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MAINTENANCE MANUAL and PARTS CATALOG

NO. 3352A

1-22 MASTERMIL

This Is A Maintenance Manual And Parts Catalog Only.
For Operating Instructions Refer To Manual No. **3353**.

This Manual Contains Maintenance Instructions And The
Parts List For The Gorton Model **1-22** Mastermil.



The machine to which this manual applies has been carefully assembled, inspected and test-run under maximum load at the Gorton factory. It is in satisfactory operating condition. Routine operations and adjustments are explained herein, but the manufacturer will not be held responsible for satisfactory operation if unauthorized modifications, alterations or major repairs are attempted without specific instructions from the factory. One of these manuals is furnished with each machine. Additional copies may be purchased direct from the Gorton Machine Corporation at \$5.00 each.

The right is reserved to improve, change, modify or discontinue any Gorton machine, attachment or accessory without obligation to make such improvement, change or modification on equipment previously sold or on order.

Patent Notice: The machines and attachments to which these instructions apply are protected by issued and pending United States and foreign patents.

GORTON MACHINE CORPORATION

SUBSIDIARY OF KEARNEY & TRECKER CORPORATION

RACINE WISCONSIN 53403 U S A

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The GORTON MACHINE CORPORATION warrants that the equipment which it supplies will fulfill the specifications contained in the contract of sale. If either the workmanship or material is not as agreed, such defect shall be remedied by Gorton. No allowance will be made for any expense incurred by the purchaser in repairing defective parts or in supplying any missing parts, except on Gorton's written consent. The warranty on all components purchased by Gorton from other vendors shall be in accordance with the warranty given by such vendor. Gorton shall not be liable for any loss of profits or any other consequential damages whatsoever arising from any breach of warranty, delays in shipment, or from any other cause(s) whatsoever. No other warranty shall be implied, or attach by operation of law. This warranty is limited to twelve (12) months after date of shipment from Gorton's plant (six (6) months if used on a two shift operation), and is void if the original equipment has been altered. This warranty is limited to the first purchaser and is not transferable.

GORTON MACHINE CORPORATION
RACINE, WISCONSIN, U. S. A.

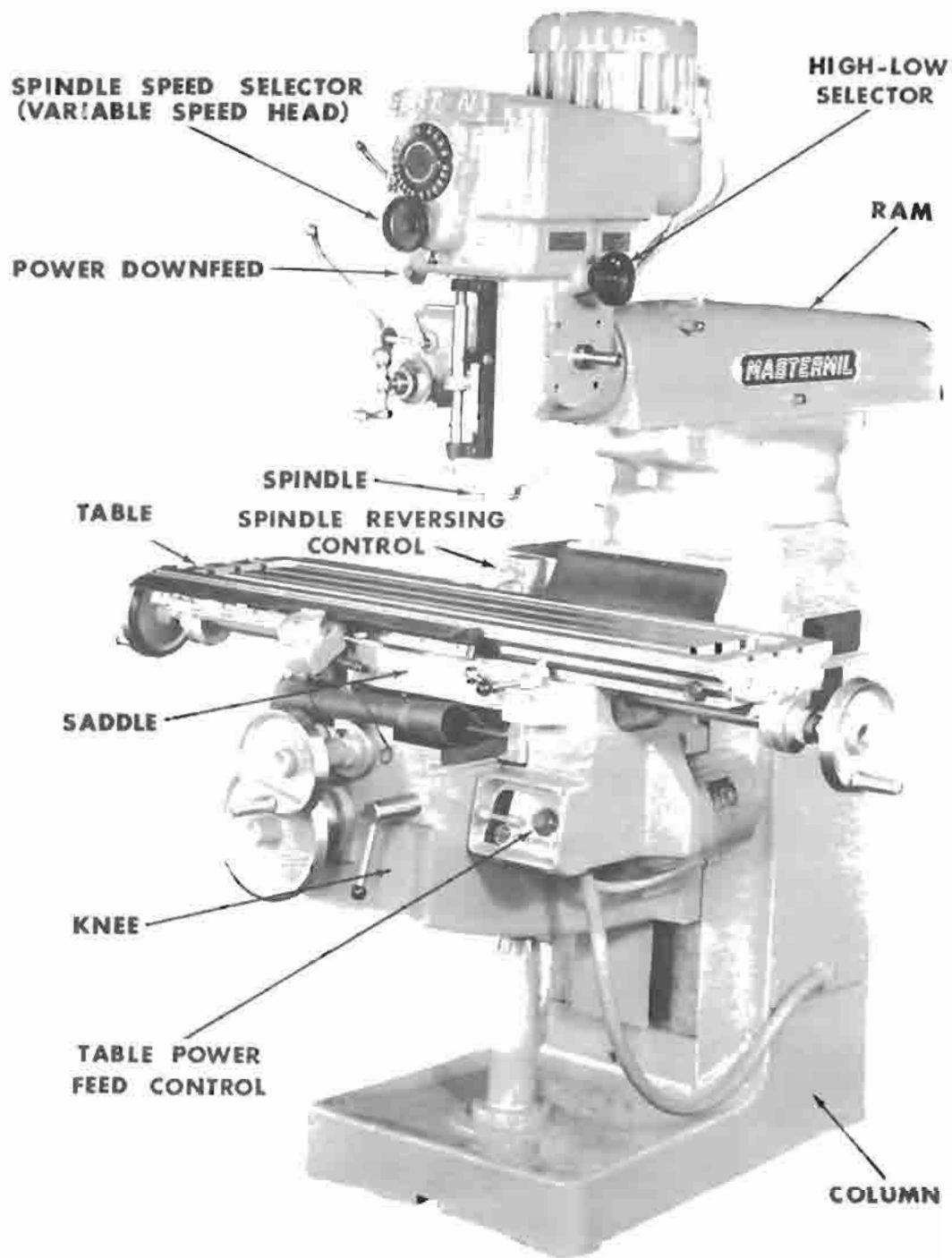
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Gorton Model 1-22 Mastermil

PRELIMINARY OPERATIONS

1. UNCRATING

Remove crating with care so that machine and parts are not marred, scratched or damaged. Examine carefully for evidence of shipping damage. Report at once to transportation company and to Gorton representative any evidence of such damage. Check shipment carefully against itemized packing list for possible shortages.

2. FOUNDATION

Before moving the machine be sure the location has a solid footing and is level as possible. Have steel shims ready for leveling. steel shims should be used because softer metals are not stable enough to maintain level of the machine. Use vibration pads under all four corners of the machine.

The machine does not have to be bolted to the floor.

3. MOVING THE MACHINE (See figure 1)

This machine is easily moved by shop hoist or crane. Be sure that ram is in operating position and that ram is securely held by ram clamping nuts. Position the table with its center directly below the spindle and place table clamping lever in clamp position.

Insert lifting hook into the eye bolt on top of ram and carefully move machine to desired location. If machine does not lift evenly, change the cross position of table.

DO NOT USE CHAINS UNDER TABLE OR RAM. This could damage the bearing surfaces causing misalignment.

The machine can also be moved by using a lift truck as shown in figure 1. Use wood spacers between the forks and bearing surfaces to prevent damage.

CAUTION

Make sure that ram is securely clamped to turret with front and rear ram clamping bolts (figure 1). Place lifting hook in eye bolt on top of ram and move machine to its permanent location.

4. CLEANING

Do not operate any moving part of this machine until it is thoroughly clean and has been given a coating of oil. Remove shipping grease with clean oilum spirits, or other grease solvent. Use lintless rags, not cotton waste. Never use an air hose. When machine is clean, give it a light coat of a good grade clean machine oil to prevent rust spots and other corrosion. For lubrication see LUBRICATION page 41.

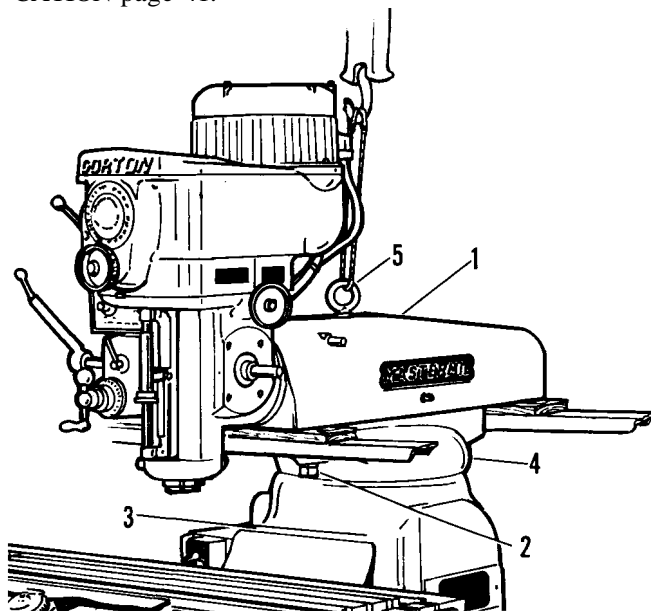


Figure 1. Moving The Machine

- | | |
|------------------|-----------------|
| 1. Ram | 4. Clamping Nut |
| 2. Clamping Nut | 5. Lifting Hook |
| 3. Serial Number | |

5. LEVELING

After machine has been installed and cleaned, it must be carefully leveled. Make sure it is at room temperature before beginning to level. Use a sensitive, graduated spirit level (10 seconds per graduation) for best results. Level machine by placing spirit level first lengthwise, then crosswise on the table, and change the position of the table several times during the process. Remember that this machine must be re-leveled from time to time due to floor settlement.

ELECTRICAL

6. HOOK-UP PROCEDURE

This machine and control equipment have been wired, phased, inspected and test run in our factory to insure correct performance in the customer's plant.

If machine was shipped with spindle motor dismantled, the motor must first be mounted and connected. To connect spindle motor, open motor terminal box cover and match color coded "tattle tail" lead wires of the motor to the same color wire of the power supply line. In some cases, wires are marked with letters and numbers. If motor leads are accidentally disarranged, consult motor specification plate for proper lead wire connection.

Proceed to connect the power input line to the test leads marked L1, L2 and L3 on the terminal strip in the control cabinet. Make certain the correct voltage and phase is used.

7. MOTOR ROTATION

Place spindle reversing switch at "FORWARD" position and check spindle motor operating direction. The rotation direction of a standard machine is clockwise, when looking down at the spindle.

CAUTION

If spindle has correct rotation, all other power feed controls will be directional. If power feed controls are directional, but spindle rotation is incorrect, CHANGE LEADS TO SPINDLE MOTOR.

If it rotates counter-clockwise, reverse the power leads to the cabinet. All other motors which require counter-clockwise operation will be so marked with an arrow on the motor end bell.

Maximum efficiency requires full power. Check input voltage while machine is running and while all other electrical equipment on the same line is operating. The input voltage to the machine must be within plus or minus 8% of the voltage marked on the electrical cabinet nameplate to insure proper operation of controls.

8. POWER FEED (DYNA-DRIVE, OPTIONAL)

Power feed to the table and spindle downfeed are supplied by D. C. shunt wound motors. If the direction of rotation does not conform with the setting of the downfeed toggle switch or the longitudinal direction engagement lever, the armature leads must be reversed at the corresponding motor.

9. POWER ELEVATE (OPTIONAL)

The power elevate motor is a 3-phase induction motor operated by a drum-type reversing switch located in Dyna Drive II control panel at the front of the saddle. If the direction of movement controlled by the switch is wrong, correct by changing power supply leads on the motor.

10. DIAGRAMS

One of each of the following will be found in the pocket on the inner wall of the control cabinet door: elementary connection diagram, panel layout diagram, sequence of operations and feed motor instructions. Location of fuses, hook-up of actuators and controls is provided. This data should remain with the machine at all times for efficient service and maintenance.

11. D. C. POWER SUPPLY

The spindle downfeed and table feed power supply provides the means of operating D. C. drive motors from an A. C. line. The function of the D. C.

control panel, located in the main electrical cabinet, is to supply power to the armature and fields on the two D. C. feed motors. The armature voltage is controlled so that the motor speed may be varied from minimum to maximum rating. Maximum horsepower is delivered at maximum speed. At speeds below maximum, the torque is constant and the horsepower is directly proportional to the set running speed.

The complete power drive system consists of the following units: (1) the power supply, (2) the D. C. drive motors and (3) the operator control potentiometers. The power supply is mounted in a vertical position within the cabinet for proper ventilation of the heat sink. The power supply contains the circuits for converting A. C. single phase to D. C. to control the feed motors. The motor field is supplied with a half-wave rectified D. C. voltage. Variable armature voltage (controlled from operator's potentiometer control) is supplied from a half-wave silicon control rectifier circuit.

12. D. C. OPERATIONAL CHECK

The system should be placed in operation as follows:

1. Set table and spindle feed rate selectors (potentiometers) to their zero "click off" positions,
2. Close line disconnect switch on machine electrical control cabinet.
3. Advance the table feed rate selector to .6.
4. Engage the table direction selector. The table should move at a low feed rate.
5. Advance feed rate control to maximum and note that table feed rate increases smoothly.
6. Return table feed rate selector to the zero "click off" position.
7. Engage the spindle downfeed clutch lever and operating lever on the downfeed gear box (turn depth stop down to low position).

8. Advance the downfeed rate selector to .5.
9. Engage the downfeed direction selector (toggle switch). The quill should move at a low feed rate.
10. Advance feed rate control to maximum and note that downfeed rate increases smoothly.
11. At conclusion of tests, declutch levers and return downfeed rate selector to the zero "click off" position.

13. POTENTIOMETER CONTROLS

The table feed and spindle downfeed potentiometer controls (I. P. M. selectors) are connected in parallel. WHEN NOT IN USE, BOTH SHOULD BE TURNED OFF (spindle downfeed in "click-off"). When either table feed or spindle downfeed control is engaged, the remaining control is automatically disconnected through an electrical interlock relay.

14. GENERAL

If it is necessary to disconnect any motor, actuator or control, it is advisable to tag or mark the lead wires.

If for any reason the drawings have been misplaced, consult the nameplate on the control cabinet for EE and EP drawing numbers.

Reserve fuses for D. C. power supply are shipped with the machine. Only fuses of the same specification are to be used in the corresponding component. DO NOT USE SUBSTITUTE FUSES.

All electrical components are standard. In case of component fatigue or breakdown, the replacement should be of the same model and manufacture.

COLUMN

15. SERIAL NUMBER LOCATION (figure 1)

The serial number of each machine is located on the front of the column just above the left way. When ordering parts and when writing to the factory always include the serial number of the machine.

16. FLOOD COOLANT

The flood coolant system is a gusher type of package unit in which the reservoir, motor and pump are located in the back, lower part of the column. The coolant tank has a capacity of 2-1/2 gallons. The motor and pump are integral and must be replaced as a unit. Rotation of the pump is counter-clockwise (looking down from top), and is indicated by an arrow on the pump housing.

The coolant return line is connected to the left table bracket and runs through the left side of the column into the reservoir. The outlet line has a flexible, nozzle and shutoff valve.

A screen is provided in the table to remove chips and other foreign material from the coolant. However, we suggest that periodically the reservoir be removed and inspected for foreign material. If any is present it should be removed to prevent damage to the coolant pump.

Fill reservoir to level mark before starting pump.

Before stopping the pump, set the shutoff on the nozzle to the OFF position so the "prime" will not be lost. To keep the return line open, remove and clean the screen on the left end of the table and the return line.

The spindle motor and coolant pump are electrically interlocked.

17. SPRAY MIST COOLANT

The spray mist coolant system is air operated and is mounted on the rear of the column. A 1/4 inch pipe tap on the left side of the unit connects to a shop air line and pressure should not exceed 125 lbs. Air and coolant lines connect to the right side of the unit. The nozzle has a magnetic holder for efficient positioning relative to the cutter, and a thumbscrew needle control on the nozzle is used to control the amount of coolant in the spray. When the thumbscrew is closed, only air comes out of the nozzle.

A slotted screw, under the acorn nut on the top left of the unit, can be turned to regulate outgoing air pressure. A gage is supplied for visually checking this pressure.

The filler cap on the top, right of the unit, should not be removed while the unit is activated. The unit is activated by electrical interlock between the spindle motor and the solenoid on top of the spray mist unit. Coolant flow will start or stop with spindle motor control. Air flow will continue with coolant off.

A sight gage on the front of the unit provides a visual means of checking coolant level when filling the unit, and directly below the sight gage is the drain plug.

Water soluble oils are used in this unit and the mixture should be to manufacturer's specification and consistency to insure non rust and non clogging conditions. Multi nozzle manifold blocks are available so more than one nozzle can be used for greater cutting efficiency.

KNEE - ADJUSTMENT

18. TAPERED GIB (figure 2)

Adjust the tapered gib as follows:

1. Remove the right wiper (4).
2. Back off the bottom gib screw (2) and take up the same amount on top gib screw (1).
3. When the tapered gib is properly adjusted the knee will move down of its own weight. This can be checked by raising the knee with the handwheel, clamping the knee, and rotating the handwheel counter-clockwise to take up any backlash in the elevate train. By releasing the clamp the knee should drop and not hang".

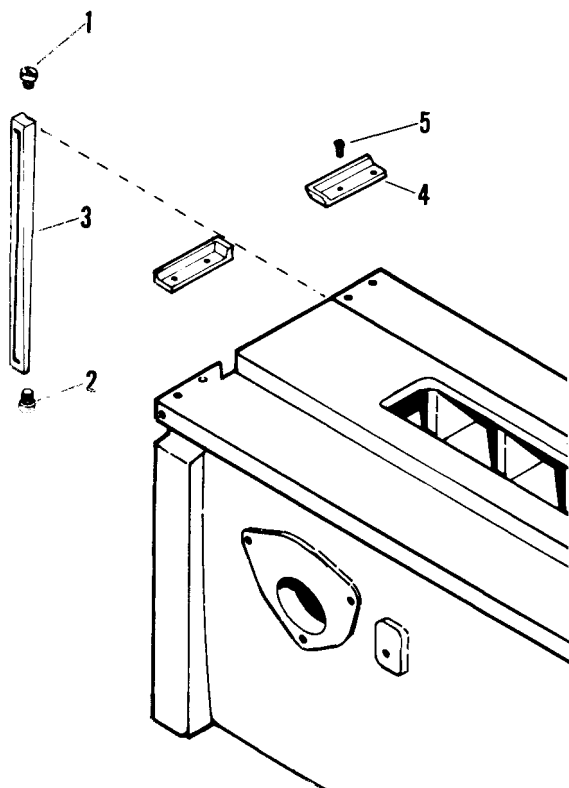


Figure 2. Knee Gib

- | | |
|---------------------|----------------|
| 1. Top Gib screw | 4. Right Wiper |
| 2. Bottom Gib Screw | 5. Wiper Screw |
| 3. Tapered Gib | |

19. VERTICAL TRAVEL MICROSWITCH, POWER ELEVATE (figure 3).

This microswitch (1) stops the knee at its limits of travel when power operated. The limit stops (2) are fixed and cannot be adjusted. If the limit stops are reached the power elevate stops.

To check operation of the microswitch, turn the elevate handwheel to move the knee up and down. Listen for the relay dropout and the click of the microswitch as it reaches the limit stops. Approximately four complete turns of the handwheel, after you hear the click, should move the knee to its top or bottom limits.

It is necessary to manually operate the knee until the switch roller (3) moves off the stop and the power elevate assist is re-activated.

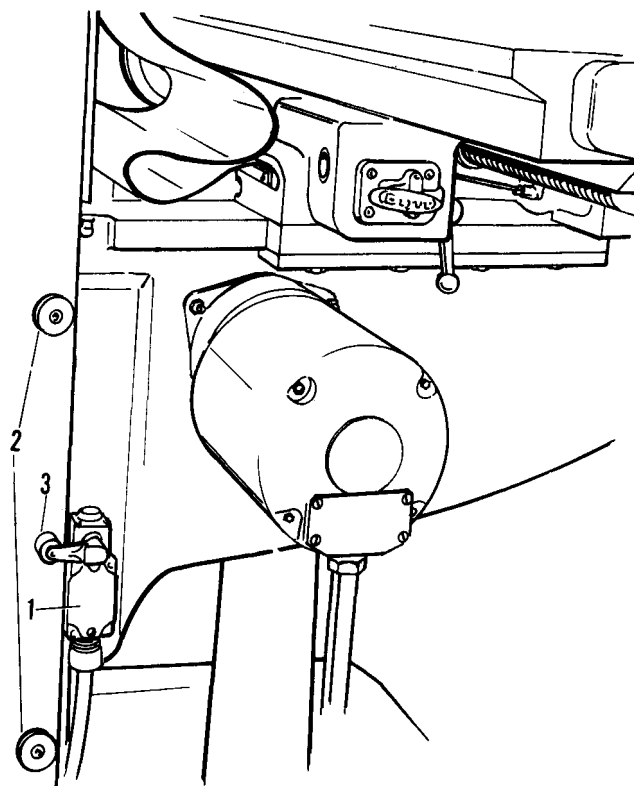


Figure 3. Left Side Of Knee

1. Vertical Travel Microswitch
2. Limit Stops
3. Switch Roller

20. ANTI-BACKLASH NUT (CROSS, 12" KNEE)
(figure 4).

To eliminate backlash between the cross feed screw and nut for climb milling, the anti-backlash nut should be adjusted as follows:

1. Move the saddle as far as possible to the rear of the machine, and lift up the front apron (1).
2. Loosen the two socket head screws (2) holding the adjustable nut (3).
3. To eliminate backlash, rotate the adjustable nut counterclockwise (as you face it).
4. If nut is too tight (no backlash) rotate it clockwise.
5. Retighten the two socket head screws (2) and drop the apron back into position.

NOTE

The 10" cross feed knee has a single fixed nut, so no backlash adjustment is possible.

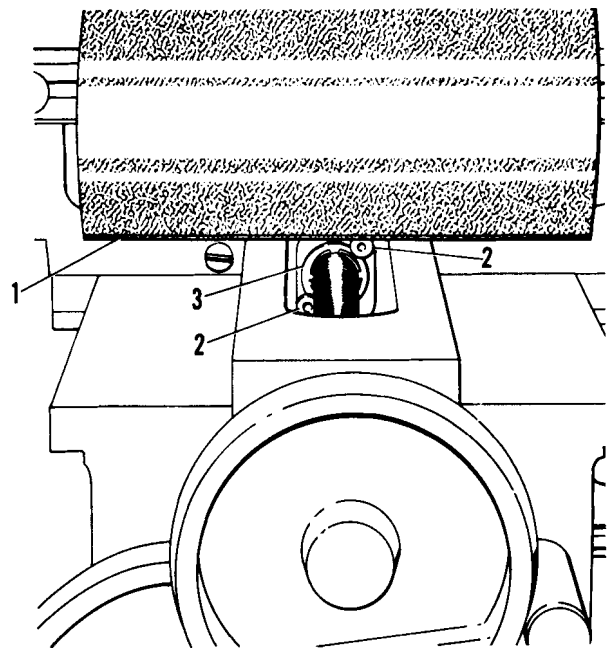


Figure 4. Adjusting Anti-Backlash Nut-Cross 12" Knee

1. Front Apron
2. Socket Head Screws
3. Adjustable Nut

KNEE - REMOVING AND REPLACING PARTS

21. CROSS FEED SCREW NUTS AND BEARINGS
(figure 5)

Remove the cross feed screw, nuts and bearings as follows:

1. Move the saddle to its forward position.
2. Take out the roll pin (1) and pull off the handwheel (2).
3. Unscrew the thumb screw (3) and remove the micrometer dial (4).
4. Remove the three capscrews (5) and take off the bearing plate (6).
5. Replace the handwheel (2) and the roll pin (1) holding the handwheel to the shaft.
6. Turn the handwheel until the cross feed screw (7) backs out of the cross feed nut.
7. Remove the roll pin (1) and again take off the handwheel (2), so the other parts can be removed.

8. Remove the bearing locknut (17) and take out the ball bearings (9) and two spacers (10 and 11).
9. Take out the two capscrews (12) and remove the front adjustable nut (13).
10. Lightly tap the rear stationary nut (14) to remove it.

NOTE

The 10" knee does not have an adjustable nut. To remove the stationary nut, move the saddle forward. Remove the locknut (15) and tap out the stationary nut (16).

11. Reassemble the parts in reverse order. Be sure the dog point in the setscrew mates with the slot in the stationary nut. It may be necessary to rotate the adjustable nut so that the screw passes through the nuts without binding.

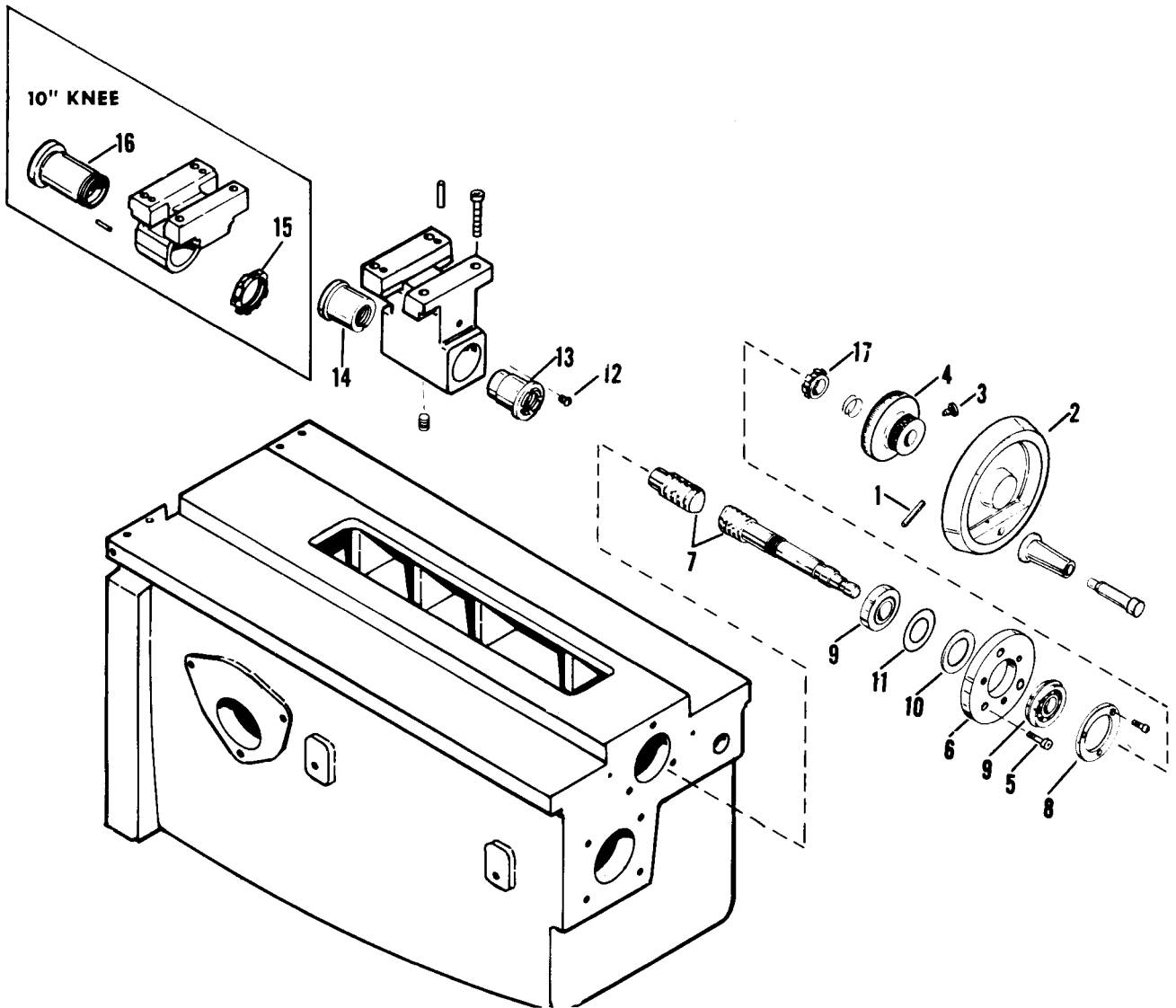


Figure 5. Removing Cross Feed Screw Nuts And Bearings

- | | |
|---------------------|--------------------------|
| 1. Roll Pin | 11. Spacer |
| 2. Handwheel | 12. Spacer |
| 3. Thumb Screw | 13. Adjustable Nut |
| 4. Micrometer Dial | 14. Stationary Nut |
| 5. Capscrews | 15. Locknut |
| 6. Bearing Plate | 16. Stationary Nut |
| 7. Cross Feed Screw | 17. Bearing Locknut |
| 8. Bearing Locknut | NOTE: Items 12 to 15 are |
| 9. Ball Bearing | in saddle. |
| 10. Spacer | |

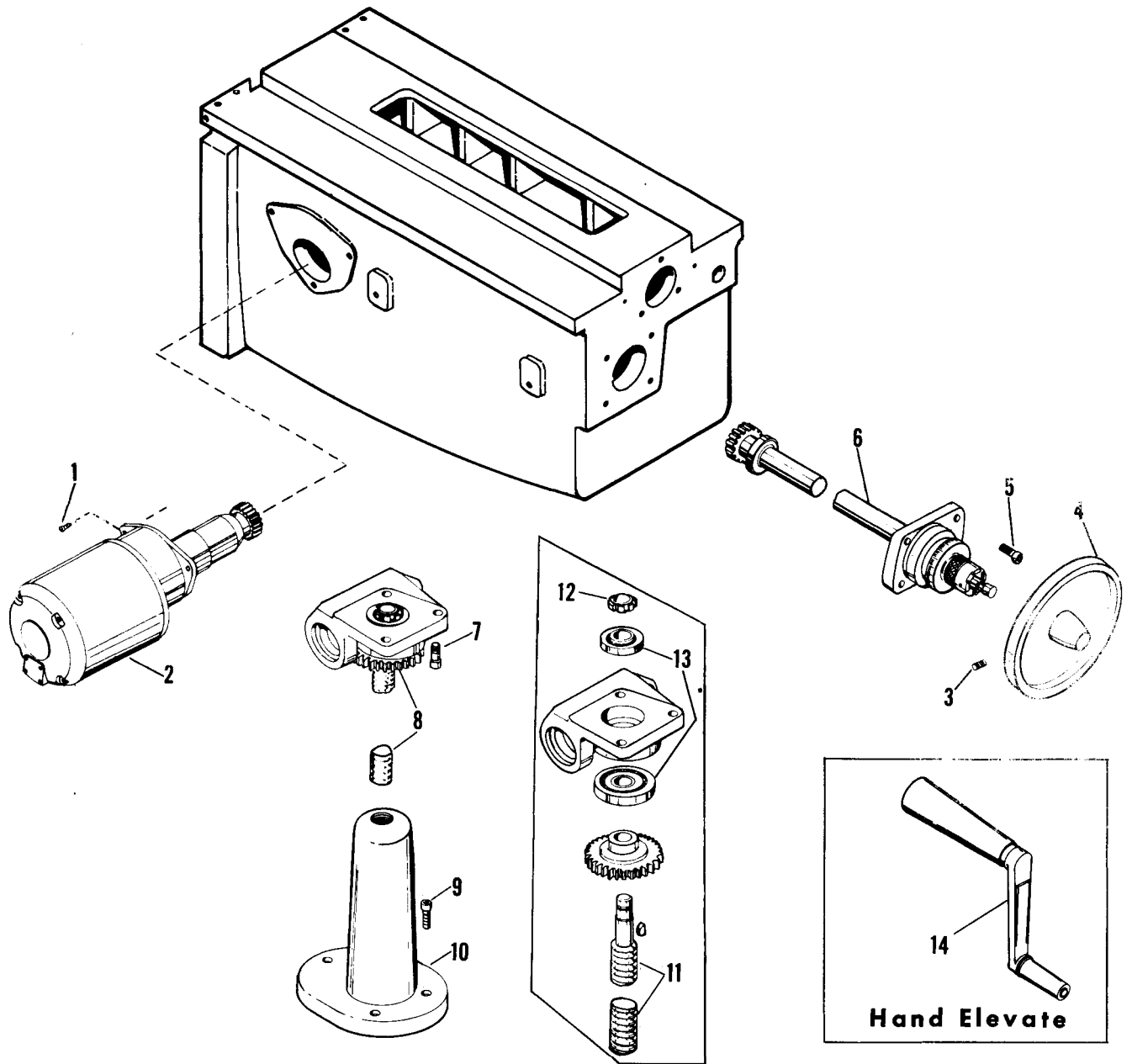


Figure 6. Elevate Feed Screw Nut And Bearing, Power and Manual Elevate

- | | |
|----------------------------|----------------------------------|
| 1. Capscrews | 8. Elevate Gear Bracket Assembly |
| 2. Power Elevate Assembly | 9. Screws |
| 3. Setscrew | 10. Elevate Nut |
| 4. Handwheel-Power | 11. Elevate Screw |
| 5. Capscrews | 12. Locknut |
| 6. Manual Elevate Assembly | 13. Roller Bearings |
| 7. Screws | 14. Hand Crank Manual |

22. ELEVATE FEED SCREW, NUT AND BEARINGS POWER ELEVATE (figure 6)

Remove the elevate feed screw, nut and bearings as follows:

1. Elevate knee to uppermost position, using a 4 x 4 or car jack, block up knee so it cannot move downward.
2. Take out the three screws (1) holding the power elevate assembly and slide out the complete power elevate assembly (2).
3. Loosen the setscrew (3) in the cross feed handwheel and remove the handwheel (4).
4. Remove the cross feed handwheel, see step 2, paragraph 21.
5. Take out the three capscrews (5) holding the manual elevate assembly (6) and remove the complete assembly.
6. Remove the three screws (7) holding the elevate gear bracket assembly (8) in knee. These screws can be reached through access hole in bottom of knee.
7. Remove the two screws (9) and rotate the elevate screw (11), clockwise, looking down from the top, until the elevate gear bracket, elevate screw and nut can be removed.
8. Unscrew the elevate nut (10) from the elevate screw (11).

