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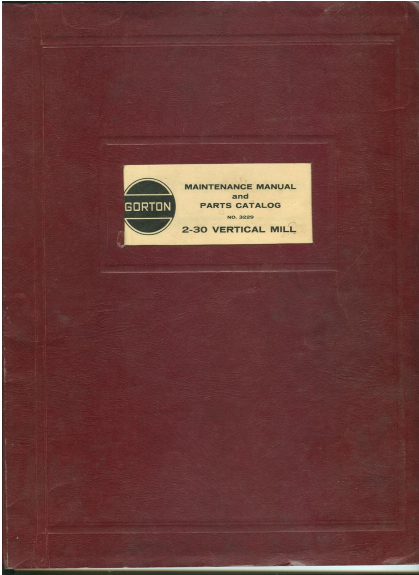
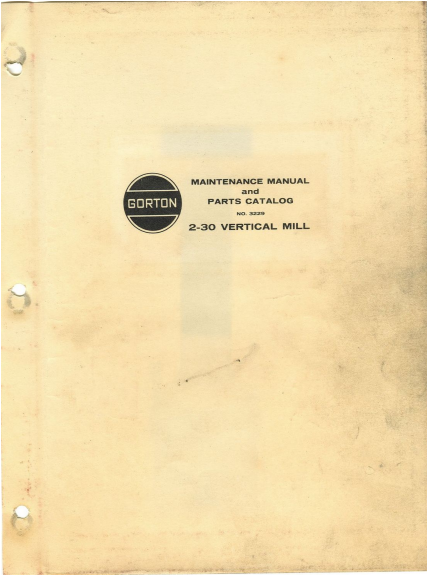


Photo 2



# Photo 3

## MAINTENANCE MANUAL and PARTS CATALOG

NO. 3229

## 2-30 VERTICAL MILL

This is A Maintenance Manual And Parts Catalog Only.  
For Operating Instructions Refer To Manual No. 3227.

This Manual Contains Maintenance Instructions And The  
Parts List For The Gorton Model 2-30 Vertical Milling  
Machine.

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 George Gorton Machine Co. at \$5.00 each.

**GEORGE GORTON MACHINE CO.**  
RACINE, WISCONSIN, U. S. A.

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 or equipment previously sold or on order.

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

# Photo 4

MAINTENANCE MANUAL

## WARRANTY

PARTS LIST

The GEORGE GORTON MACHINE CO. 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.

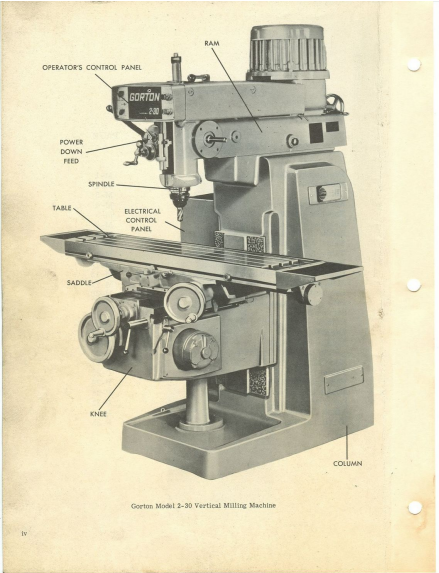
GEORGE GORTON MACHINE CO.  
RACINE, WISCONSIN, U. S. A.

# Photo 5

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# Photo 6



## 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 Corcon 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.

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

### 3. MOVING THE MACHINE (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 position of spindle drive motor and 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.

### 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 alkali 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

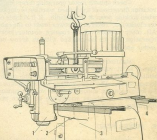
### 6. HOOK-UP PROCEDURE

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.

other corrosion. For lubrication see LUBRICATION page 20

### CAUTION

Make sure that head is securely clamped to column 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.



- |                 |                  |
|-----------------|------------------|
| 1. Ram          | 3. Serial number |
| 2. Clamping nut | 4. Clamping nut  |

Figure 1. Moving The Machine

### 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 (30 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

If machine was shipped with spindle motor disassembled, the motor must first be mounted and connected. To connect spindle motor, open terminal box cover and match color coded "lattle tail" lead

# Photo 8

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 in the control cabinet. Make certain the correct voltage and phase is used.

## 7. MOTOR ROTATION

Check spindle motor operating direction. The rotation direction of a standard machine is clockwise, when looking down at the spindle. If it rotates counterclockwise, reverse the power leads to the cabinet. All other motors which require counterclockwise 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 5% of the voltage marked on the electrical cabinet nameplate to insure proper operation of controls.

## 8. POWER FEED

Power feed to the table and spindle down-feed 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 and transverse device engagement levers, the armature leads must be reversed at the corresponding motor.

## 9. POWER ELEVATE

The power elevate motor is a 3-phase induction motor operated by a drum-type reversing switch located at the front of the knee. If the direction of movement of knee does not conform to setting of switch, correct by changing power supply leads on the motor.

Make final hook-up and close cabinet door securely.

## 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. Locations 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.

M-2

## 11. D. C. POWER SUPPLY

The variable speed drive is a complete variable speed motor control system for operating a D. C. motor from an A. C. line. The function of the rectifier panel is to supply power to the armature and the field of the D. C. motor, and to so control the armature voltage that variable speed can be obtained up to the base speed rating of the motor at constant torque. Maximum horsepower is delivered at maximum speed. At speeds below the maximum, the rated torque is constant and the horsepower is directly proportional to the running speed.

The complete system is made up of the following units: (1) rectifier panel, (2) D. C. motor and (3) speed setting control (mounted on machine control panel). The rectifier panel contains the circuits for converting the A. C. line to D. C. to control the D. C. motor. The motor field is supplied with constant, full wave rectified D. C. voltage. Variable armature voltage is supplied from a full-wave silicon controlled rectifier circuit. A feedback circuit which monitors the armature voltage provides stability and excellent speed regulation under varying load conditions.

Three plug-in assemblies are contained in the rectifier panel. They are: (1) type RA11-rectifier assembly, (2) type TA1A-transistor amplifier assembly and (3) type TA1-silicon junction transistor assembly. Two controls are contained on the rectifier panel for set-up adjustments. These are the high speed control and the sensitivity control. The silicon controlled rectifiers and bridge diode rectifiers are mounted on heat sinks to provide proper cooling under full load conditions. A fuse (FYM3) protects the system from injurious overloads.

## 12. D. C. OPERATIONAL CHECK

The system should be placed in operation as follows:

1. Set feed rate control on zero (0) (machine control panel).
2. Close line disconnect switch.
3. Advance feed rate control potentiometer.
4. Table should move at low feed rate.
5. Advance feed rate control to maximum.
6. Adjust high speed control (on SCR panel in control cabinet) to 35 I. P. M. under no cutting load.
7. Adjust feed rate control for a table feed of 2 to 3 I. P. M.
8. Apply cutting load (typical: 1/2" wide, 1/2" deep in E112 material).
9. If table feed falls off more than plus or minus 2% of set feed, turn sensitivity control on SCR panel clockwise slightly.
10. Repeat until table feed remains within  $\pm 2\%$  of set speed under light load to heavy load conditions.



# Photo 9

11. This setting of the sensitivity control will give excellent regulation over the entire feed range.

12. If the sensitivity control is advanced too much, the table feed will pulse or run erratically.

## 13. POTENTIOMETER CONTROLS

The table feed and spindle downfeed potentiometer controls (P.M. selector) 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 interlock relay.

## 14. GENERAL

If it is necessary to disconnect any motor,

## 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 counterclockwise (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 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 elec-

trically interlocked.

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

Reserve fuses 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.

trically 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 thumb screw nozzle control on the nozzle is used to control the amount of coolant in the spray. When the thumb screw 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.

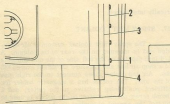
Water soluble oils are used in this unit and the mixture should be to manufacturer's specifications and consistency to insure smooth and non-clogging conditions. Multi nozzle manifold blocks are available so more than one nozzle can be used for greater cutting efficiency.

## KNEE-ADJUSTMENTS

### 18. VERTICAL GIB (figure 2)

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

1. Support the knee by holding up the table using hydraulic jacks or lift trucks at each end of the table or use a hoist with slings on both ends of the table.
2. Remove the five bolts (1) holding the vertical gibs (2) and spacers (3).
3. Take a micrometer measurement of the column ways (4) on both sides.
4. Machine the two spacers to the dimension of the column ways  $\pm .001$  inch.
5. Reassemble, being sure that left and right gibs are in proper locations.



- |                      |               |
|----------------------|---------------|
| 1. Hex head bolts    | 3. Spacer     |
| 2. Knee vertical gip | 4. Column way |

Figure 2. Adjusting Knee Vertical Gibs

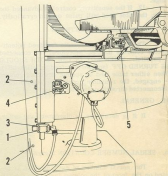
### 19. TAPERED GIB (figure 5)

Adjust the tapered gip as follows:

1. Remove the right wiper (5).
2. Back off the bottom gip screws (4) and take up the same amount on top gip screws (1).
3. When the straight and tapered gibs are 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 counterclockwise to take up any backlash in the elevate train. By releasing the clamp the knee should drop and not "hang".

### 20. VERTICAL TRAVEL MICROSWITCH (figure 3)

This microswitch (1) stops the knee at its extreme limits of travel when power operated. The



- |                           |                           |
|---------------------------|---------------------------|
| 1. Vertical travel switch | 4. Bijur lubrication pump |
| 2. Limit stops            | 5. Bijur lubrication pump |
| 3. Switch roller          |                           |

Figure 3. Left Side of Knee

limit stops (2) are fixed and cannot be adjusted. If the limit stops are reached the power elevate stops.

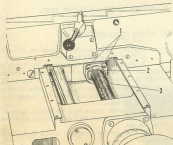
It is necessary to manually operate the knee until the switch roller (3) moves off the stop and the power elevate assist is reactivated.

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.

### 21. BIJUR ONE SHOT SYSTEM (figure 3)

The Bijur lubrication pump (4) located on the left side of the knee, 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. Socket head screws 2. Cross feed screw  
3. Adjustable nut  
Figure 4. Adjusting Anti-Backlash Nut (Cross)

## 23. ANTI-BACKLASH NUT (CROSS) (figure 4)

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

1. Move the saddle to the rear of the machine.
2. Remove the sliding shields (see par. 23).
3. Loosen the two socket head screws (1) holding the adjustable nut (2).
4. To eliminate backlash rotate the nut counterclockwise (from front). If nut is too tight, rotate it clockwise.
5. Retighten the two socket head screws (1) and replace shields.

## KNIE-REMOVING AND REPLACING PARTS

### 23. SLIDING SHIELDS--FRONT (figure 5)

Remove the front sliding shields as follows:

1. Loosen the set screws in the cross feed handwheel and remove the handwheel assembly.
2. Remove the front knee wiper (15).
3. Move the shields (14) forward and remove the two slide stops (13). The shields can then be lifted out.

### 24. SLIDING SHIELDS--REAR (figure 5)

Remove the rear sliding shields from the knee as follows:

1. Move the saddle forward.

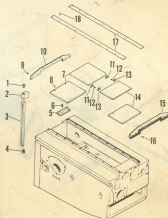


Figure 5. Knee Shields, Gibs and Wipers  
Legend - Figure 5.

- |                     |                           |
|---------------------|---------------------------|
| 1. Top gib screw    | 10. Rear knee wiper       |
| 2. Gib spacer       | 11. Slide stops (rear)    |
| 3. Tapered gib      | 12. Slide stop screws     |
| 4. Bottom gib screw | 13. Slide stops (front)   |
| 5. Right wiper      | 14. Front shields         |
| 6. Wiper screw      | 15. Front knee wiper      |
| 7. Rear shields     | 16. Wiper screw           |
| 8. Cap screws       | 17. Retainer strips       |
| 9. Wiper screw      | 18. Retainer strip screws |

2. Remove the rear knee wiper (10).
3. Take out the two cap screws (8) holding the rear shield.
4. Remove the two slide stops (11).
5. Remove the back three screws (18) holding one of the retainer strips (17).
6. Move the top shield back and the bottom shield forward a little. Shields can then be pulled out sideways from under retainer strip.

### 25. TIMING DRIVE BELT (figure 6)

- Replace the timing drive belt as follows:
1. Remove the front knee shields (par 23).
  2. Remove the front cover (8) by taking out

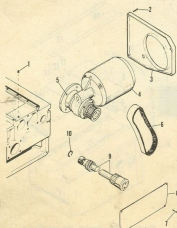


Figure 6. Knee Timing Belt and P. T. O. Shaft

Legend - Figure 6.

