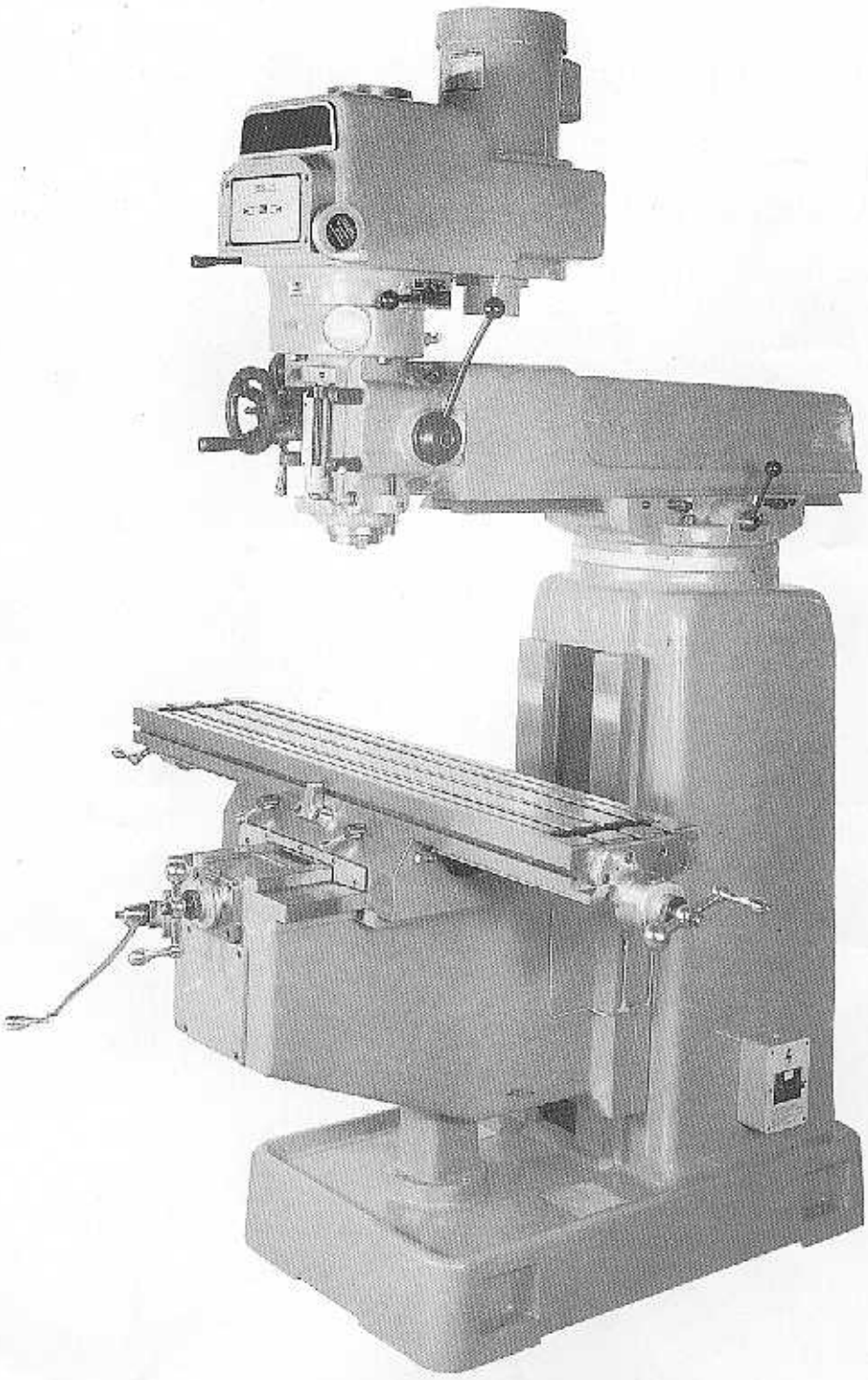
OPERATION MANUAL

TURRET MILLING MACHINE



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*Specifications subject to change without prior notice

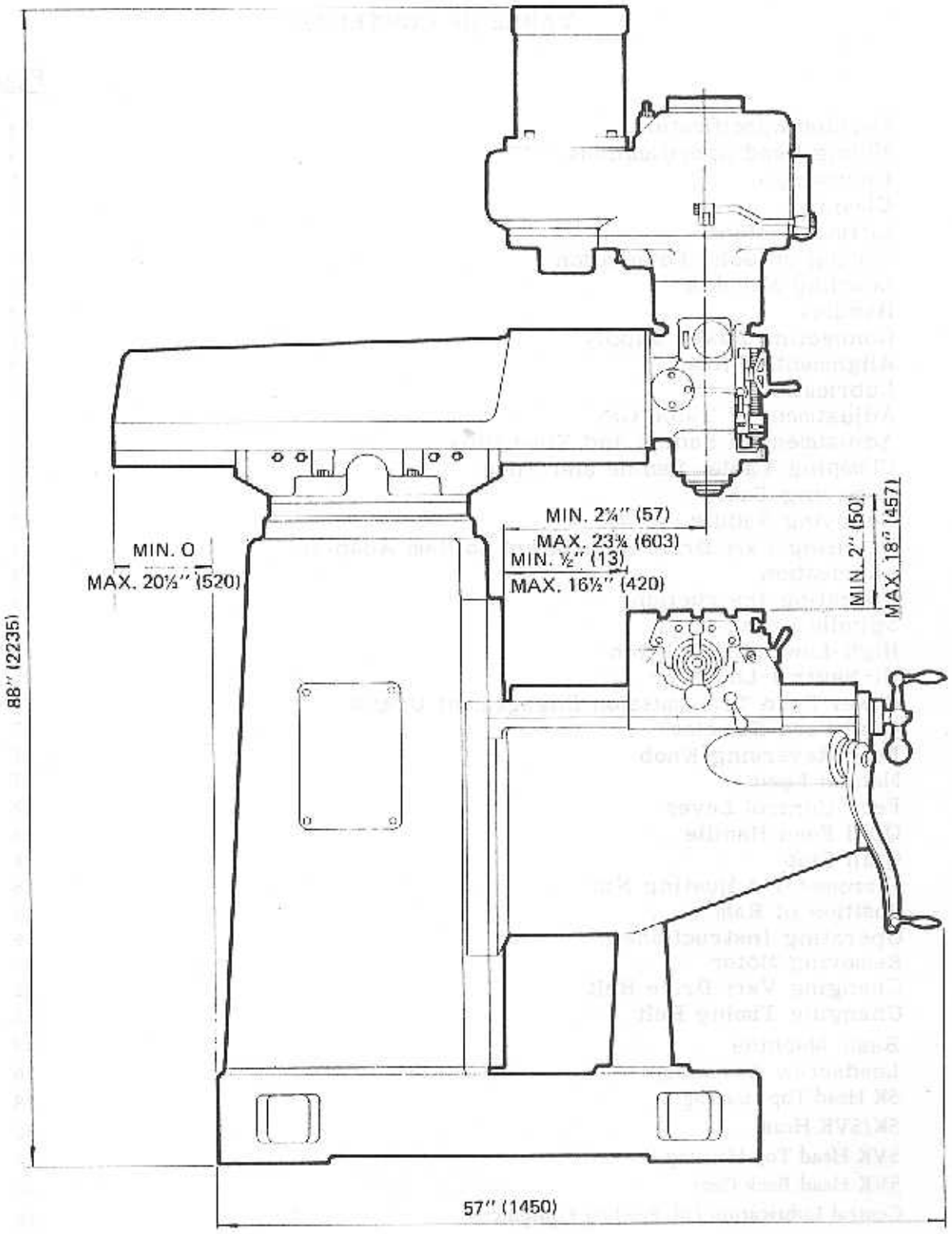


Figure 1. Basic Dimensions

BASIC MACHINE SPECIFICATIONS

Range

Table travel (X-axis)	36 in. (914mm)
Saddle travel (Y-axis)	16 in. (406mm)
Quill travel	5½ in. (140mm)
Knee travel (Z-axis manual)	16 in. (406mm)
Ram travel	21½ in. (546mm)
Throat distance (min.)	2½ in. (57mm)
(max.)	23-3/8 in. (603mm)
Table to spindle nose gage line (min.)	2 in. (50mm)
Max. weight of workpiece	850 lbs. (386 kg.)

Table

Overall sizes	10 in x 50 in (254mm x 1270mm)
T-Slots	3 on 2-1/2 in. (63.5mm) centers
T-Slot size	5/8 in. (16mm)
Height above floor (max.)	50 in. (1270mm)

Milling

Feed rate (Power optional)

Space and weight

Floor area	7 x 10ft. (2.1 x 3.1m)
Height	88 in. (2235mm)
Net weight	3500 (1600 kg)
Shipping weight	3850 lbs. (1750 kg)

Power

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

Color

Standard - Machine Gray

MILLING HEAD SPECIFICATIONS

MODEL	HEAD (5K)	HEAD 5VK
Power	5 HP	5 HP
Motor RPM	1720 RPM	1720 RPM
Speed Ranges – RPM Low HIGH	10 Steps 75, 125, 200, 300, 450 600, 1000, 1550, 2350, 3600	Variable Speed 75 – 550 550 – 3800
Quill Travel Quill Diameter	5½" (140mm) 4.173" (106mm)	5½" (140mm) 4.173" (106mm)
Spindle Taper	I.S.O. 40	I.S.O. 40
Spindle Diameter	3½" (89mm)	3½" (89mm)
Spindle Feed Rate Spindle Feed Rate	0.0017"/Rev (0.044mm) 0.0032"/Rev (0.083mm) 0.0054"/Rev (0.138mm)	0.0017"/Rev (0.044mm) 0.0032"/Rev (0.083mm) 0.0054"/Rev (0.138mm)
Drilling Capacity-Manual Drilling Capacity-Power	1¼" (32mm) dia. 5/8" (16mm) dia.	1¼" (32mm) dia. 5/8" (16mm) dia.
Boring Capacity	8.0" (200mm) dia.	8.0" (200mm) dia.
Milling Capacity	2.5 in^3/min	2.5 in^3/min
Spindle to Column-Minimum Spindle to Column-Maximum	2¼" (37mm) 23¾" (603mm)	2¼" (57mm) 23¾" (603mm)

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.

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 (#143, 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 30 ft. lbs. torque, then repeat to 75 ft. lbs.

LIFTING THE MACHINE

Note position of ram and table when lifting with sling.

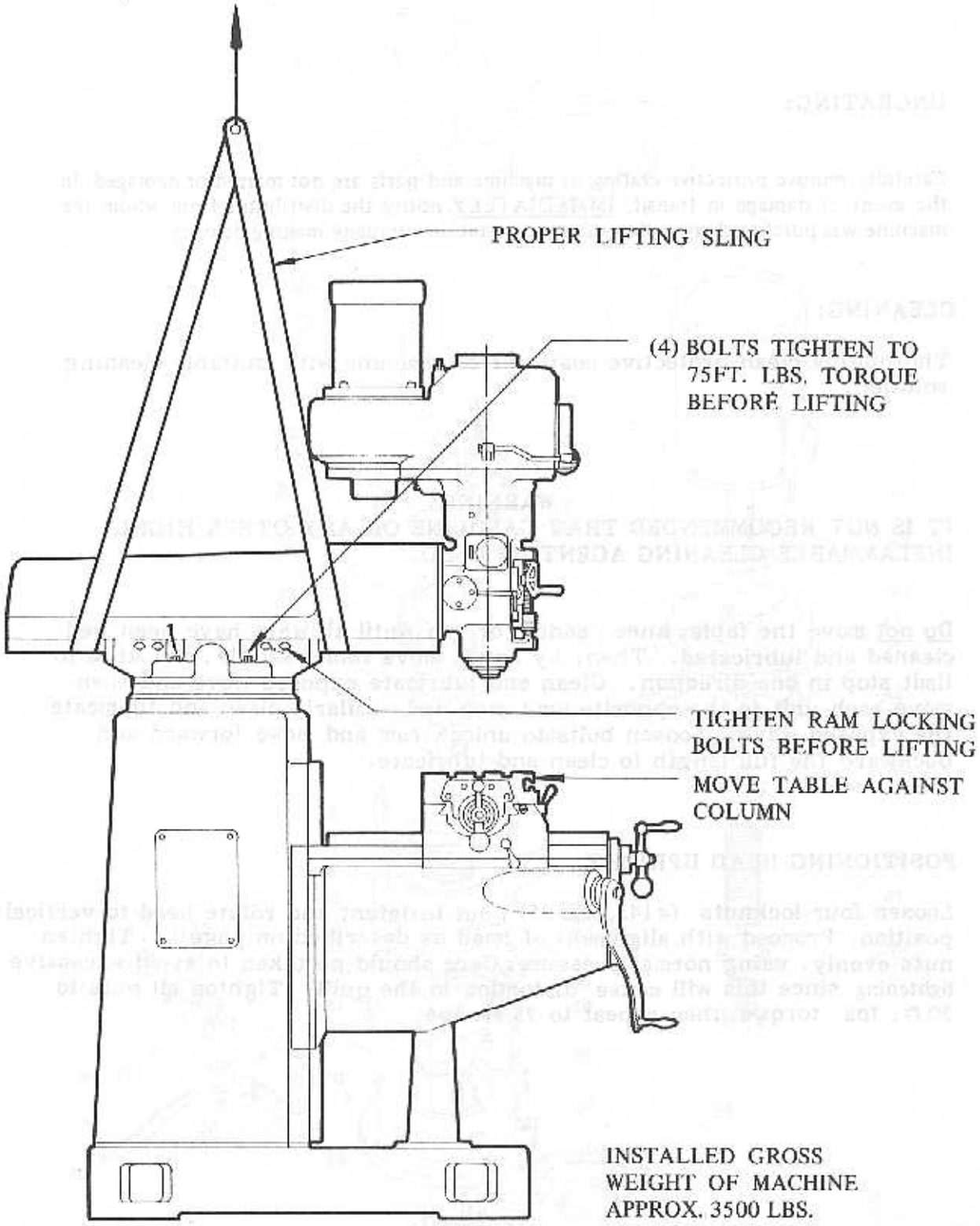


FIGURE 2 LIFTING THE MACHINE

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 3 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.