9. Remove the locknut (12) and remove the elevate screw (11) from the gear and bearing assembly.

10. Access holes are provided so the two tapered roller bearings (13) can be tapped out.

11. Reassemble in reverse order of disassembly. Do not tighten the three screws holding the gear bracket until the power elevate motor and manual elevate assembly are in assembled position. Use extreme care when attaching the elevate nut to be sure vertical alignment of feed screw to column ways is maintained so no binding occurs.

23. ELEVATE FEEDSCREW, NUT AND BEARINGS MANUAL ELEVATE (figure 6)

1. Elevate knee to uppermost position, using a 4 x 4 or car jack, block up knee so it cannot move downward.
2. Remove the elevate hand crank (14).
3. Follow procedure outlined in steps 5 through 10 in paragraph 22.
4. Reassemble in reverse order of disassembly. Use extreme care when attaching the elevate support to be sure vertical alignment of feed screw to column ways is maintained so no binding occurs.

SADDLE-ADJUSTMENTS

24. FLAT GIBS (figure 7)

To adjust the flat gibs, they must be removed from the machine. Do so as follows:

1. Turn off all electric power to the machine.
2. Remove the two capscrews (1 and 2) and the cover (3).

NOTE

The next step will allow removal of the complete Dyna Drive II assembly from the saddle. Be sure to support this assembly before proceeding.

3. Remove capscrew (4), capscrew (5) and two capscrews (6) and lift off the complete Dyna Drive II assembly (7).
4. Remove the eight capscrews (8) holding the guide plates (9) and guide plate spacers (10) on each side of the saddle, and remove the plates and spacers.
5. Take a micrometer measurement of the two knee ways (11).
6. Machine the two spacers to the dimension of the knee ways $+0.001$ inch for oil space.
7. Reassemble, being sure that left and right gibs are in correct location.

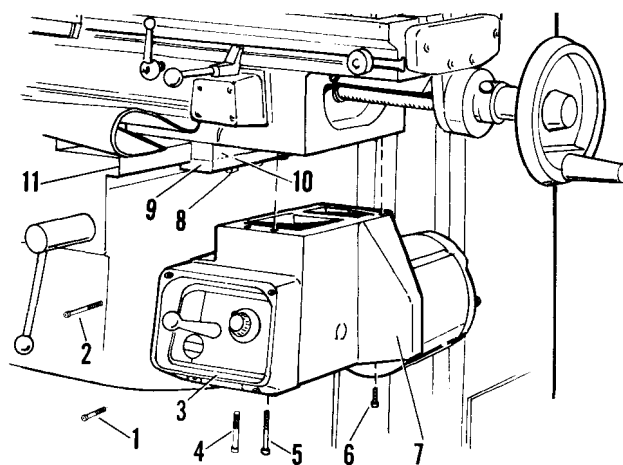


Figure 7. Adjusting Flat Gibs

- | | |
|---------------------------|-------------------------|
| 1. Capscrews | 8. Capscrews |
| 2. Capscrews | 9. Guide Plates |
| 3. Cover | 10. Guide Plate Spacers |
| 4. Capscrew | 11. Knee Ways |
| 5. Capscrew | 12. Pipe Plug |
| 6. Capscrew | 13. Clamp Handle |
| 7. Dyna Drive II Assembly | |

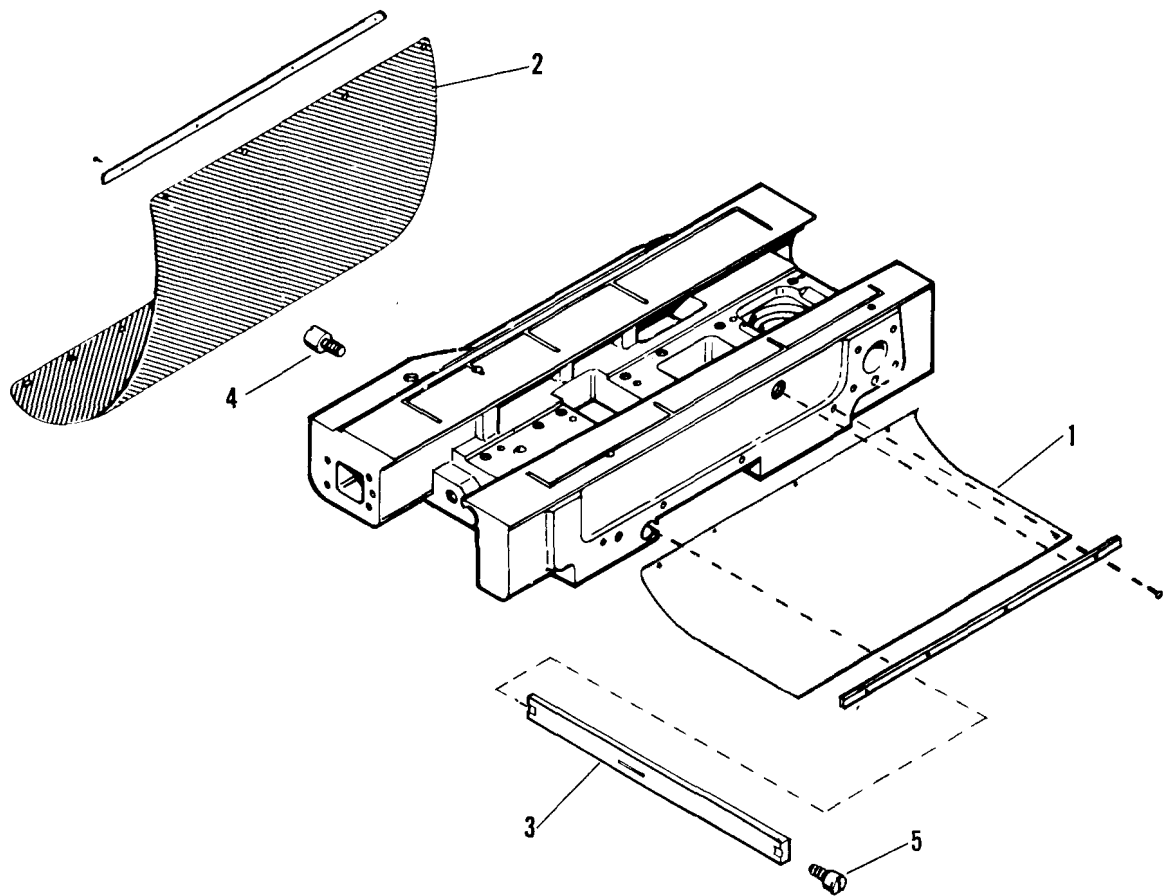


Figure 8. Adjusting Tapered Gib

- | | |
|----------------|--------------------|
| 1. Front Apron | 4. Rear Gib Screw |
| 2. Rear Apron | 5. Front Gib Screw |
| 3. Tapered Gib | |

25. TAPERED GIB (figure 8)

Adjust the tapered gib as follows

1. The tapered gib is on the left side of the narrow guide of the knee. Lift up the front and rear aprons (1 and 2) to gain access to the gib screws.

2. Back off the rear gib screw (4) and take up on the front gib screw (5) the same number of turns.

NOTE

Any time a gib is removed the clamp for that particular slide should be held in extreme "off" position by using rubber band, string, etc. This will prevent the gib clamping rod from moving into the space normally occupied by gib. If this should happen, it is very difficult to re-position the clamping rod so gib can be inserted.

26. SADDLE AND QUILL GIB CLAMPS (figures 11 and 14).

If the saddle and quill gib clamp handles are misused, they will eventually become inoperative and will not be usable. If this occurs they can be adjusted as follows:

1. Back off the pipe plug in the clamp screw shaft.
2. Move the clamp handle to desired position and retighten the pipe plug.

27. BIJUR ONE SHOT SYSTEM

The Bijur lubrication pump (5, figure 11) located on the left side of the saddle, is operating properly when the handle returns slowly after it is pulled back. If the handle snaps back, the ball check is stuck open and oil is returned to the reservoir instead of going to the lubrication fittings.

If pump is not operating properly, remove it and immerse it in solvent. Operate the plunger until the plunger operates slowly instead of snapping back to the closed position. Reinstall the pump and check its operation.

1. Setscrew
2. Handwheel
3. Roll Pin
4. Handwheel
5. Roll Pin
6. Clutch
7. Thumbscrew
8. Micrometer Dial
9. Spring
10. Snap Ring
11. Left End Radial Bearing
12. Left End Table Bracket
13. Capscrews
14. Left Adjustable Stop
15. Capscrews
16. Capscrews
17. Fixed Nut
18. Adapter
19. Adjustable Nut
17. Adjustable Nut
18. Adapter
19. Fixed Nut
20. Feed Screw
21. Thrust Bearing
22. Thrust Bearing
23. Bearing Thrust Plate
24. Capscrew
25. Bearing Locknut
26. Spring
27. Micrometer Dial
28. Thumbscrew
29. Handwheel
30. Setscrew

NOTE: Items 16 to 19 are in saddle.

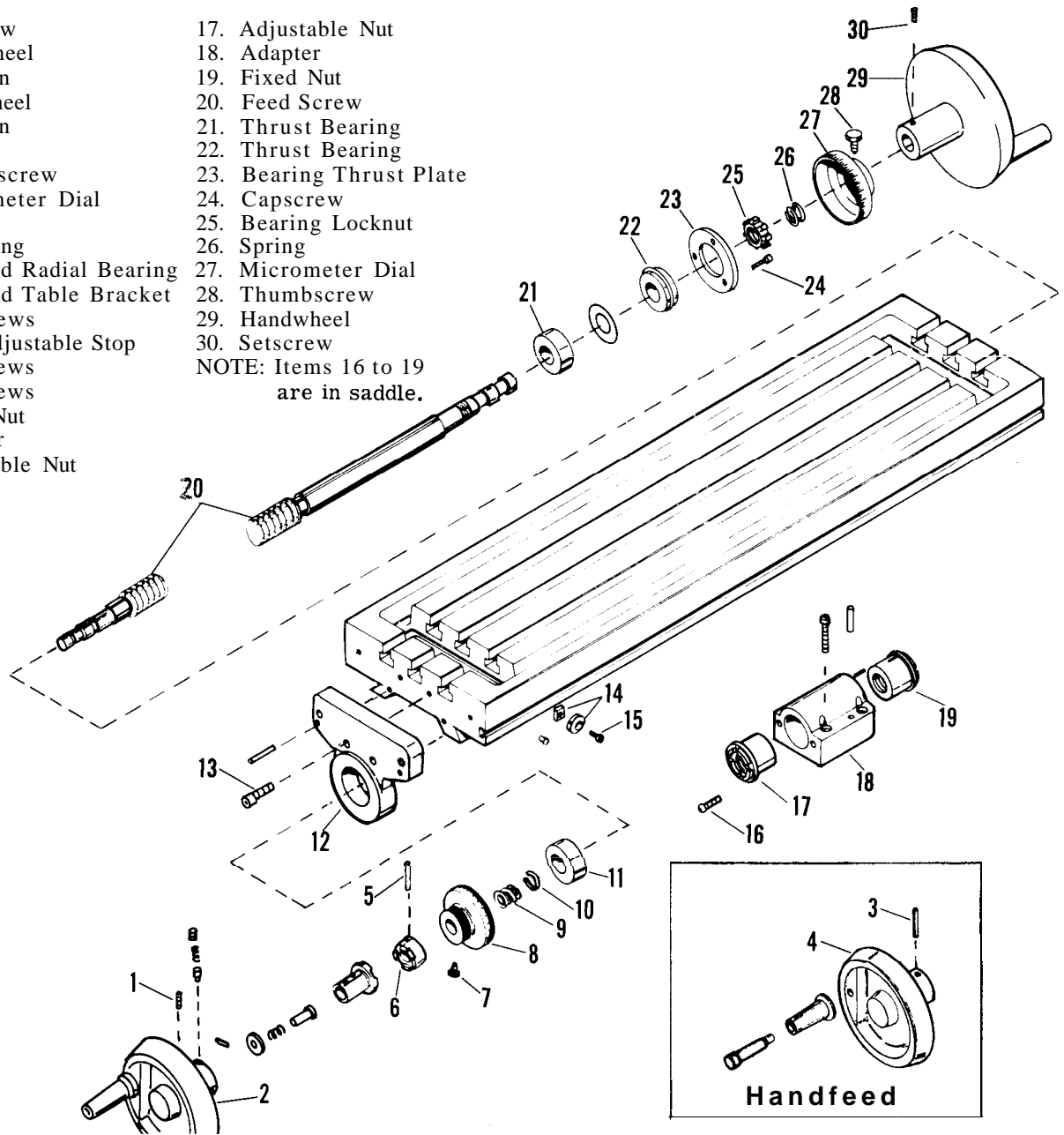


Figure 9. Longitudinal Feed Screw, Bearings and Saddle Nuts

SADDLE - REMOVING AND REPLACING PARTS

28. LONGITUDINAL FEED SCREW, BEARINGS AND SADDLE NUTS--POWER FEED (figure 9)

Remove the longitudinal feed screw, bearings and saddle nuts as follows:

1. Loosen the setscrew (1) in the left handwheel (2) and remove the handwheel.

NOTE

On handfeed machines, remove the roll pin (3) and take off the handwheel (4).

2. Drive out the roll pin (5) and remove the clutch (6).
3. Loosen the thumbscrew (7) and take off the micrometer dial (8).
4. Remove the spring (9), and take off the snap ring (10).
5. Loosen the setscrew (30) in the right handwheel (29) and remove the handwheel.
6. Loosen the thumbscrew (28) and remove the micrometer dial (27) and spring (26).
7. Remove the three capscrews (24) and the thrust plate (23).
8. Replace the right handwheel on the feed screw and lock it in position with the setscrew (27).
9. Unscrew the bearing locknut (25).

10. Rotate the feed screw (20) to remove it and the thrust bearings (21 and 22) from the right side of the machine. Remove the bearings from the feed screw.

NOTE

We recommend replacement of the longitudinal feed screw and both adjustable and fixed nuts as a unit, rather than replacing separate parts,

11. When reassembling these parts be sure the clutch is turned so the key is at the bottom.

12. The left end radial bearing (11) can now be removed from the left table end bracket (12).

13. To remove the saddle nuts proceed as follows: (figure 9).

A. Take out the four capscrews (13) and remove the left table end bracket (12).

B. Remove the left adjustable stop (14) by taking out the capscrew (15). This will allow the table to be moved to the right to expose the fixed (19) and adjustable (17) nuts.

NOTE

It is good practise to support the right end of table so excessive overhang will not disturb the ways.

C. Remove the adjustable nut (17) by taking out the two capscrews (16) and sliding adjustable nut out of the adapter (18).

D. Remove fixed nut (19) from opposite end of adapter.

E. Reassemble parts in reverse order of disassembly.

NOTE

When installing the fixed nut (19), the dog point setscrew should be positioned so it slides into the slot on the nut. It may be necessary, when installing the feed screw, to rotate the adjustable nut (17) so the threads of the two nuts and the screw line up properly with no binding.

29. REMOVING DYNA DRIVE II

To remove the Dyna Drive II for repair or replacement, proceed as follows:

1. Follow steps 1 through 3 in paragraph 24.
2. Disconnect leadwires and mark them for proper matching at reassembly.
3. Reassemble in reverse order of disassembly.

30. ELECTRONIC D. C. DRIVE (figure 10).

In the event of a Dyna Drive failure, the following procedure should be used to isolate the trouble.

NOTE

The following checks should be made by a qualified electrician as electrical shock can result if standard safety precautions are not followed.

1. Check for 115 volts A. C. on terminals 1 and 2 of the D. C. power supply located within the main control enclosure. Absence of 115 volts may be a result of:

- a. The power to the machine being turned off.
- b. Blown fuse in the main disconnect switch.
- c. Blown fuse on the control transformer. This fuse is mounted on the transformer inside of the control enclosure,

2. With 115 volts A. C. at terminals 1 and 2, check for 115 volts A. C. on terminals 1 and 13 of the D. C. power supply. Absence of this voltage indicates a blown fuse in the D. C. power supply.

NOTE

If this fuse blows as soon as it is replaced, this indicates a short in either the motor or the D. C. control. To isolate this condition, disconnect the leads in the motor connection box at the motor and insulate the exposed leads with electricians tape or equivalent.

BE SURE TO MARK ALL LEADS PRIOR TO DISCONNECTING SO THAT THEY CAN BE RECONNECTED PROPERLY.

Install a new fuse in the D. C. power supply and check for 115 volts A. C. at terminals 2 and 13 of the D. C. power supply. If this now is present, this would indicate a shorted motor winding and in such case, the motor should be replaced or rewound by an authorized service agent. If this fuse blows with the motor disconnected, this indicates a defective motor control amplifier which should be replaced.

3. With 115 volts A. C. at terminals 2 and 13 of the D. C. power supply, check for 0 to 75 volts D.C. on terminals 2 and 4 of the D. C. power supply.

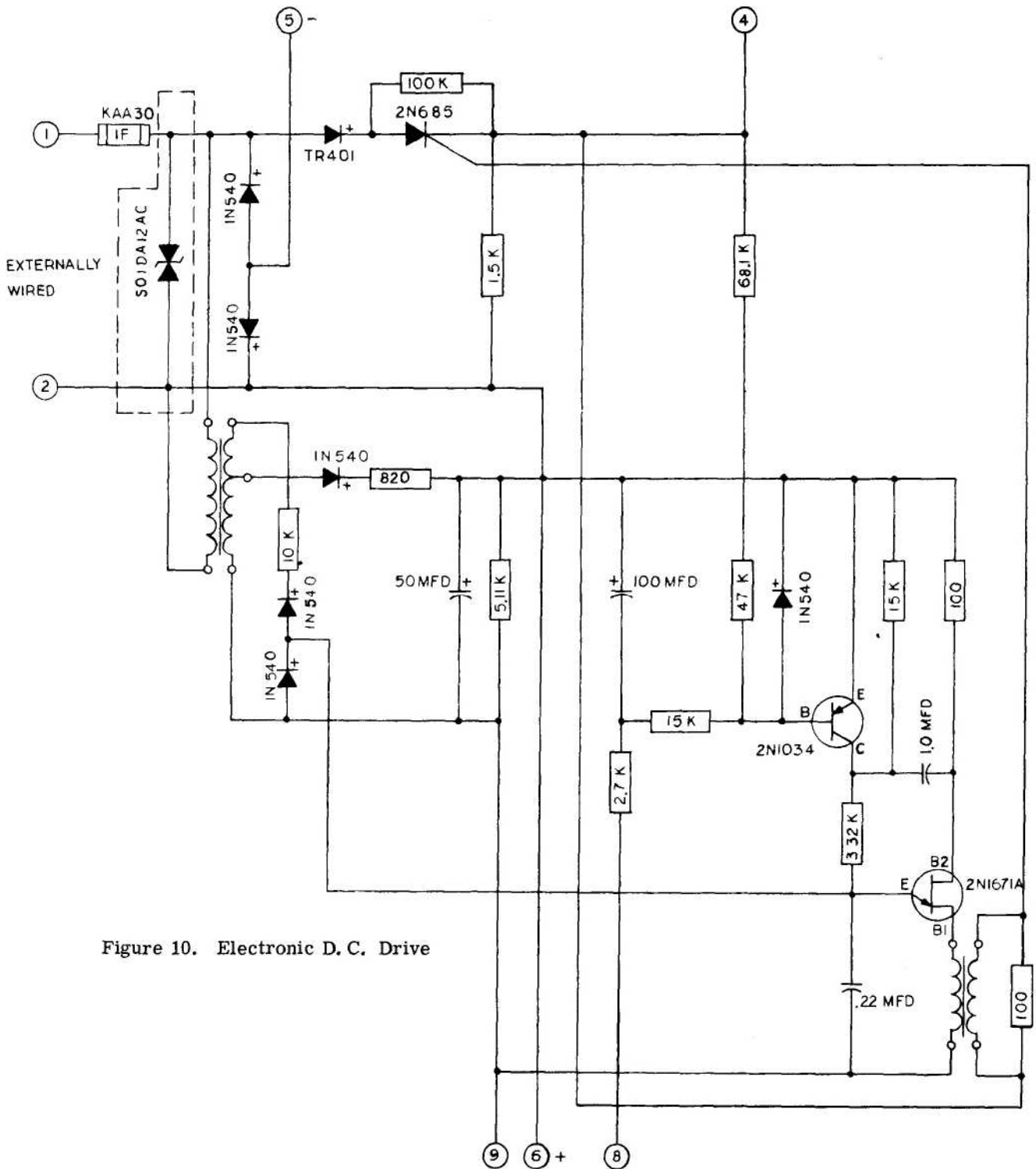


Figure 10. Electronic D. C. Drive

With the feed rate control set for 0 speed, the D. C. voltage should be 0, with the feed rate control set for maximum speed, the D. C. voltage should be 75 volts. If this voltage is not present, the D. C. control should be replaced.

4. With 115 volts A. C. on terminals 2 and 13 and 0 to 75 volts D. C. on terminals 2 and 4 of the D. C. control, check for 50 volts D. C. on terminals 2 and 5 of the D. C. power supply.

5. If all of the above conditions are met and the Dyna Drive still does not operate, this would indicate an open field or armature circuit in the motor, which could be caused from:

a. Worn brushes in the motor which should be replaced.

- b. A brush which is stuck or hung up in the brush holder. In this case, the brush holder and brushes should be cleaned and replaced.
- c. An open armature winding within the motor which should be corrected by either replacing or rewinding the motor.
- d. An open field winding in the motor which should be corrected by rewinding of the motor.

The diagram in Figure 10 will give additional information to the electronically oriented technician should he desire to service the control assembly. We recommend that if there is a malfunction in this control that the entire power supply be replaced.

TABLE - ADJUSTMENTS

31. ANTI-BACKLASH NUT (figure 11)

Adjust the anti-backlash nut as follows:

1. Move the table to a point near center or left of center to gain access to the adjustable nut (1).
2. To remove backlash in lead screw, loosen the two socket capscrews (2), turn the adjustable nut (1) clockwise until snug and retighten the two socket capscrews.

32. HOW TO CHECK BACKLASH

Check cross and longitudinal backlash as follows:

1. Move saddle and table all to their mid-range positions, and tighten the clamps.
2. Turn the handwheels back and forth to determine the amount of backlash.
3. If work has constantly been machined in the same area of the table, excessive backlash will occur in that area of the screw. In areas of the screw not normally used the fit between the feed screw and nut will be tight (zero backlash). Therefore, in order to establish near uniform backlash throughout screw length, the backlash adjustment should be made on the little-used area of the screw.

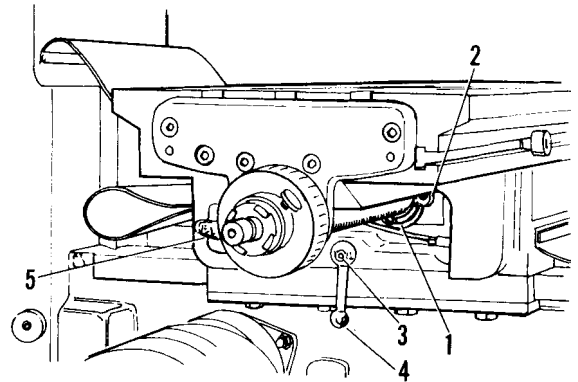


Figure 11. Adjusting Anti-Backlash Nut

- | | |
|-------------------|-----------------|
| 1. Adjustable Nut | 4. Clamp Handle |
| 2. Capscrews | 5. Bijur Pump |
| 3. Pipe Plug | |

TABLE - REMOVING AND REPLACING PARTS

33. GIB (figure 12)

Adjust the tapered gib as follows:

1. Move the table to a point somewhere near center to gain access to the gib screws.
2. To tighten gib, back off the gib screw (2) on the left end of the gib (1) and tighten the gib screw (3) on the right end the same amount.

34. TABLE (figure 12)

To remove the table proceed as follows:

1. Follow steps 1 through 8 under paragraph 28, page M-11.
2. Rotate the feed screw (4) to remove it and the thrust bearings (5 and 7) from the right side of the machine.

3. Remove the right and left adjustable stops (9 and 11) by taking out the capscrews (10 and 12).

4. Take out the four capscrews (14) and remove the left end table bracket (13).

5. Remove the gib screw (3) on the right end of the table and take out the gib (1). (See NOTE, paragraph 25).

6. Use a hoist to remove the table, or slide the table out and onto "horses". Raise or lower the knee so table height matches height of the "horses".

7. Reassemble in reverse order of disassembly.

35. TABLE FEEDSCREW, BEARINGS AND SADDLE NUTS

To remove table feed screw, bearings and saddle nuts, follow procedure in paragraph 28.