- |                   |                         |
|-------------------|-------------------------|
| 1. Setscrew       | 6. Timing belt          |
| 2. Cover screws   | 7. Cross screws         |
| 3. Right cover    | 8. Front cover          |
| 4. Motor gear box | 9. P. T. O. shaft assy. |
| 5. Gear box bolts | 10. Snap ring           |

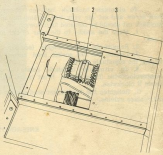
the four socket screws (7).  
 3. Remove the right cover (3) by taking out the four socket screws (2).  
 4. Loosen the four hex head bolts (5) holding the motor gear box (4), so timing belt (6) will be loose.  
 5. Loosen the setscrew (1) at the top, front of the knee.  
 6. Move the saddle forward.  
 7. Remove the two cap screws (8, figure 5) holding the rear knee shields (7) and slide the shields forward to expose the cross feed clutch (figure 7).  
 8. Knock out the roll pin and remove the snap ring (10) at the rear end of the P. T. O. shaft (9) and slide out the P. T. O. shaft assembly.  
 9. Disengage and remove the timing belt from the timing gear.  
 10. Install a new belt and reassemble all parts. **BE SURE TO TIGHTEN SETSCREW AT TOP OF THE KNEE, AND BE SURE BELT IS TIGHT TO**

## ELIMINATE BACKLASH IN THE FEED.

### 26. CROSS FEED SCREW

Remove the cross feed screw as follows:

1. Move the saddle forward.
2. Remove the two cap screws (8, figure 5) holding the rear knee shields (7) and slide the shields forward to expose the cross feed clutch (figure 7).
3. Remove the four bolts (17, figure 8) holding the cross feed screw assembly (16, figure 8) at the front of the knee.
4. Turn the cross feed handwheel counter-clockwise until the cross feed screw backs out of the clutch and out.
5. Pull out the complete cross feed screw assembly.
6. Reassemble in reverse order of disassembly. Be sure the clutch shifting shoe (figure 7) is engaged with the center groove on the clutch and that the key in the clutch engages the keyway in the feed screw.

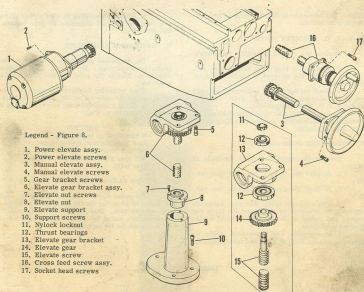


- |                  |                          |
|------------------|--------------------------|
| 1. Clutch        | 3. Shields moved forward |
| 2. Shifting shoe |                          |

Figure 7. Cross Feed Clutch Mechanism

7. Before tightening the four cap screws holding the assembly, move the saddle completely forward. This will aid in aligning the feed screw and the end cover with the saddle. Tighten the four cap screws.

# Photo 13



Legend - Figure 8.

1. Power elevate assy.
2. Power elevate screws
3. Manual elevate assy.
4. Manual elevate screws
5. Gear bracket screws
6. Elevate gear bracket assy.
7. Elevate nut screws
8. Elevate nut
9. Elevate support
10. Support screws
11. Nylon locknut
12. Thrust bearings
13. Elevate gear bracket
14. Elevate gear
15. Elevate screw
16. Cross feed screw assy.
17. Socket head screws

Figure 8. Knee Elevate Mechanism

## 27. ELEVATE FEED SCREW (Figure 8)

Remove the elevate feed screw as follows:  
1. Elevate knee to uppermost position: Using a 4 x 4 car jack, block up knee so it cannot move downward.

2. Take out the three screws (2) holding the power elevate motor (1) and slide out the complete power elevate assembly.

3. Loosen the setscrew in the cross feed handwheel and remove the handwheel.

4. Take out the four screws (4) holding the manual elevate assembly (3) and slide out the complete assembly.

5. Remove the three screws (6) holding the elevate gear bracket assembly (6) in knee. These screws can be reached through access hole in bottom of knee.

6. Rotate the elevate screw counterclockwise (looking down from top) by hand until elevate gear bracket (6) assembly approaches bottom surface of knee.

7. Remove the three cap screws (10) holding elevate support (9) to column. The elevate screw, support and elevate nut can then be swung to the side and pulled out of the knee.

8. To remove the elevate feed screw (15) from the elevate gear bracket (13) unscrew the Nylon lock nut (11) and tap out the feed screw.

9. Remove the feed screw and elevate nut (9) from the elevate support (9) by removing the three screws (7) holding the nut to the support.

10. Reassemble in reverse order of disassembly. Do not tighten the three screws holding the elevate gear bracket until the power elevate motor and manual elevate assembly are in assembled position. 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.

## 28. THRUST BEARINGS-ELEVATE FEED SCREW

To remove these bearings (12, figure 8) follow the procedure for removing the elevate feed

# Photo 14

screw. The bearings can then be removed from the elevate gear bracket.

## 29. P. T. O. ASSEMBLY (figure 8)

Remove the P. T. O. assembly as follows:

1. Remove the rear knee shields (par. 24).
2. Loosen the setscrew (1) at the top, front of the knee.
3. Knock out the roll pins and remove the snap ring at the rear end of the P. T. O. shaft, and slide out the P. T. O. shaft assembly (9).
4. Use the exploded view page P-10 as reference for disassembling and reassembling the P. T. O. shaft assembly.

## 30. CROSS FEED GEAR ASSEMBLY

Remove the cross feed gear assembly as follows:

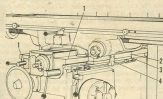
1. Remove the P. T. O. assembly (see par. 29.)
2. Remove the cross feed screw (see par. 26.)
3. The complete cross feed gear assembly can then be removed by taking out the three cap screws and prying up the assembly which is also dovetailed in position.
4. Disassemble and reassemble using illustration on page P-10 in parts list for reference.

## SADDLE-ADJUSTMENTS

### 33. FLAT GIB (figure 9)

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

1. Remove the two socket head screws and take off the cross trip (figure 4).
2. Take out the four socket head screws



1. Knee ways                      3. Flat gib  
2. Guide plate spacer          4. Cross trip finger  
Figure 9. Adjusting Flat Saddle Gibs

5. When reassembling be sure proper shims are used for correct alignment of gear centers. (See parts list).

### 31. HANDWHEEL ASSEMBLIES

The handwheel assemblies are held to the shafts by setscrews. To remove the complete assemblies loosen the setscrew and slide off the handwheel.

When installing handwheel be sure that setscrew enters the undercut on the shaft. The handwheel is spring loaded and must turn freely when it is not engaged (pushed in).

#### CAUTION

If handwheel is improperly installed, so it does not have spring loaded return, it becomes a safety hazard. It will also place a strain on the feed gear train.

### 32. POWER ELEVATE ASSEMBLY (figure 8)

The power elevate assembly can be removed as a unit by removing the three cap screws (2) holding it to the knee. Disassemble and reassemble it as necessary, using the illustration on page P-4 of the parts catalog for reference.

holding the flat gib (3) and guide plate spacer (2) on each side of the saddle.

3. Carefully remove the two flat gibs and spacers.

4. Take a micrometer measurement of the two knee ways (1).
5. Machine the two spacers to the dimension of the knee ways - .001 inch for oil space.
6. Reassemble, being sure that left and right gibs are in correct location.

### 34. TAPERED GIB (figure 11)

Adjust the tapered gib (17) as follows:

1. Remove the front (10) and rear (9) saddle wipers by removing the seven screws (8) holding each wiper.
2. Back off the rear gib screw (16) and take up on the front gib screw (18) the same number of turns.

#### NOTE

Anytime 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 the gib. If this should happen it is very difficult to re-position the clamping rod so gib can be inserted,

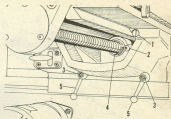
### 35. CROSS AND LONGITUDINAL GIB CLAMPS (figure 10)

If the cross and longitudinal 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 (3) in the clamp screw shaft.
2. Move the clamp handle (5) to desired position and retighten the pipe plug (3).

### 36. HJUR ONE SHOT SYSTEM

The Hjur pump (5, figure 4) is the same as in the knee. Refer to paragraph 21 for service instructions.



- |                      |                   |
|----------------------|-------------------|
| 1. Gib screw         | 4. Adjustable nut |
| 2. Socket cap screws | 5. Clamp handle   |
| 3. Pipe plug         |                   |

Figure 10. Adjusting Table Gib and Gib Clamps

### SADDLE-REMOVING AND REPLACING PARTS

#### 37. CROSS FEED NUTS (figure 11)

Remove the cross feed nuts as follows:

1. Remove the front and rear sliding shield (see paragraphs 23 and 24).

2. Remove the flat gibs and guide plate spacers (see paragraph 33).

3. Remove the two gib screws (16 & 18) and take out the tapered gib (17). See note in paragraph 34.

4. Remove the cross feed screw assembly (see paragraph 26).

5. Remove the P. T. O. assembly (see paragraph 29).

6. Remove the apron holder and chip apron from saddle (3 & 4 figure 3).

7. With hoist, or two hydraulic lift trucks, carefully lift the assembled table and saddle and set the assembly on a sturdy table.

8. Remove the fixed nut key (15, figure 11) from the bottom of the cross feed nut housing (12) and the two socket cap screws (14) holding the adjustable nut (13). The fixed (11) and adjustable (13) nuts can then be removed.

#### TABLE-ADJUSTMENTS

#### 40. TABLE FEED SELECTOR SWITCH (page P-34)

This switch (15) (optional equipment) is located in the lower, left hand area of the electrical con-

#### NOTE

We recommend replacement of the cross feed screws and both adjustable and fixed nuts as a unit rather than replacing separate parts.

#### 38. ANGULAR HANDFEED SHAFT (figure 11)

Remove the angular handfeed shaft as follows:

1. Loosen the setscrew (24) and remove the handwheel assembly.

2. Take out the roll pin (22) and take off the dial clutch (20) and dial (21).

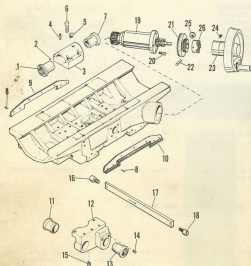
3. Take out the four cap screws (20) and pull out the complete angular shaft assembly (19). It may be necessary to rotate the shaft slightly to disengage the gear teeth.

#### 39. ANGULAR HANDFEED HANDWHEEL

See paragraph 31 for servicing instructions.

rol panel and provides live traverse when desired. It has two positions as follows: Position 1 - Table power feed, spindle rotating. Position 2 - Table power feed, spindle rotating or at rest.

# Photo 16



Legend - Figure 11.

1. Adjustable nut
2. Button head screw
3. Table nut adapter
4. Dowel pin
5. Fixed table nut key
6. Cap screws
7. Fixed table nut
8. Wiper screws
9. Rear saddle wiper
10. Front saddle wiper
11. Fixed nut
12. Cross feed nut housing
13. Adjustable nut
14. Socket cap screws
15. Fixed nut key
16. Rear gib screw
17. Tapered gib
18. Front gib screw
19. Angular shaft assembly
20. Cap screws
21. Dial
22. Roll pin
23. Handwheel assembly
24. Set screw
25. Knurled head screw
26. Dial clutch

Figure 11. Adjusting Tapered Saddle Gib

#### 41. GIB (figure 12)

Adjust the tapered table 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 (3) on the left end of the gib (4) and tighten the gib-screw (6) on the right end the same amount.

#### 42. 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. Loosen the two socket cap screws (2), turn the adjustable nut (1) clockwise until snug and retighten the two socket cap screws. (See par. 43)

#### TABLE-REMOVING AND REPLACING PARTS

#### 44. TABLE (figure 12)

Remove the table as follows:

#### 45. HOW TO CHECK BACKLASH

Check cross and longitudinal backlash as follows:

1. Move knee, saddle and table all to their mid-range positions, and tighten the clamps.
2. Turn the handwheel (cross, angular) back and forth to determine the amount of backlash.
3. When backlash may have been adjusted properly and if work has constantly been machined in the same area of the table, excessive backlash will occur in that area of the screw. Also, in areas of the screw not normally used, the fit between the feed screw and nut will be excessively tight (zero backlash). Therefore, it will be necessary to increase backlash to insure freedom of movement through the entire range.

1. Take out the six cap screws (1) holding the left hand table bracket (2) and remove the bracket.
2. Remove three screw (17) from right end



# Photo 17

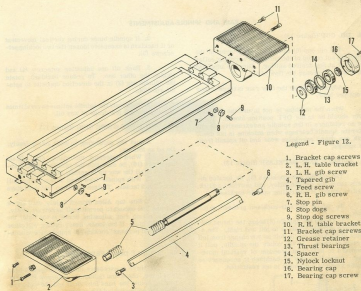


Figure 12. Removing Table

bearing cap (16) and remove bearing cap.