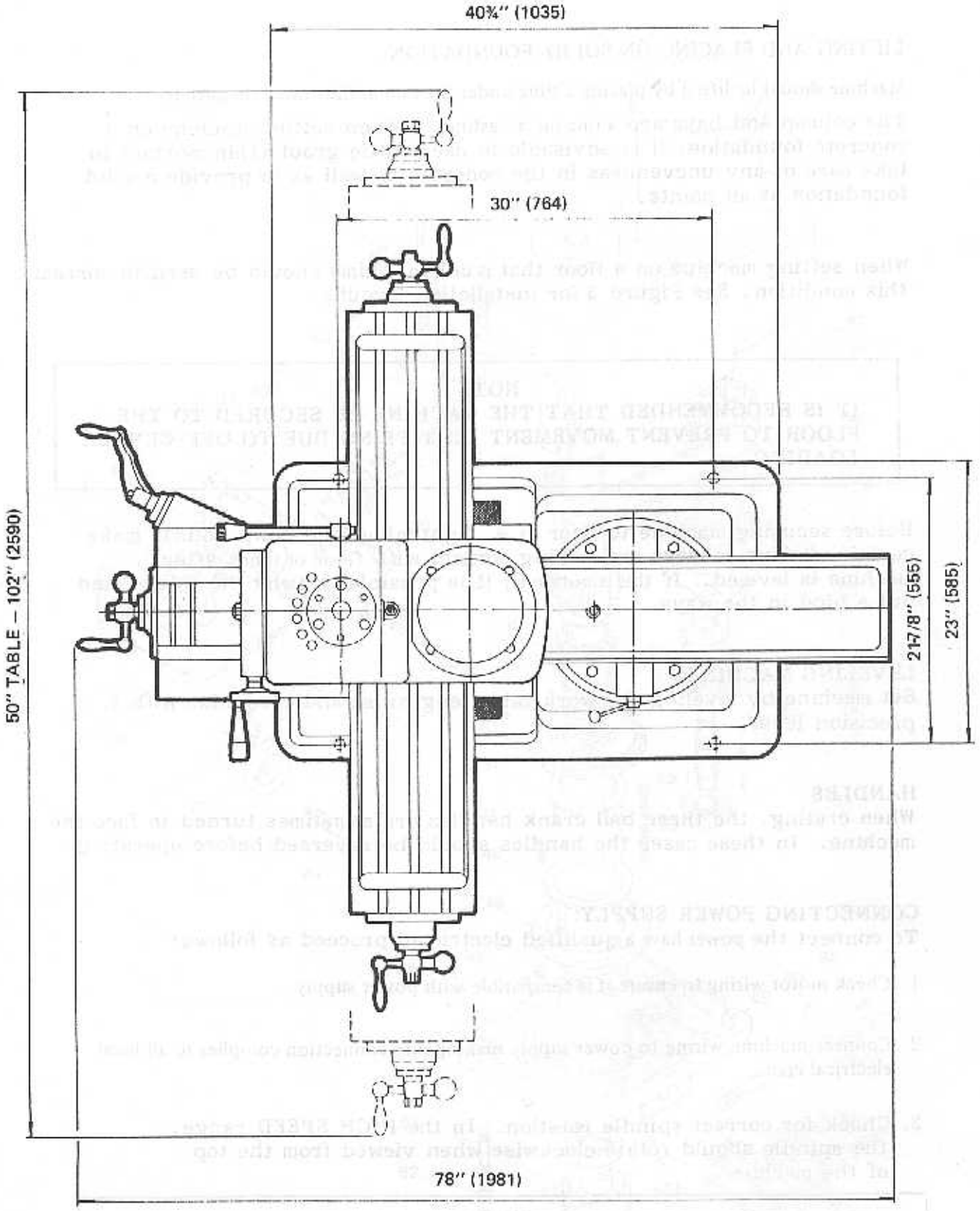


FIGURE 3 INSTALLATION LAYOUT

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 4. Loosen four locknuts (#143, page 34). but leave longitudinal axis, mount indicator as shown in Figure 4.

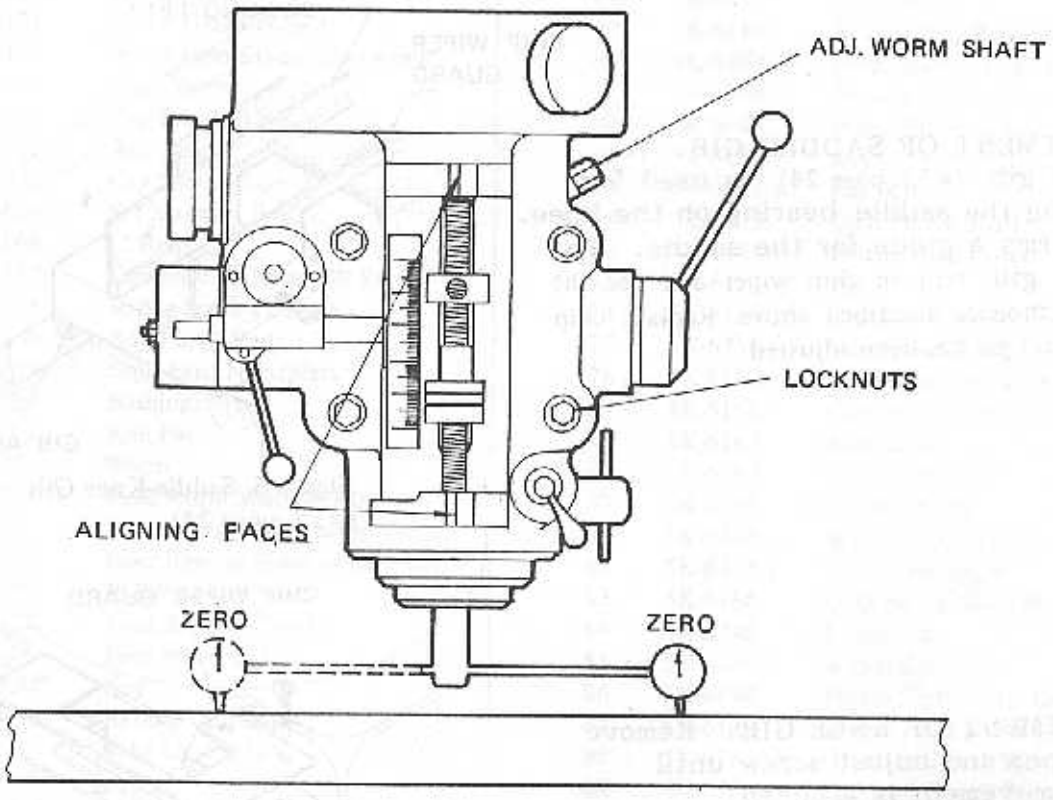


Figure 4. Head Alignment X Axis

LUBRICATION:

Do not operate until properly lubricated:

(A) Way surfaces and lead screws
Sunoco waylube #80 or equivalent.

(B) Milling Heads (Spindle Bearings)
S.A.E. 10 or 10W light oil.

(C) Motors are greased for life of bearings.

ADJUSTMENT OF TABLE GIB. The table is provided with a full length tapered gib (#63, page 24)) in the saddle, and an adjusting screw on the left side. To take up gib, tighten gib adjusting screw (#43, page 24)) slightly and repeat until a slight drag is felt when moving the table by hand.

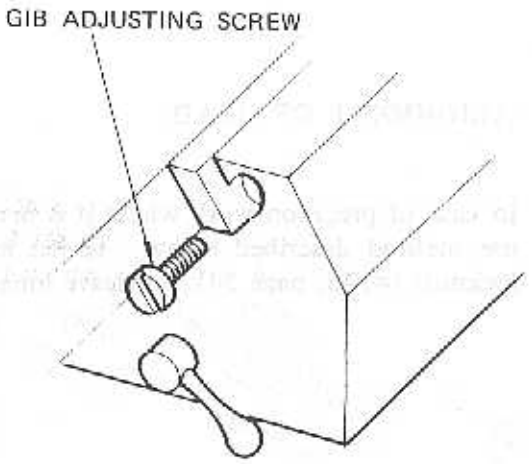


Figure 5. Saddle/Table Gib (#63, page 24)

ADJUSTMENT OF SADDLE GIB. A tapered gib (#53, page 24) 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.

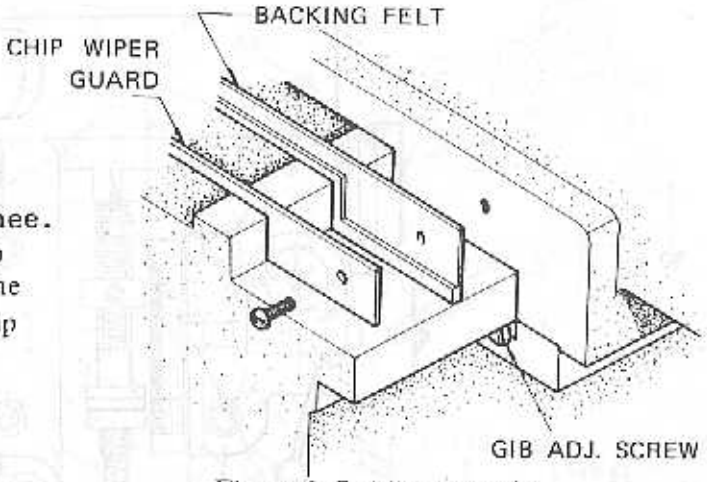


Figure 6. Saddle-Knee Gib (#53, page 24)

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

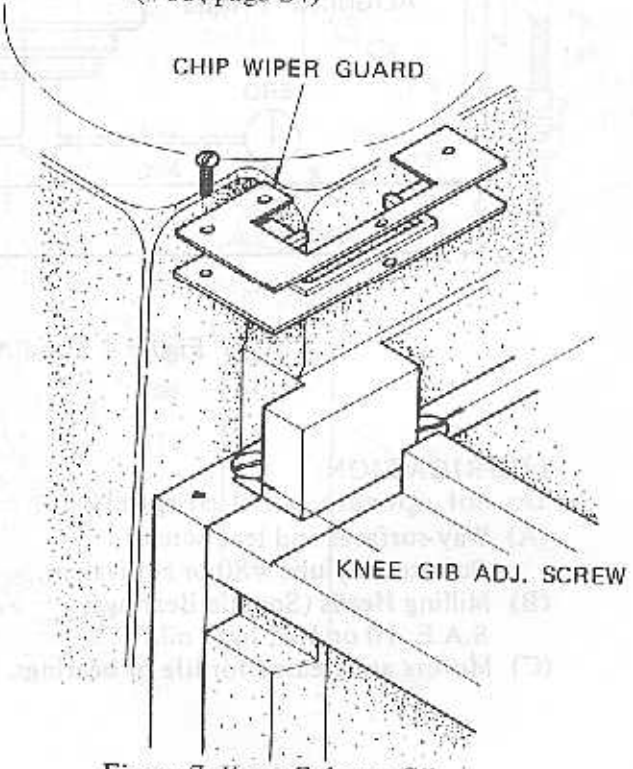


Figure 7. Knee-Column Gib (#41, page 24)

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.