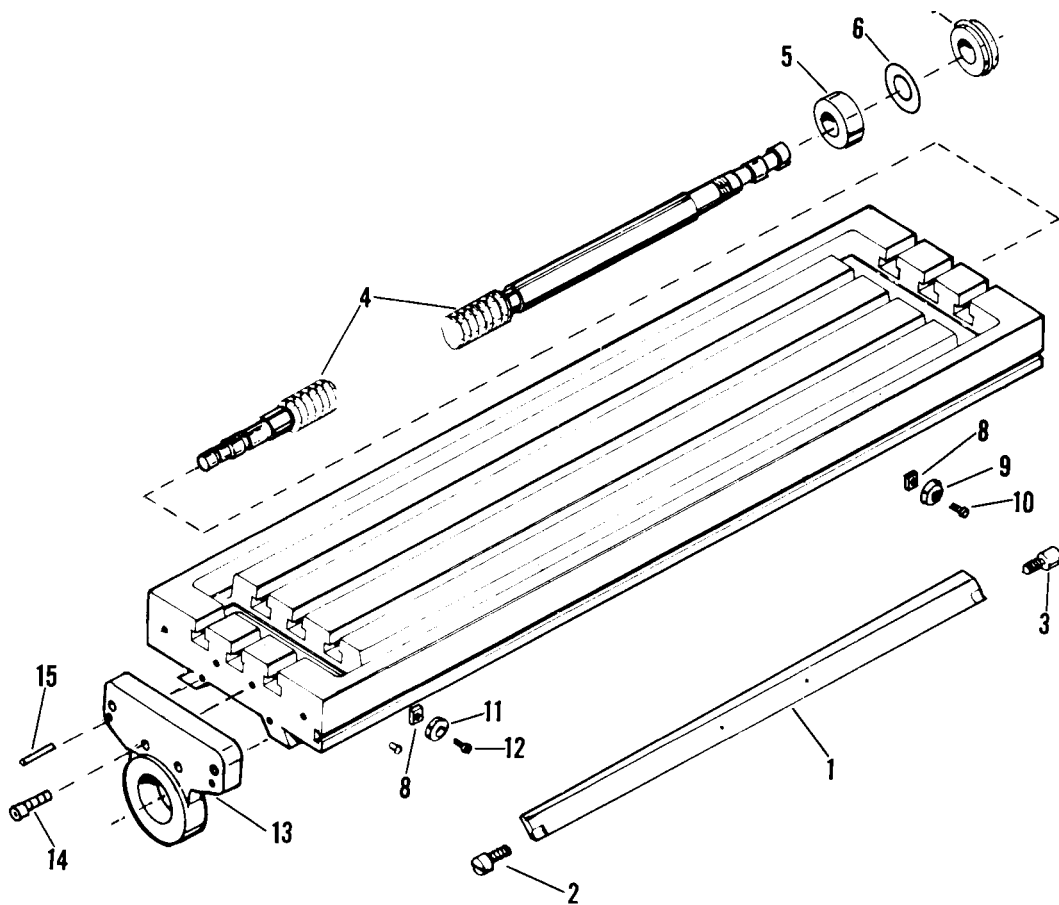


Figure 12. Table Exploded View

- | | |
|--------------------|----------------------------|
| 1. Tapered Gib | 9. Right Adjustable Stop |
| 2. Left Gib Screw | 10. Capscrews |
| 3. Right Gib Screw | 11. Left Adjustable Stop |
| 4. Feed Screw | 12. Capscrews |
| 5. Thrust Bearing | 13. Left End Table Bracket |
| 6. Spacer | 14. Capscrews |
| 7. Thrust Bearing | 15. Dowel Pin |
| 8. Tee Slot | |

SPINDLE-ADJUSTMENTS

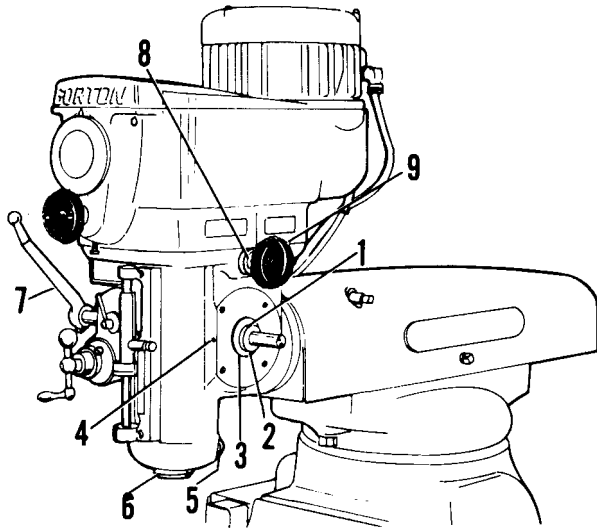


Figure 13. Adjusting Quill Retract Spring And Guide Ring

- | | |
|-------------------------------|----------------------------|
| 1. Setscrew | 6. Spindle Sleeve Bushing |
| 2. Collar | 7. Spindle Feed Hand Lever |
| 3. Housing | 8. Sleeve |
| 4. Setscrew | 9. Setscrew |
| 5. Clamp Ring Adjusting Screw | |

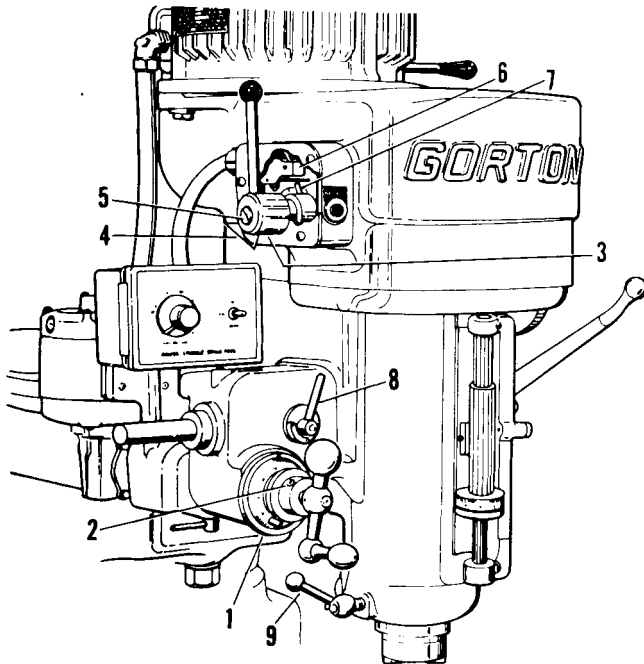


Figure 14. Adjusting Spindle Down Feed

- | | |
|-----------------------|-------------------------|
| 1. Setscrew (Housing) | 6. Microswitch |
| 2. Setscrew (Collar) | 7. Pin |
| 3. Setscrew | 8. Shifter Handle |
| 4. Dog Pt. Setscrews | 9. Spindle Clamp Handle |
| 5. Brake Screw | |

36. ADJUSTING QUILL RETRACT SPRING (figure 13)

The quill retract spring can be adjusted to obtain desired sensitivity of vertical spindle movement. Make the adjustment as follows:

1. To obtain a "soft feel" loosen the setscrew (1) and slide the collar (2) to the right.
2. Place a pin spanner wrench in the housing (3).
3. Back off setscrew (4) so housing can be rotated counter-clockwise, as you face it.

NOTE

The housing (3) has detent holes every 45°. Be sure setscrew (4) enters one of these holes to prevent housing from slipping after adjustment.

4. To obtain a "heavy feel" rotate the housing clock-wise.
5. Retighten both setscrews (1 and 4).

37. ADJUSTING QUILL GUIDE RING (figure 13)

The adjustable quill guide ring is a feature of the Mastermil head. It is to be adjusted for varying spindle loads--tighter for heavier cuts--looser for lighter cuts.

To adjust the quill guide ring so quill moves freely, proceed as follows:

1. When tightening the clamp ring adjusting screw (5), be sure that the spindle sleeve bushing (6) is all the way up in spindle housing nose.
2. With spindle feed hand lever (7), bring quill down 2 or 3 inches. Tighten screw so that quill stays in place.
3. Now tap Allen wrench lightly until screw (5) loosens just enough to permit quill to retract freely. If this clamp ring adjusting screw is too tight, the quill will bind. If too loose, heavy cutting will cause chatter and perhaps "cocking" of spindle sleeve bushing.

38. SPINDLE DOWN FEED (figure 14)

If there is excessive float in the spindle hand feed crank, check and tighten the setscrew (1) in the housing below the hand feed shaft and the setscrew (2) in the collar behind the crank.

The torque output, using the power down feed should be sufficient to drill a 3/4 inch hole in cast iron. If this is not possible the over-riding slip clutch may have lost its torque output due to lengthy usage. Replace the slip clutch (paragraph 43).

The direction selector toggle switch must be in the "OFF" position and the feed rate selector must be in "CLICK-OFF" position when the unit is not in use, since the unit is electrically interlocked with table feed. If table is moving, and power down feed switch is activated, the table will stop.

39. ADJUSTING BACK GEAR SHIFTER CLUTCH (figure 13)

In the spindle high speed range, a clutch is used between the bull gear and the timing gear. This clutch must engage so there is "zero" backlash. Any backlash between clutches will cause spindle rattle, excessive backlash and poor cutting performance.

To adjust the back gear shifter clutch proceed as follows:

1. Be sure spindle is turned off (not rotating) and brake lever is in forward position.
2. Move the back gear shifter knob to the high range.
3. Place a pin (not supplied) in one of the two holes on the sleeve (8).
4. Loosen the setscrew (9) and, with the pin, rotate the sleeve clockwise, as you face it, until you feel a slight resistance.

5. Retighten the setscrew.

NOTE

When properly adjusted, the knob will "snap" into the engaged (high) position.

40. ADJUSTING SPINDLE BRAKE (figure 14)

Adjust the spindle brake as follows:

1. Loosen the setscrew (3) and the two dog point screws (4).
2. With a screwdriver, turn the slotted end of the brake screw (5) clockwise, as you face it.

CAUTION

It is extremely important that the microswitch (6) is contacted by the pin (7), so the switch cuts off electrical power to the spindle motor BEFORE the brake shoes contact the sheave.

When the brake is properly adjusted, an electrical interlock prevents starting the spindle when the brake is engaged.

SPINDLE - REMOVING AND REPLACING PARTS

41. REMOVING SPINDLE (figure 15)

The cutter spindle requires no adjustment. The bearings are permanently grease-sealed and require no lubrication. If an irregular pattern develops during face milling, or if play should develop after a long period of service, the super-precision ball bearings which are fixed pre-load should be replaced by bearings of the same type from the Gorton Machine Corporation, which will put the spindle in "like new" condition.

NOTE

It is strongly recommended that spindles requiring service be returned to the factory for expert attention. However, if it is necessary to replace bearings in the field, do so as follows:

1. Loosen pipe plug (1) so the locking handle (2) can be removed.
2. Remove the clamping stud (3) and locking slug (4).

NOTE

Locking slug mates with spindle quill (6) through hole in quill ring (5). On reassembly it is necessary to align hole in ring and tapped hole in casting so spindle clamp will work freely.

3. Remove the capscrew (12) and drive a soft metal wedge in slot at rear of spindle housing thereby releasing quill guide ring.

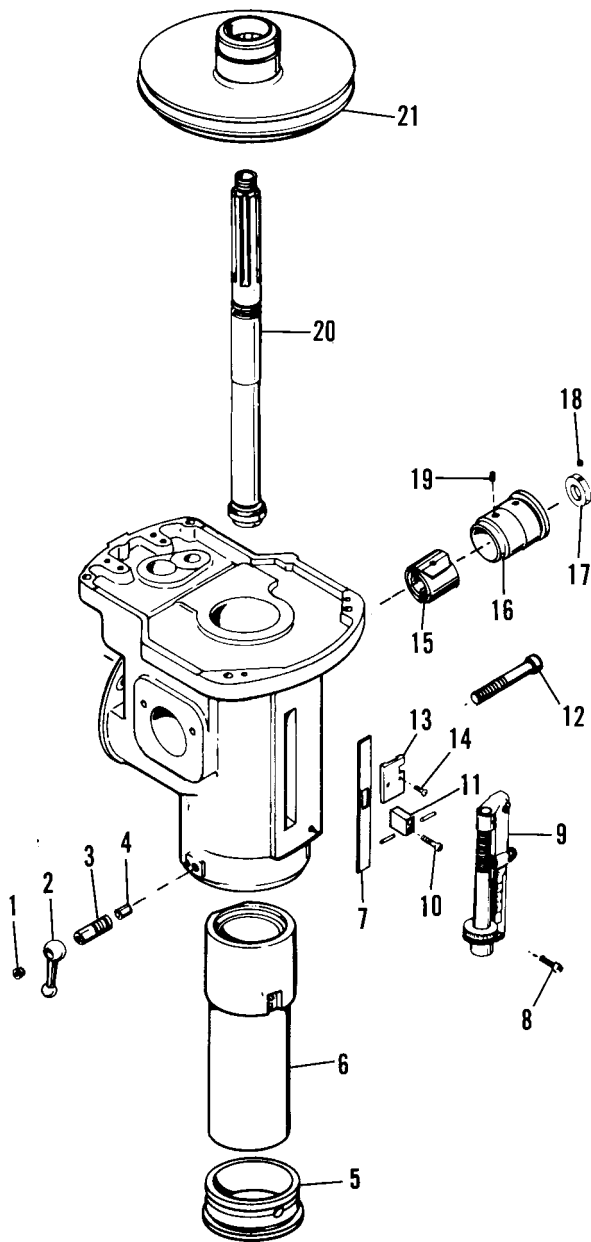


Figure 15. Removing Spindle Exploded View

- | | |
|-----------------------------------|-----------------------|
| 1. Pipe Plug | 11. Stop Key |
| 2. Locking Handle | 12. Capscrew |
| 3. Clamping Stud | 13. Slot Cover Shield |
| 4. Locking Slug | 14. Button Head Screw |
| 5. Quill Ring | 15. Spindle Spring |
| 6. Spindle Quill | 16. Retainer |
| 7. Depth Stop Cover Plate | 17. Feed Shaft Collar |
| 8. Capscrews | 18. Setscrew |
| 9. Micrometer Depth Stop Assembly | 19. Setscrew |
| 10. Capscrews | 20. Spindle |
| | 21. Pulley |

4. Engage the clutch in hand feed box by moving the shifter handle (8, figure 14) to the right. This will hold the spindle in the vertical position while the tension spring is being released.

5. Mark the nose of the spindle shaft (20) and the pulley (21), so that the splines can be re-mated in the same position during reassembly.

6. Remove the two capscrews (8) and the complete micrometer depth stop assembly (9).

7. Remove the two button head screws (14) and slot cover shield (13). Remove the two capscrews (10), the depth stop cover plate (7) and bracket (11).

8. Loosen the setscrews (18) and slide the feed shaft collar (17) to the right.

9. Place a pin spanner wrench in two holes of the retainer (16) so the spindle spring (15) will not recoil rapidly when the setscrew (4, figure 13) is released.

NOTE

See figure 16 for the following steps.

10. Place wood blocks (1) on the table, below the spindle, to protect the table surface.

11. Grasp the nose (2) of the spindle and slowly turn the hand feed crank (3) to lower the spindle and completely disengage the rack and pinion gear teeth.

CAUTION

This assembly is quite heavy and will require more than one hand to support it as it moves down.

12. This procedure allows the complete spindle assembly and guide ring (4) to be removed together. It may be necessary to re-position the wedge so the assembly does not have to be forced out.

13. Reassemble in reverse order of disassembly and adjust the guide ring (see paragraph 37).

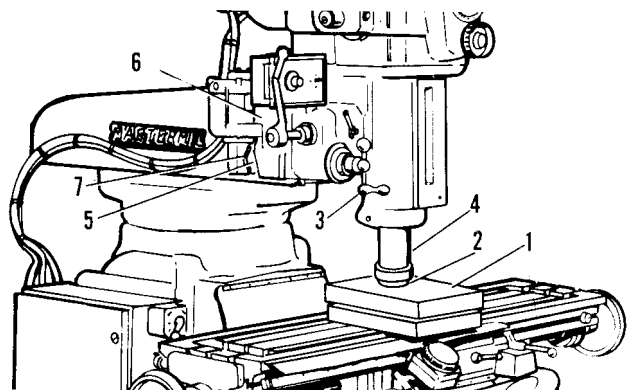


Figure 16. Removing Spindle

- | | |
|------------------------------------|---------------------|
| 1. Wood Block | 5. Setscrew (Shaft) |
| 2. Spindle Nose | 6. Capscrews |
| 3. Hand Feed Crank | 7. Setscrew |
| 4. Spindle Assembly and Guide Ring | |

42. REPLACING SPINDLE BEARINGS (figure 17)

To replace the spindle bearings proceed as follows:

1. Mark the spindle and pulley so the splines will match on reassembly.
2. Move the shifter knob to the high range.

CAUTION

This assembly is quite heavy and will require more than one hand to support it as it moves downward.

3. Remove the nut (2) at the nose of spindle. This nut has a left-hand thread.

4. Release tang on lockwasher (8) and remove locknut (9). Tap top of spindle (3) with a soft mallet and remove spindle (3). This will allow removal of lower bearings (4), upper bearings (7) and spacer (5).

NOTE

If these parts are not marked for reassembly, it may cause excessive spline-end or nose-end runout causing poor operation.

NOTE

It is recommended that replacement of spindle bearings be done at the Gorton factory. However, if done in the field, the faces marked "Thrust" should face each other with the match marks aligned.

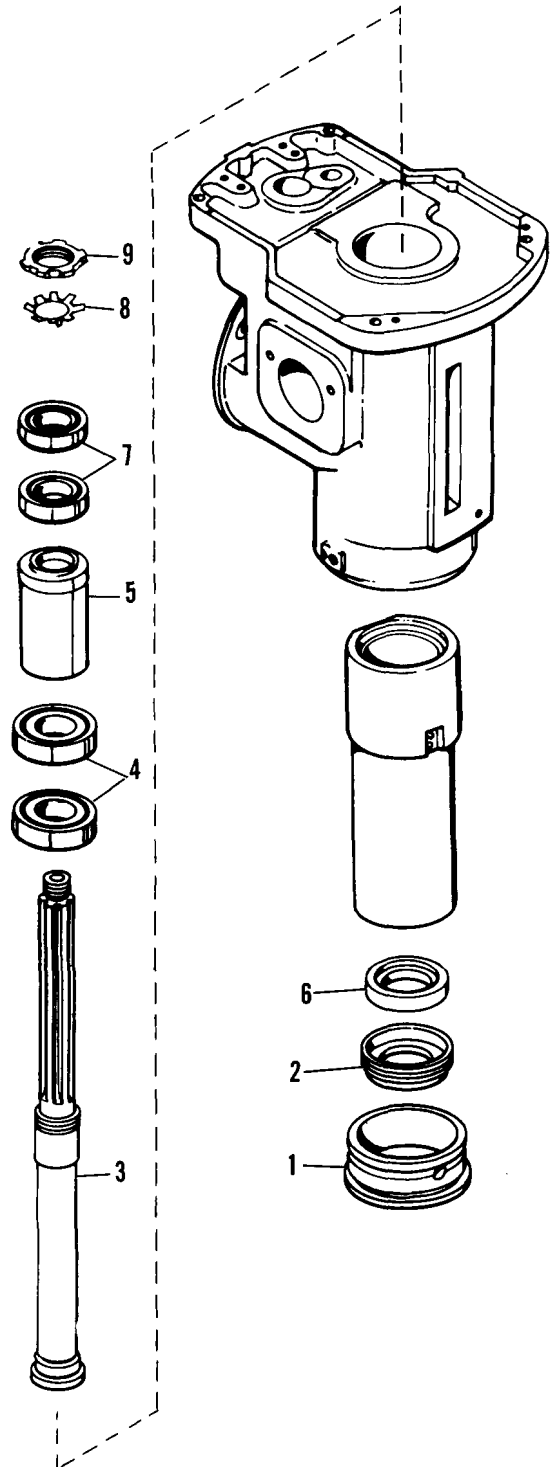


Figure 17. Removing Spindle Bearings

The bearings (4 and 7) used are fixed preload, and therefore the locknut (9) should not be tightened excessively.

6. Reassemble the parts in reverse order of disassembly.

- | | |
|-----------------------|--------------------|
| 1. Quill Ring | 6. Grease Retainer |
| 2. Nut (L. H. Thread) | 7. Bearings |
| 3. Spindle | 8. Lockwasher |
| 4. Bearings | 9. Locknut |
| 5. Spacer | |

43. REPLACING SLIP CLUTCH (figure 16)

Replace the slip clutch as follows:

1. Back off the setscrew (5) on motor gear box shaft.
2. Remove the four capscrews (6) holding motor to bracket and move motor back.
3. Loosen setscrew (7) in slip clutch and remove the clutch.

CAUTION

In reassembly a few thousandths misalignment is permissible and will be compensated for by the slip clutch. Greater misalignment will load the clutch so output torque will be diminished.

44. REPLACING QUILL RETRACT SPRING (figure 18)

Remove the quill retract spring (1) as follows:

1. If the hand feed lever (8) is on the right side of the downfeed shaft (5), remove the lever.
2. Loosen the setscrew (7) and remove the collar (6).
3. Clamp the quill with the locking handle.
4. Place a pin spanner wrench in the retainer sleeve (2) and loosen the setscrew (4).
5. Turn the spanner wrench counter-clockwise to relieve all tension on the spring.
6. Slide the retainer sleeve with its enclosed parts off of the downfeed shaft.
7. Remove the slotted spring keeper screw (3) and pull out the old quill retract spring.

NOTE

The new spring is held in a coiled position with a retainer ring. Do not remove the retainer. It will slide off when the spring is installed in the housing.

8. Slide the new spring (1) into the retainer sleeve (2) and discard the retainer ring which slides off the spring.

9. Install the entire assembly onto the downfeed shaft (5) so the bent end of the spring is in the slot on the shaft.

10. Rotate the retainer sleeve (2) to align the hole in spring and the hole in the sleeve.

11. Replace setscrew (3).

12. Remove the spring and sleeve assembly.

13. Insert the end of a punch between the outer coil and the next coil of the spring directly in line with the setscrew (3). Tap the punch until the outer coil conforms to the radius of the sleeve and the spring is firmly held by the setscrew.

14. Adjust tension of the spring (see paragraph 36).

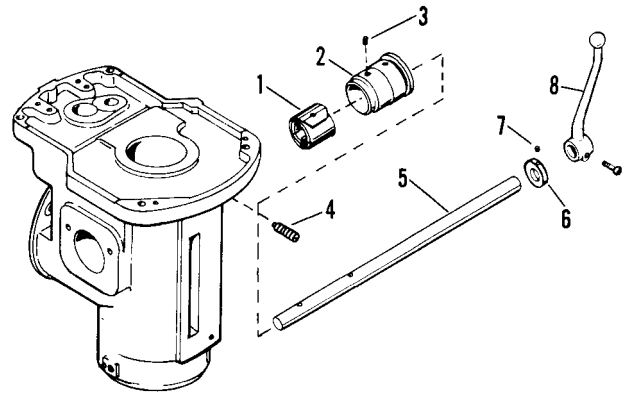


Figure 18. Replacing Quill Retract Spring

- | | |
|-------------------------|--------------------|
| 1. Quill Retract Spring | 5. Downfeed Shaft |
| 2. Retainer Sleeve | 6. Collar |
| 3. Setscrew | 7. Setscrew |
| 4. Setscrew | 8. Hand Feed Lever |

VARIABLE SPEED HEAD

45. REPLACING BULL GEAR BEARINGS (figure 19)

To replace the bull gear bearings on the variable speed head, proceed as follows:

1. Turn the spindle speed control knob to its lowest r.p.m. setting.
2. Remove the draw bar (4) and adapters.
3. Turn off all power to the machine.
4. Remove the two long socket head cap-

screws (2) and the two shorter socket head capscrews (1) from the cover (3) and take off the cover.

5. Loosen the setscrew (5) and remove the pulley locknut (6).

6. Loosen the setscrew (7) and remove the speed adjusting arm shaft (8).

7. Remove the roll pin (12) and, while removing it, place fingers inside of the sleeve (17) to catch roll pin so it doesn't drop into spindle spline.

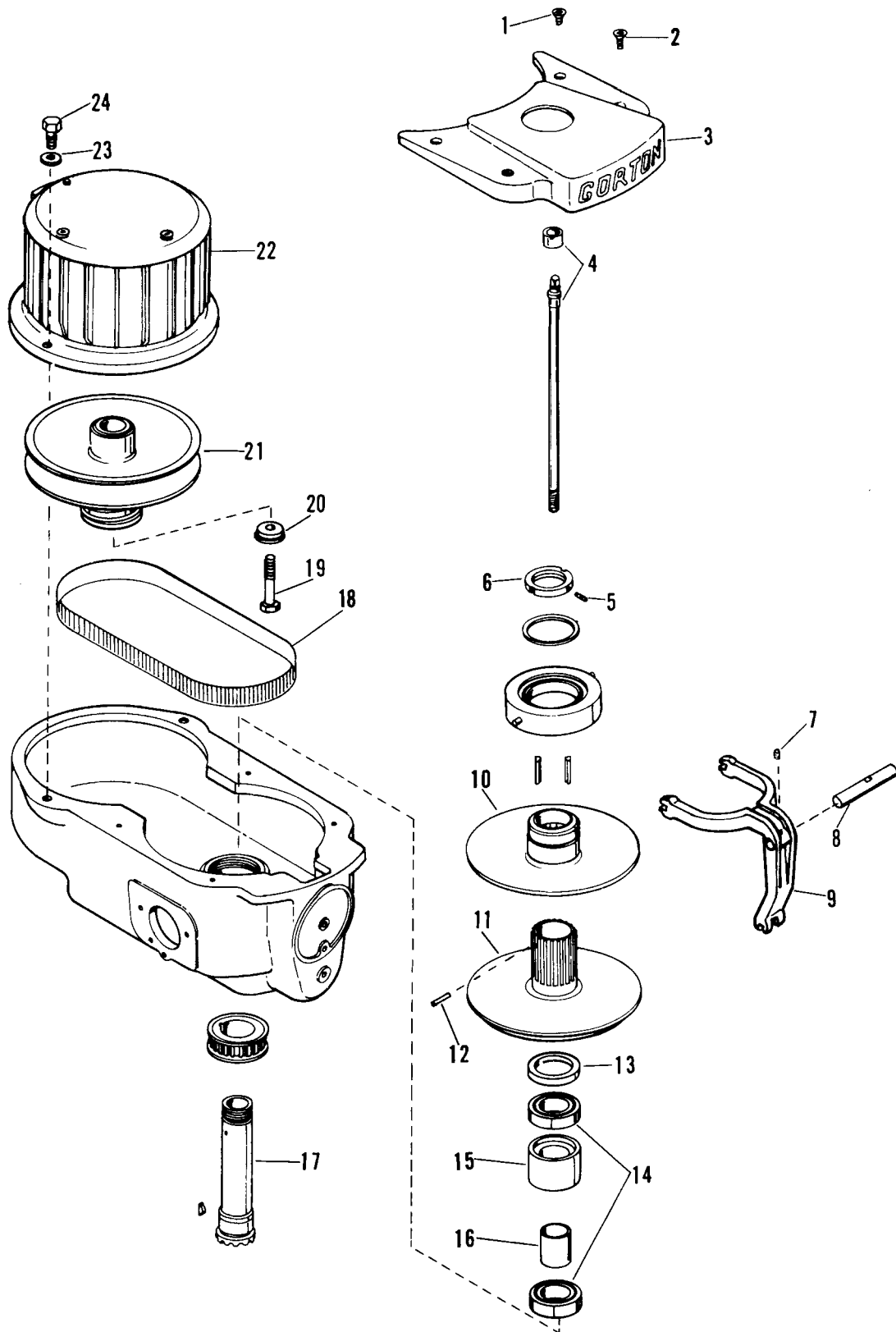


Figure 19. Replacing Bull Gear Bearings--Variable Speed Head

- | | | |
|------------------------------|---------------------------|------------------------------------|
| 1. Capscrews | 9. Shifter | 18. Spindle Drive Belt |
| 2. Capscrews | 10. Front Variable Sheave | 19. Hex Bolt |
| 3. Cover | 11. Lower Sheave | 20. Washer |
| 4. Draw Bar | 12. Roll Pin | 21. Motor Variable Pulley Assembly |
| 5. Setscrew | 13. Bearing Retaining Nut | 22. Motor |
| 6. Pulley Locknut | 14. Bearings | 23. Washers |
| 7. Setscrew | 15. Spacer | 24. Hex Head Bolts |
| 8. Speed Adjusting Arm Shaft | 16. Spacer | |
| | 17. Sleeve | |

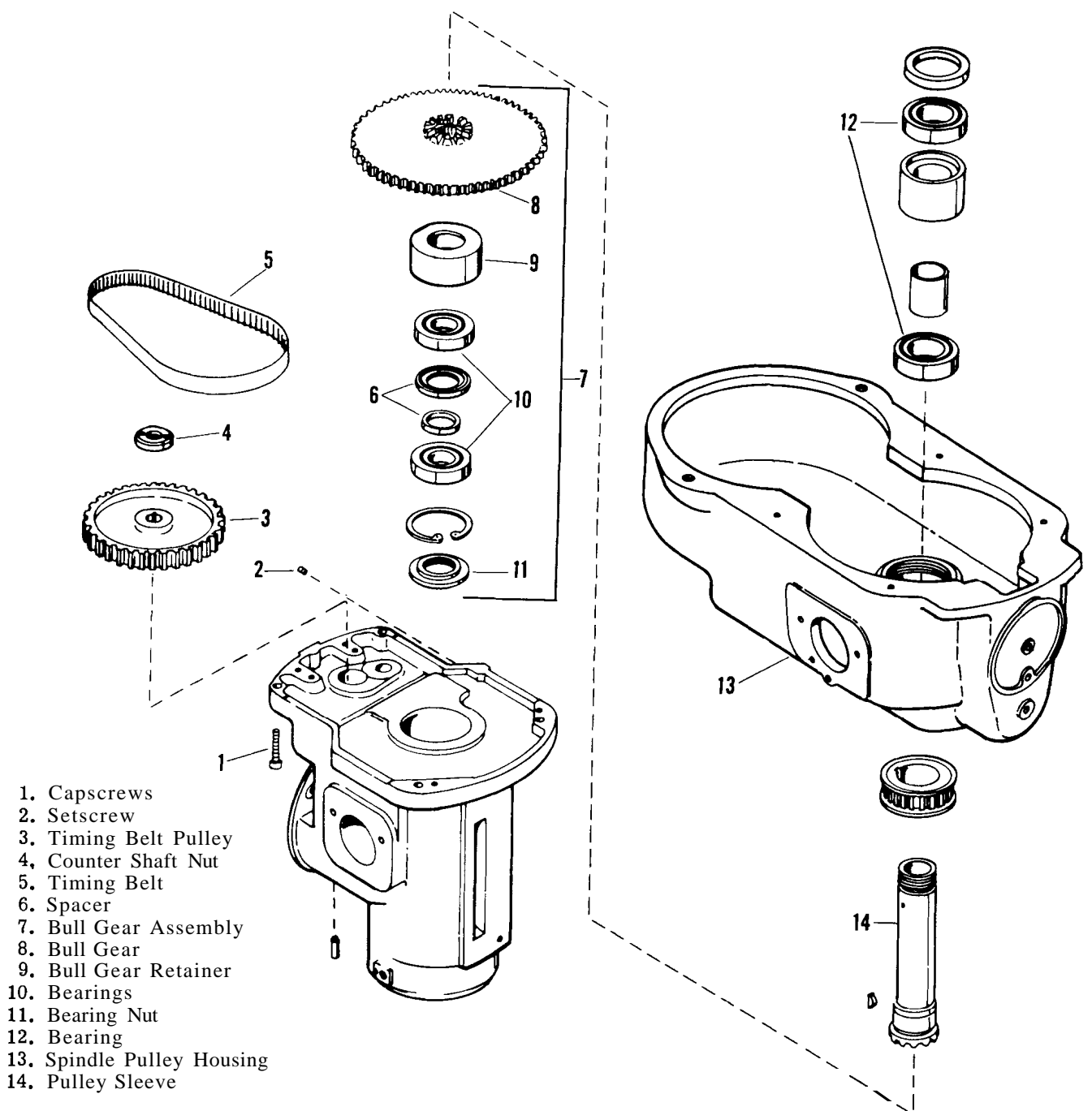


Figure 20. Replacing Bull Gear Bearings--Variable Speed Head

8. Remove the two hex head bolts (24) and washers (23). Tilt the motor (22) back and wedge it in position so the front variable sheave (10) can be lifted off.

9. Lift off the variable sheave (10). It may be necessary to rotate the speed knob so the shifter (9) disengages and can be removed.

10. Lift the spindle drive belt (18) off of the spindle upper drive section.

11. Remove motor, variable pulley and drive belt. Release the electric cable clamps so cable will be free and motor can be set on the floor or a bench. To remove motor variable pulley assembly (21), remove hex bolt (19) and washer (20) and slide off the variable pulley assembly (21).

12. Remove the lower sheave (10).

NOTE

It may be necessary to use a wheel puller to remove pulley sheaves.

(See figure 20 for the following steps).

13. Remove the four socket capscrews (1) holding the spindle pulley housing (13) to the spindle head.

14. Lift the pulley housing off of the machine. It may be necessary to rotate spindle to disengage the timing belt (5). If the pulley sleeve (14) does not disengage from the bearing (12), tap on top of pulley sleeve and remove it from the bearing. This sleeve should have a light push fit through the bearings for ease of reassembly.

