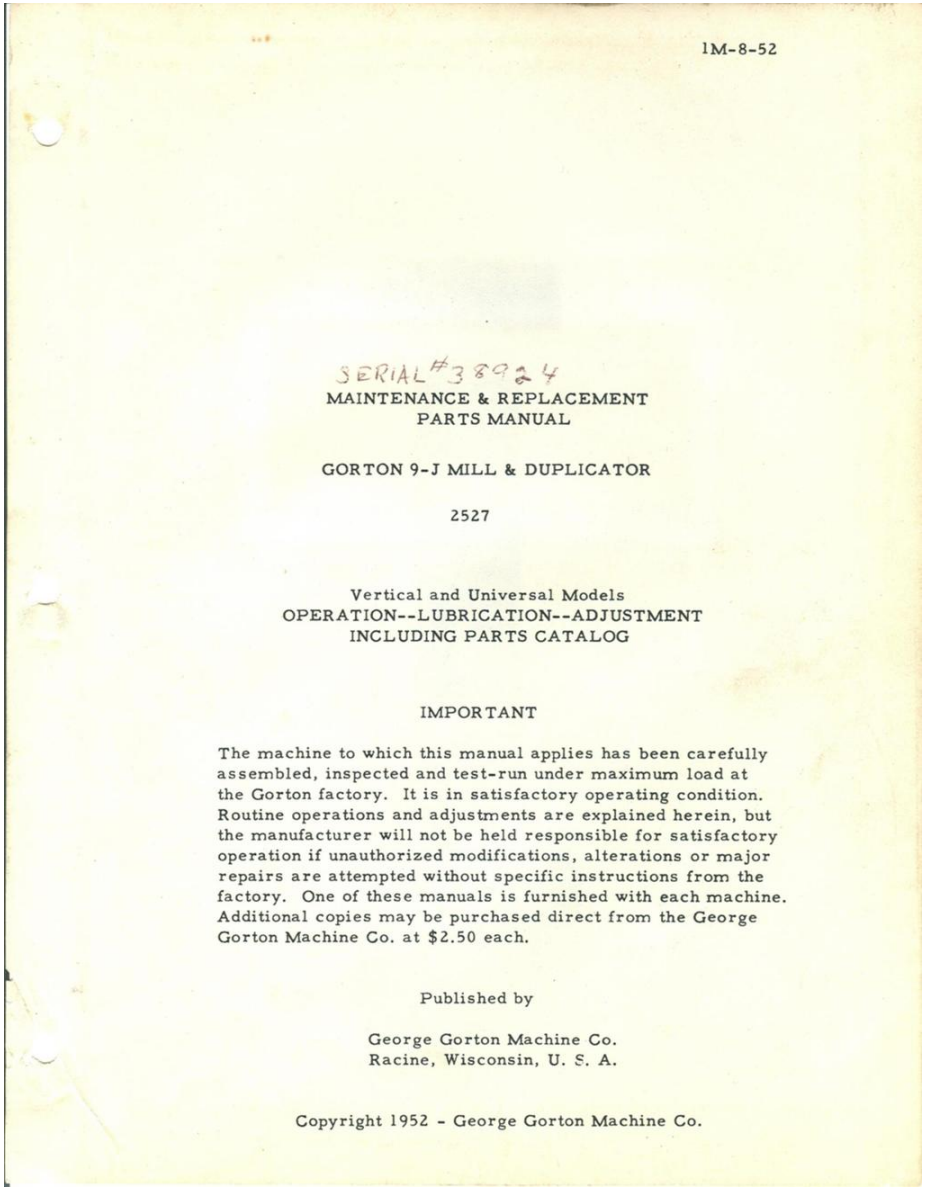
Photo 1



1M-8-52

SERIAL #38924

MAINTENANCE & REPLACEMENT
PARTS MANUAL

GORTON 9-J MILL & DUPLICATOR

2527

Vertical and Universal Models
OPERATION--LUBRICATION--ADJUSTMENT
INCLUDING PARTS CATALOG