3. Unscrew the Nylock lock nut (15) from the feed screws (5). Take out the six cap screws (11) holding right hand table bracket (10) and remove the bracket.

4. Loosen the two screws holding (9) the adjustable stop dogs (8), remove the stop pins (7) and slide the stop dogs out of the table.

5. Remove the gib screw (6) from the right end of the gib (4) and remove the gib making sure the table clamp is loose. (See NOTE, paragraph 34).

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

7. Reassemble in reverse order.

#### 45. TABLE FEEDSCREW, BEARINGS AND SADDLE NUTS

Remove the table feed screw and bearings as follows:

1. Follow procedure for removing table (paragraph 44).

2. Turn angular handwheel so screw moves out right side of machine.

3. Remove thrust bearings from table brackets by pressing bearings and races. See figure 12 for reference.

4. Fixed and adjustable nuts can be removed from saddle as follows: (figure 13)  
a. Remove the four screws (8) and dowel pin (4) holding table nut adapter (3) and remove adapter.

b. Remove fixed table nut key (5).

c. Remove fixed table nut (7).

d. Remove two screws (2) holding adjustable nut (1) and remove nut.

5. Reassemble in reverse order.

#### CAUTION

When inserting feed screw into nut use extreme care when engaging nut to screw so threads will not be damaged and cause binding.

6. Adjust backlash (par. 41)

## RAM AND SPINDLE-ADJUSTMENTS

### 46. OIL CUP (figure 13)

The oil cup (5) has an ON-OFF lever in the adjusting nut on top of the unit, with a locking collar to lock it at any desired setting. Turn the adjusting nut down to decrease the flow of oil.

Adjust the nut so the flow rate is three or four drops per hour.

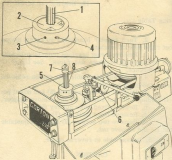
When the machine is not in use the ON-OFF lever should be in the OFF position (down). There are no retainers in the spindle and excessive oil will enter the spindle bearings when machine is not used. This can cause excessive wear and oil splash from the spindle.

### 47. SPINDLE ANTI-BACKLASH (figure 13)

The spindle anti-backlash (5), is located directly above the spindle pulley, and provides a quick, positive means of controlling spindle backlash.

To adjust the anti-backlash proceed as follows:

1. Grasp the spindle (6) below the thrust collar (7) and sharply rotate it to left and right. The amount of backlash can be felt as you change from left to right rotation. As you rotate the spindle, pull it downward to determine freedom of vertical movement. A small amount of backlash is necessary so spindle vertical movement is not restricted.



- |                       |                          |
|-----------------------|--------------------------|
| 1. Spindle splines    | 5. Spindle anti-backlash |
| 2. Spindle dog        | 6. Oil cup               |
| 3. Locking setscrew   | 7. Thrust collar         |
| 4. Adjusting setscrew | 8. Spindle               |

Figure 13. Spindle Anti-Backlash Adjustment

2. If spindle binds during vertical movement or if backlash is excessive loosen the two locking setscrews (3).

3. Back off one adjusting setscrew (4) and tighten the other one. To reduce backlash, rotate the spindle dog (2) in the direction opposite to spindle rotation.

4. Lubricate the spindle splines several times a week, using a few drops of way oil.

### 48. ADJUSTING GUIDE RING (figure 17)

Adjust the guide ring so quill moves freely. Do so as follows:

1. When tightening the clamp ring adjusting screw (16), be sure that the spindle sleeve bushing (8) is all the way up in spindle housing nose.

2. With spindle feed hand lever, bring quill down 2 or 3 inches. Tighten screw so that quill stays in place.

3. Now tap Allen wrench lightly until screw 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 "locking" of spindle sleeve bushing.

### 49. SPINDLE DOWN FEED (figure 14)

If there is excessive float in the spindle hand feed lever, check and tighten the setscrew (6) in the housing below the hand feed shaft and the setscrew (5) 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 overriding slip clutch may have lost its torque output due to lengthy usage. Replace the slip clutch (paragraph 51).

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.

### 50. SPINDLE BRAKE (figure 14)

Adjust the spindle brake as follows:

1. Move the brake lever (2) as far as possible toward the front of machine (clamped position).

2. Loosen the socket cap screw (1) in the brake lever hub (2) and use a wedge to open the split in the hub so the brake lever can be moved.

3. Move the brake lever toward the rear (about to the center, between front and rear, of the machine) and retighten the cap screw.

## RAM AND SPINDLE-REMOVING AND REPLACING PARTS

### 51. REPLACING SLIP CLUTCH (figure 14)

Replace the slip clutch as follows:

1. Back off the setscrew (7) on motor gear box shaft.
2. Remove the four cap screws (8) holding the motor to bracket.
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 motor so manual output torque will be diminished.

### 52. RAM

Remove ram head assembly as follows:

1. Move ram to mid position.
2. Remove the two clamping nuts (figure 1).
3. Follow same procedure as for moving the machine. (See par. 3)
4. Place on a support protecting lower surface of ram. On reassembly be sure the pinion gear teeth engage properly with rack teeth on top of column.

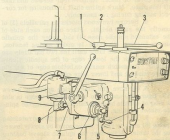
### 53. REMOVING SPINDLE (figure 15 and 16)

The cutter spindle requires no adjustment. It requires no attention other than correct 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 George Corbin Machine Co., which will put the spindle in "like new" condition.

#### NOTE

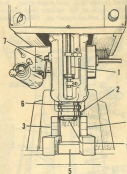
It is strongly recommended that spindles requiring service be returned to the factory for expert attention. However, if it is necessary to replace bearings in the field, do so as follows:

1. Bring spindle down approximately 2-1/2 inches and lock spindle in place with spindle locking lever (7).
2. Move the table to approximately four inches below spindle nose. Place wood block (5) on table to protect top.
3. Remove micrometer depth stop bracket assembly (1) by removing three socket head cap screws.



- |                            |                       |
|----------------------------|-----------------------|
| 1. Socket cap screw        | 6. Setscrew (housing) |
| 2. Brake lever hub         | 7. Setscrew (shaft)   |
| 3. Spindle brake lever     | 8. Setscrew (clutch)  |
| 4. Spindle hand feed lever | 8. Cap screws         |
| 5. Setscrew (collar)       |                       |

Figure 14. Spindle Feed and Brake Adjustment



- |                                   |                          |
|-----------------------------------|--------------------------|
| 1. Micrometer depth stop assembly | 4. Spindle nose          |
| 2. Spindle sleeve bushing         | 5. Wood block            |
| 3. Parallel                       | 6. Retaining spring      |
|                                   | 7. Spindle locking lever |

Figure 15. Removing Spindle

4. Remove depth stop attached to front of spindle behind the bracket.

5. At top of spindle pulley housing there is a round cover or plate. Remove four screws and take off this plate. Mark spindle shaft and housing for correct mating during re-assembly.

6. Secure two wood blocks or parallels (3) of exactly the same height. Place one on each side of the extended spindle nose (4) and under the spindle sleeve bushing (2) which is under spring tension.

7. Raise the table until the two parallels are in contact with the lower edge of the spindle sleeve bushing. Put match marks on bottom edge of spindle sleeve bushing and lower edge of spindle housing for locating during re-assembly.

8. Remove the clamp ring adjusting screw (6), figure 17) and drive a soft metal wedge in slot at rear of spindle housing thereby releasing the spindle sleeve bushing.

9. The spindle sleeve bushing (2) and retaining spring (8) are now ready for removal by slowly lowering the table. Make sure the spindle sleeve bushing follows down with the table. Continue lowering the table until spindle sleeve bushing and spring are completely free.

10. Remove the blocks (3), spindle sleeve bushing (2) and spring (8).

11. Place another block (or blocks) of wood under the spindle nose (2, figure 16). Raise the table until block comes in contact with spindle nose.

12. Release spindle locking lever and again lower the table. As spindle sleeve (1) comes down, spindle feed levers will also come down. Note the approximate angle of the spindle feed levers when the spindle rack and pinion let go. (When reassembling

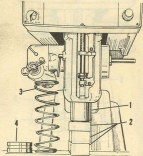


Figure 16. Removing Spindle

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ling spindle, the spindle feed levers should be held at the same approximate angle when reengaging the rack and pinion.)

13. Continue lowering table until the spindle sleeve is completely free of housing.

#### 54. SPINDLE BEARINGS (figure 17)

Replace spindle ball bearings as follows:

1. Remove the spindle (paragraph 53).

2. Disengage the tang on lockwasher (11) from ball bearing thrust nut (10) and remove the nut (10) inside the top of spindle quill or barrel (14).

3. Remove the large slotted ring nut (5, L. H. thread) which is in the lower end of spindle sleeve.

**IMPORTANT**-Before removing or moving the spacer (13) which separates upper (12) and lower (15) bearings, be sure to inscribe match lines on both spacer end and spindle. When re-assembling, make doubly sure that these lines are rematched accurately.

4. Remove spindle (6) and press lower bearings (13) out from top and upper bearings out from bottom of quill using the spacer.

#### 55. INSTALLING SPINDLE AND SPINDLE BEARINGS (figure 17)

1. When installing new bearings, place the stamped thrust faces of the two outer rings together. Also match the "balance" marks on both inner and outer races. Slide bearings (13) down spindle shaft (8) to nose. They should slide with a light "push" fit. When bearings are in place, tap spindle nose gently on wood to seat both bearings.

2. Insert spindle (8) in spindle barrel (14) and install spacer (13), being sure that match marks you made line up.

3. Install upper set of ball bearings (12) in the same manner as for those at spindle nose.

4. Install lockwasher (11) and bearing nut (10). Tighten this nut, then reverse position of spindle and sleeve, and re-install the large slotted ring nut (5, L. H. thread).

5. Lay spindle assembly on its side in a V-block. Check the runout on the O.D. of the spindle shaft at its end with a dial indicator. This shaft must be concentric within  $.001''$  of total indicator reading.

6. If run-out is greater, find the low spot on the spindle shaft and mark the exposed face of the nut in line with the low spot on the spindle shaft.

7. Remove nut (10) and file or scrape at the spot marked, but on the opposite face of the nut until the spindle shaft runs within the  $.001''$  tolerance. Be sure the tang of lockwasher is inserted in slot on the bearing nut. Tightness of the bearing nut does not affect bearing pre-load.

8. To install the spindle, reverse the procedure in paragraph 53. Make sure that the brass plug (3) at the end of the spindle locking screw (2) does not protrude into the spindle bore. Be sure to

match mating marks on spline shaft and housing (paragraph 53, step 5). Also make sure that spindle feed levers are at approximately the same angle as described in paragraph 53, step 12.

5. Adjust guide ring (paragraph 48).

#### 54. PULLEY HOUSING BEARINGS

To replace the pulley housing bearings proceed as follows: (figure 18)

1. Remove the V-belt (See Operator's Manual).
2. Remove brake assembly (paragraph 57).
3. Take out the four slotted head screws (1) from the retainer cover (2) and remove the cover.
4. Remove the four cap screws (3) holding the anti-backlash housing (4) to the spindle pulley (5).
5. Loosen the lockwasher (7) and locknut (6) holding pulley (5) to spline drive (8).

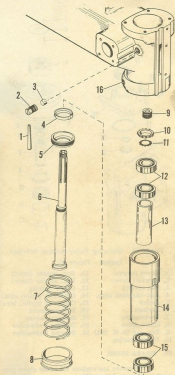
#### NOTES

Mark spindle spline and driving spline, so that the same splines will be mated during re-assembly.

6. Lift pulley (5) up and out of machine.
7. Remove four cap screws (14) holding the bearing mount (16) to pulley shield. Remove four cap screws (15) holding bearing mount to top of the spindle bore and remove the mount with bearings inside.
8. Remove the nut (9, R.H. thread) holding the upper bearing (10) in place.
9. Loosen the bearing mount and press or tap on the bottom bearing (now on top) to remove upper bearing (10), two spacers (11, 12), spined drive (8) and lower bearing (13).
10. Remove the spined drive from the bearings.
11. Install new bearings so that the thrust faces and match marks are together.
12. Re-assemble in reverse order of dis-assembly.

#### NOTE

On re-assembly it may be necessary to move bearing mount (16) so pulley spline passes through driving spline with equal clearance in 360 degrees of rotation. This clearance can be easily checked by grasping spined shaft and, with rapid back and forth rotation, check backlash between the splines. Rotate the spindle 45 degrees and recheck. Do this until the complete circumference of the spindle has been checked.