15. Remove the counter shaft nut (4) and the timing belt pulley (3).

NOTE

On reassembly use one drop of Lock-tite on the counter shaft nut (4) to secure it.

- | | |
|-------------------------|------------------------|
| 1. Setscrew | 8. Guide Pin |
| 2. Setscrew | 9. Brake Screw |
| 3. Handle Assembly | 10. Brake Shoe Assy's. |
| 4. Button Head Screws | 11. Brake Shoes |
| 5. Switch Plate Cover | 12. Setscrew |
| 6. Capscrews | 13. Gear |
| 7. Brake Switch Housing | 14. Speed Dial |

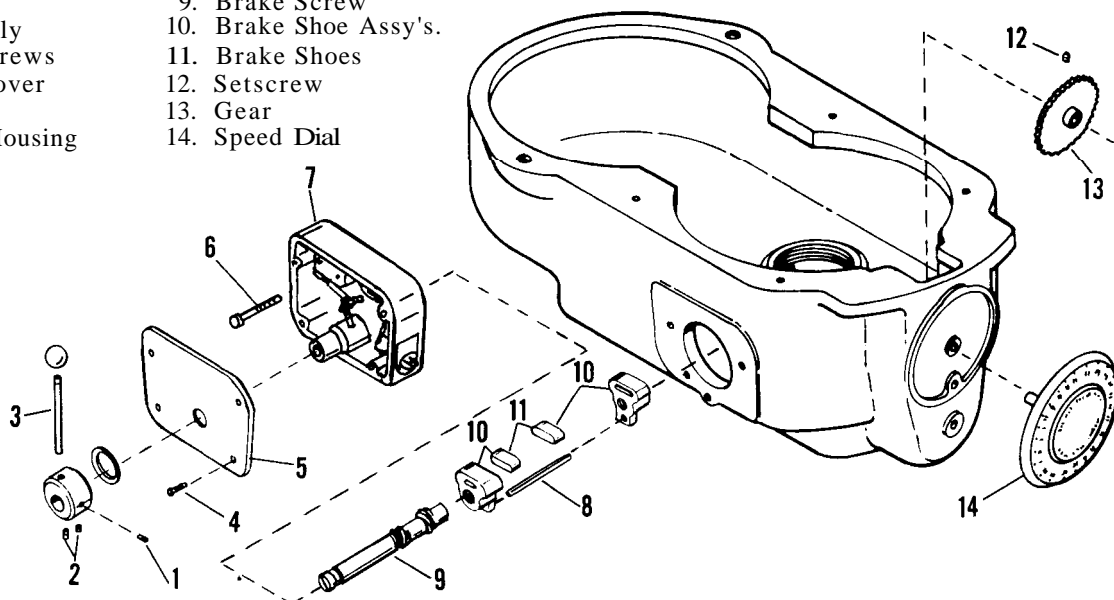


Figure 21. Spindle Brake And Speed Dial--Variable Speed Head

16. Loosen the setscrew(2) in the back gear shifter assembly, and lift off the bull gear assembly (7).

17. Remove the bearing nut (11) and remove the bull gear (8) from the bull gear retainer (9). Take out the bearings (10) and spacer (6) from the retainer.

18. When reassembling, the bull gear should be in the high speed position, with the clutch on sleeve (14) mated with the bull gear clutch. The timing belt (5) can then be placed in position.

Slide the pulley housing (13) over the sleeve (14) and reassemble the other parts in reverse order of disassembly. See paragraph 39 for adjusting the back gear clutch.

46. REMOVING/RE PLACING SPINDLE DRIVE BELT

To remove or replace spindle drive belt (17, figure 19), follow steps 1 through 10, paragraph 45.

47. REMOVING/REPLACING TIMING BELT

To remove or replace timing belt (5, figure 20), follow steps 1 through 14, paragraph 45.

48. REMOVING PULLEY HOUSING BEARINGS (figure 19)

To remove the pulley housing bearings proceed as follows:

1. Follow steps 1 through 14 under paragraph 45, REPLACING BULL GEAR BEARINGS.
2. Remove the bearing retaining nut (13) and remove the bearings (14) and the two spacers (15 and 16).
3. Follow procedure in step 18, paragraph 45, REPLACING BULL GEAR BEARINGS for reassembling.

NOTE

When variable pulleys and shifter are removed, it may be necessary to re-time the spindle speed dial (See figure 21). Do this by running the spindle at its lowest r. p. m. and check it with a tachometer. Loosen the setscrew (12) in gear (13), rotate the speed dial (14) to the correct speed and retighten the setscrew.

49. REPLACING SPINDLE BRAKE SHOES (figure 21)

To replace the spindle brake shoes proceed as follows:

1. Follow steps 1 through 12 under paragraph 45, REPLACING BULL GEAR BEARINGS.
2. Loosen the setscrew (1) and the two setscrews (2) so the spindle brake handle assembly (3) can be removed.
3. Remove the four button head screws (4) and take off the switch plate cover (5).
4. Remove the three capscrews (6) so the brake switch housing (7) can be removed.
5. Take out the guide pin (8) and pull out the brake screw (9) and the two brake shoe assemblies (10).

NOTE

If only the brake shoes (11) are to be replaced, cement them in place with Pliobond No. 20 cement.

6. Reassemble the parts in reverse order of disassembly.

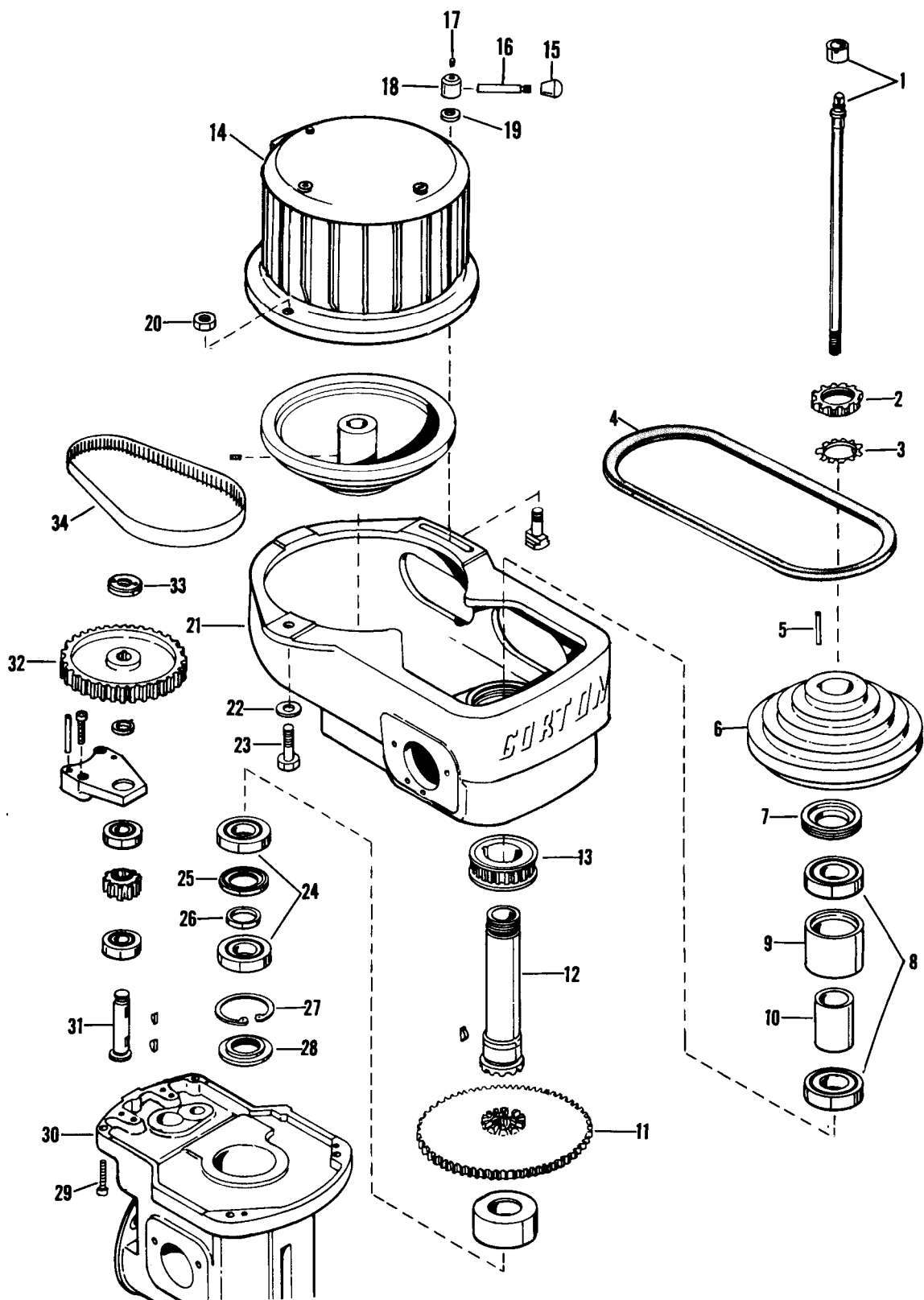


Figure 22. Replacing Bull Gear Bearings--Standard Head

- | | | | |
|-------------------------|--------------------------------|----------------------|------------------------|
| 1. Draw Bar | 10. Spacer | 18. Clamp Handle Nut | 27. Bull Gear Retainer |
| 2. Locknut | 11. Bull Gear Assembly | 19. Washer | 28. Bearing Nut |
| 3. Lockwasher | 12. Pulley Sleeve | 20. Nut | 29. Capscrew |
| 4. Spindle Drive Belt | 13. Timing Belt Spindle Pulley | 21. Locknut | 30. Spindle Head |
| 5. Key | 14. Motor | 22. Washer | 31. Counter Shaft |
| 6. Spindle Pulley | 15. Knob | 23. Capscrew | 32. Timing Belt Pulley |
| 7. Ball Bearing Locknut | 16. Clamp Handle | 24. Bearings | 33. Counter Shaft Nut |
| 8. Bearings | 17. Setscrew | 25. Spacer | 34. Timing Belt |
| 9. Spacer | | 26. Spacer | |

STANDARD HEAD

50. REPLACING BULL GEAR BEARINGS--STANDARD HEAD (figure 22)

To remove the bull gear bearings from the standard head proceed as follows:

1. Turn off all power to the machine.
2. Remove the draw bar (1) and any tooling in the spindle.
3. Take off the electrical cable clamps on the ram.
4. Remove the capscrew (23) and washer (22). Remove the nut (20).
5. Loosen setscrews (17) and with knob (15) loosen the clamp nut (18).
6. Remove the knob (15) and handle (16) unscrew the clamp handle nut (18) and remove the washer (19).
7. Move the motor forward and remove the spindle drive belt (4).
8. Lift the motor (14) off of the machine.
9. Remove the ball bearing locknut (2) and ball bearing lockwasher (3).
10. Remove the four capscrews (29) holding the spindle pulley housing (21) to the spindle head (30).
11. Release the spindle brake if it is not already released.
12. Remove the spindle pulley (6) and key (5).
13. Lift the spindle pulley housing (21) off of the machine. If the pulley sleeve (12), does not remain in its position, it may be necessary to rotate the spindle so timing belt (34) will disengage from timing belt spindle pulley (13).
14. Unscrew the counter shaft nut (33) and take off the timing belt (34). Lift the timing belt pulley (32) off of the counter shaft (31).
15. The bull gear assembly (11) can now be removed over the top of spindle.
16. Take off the bearing nut (28) and slide the bull gear retainer (27) and bearings (24) from the bull gear.
17. Press out the bearings (24) and the two spacers (25 and 26).
18. Reassemble the parts in reverse order of disassembly.

51. REPLACING PULLEY HOUSING BEARINGS--STANDARD HEAD (figure 22)

Replace the pulley housing bearings as follows:

1. Follow steps 1 through 13 in paragraph 50, REPLACING BULL GEAR BEARINGS.
2. Remove the bearing retainer nut (7).
3. Invert the spindle pulley housing (21) and press out the bearings (8) and two spacers (9 and 10).

52. REPLACING BRAKE SHOES--STANDARD HEAD (figure 23)

To replace the brake shoes on the standard head, proceed as follows:

1. Remove the spindle drive belt (16) move the motor back as far as possible and clamp it.
2. Remove the bearing locknut (15) and lockwasher (14).
3. Loosen the setscrew (3) and the two setscrews (2) so the spindle brake handle assembly (1) can be removed.
4. Remove the four button head screws (4) and take off the switch plate cover (5).
5. Remove the three capscrews (6) so the brake switch housing (7) can be removed.
6. Remove the guide pin (10).
7. Lift up the spindle pulley (13) so the braking flange will clear the brake shoe assembly (12).
8. Slide the brake screw (8) and brake shoe assemblies (9 and 12) from the housing.

NOTE

If only the brake shoes (11) are to be replaced, they should be cemented in place with Goodyear Pliobond No. 20 cement.

9. Reassemble in reverse order.

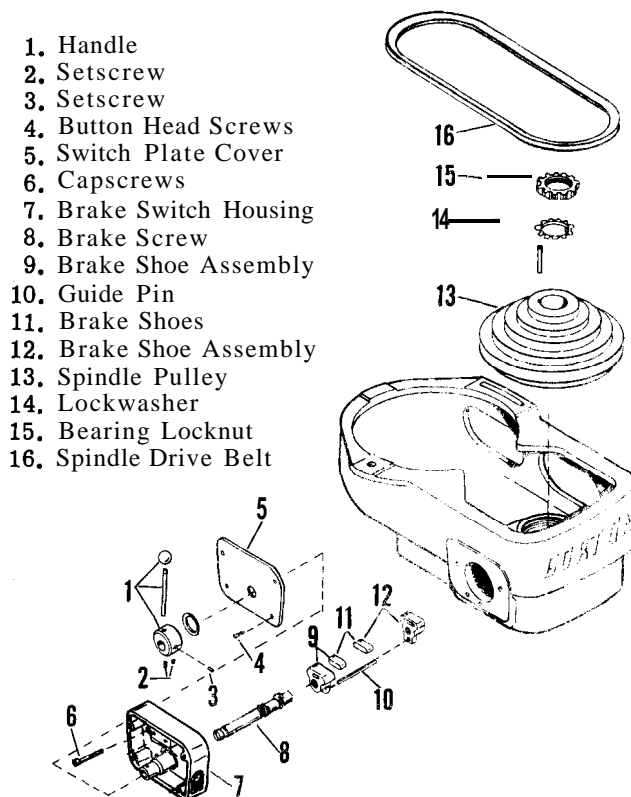


Figure 23. Replacing Brake Shoes--Standard Head

RAM AND TURRET

53. REMOVING SWIVEL HEAD (figure 24)

To remove the swivel head proceed as follows:

1. Turn off all electrical power to the machine.
2. Move the knee to its lowest position, and move the saddle completely forward.
3. Move the ram to the rear so the motor will not strike the table when the head is rotated.

NOTE

It is good practice to support the swivel head while it is being inverted. Just before the head is completely inverted, the worm and worm wheel will disengage. Wood supports can be used under the inverted head to stabilize it on the machine table.

4. Loosen the three nuts (1) and invert the head using worm and worm wheel (3).
5. Remove the three nuts (1). Use hand elevation so the machine table will support the head.
6. Loosen the two hex clamping nuts (2) and move the ram back with wrench until it is completely disengaged from swivel head.

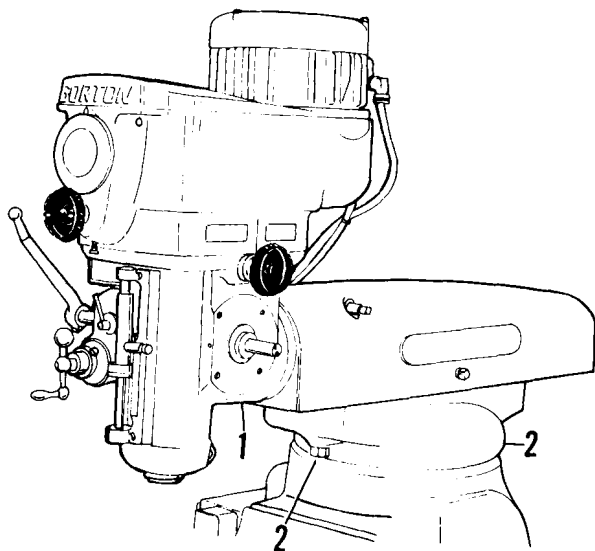


Figure 24. Removing Swivel Head

1. Hex Nuts
2. Hex Clamping Nuts
3. Worm And Worm Wheel

If electrical cables must be disconnected, mark each individual wire, and make a sketch of connections for aid in re-connecting.

When re-assembling, the alignment of the pilot on swivel head and the bore in ram must be precisely made. It is also necessary to physically assist the head to obtain engagement of worm and worm wheel.

NOTE

If the swivel head turns under normal cutting pressure, it is possible that foreign material is between the cutting faces of head and ram. If this happens, follow steps 1 through 5 in this paragraph. Clean off both faces and be sure they are dry before reassembling.

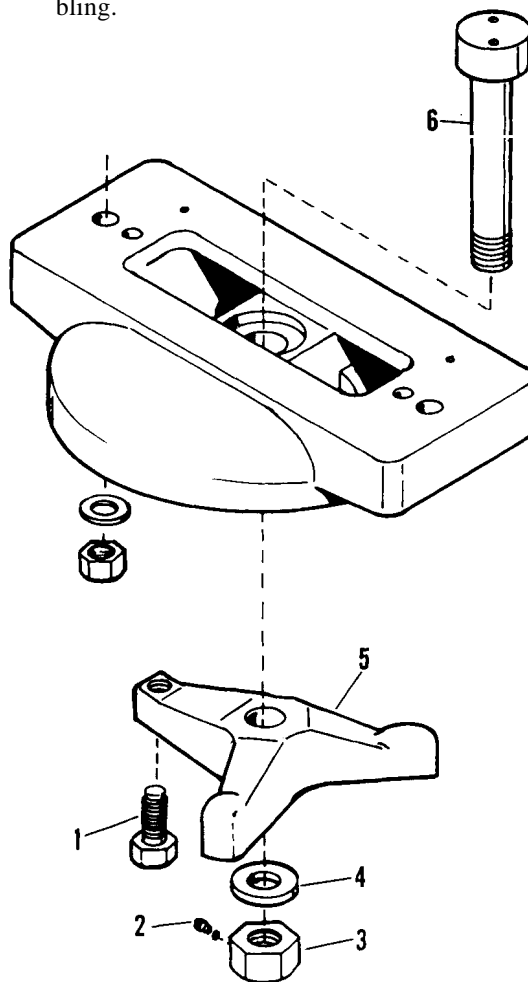


Figure 25. Removing Turret

1. Spider Clamp Screw
2. Setscrew
3. Hex Nut
4. Washer
5. Spider Clamp
6. Spider Bolt

54. REMOVING RAM AND HEAD ASSEMBLY (figure 24)

To remove the ram proceed as follows:

1. Remove the two hex nuts (2).
2. With a hoist and sling, lift the ram straight up off guide keys and rack. Use caution, as assembly is off center load. Set it on wood blocks to protect the way surfaces.

On reassembly be sure that the rack and gear teeth are engaged as ram is lowered into position.

55. REMOVING TURRET (figure 25)

To remove the turret proceed as follows:

1. Loosen the spider clamp screw (1). This screw and the following parts can be reached through the access hole in the rear of column.

2. Loosen the setscrew (2) and remove the large hex nut (3) and washer (4). The spider clamp (5) will drop, and the turret can then be lifted off of column with a sling.

56. ADJUSTING SPIDER CLAMP FOR TURRET (figure 25)

If the turret turns under normal cutter pressure, check the spider clamp for the turret, and, if necessary, adjust it as follows:

1. Loosen the spider clamp screw (1) so approximately 1/2" to 3/4" of thread is exposed below the spider clamp (5). This screw is reached through access hole in back of column.

2. Loosen the setscrew (2) and rotate the hex nut (3) until the ball nose on the spider clamp screw (1) contacts the casting.

3. Re-lock the setscrew (2) and re-clamp the spider (5) with the spider clamp screw (1).

HORIZONTAL SPINDLE

57. REMOVING BEARINGS FROM STYLE "B" ARBOR SUPPORT (figure 26)

Remove the bearings from the style "B" arbor support as follows:

1. Remove the arbor support bearing (1).
2. Insert a rod between the needle bearings (2 and 3) and tap out one of the bearings. The other bearing can then be pressed out.

NOTE

When bearings are replaced, the seals should also be replaced.

3. Install new needle bearings by pressing into the housing (4) from either end, so the outside face of the bearings is just past the shoulder in the casting. This will allow clearance between the bearings and the seals when the seals are installed.

CAUTION

Do not press needle bearings so far that they meet in the middle of the casting. This would block off lubrication holes.

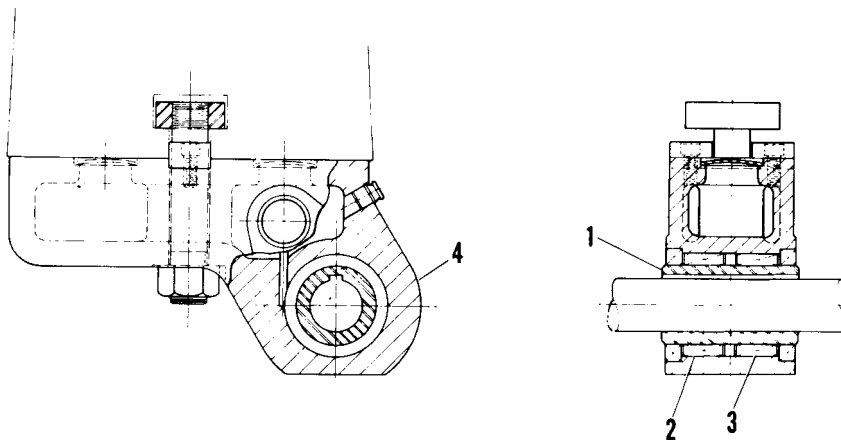


Figure 26. Removing Bearings From Style "B" Arbor Support

- | | |
|-------------------|-------------------|
| 1. Bearing | 3. Needle Bearing |
| 2. Needle Bearing | 4. Housing |

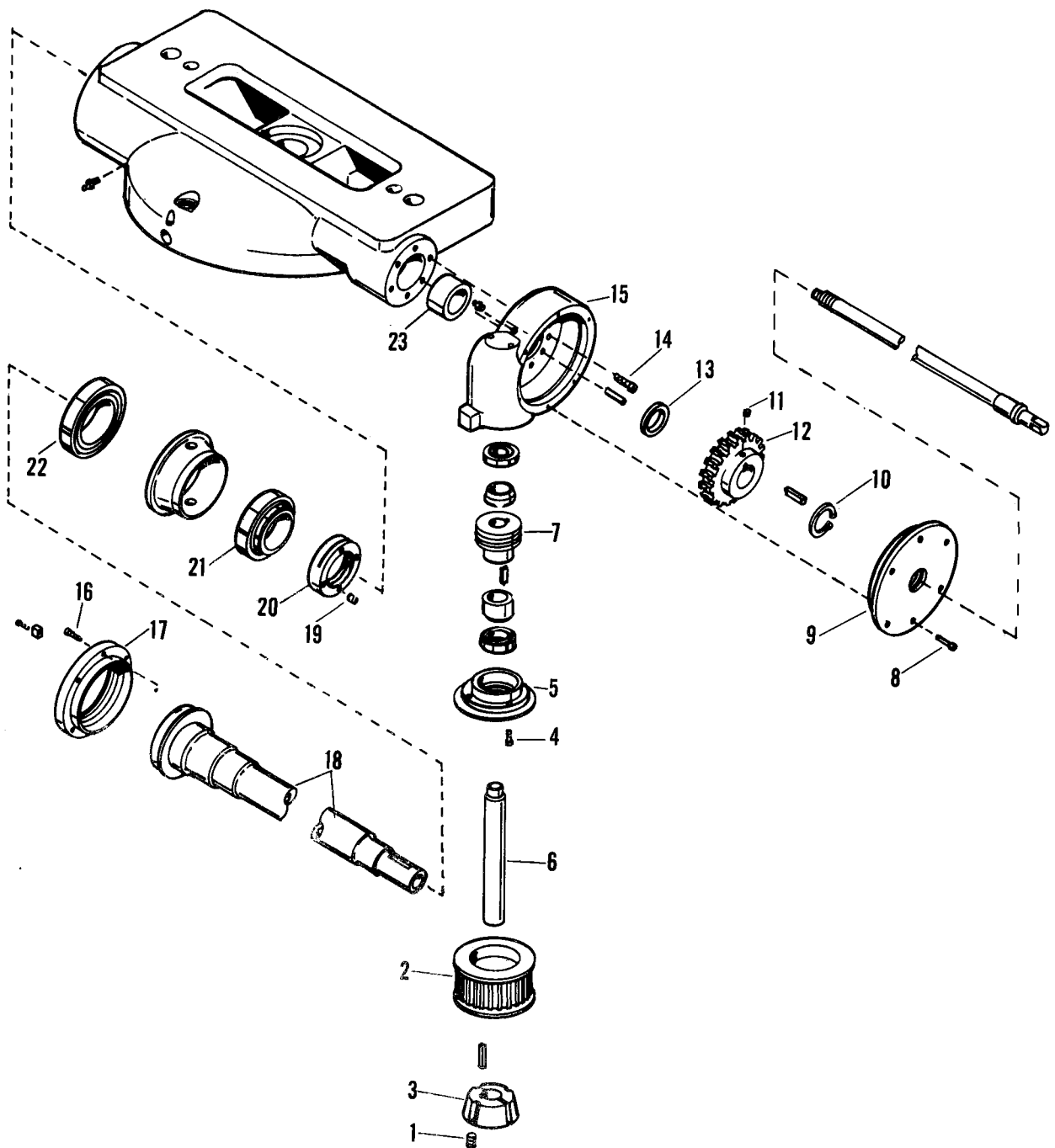


Figure 27. Removing Horizontal Spindle And Bearings

- | | |
|-----------------------|----------------------------|
| 1. Setscrew | 13. Spacer |
| 2. Timing Pulley | 14. Capscrews |
| 3. Taper Lock Bushing | 15. Gear Box |
| 4. Capscrews | 16. Capscrews |
| 5. Bearing Retainer | 17. Bearing Retaining Ring |
| 6. Pulley Shaft | 18. Spindle Shaft |
| 7. Helical Gear | 19. Setscrews |
| 8. Capscrews | 20. Pre-load Nut |
| 9. Gear Box Cover | 21. Bearing |
| 10. Retaining Ring | 22. Bearing |
| 11. Setscrews | 23. Needle Bearing |
| 12. Helical Gear | |

58. REMOVING HORIZONTAL SPINDLE AND BEARINGS (figure 27)

To remove the horizontal spindle and bearings proceed as follows:

1. Carefully label all fitting washers and shims when they are removed, so they will be replaced in the correct location.
2. Remove setscrew (1), so the timing pulley (2) can be removed along with the taper lock bushing (3).
3. Take out the four capscrews (4) and the bearing retainer (5). This will allow removal of the pulley shaft (6).
4. Remove the helical gear (7).
5. Take out the six capscrews (8) and gear box cover (9).
6. Remove the retaining ring (10). Loosen the setscrew (11) and remove the helical gear (12) and spacer (13).
7. Take out the four capscrews (14). Remove the gear box (15) and needle bearing (23).

8. Take out the six capscrews (16) and bearing retainer ring (17).

9. Tap the back end of spindle shaft (18) and remove the spindle through the front end of machine.

NOTE

It is strongly recommended that spindles requiring service be returned to the factory for expert attention. However, if it is necessary to replace bearings in the field do so as follows:

A. Loosen the setscrews (19) and remove the pre-load nut (20).

B. Remove the bearings (21 and 22). Use a bearing puller to remove bearing (21) on the narrow end of spindle.

10. Reassemble the parts in reverse order of disassembly.

MAINTENANCE CHECK LIST

- | | | |
|---|--|--|
| 1. No coolant or inadequate supply. (Flood type) | Plugged lines or table screen.
Pump rotation is wrong.
Prime is lost. | Clean out reservoir and table screen (par. 16).
Check rotation (par. 16) and correct by reversing leads to pump.
Re-prime. |
| 2. No coolant or inadequate supply. (Spray mist type) | No air, or low pressure.
Low coolant level. | (See par. 17).
Add coolant (par. 17). |
| 3. Knee binds | Tapered gib too tight.
Knee clamp is "on". | Adjust tapered gib (par. 18).
Release clamp. |
| 4. Knee movement is too loose | Tapered gib too loose.
Elevate screw and nut worn. | Adjust tapered gib (par. 18).
Replace screw and nut (par. 22 and 23). |
| 5. No power elevate. | Microswitch has moved past limit stop.
Microswitch worn out.
Relay inoperative.
Power elevate motor burned out. | Manually operate knee (par. 19).
Replace switch.
Use wiring diagram and check relay.
Replace motor (par. 22). |
| 6. Inadequate supply of lubricant | Check Bijur One-Shot pump. | Clean pump if necessary (par. 21). |
| 7. Too much or too little backlash | Anti-backlash nut needs adjusting. (12" cross only), | Adjust (par. 20). |

MAINTENANCE CHECK LIST

- | | | |
|--|---|---|
| 8. No power to table. | Feed motor burned out.
Feed rate potentiometer faulty.
D. C. Power supply fuse blown.
Shifting shoes broken.

Electrical failure or disconnect.

Spindle downfeed switch in "on" position. | Replace motor (par. 30).
Replace potentiometer.
Replace fuse.
Check and replace, using exploded view for reference.
Check fuses and connections using wiring diagram furnished.
Turnfeed dial to "click-off" position (par. 13). |
| 9. Erratic cross feed movement. | Cross feed screw and nut worn. | Replace cross feed screw and nut (par. 21). |
| 10. Saddle binds. | Tapered gib too tight. | Adjust tapered gib. (par. 25). |
| 11. Saddle movement too loose. | Knee ways worn. | Adjust flat gib (par. 24). |
| 12. Table binds. | Tapered gib too tight.
Lack of lubrication. | Adjust gib (par. 31).
Fill and check reservoir. |
| 13. Too much or too little backlash in table feed. | Anti-backlash nut needs adjusting. | Adjust (par. 32). |
| 14. Erratic table movement. | Table lead screw and saddle nuts worn. | Replace screw and nuts (par. 35). |
| 15. Excessive float in spindle hand feed lever. | Setscrew loose. | Tighten (par. 38). |
| 16. Spindle torque output inadequate. (Power feed). | Worn slip clutch.
Misalignment of motor and gear box. | Replace the clutch. (par. 44).
Align. |
| 17. No power to spindle feed. | D. C. power supply fuse blown.
Feed rate potentiometer faulty.
Table feed rate dial in "on" position. | Replace fuse.
Replace potentiometer.
Turn dial to "off" position. |
| 18. Spindle brake not operating properly. | Brake lever needs adjustment.
Brake shoes worn. | Adjust (par. 40).
Replace brake shoes (par. 47 or 50). |
| 19. Irregular pattern during face milling, or play in spindle. | Spindle ball bearings worn.