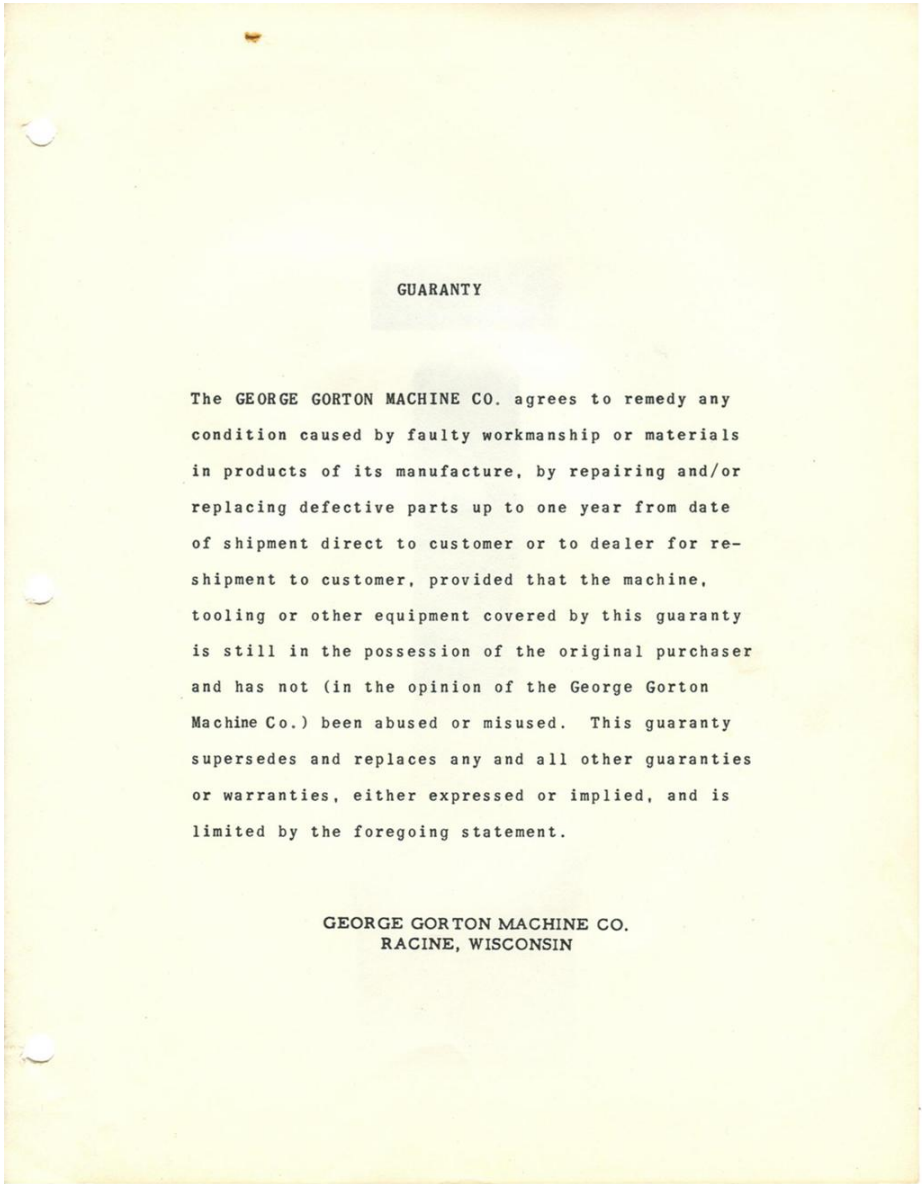
IMPORTANT

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 $2.50 each.

Published by

George Gorton Machine Co.
Racine, Wisconsin, U. S. A.

