RD. Head Screw (2 Req.)	183	6157-2	Set Screw
137	6180	Spring Cover			
138	6181	Clock Spring (Clock Spring Assy)			



3VK HEAD TOP HOUSING

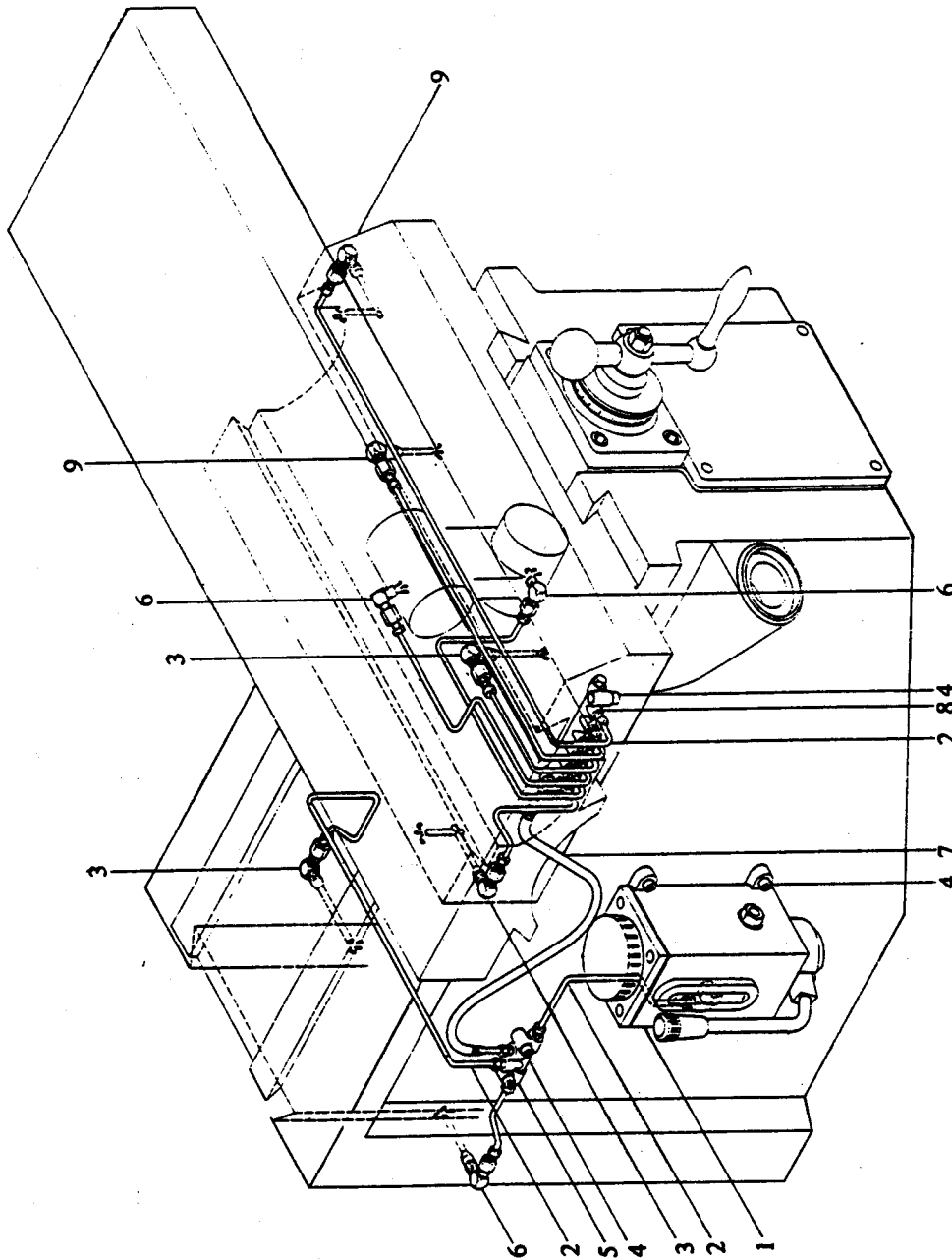
ITEM NO.	PARTS NO.	DESCRIPTION	ITEM NO.	PARTS NO.	DESCRIPTION
1	H7001	Hex Cap Nut	52	7052	Flat HD Socket Cap Screw (2 Req.)
1-1	7001-1	Washer	54	7054	Oil Cap (2 Req.)
2	7002	Vari-Speed Dial	55	7055	Compression Spring (3 Req.)
4	7004	Full Dog Socket Set Screw	55-1	7055-1	Adjust Pin (3 Req.)
5	H7005	Speed Changer Housing	56	7056	Bearing Locknut
6	H7006	Name Plate	57	7057	Bearing Sleeve
7	H7007	Socket Cap Screw (4 Req.)	57-1	7057-1	Lock Washer
8	7008	Chain Joint	57-2	7057-2	Washer
8-1	7008-1	Roll Pin	59	7059	Bull Gear Shift Pinion
8a	7008a	Roll Pin	60	7060	HI-LOW Detent Plate
8b	7008b	Speed Change Stud	61	7061	Hex Nut (3 Req.)
10	H7010	Speed Change Chain	62	7062	Spring Washer (3 Req.)
10-1	7010-1	Washer	63	7063	Studs (3Req.)
13	7013	Top Bearing Cap	64	7064	Socket Set Screw
15	7015	Roll Pin	65	7065	Adjustable Plate
16	7016	Spring Washer	66	7066	HI-LOW Detent Plunger
18	H7018	Speed Change Shaft	67	7067	Spring
19	H7019	Handle	68	7068	Socket Cap Screw (2 Req.)
20	7020	Caution Plate	69	7069	Black Plastic Ball Handle
21	H7021	Speed Change Handwheel	70	7070	HI-LOW Shift Crank