- |                          |                            |
|--------------------------|----------------------------|
| 1. Handle                | 9. Thrust collar           |
| 2. Lock screw            | 10. Ball bearing nut       |
| 3. Brass plug            | 11. Lockwasher             |
| 4. Oil retainer          | 12. Upper spindle bearings |
| 5. Ring nut (L. H. thd.) | 13. Spacer                 |
| 6. Spindle               | 14. Spindle barrel         |
| 7. Spindle spring        | 15. Lower spindle bearings |
| 8. Bushing               | 16. Clamp ring adj. screw  |

Figure 17. Spindle Assembly

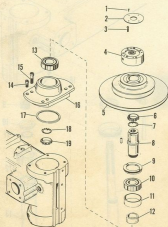


Figure 18. Replacing Pulley Housing Bearings

Legend - Figure 18.

- |                          |                             |
|--------------------------|-----------------------------|
| 1. Cover screws          | 11. Brg. spacer (outer)     |
| 2. Retainer cover        | 12. Brg. spacer (inner)     |
| 3. Cap screws            | 13. Lower bearing           |
| 4. Anti-lackdash assy.   | 14. Capscrew (pulley shld.) |
| 5. Pulley                | 15. Capscrew (spdlc. sure)  |
| 6. Lockout               | 16. Bearing mount           |
| 7. Lockwasher            | 17. Dumper washer           |
| 8. Spdlc. drive          | 18. Bearing lockwasher      |
| 9. Brg. nut (R. H. thd.) | 19. Bearing lockwasher      |
| 10. Upper bearing        |                             |

### 57. BRAKE SHOES

To remove and replace the brake shoes proceed as follows: (Figure 19)

1. Loosen the cap screw (1) holding the brake lever hub (2) and slide the assembled brake lever and hub up and off of the brake screw.
2. Loosen the setscrew (6) in the bottom brake screw collar (9) which is located above the left brake shoe (11).
3. Turn the brake screw (4) so the shoes are in the maximum open position.
4. Remove the two cap screws (8) holding the brake support (7).
5. Tilt the brake assembly forward and remove the complete assembly.

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6. Loosen the setscrew (6) in the top brake screw collar (5) and remove the brake guide pin (13) and brake shoes (11, 15).

7. Re-assemble in reverse order of disassembly. When re-assembling, rotate brake guide pin to bring the new brake shoes together on the pulley and tighten setscrews in top and bottom collars (8, 9).

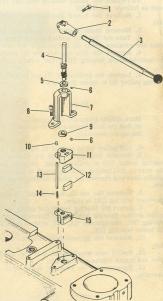


Figure 19. Replacing Spindle Brake

Legend - Figure 19.

- |                    |                        |
|--------------------|------------------------|
| 1. Capscrew        | 9. Bottom collar       |
| 2. Brake lever hub | 10. Outside pin collar |
| 3. Brake lever     | 11. Left brake shoe    |
| 4. Brake screw     | 12. Brake shoe inserts |
| 5. Top collar      | 13. Brake guide pin    |
| 6. Setscrew        | 14. Guide pin spring   |
| 7. Brake support   | 15. Right brake shoe   |
| 8. Capscrews       |                        |

# Photo 23

## MAINTENANCE CHECK LIST

PROBLEM	CAUSE	SOLUTION
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 (See par. 17) Add coolant (par. 17)
No coolant or inadequate supply (Spray Mist type)	No air, or low air pressure. Low coolant level.	
Knee binds.	Tapered gib too tight. Knee clamp is "on".	Adjust tapered gib (par. 19). Release clamp.
Knee movement is too loose.	Column ways worn. Flat gib worn. Elevate screw and nut worn.	Adjust vertical gib (par. 18). See par. 18. Replace screw and nut (par. 27).
No power elevate.	Microswitch has moved past limit stop. Microswitch worn out. Relay inoperative. Power elevate motor burned out.	Manually operate knee (par. 20). Replace switch. Use wiring diagram and check relay. Replace motor (par. 27) step 2.
Inadequate supply of lubricant.	Check Bijur One-Shot pumps.	Clean pumps if necessary (par. 21).
Too much or too little backlash in cross feed.	Anti-backlash nut needs adjusting.	Adjust (par. 22).
No power to table or saddle.	Timing belt broken. Feed motor burned out.	Replace belt (par. 25). Replace motor (par. 25) steps 1 to 4, except remove four bolts, instead of just loosening them, and pull out motor and gear box.
	Feed rate potentiometer faulty. D. C. power supply fuse blown. Shifting shoes broken.	Replace potentiometer. Replace fuse. Check and replace, using exploded view for reference.
	Electrical failure or disconnect. Spindle downfeed switch in on position.	Check fuses and connections using wiring diagram furnished. Turn feed dial to "Click-Off" position (par. 13).
Erratic cross feed movement.	Cross feed screw and nut worn.	Replace cross feed screw and nut (par. 37).
Saddle binds.	Tapered gib too tight.	Adjust tapered gib (par. 34).
Saddle movement too loose.	Knee ways worn.	Adjust flat gib (par. 33).
Table binds.	Tapered gib too tight. Lack of lubrication.	Adjust gib (par. 41). Fill and check reservoir.

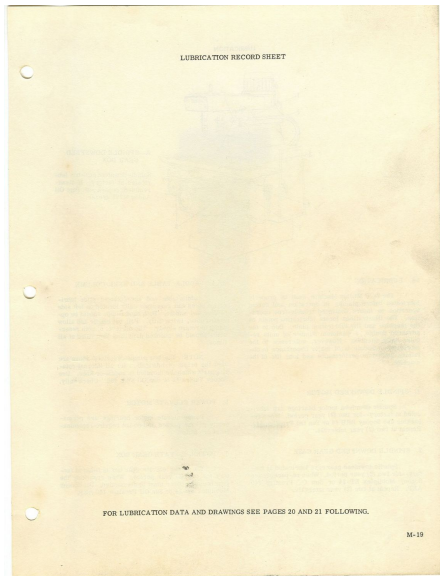
# Photo 24

## MAINTENANCE CHECK LIST

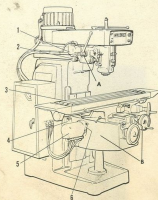
PROBLEM	CAUSE	SOLUTION
Too much or too little backlash in table feed.	Anti-backlash nut needs adjusting.	Adjust (par. 42).
Erratic table movement.	Table lead screw and saddle nut worn.	Replace screw and nut (par. 45).
Oil splash from spindle.	Excessive oil.	Follow instructions in par. 46.
Too much or too little spindle backlash.	Anti-backlash needs adjustment.	Adjust (par. 47).
Excessive float in spindle hand feed lever.	Setcrew loose.	Tighten (par. 49).
Spindle torque output inadequate. (Fover feed).	Worn slip clutch.	Replace the clutch (par. 51).
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.
Spindle brake not operating properly.	Brake lever needs adjustment. Brake shoes worn.	Adjust (par. 50). Replace brake shoes (par. 57).
Irregular pattern during face milling, or play in spindle.	Ball bearings worn. Cutting tool improperly sharpened.	Return spindle to factory, or if this is not possible, replace bearings (par. 54). Re-sharpen tool.
Quill binds.	Clamp ring adjusting screw too tight. Anti-backlash adjustment too tight.	Loosen screw (par. 48). Adjust (par. 47).
Heavy cutting causes chatter.	Clamp ring adjusting screw too loose.	Tighten screw (par. 48).
Vernae optics inaccurate.	Reader out of focus. Scales misaligned. Scales dirty.	Refocus. Realign scales. Clean with tissue-No solvent.
No power to table.	Feed selector switch in electrical cabinet in wrong position.	See par. 40.



# Photo 25



## LUBRICATION



### A--SPINDLE DOWNFEED GEAR BOX

Spindle downfeed gear box lubricated at factory. If disassembled, repack with Pate Oil Andox M279 grease.

### 58. LUBRICATION

The 2-30 Milling Machine 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 GEAR CASE

Spindle downfeed gear case lubricated at factory--for two (2) year period. When re-packing 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 and knee/column slide lubrication pump and reservoir units located on left side of knee and saddle. Both hand pumps should be operated once, twice daily. Pull out handle and allow pump to return slowly. The oil level of both reservoirs should be checked daily and kept filled at all times.

NOTE: The two pumps described above are also the origin of lubrication for all internal rotating parts which are mounted in saddle or knee. Use Socony Vaetra #2 or Sun Oil SWL #80. Check daily.

#### 5. POWER ELEVATE MOTOR

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

#### 6. POWER ELEVATE GEAR BOX

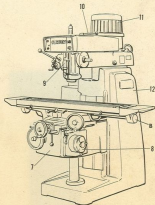
The power elevate gear box is filled at factory for two (2) year period. When repacking the gear housing, cover must be dismantled. Use Socony Mobilplex EP-24 or Sun Oil Prestige 740 AEP.

# Photo 27

## LUBRICATION

### B-BEARINGS

Vertical elevate, cross feed and longitudinal feed screws thrust bearings. If disassembled, repack with Pate Oil Andon C grease.



### 7. KNEE GEAR CASE

The knee gear case lubricant level must be maintained. A monthly inspection when motor is not running is recommended. The correct lubrication level is indicated by brass plug. Add lubricant through filler plug (access to the gear case by removal of cover plate at lower front of knee). The entire gear case should be drained and re-filled every six months. Use Socoy Vactra #4 or Sun Oil SWL #90.

### 8. KNEE FEED DRIVE MOTOR

The knee feed drive motor bearings are grease packed at factory. Repack after three (3) years of operation—under severe conditions after approximately 18 months. Use Socoy Mobilux No. 2 or Sun Oil Prestige #42.

NOTE: Do not over-lubricate ball bearings.

### 9. SPINDLE BARREL AND DEPTH STOP

The spindle barrel and depth stop should be thoroughly cleaned and lightly oiled once a week. Use Socoy Vactra #4 or Sun Oil SWL #90.

NOTE: At same time place five (5) drops of oil around spindle spline at point spindle protrudes above drives pulley. Use Socoy Vactra #2 or Sun Oil SWL #90.

### 10. CUTTER SPINDLE

Cutter spindle lubrication is provided by a drip-type oiling unit which is located on top of the ram. The oiler has a built-in shut-off valve which should be turned (pointing up) when starting the machine, otherwise the spindle will receive no lubrication. The oil flow may be stopped when machine is not in use by turning the shut-off to one-side. The oil flow adjustment should be set to feed one to three drops per hour. Excessive oiling will result in spindle overheating and undesirable oil deposits on work piece. This oiler should be checked daily and refilled as required. Use Socoy Velocity #10 or Sun Oil Solus #70.

### 11. SPINDLE DRIVE MOTOR

Spindle drive motor bearings are lubricated at factory. Requires no additional lubrication.

### 12. 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.

# Photo 28

## SERVICE POLICY

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

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

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

### GORTON PREVENTIVE MAINTENANCE PROGRAM

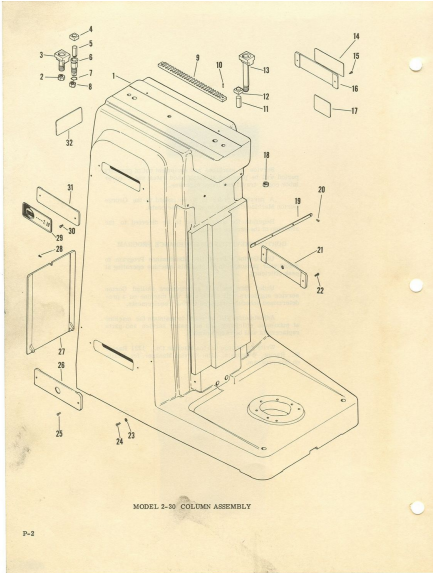
Use Gorton's Preventive Maintenance Program to assist your personnel in keeping this machine operating at peak efficiency.

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 George Gorton Machine Co., 1321 Racine St., Racine, Wisconsin, Attn: Service Manager, for details on this program.