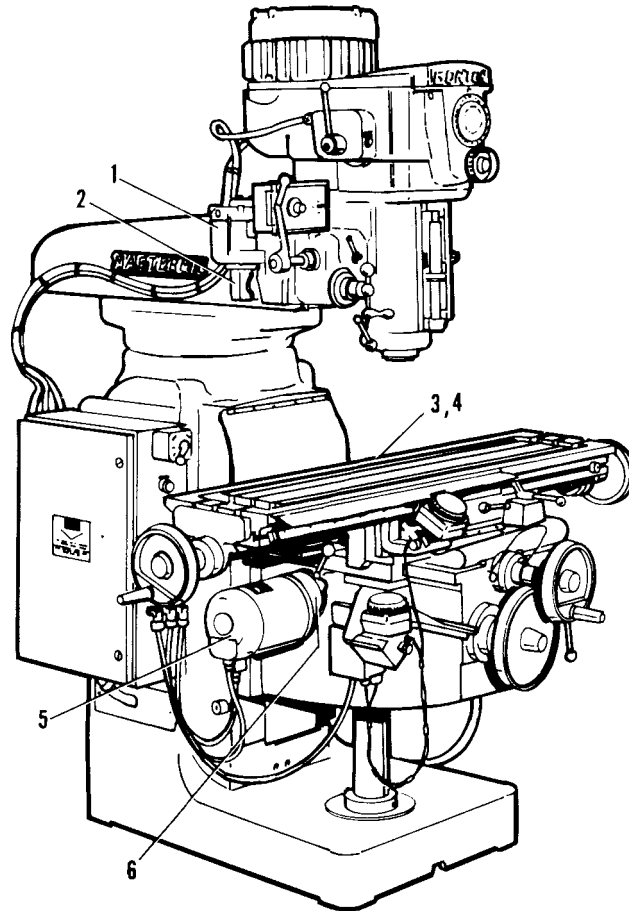
Cutting tool improperly sharpened. | Return spindle to factory, or if this is not possible, replace bearings (par. 42 or 55).
Re-sharpen tool. |
| 20. Quill binds. | Clamp ring adjustment too tight. | Loosen screw (par. 37). |
| 21. Heavy cutting causes chatter. | Clamp ring adjustment too loose. | Tighten screw (par. 37). |

MAINTENANCE CHECK LIST

22. Vernac optics inaccurate.	Reader out of focus. Scales misaligned. Scales dirty.	Re-focus. Re-align scales. Clean with tissue. (No solvent).
23. Turret turns under normal cutter pressure.	Spider clamp too loose.	Tighten (par. 54).
24. Head turns under normal cutter pressure,	Foreign material between mating surfaces.	Clean (par. 51).
25. Cutter spindle does not rotate under power.	Shifter knob in neutral position. Main electric switch open. Drive belt broken. "Forward-Reverse" switch in neutral position. Spindle brake "On". Main fuse blown. Heater coil activated.	Place in "High or Low" position. Close switch on electric cabinet. Replace belt (par. 46). Place in proper position. Release brake. Replace fuse. Push reset.

FOR LUBRICATION DATA AND DRAWINGS SEE PAGES M-30 AND M-31 FOLLOWING.

LUBRICATION



59. LUBRICATION

The 1-22 Mastermil must be properly lubricated before placing in operation and during operation to insure continued trouble-free operation. The illustrations locate lubrication points on the machine and the lubrication plate. Due to the advanced design, a minimum number of units require daily attention. However, adherence to the lubrication schedule is of major importance in obtaining maximum performance and long life of the machine.

1. SPINDLE DOWNFEED MOTOR

Spindle downfeed motor bearings are lubricated at factory--for two (2) year period. When repacking use Socony BRB #4 or Sun Oil Prestige #42. Repeat at two (2) year intervals.

2. SPINDLE DOWNFEED MOTOR GEAR CASE

Spindle downfeed gear case lubricated at factory--for two (2) year period. When repacking use Socony Mobilplex EP-24 or Sun Oil Prestige 740 AEP. Repeat at two (2) year intervals.

3,4. SADDLE/TABLE AND KNEE/COLUMN

Saddle/table slide lubrication pump and reservoir unit is located on left side of saddle. Hand pump should be operated once, twice daily. Pull out handle and allow pump to return slowly. The oil level of the reservoir should be checked daily and kept filled at all times.

Knee/column slide lubrication is through oil cups on knee. Check daily and keep filled. Use Socony Vactra #2 or Sun Oil SWL #80.

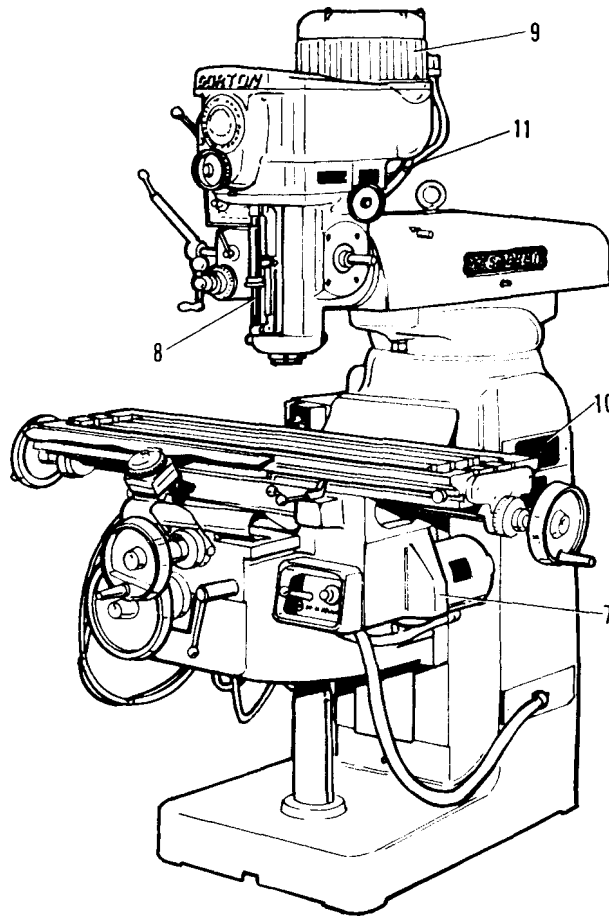
5. POWER ELEVATE MOTOR

Power elevate motor bearings are permanently grease packed and do not require replenishment or charge.

6. POWER ELEVATE GEAR BOX

The power elevate gear box is filled at factory for two (2) year period. When repacking the gear housing, cover must be dismantled. Use Socony Mobilplex EP-24 or Sun Oil Prestige 740 AEP.

LUBRICATION



7. DNYA-DRIVE II

Dyna-Drive II motor bearings are grease packed at factory. Repack after three (3) years of operation--under severe conditions, after approximately 18 months. Use Socony Mobilux No. 2 or Sun Oil Prestige #42,

8. SPINDLE BARREL AND DEPTH STOP

The spindle barrel and depth stop should be thoroughly cleaned and lightly oiled once per week. Use Socony Velocity #10 or Sun Oil Solnus #70.

NOTE: At same time lubricate the spindle splines with Fisk Refinery Lubriplate.

9. SPINDLE DRIVE MOTOR

Spindle drive motor bearings are lubricated

at factory. Requires no additional lubrication.

10. LUBRICATION PLATE

The lubrication plate which indicates type and frequency of lubrication as outlined above, is located on rear curved section of column.

For maximum efficiency and minimum downtime, always follow the directions as outlined. It is important to use fresh, clean lubricants at all times and to follow the specifications. Specific lubricants have been developed through extensive testing. Do not substitute unless equivalent product is available.

11. SPINDLE HEAD

Lubricate the spindle head through the grease fitting at the back of the head once per week. Use three (3) shots of Keystone #122 grease.

How to Identify and Order Replacement Parts

1. Refer to the following pages of parts illustrations and identification. Locate the desired part and index number in the exploded view.
2. Refer to the corresponding index number in the parts list on the facing page to determine the part number and name.
3. Send purchase order with part number, name, quantity and the SERIAL NUMBER OF THE MACHINE to:

Parts Division

**GORTON MACHINE CORPORATION
P.O. Box 705
Racine, Wisconsin 53401 USA**

Telephone: (414) 886-3711
Telex: 264427

NOTE: USE ONLY GORTON PART NUMBERS!

Do not use index numbers from illustrations in Maintenance Section. Use part name and number from parts list.

Do not use manufacturer's number. If part is not identified, sketch or photograph part required and include with order.

SERVICE POLICY

Service on machines and equipment out of warranty period will be provided at established rates which cover labor costs, travel and living expenses.

A purchase order is to be issued to the Gorton Machine Corporation to cover these costs.

Requests for service are to be directed to the attention of the service manager.

GORTON PREVENTIVE MAINTENANCE PROGRAM

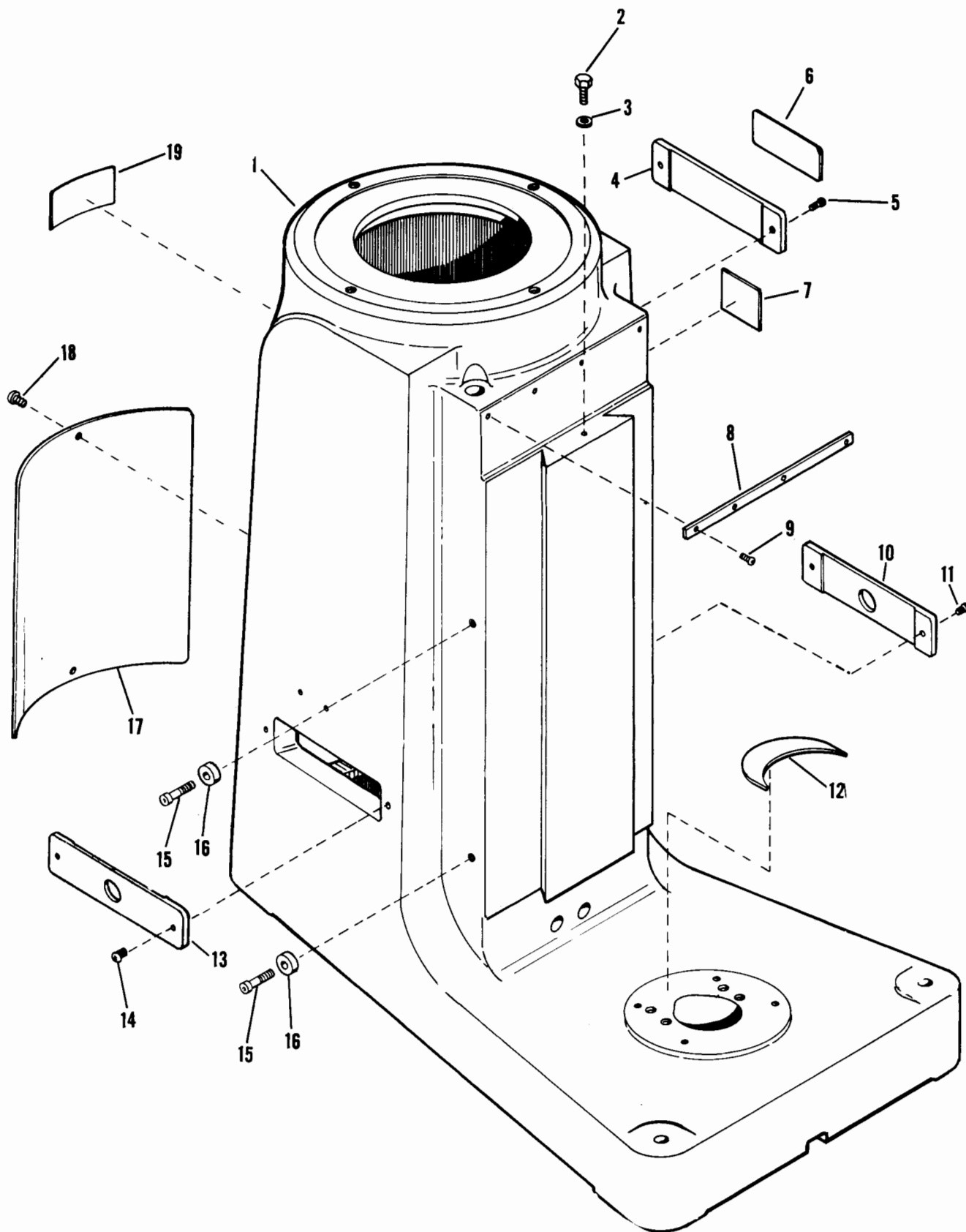
Use Gorton's Preventive Maintenance Program to assist your personnel in keeping this machine operating at peak efficiency

Under this contract arrangement skilled Gorton service engineers will check over the machine on a pre-determined schedule--tailored to your requirements.

Adjustments will be made to maintain the machine at maximum efficiency and necessary service and parts replacement will be recommended.

Write to Gorton Machine Corporation, 1321 Racine St., Racine, Wisconsin, Attn: Service Manager, for details on this program.

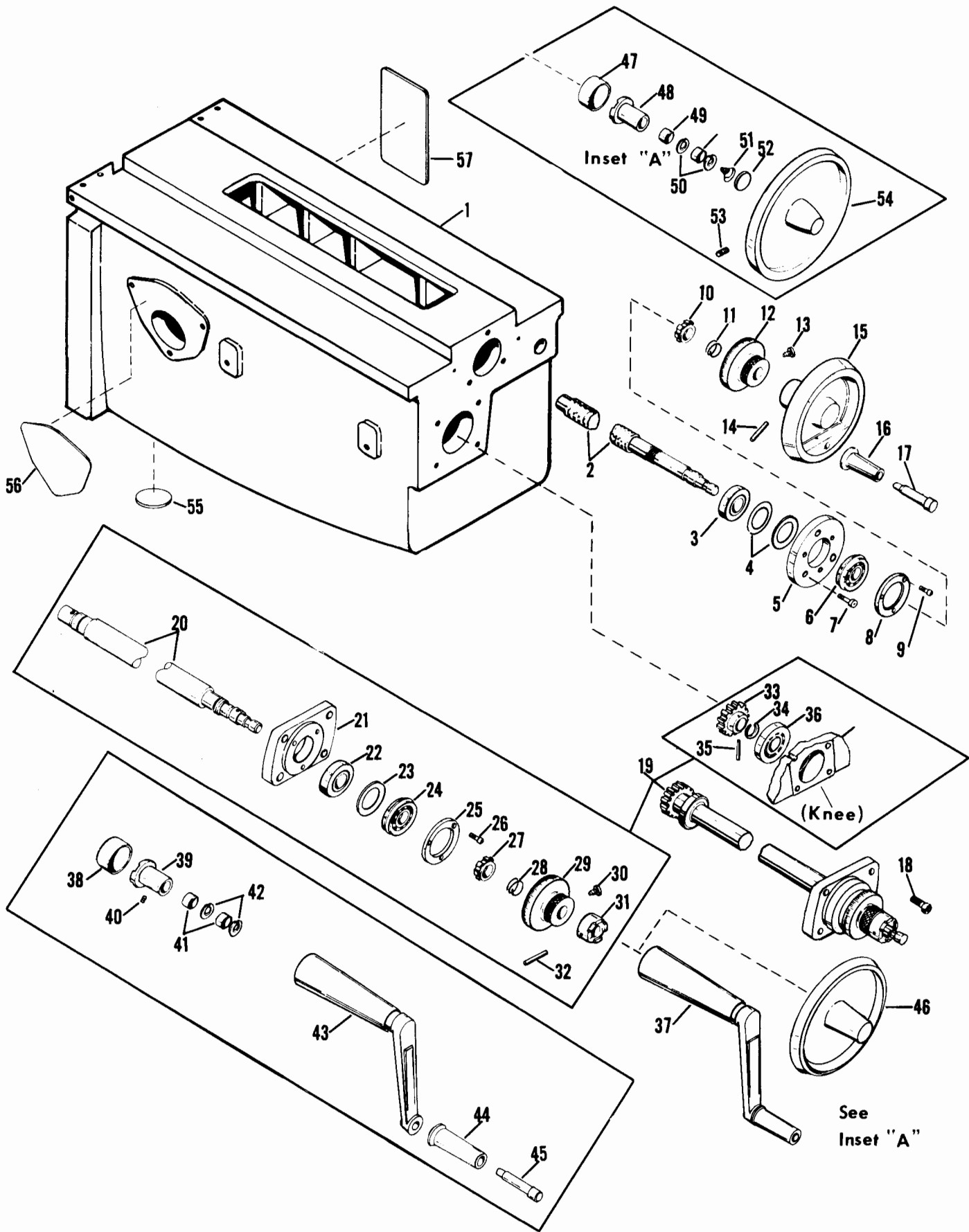
MODEL 1-22 COLUMN



MODEL 1-22 COLUMN

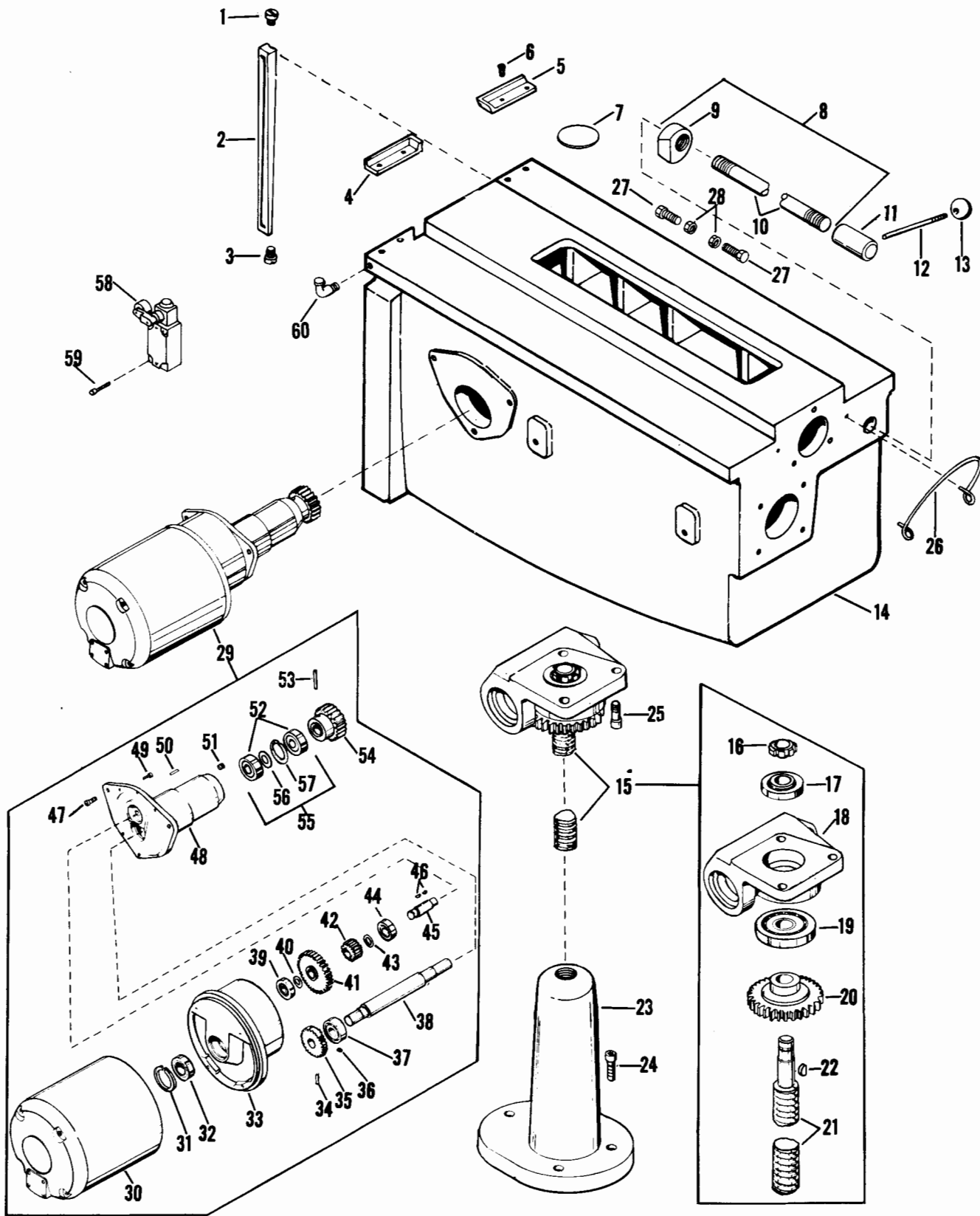
Index No.	Part No.	Part Name	Qty.
1	20602	Column	1
2	K-2031	Hex head cap screw, 3/8-16 x 5/8	1
3	K-454	Wrought washer, 1 x 7/16	1
4	23224	Side cover	1*
5	K-6608	Button head socket cap screw, 5/16-18 x 5/8	2
6	K-7560	Model name plate	1
7	K-7445	Patent number plate	1
8	21288	Apron holder	1
9	K-5388	Button head socket cap screw, 10-32 x 1/2	4
10	20511	Side cover, (power feed only)	1
11	K-6608	Button head socket cap screw, 5/16-18 x 5/8	2
12	20780**	Crescent cover	1
13	19777	Side cover, (flood coolant)	1
14	K-6608	Button head socket cap screw, 5/16-18 x 5/8	2
15	K-147	Socket cap screw, 5/16-18 x 5/8	2
16	20337	Stop, (power elevate)	2
17	22280	Rear column cover	1
18	K-6608	Button head socket cap screw, 5/16-18 x 5/8	2
19	K-7873	Lubrication plate	1

* Two used on hand feed
 ** For 10" knee



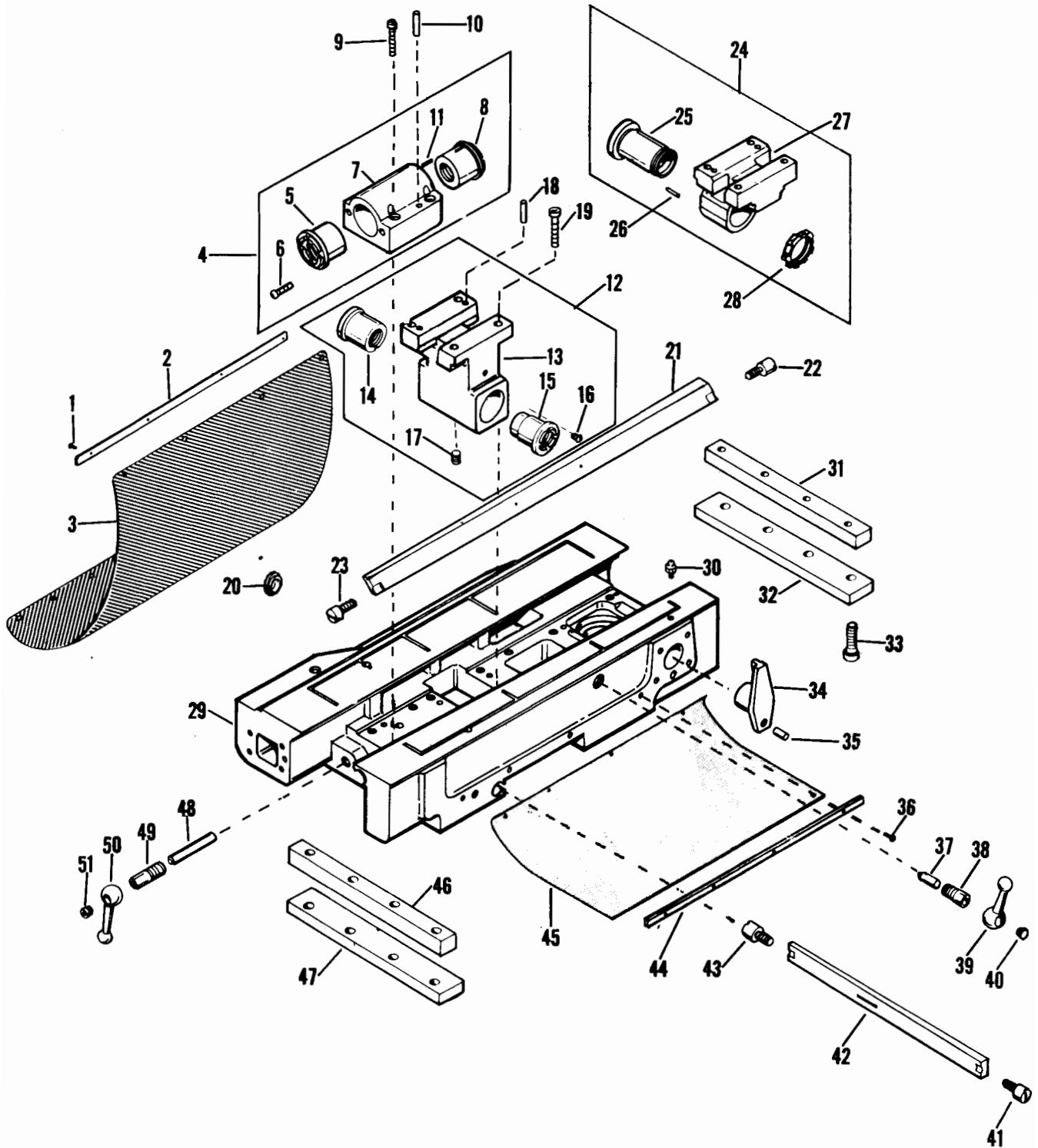
Index No.	Part No.	Part Name	Qty.
1	21052	Knee, 10"	1
1	20600	Knee, 12"	1
2	21069	Saddle feed screw, 10" knee	1
2	20623	Saddle feed screw, 12" knee	1
3	KB-2527	Ball bearing	1
4	K-7763	Shim bearing spacer (.002)	2
4	K-7764	Shim bearing spacer (.003)	2
4	K-7765	Shim bearing spacer (.007)	2
5	21058	Feed bearing housing	1
6	KB-6230	Ball bearing	1
7	K-141	Socket cap screw, 5/16-18 x 3/4	3
8	K-7350	Bearing plate	1
9	K-135	Socket cap screw, 1/4-20 x 3/4	3
10	K-6858	Bearing locknut	1
11	20442	Spring, 12" knee	1
12	21118	Dial	1
13	21126	Thumb screw	1
14	K-5563	Roll pin, 1/4 x 1-3/4	1
15	20387	Handwheel, HF knees	1
15	20298	Handwheel, PF knees	1
16	20164	Machine handle	1
17	20165	Machine handle	1
18	K-143	Socket cap screw, 12" knees, 5/16-18 x 1	4
19	CP-2341	Elevate shaft assembly, 10" knees	1
19	CP-2430	Elevate shaft assembly, 12" knees	1
20	20414	Elevate handwheel shaft, 10"	1
20	20625	Elevate handwheel shaft, 12"	1
21	22164	Elevate bearing plate, 10"	1
21	20097	Elevate bearing plate, 12"	1
22	KB-2527	Ball bearing	1
23	K-7763	Shim bearing spacer (.002)	AR
23	K-7764	Shim bearing spacer (.003)	AR
23	K-7765	Shim bearing spacer (.007)	AR
24	KB-6230	Ball bearing	1
25	K-7350	Bearing plate	1
26	K-135	Socket cap screw, 1/4-20 x 3/4	3
27	K-6858	Bearing locknut	1
28	20442	Spring	1
29	21062	Knee elevate dial	1
30	21126	Thumb screw	1
31	21121	Dial clutch	1
32	K-7383	Roll pin, 1/4 x 1-5/8	1
33	20432	Elevate drive gear	1
34	K-6497	Retaining washer	1
35	K-5983	Roll pin, 5/16 x 1-5/8	1
36	KB-3418	Ball bearing	1
37	CP-2417	Elevate crank assembly, HF knees	1
38	21122	Dial clutch guard	1
39	20299	Handwheel clutch	1
40	K-7853	Socket set screw, half dog pt., 1/4-20 x 5/8	1
41	KB-7848	Needle bearing	2
42	K-6299	Retaining ring	2
43	20582	Elevate crank	1
44	20164	Machine handle	1
45	20165	Machine handle	1
46	CP-2338	Elevate handwheel, PF knees	1
47	21122	Dial clutch guard	1
48	20299	Handwheel clutch	1
49	KB-7848	Needle bearing	2
50	K-6299	Retaining ring	2
51	19878	Taper coil spring	1
52	K-6505	Wrought washer, 1-3/16 x 1/4	1
53	K-7853	Socket set screw, half dog pt., 1/4-20 x 5/8	1
54	20342	Handwheel	1
55	20633	Round cover, 12" knees	1
56	K-7633	Cover, HF knees	1
57	20632	Cover, 12" knees	1

MODEL 1-22 KNEE LIST NO. 2



Index No.	Part No.	Part Name	Qty.
1	6296	Gib adjusting screw, 10" knee	1
2	20344	Gib adjusting screw, 12" knee	1
2	20619	Knee gib	1
3	6296	Gib adjusting screw, 10" knee	1
3	20344	Gib adjusting screw, 12" knee	1
4	K-8137	Wiper, 12" knee	1
5	K-8136	Wiper, 12" knee	1
6	K-7466	Button head socket screw, 12" knee, 10-32 x 5/8	4
7	K-7311	Expansion plug	1
8	CP-2419	Knee lock, 12" knee	1
8	CP-2055	Shaft and gib lock, 10" knee	1
9	22235	Knee lock, 10" and 12" knee	1
10	21065	Knee lock shaft, 10" knee	1
10	20622	Knee lock shaft, 12" knee	1
11	19927	Knee lock hub	1
12	19928	Lock handle	1
13	K-546	Black plastic knob	1
14	21052	Knee, 10"	1
14	20600	Knee, 12"	1
15	CP-2331	Elevate screw and bracket	1
16	K-6858	Bearing locknut #5	1
17	KB-7766	Bearing	1
18	20144	Elevate gear bracket	1
19	KB-7767	Bearing	1
20	20434	Elevate gear	1
21	20375	Elevate screw	1
22	K-4505	Hi pro key, HP-708	1
23	20601	Elevate nut	1
24	K-175	Socket cap screw, 7/16-14 x 1-1/4	2
25	K-2505	Socket cap screw, 7/16-14 x 1-1/2	3
26	7137	Apron support	1
27	K-2646	Hex head cap screw, PF knees, 1/4-20 x 1	2
28	K-1517	Hex half nut, 12" knees, 1/4-20	2
29	T-1454-1	Power elevate assembly, PF knees	1
30	E-1252	Elevate motor, 1/2 HP	1
31	K-7573	Snap ring, 5002-156	1
32	KB-3824	Ball bearing, 203KPP	1
33	20011	Gear housing	1
34	K-5440	Roll pin, 3/16 x 1	1
35	K-7412	Spur gear, 48 teeth	1
36	K-3628	Socket set screw, 10-32 x 3/16	1
37	KB-7415	Ball bearing, 302KDD	1
38	20014	Power shaft	1
39	KB-7431	Ball bearing, 301KDD	1
40	20069	Washer	1
41	K-7410	Spur gear, 63 teeth	1
42	K-7411	Spur gear, 28 teeth	1
43	20069	Washer	1
44	KB-7431	Ball bearing, 301KDD	1
45	20013	Idler gear shaft	1
46	K-554	Woodruff key #6	2
47	K-135	Socket cap screw, 1/4-20 x 3/4	3
48	20012	Gear housing cover	1
49	K-1991	Socket cap screw, 10-32 x 1/2	4
50	K-6477	Roll pin, 1/8 x 1/2	1
51	K-7574	Pipe plug, 1/8 N. P. T.	1
52	KB-7416	Ball bearing, 302KD-DB, open sides abutting	1pr.
53	K-5652	Roll pin, 3/16 x 1-1/2	1
54	K-7413	Elevate drive gear	1
55	CP-2244	Bearing spacers, inner and outer	1
56	20018	Bearing spacer, inner	1
57	K-7572	Snap ring spacer	1
58	E-3014	Switch, PF knees	1
59	K-6739	Socket cap screw, PF knees, 10-32 x 1-3/4	2
60	K-2405	Oil cup	2