22	H7022	Flat Hd. Cap Screw (16 Req.)	71	7071	HI-LOW Pinion Block
23	H7023	Plastic Face Plate	71-1	7071-1	Socket Set Screw
24	7024	Set Screw	72	7072	Roll Pin
25	H7025	Socket Cap Screw (4 Req.)	72-1	7072-1	Socket Cap Screw (2 Req.)
30	7030	Worm Gear	73	7073	Socket Cap Screw (6 Req.)
30-1	7030-1	Washer	77	7077	Socket Set Screw
32	7032	Pin (2 Req.)	78	7078	Key
33	7033	Speed Changer Spur Gear	79	7079	Ball Bearing 6203# (2 Req.)
35	H7035	Speed Changer Chain Drum	80	7080	Bull Gear Pinion Counter Shaft
35-1	7035-1	Roll Pin	80-1	7080-1	Key
36	7036	Belt	81	7081	Key
38	7038	Timing Pulley Clutch Sleeve	82	7082	Wave Spring Washer
39	7039	Splined Gear Hub	83	7083	Bull Gear Pinion
40	7040	Splindle Bull Gear Assembly	84	7084	Bull Gear Pinion Bearing Cap
41	7041	Ball Bearing 6908# (2 Req.)	85	7085	Socket Cap Screw (3 Req.)
42	7042	Snap Ring	86	7086	Timing Belt Pulley
43	7043	Bull Gear Bearing Spacer	87	7087	Jam Nut
45	7045	Vert, Tee Bolts (3 Req.)	87-1	7087-1	Washer
46	7046	Steel Washer (3 Req.)	87-2	7087-2	Spring Washer
47	7047	Nut (3 Req.)	88	H7088	Ventilator (2 Req.)
48	7048	Ball Bearing Gear Sleeve Washer	88-1	H7088-1	Rubber Cover (2 Req.)
49	7049	Fixed Clutch Bracket			
51	7051	Guide for Clutch Bracket (2 Req.)			