Photo 2

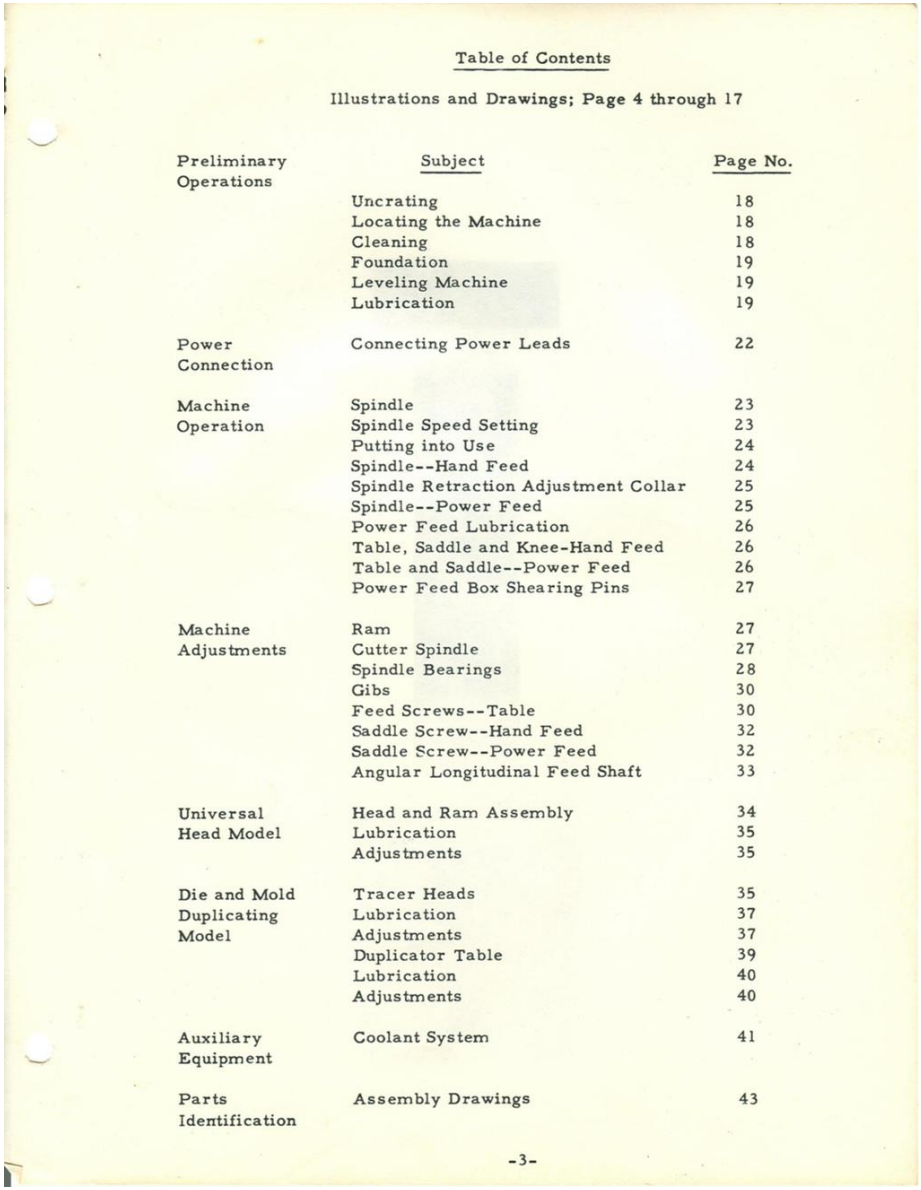


GUARANTY

The GEORGE GORTON MACHINE CO. agrees to remedy any condition caused by faulty workmanship or materials in products of its manufacture, by repairing and/or replacing defective parts up to one year from date of shipment direct to customer or to dealer for re-shipment to customer, provided that the machine, tooling or other equipment covered by this guaranty is still in the possession of the original purchaser and has not (in the opinion of the George Gorton Machine Co.) been abused or misused. This guaranty supersedes and replaces any and all other guaranties or warranties, either expressed or implied, and is limited by the foregoing statement.

GEORGE GORTON MACHINE CO.
RACINE, WISCONSIN

Photo 3



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Illustrations and Drawings; Page 4 through 17

Photo 4

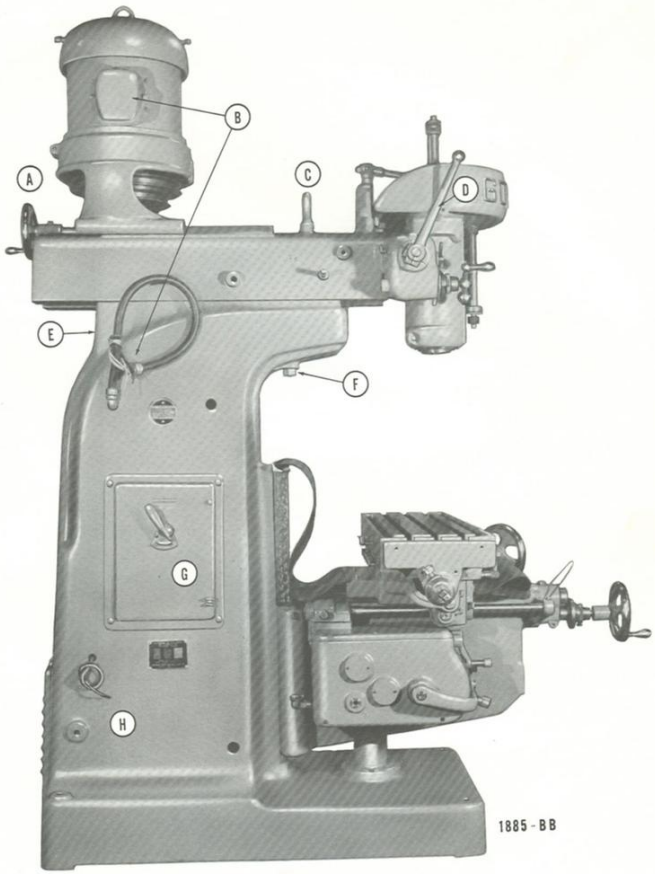


Figure 1

Left Side of Gorton 9-J Vertical Mill

A. Belt Adjustment Hand Wheel
B. Terminal Housing Box on Motor and Power Line to Motor Disconnected for Shipment
C. Eye Bolt for Lifting
D. Lefthand Spindle Feed Lever
E. Rear Ram Clamping Bolt
F. Front Ram Clamping Bolt
G. Main Disconnect Switch
H. Main Power Line Lead