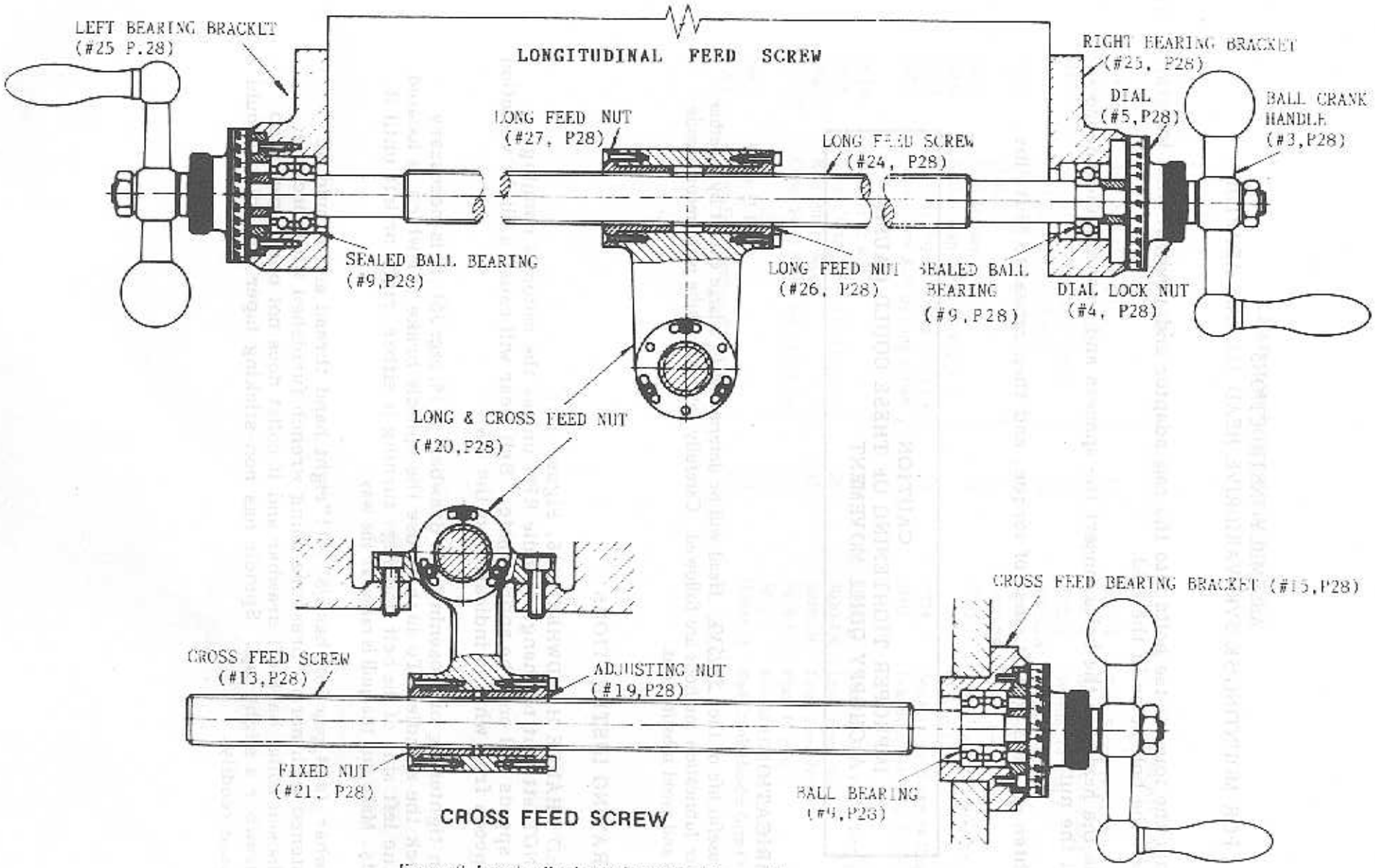


Figure 8. Longitudinal and Cross Feed Assembly

ASSEMBLY INSTRUCTIONS
FOR MOUNTING 5K/5VK 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 30 ft. lbs. of torque, and then repeat to 75 ft. lbs.

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

LUBRICATION:

The useful life of the 5K/5VK 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 36), 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 36) has 5/8" - 11" 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.

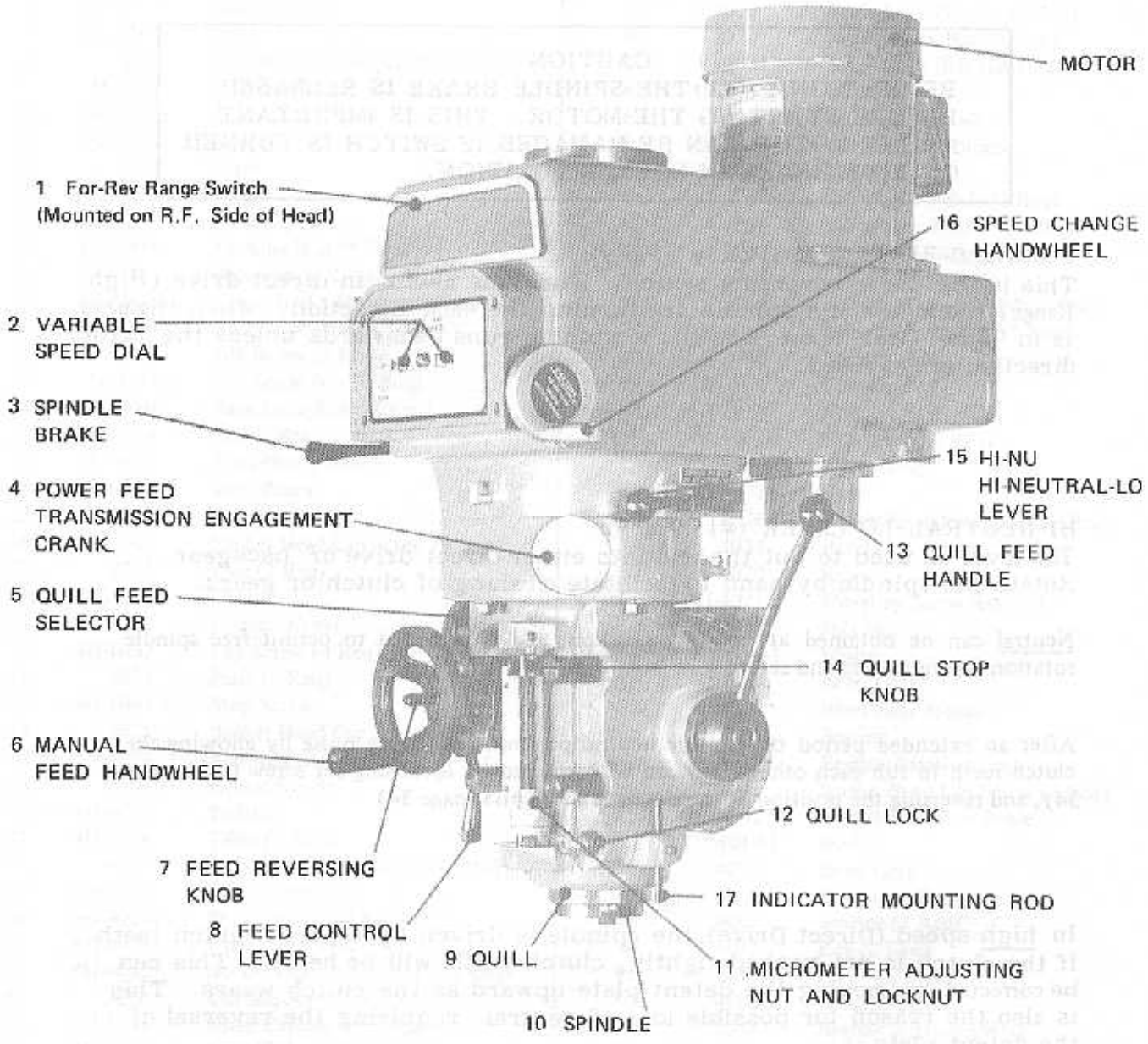


Figure 9. 5VK Milling Head

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.

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 34), and reversing the position of the detent plate (#65, page 34)

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.

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.

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.

FEED REVERSE KNOB (#7, Fig. 9):
Position of this knob depends upon direction of spindle ro ation. 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, 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.

FEED CONTROL LEVER (#8, Fig. 9):
Engages over-load 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. 161, page 30)

CAUTION

WHEN ADJUSTING THE SOCKET SET SCREW, CHECK AUTOMATIC DISENGAGEMENT IN BOTH DIRECTIONS: THAT IS WITH QUILL-STOP NUT (#150, page 30) AGAINST THE FEED TRIP LEVER (#160, page 30) FOR DOWN POSITION. AND AGAINST REVERSE TRIP BALL LEVER (#67, page 30) 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.

QUILL STOP KNOB (#14, Fig. 9):
Is used to disengage power feed in either direction as well as acting as a depth stop when working to a given depth.

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 (#10, Fig. 9):
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 (#21, page 24) on turret (#11, page 24) 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 5/8" diameter in mild tool steel. Overload clutch is preset to hold up to 300 lbs down pressure on quill. Use manual feed for drills over 5/8"

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

OPERATING INSTRUCTIONS

> CAUTION
> DO NOT TRY TO CHANGE SPINDLE SPEED ON 2VS VARI-DRIVE HEAD UNTIL MOTOR IS RUNNING. THIS COULD CAUSE PARTS BREAKAGE.

Spindle Feeds are adjusted by turning speed change handwheel (#21 , page 34) on the front of the belt housing. There are two ranges shown, 75 to 550 and 550 to 3800

75–550 RPM 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).

550 - 3800 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 34) 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 3800 reading on the dial.) Use a tachometer to determine the spindle speed, then turn the pivot stud (#16, page 36), after loosening the jam nut (Item #7, page 38) until the spindle speed registers 3800 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 34), until the spindle speed registers 3800 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 34) on the upper part of the Quill Housing (#170, page 30). These are set at the factory and are used only for alignment.

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 36) (B. Figure 10) at the lower end of the motor shaft. Use two cover screws (#55,page 36) (A) to fasten the spring (#44, page 36) (C) on the lower end of the motor shaft, to the lower motor vari-drive pulley (#43, page 36). 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 36) 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 36) (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 36) deeply into the spindle pulley (#25, page 36) providing the slack needed to ship the belt over the motor pulley (#43, page 36).

4. Now lift the motor high enough to rest the motor base GENTLY on the adjusting screw (#16, page 36) (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.

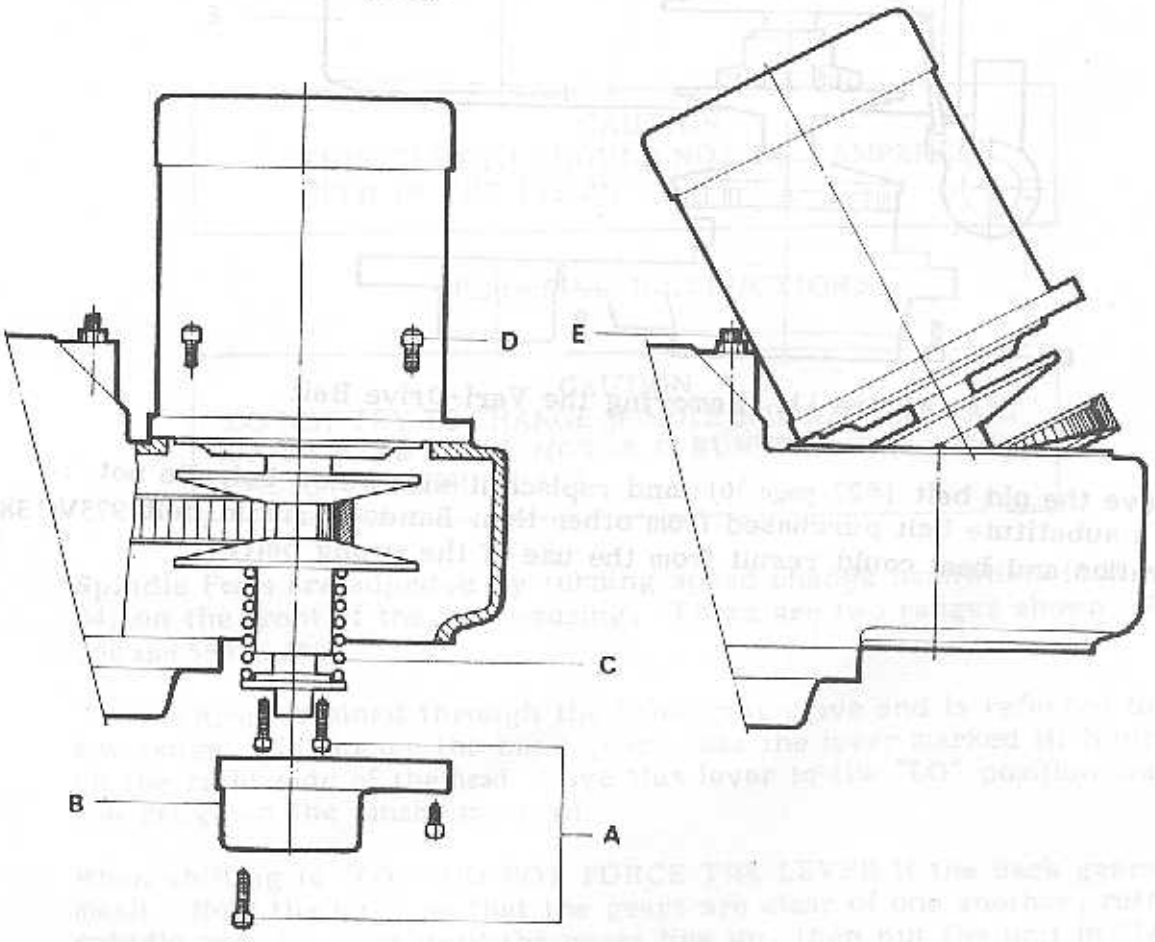


Figure 10. Removing the Motor (Side View)

CHANGING VARI-DRIVE BELT (Figure 11)

Complete the previous procedures for removing the motor, then remove the three screws (#1, page 36)((A. Fig. 11) and lift out the top bearing cap (#13, page 34) (B). Looking down inside of the housing, locate and remove two socket head cap screws (#17, page 36) and sleeves (#19, page 36) (C). Next, remove the six screws (#56, page 36). (D), then holding the belt housing (E) to the base (#63, page 36) .