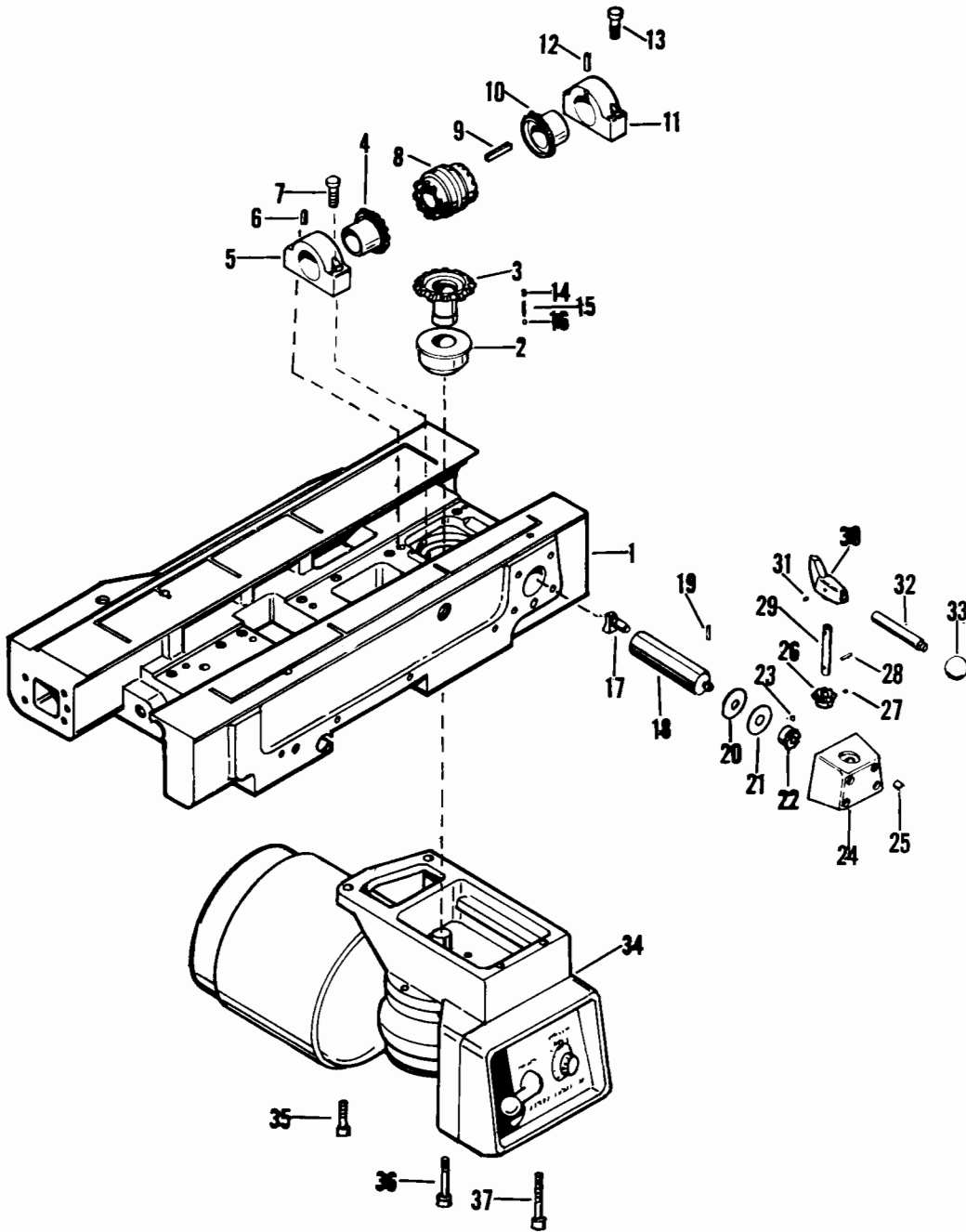
MODEL 1-22 SADDLE--NO. 1



MODEL 1-22 SADDLE--LIST NO. 1

Index No.	Part No.	Part Name	Qty.
1	K-5388	Button head screw, 10-32 x 1/2	4
2	21288	Apron holder on saddle	1
3	21359	Chip apron	1
4	CP-2489	Table feed nut and adapter	1
4	CP-2490	Table feed nut and adapter-Special accuracy (Individual parts not listed)	1
5	21092	Adjustable table nut	1
6	K-7293	Button head socket screw, 3/8-16 x 5/8	2
7	21229	Table nut adapter	1
8	21091	Fixed table nut	1
9	K-153	Socket cap screw, 3/8-16 x 1-1/2	4
10	K-3698	Dowel pin, 5/16 x 1-3/4, PF	2
11	K-5092	Socket set screw, 10-32 x 3/4	2
12	CP-2488	Cross feed nut and adapter, 12"	1
12	CP-2493	Cross feed nut and adapter-Special accuracy (Individual parts not listed)	1
13	20603	Cross feed nut housing, 12"	1
14	20627	Fixed saddle nut, 12"	1
15	20626	Adjustable nut, 12"	1
16	K-7293	Button head socket screw, 3/8-16 x 5/8	2
17	K-5092	Socket set screw, 10-32 x 3/4	1
18	K-4627	Dowel pin, 5/16 x 1-1/4	2
19	K-153	Socket cap screw, 3/8-16 x 1-1/2	4
20	K-5992	Bijur sight gage	1
21	20597	Table gib	1
22	6296	Gib screw	1
23	6296	Gib screw	1
24	CP-1917	Cross feed nut assembly, 10" saddles	1
25	21090	Saddle feed nut	1
26	K-5440	Roll pin	1
27	21082	Nut housing	1
28	K-87	Ball bearing locknut	1
29	19991	Saddle	1
30	K-3927	Socket set screw, cup point, HF, 5/16-18 x 3/4	1
31	21087	Guide plate spacer	1
32	21088	Guide plate	1
33	K-5999	Hex head cap screw, 1/2-13 x 2-1/4	8
34	20439	Table feed stop, HF	1
35	K-5528	Dowel pin, 3/8 x 1, HF	1
36	K-5388	Button head screw	4
37	19931	Table clamp pin	1
38	19922	Clamping stud	1
39	19924	Locking handle	1
40	K-406	Pipe plug	1
41	6296	Gib screw	2
42	22172	Saddle gib	1
43	6296	Gib screw	1
44	21288	Apron holder on saddle	1
45	20815	Chip apron, all 12" saddles	1
45	21358	Chip apron, 10" PF saddle	1
46	21087	Guide plate spacer	1
47	21088	Guide plate	1
48	21109	Gib clamp rod	1
49	19930	Saddle clamp	1
50	19924	Locking handle	1
51	K-406	Pipe plug, 1/8 N. P. T.	2

MODEL 1-22 SADDLE--NO. 2

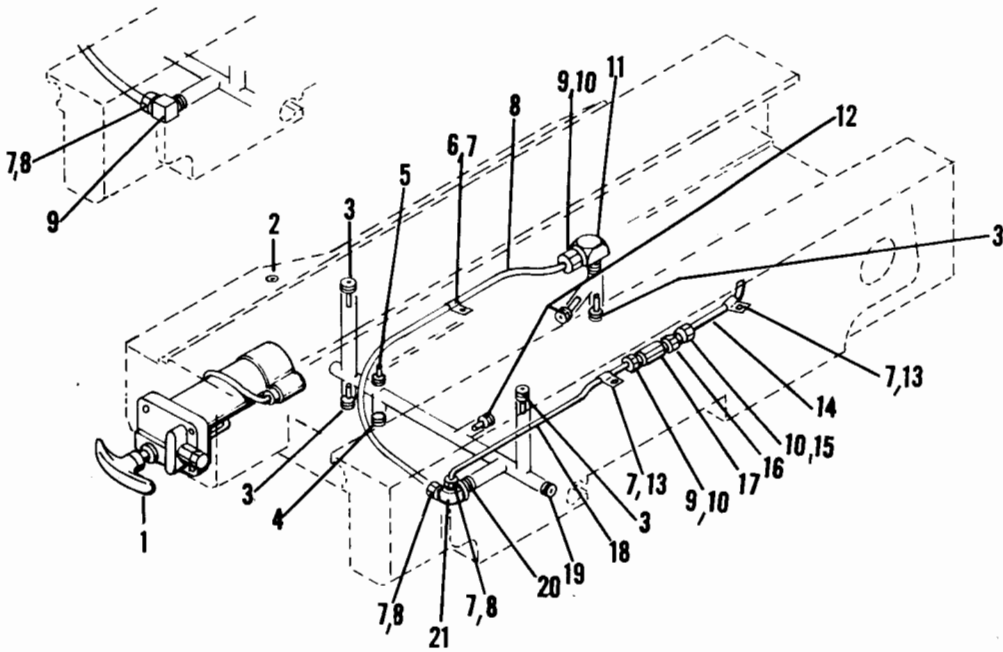


MODEL 1-22 SADDLE--LIST NO. 2

Index No.	Part No.	Part Name	Qty.
1	19991	Saddle	1
2	20028	Bevel gear bushing (PF)	1
3	20027	Feed bevel gear (PF)	1
4	20135	Drive clutch bevel gear (PF)	1
5	21083	Bevel gear bearing block (PF)	1
6	K-5990	Dowel pin (PF), 1/4 x 1-3/4	2
7	K-154	Socket cap screw (PF), 3/8-16 x 1-3/4	2
8	20045	Drive clutch (PF)	1
9	22199	Table feed clutch key (PF)	1
10	20135	Drive clutch bevel gear (PF)	1
11	21083	Bevel gear bearing block (PF)	1
12	K-5990	Dowel pin (PF), 1/4 x 1-3/4	2
13	K-154	Socket cap screw (PF), 3/8-16 x 1-3/4	2
14	K-201	Socket set screw (PF), flat pt. 5/16-18 x 1/2	1
15	7718	Spring, 12" PF saddle	1
15	9448	Knockout lever spring, 10" PF saddle	1
16	KB-76	Steel ball (PF)	1
17	20549	Shifting shoe (PF)	1
18	20440	Longitudinal feed shaft (PF)	1
19	K-7089	Roll pin (PF), 1/8 x 7/8	1
20	20058	Long shifter washer (PF)	1
21	20819	Spacer (PF)	1
22	20059	Bevel gear (PF)	1
23	K-1986	Socket set screw (PF), 10-32 x 1/4	1
24	20063	Long. shifter gear box (PF)	1
25	K-805	Cap screw (PF), 1/4-20 x 2-1/4	4
26	20060	Bevel gear (PF)	1
27	K-1986	Socket set screw (PF), 10-32 x 1/4	1
28	K-7089	Roll pin (PF), 1/8 x 7/8	2
29	20061	Shifter shaft	1
30	20441	Long. trip finger (PF)	1
31	K-7089	Roll pin (PF), 1/8 x 7/8	1
32	20062	Shifter handle (PF)	1
33	K-546	Black plastic knob (PF)	1
34	T-14554	Dyna Drive II (PF) (see page P-37 for parts breakdown)	1
35	K-151	Socket cap screw (PF), 3/8-16 x 1	2
36	K-159	Socket cap screw (PF), 3/8-16 x 3	1
37	K-2870	Socket cap screw (PF), 3/8-16 x 3-1/2	1

NOTE: HF - Hand Feed
PF - Power Feed

MODEL 1-22 SADDLE LUBRICATION

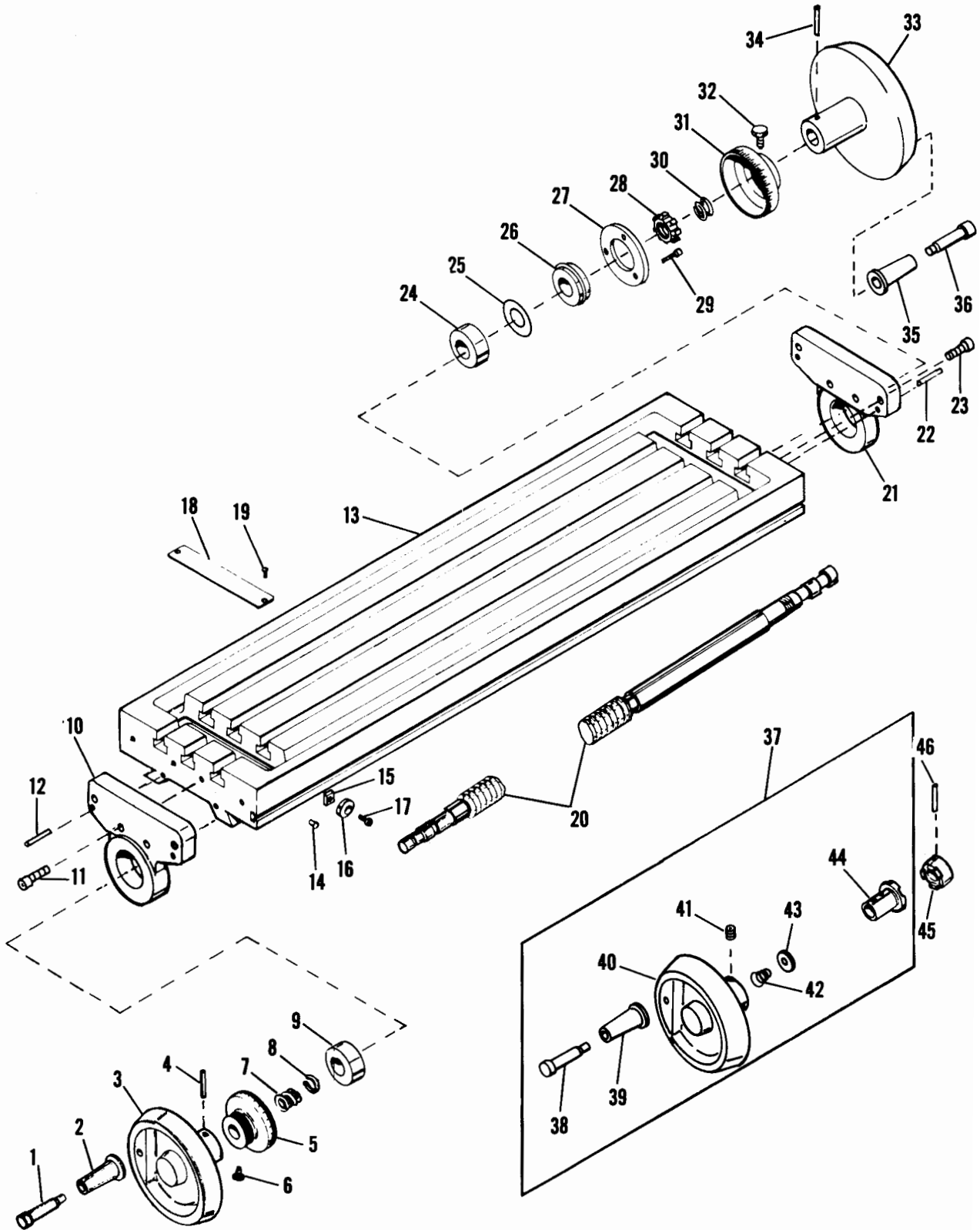


MODEL 1-22 SADDLE LUBRICATION

Index No.	Part No.	Part Name	Qty.
1	K-5991	Bijur one shot oiler	1
2	K-411	Socket pipe plug, 3/8 N. P. T. (HF)	1
3	K-5996	Bijur meter unit, FKA-1B	4
4	K-687	Socket pipe plug, 1/4 N. P. T.	1
5	K-5994	Bijur, FKB-2B	1
6	K-2908	Steel clip	1
7	K-6159	Round head, self tapping screw, 6-32 x 1/4	3
8	21357	Hand feed oil line	1
9	K-4520	Bijur bushing (Only 2 used on HF)	4
10	K-4522	Bijur sleeve (Only 2 used on HF)	5
11	K-5541	Elbow adapter, A-3080	1
12	K-5993	Bijur, FKA-3B	2
13	K-6385	Plastic clip	2
14	21788	Power feed oil line	1
15	K-4604	Compression nut, B-1095	1
16	K-6384	Bijur meter unit, FJB-00	1
17	K-6383	Female coupling	1
18	21675	Power feed oil line	1
19	K-406	Socket pipe plug, 1/8 N. P. T.	1
20	K-2152	Pipe nipple	1
21	K-6382	Junction header	1

NOTE: HF - Hand Feed
PF - Power Feed

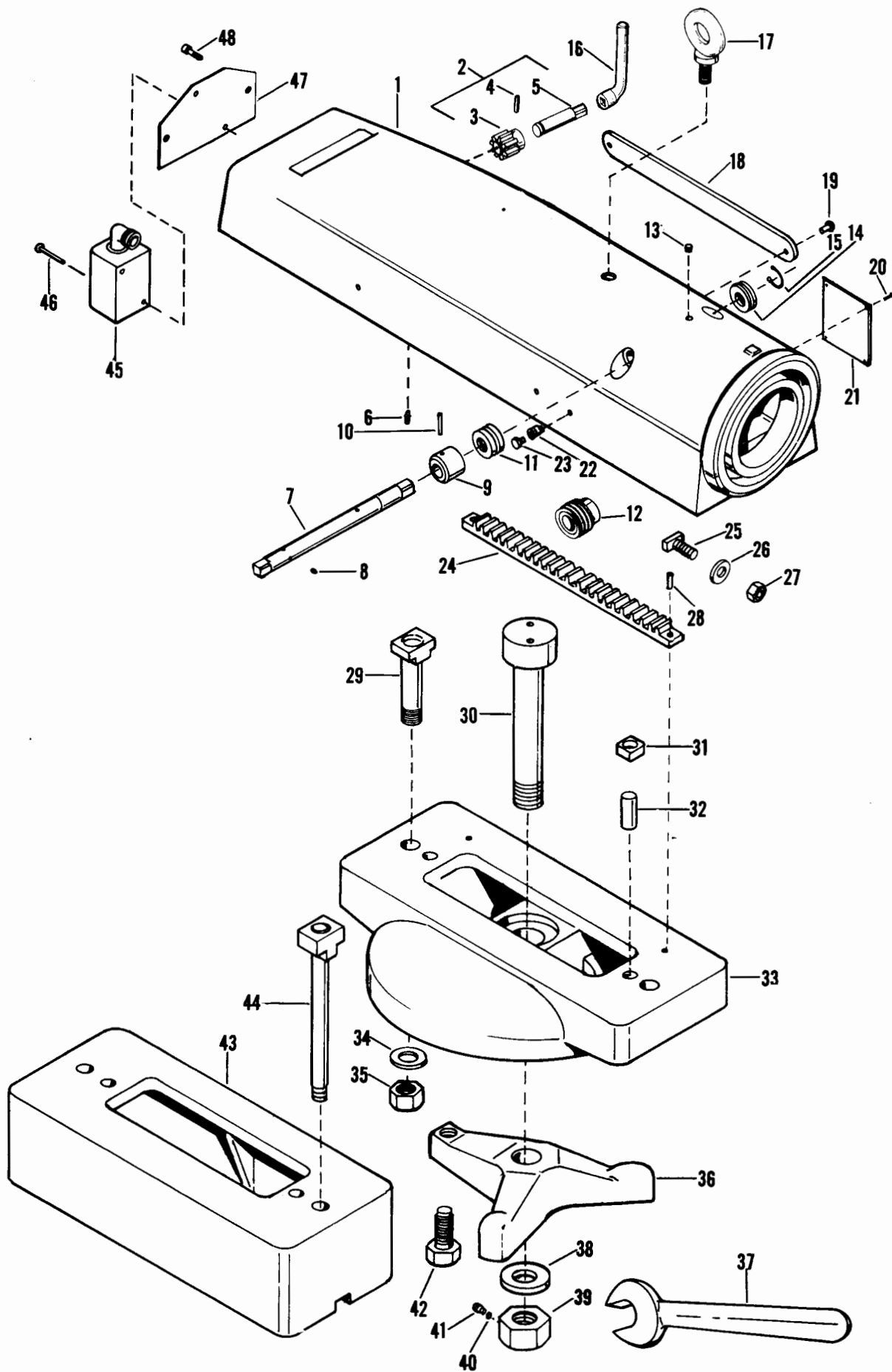
MODEL 1-22 TABLE



MODEL 1-22 TABLE

Index No.	Part No.	Part Name	Qty.
1	20165	Machine handle	2
2	20164	Machine handle	2
3	20387	Handwheel	2
4	K-5563	Roll pin, 1/4 x 1-3/4	1
5	21118	Dial	1
6	21126	Thumb screw	1
7	20442	Spring	1
8	K-4591	Truarc snap ring	1
9	KB-2527	Ball bearing	1
10	21117	Table end bracket	1
11	K-813	Socket head cap screw, 7/16-14 x 1	4
12	K-4627	Dowel pin, 5/16 x 1-1/4	2
13	21115	Table, 10"	1
13	22452	Table, 12"	1
14	K-133	Socket cap screw, 1/6-20 x 1/2	2
15	21130	Tee slot	2
16	21129	Adjustable stop	2
17	K-141	Socket cap screw, 5/16-18 x 3/4	2
18	21127	Coolant screen	1
19	K-394	Round head mach. screw, 10-32 x 3/8	2
20	21120	Table screw, 10"	1
20	22451	Table screw, 12"	1
21	21116	Table end bracket	1
22	K-4627	Dowel pin, 5/16 x 1-1/4	2
23	K-813	Socket head cap screw, 7/16-14 x 1	4
24	KB-2527	Ball bearing	1
25	K-7764	Shim bearing spacer	2
25	K-7765	Shim bearing spacer	2
26	KB-6230	Ball bearing	1
27	K-7350	Bearing plate	1
28	K-6858	Bearing locknut	1
29	K-135	Socket cap screw, 1/4-20 x 3/4	3
30	20442	Spring	1
31	21118	Dial	1
32	21126	Thumb screw	1
33	20387	Handwheel	1
34	K-5563	Roll pin, 1/4 x 1-3/4	1
35	20164	Machine handle	1
36	20165	Machine handle	1
37	CP-2302	Handwheel and clutch, PF	2
38	20165	Machine handle	1
39	20164	Machine handle	1
40	20163	Handwheel	1
41	K-8032	Socket set screw, half dog point, 1/4-20 x 1/2	1
42	19878	Taper coil spring	1
43	K-6505	Wrought washer, 1-3/16 x 1/4	1
44	21123	Handwheel clutch	1
45	21121	Dial clutch, PF	2
46	K-5563	Roll pin, 1/4 x 1-3/4, PF	2

MODEL 1-22 RAM AND TURRET

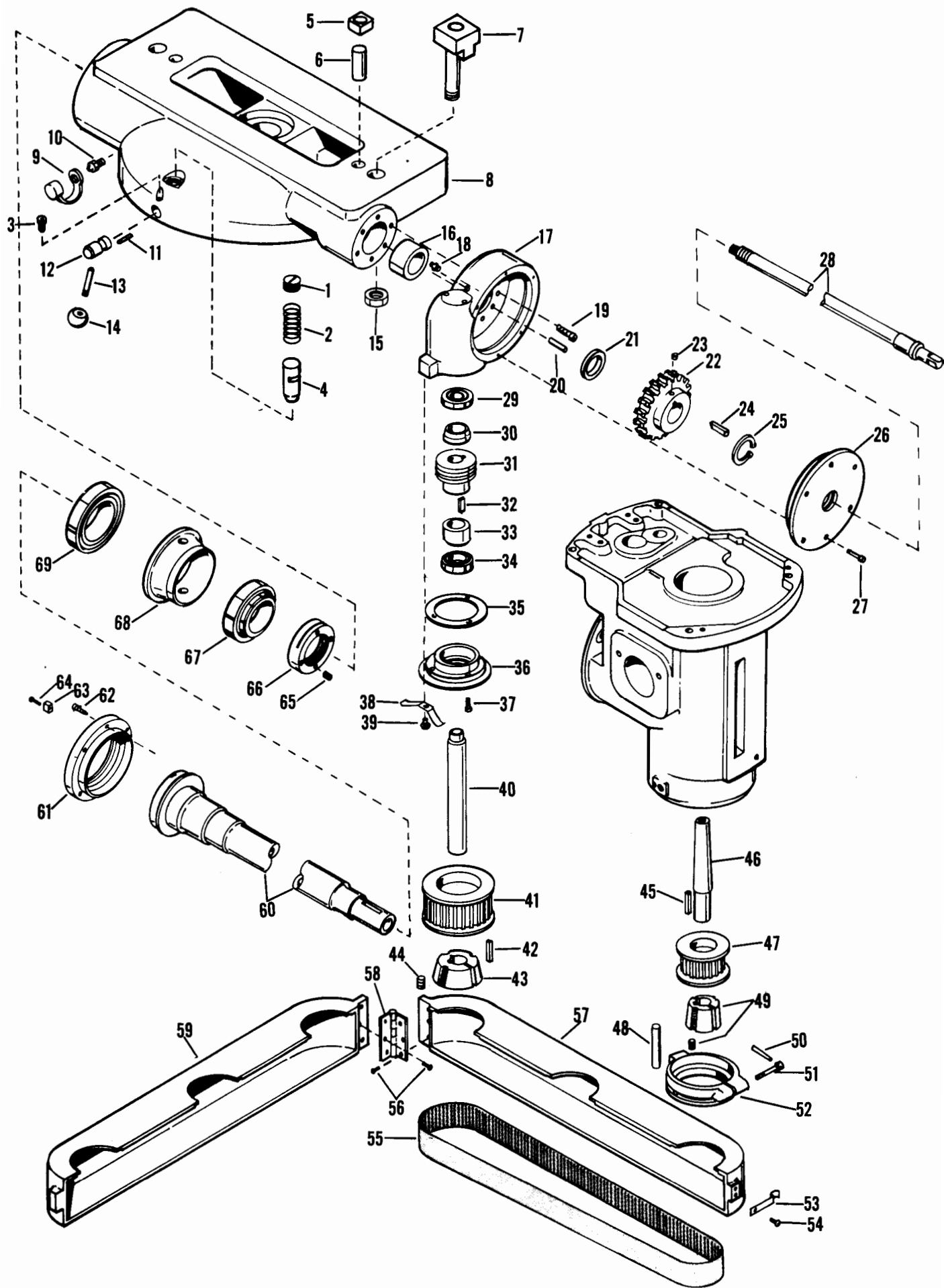


MODEL 1-22 RAM AND TURRET

Index No.	Part No.	Part Name	Qty.
	CP-2002	Ram assembly	1
1	21131	Ram	1
2	CP-1924	Rack pinion shaft assembly	1
3	7857	Rack pinion	1
4	K-5562	Roll pin, 1/4 x 1-1/4	1
5	21136	Shaft	1
6	K-6005	Nylock socket set screw, full dog point, 3/8-16 x 3/4	1
7	21137	Head adjusting shaft	1
8	K-3628	Socket set screw, 1C-32 x 3/16	2
9	21138	Head adjusting shaft collar	1
10	K-5562	Roll pin, 1/4 x 1-1/4	1
11	KB-44	Thrust bearing	1
12	21141	Head adjusting shaft worm	1
13	K-406	Pipe plug, 1/8 N. P. T.	1
14	KB-44	Thrust bearing	1
15	K-7379	Retaining ring	1
16	K-6151	Socket wrench	1
17	K-2363	Eye bolt	1
18	21293	Name plate	2
19	K-6228	Drive pin	4
20	K-423	Drive pin	4
21	K-5718	Spindle speed plate	1
22	22717	Cable clamp	1
23	22716	Cable clamp thumb screw	1
24	20763	Ram transport rack	1
25	K-6008	Tee bolt	3
26	12973	Machine washer	3
27	K-6009	Hex nut, 1/2-13	3
28	K-5982	Roll pin, 5/16 x 1-1/4	2
29	CP-2054	Stud and nut	2
30	22234	Spider bolt	1
31	22241	Ram key	2
32	20348	Ram key pin	2
33	21133	Turret	1
34	K-448	Spring lockwasher	2
35	K-2277	Hex nut, 7/8-9	2
36	21132	Spider	1
37	K-6067	Williams wrench	1
38	K-6622	Wrought washer, 2-1/4 x 1-13/32	1
39	22497	Hex nut	1
40	11996	Brass plug	1
41	K-2009	Socket set screw, 5/16-18 x 5/16	1
42	21135	Spider adjusting screw	1
43	21824*	Raising block	1
44	CP-2168*	Clamp stud and tee nut	2
45	E-2105	Push button station, standard commercial	1
45	E-2028	Push button station, NMTBA or J. I. C.	1
46	K-2670	Round head mach. screw, 1/4-20 x 1/4	2
47	23219	Switch mtg. plate (Horiz. Only)	1
48	K-142	Socket cap screw (Horiz. Only) 5/16-24 x 3/4	2