Photo 5

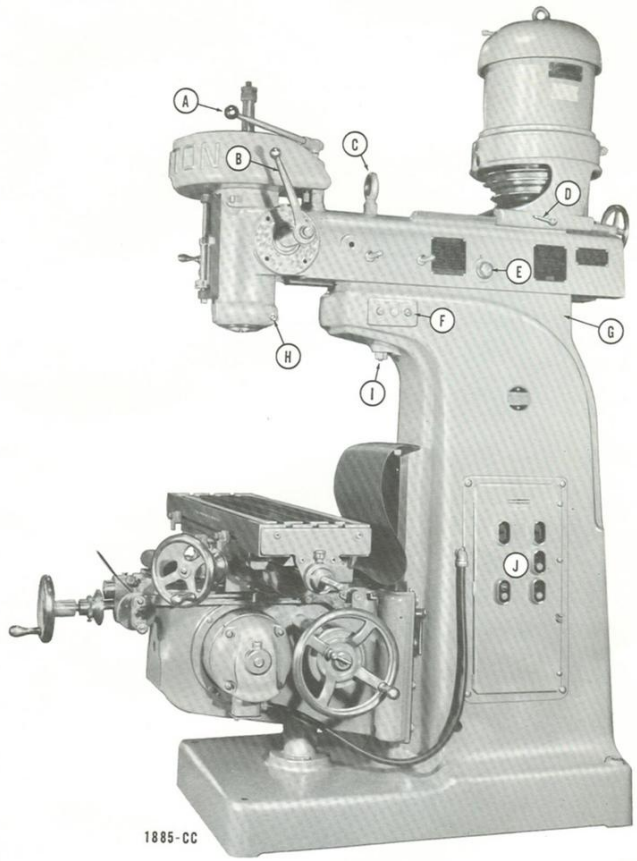


Figure 2

Right Side of Gorton 9-J Vertical Mill

A. Spindle Brake Lever
B. Righthand Spindle Feed Lever
C. Eye Bolt for Lifting
D. Motor Bracket Locking Lever
E. Ram Adjusting Nut
F. Spindle Control Buttons
G. Rear Ram Clamping Bolt
H. Clamp Ring Adjusting Screw
I. Front Ram Clamping Bolt
J. Main Control Panel

Photo 6

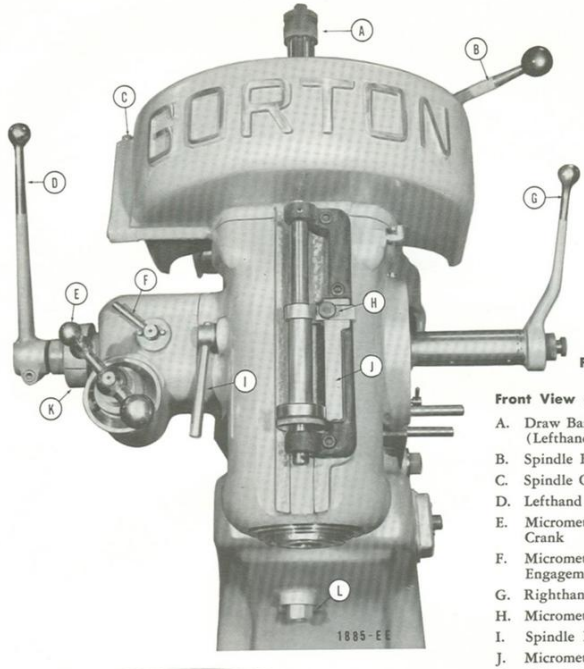


Figure 3

Front View of Spindle Housing

A. Draw Bar Back-Up Collar (Lefthand Thread)
B. Spindle Brake Lever
C. Spindle Oil Cup Connection
D. Lefthand Spindle Feed Lever
E. Micrometer Spindle Feed Crank
F. Micrometer Spindle Feed Engagement Lever
G. Righthand Spindle Feed Lever
H. Micrometer Depth Stop Lock
I. Spindle Locking Lever
J. Micrometer Depth Stop
K. Spindle Retraction Adjustment Collar
L. Front Ram Clamping Bolt