# Photo 29



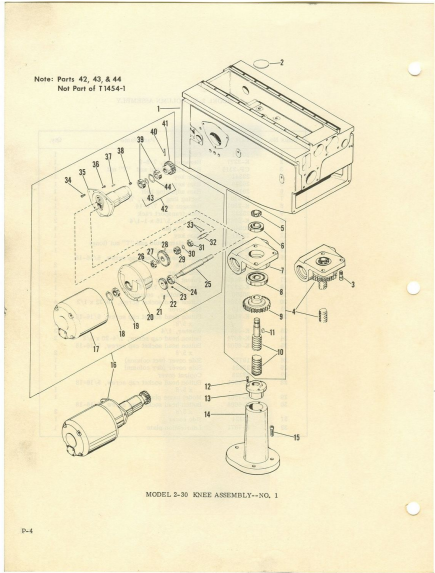
MODEL 2-30 COLUMN ASSEMBLY

# Photo 30

MODEL 2-30 COLUMN ASSEMBLY

Index No.	Part No.	Part Name	Qty.
1	20341	Column	1
2	K-2277	Hexagon nut, 7/8-9	1
3	CP-2315	Ram clamp stud and "T" nut	1
4	22341	Ram key	1
5	20348	Ram key pin	1
6	20130	Ram adjusting bolt	1
7	K-444	Spring lock washer, 2/8	1
8	K-2801	Hexagon nut, 7/8-14	1
10	23223	Ram transport rack	1
9	K-5982	Roll pin, 5/16 x 1-1/4	2
11	20348	Ram key pin	1
12	22341	Ram key	1
13	CP-2314	Ram clamp stud and "T" nut (long)	1
14	K-7561	Model name plate	1
15	K-6608	Button head socket cap screw, 5/16-18 x 5/8	2
16	23224	Side cover	1
17	K-7445	Patent number plate	1
18	K-2277	Hexagon nut, 7/8-9	1
19	20340	Apron holder, column	1
20	K-5288	Button head socket screw, 10-32 x 1/2	4
21	20510	Side cover	1
22	K-6608	Button head socket cap screw, 5/16-18 x 5/8	2
23	K-459	Washer, 1/4	2
24	K-6074	Button head cap screw, 1/4-20 x 1/2	2
25	K-6608	Button head socket cap screw, 5/16-18 x 5/8	2
26	19777	Side cover (west column)	1
26	23224	Side cover (grey column)	1
27	23223	Coolant cover	1
28	K-6608	Button head socket cap screw, 5/16-18 x 5/8	1
29	K-7561	Model name plate	1
30	K-6608	Button head socket cap screw, 5/16-18 x 5/8	2
31	23224	Side cover	1
32	K-7871	Lubrication plate	1

# Photo 31



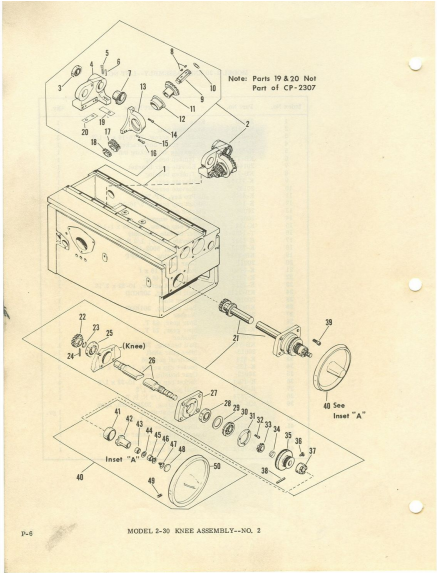
# Photo 32

MODEL 2-30 KNEE ASSEMBLY-- LIST NO. 1

Index No.	Part No.	Part Name	Qty.
1	20340	Knee	1
2	K-7311	Expansion plug	1
3	K-2556	Socket cap screw, 7/16-14 x 1-1/2	3
4	CP-2304	Elevate screw and bracket	1
5	K-6059	Bearing self locking nut #5	1
6	KB-7796	Timken bearing	1
7	20144	Elevate gear bracket	1
8	KB-7797	Timken bearing	1
9	K-7715	Elevate gear	1
10	20145	Elevate screw	1
11	K-4505	M Pro key, HP-706	1
12	K-143	Socket cap screw, 5/16-18 x 1	3
13	20096	Elevate nut	1
14	20095	Elevate nut support	1
15	K-152	Socket cap screw, 3/8-16 x 1-1/2	3
16	T-1484-1	Power elevate assembly	1
17	K-1252	Elevate motor, 1/2 H. P.	1
18	K-7573	Snap ring, 500D-156	1
19	KB-3634	Ball bearing, 203KPP	1
20	20011	Gear housing	1
21	K-9440	Roll pin, 3/16 x 1	1
22	K-7412	Spur gear, 48 T.	1
23	K-3628	Socket set screw, 10-32 x 3/16	1
24	KB-7415	Ball bearing, 302KDD	1
25	20014	Power shaft	1
26	KB-7431	Ball bearing, 301KDD	1
27	20069	Washer	1
28	K-7410	Spur gear, 43 T.	1
29	K-7411	Spur gear, 28 T.	1
30	20069	Washer	1
31	KB-7431	Ball bearing, 301KDD	1
32	20013	Idler gear shaft	1
33	K-554	Woodruff key, #6	2
34	K-129	Socket cap screw, 1/4-20 x 3/4	3
35	20012	Gear housing cover	1
36	K-1691	Socket cap screw, 10-32 x 1/2	4
37	K-6977	Roll pin, 1/8 x 1/2	1
38	K-7574	Pipe plug, 1/8 N. P. T.	1
39	KB-7416	Ball bearing, 302KD-DB, open side shunting	1 pr.
40	K-8452	Roll pin, 3/16 x 1-1/2	1
41	K-7413	Elevate drive gear	1
42	CP-2244	Bearing spacers, inner and outer	1
43	20018	Bearing spacer, inner	1
44	K-7572	Snap ring spacer	1



# Photo 33

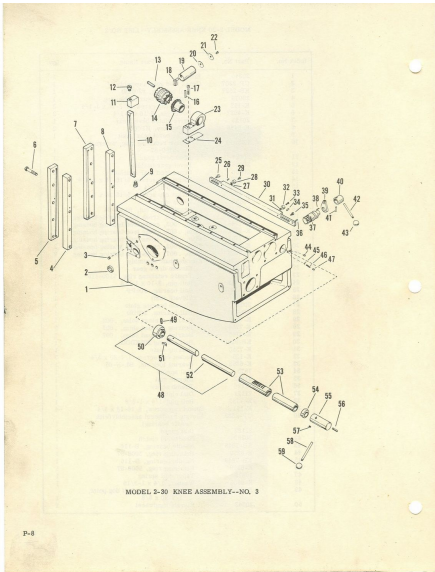


# Photo 34

MODEL 2-30 KNEE ASSEMBLY--LIST NO. 2

Index No.	Part No.	Part Name	Qty.
1	20340	Knee	1
2	CP-2307	Cross feed gear assembly	1
3	KB-2527	Ball bearing, #205DD	1
4	20079	Cross feed bearing housing	1
5	K-152	Socket cap screw, 3/8-16 x 1-1/4	3
6	K-4627	Dowel pin, 5/16 x 1-1/4	2
7	20132	Drive clutch bevel gear	1
8	K-5436	Hi Pro key, HP606	2
9	20078	Cross bevel gear shaft	1
10	K-3930	Truarc retaining ring, external #5100-87	1
11	20027	Bevel bevel gear	1
12	20028	Bevel gear bushing	1
13	20050	Cross feed gear bracket	1
14	K-147	Socket cap screw, 5/16-18 x 1-5/8	1
15	K-3808	Dowel pin, 1/4 x 1	2
16	K-143	Socket cap screw, 5/16-18 x 1	2
17	20053	Warm wheel	1
18	K-7312	Bearing lock nut, BL-N-04	1
19	K-7754	Shim, .002, cross feed bearing housing	2
19	K-7755	Shim, .003, cross feed bearing housing	2
19	K-7756	Shim, .007, cross feed bearing housing	2
20	K-7751	Shim, .002, cross feed bearing housing	2
20	K-7752	Shim, .003, cross feed bearing housing	2
20	K-7753	Shim, .007, cross feed bearing housing	2
21	CP-2303	Elevate shaft assembly	1
22	20482	Elevate drive gear	1
23	K-6497	Truarc retaining ring, 5100-118	1
24	K-5983	Roll pin, 5/16 x 1-5/8	1
25	KB-3418	Ball bearing, 206PP	1
26	20098	Elevate shaft	1
27	20097	Elevate bearing plate	1
28	KB-2427	Ball bearing, 205DD	1
29	K-7793	Bearing preload shim, .002	2
29	K-7794	Bearing preload shim, .003	2
29	K-7795	Bearing preload shim, .007	2
30	KB-6230	Ball bearing 206KD00	1
31	K-7350	Bearing plate	1
32	K-135	Socket cap screw, 1/4-20 x 3/4	3
33	K-6358	Bearing lock nut, BL-N-05	1
34	7875	Dial spring	1
35	21062	Elevate dial	1
36	21126	Thumb screw	1
37	21121	Dial clutch	1
38	K-7383	Roll pin, 1/4 x 1-5/8	1
39	K-141	Socket cap screw, 5/16-18 x 3/4	4
40	CP-2338	Elevate handwheel assembly (with needle bearing)	1
41	21122	Dial guard	1
42	20289	Handwheel clutch	1
43	KB-7848	Needle bearing, B-116	1
44	K-6399	Retaining ring, 5008-87	1
45	KB-7848	Needle bearing, B-118	1
46	K-6298	Retaining ring, 5008-87	1
47	18878	Taper coil spring	1
48	K-6503	Washer, 1/4 x 1-3/16	1
49	K-7353	Socket set screw, half dog point, 1/4-20 x 5/8	1
50	20342	Elevate handwheel	1

# Photo 35

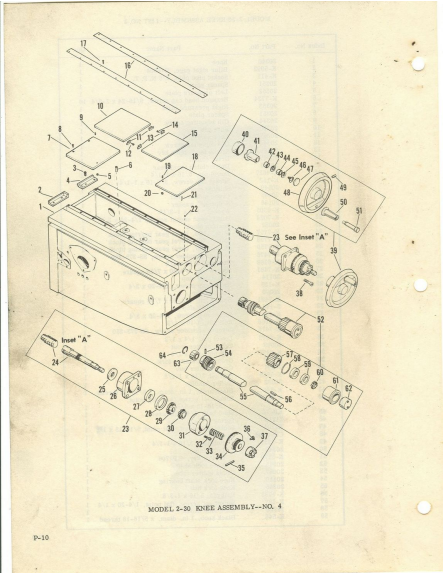


# Photo 36

MODEL 2-50 KNEE ASSEMBLY--LIST NO. 3

Index No.	Part No.	Part Name	Qty.
1	20340	Knee	1
2	K-5992	Bjurr sight gage, B-4904	1
3	K-411	Socket pipe plug, 3/8 N. P. T.	1
4	20351	Spacer plate	1
5	20352	Left pressure plate	1
6	K-7734	Hexagon head cap screw, 5/16-24 x 2-3/4	10
7	20353	Right pressure plate	1
8	20351	Spacer plate	1
9	20344	Gib adjusting screw	1
10	20350	Knee gib	1
11	20347	Lock spacer	1
12	20344	Gib adjusting screw	1
13	22199	Saddle feed clutch key	1
14	20045	Drive clutch	1
15	20195	Drive clutch bevel gear	1
16	K-4637	Dowel pin, 5/16 x 1-1/4	2
17	K-152	Socket cap screw, 3/8-16 x 1-1/4	2
18	20519	Slifting shoe	1
19	20085	Cross shifter rear	1
20	20136	Neoprene washer	1
21	K-4505	Washer, 1/4 x 1-3/16	1
22	K-7024	Button head socket screw, 1/4-20 x 3/8	1
23	20082	Bearing block	1
24	K-1737	Shim, .003, bevel gear bearing block	2
24	K-7758	Shim, .003, bevel gear bearing block	2
24	K-7759	Shim, .007, bevel gear bearing block	2
32	K-7476	Jergens shoulder screw, SS-375-250	1
36	K-6168	Roll pin, 3/16 x 1/2	1
37	K-7481	Square nut, 1/4-20 x 7/16 square	1
38	20114	Adjustable stop	1
39	K-135	Socket cap screw, 1/4-20 x 3/4	1
39	20090	Two slot nut	1
31	K-7481	Square nut, 1/4-20 x 7/16 square	1
32	2-114	Adjustable stop	1
33	K-155	Socket cap screw, 1/4-20 x 3/4	1
34	K-6168	Roll pin, 3/16 x 1/2	1
35	K-7476	Jergens shoulder screw, SS-375-250	1
36	K-6072	Dowel pin, 1/4 x 1/2	1
37	21088	Cross shifter front	1
38	K-6477	Roll pin, 1/8 x 1/2	1
39	20089	Cross feed shifter fork	1
40	20091	Cross shifter hub	1
41	K-5605	Roll pin 3/16 x 1-1/8	1
42	20082	Shifter handle	1
43	K-546	Black knob, 1 in. diam. x 5/16-18 thread	1
44	K-4177	Socket set screw, half dog point, 5/16-18 x 5/2	1
45	KD-76	Steel ball, 1/4" diameter	1
46	21112	Spring	1
47	K-301	Socket set screw, flat point, 5/16-18 x 1 1/2	1
48	CJ-2508	Knee lock	1
49	K-7359	Roll pin, 3/16 x 1-1/4	1
50	20349	Lock cam	1
51	K-5579	Hi Pro key, HP-706	1
52	20345	Knee lock shaft	1
53	20087	Cross shifter tube	1
54	20110	Knee lock shaft bearing	1
55	20346	Knee lock hub	1
56	K-7703	Roll pin, 3/16 x 1-3/8	1
57	K-187	Socket set screw, flat point, 1/4-20 x 1/4	1
58	19928	Knee lock handle	1
59	K-546	Black knob, 1 in. diam. x 5/16-18 thread	1