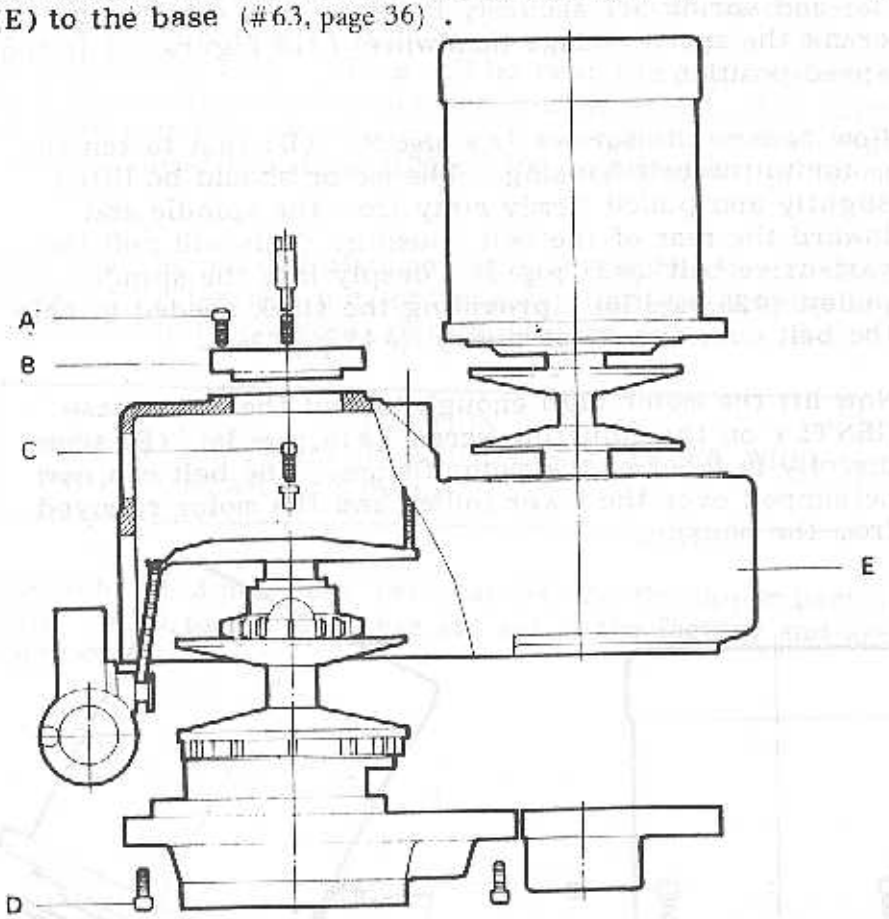


Figure 11. Removing the Vari-Drive Belt.

Remove the old belt (#27, page 36) . and replace it with a new belt. Do not use a substitute belt purchased from other than Bando Variable Belt 975VC 38 x 30 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 36) (A, Figure 12) and lower the spindle.

Remove screws (#64, page 36) (B) holding the upper and lower housings (#63, page 36) together, including the two lower screws (C) in speed changer bracket just below the speed dial.

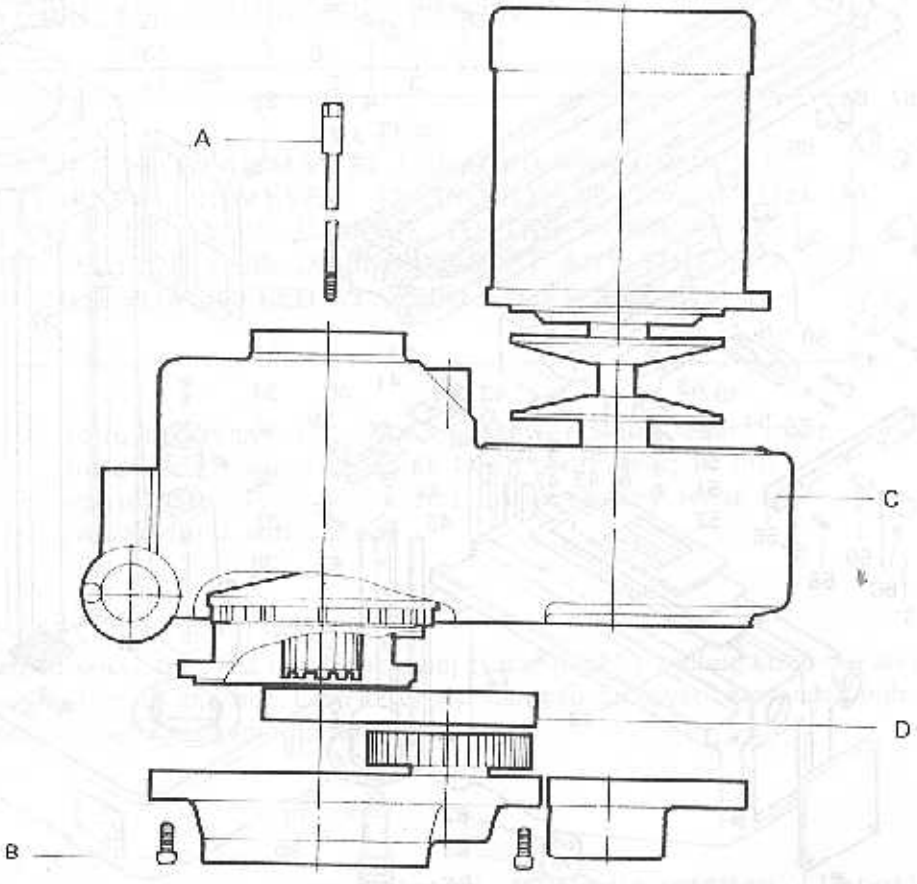
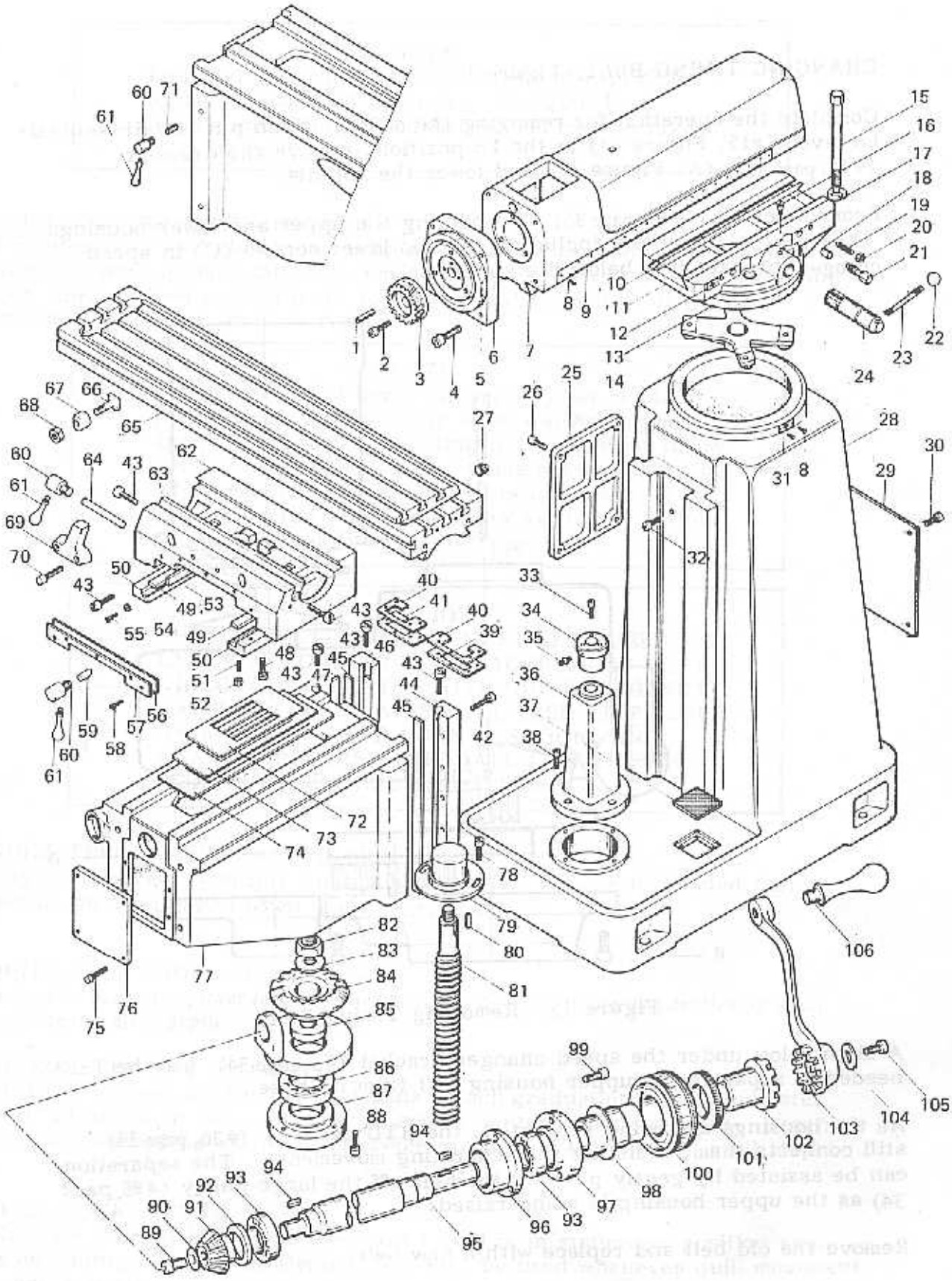


Figure 12. Removing Timing Belt

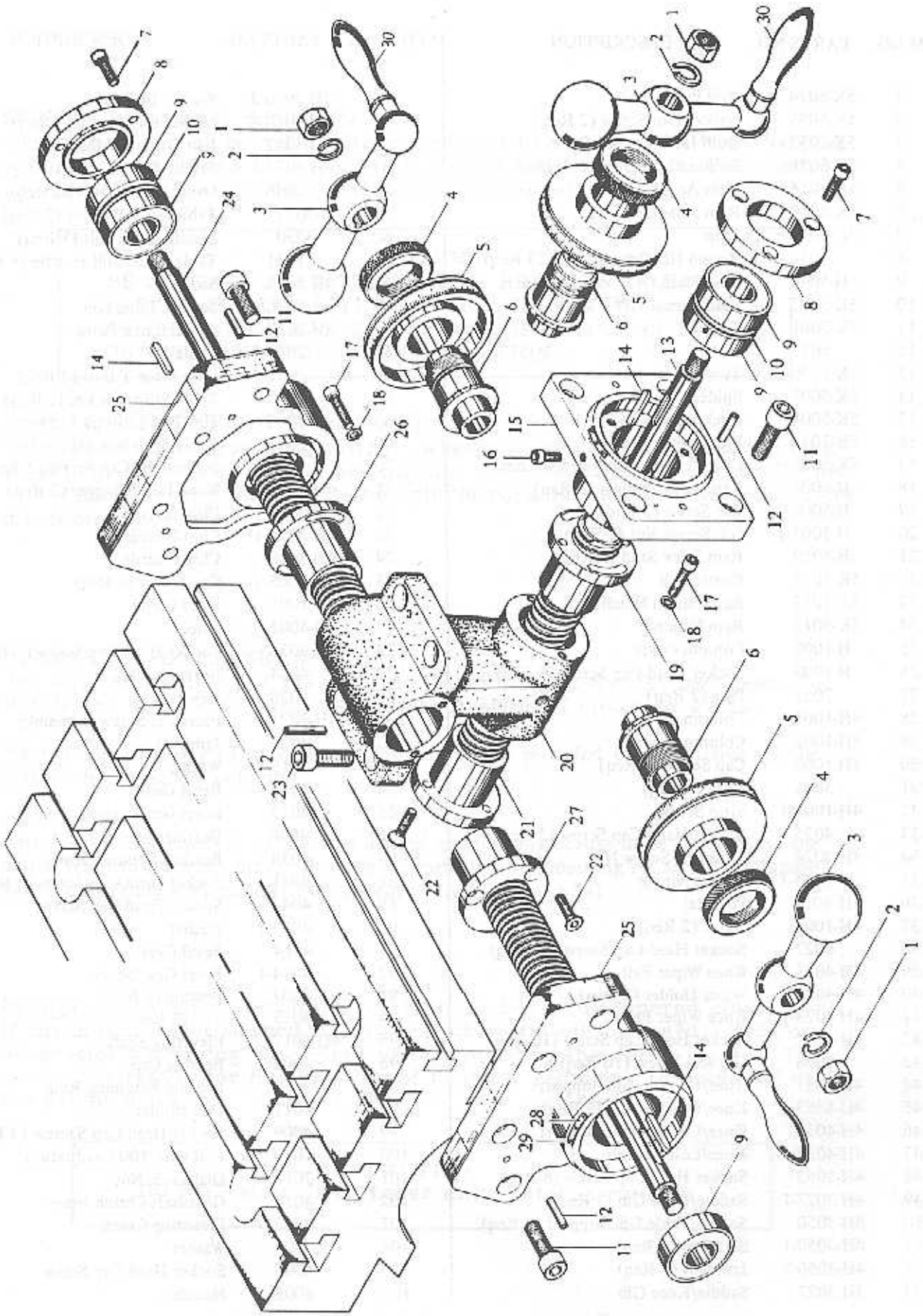
A slight blow under the speed changer bracket (#5, page 34) may be needed to separate the upper housing (D) from its base.