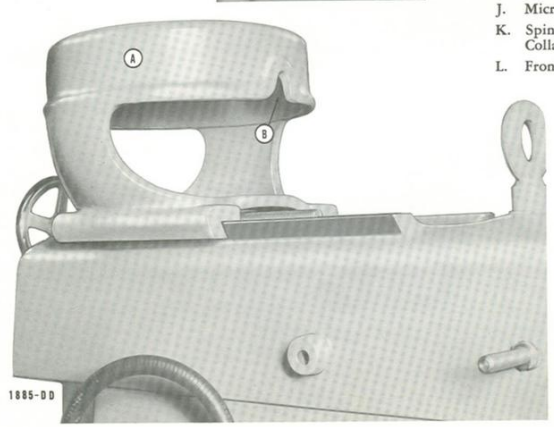


Figure 4

A. Motor Bracket
B. Grease Tube Slot

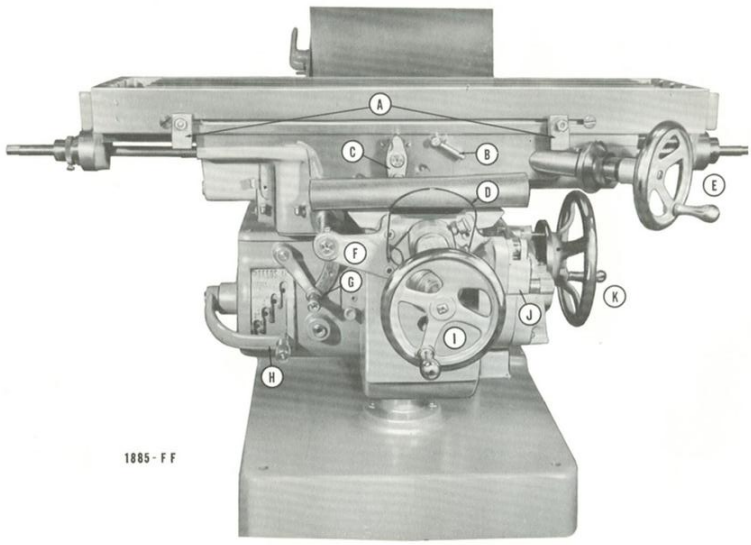


Figure 5

Table, Saddle, and Knee

A. Longitudinal Feed Adjustable Stop Dogs
B. Table Locking Lever
C. Longitudinal Power Feed Lever (Handle is Directional)
D. Wire Chip Guard Support
E. Angular Longitudinal Feed Hand Wheel
F. Front Knee Bracket
G. High-Medium-Low Feed Range Lever
H. Feed Selector Lever
I. Cross Feed Hand Wheel
J. Cross Power Feed Lever (Directional)
K. Knee Elevate Hand Wheel

Photo 7

Photo 8

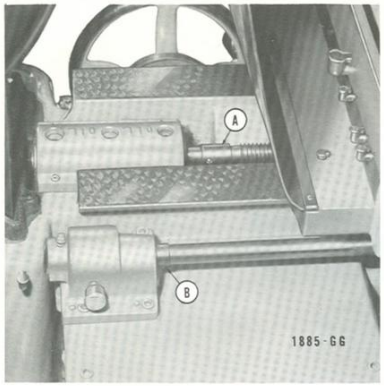


Figure 6

Shearing Pins

A. Cross Feed Drive Shear Pin
B. Longitudinal Drive Shaft Shear Pin

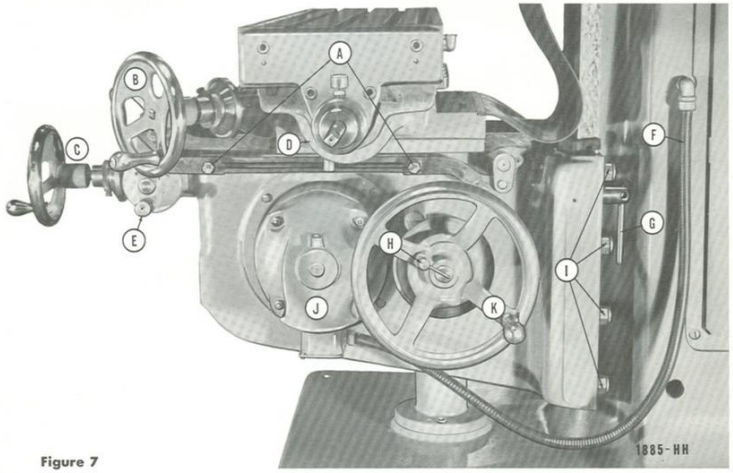
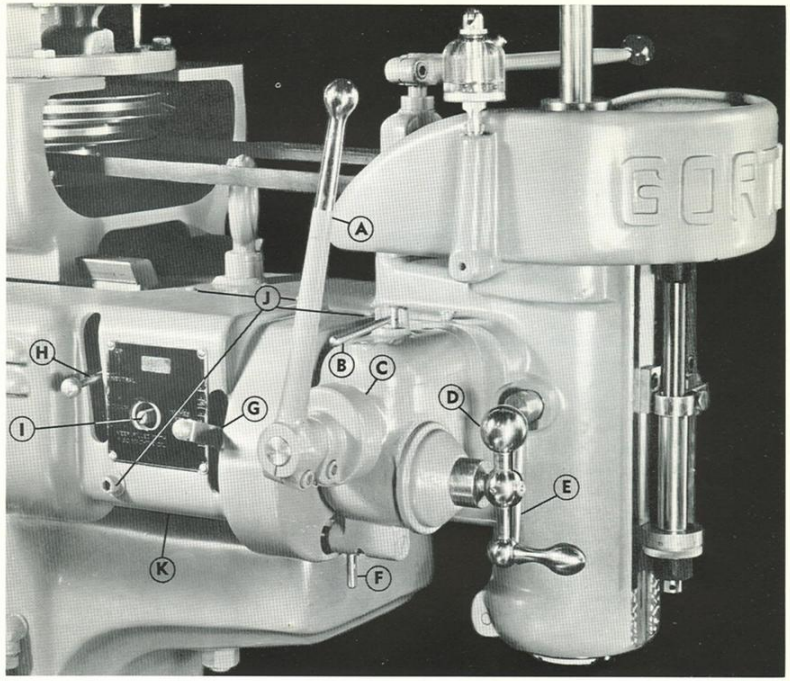