# Photo 37

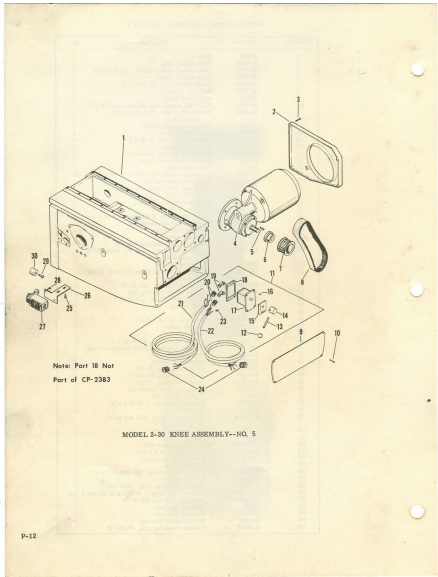


# Photo 38

MODEL 2-30 KNEE ASSEMBLY--LIST NO. 4

Index No.	Part No.	Part Name	Qty.
1	20340	Knee	1
2	K-7142	Knee wiper, left	1
3	K-7466	Button head socket screw, 10-32 x 5/8	4
4	K-7741	Knee wiper, right	1
5	K-3548	Hexagon half nut, 10-32 x 5/8	1
6	K-7968	Roll pin, 5/8 x 1	1
7	20423	Hear feed shield	1
8	K-8296	Flat head socket cap screw, 10-32 x 1/2	2
9	K-1947	Socket set screw, half dog point, 10-32 x 1/2	1
10	20428	Rear removable shield	1
11	20428	Knee shield stop	2
12	K-4693	Socket cap screw, 6-32 x 3/8	4
13	20426	Knee shield stop	2
14	K-4693	Socket cap screw, 6-32 x 3/8	4
15	20414	Stroud front knee shield	1
16	20417	Rigid retainer	2
17	K-5003	Flat head socket cap screw, 6-32 x 3/8	20
18	20423	First front knee shield	1
19	K-1947	Socket set screw, half dog point, 10-32 x 1/2	1
20	K-3548	Hexagon half nut, 10-32	1
21	K-6169	Roll pin, 3/16 x 1/2	1
22	K-185	Socket set screw, cup point, 1/4-20 x 1/4	1
23	CP-2305	Cross feed screw assembly	1
24	20677	Cross feed screw	1
25	20508	Grease retainer	1
26	20509	Cross screw bearing bracket	1
27	KB-7462	Timken bearing, class #2, cone 15101, cup 15245	1
28	20627	Bearing spacer	1
29	KB-7462	Timken bearing, class #3, cone 15101, cup 15245	1
30	K-4834	Bearing lock nut, BL-36-05	1
31	20684	Cross screw bearing cap	1
32	K-3544	Socket cap screw, 1/4-20 x 2	3
33	20650	Dial spring	1
34	21118	Dial	1
35	K-7383	Roll pin, 1/4 x 1-5/8	1
36	21126	Thumb screw	1
37	21123	Dial clutch	1
38	K-141	Socket cap screw, 5/16-18 x 3/4	4
39	CP-2335	Handwheel assembly (with needle bearing)	1
40	21122	Dial clutch guard	1
41	20269	Handwheel clutch	1
42	KB-7948	Needle bearing, B-116	1
43	K-8209	Retaining ring, #5008-07	1
44	KB-7948	Needle bearing, B-116	1
45	K-8299	Retaining ring, #5008-07	1
46	19874	Tapet coil spring	1
47	K-6565	Wrought washer, 1-3/16 x 1/4	1
48	20163	Handwheel	1
49	K-1933	Socket set screw, half dog point, 1/4-20 x 5/8	1
50	20164	Handwheel handle	1
51	20165	Handle stud	1
52	CP-2396	P. T. O. shaft assembly	1
53	K-6002	Drive pin, 1/4 x 1-1/2	1
54	20081	Cross P. T. O. worm	1
55	20094	P. T. O. shaft	1
56	K-7434	H. Pro leader key, HP-606 x 1-1/4	1
57	20093	P. T. O. pulley	1
58	K-5294	Truarc retaining ring, #160-185	1
59	KB-7473	Ball bearing (1 pr.) #204 RDDB, Grade 1 1pr.	1
60	K-7414	Bearing lock nut, BL-N-30	1
61	20092	Bearing retainer	1
62	20107	Bearing lock nut	1
63	K-7475	McGill roller bearing	1
64	K-4109	Truarc retaining ring, #5100-75	1

# Photo 39



# Photo 40

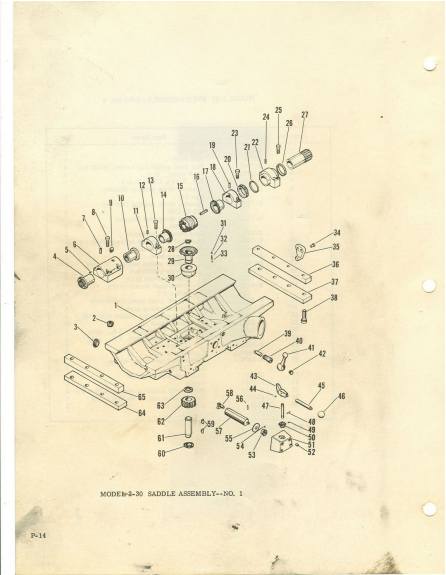
MODEL 2-30 KNEE ASSEMBLY--LIST NO. 5

Index No.	Part No.	Part Name	Qty.
1	20340	Knee	1
2	20279	Side cover	1
3	K-7905	Flat head socket cap screw, 10-32 x 1	4
4	E-1260	Feed motor, D.C.	1
5	-----	Key, 3/16 x 3/16 x 1-1/4	1
6	K-7475	Positive drive bushing (Maurey type JA)	1
7	K-7478	Positive drive bushing (Maurey #16-II-150)	1
→ 8	K-7477	Positive drive belt (Maurey #27014150)	1
9	20305	Knee cover plate, front	1
10	K-7905	Flat head socket cap screw, 10-32 x 1	4
11	CP-2383	Power elevate switch	1
12	K-7467	Plastic knob	1
13	20142	Elevate switch handle	1
14	20141	Elevate switch hub	1
15	K-7330	Power elevate plate	1
16	K-5589	Button head socket screw, 8-32 x 1/2	4
17	E-3007	Size 00 drum reversing switch	1
18*	20134	Elevate switch gasket	1
19	K-6086	Cable connector (Ralco RCG 110)	2
20	E-3085	Conduit lock nut	2
21	E-3087	Cable, 3 connector, 5 ft., gray	1
22	E-3088	Cable, 4 connector, 5 ft., gray	1
23	E-1053	Cup eye lug	6
24	E-3085	Conduit lock nut	2
25	K-6074	Button head socket cap screw, 1/4-20 x 1/2	2
26	20362	Switch mounting bracket	1
27	E-3027	Switch	1
28	K-7024	Button head socket screw, 1/4-20 x 3/8	2
29	K-148	Socket cap screw, 5/16-18 x 1-1/2	2
30	22621	Adjustable stop	2

\* Not part of CP-2383



# Photo 41

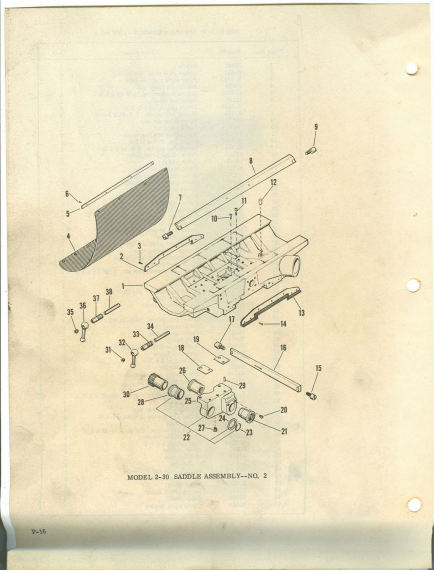


# Photo 42

MODEL 2-30 SADDLE ASSEMBLY--LIST NO. 1

Index No.	Part No.	Part Name	Qty.
1	20041	Saddle	1
2	K-411	Socket pipe plug, 3/8 N. P. T.	1
3	K-5932	Bljler sight gage B-4904	1
4	20129	Adjustable table nut	4
5	K-1289	Button head screw, 3/8-16 x 5/8	2
6	21229	Table nut adapter	1
7	K-3686	Dowel pin, 5/16 x 1-3/4	2
8	K-154	Socket cap screw, 3/8-16 x 1-3/4	4
9	21111	Fixed table nut key	1
10	20137	Fixed table nut	1
11	21053	Bevel gear bearing block	2
12	K-5980	Dowel pin, 1/4 x 1-3/4	2
13	K-154	Socket cap screw, 3/8-16 x 1-3/4	2
14	20135	Drive clutch bevel gear	1
15	20045	Drive clutch	1
16	22199	Table feed clutch key	1
17	20135	Drive clutch bevel gear	1
18	21053	Bevel gear bearing block	1
19	K-5980	Dowel pin, 1/4 x 1-3/4	2
20	K-7172	Bearing locknut, BL-N-08	1
21	20071	Fitting washer	1
22	20044	Bearing block	1
23	K-154	Socket cap screw, 3/8-16 x 1-3/4	2
24	K-5980	Dowel pin, 1/4 x 1-3/4	2
25	K-154	Socket cap screw, 3/8-16 x 1-3/4	2
26	20071	Fitting washer	1
27	CP-2229	Helix drive gear and key	1
28	K-3030	Truarc retaining ring	1
29	20147	Longitudinal feed bevel gear	1
30	20869	Bevel gear bushing	1
31	K-201	Socket set screw, flat pt., 5/16-18 x 1/2	1
32	7718	Spring	1
33	KB-76	Steel ball	1
34	K-1618	Socket cap screw, 1/4-20 x 5/8	2
35	20067	Cross trip finger	1
36	20972	Guide plate spacer	1
37	20068	Guide plate	1
38	K-178	Socket cap screw, 7/16-14 x 2	4
39	20109	Table clamp pin	2
40	19821	Table clamp stud	1
41	19824	Lock handle	1
42	K-406	Socket pipe plug, 1/8 N. P. T.	1
43	20060	Long trip finger	1
44	K-7089	Ball pin, 1/8 x 7/8	1
45	20082	Shifter handle	1
46	K-546	Black knob, 1 in. diameter	1
47	20091	Shifter shaft	1
48	K-7089	Ball pin, 1/8 x 7/8	1
49	K-1388	Socket set screw, flat pt., 10-32 x 1/4	1
50	20080	Bevel gear	1
51	20063	Long shifter gear box	1
52	K-805	Socket cap screw, 1/4-20 x 2-1/4	4
53	20010	Bevel gear	1
54	K-1808	Socket set screw, flat pt., 10-32 x 1/4	1
55	20021	Long shifter washer	1
56	K-7089	Ball pin, 1/8 x 7/8	1
57	20017	Long shifter	1
58	20049	Shifting shoe	1
59	K-5436	Hi Pro key	2
60	K-7212	Bearing lock nut BL-N-04	1
61	20051	Long bevel gear shaft	1
62	20883	Worm wheel	1
63	20282	Worm wheel shim	1
64	20066	Guide plate	1
65	20065	Guide plate spacer	1