* Optional Equipment

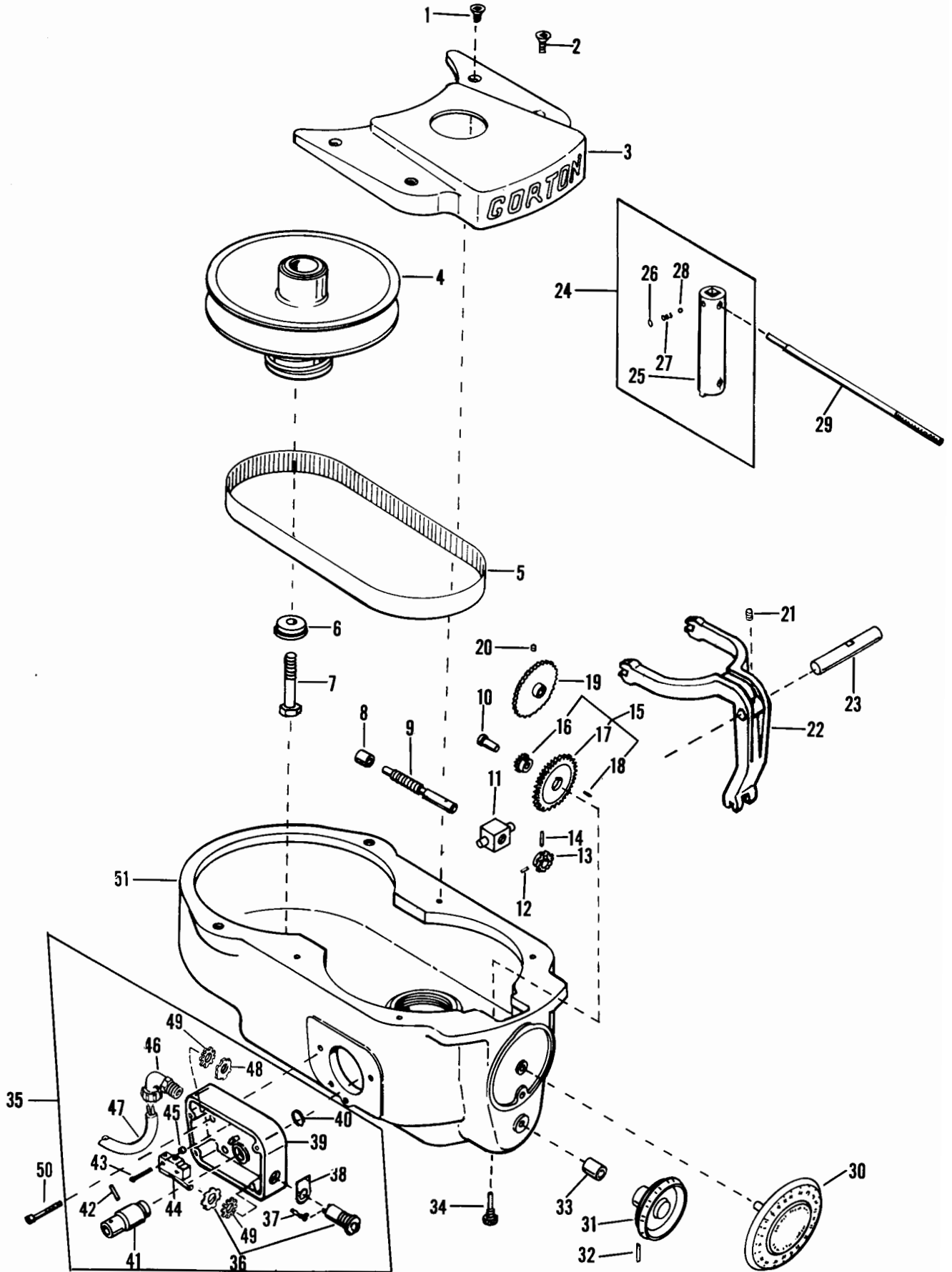
MODEL 1-22 HORIZONTAL SPINDLE



MODEL 1-22 HORIZONTAL SPINDLE

Index No.	Part No.	Part Name	Qty.
1	20464	Spring retainer	1
2	20483	Plunger spring	1
3	K-7853	Socket set screw, half dog pt., 1/4-20 x 5/8	1
4	20463	Lock pin	1
5	23616	Ram key	2
6	20348	Ram key pin	2
7	CP-2167	Clamp stud and tee nut	2
8	22770	Turret	1
9	K-8188	Grease cap	1
10	K-2023	Grease fitting	1
11	K-4545	Dowel pin, 1/4 x 3/4	1
12	20465	Lock pin shaft	1
13	20466	Lock handle shaft	1
14	K-546	Black plastic knob	1
15	K-2277	Hex nut, 7/8-9	2
16	KB-6930	Bearing	1
17	22771	Gear box	1
18	K-2023	Grease fitting	1
19	K-2026	Socket cap screw, 5/16-18 x 7/8	4
20	K-3934	Dowel pin, 5/16 x 1	2
21	19916	Spacer	1
22	K-6931	Helical gear	1
23	K-7063	Socket set screw, cup pt., 7/16-14 x 1/2	1
24	11982	Counter shaft pinion key	1
25	K-7832	Retaining ring	1
26	22776	Gear box cover	1
27	K-1990	Socket head cap screw, 10-32 x 5/8	6
28	CP-2158	Draw bar rod and head	1
29	KB-6935	Timken Bearing	1
30	22782	Gear spacer	1
31	K-6936	Helical gear	1
32	18049	Key	1
33	22784	Preload washer	1
34	KB-6937	Timken bearing	1
35	K-7335	Shim	1
36	22785	Bearing retainer	1
37	K-135	Socket cap screw, 1/4-20 x 3/4	2
38	22794	Belt guard spring	1
39	K-5387	Button head cap screw, 10-32 x 3/8	1
40	22778	Pulley shaft	1
41	K-6939	Pulley	1
42	18049	Key	1
43	K-6940	Taper lock bushing	1
44	K-2009	Socket set screw, flat pt., 5/16-18 x 5/16	1
45	18049	Key	1
46	22777	Drive pulley shaft	1
47	K-6934	Drive pulley	1
48	17218	Drill rod pin	1
49	22981	Drive pulley bushing	1
50	K-490	Taper pin, #4 x 2-1/2	1
51	7558	Clamp screw	1
52	22793	Belt guard support	1
53	22795	Belt guard latch	1
54	K-5387	Button head cap screw, 10-32 x 3/8	1
55	K-6932	Timing belt, short (60 teeth)	1
55	K-6943	Timing belt, long (102 teeth)	1
56	K-362	Flat head machine screw, 8-32 x 7/16	6
57	22796	Belt guard, right	1
58	K-4508	Door hinge	1
59	22797	Belt guard, left	1
60	22772	Spindle	1
61	22788	Bearing retainer ring	1
62	K-141	Socket cap screw, 5/16-18 x 3/4	6
63	10266	Spindle nose key	2
64	K-135	Socket cap screw, 1/4-20 x 3/4	2
65	K-1569	Flat point socket set screw, 1/4-20 x 3/8	2
66	22774	Preload nut	1
67	KB-6929	Bearing	1
68	22773	Bearing spacer	1
69	KB-4277	Roller bearing	1

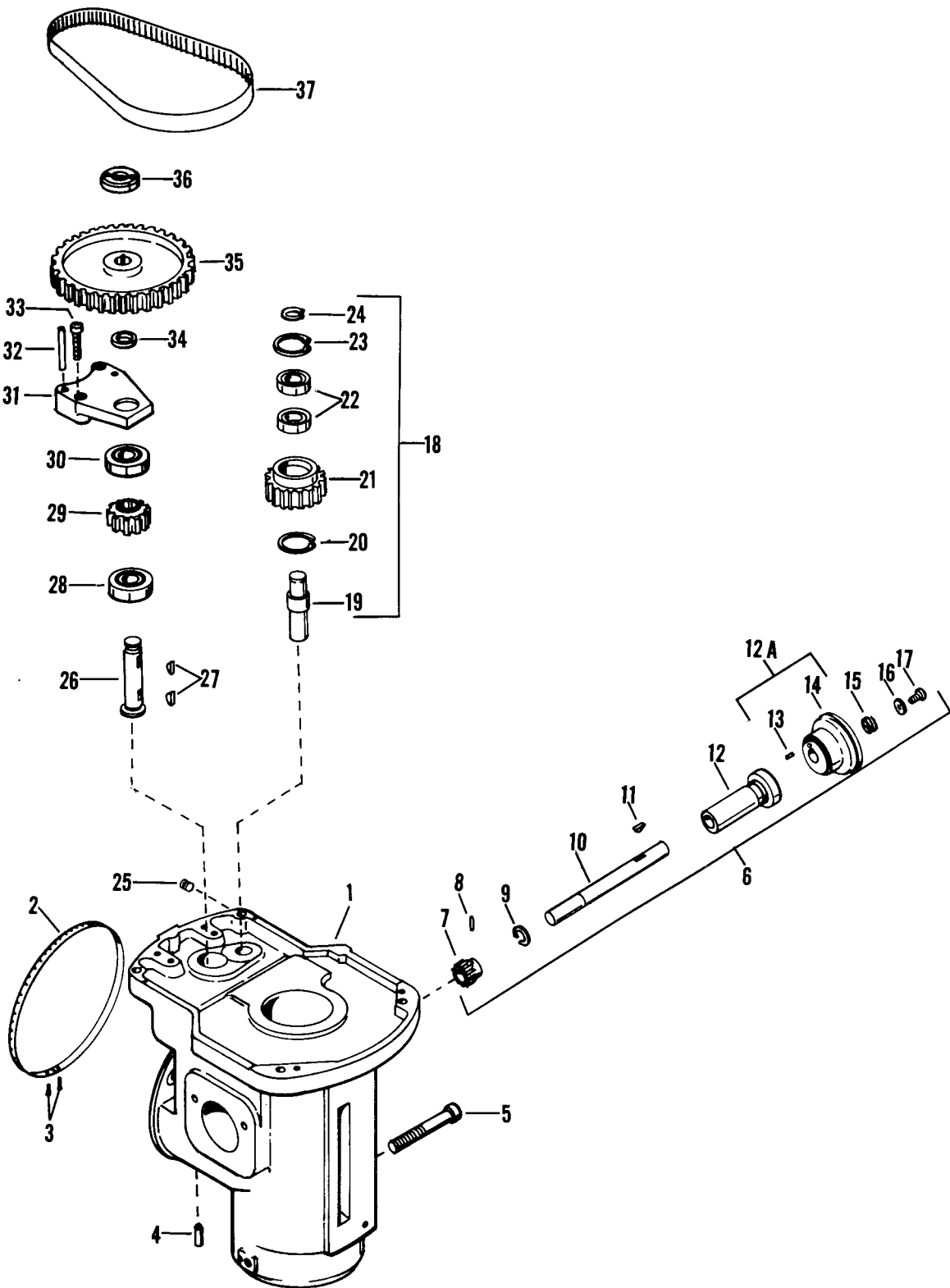
MODEL 1-22 VARIABLE SPEED HEAD NO. 1



MODEL 1-22 VARIABLE SPEED HEAD LIST No. 1

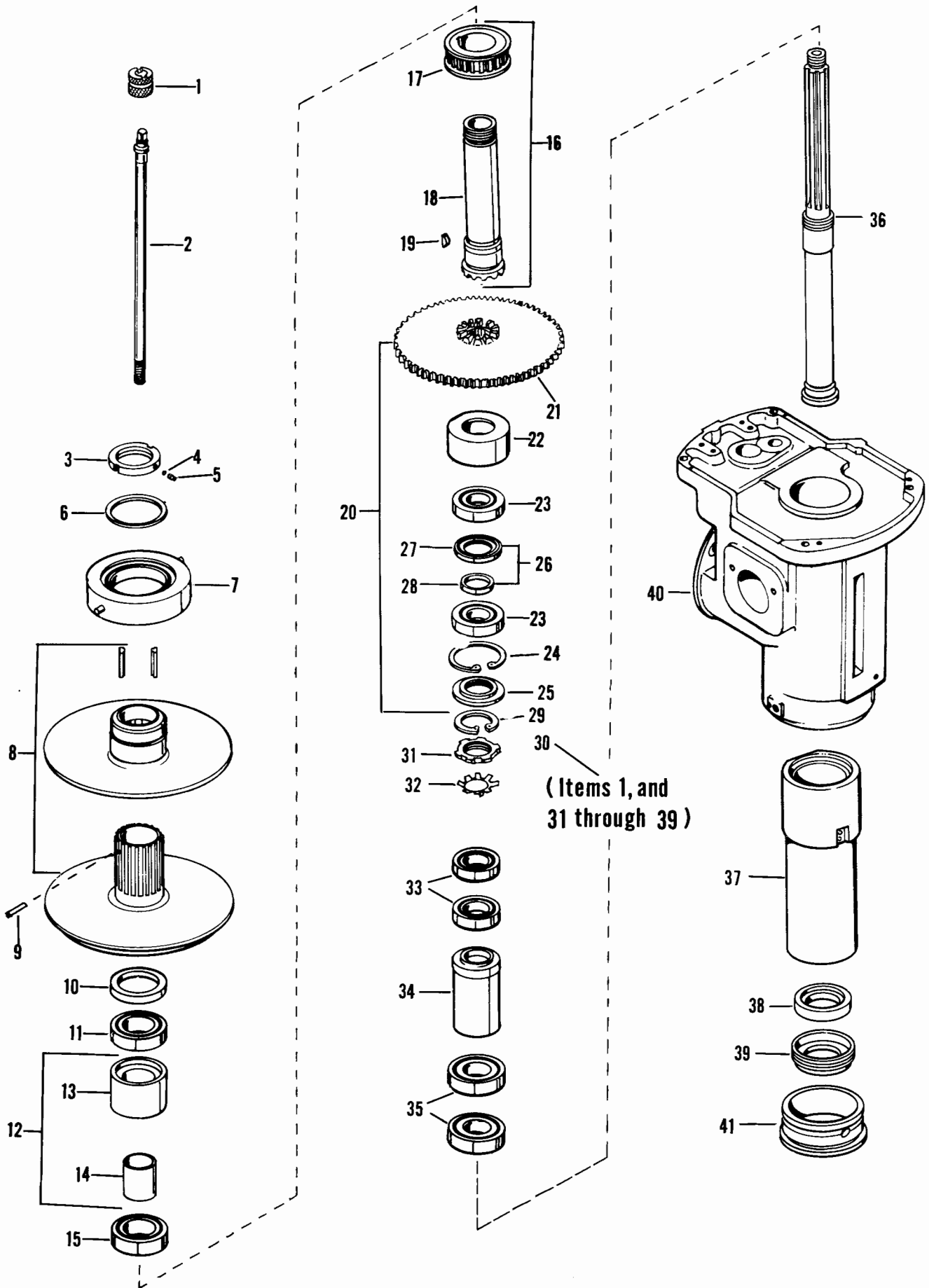
Index No.	Part No.	Part Name	Qty.
1	K-7747	Flat head socket screw, 1/4 x 1	2
2	K-6427	Flat head socket screw, 1/4 x 1-1/4	2
3	CP-2301	Housing cover	1
4	CP-2390	Motor pulley assembly	1
5	K-8130	Special belt	1
6	20295	Pulley retaining washer	1
7	K-7865	Hex head cap screw, 3/8-16 x 2-1/2	1
8	19975	Adjusting shaft bushing	1
9	19978	Gear adjusting shaft	1
10	19977	Gear shaft	1
11	19270	Trunion	1
12	K-2792	Socket set screw, cup point, 10-32 x 3/16	1
13	23266	Gear	1
14	K-5944	Roll pin, 1/8 x 3/4	1
15	CP-2247	Gear	1
16	19995	Gear, (30 teeth)	1
17	23267	Gear, (90 teeth)	1
18	K-7125	Dowel pin, 1/16 x 3/16	1
19	19994	Gear, (94 teeth)	1
20	K-7307	Socket set screw, knurled cup point, 10-32 x 3/16	1
21	K-1569	Flat point socket set screw, 1/4-20 x 3/8	1
22	19759	Speed adjusting arm	1
23	23254	Speed adjusting arm shaft	1
24	CP-2691	Wrench body and detent	1
25	23451	Wrench body	1
26	K-7712	Welsh plug	1
27	K-7711	Spring	1
28	K-7645	Steel ball	1
29	20198	Wrench handle	1
30	K-7617	Spindle speed dial and shaft	1
31	K-7618	Handwheel and insert	1
32	K-6753	Roll pin, 1/8 x 1	2
33	K-7140	Oilite bearing	1
34	20401	Dial lock screw	1
35	CP-2310	Brake switch housing assembly	1
36	E-2619	Push button	1
37	E-3029	Clips eye lugs	5
38	K-7736	Spindle start plate	1
39	19937	Brake switch housing	1
40	K-6146	Retaining ring	1
41	19939	Cam switch	1
42	K-7378	Dowel pin, 3/16 x 7/8	1
43	K-2370	Machine screw, round head, 6-32 x 1-1/8	2
44	E-3169	Microswitch	1
45	K-8610	Molded bushing	2
46	E-3232	45° Elbow cord grip	1
47	E-3028	Neoprene covered cable	1
48	E-3228	Lock nut	1
49	K-6241	External tooth lockwasher	2
50	K-135	Socket cap screw, 1/4-20 x 3/4	3
51	19999	Spindle pulley housing	1

MODEL 1-22 VARIABLE SPEED HEAD--NO. 2



MODEL 1-22 VARIABLE SPEED HEAD--LIST NO. 2

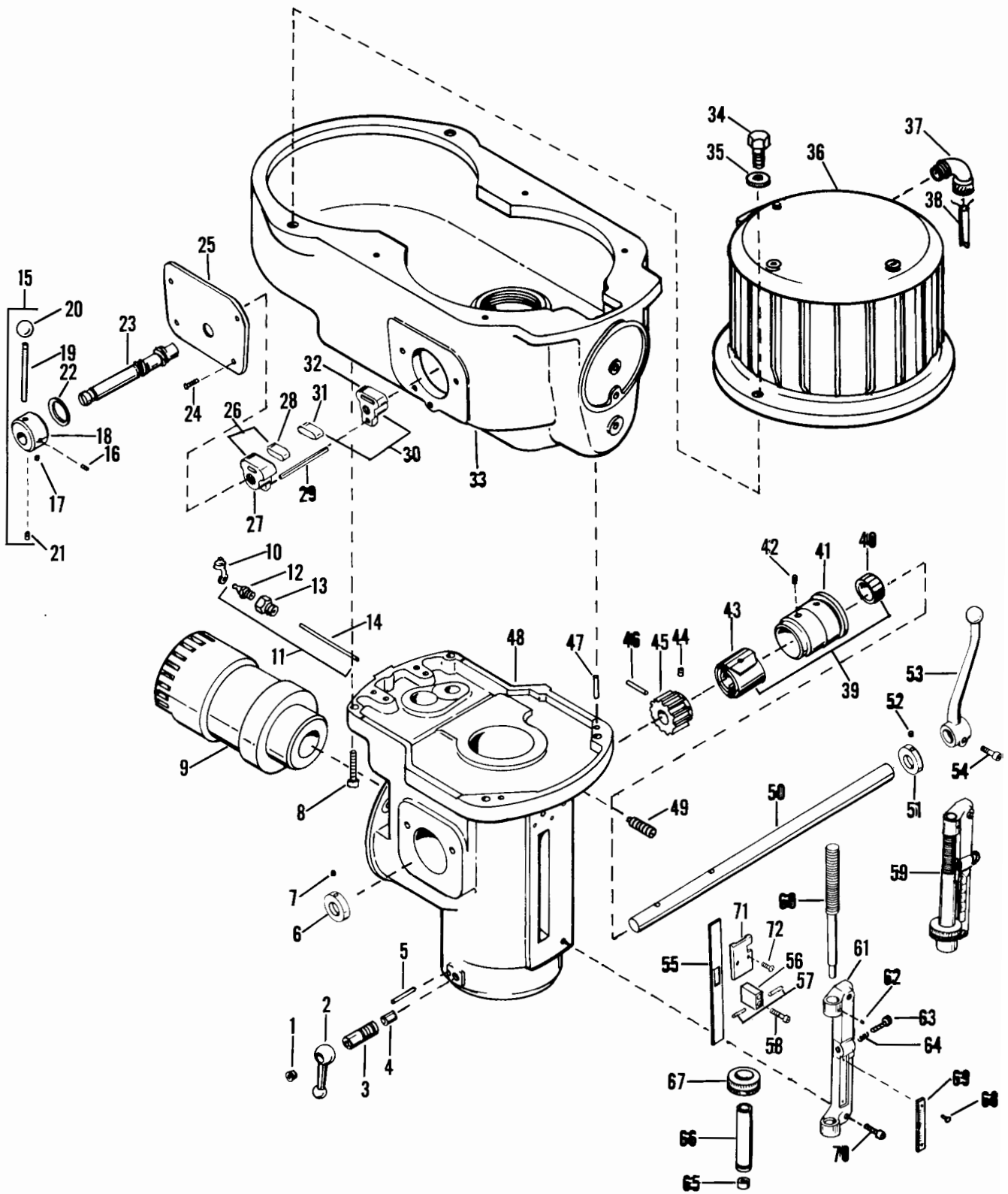
Index No.	Part No.	Part Name	Qty.
1	23080	Spindle head	1
2	K-8033	Graduated band	1
3	K-5306	Drive pin	2
4	K-4059	Hardened dowel pin, 3/8 x 1-1/4	1
5	K-4490	Socket cap screw, 5/8-11 x 4	1
6	CP-2671	Gear shifter knob and SF	1
7	22779	Gear shift pinion	1
8	K-5975	Roll pin	1
9	K-7885	Retaining ring	1
10	20411	Gear shift shaft	1
11	K-4495	Hi pro key	1
12	20416	Gear shift sleeve	1
12A	CP-2384	Hand knob	1
13	K-7749	Dowel pin, 3/16 x 1/2	1
14	20412	Gear shift sleeve	1
15	22339	Compression spring	1
16	22380	Washer	1
17	K-6074	Button head screw, 1/4-20 x 1/2	1
18	CP-2392	Spindle idler gear and bearing	1
19	21205	Idler gear shaft	1
20	K-6076	Retaining ring	1
21	20533	Idler gear	1
22	KB-6077	Ball bearing	2
23	K-6076	Retaining ring	1
24	K-5255	Retaining ring	1
25	K-7136	Socket set screw, knurled cup pt., 5/16-18 x 3/8	3
26	23305	Counter shaft	1
27	K-5579	Hi pro key	2
28	KB-32	Ball bearing	1
29	19866	Pinion gear	1
30	KB-32	Ball bearing	1
31	22033	Bearing support	1
32	K-5368	Dowel pin	2
33	K-153	Socket cap screw, 3/8-16 x 1-1/2	2
34	22035	Spacer	1
35	22341	Timing belt pulley	1
36	23304	Counter shaft nut	1
37	K-6082	Timing belt	1



MODEL 1-22 VARIABLE SPEED HEAD --LIST NO. 3

Index No.	Part No.	Part Name	Qty.
1	23097	Draw bar thrust nut	1
2	CP-2537	Draw bar rod and head	1
3	23302	Pulley lock nut	1
4	11994	Brass plug	1
5	K-1988	Flat point socket set screw	1
6	K-8008	Beveled ring	1
7	CP-2409	Bearing and yoke assembly	1
8	CP-2391	Spindle pulley assembly	1
9	K-8011	Roll pin, 1/4 x 3/8	1
10	19976	Bearing retaining nut	1
11	KB-6639	Ball bearing	1
12	CP-2287	Inner and outer bearing spacers	1
13	20328	Spacer	1
14	21193	Bearing spacer	1
15	KB-6639	Ball bearing	1
16	CP-2541	Pulley sleeve and pulley	1
17	CP-2001	Timing belt pulley	1
18	23095	Spindle pulley sleeve	1
19	K-5436	Hi pro key	1
20	CP-2536	Bull gear and bearing retainer	1
21	23081	Bull gear	1
22	23082	Bull gear retainer	1
23	KB-8404	Ball bearing	1pr.
24	K-8405	Beveled retaining ring	1
25	23085	Bearing nut	1
26	CP-2530	Bull gear bearing spacer	1
27	23083	Outer bearing spacer	1
28	23084	Inner bearing spacer	1
29	K-8505	Snap ring	1
30	CP-2531	Cutter spindle and barrel, #9 B&S (NOTE: See page P-28 for other spindles)	1
31	K-1349	Ball bearing locknut	1
32	K-95	Ball bearing lockwasher	1
33	KB-8404	Ball bearing	1pr.
34	7946	Spacer	1
35	KB-8404	Ball bearing	1pr.
36	23088	Cutter spindle	1
37	19847	Spindle barrel	1
38	7948	Oil retainer	1
39	7942	Locknut	1
40	23080	Spindle head	1
41	23098	Quill ring	1

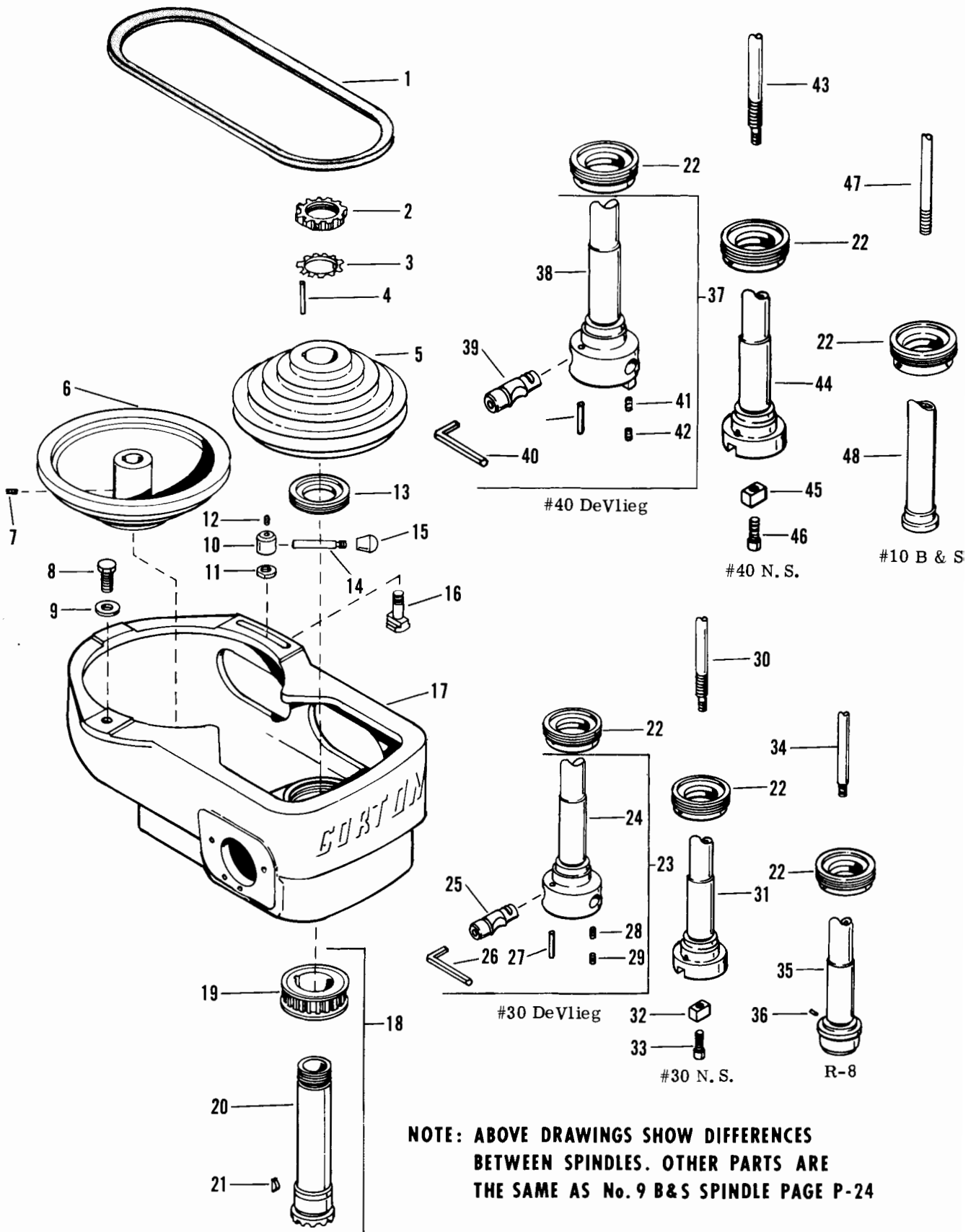
MODEL 1-22 VARIABLE SPEED HEAD NO. 4



MODEL 1-22 VARIABLE SPEED HEAD--LIST NO. 4

Index No.	Part No.	Part Name	Qty.
1	K-406	Pipe plug, 1/8 N. P. T.	1
2	19924	Locking handle	1
3	19922	Clamping stud	1
4	19923	Locking slug	1
5	12849	Drill rod pin	1
6	19488	Spindle feed shaft collar	1
7	K-7136	Socket set screw, knurled cup point, 5/16-18 x 3/8	1
8	K-152	Socket cap screw, 3/8-16 x 1-1/4	4
9	22383	Spindle head pilot	1
10	K-8188	Grease cap	1
11	CP-2295	Grease tube	1
12	K-2023	Grease fitting	1
13	K-7054	Grease fitting, ext.	1
14	20334	Grease tube	1
15	CP-2311	Spindle brake handle and hub	1
16	K-7322	Socket set screw, knurled cup point, 5/16-18 x 1/2	1
17	K-2503	Socket set screw, half dog point, 1/4-20 x 5/16	1
18	19942	Brake lever hub	1
19	19928	Lock handle	1
20	K-546	Black plastic knob	1
21	K-7322	Socket set screw, knurled cup point, 5/16-18 x 1/2	1
22	K-7390	Washer	1
23	19940	Brake screw	1
24	K-5388	Button head screw, 10-32 x 1/2	4
25	19938	Switch plate cover	1
26	CP-1932	Brake shoe	1
27	21489	Brake shoe	1
28	21182	Brake shoe insert	1
29	21488	Guide pin	1
30	CP-1931	Brake shoe	1
31	21183	Brake shoe insert	1
32	21490	Brake shoe	1
33	19999	Spindle pulley housing	1
34	K-275	Hex head cap screw, 1/2-13 x 1-1/2	2
35	12973	Machine washer	2
36	E-1249M	Spindle drive motor	1
37	K-6161	Conduit elbow	1
38	E-2478	Cable	1
39	CP-2415	Bearing and spring retaining sleeve	1
40	KB-1602	Bearing	1
41	20454	Bearing and spring retaining sleeve	1
42	23100	Spring keeper screw	1
43	K-8007	Clock spring	1
44	K-189	Socket set screw, flat point, 1/4-20 x 5/16	1
45	20781	Spindle feed pinion	1
46	K-7383	Roll pin, 1/4 x 1-5/8	1
47	K-6478	Dowel pin, 5/16 x 1-1/2	2
48	23080	Spindle head	1
49	K-1352	Socket set screw, half dog point, 3/8-16 x 1-1/2	1
50	23284	Down feed shaft	1
51	19488	Spindle feed shaft collar	1
52	K-7136	Socket set screw, knurled cup point, 5/16-18 x 3/8	1
53	8659	Spindle feed lever	1
54	K-152	Socket cap screw, 3/8-16 x 1-1/4	1
55	23086	Depth stop cover plate	1
56	23087	Feed stop	1
57	K-6753	Roll pin, 1/8 x 1	2
58	K-149	Socket cap screw, 5/16-18 x 2	2
59	CP-1930	Feed stop bracket assembly	1
60	22612	Feed stop micro screw	1
61	21199	Feed stop bracket	1
62	K-187	Socket set screw, flat point, 1/4-20 x 1/4	1
63	19736	Thumb screw	1
64	6415	Lock screw spring	1
65	K-6641	Oilite bearing	1
66	21201	Feed stop micro collar	1
67	21202	Feed stop micro wheel	1
68	K-5307	Drive pin	2
69	21203	Depth stop scale	1
70	K-151	Socket set screw, flat point, 1/4-20 x 1/4	2
71	23099	Slot cover shield	1
72	K-7466	Button head screw, 10-32 x 5/8	2