Figure 7

Right Side of Table, Saddle, and Knee

A. Cross Feed Adjustable Stop Dogs
B. Angular Longitudinal Feed Hand Wheel
C. Cross Feed Hand Wheel
D. Saddle Locking Lever (Concealed)
E. Cross Power Feed Lever (Directional)
F. Power Line to Knee Motor
G. Knee Locking Lever
H. Knee Elevate Micrometer Dial Locking Lever
I. Knee Gib Bolts
J. Knee Motor
K. Knee Elevate Hand Wheel

Photo 9



P2804-C

NEW SPINDLE POWER DOWN FEED UNIT 1194-1

If your machine is equipped with this new unit, information and instructions for operation and maintenance are contained on the front and back of this page only.

A. Left-Hand Spindle Feed Lever

B. Micrometer Spindle Feed Engagement Lever

C. Spindle Retraction Adjustment Collar

D. Micrometer Spindle Feed Crank

E. Spindle Locking Lever

F. Spindle Power Feed Engagement Lever

G. Feed Regulator Lever

H. Directional Feed Lever

I. Oil Filler Plug

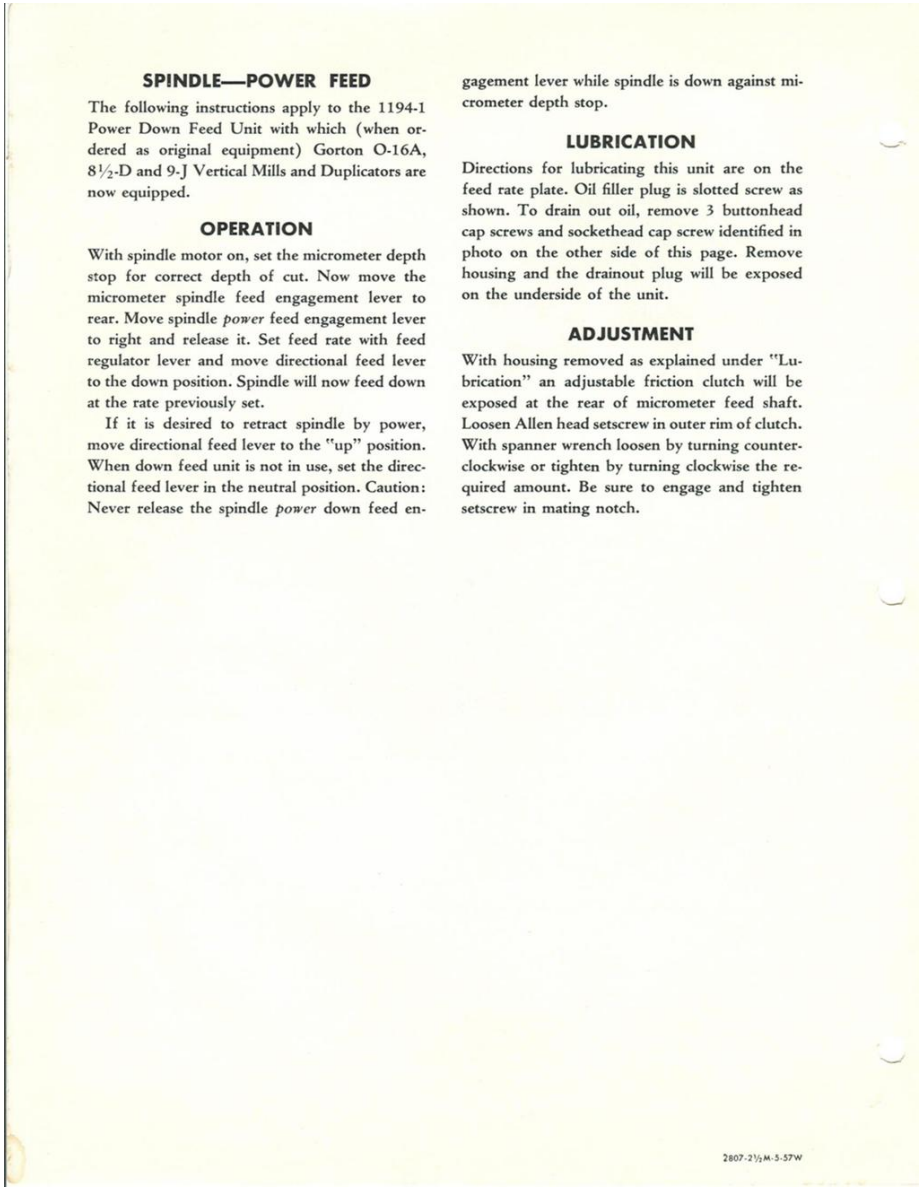
J. 3 Buttonhead Cap Screws and Sockethead Cap Screw