As the housings are being separated, the HTD belt (E) (#36, page 34) still connects them, resisting the separating movement. The separation can be assisted by gently pushing the belt off the large pulley (#86, page 34) as the upper housing is being raised.

Remove the old belt and replace with a new belt.

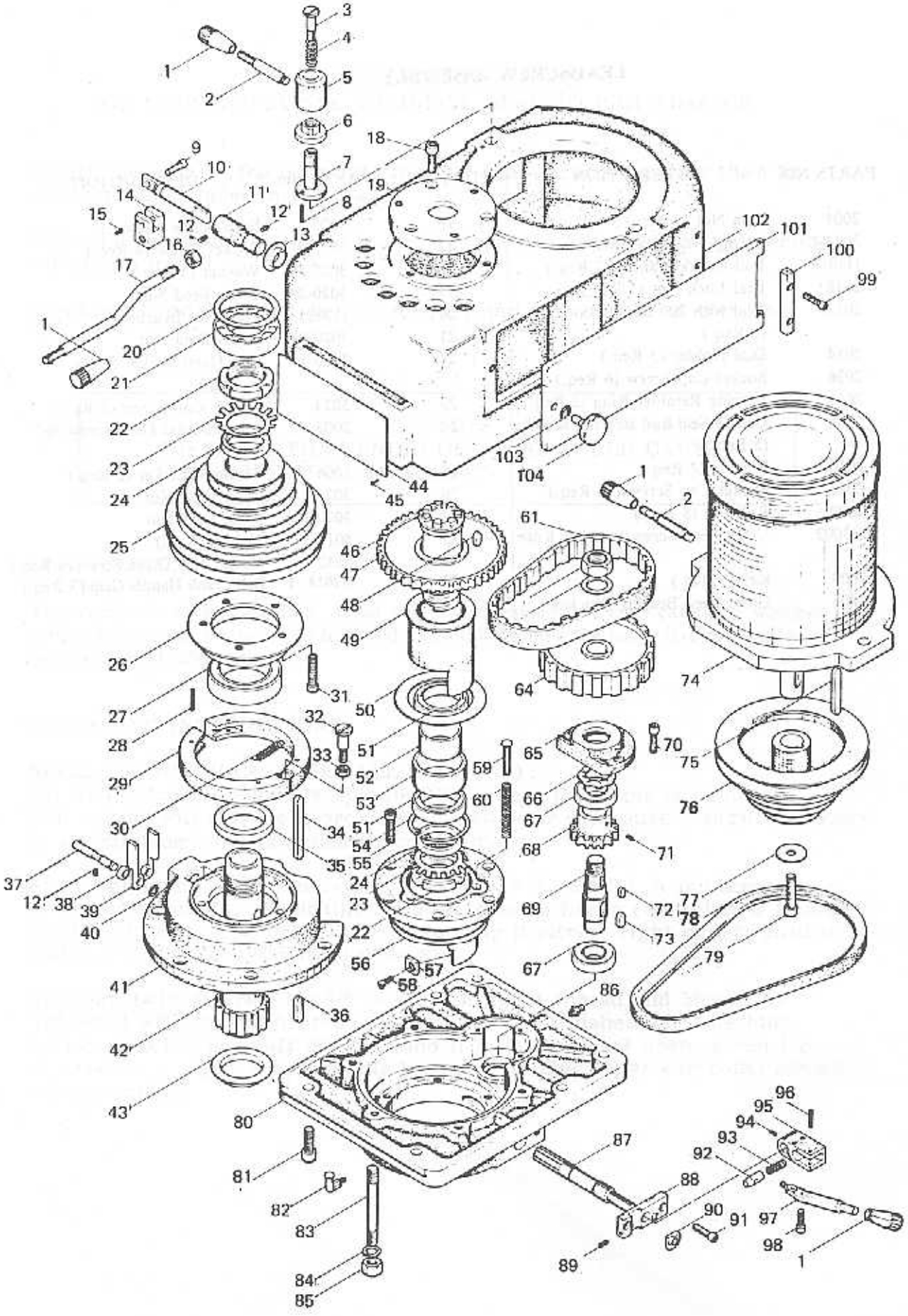


ITEM NO.	PARTS NO.	DESCRIPTION
1	5K-5034	Roll Pin
2	5K-5035	Socket Cap Screw (2 Req)
3	5K-5033	Quill Housing Adj. Gear
4	5K-5028	Socket Cap Screw (7 Req)
5	5K-5016	Ram Adapter Plate
6	5K-5019	Ram Adapter
7	5K-5018	Ram
8	5032	Round HD Drive Screw (23 Req)
9	H-5044	Ram Plate
10	5K-5002	Ram/Turret Gib
11	5K-5001	Turret
12	5031	Plate
13	5K-5030	Turret Plate
14	5K-5003	Spider
15	5K-5004	Locking Bolt (4 Req)
16	5K-5015	Ram Pinion Screw
17	5K-5005	Chamfered x Hardened Washer
18	H-5006	Ram Lock Plunger (2 Req)
19	H-5007	Gib Screw (2 Req)
20	H-5007-1	Gib Screw Nut (2 Req)
21	H-5010	Ram Lock Stud (2 Req)
22	5K-5014	Plastic Ball
23	5K-5013	Ram Pinion Handle
24	5K-5012	Ram Pinion
25	H-1002	Column Cover
26	H-1003	Socket Head Cap Screw (4 Req)
27	2035	Plug (2 Req)
28	4H-1001	Column
29	4H-1002	Column Cover
30	4H-1003	Cap Screw (4 Req)
31	5031	Plate (5 Req)
32	4H-1001-1	Stop Screw
33	4025	Socket Hand Cap Screw (3 Req)
34	4H-4024	Elevating Screw Nut
35	4024-1	Grease Nipple
36	4H-4026	Pedestal
37	4H-1004	Filter (2 Req)
38	4027	Socket Head Cap Sacrew (4 Req)
39	4H-4028	Knee Wiper Felt
40	4H-4028-2	Wiper Holder (2 Req)
41	4H-4028-1	Knee Wiper Felt
42	4H-4052	Socket Head Cap Screw (10 Req)
43	3028	Gib Adj-Screw (10 Req)
44	4H-4051	Knee/Column Gib Support
45	4H-4053	Knee/Column Gib (2 Req)
46	4H-4050	Knee/Column Gib Support
47	4H-4038	Knee/Column Gib
48	4H-3052	Socket Head Cap Screw (8 Req)
49	4H-3027-1	Saddle/Knee Gib (2 Req)
50	4H-3050	Saddle/Table Gib Support (2 Req)
51	4H-3050-1	Setscrew (8 Req)
52	4H-3050-2	Jam Nut (8 Req)
53	4H-3027	Saddle/Knee Gib
54	4H-3050-3	Washer (4 Req)
55	4H-3050-4	Socket Cap Screw (4 Req)
56	4H-3037	Felt Wipers (2 Req)
57	4H-3037-1	Saddle Knee (2 Req)
58	3038	Oval Head Screw (10 Req)
59	H-3029	Table Lock Plunger (2 Req)
60	3030	Saddle Lock Bolt (5 Req)
61	3031	Table Lock Bolt Handle (5 Req)
62	4H-3001	Saddle
63	3026	Saddle/Table Gib
64	4H-3032	Saddle Lock Plunger
65	2001-50	Table-50"
66	2031	Stop Piece T-Bolt (2 Req)
67	2030	Table Stop Bracket (2 Req)
68	2032	Hex Nut (2 Req)
69	3035	Table Stop Bracket
70	3036	Socket HD Cap Screw (2 Req)
71	4H-4043	Knee Lock Plunger (2 Req)
72	H-3040	Chip Guards
73	H-3039-1	Chip Guards
74	4H-3039	Chip Guards
75	3B-1005-1	Cap Screw (4 Req)
76	3B-1005	Knee Cover
77	4H-4001	Knee
78	4036	Socket Head Cap Screw (2 Req)
79	4034	Bevel Gear Cover
80	4020	Key
81	4H-4021	Elevating Screw Assembly
82	4023	Jam Nut
83	4019-1	Washer
84	4019	Bevel Gear
85	4022	Bevel Gear Spacer
86	4040	Bearing
87	4039	Bearing Retainer Ring
88	4041	Socket Head Cap Screw (3 Req)
89	4042	Socket Head Cap Screw
90	4017-1	Washer
91	4014	Bevel Gear
92	4014-1	Bevel Gear Spacer
93	4007	Bearing (2 Req)
94	4015	Key (2 Req)
95	4H-4017	Elevating Shaft
96	4006	Bearing Cap
97	2011	Bearing Retaining Ring
98	4011	Dial Holder
99	4009	Socket Head Cap Sacrew (3 Req)
100	4010	Dial with 100 Graduation
101	2016	Dial Lock Nut
102	4013	Gearshaft Clutch Insert
103	4002	Elevoting Crank
104	4004	Washer
105	4005	Socket Head Cap Screw
106	4003	Handle.