# Photo 43



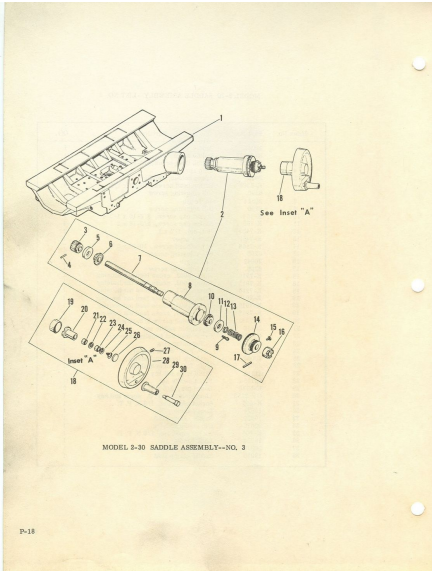
V-16

# Photo 44

MODEL 2-30 SADDLE ASSEMBLY--LIST NO. 2

Index No.	Part No.	Part Name	Qty.
1	20041	Saddle	1
2	K-7458	Saddle wiper	1
3	K-7466	Button head screw, 10-32 x 5/8	1
4	20139	Chap apron	1
5	20289	Apron holder, saddle	1
6	K-3388	Button head screw, 10-32 x 1/2	4
7	6296	Gib adjusting screw	1
8	20114	Table gib	1
9	6296	Gib adjusting screw	1
10	K-154	Socket cap screw, 3/8-16 x 1-3/4	1
11	K-155	Socket cap screw, 3/8-16 x 2	2
12	K-7483	Roll pin, 1/2 x 1	1
13	K-7458	Saddle wiper	1
14	K-7466	Button head screw, 10-32 x 5/8	7
15	6296	Gib adjusting screw	1
16	20042	Saddle gib	1
17	6296	Gib adjusting screw	1
18	K-7914	Shim, .002, cross feed nut housing	1
18	K-7915	Shim, .005, cross feed nut housing	1
18	K-7916	Shim, .007, cross feed nut housing	1
19	K-7917	Shim, .002, cross feed nut housing	1
19	K-7918	Shim, .005, cross feed nut housing	1
19	K-7919	Shim, .007, cross feed nut housing	1
20	K-7293	Button head screw 3/8-16 x 5/8	2
21	20116	Adjustable saddle nut	1
22	CP-2309	Cross feed nut housing assembly	1
23	K-4315	Retaining ring	1
24	20056	P. T. O. worm spacer	1
25	20064	Cross feed nut housing	1
26	20055	P. T. O. worm housing	1
27	21111	Fixed table nut key	1
28	20115	Fixed saddle nut	1
29	K-5528	Dowel pin, 3/8 x 1	2
30	CP-2253	Longitudinal P. T. O. worm and key	1
31	K-406	Socket pipe plug, 1/8 N. P. T.	1
32	19924	Lock handle	1
33	19930	Saddle clamp stud	1
34	20070	Gib clamp rod	1
35	K-406	Socket pipe plug, 1/8 N. P. T.	1
36	19924	Lock handle	1
37	20070	Gib clamp rod	1
38	19930	Saddle clamp stud	1

# Photo 45



P-18

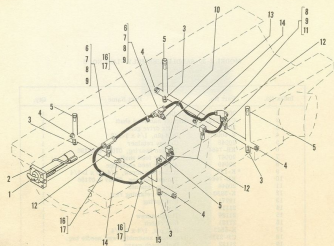
# Photo 46

MODEL 2-30 SADDLE ASSEMBLY--LIST NO. 3

Index No.	Part No.	Part Name	Qty.
1	20041	Saddle	1
2	CP-2255	Angular handfeed shaft	1
3	30046	Helix drive gear	1
4	K-6002	Bolt pin, 1/4 x 1-1/2	1
5	30048	Grease retainer	1
6	KB-7464	Timken bearing, 07087 & 07196	1
7	20047	Angular feed shaft	1
8	30049	Angular feed cartridge	1
9	* K-138	Socket cap screw, 1/4-20 x 1-1/4	4
10	KB-7464	Timken bearing, 07087 & 07196	1
11	30048	Grease retainer	1
12	K-3930	Truarc retaining ring	1
13	19771	Ezal spring	1
14	21118	Dial	1
15	21128	Thumb screw	1
16	21121	Dial clutch	1
17	K-5963	Roll pin, 1/4 x 1-3/4	1
18	CP-2235	Handwheel assembly, with needle hrg.	1
19	21122	Dial clutch guard	1
20	20299	Handwheel clutch	1
21	KB-7848	Needle bearing, B-116	1
22	K-6295	Retaining ring, 5008-87	1
23	KB-7848	Needle bearing, B-116	1
24	K-6290	Retaining ring, 5008-87	1
25	19873	Taper coil spring	1
26	K-8505	Wrought washer, 1-3/16 x 1/4	1
27	K-7853	Socket set screw, 1/2 dia g <sup>+</sup> , 1/4-20 x 3/8	1
28	20163	Handwheel	1
29	20165	Handle stud	1
30	20164	Handwheel handle	1

\* Not part of CP-2255

# Photo 47

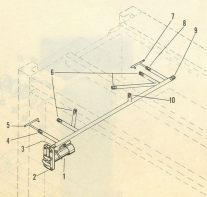


MODEL 2-30 SADDLE LUBRICATION

Index No.	Part No.	Part Name	Qty.
1	K-7463	Bijur one shot oiler	1
2	K-1616	Socket cap screw, 1/4-20 x 5/8	4
3	K-7469	Bijur meter unit, FKA-2	4
4	K-408	Socket pipe plug, 1/8 N. P. T.	4
5	K-5993	Bijur meter unit, FKA-3	4
6	K-7468	Bijur junction header	2
7	K-2132	Pipe nipple, 1/8	2
8	K-4523	Bijur compression sleeve	8
9	K-4520	Bijur compression bushing	8
10	K-7852	Bijur meter unit, FKA-1	1
11	K-6383	Bijur junction header	1
12	K-5996	Bijur meter unit, FKA-1	4
13	K-5541	Bijur elbow adapter	2
14	K-7471	Bijur meter unit, FKA-0	2
15	K-6181	Nylon tube, 1/32 O. D. x 108 L. D.	AR
16	K-6159	Self tapping screw	3
17	K-6985	Plastic clip	3

# Photo 48

MODEL 2-30 KNEE LUBRICATION

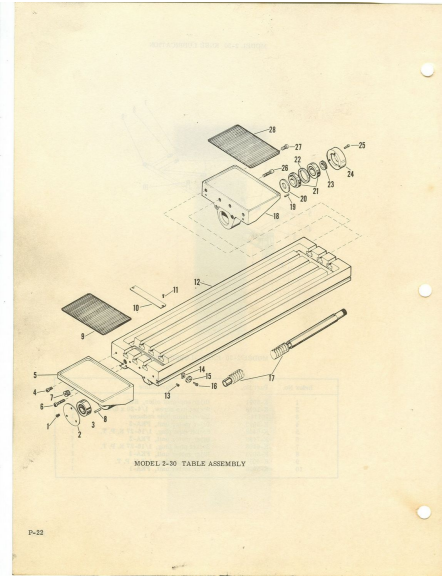


MODEL 2-30 KNEE--LUBRICATION

Index No.	Part No.	Part Name	Qty.
1	K-5991	Bijur one-shot oiler, KIC	1
2	K-1618	Socket cap screw, 1/4-20 x 5/8	4
3	20111	Lubrication hole reducer	1
4	K-5993	Bijur meter unit, FKA-3	2
5	K-6408	Socket pipe plug, 1/16-27 N. P. T.	1
6	K-7469	Bijur meter unit, FKA-2	4
7	K-6408	Socket pipe plug, 1/16-27 N. P. T.	1
8	K-5993	Bijur meter unit, FKA-3	1
9	K-605	Socket pipe plug, 1/8 N. P. T.	1
10	K-5996	Bijur meter unit, FKA-1	1



# Photo 49

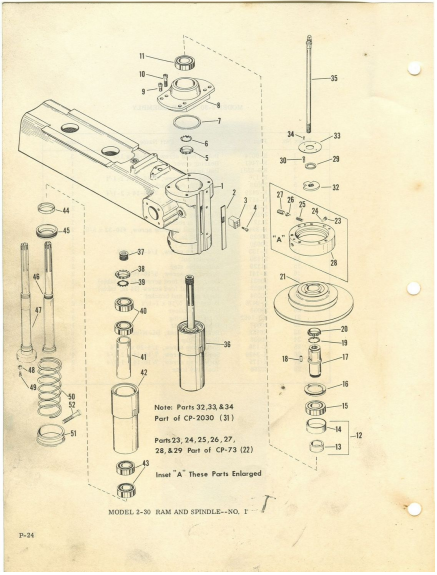


# Photo 50

## MODEL 2-30 TABLE ASSEMBLY

Index No.	Part No.	Part Name	Qty.
1	K-5074	Button head screw, 1/4-20 x 1/2	3
2	K-7401	Bearing cover	1
3	KB-6881	Ball bearing	1
4	K-175	Socket cap screw, 7/16-14 x 1-1/4	2
5	20033	Left table end bracket	1
6	K-3429	Socket cap screw, 7/16-14 x 2-1/4	4
7	K-417	Socket pipe plug, 3/4	1
8	K-6478	Dowel pin, 5/16 x 1-1/2	2
9	20266	Tool tray liner	1
10	21127	Coilant screen	1
11	K-394	Round head machine screw, #10-32 x 3/8	2
12	20029	Table (68 in.)	1
13	20030	Table (64 in.)	1
13	K-133	Socket cap screw, 1/4-20 x 1/2	2
14	21130	Toe slot nut	2
15	21129	Adjustable stop	2
16	K-141	Socket cap screw, 5/16-18 x 3/4	2
17	20031	Longitudinal feed screw (68 in. table)	1
17	20032	Longitudinal feed screw (64 in. table)	1
18	20034	Right table end bracket	1
19	K-6479	Dowel pin, 5/16 x 1-1/2	2
20	20035	Grease retainer	1
21	KB-7462	Timken bearing	2
22	20037	Bearing spacer	1
23	N6156	Bearing lock nut, DL-N-05	1
24	20036	Bearing cap	1
25	K-138	Socket cap screw, 1/4-20 x 1-1/4	3
26	K-3429	Socket cap screw, 7/16-14 x 2-1/4	4
27	K-175	Socket cap screw, 7/16-14 x 1-1/4	2
28	20266	Tool tray liner	1

# Photo 51

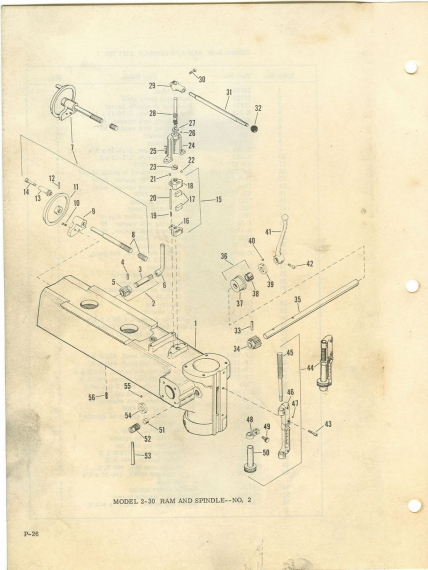


# Photo 52

MODEL 2-30 RAM AND SPINDLE LIST NO. 1

Index No.	Part No.	Part Name	Qty.
1	20174	Sliding head	1
2	10720	Depth stop cover plate	1
3	15330	Feed stop on spindle barrel	1
4	K-148	Socket cap screw, 5/16-18 x 1-1/2	2
5	K-1340	Ball bearing lock washer, #9	1
6	K-99	Ball bearing lock washer, #9	1
7	7070	Damper washer	1
8	20006	Bearing mount	1
9	K-141	Socket cap screw, 5/16-18 x 3/4	4
10	K-163	Socket cap screw, 1/2-13 x 2	4
11	KB-37	Ball bearing, #209	1
12	CP-287	Ball bearing spacer in pulley shield	1
13	7945	Ball bearing spacer, inner	1
14	7944	Ball bearing spacer, outer	1
15	KB-37	Ball bearing, #209	1
16	7945	Ball bearing locknut	1
17	7930	Spindle pulley sleeve	1
18	7941	Key for spindle pulley sleeve	1
19	K-95	Ball bearing lock washer, #9	1
20	K-1340	Ball bearing lock washer, #9	1
21	8062	Spindle drive pulley	1
22	CP-73	Spindle dog retainer	1
23	K-3984	Socket set screw, flat point, 1/4-28 x 1/4	2
24	11905	Brass disc	2
25	9440	Knockout lever spring	2
26	10247	Spindle dog plunger	2
27	K-2330	Socket set screw, flat point, 5/16-24 x 1	2
28	10246	Spindle dog	1
29	9518	Felt washer	1
30	K-138	Socket cap screw, 1/4-20 x 1-1/4	4
31	CP-3030	Spindle dog retainer and cover	1
32	10248	Spindle dog retainer	1
33	10245	Retainer cover	1
34	8271	Screw	4
35	CP-1786	Draw bar rod and head, #10 B & S	1
36	CP-1773	Draw bar rod and head, #40 N. S.	1
38	CP-1250	Spindle and spindle barrel, #10 B & S	1
39	CP-1277	Spindle and spindle barrel, #40 N. S.	1
33	7951	Thrust collar (#10 B & S only)	1
38	K-1349	Ball bearing lock nut, #9	1
39	L-95	Ball bearing lock washer, #9	1
40	KB-37	Ball bearing, #209	1pr.
41	7846	Ball bearing spacer on spindle	1
42	19047	Spindle barrel	1
43	KB-37	Ball bearing, #209	1pr.
44	7845	Ball retainer on spindle	1
45	7942	Ball bearing lock nut	1
46	7943	Cutter spindle, #10 B & S	1
47	10295	Cutter spindle, #40 N. S.	1
48	10266	Spindle nose key, #40 N. S.	2
49	K-195	Socket cap screw, 1/4-20 x 3/4 #40 N. S.	2
50	8746	Spindle sleeve spring	1
51	10240	Washer for spindle barrel	1
52	K-174	Socket cap screw, 5/8-11 x 4-1/2	1