K. Oil Drainout (inside housing)

FORM 2807

SEE OTHER SIDE OF PAGE

Photo 10



SPINDLE—POWER FEED

The following instructions apply to the 1194-1 Power Down Feed Unit with which (when ordered as original equipment) Gorton O-16A, 8½-D and 9-J Vertical Mills and Duplicators are now equipped.

OPERATION

With spindle motor on, set the micrometer depth stop for correct depth of cut. Now move the micrometer spindle feed engagement lever to rear. Move spindle *power* feed engagement lever to right and release it. Set feed rate with feed regulator lever and move directional feed lever to the down position. Spindle will now feed down at the rate previously set.

If it is desired to retract spindle by power, move directional feed lever to the "up" position. When down feed unit is not in use, set the directional feed lever in the neutral position. Caution: Never release the spindle *power* down feed engagement lever while spindle is down against micrometer depth stop.

LUBRICATION

Directions for lubricating this unit are on the feed rate plate. Oil filler plug is slotted screw as shown. To drain out oil, remove 3 buttonhead cap screws and sockethead cap screw identified in photo on the other side of this page. Remove housing and the drainout plug will be exposed on the underside of the unit.

ADJUSTMENT

With housing removed as explained under "Lubrication" an adjustable friction clutch will be exposed at the rear of micrometer feed shaft. Loosen Allen head setscrew in outer rim of clutch. With spanner wrench loosen by turning counterclockwise or tighten by turning clockwise the required amount. Be sure to engage and tighten setscrew in mating notch.

2807-2½M-5-57W

Photo 11

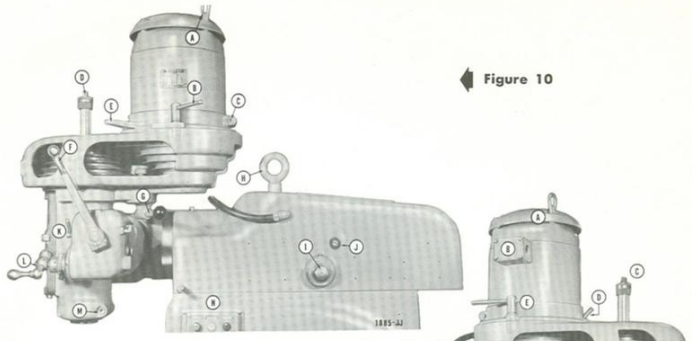


Figure 10 ◀

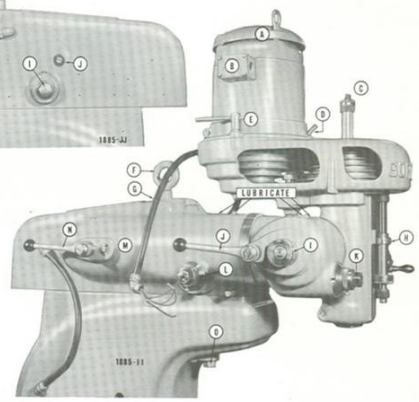


Figure 11 ▶

Figure 10

Right Side of Universal Head and Ram Assembly

A. One of Two Motor Lifting Eye Bolts
B. Righthand Motor Housing Clamping Bolt
C. Motor Housing Ring Clamping Bolt
D. Draw Bar and Draw Bar Back-Up Collar (Lefthand Thread)
E. Motor Shifting Lever
F. Spindle Feed Lever
G. Spindle Brake Lever
H. Eye Bolt for Lifting
I. Ram Adjusting Nut
J. Righthand Swivel Clamping Adjustment Stud
K. Micrometer Spindle Feed Engagement Lever
L. Micrometer Spindle Feed Crank
M. Clamp Ring Adjusting Screw
N. Spindle Control Buttons