LEADSCREW ASSEMBLY

ITEM NO.	PARTS NO.	DESCRIPTION
1	2004	Jam Nut (3 Req.)
2	2004-1	Spring Washer (3 Req.)
3	H2018	Ball Crank Handle (3 Req.)
4	2016	Dial Lock Nut (3 Req.)
5	2012	Dial with 200 Graduations (3 Req.)
6	2014	Dial Holder (3 Req.)
7	2036	Socket Cap Screw (6 Req.)
8	2011	Bearing Retainer Ring (2 Req.)
9	2008	Grease Seal Ball Bearing 6204# (5 Req.)
10	2010	Washer (2 Req.)
11	2026	Socket Cap Screw (12 Req.)
12	2027	Roll Pin (8 Req.)
13	H3002	Cross Feed Screw for 13¾" Knee
14	2003	Key (3 Req.)
15	3005	Cross Feed Bearing Bracket
16	3005-1	Stop Screw (4 Req.)
17	3025-2	Socket Screw (4 Req.)
18	3025-3	Washer (4 Req.)
19	3020-2A	Cross Feed Nut
20	H3025	Feed Nut Bracket
21	3020-2B	Cross Feed Nut
22	3025-1	Flat Head Socket Screw (6 Req.)
23	3024	Socket Cap Screw (4 Req.)
24	2002	Longitudinal Feed Screw 50"
25	2006	Bearing Bracket (2 Req.)
26	3020-1A	Long Feed Nut
27	3020-1B	Long Feed Nut
28	5016-1	Plate (3 Req.)
29	5032	Round HD Drive Screw (6 Req.)
30	H2018-1	Ball Crank Handle Grip (3 Req.)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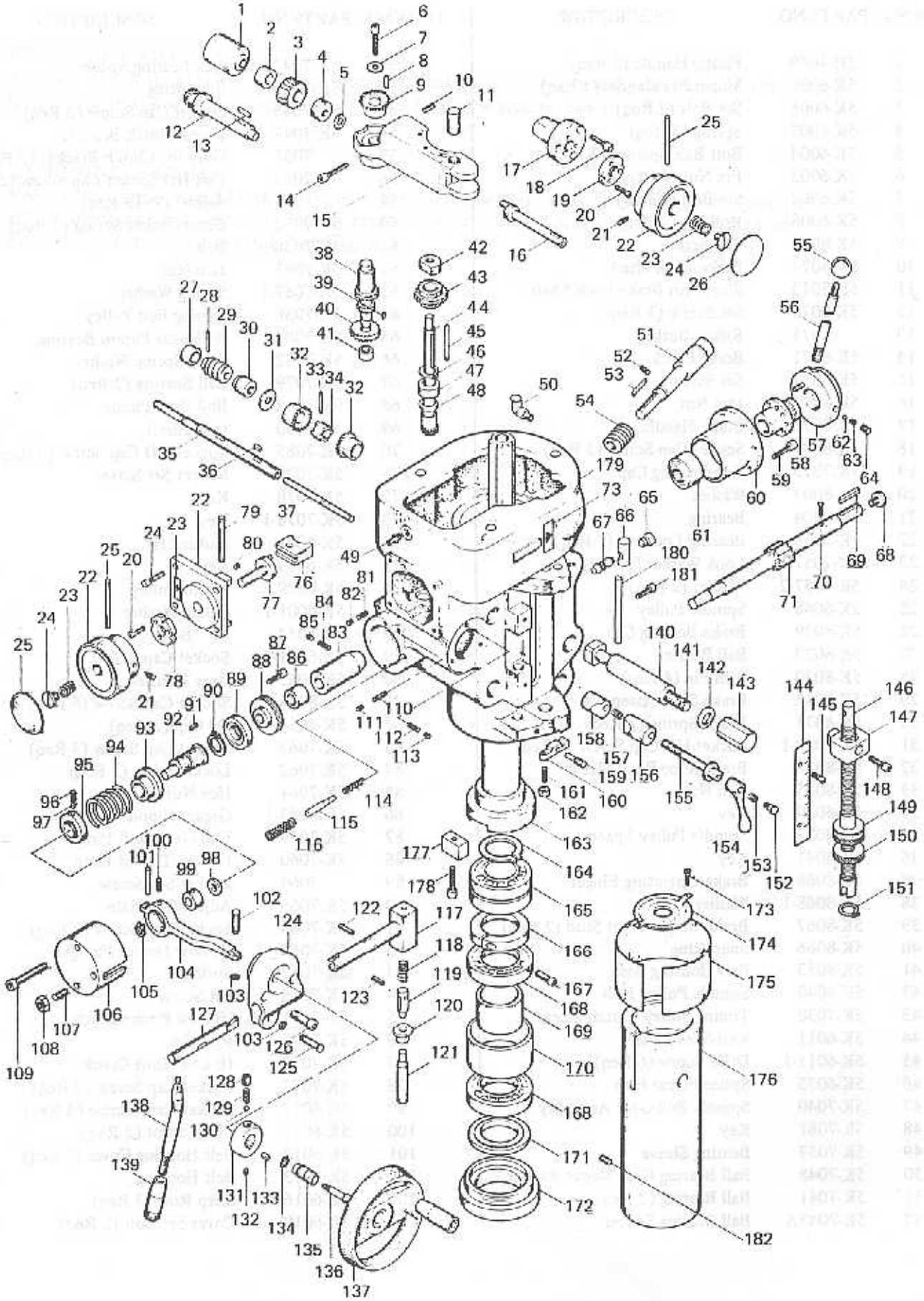
5K HEAD TOP HOUSING

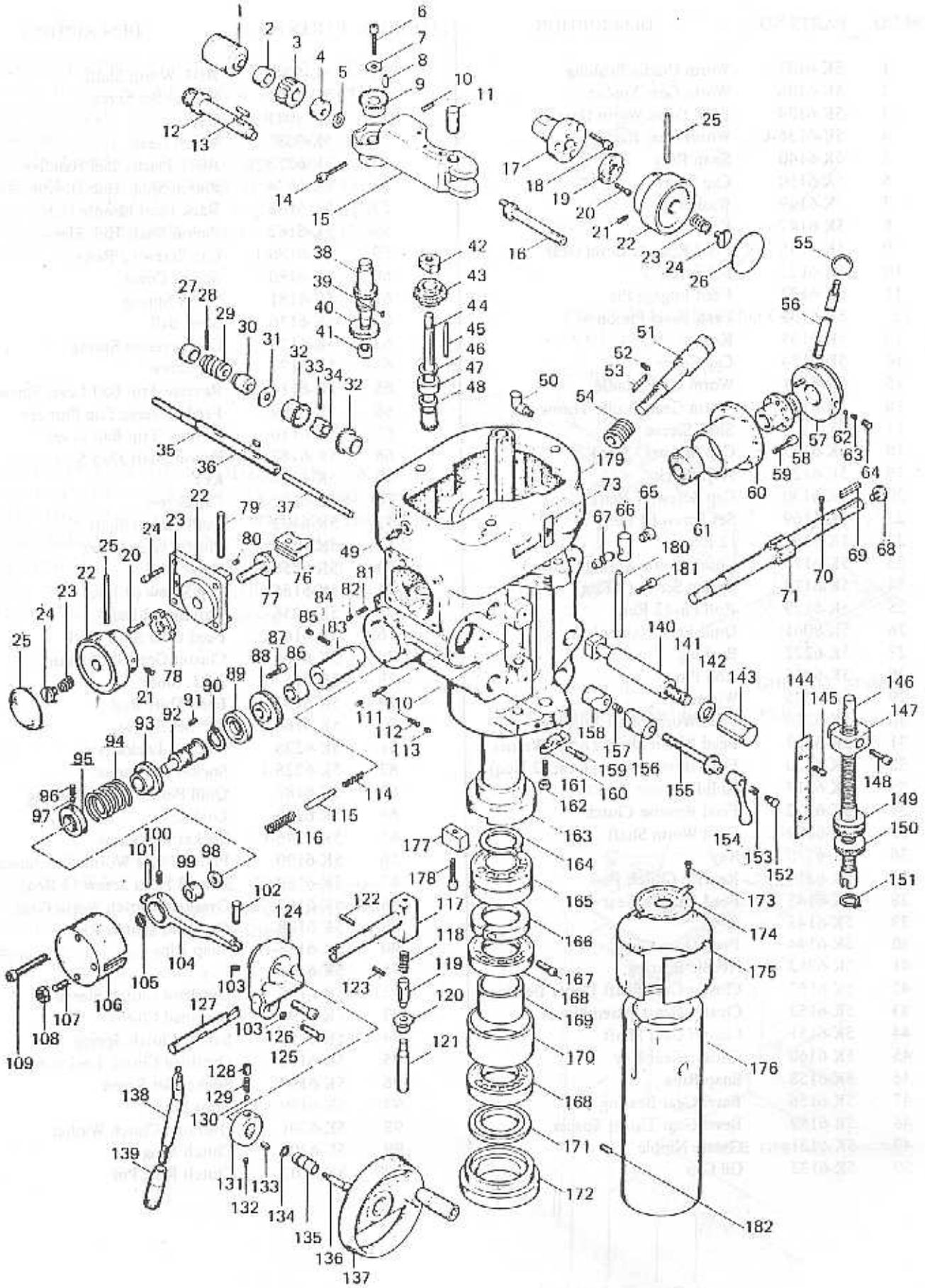
ITEM NO.	PARTS NO.	DESCRIPTION
1	3H-7069	Plastic Handle (5 Req)
2	5K-6006	Motor Fix Handle (3 Req)
3	5K-6005	Set Bolt (2 Req)
4	5K-6007	Spring (2 Req)
5	5K-6004	Bolt Box Spamer (2 Req)
6	5K-6003	Fix Nut (2 Req)
7	5K-6002	Set Bolt (2 Req)
8	5K-6008	Roll Pin (2 Req)
9	5K-8072	Cap Screw
10	5K-8074	Brake Lock Shaft
11	5K-8073	Sleeve for Brake Lock Shaft
12	5K-8076	Set Screw (3 Req)
13	8075	Rubbr Busing
14	5K-8071	Brake Block
15	5K-8077	Set Screw
16	5K-8070-1	Jam Nut
17	5K-8070	Brake Handle
18	5K-8001	Socket Cap Screw (3 Req)
19	5K-7013	Top Bearing Cap
20	5K-8003	Washer
21	5K-8004	Bearing
22	5K-7056	Bearing Locknut (2 Req)
23	5K-7057-1	Look Washer (2 Req)
24	5K-7057-2	Washer (2 Req)
25	5K-6048	Spindle Pulley
26	5K-8029	Brake Bearing Cap
27	5K-8023	Ball Bearing
28	5K-8030	Roll Pin (4 Req)
29	5K-8032	Brake Shoe Assembly
30	5K-8031	Brake Spring (2 Req)
31	5K-8029-1	Socket HD Cap Screw (5 Req)
32	5K-8036	Brake Shoe Pivot Sleeve
33	5K-8035	Jam Nut
34	5K-6039	Key
35	5K-8033	Spindle Pulley Spacer
36	5K-6041	Key
37	5K-8068-1	Brake Operating Finger
38	5K-8068-1	Washer
39	5K-8067	Brake Finger Pivot Stud (2 Req)
40	5K-8066	Snap Ring
41	5K-8053	Belt Housing Base
42	5K-6040	Spindle Pulley Hub
43	5K-7038	Timing Pulley Clutch Sleeve
44	5K-6011	Vari-Speed Dial
45	5K-6011-1	Drive Screw (6 Req)
46	5K-6075	Splined Gear Hub
47	5K-7040	Spindle Bull Gear Assembly
48	5K-7081	Key
49	5K-7057	Bearing Sleeve
50	5K-7048	Ball Bearing Gear Sleeve Washer
51	5K-7041	Ball Bearing (2 Req)
52	5K-7043A	Ball Bearing Spacer
53	5K-7043B	Ball Bearing Spacer
54	5K-7042	Snap Ring
55	5K-7045	Socket Cap Screw (6 Req)
56	5K-7049	Fixed Clutch Bracket
57	7051	Guib for Clutch Bracket (2 Req)
58	7052	Flat HD Socket Cap Screw (2 Req)
59	7055-1	Adjust Pin (3 Req)
60	5K-7055	Compression Spring (3 Req)
61	5K-7036	Belt
62	5K-7087	Jam Nut
63	5K-7087-1	Spring Washer
64	5K-7086	Timing Belt Pulley
65	5K-7084	Bull Gear Pinion Bearing
66	5K-7082	Wave Spring Washer
67	5K-7079	Ball Bearing (2 Req)
68	5K-7083	Bull Gear Pinion
69	5K-7080	Gear Shaft
70	5K-7085	Socket HD Cap Screw (3 Req)
71	5K-7077	Socket Set Screw
72	5K-7078	Key
73	5K-7078-1	Key
74	5K-6001	Motor 5HP
75	5K-6009-1	Key
76	5K-6009	Motor Pulley
77	5K-6001-1	Pulley Washer
78	5K-6034	"V" Belt
79	5K-6001-2	Socket Cap Screw
80	5K-8063	Gear Housing
81	5K-8064	Socket Cap Screw (6 Req)
82	5K-7054	Oil Cap (2 Req)
83	5K-7063	Socket Cap Screw (3 Req)
84	5K-7062	Lock Washer (3 Req)
85	5K-7061	Hex Nut (3 Req)
86	5K-8063-1	Grease Nipple
87	5K-7059	Bull Gear Shift Pinion
88	5K-7060	Hi-Low Detent Plate
89	7064	Socket Set Screw
90	5K-7065	Adjustable Plate
91	5K-7068	Socket Cap Screw (2 Req)
92	5K-7066	Hi-Low Detent Plunger
93	5K-7067	Spring
94	5K-7064	Set Screw
95	5K-7071	Hi-Low Pinion Block
96	5K-7072	Roll Pin
97	5K-7070	Hi-Low Shift Crank
98	5K-7072	Socket Cap Screw (2 Req)
99	5K-6017	Socket Cap Sacrew (4 Req)
100	5K-6015	Cover Strut (2 Req)
101	5K-6012	Belt Housing Cover (2 Req)
102	5K-6013	Belt Housing
103	5K-6016	Snap Ring (2 Req)
104	5K-6010	Cover Set Bolt (2 Req)