# Photo 53

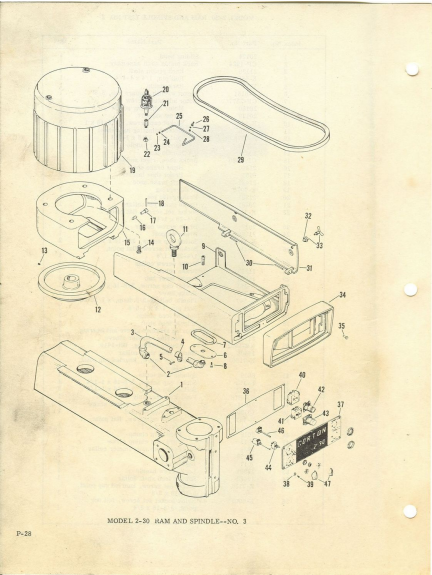


# Photo 54

MODEL 2-30 HAM AND SPINDLE LIST NO. 2

Index No.	Part No.	Part Name	Qty.
1	20174	Sliding head	1
2	CP-1924	Rack pinion shaft assembly	1
3	21195	Rack pinion shaft	1
4	K-5562	Roll pin, 1/4 x 1-1/4	1
5	7957	Rack pinion	1
6	K-8151	Socket wrench, square hub, 5/8"	1
7	CP-2377	Motor adjusting screw	1
8	20190	Motor adjusting screw	1
9	20379	Screw support	1
10	K-143	Socket cap screw, 9/16-18 x 1	3
11	20376	Motor adjusting handwheel	1
12	K-7778	Roll pin, 3/16 x 1-3/8	1
13	20378	Handwheel handle	1
14	20377	Handle shoe	1
15	CP-1920	Brake shoe, right and left	1
16	21490	Right brake shoe	1
17	8995	Brake shoe insert	2
18	21489	Left brake shoe	1
19	K-7070	Brake spring	1
20	21381	Brake guide pin	1
21	20291	Brake guide pin collar	1
22	K-187	Socket set screw, flat point, 1/4-20 x 1/4	1
23	7027	Brake screw collar	1
24	21302	Brake support	1
25	K-152	Socket cap screw, 3/8-16 x 1-1/4	2
26	K-187	Socket set screw, flat point, 1/4-20 x 1/4	1
27	7027	Brake screw collar	1
28	11275	Brake screw	1
29	11276	Brake lever hub	1
30	K-161	Socket cap screw, 3/8-16 x 1	1
31	11280	Brake lever	1
32	K-547	Plastic ball, 1-3/8 diam. x 7/16-20 thd.	1
33	K-7583	Roll pin, 1/4 x 1-5/8	1
34	18943	Spindle feed pinion	1
35	20362	Spindle feed shaft	1
36	CP-2333	Bearing retainer sleeve and bearing	1
37	21138	Bearing retainer sleeve	1
38	K8-1602	Needle bearing, BN-1416	1
39	19488	Spindle feed shaft collar	1
40	K-7136	Socket set screw, knurled cup point, 9/16-18 x 3/8	1
41	8659	Spindle feed lever	1
42	K-152	Socket cap screw, 3/8-16 x 1-1/4	1
43	K-152	Socket cap screw, 3/8-16 x 1-1/4	3
44	CP-818	Feed stop assembly	1
45	22611	Feed stop micrometer screw	1
46	10730	Feed stop bracket	1
47	K-187	Socket set screw, flat point, 1/4-20 x 1/2	1
48	7012	Feed stop clamp	1
49	7013	Feed stop clamp screw	1
50	7938	Feed stop micrometer collar	1
51	15238	Brass shoe	1
52	7017	Lock screw	1
53	12891	Lock screw handle	1
54	19488	Spindle feed shaft collar	1
55	K-7136	Socket set screw, knurled cup point, 9/16-18 x 3/8	1
56	K-6006	Notch socket set screw, full dog point, 3/8-16 x 3/4	1

# Photo 55



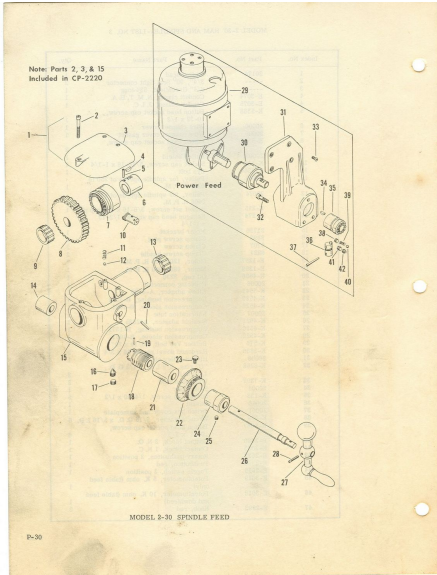
# Photo 56

MODEL 2-30 RAM AND SPINDLE--LIST NO. 3

Index No.	Part No.	Part Name	Qty.
1	20174	Sliding head	1
2	-----	3/4", 90° Seal tight connector	2
3	-----	3/4" Greenfield, 53" long	1
4	E-3074	Conduit clamp, N. M. T. B. A.	1
5	E-3075	Conduit clamp, J. I. C.	1
6	K-5380	Button head socket cap screw, 10-32 x 1/2	1
7	20000	Wire channel cover	1
8	20059	Wire channel cover gasket	1
9	K-5388	Button head socket cap screw, 10-32 x 1/2	2
10	20005	Pulley shield	1
11	K-146	Socket cap screw, 5/16-18 x 1-1/4	2
12	K-2264	Eye bolt	1
13	22284	Pulley, for spindle speeds of 250 to 4000 R. P. M.	1
14	22074	Pulley, for spindle speeds of 133 to 2666 R. P. M.	1
15	K-215	Socket set screw, 3/8-16 x 3/8 cup pt.	1
16	K-574	Hexagon head cap screw, 1/2-13 x 1-1/4	4
17	21756	Motor bracket	1
18	9893	Clamp screw plug	2
19	5707	Clamp screw	2
20	9821	Clamp screw handle	2
21	E-1257	Motor, 1500/600 R. P. M.	1
22	E-1255	Motor, 1800/900 R. P. M.	1
23	K-4666	Oil cup, 2230	1
24	20008	Reducing connector	1
25	K-5541	Elbow adapter, A-3080	1
26	K-4520	Compression bushing, B-1371	1
27	K-4522	Compression sleeve, B-1061	1
28	20007	Lubrication tube	1
29	K-4521	Straight adapter, A-2895	1
30	K-4520	Compression bushing, B-1371	1
31	K-4522	Compression sleeve, B-1061	1
32	K-576	Rubber Vee belt, 15/16 x 79"	1
33	E-3830	Hardened dowel pin, 3/16 x 3/4	2
34	20003	Hinged pulley shield	1
35	K-6838	"O" ring, 3/8 I. D. x 1/2 O. D., 1/16 wall	2
36	K-7397	Wing head stud	2
37	20004	Switch box	1
38	K-153	Socket cap screw, 1/4-20 x 1/2	5
39	20010	Gasket	1
40	20001	Switch box cover and nameplate	1
41	K-459	Wrought washer, 9/16 O. D. x 5/16 I. D.	6
42	K-5387	Button head socket cap screw, 10-32 x 3/8	6
43	E-2380	Contact block, 2 N. C.	1
44	E-2053	Contact block, 1 N. C.	1
45	E-2623	Rotary pushbutton, 2 position	1
46	E-2306	Pushbutton, red	1
47	E-2955	Toggle switch, 3 position	1
48	E-3019	Potentiometer, 5 K. ohm (stable feed only)	1
49	E-3018	Potentiometer, 10 K. ohm (stable feed and downfeed)	1
50	E-2993	Knob, red	2



# Photo 57



# Photo 58

## MODEL 2-30 SPINDLE FEED

Index No.	Part No.	Part Name	Qty.
1*	CP-2220	Spindle feed gear box and cover	1
2	K-1558	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-7394	Roll pin, 1/4 x 1-3/8	1
6	7959	Spacer	1
7	13564	Clutch, sliding	1
8	13966	Spindle feed worm wheel and clutch	1
9	KB-1602	Needle bearing, BR-1416	1
10	11185	Shifter	1
11	9847	Spring	1
12	KB-76	Steel ball	1
13	KB-1602	Needle bearing, BR-1416	1
14	18832	Plug (Stand 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	19829	Spindle feed worm	1
19	K-5440	Roll pin, 3/16 x 1	1
20	12875	Shifter handle	1
21	19881	Worm shaft housing	1
22	9296	Micrometer dial	1
23	16278	Micrometer collar adjusting screw	1
24	16279	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 x 1-1/4	1
29**	E-12518	Drive motor (Dialless), 1/8 H. P.	1
30**	K-7740	Overload protector coupling	1
31**	20336	Motor mounting bracket	1
32**	K-137	Socket cap screw, 1/4-20 x 1	3
33**	K-5968	Button head socket cap screw, 10-52 x 3/4	4
34**	K-554	Woodruff key, No. 6	1
35**	19828	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 3/16	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

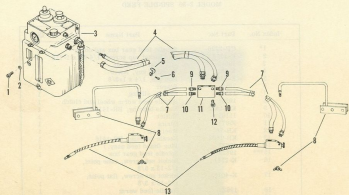
\* Includes part 15

\*\* Used only with power down feed

\*\*\* Part of CP-2220

# Photo 59

MODEL 2-30 SPRAY MIST COOLANT



MODEL 2-30 SPRAY MIST COOLANT

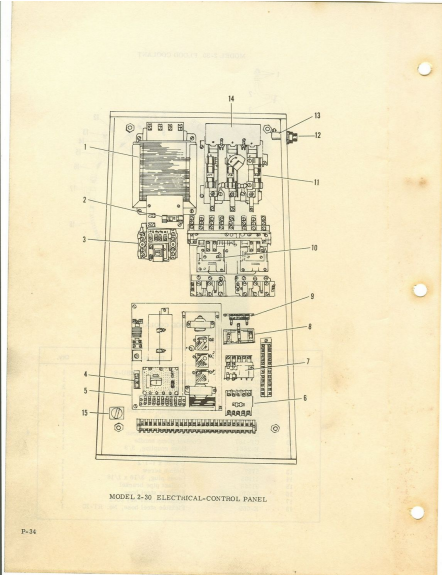
Index No.	Part No.	Part Name	Qty.
1	K-135	Socket cap screw, 1/4-20 x 3/4	2
2	K-440	Spring lockwasher, 1/4 in.	2
3	K-6510	Spray mist coolant unit UBA, Bijur No. D-107	1
4	K-6512	Dual hose assembly, 8 ft., Bijur No. B-156-8	1
5	K-6559	Parker hose clip	1
6	K-3387	Buttress head socket screw, 10-32 x 3/8	1
7	K-6775**	Dual hose assembler, 3 ft.	2
8	K-6513	Magnetic jet holder, Bijur No. B-133	2*
9	K-6533**	Straight adapter, No. A-2335	3
10	K-6776**	Hose connector, 5/16, No. B-150	3
11	K-6774**	3-Way dual tee block	1
12	K-1160	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



# Photo 61



# Photo 62

MODEL 2-30 ELECTRICAL--CONTROL PANEL

Index No.	Part No.	Part Name	Qty.
1	E-3057	Transformer, 2 K. V. A.	1
2	E-2889	Fuse, 25 amp., 250 volt	1
3	E-3020	Starter, size 00 (Coolant)	1
4	E-3084	Fuse, 35 amp., 250 volt	1
5	E-3030	S. C. R. Drive unit	1
6	E-3050	Control relay, 3 NO-1 NC (PF & DF interlock)	1
7	E-3043	Timer relay, 3 NO-1 NC	1
8	E-3045	Capacitor, 300 MFD	1
9	E-3046	Resistor, 5 ohm, 25 watt	1
10	E-2452	2 Speed starter, Size 1 (Spindle)	1
11	E-2573	Fuse, 30 amp, 600 volt (For 440 volt line)	1
11	E-2671	Fuse, 35 amp, 250 volt (For 220 volt line)	1
12	E-2419	Selector switch, 3 position	1
13	E-2398	Contact block, 1 NO-1 NC	1
14	E-2606	Disconnect switch mechanism, 60 amp.	1
15	-----	Table feed selector switch	1

# Photo 63