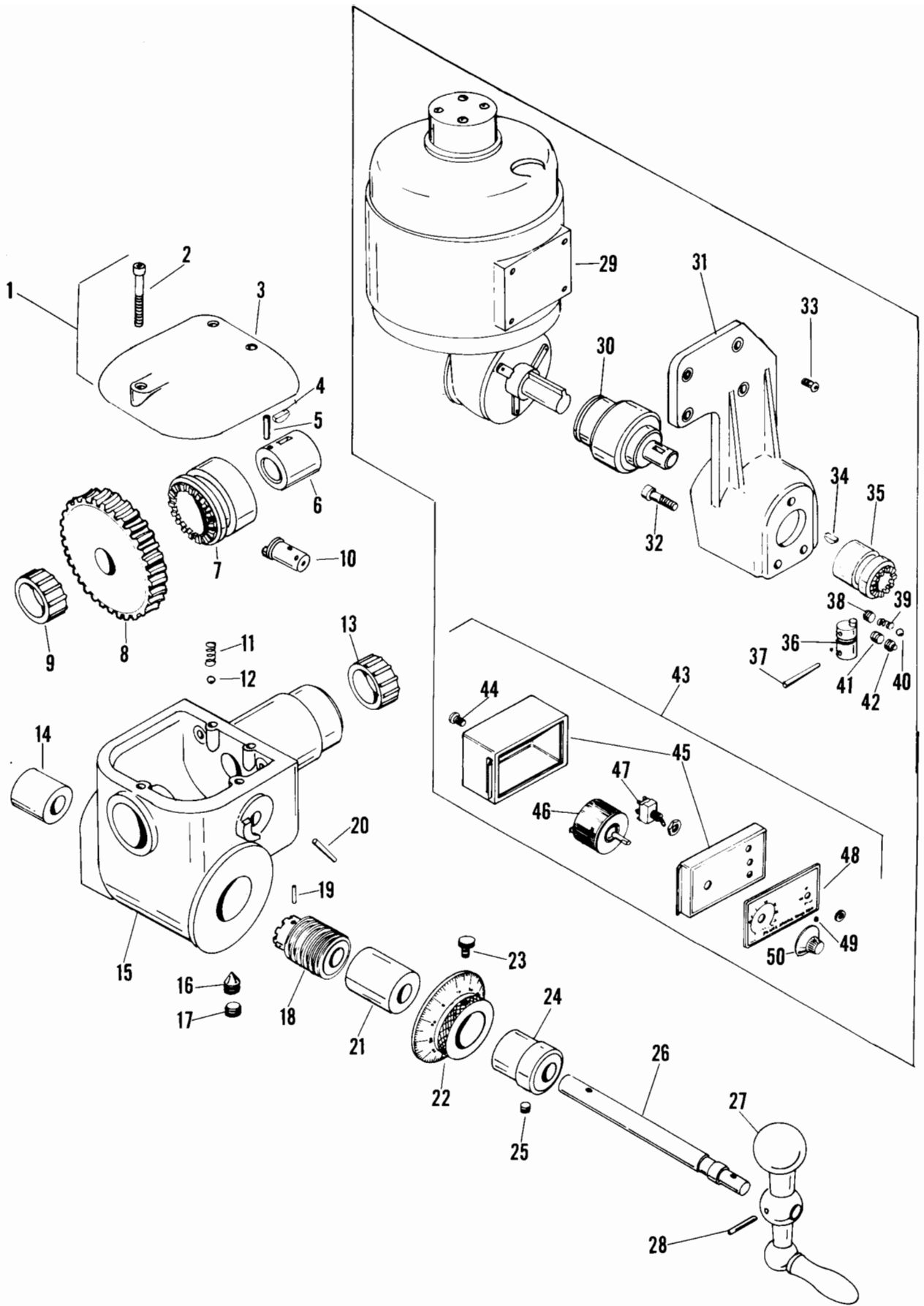
MODEL 1-22 STANDARD HEAD AND SPINDLES (DeVlieg, #30 N. S. ,
#40 N. S. , #10 N. S. AND R8 BRIDGEPORT)



**NOTE: ABOVE DRAWINGS SHOW DIFFERENCES
BETWEEN SPINDLES. OTHER PARTS ARE
THE SAME AS No. 9 B&S SPINDLE PAGE P-24**

MODEL 1-22 STANDARD HEAD AND SPINDLES (DeVlieg, #30 N. S. ,
#40 N. S. , #10 N. S. AND R8 BRIDGEPORT)

Index No.	Part No.	Part Name	Qty.
1	K-6374	Spindle drive belt	1
2	K-1349	Ball bearing locknut	1
3	K-95	Ball bearing lockwasher	1
4	18049	Key	1
5	21172	Spindle pulley	1
6	21173	Motor pulley	1
7	K-1569	Flat point socket set screw, 1/4-20 x 3/8	1
8	K-275	Hex head cap screw, 1/2-13 x 1-1/2	1
9	12973	Machine washer	1
10	20526	Bolt clamp nut	1
11	20804	Machine washer	1
12	K-189	Socket set screw, flat point, 1/4-20 x 5/16	1
13	19976	Ball bearing locknut	1
14	22680	Clamp handle	1
15	K-6757	Plastic knob	1
16	20580	Tee slot bolt	1
17	22001	Spindle pulley housing	1
18	CP-2540	Pulley sleeve and pulley	1
19	CP-2001	Timing belt pulley	1
20	23096	Spindle pulley sleeve	1
21	K-5436	Hi pro key	1
22	7942	Ball bearing locknut	1
23	CP-2570	Spindle and lock, DeVlieg #30	1
24	23092	Cutter spindle, DeVlieg #30	1
25	K-7064	Tool lock, DeVlieg #30	1
26	K-250	Hex socket screw wrench, DeVlieg #30	1
27	K-7065	Dowel pin, DeVlieg #30	1
28	K-4703	Socket set screw, half dog point, 10-32 x 1/4, DeVlieg #30	1
29	K-1986	Socket set screw, flat point, 10-32 x 1/4, DeVlieg #30	1
30	CP-2538	Draw bar rod and head, #30 N. S.	1
31	23090	Cutter spindle, #30 N. S.	1
32	10266	Spindle nose key, #30 N. S.	2
33	K-135	Socket cap screw, 1/4-20 x 3/4, #30 N. S.	2
34	CP-2539	Draw bar rod and head, R8 Bridgeport	1
35	23091	Cutter spindle, R8 Bridgeport	1
36	20417	Drill rod pin, R8 Bridgeport	1
37	CP-2572	Spindle and lock, DeVlieg #40	1
38	23094	Cutter spindle, DeVlieg #40	1
39	K-8144	Tool lock, DeVlieg #40	1
40	K-8145	Locking wrench, DeVlieg #40	1
41	K-8143	Socket set screw, half dog point, 1/4-28 x 3/8, DeVlieg #40	1
42	K-3984	Socket set screw, flat point, 1/4-28 x 3/8, DeVlieg #40	1
43	CP-1773	Draw bar rod and head, #40 N. S.	1
44	23093	Cutter spindle, #40 N. S.	1
45	10266	Spindle nose key, #40 N. S.	2
46	K-135	Socket cap screw, 1/4-20 x 3/4, #40 N. S.	2
47	CP-1786	Draw bar rod and head, #10 B&S	1
48	23089	Cutter spindle, #10 B&S	1



MODEL 1-22 MASTERMIL--SPINDLE FEED

MODEL 1-22 MASTERMIL SPINDLE FEED

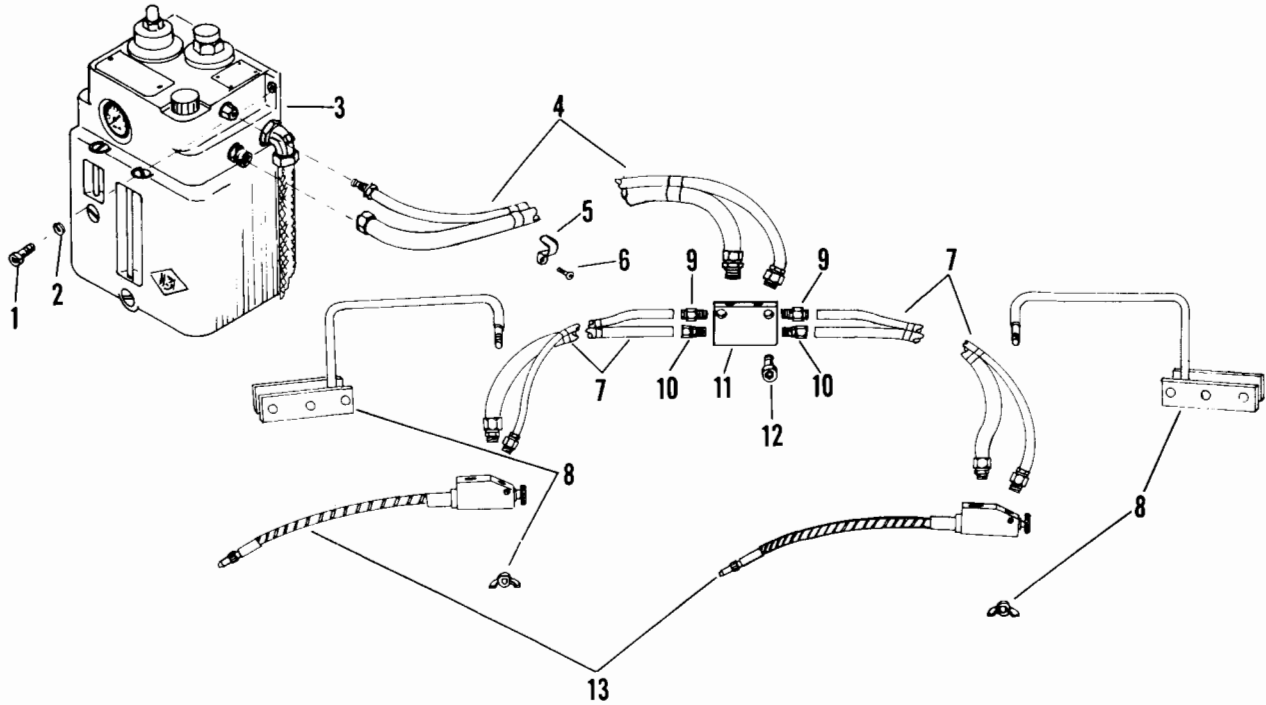
Index No.	Part No.	Part Name	Qty.
1*	CP-2220	Spindle feed gear box and cover	1
2	K-1568	Socket cap screw, 1/4-20 x 1-1/2	3
3	19880	Gear box cover	1
4	K-555	Woodruff key, No. 9	1
5	K-7384	Roll pin, 1/4 x 1-3/8	1
6	7959	Spacer	1
7	13564	Clutch, sliding	1
8	19966	Spindle feed worm wheel and clutch	1
9	KB-1602	Needle bearing, BR-1416	1
10	11185	Shifter	1
11	9567	Spring	1
12	KB-76	Steel ball	1
13	KB-1602	Needle bearing, BR-1416	1
14	19832	Plug (Hand feed assy.)	1
15***	19829	Spindle feed gear box	1
16	K-2341	Socket set screw, cone point, 1/2-13 x 5/8	1
17	K-4016	Socket set screw, flat point, 1/2-13 x 3/8	1
18	19825	Spindle feed worm	1
19	K-5440	Roll pin, 3/16 x 1	1
20	12875	Shifter handle	1
21	19881	Worm shaft bushing	1
22	9236	Micrometer dial	1
23	16278	Micrometer collar adjusting screw	1
24	19879	Dial collar	1
25	K-7322	Socket set screw, knurled cup point, 5/16-18 x 1/2	1
26	19824	Spindle feed worm shaft	1
27	6656	Spindle feed crank handle	1
28	K-7395	Roll pin, 3/16-18 x 1-1/4	1
29**	E-1258	Drive motor (Bodine), 1/8 H. P.	1
30**	K-7740	Overload protector coupling	1
31**	20338	Motor mounting bracket	1
32**	K-137	Socket cap screw, 1/4-20 x 1	3
33**	K-5968	Button head socket cap screw, 10-32 x 3/4	4
34**	K-554	Woodruff key, No. 6	1
35**	19826	Power feed clutch	1
36**	19828	Shifter	1
37**	K-3630	Taper pin, No. 5 x 2	1
38**	K-2009	Socket set screw, flat point, 5/16-18 x 5/16	1
39**	7718	Spring	1
40**	KB-76	Steel ball	1
41**	K-187	Socket set screw, flat point, 1/4-20 x 1/4	3
42**	K-810	Socket set screw, dog point, 1/4-20 x 3/8	1
43**	EP-3304	Control box for power downfeed	1
44**	K-6074	Button head screw, 1/4-20 x 1/2	2
45**	E-2987	Switch box	1
46**	E-2779	Variable transformer	1
47**	E-2955	Toggle switch, 3 position	1
48**	K-7833	Switch plate	1
49**	K-2650	Socket set screw, 8-32 x 5/16	1
50**	21868	Knob, red	1

* Includes part 15

** Used only with power downfeed

*** Part of CP-2220

MODEL 1-22 MASTERMIL--SPRAY MIST COOLANT



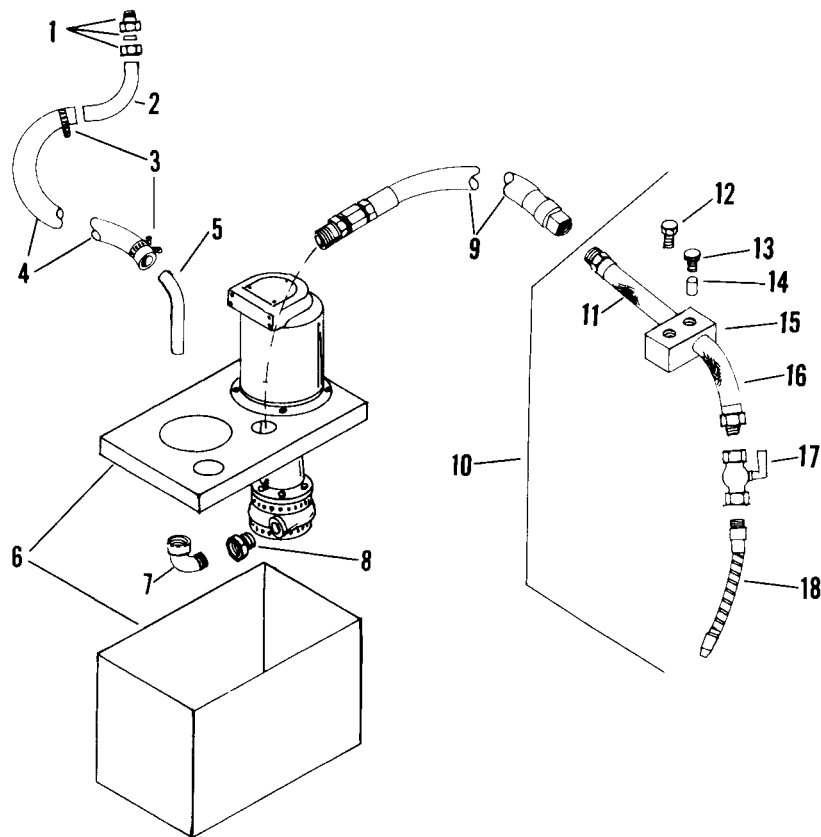
MODEL 1-22 MASTERMIL--SPRAY MIST COOLANT-

Index No.	Part No.	Part Name	Qty.
1	K-135	Socket cap screw, 1/4-20 x 3/4	2
2	K-440	Spring lockwasher, 1/4 in.	2
3	K-6510	Spray mist coolant unit UBA, Bijur No. D-107	1
4	K-6512	Dual hose assembly, 8 ft., Bijur No. B-156-8	1
5	K-6539	Parker hose clip	1
6	K-5387	Button head socket screw, 10-32 x 3/8	1
7	K-6775**	Dual hose assembler, 3 ft.	2
8	K-6513	Magnetic jet holder, Bijur No. B-133	2*
9	K-4521**	Straight adapter, No. A-2835	3
10	K-6776**	Hose connector, 5/16, No. B-150	3
11	K-6774**	3-Way dual tee block	1
12	K-1568	Socket cap screw, 1/4-20 x 1-1/2	2
13	K-6511	Flexible extension jet, Bijur No. B-101	2*

*Only one used in single nozzle system

**Used only on dual nozzle system

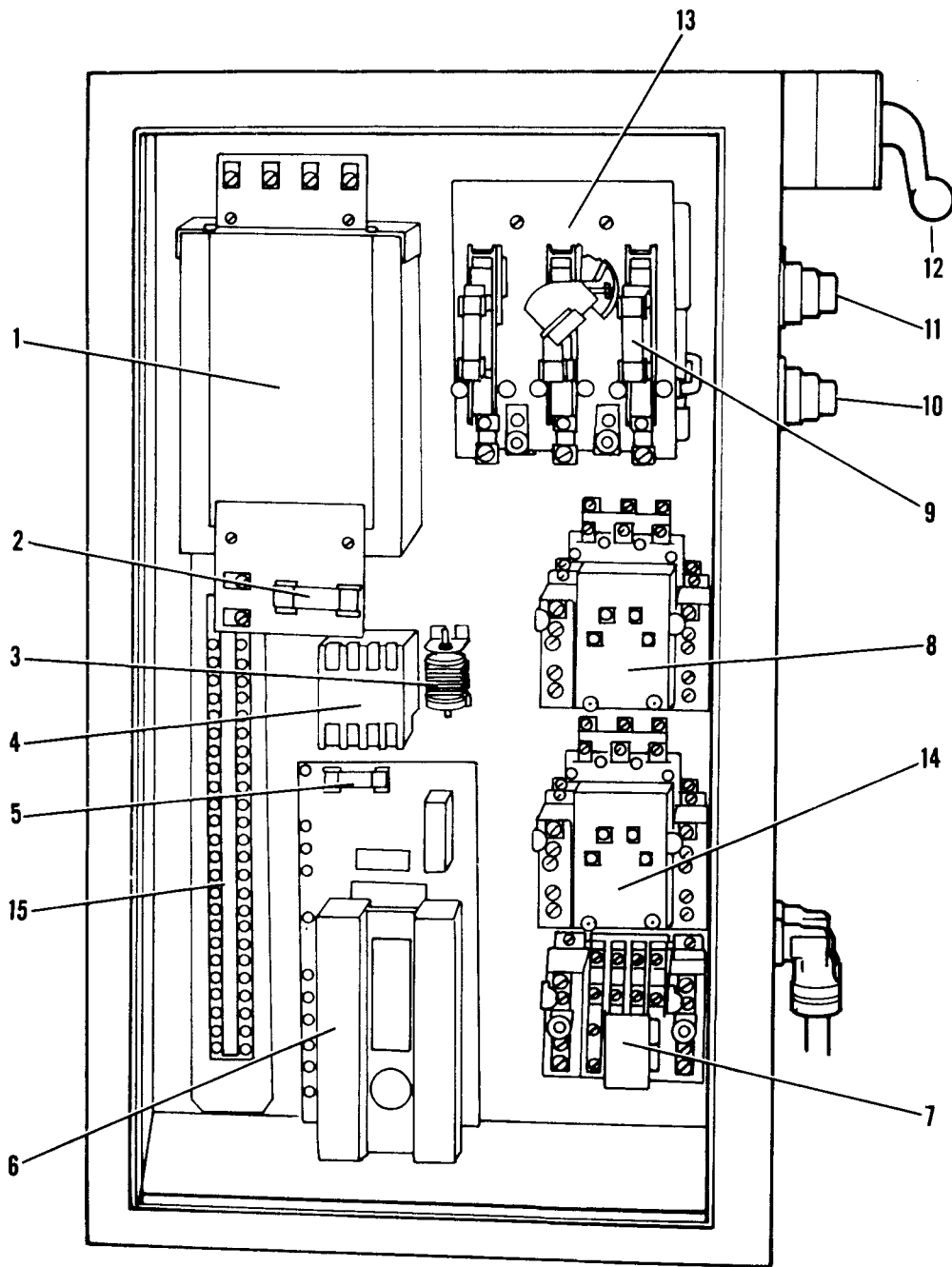
MODEL 1-22 MASTERMIL--FLOOD COOLANT



MODEL 1-22 MASTERMIL--FLOOD COOLANT

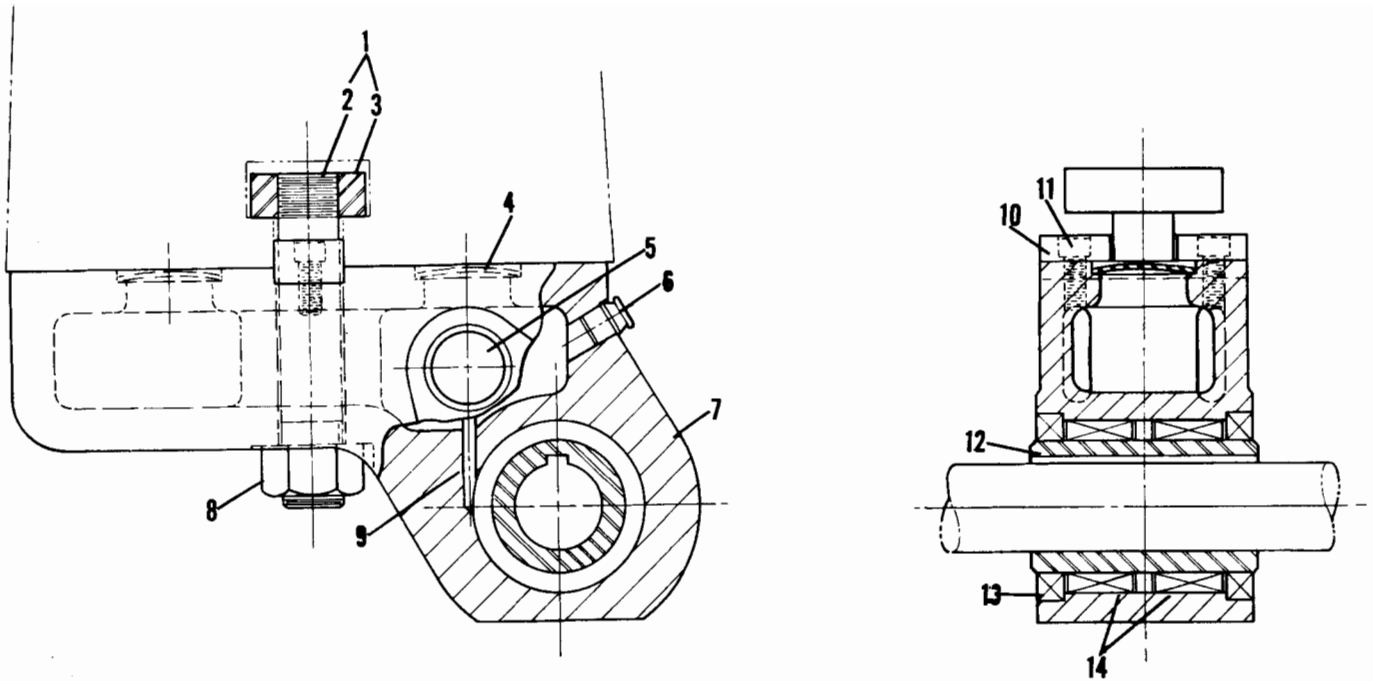
Index No.	Part No.	Part Name	Qty.
1	K-7851	Tube fitting, No. 12FBU-S	1
2	20399	Coolant return elbow	1
3	K-7850	Hose clamp	2
4	K-8009	Coolant return hose	1
5	20398	Coolant return tube	1
6	E-1084	Coolant pump, tank and motor	1
7	K-816	Street ell, 3/8	1
8	K-2050	Reducer, 1/2 to 3/8	1
9	K-7857	Coolant discharge hose	1
10	CP-187	Coolant pump handle	1
11	K-2664	Hose coupling, 3/8	1
12	K-4491	Hexagon head cap screw, 1/4-20 x 1-1/2	1
13	5737	Thumb screw	1
14	11995	Brass plug, 3/16 x 1/16	1
15	21568	Coolant pipe bracket	1
16	K-670	Flexible steel hose	1
17	K-534	Lunkenheimer key cock	1
18	K-669	Flexible steel hose, No. RT-20	1

MODEL 1-22 ELECTRICAL--CONTROL PANEL



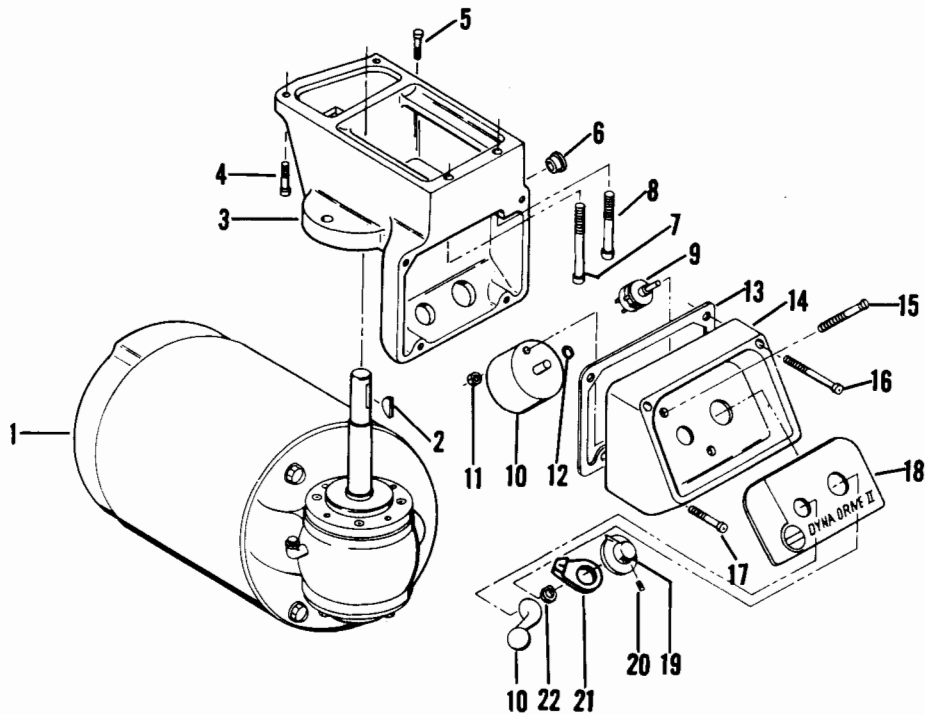
MODEL 1-22 ELECTRICAL--CONTROL PANEL

Index No.	Part No.	Part Name	Qty.
1	E-3056	Transformer, 1.5 K. V. A.	1
2	E-2867	Fuse, 15A., 250V.	1
3	GE 205P4B4	Suppressor	1
4	E-3021	Control relay, 2NO-2NC	1
5	E-3084	Fuse, 25A., 125V.	1
6	E-3092	SCR-D. C. control	1
7	E-3020	Elevate motor starter, size 00	1
8	E-2371	Spindle motor starter, size 1	1
9	E-2873	Fuse, 20A., 600V. (440V. line)	3
9	E-2869	Fuse, 25A., 250V. (220V. line)	3
10	E-2418	Elevate motor switch, 2 position	1
10	E-3052	Contact block, 1NO	1
11	E-2419	Coolant switch, 3 position	1
11	E-2398	Contact block, 1NO-1NC	1
12	E-2598	Spindle direction switch	1
13	E-2602	Disconnect switch, 30A.	1
14	E-3020	Coolant motor starter, size 00	1
15	E-2782	Terminal block	36



MODEL 1-22 STYLE "B" ARBOR SUPPORT

Index No.	Part No.	Part Name	Qty.
1	CP-2156	Lock block and bolt	1
2	22781	Lock bolt	1
3	22780	Lock block	1
4	K-4558	Expansion plug	2
5	K-8109	Gits gauge	1
6	K-4535	Oil cup	1
7	22792	Arbor support	1
8	K-2277	Hex nut, 7/8-9	1
9	K-427	Felt wicking	1
10	22783	Arbor support key	2
11	K-141	Socket cap screw, 5/16-18 x 3/4	2
12	K-6944	Arbor support bushing, 1-1/4 I. D.	1
12	K-7102	Arbor support bushing, 1" I. D., optional	1
12	K-7132	Arbor support bushing, 7/8" I. D., optional	1
13	K-6941	Oil seal, Victor	2
14	KB-6942	Roller bearing	2



MODEL 1-22 DYNA DRIVE

Index No.	Part No.	Part Name	Qty.
1	E-1253	Motor and gear box	1
2	K-7436	Hi pro key	1
3	19990	Motor housing	1
4	K-151	Socket cap screw, 3/8-16 x 1	2
5	K-135	Socket cap screw, 1/4-20 x 3/4	4
6	K-7619	Plug button	1
7	K-159	Socket cap screw, 3/8-16 x 3	1
8	K-2870	Socket cap screw, 3/8-16 x 3-1/2	1
9	E-3153	Potentiometer	1
10	K-2992	Drum reversing switch, size "O"	1
11	K-1763	Hex nut, 8-32	2
12	K-6871	"O" Ring	1
13	20172	Switch box cover gasket	1
14	19989	Switch box cover	1
15	K-7616	Flat head machine screw, 8-32 x 2-1/4	2
16	K-5610	Socket head cap screw, 1/4-20 x 2-1/2	2
17	K-3544	Socket head cap screw, 1/4-20 x 2	2
18	K-7434	Switch plate (Power elevate)	1
18	K-7435	Plate (No power elevate)	1
19	21868	Feed rate control knob	1
20	K-2650	Socket set screw, cup point, 8-32 x 5/16	1
21	K-7983	Feed indicator, lucite	1
22	K-8129	Brass nut	1