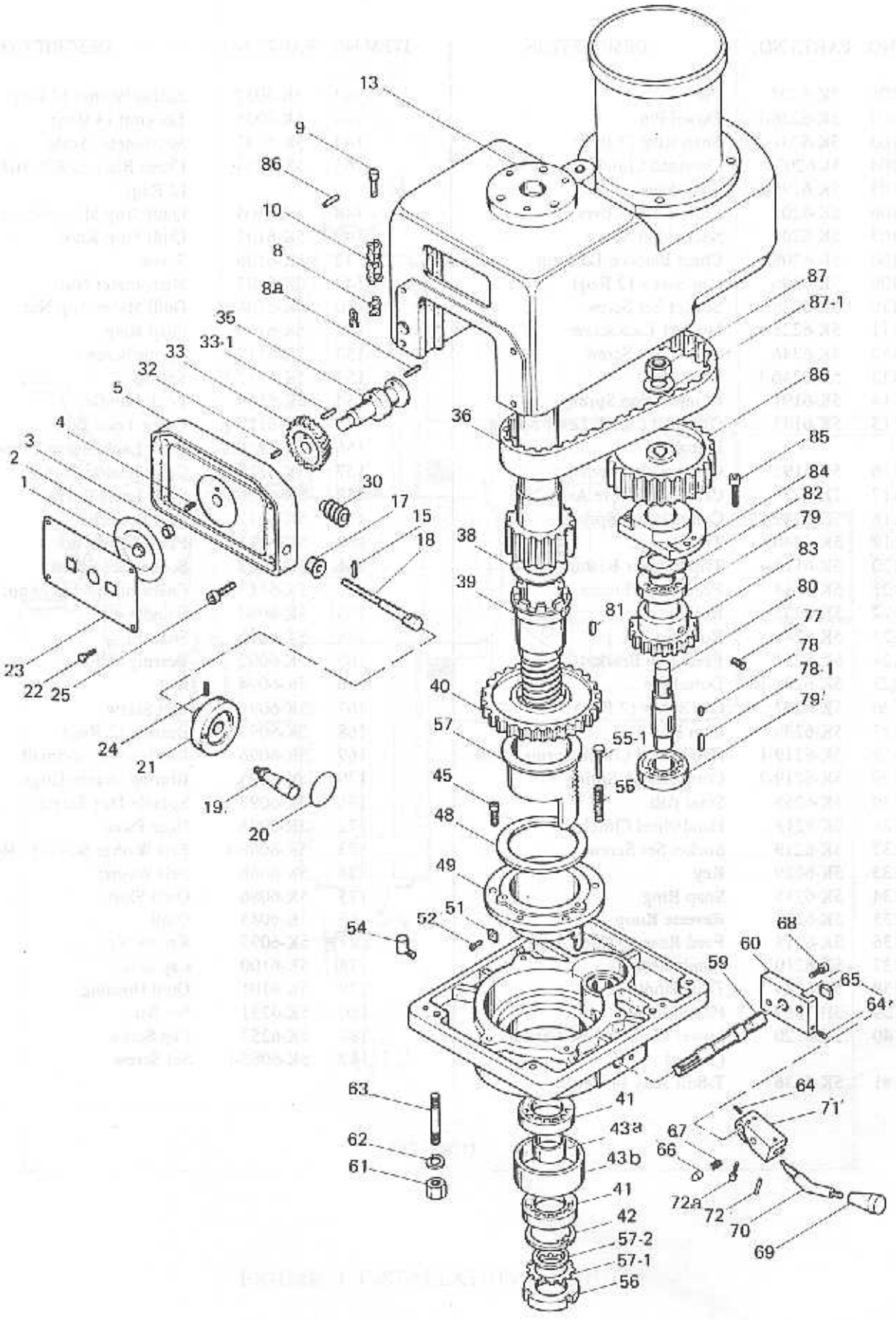
5K/5VK HEAD

ITEM NO.	PARTS NO.	DESCRIPTION
1	5K-6137	Worm Cradle Bushing
2	5K-6136	Worm Gear Spacer
3	5K-6134	Feed Drive Worm Gear
4	5K-6136-1	Worm Gear Bushing
5	5K-6140	Snap Ring
6	5K-6150	Cap Screw
7	5K-6149	Washer
8	5K-6147	Key
9	5K-6148	Feed Reverse Bevel Gear
10	5K-6123	Set Screw
11	5K-6122	Feed Engage Pin
12	5K-6139	Feed Bevel Pinion
13	5K-6135	Key
14	5K-6124	Cap Screw
15	5K-6121	Worm Gear Cradle
16	5K-6126	Worm Gear Cradle Throw-out
17	5K-6125	Shift Sleeve
18	5K-6132	Cap Screw (3 Req)
19	5K-6127	Adj. Block
20	5K-6130	Cap Screw (7 Req)
21	5K-6169	Set Screw (2 Req)
22	5K-6168	(2 Req)
23	5K-6170	Compression Spring (2 Req)
24	5K-6128	Spring Screw (2 Req)
25	5K-6129	Roll Pin (2 Req)
26	5K-8061	Quill Feed Namepleta
27	5K-6227	Bushing
28	5K-6226	Roll Pin
29	5K-6225	Worm
30	5K-6224	Feed Worm Shaft Bushing
31	5K-6223	Feed Worm Shaft Thrust Washer
32	5K-6220	Feed Reverse Bevel Gear (2 Req)
33	5K-6217	Roll Pin
34	5K-6222	Feed Reverse Clutch
35	5K-6209	Feed Worm Shaft
36	5K-6230	Key
37	5K-6216	Reverse Clutch Rod
38	5K-6143	Feed Driving Gear
39	5K-6145	Key
40	5K-6144	Feed Drive Gear
41	5K-6252	Needle Bearing
42	5K-6157	Cluster Gear Shaft Upper Bearing
43	5K-6153	Cluster Gears Assembly
44	5K-6151	Cluster Gear Shaft
45	5K-6160	Cluster Gear Key
46	5K-6158	Snap Ring
47	5K-6156	Bevel Gear Bearing
48	5K-6159	Bevel Gear Thrust Spacer
49	5K-6131	Grease Nipple
50	5K-6133	Oil Cap

ITEM NO.	PARTS NO.	DESCRIPTION
51	5K-5040	ADJ. Worm Shaft
52	5K-5042	Socket Set Screw
53	5K-5041	Key
54	5K-5039	Worm Gear
55	5K-6173	Black Plastic Ball Handles
56	5K-6174	Pinion Shaft Hub Handle
57	5K-6178	Rack Feed Handle Hub
58	5K-6182	Pinion Shaft Hub Sleeve
59	5K-6180-1	Cap Screw (2 Req)
60	5K-6180	Spring Cover
61	5K-6181	Clock Spring
62	5K-6176	Steel Ball
63	5K-6175	Compression Spring
64	5K-6177	Set Screw
65	5K-6114	Reverse Trip Ball Lever Screw
66	5K-6109	Feed Reverse Trip Plunger
67	5K-6110	Reverse Trip Ball Lever
68	5K-6183	Pinion Shaft Hub Screw
69	5K-6184	Key
70	5K-6172-1	Cap Screw
71	5K-6172	Quill Pinion Shaft
72	5K-6161	Cluster Gear Cover
73	5K-6256-1	Plate
74	5K-6165	Cap Screw (4 Req)
75	5K-6256	Vari-Speed Dial
76	5K-6162	Feed Gear Shift Fork
77	5K-6166	Cluster Gear Shift Crank
78	5K-6167	ADJ. Block
79	5K-6163	Feed Shift Rod
80	5K-6164	KP. Set Screw
81	5K-6228	Mock-it Lockscrew
82	5K-6228-1	Socket Set Screw
83	5K-6186	Quill Pinion Shaft Bushing
84	5K-6246	Lockscrew
85	5K-6246-1	Socket Set Screw
86	5K-6190	Pinion Shaft Worm Gear Spacer
87	5K-6189	Round Head Screw (3 Req)
88	5K-6187	Overload Clutch Worm Gear
89	5K-6188	Overload Clutch Ring
90	5K-6188-1	Snap Ring
91	5K-6196	Key
92	5K-6195	Overload Clutch Sleeve
93	5K-6194	Overload Clutch
94	5K-6197	Safety Clutch Spring
95	5K-6198	Overload Clutch Locknut
96	5K-6199	Socket Set Screw
97	5K-6199-1	Brass Plug
98	5K-6201	Overload Clutch Washer
99	5K-6200	Clutch Ring
100	5K-6202	Clutch Ring Pin



ITEM NO.	PARTS NO.	DESCRIPTION
101	5K-6204	Pin
102	5K-6236-1	Dowel Pin
103	5K-6231-2	Snap Ring (2 Req)
104	5k-6203	Overload Clutch Trip Lever
105	5K-6195-1	Snap Ring
106	5K-6205	Clutch Arm Cover
107	5K-6207	Socket Set Screw
108	5K-6208	Chem Blacked Locknut
109	5K-6206	Cap Screw (2 Req)
110	5K-6228	Socket Set Screw
111	5K-6228-1	Mock-it Lockscrew
112	5K-6246	Socket Set Screw
113	5K-6246-1	Lockscrew
114	5K-6191	Compression Spring
115	5K-6193	Overload Clutch Lever Spring Plunger
116	5K-6192	Compression Spring
117	5K-6236	Cam Rod Sleeve Assy
118	5K-6242	Compression Spring
119	5K-6240	Trip Plunger
120	5K-6118-1	Trip Plunger Bushing
121	5K-6118	Feed Trip Plunger
122	5K-6237	Roll Pin
123	5K-6241	Roll Rin
124	5K-6231	Feed Trip Bracket
125	5K-6231-1	Dowel Pin
126	5K-6232	Cap Screw (2 Req)
127	5K-6239	Cam Rod
128	5K-6219-1	Handwheel Clutch Spring Screw
129	5K-6219-2	Compression Spring
130	5K-6255	Steel Ball
131	5K-6218	Handwheel Clutch
132	5K-6219	Socket Set Screw
133	5K-6229	Key
134	5K-6215	Snap Ring
135	5K-6213	Reverse Knop
136	5K-6214	Feed Reverse Knob Stud
137	5K-6210	Handwheel
138	5K-6234	Trip Handle
139	3H-7069	Plastic Handle
140	5K-6120	Lower Clamping Bolt Spacer (2 Req)
141	5K-5036	T-Bolt Assy (4 Req)
142	5K-5037	Spring Washer (4 Req)
143	5K-5038	Locknut (4 Req)
144	5K-6243	Micrometer Scale
145	5K-6244	Chem Blacked RD. HD. Screws (2 Req)
146	5K-6104	Quill Stop Micro-Screw
147	5K-6105	Quill Stop Knob
148	5K-6106	Screw
149	5K-6107	Micrometer Nut
150	5K-6108	Quill Micro-stop Nut
151	5K-6115	Snap Ring
152	5K-6117-2	Spring Screw
153	5K-6117-1	Spring
154	5K-6119	Lock Handle
155	5K-6117	Quick Lock Bolt
156	5K-6116A	Quill Lock Sleeve Tapped
157	5K-6116-1	Compression Spring
158	5K-6116B	Quill Lock Sleeve
159	5K-6112	Trip Lever Pin
160	5K-6111	Feed Trip Lever
161	5K-6113	Socket Set Screw
162	5K-6113-1	Chem Blacked Locknut
163	5K-6084	Spindle 40*
164	5K-6090	Snap Ring
165	5K-6092	Bearing (2 Req)
166	5K-6094	Nut
167	5K-6094-1	Cap Screw
168	5K-6093	Bearing (2 Req)
169	5K-6096	Bearing Spacer-Small
170	5K-6095	Bearing Spacer-Large
171	5K-6097	Spindle Dirt Shield
172	5K-6098	Nose-Piece
173	5K-6088-1	Felt Washer Screw (2 Req)
174	5K-6088	Felt Washer
175	5K-6086	Quill Skirt
176	5K-6085	Quill
177	5K-6099	Keeper Key
178	5K-6100	Cap Screw
179	5K-6101	Quill Housing
180	5K-6251	Set Bar
181	5K-6253	Cap Screw
182	5K-6085-1	Set Screw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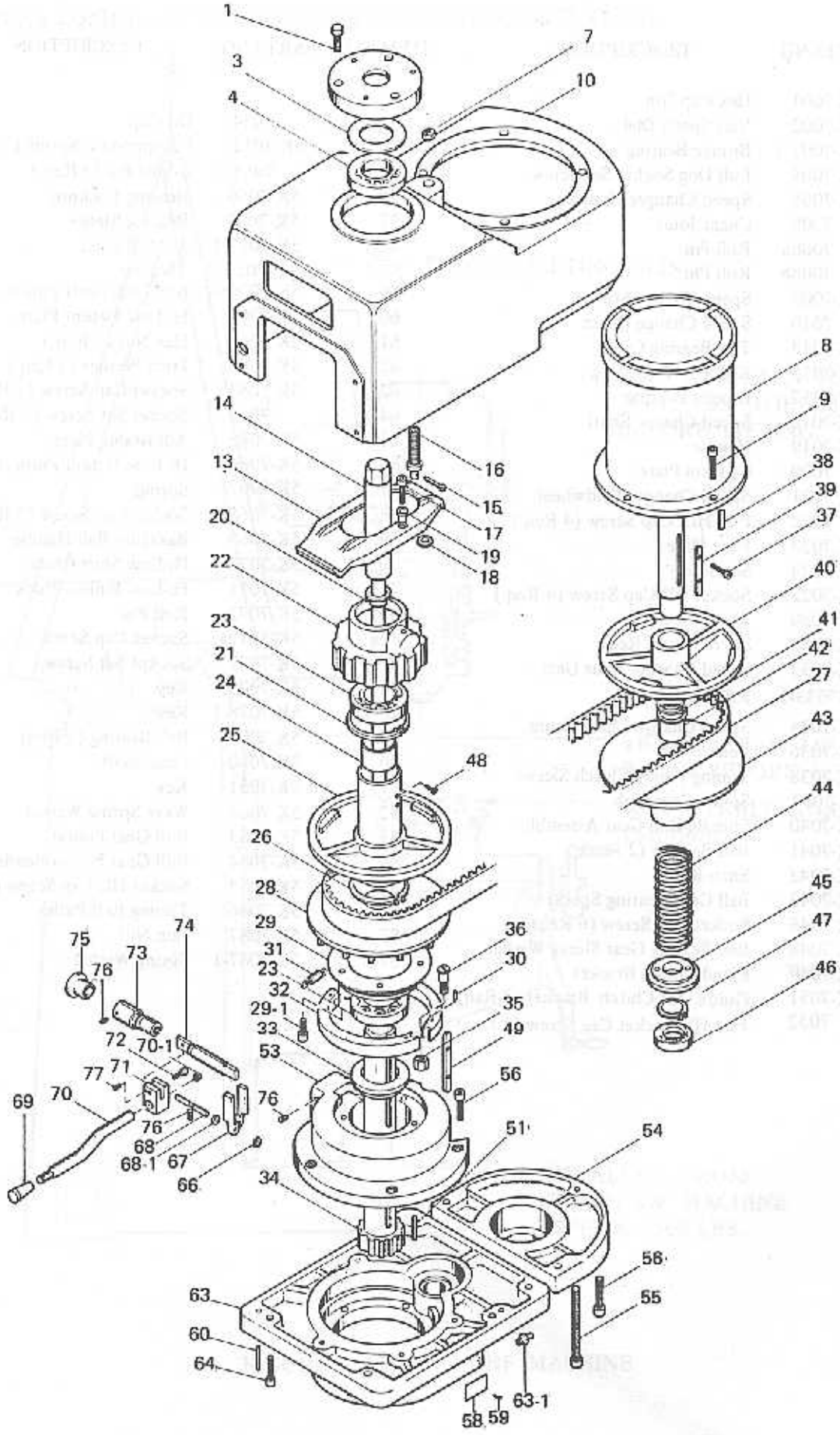
5 BVK VARI-SPEED HEAD TOP HOUSING