3VK HEAD BACK GEAR

ITEM NO.	PARTS NO.	DESCRIPTION	ITEM NO.	PARTS NO.	DESCRIPTION
1	8001	Socket Cap Screw (3 Req.)	40	8040	Stationary Motor Varidisc
3	8003	Spring Washer	41	8041	Socket set Screw
4	8004	Ball Bearing 6007#	42	8042	Plastic Insert (2 Req.)
5	8005	Snap Ring	43	8043	Adjustable Motor Varidisc Assembly
7	8007	Hex Jam Nut	44	8044	Spring for Varidisc Motor Shaft
8	8008	Motor 3HP (Complete unit)	45	8045	Adjustable Varidisc Spring Collar.
9	8009	Hex HD Screw (2 Req.)	46	8046	Socket HD Cap Screw (2 Req.)
10	H8010	Belt Housing	47	8047	Ret. Ring
13	8013	Speed Change Plate	51	8051	Key
14	8014	Drawbar	53	H8053	Belt Housing Base
15	8015	Cotter Pin	54	H8054	Motor Pulley Cover
16	8016	Speed Change Plate Pivot Stud	55	8055	Socket Cap Screw
17	8017	Socket HD Cap Screw (2Req.)	58	8058	H1-LOW Range Nameplate
18	8018	Washer	59	8059	Drive Screw (6 Req.)
19	8019	Pivot Sleeve (2Req.)	60	8060	Taper Pin (2 Req.)
20	8020	Draw Bar Washer	61	8061	Quill Feed Nameplate
21	8021	Spacer	63	H8063	Gear Housing
21-1	8021-1	Snap Ring	64	8064	Socket Cap Screw (3 Req.)
22	8022	Spindle Pulley Bearing Sliding Housing	66	8066	Snap Ring
22-1	8022-1	Snap Ring	67	8067	Brake Finger Pivot Stud (2 Req.)
23	8023	Ball Bearing 6010# (2 Req.)	68	H8068	Brake Operating Finger
24	8024	Plastic Insert (2 Req.)	68-1	H8068-1	Spacer
25	8025	Adjustable-Driven Varidisc	69	3H8069	Bakelite Ball Handle
26	8026	Snap Ring	70	H8070	Brake Lock Handle
27	8027	Belt	70-1	H8070-1	Socket Set Screw
28	8028	Stationary Driven Varidisc	70-2	H8070-2	Socket Cap Screw
29	H8029	Brake Bearing Cap	70-3	H8070-3	Jam Nut
29-1	8029-1	Socket HD Cap Screw (4 Req.)	71	H8071	Brake Lock Handle
31	8031	Brake Spring (2 Req.)	73	H8073	Sleeve for Brake Lock Shaft
32	8032	Brake Shoe Assembly	74	H8074	Brake Lock Shaft
33	8033	Spindle Pulley Spacer	74-1	8074-1	Roll Pin
34	8034	Spindle Pulley Hub	75	8075	Rubber Bushing
36	8036	Brake Shoe Pivot Sleeve Screw	77	8077	Socket Set Screw (2 Req.)
38	8038	Drive Key			
39	8039	Key (2 Req.)			
39-1	8039-1	Flat HD Socket Cap Screw (2 Req.)			
39-2	8039-2	Flat HD Socket Cap Screw (2 Req.)			

CENTRAL LUBRICATING OIL-FEEDING EQUIPMENT



ITEM NO.	PARTS NO.	DESCRIPTION	ITEM NO.	PARTS NO.	DESCRIPTION
1	9001	Hand Oiler	6	9006	Ratio Distribution Controller - CPS3 (3 Req.)
2	9002	Aluminum Pipe	7	9007	Outside Steel Wire Soft Tube
3	9003	Ratio Distribution Controller - CPS4 (3 Req.)	8	9008	"A" Type Distributor - A8
4	9004	Socket Cap Screw (8 Req.)	9	9009	Ratio Distribution Controller - CPS5 (2 Req.)
5	9005	"A" Type Distributor - A4			



**OPERATION
MANUAL**

1-1100(m)