ITEM NO.	PARTS NO.	DESCRIPTION
1	5K-7001	Hex Cap Nut
2	5K-7002	Vari-Speed Dial
3	5K-7001-1	Bronze Bearing
4	5K-7004	Full Dog Socket Set Screw
5	5K-7005	Speed Changer Housing
8	7008	Chani Joint
8a	7008a	Roll Pin
8b	7008b	Roll Pin
9	5K-7009	Speed Change Stud
10	7010	Speed Change Chain
13	5K-7013	Top Bearing Cap
15	5K-7015	Roll Pin
17	5K-7017	Bronze Bearing
18	5K-7018	Speed Change Shaft
19	5K-7019	Handle
20	7020	Caution Plate
21	5K-7021	Speed Change Handwheel
22	7022	Flat HD. Cap Screw (4 Req.)
23	5K-7023	Face Plate
24	5K-7024	Set Screw
25	5K-7025	Socket HD Cap Screw (4 Req.)
30	5K-7030	Worm Gear
32	5K-7032	Set Screw (2 Req)
33	5K-7033	Speed Changer Spur Gear
33-1	5K7033-1	Roll Pin
35	5K-7035	Speed Change Chain Drum
36	5K-7036	Belt
38	5K-7038	Timing Pulley Clutch Sleeve
39	5k-7039	Spline Gear Hub
40	5K-7040	Spindle Bull Gear Assembly
41	5K-7041	Ball Bearing (2 Req)
42	5K-7042	Snap Ring
43	5K-7043	Ball Gear Bearing Spacer
45	5K-7045	Socket Cap Screw (6 Req)
48	5K-7048	Ball Bearing Gear Sleeve Washer
49	5K-7049	Fixed Clutch Bracket
51	5K-7051	Guide for Clutch Bracket (2 Req)
52	7052	Flat HD Socket Cap Screw (2 Req)

ITEM NO.	PARTS NO.	DESCRIPTION
54	7054	Oil Cup
55	5K-7055	Compression Spring (3 Req.)
55-1	7055-1	Adjust Pin (3 Req.)
56	5K-7056	Bearing Locknut
57	5K-7057	Bearing Sleeve
57-1	5K-7057-1	Lock Washer
57-2	5K-7057-2	Washer
59	5K-7059	Bull Gear Shift Pinion
60	5K-7060	Hi-Low Detent Plate
61	5K-7061	Hex Nut (3 Req.)
62	5K-7062	Lock Washer (3 Req.)
63	5K-7063	Socket Cap Screw (3 Req.)
64	7064	Socket Set Screw (2 Req.)
65	5K-7065	Adjustable Plate
66	5K-7066	Hi-Low Detent Plunger
67	5K-7067	Spring
68	5K-7068	Socket Cap Screw (2 Req)
69	5K-7069	Baketlite Ball Handle
70	5K-7070	Hi-Low Shift Crank
71	5K-7071	Hi-Low Pinion Block
72	5K-7072	Roll Pin
72a	5K-7072a	Socket Cap Screw
77	5K-7077	Sockpt Set Screw
78	5K-7078	Key
78-1	5K-7078-1	Key
79	5K-7079	Ball Bearing (2 Req)
80	5K-7080	Gear Shaft
81	5K-7081	Key
82	5K-7082	Wave Spring Washer
83	5K-7083	Bull Gear Pinion
84	5K-7084	Bull Gear Pinion Bearing
85	5K-7085	Socket HD Cap Screw (2 Req)
86	5K-7086	Timing Belt Pulley
87	5K-7087	Jam Nut
87-1	5K-7087-1	Spring Washer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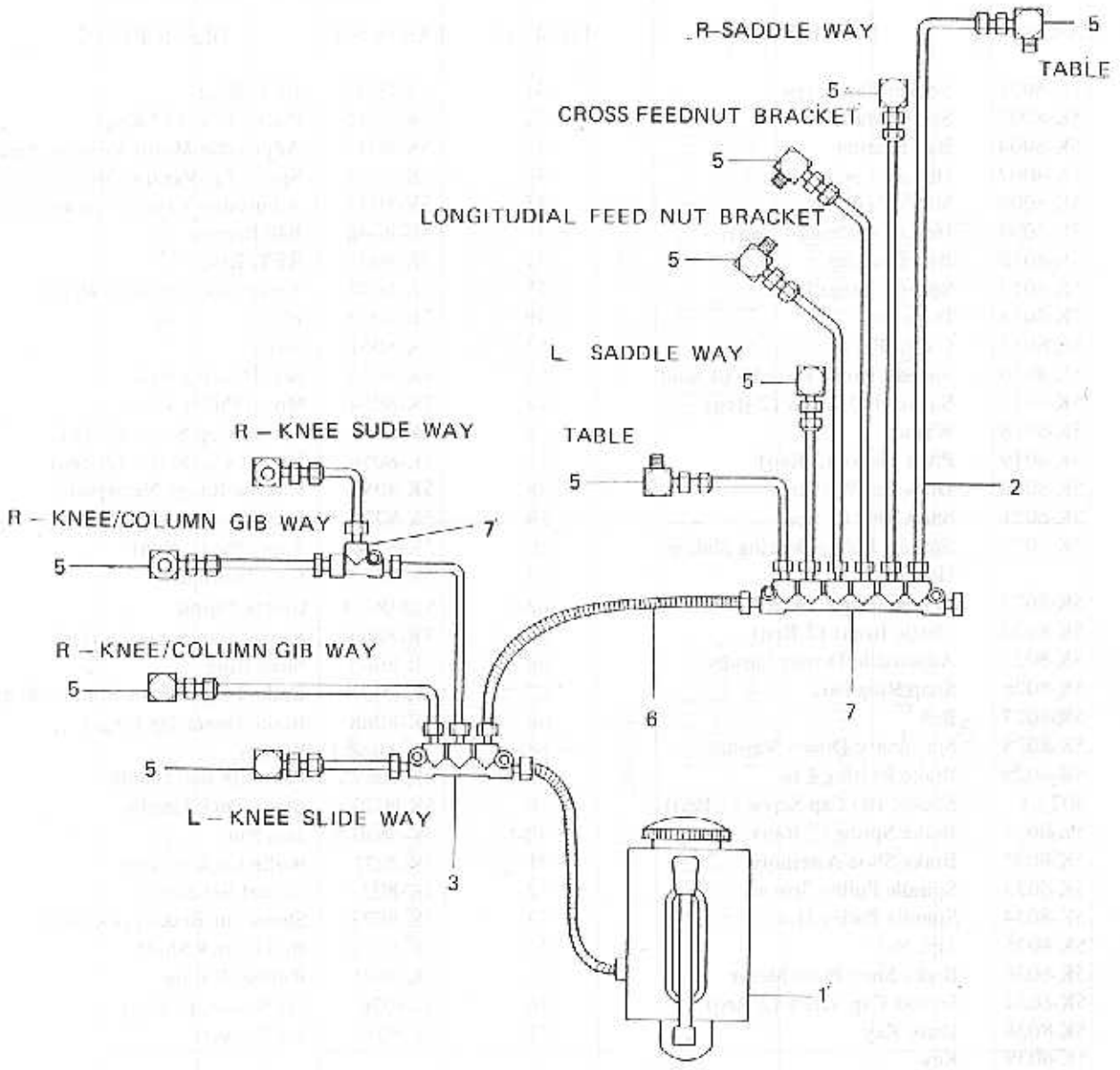
5 BVK VARI-SPEED HEAD 'BACK GEAR

ITEM NO.	PARTS NO.	DESCRIPTION
1	5K-8001	Socket Cap Screw
3	5K-8003	Spring Washer
4	5K-8004	Ball Bearing
7	5K-8007	Hex Jam Nut
8	5K-8008	Motor 5HP
9	5K-8009	Hex HD Screw (4 Req)
10	5K-8010	Belt Housing
13	5K-8013	Speed Change Plate
14	5K-8014	Drawbar
15	5K-8015	Cotter Pin
16	5K-8016	Speed Change Plate Pivot Stud
17	5K-8017	Socket HD Screw (2 Req)
18	5K-8018	Washer
19	5K-8019	Pivot Sleeve (2 Req)
20	5K-8020	Draw Bar Washer
21	5K-8021	Snap Ring (2 Req)
22	5K-8022	Spindle Pulley Bearing Sliding Housing
23	5K-8023	Ball Bearing (2 Req)
24	5K-8024	Plastic Insert (2 Req)
25	5K-8025	Adjustable-Driven Varidisc
26	5K-8026	Snap Ring No.
27	5K-8027	Belt
28	5K-8028	Stationary Driven Varidisc
29	5K-8029	Brake Bearing Cap
29-1	8029-1	Socket HD Cap Screw (5 Req)
31	5K-8031	Brake Spring (2 Req)
32	5K-8032	Brake Shoe Assembly
33	5K-8033	Spindle Pulley Spacer
34	5K-8034	Spindle Pulley Hub
35	5K-8035	Jam Nut
36	5K-8036	Brake Shoe Pivot Sleeve
37	5K-8037	Socket Cap Screw (2 Req)
38	5K-8038	Drive Key
39	5K-8039	Key
40	5K-8040	Stationary Motor Varidisc
41	5K-8041	RET. Ring
42	5K-8042	Plastic Insert (2 Req)
43	5K-8043	Adjustable Motor Varidisc Assembly
44	5K-8044	Spring for Varidisc Motor Shaft
45	5K-8045	Adjustable Varidisc Spring Collar
46	5K-8046	Ball Bearing
47	5K-8047	RET. Ring
48	5K-8048	Socket Cap Screw (2 Req)
49	5K-8049	Key
51	5K-8051	Key
53	5K-8053	Belt Housing Base
54	5K-8054	Motor Pulley Cover
55	5K-8055	Socket Cap Screw (2 Req)
56	5K-8056	Socket Cap Screw (2 Req)
58	5K-8058	Hi-Low Range Nameplate
59	5K-8059	Drive Screw (2 Req)
60	5K-8060	Taper Pin (2 Req)
63	5K-8063	Gear Housing
63-1	5K8063-1	Grease Nipple
64	5K-8064	Socket Cap Screw (6 Req)
66	5K-8066	Snap Ring
67	5K-8067	Brake Finger Pivot Stud (2 Req)
68	5K-8068	Brake Operating Finger
68-1	5K-8068-1	Washer
69	3H-7069	Baketlite Ball Handle
70	5K-8070	Brake Lock Handle
70-1	5K-8070-1	Jam Nut
71	5K-8071	Brake Lock Handle
72	5K-8072	Socket Set Screw
73	5K-8073	Sleeve for Brake Lock Shaft
74	5K-8074	Brake Lock Shaft
75	5K-8075	Ruhber Busing
76	5K8076	Set Scower (3 Req)
77	5K-8077	Set Scower

CENTRAL LUBRICATING OIL-FEEDING EQUIPMENT



ITEMNO	PARTSNO	DESCRIPTION
1	9001	HAND OILER
2	9002	ALUMINUM PIDE
3	9003	JOINT
4	9004	JOINT
5	9005	ELOBOW JOINT
6	9006	OIL REGULATING DISTRIBUTOR
7	9007	JOINT