Figure 11

Left Side of Universal Head and Ram Assembly

A. One of Two Motor Lifting Eye Bolts
B. Terminal Housing Box
C. Draw Bar and Draw Bar Back-Up Collar (Lefthand Thread)
D. Motor Bearing Grease Tube
E. Lefthand Motor Housing Clamping Bolt
F. Eye Bolt for Lifting
G. Power Line to Motor Disconnected for Shipment
H. Micrometer Depth Stop and Lock
I. Universal Clamping Adjustment
J. Universal Clamping Lever
K. Universal Setting Adjustment
L. Swivel Setting Adjustment
M. Lefthand Swivel Clamping Adjustment Stud
N. Swivel Clamping Lever
O. Front Ram Clamping Bolt

Note: For explanation of "Lubricate," see paragraph 32h.

Photo 12

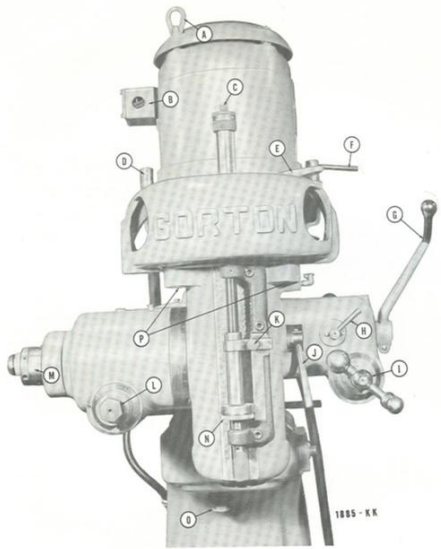


Figure 12

Front View of Universal Head

A. One of Two Motor Lifting Eye Bolts
B. Terminal Housing Box
C. Draw Bar and Draw Bar Back-Up Collar (Lefthand Thread)
D. Lefthand Motor Housing Clamping Bolt
E. Motor Shifting Lever
F. Righthand Motor Housing Clamping Bolt
G. Spindle Feed Lever
H. Micrometer Spindle Feed Engagement Lever
I. Micrometer Spindle Feed Crank
J. Spindle Locking Lever
K. Micrometer Depth Stop Lock
L. Swivel Setting Adjustment
M. Universal Clamping Adjustment
N. Micrometer Depth Stop
O. Front Ram Clamping Bolt
P. Two of Three Hold-Down Cap Screws (See paragraph 32d)

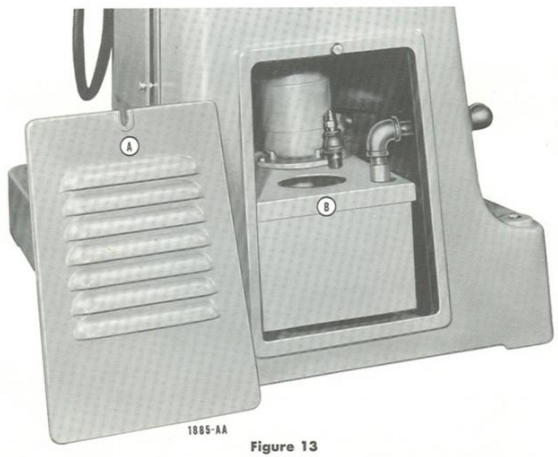


Figure 13

Coolant System

A. Coolant Compartment Cover
B. Removable Self-Contained Coolant System

Photo 13

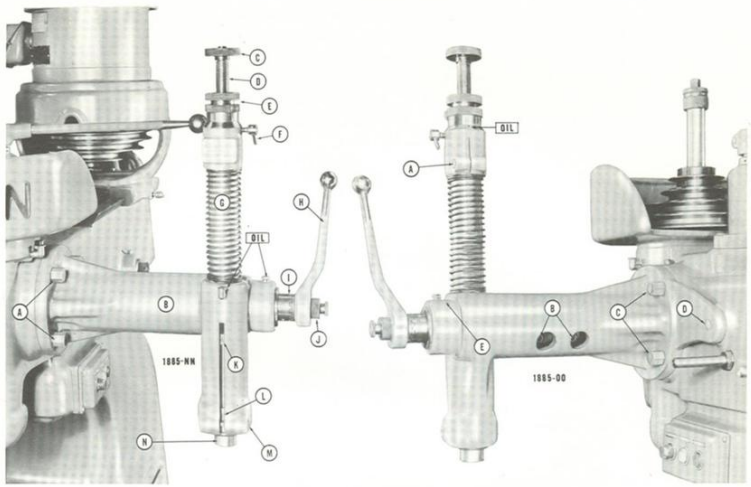


Figure 14

Front View of Tracer Head Assembly

A. Two of Four Hex Head Tracer Head Bolts
B. Tracer Head Assembly
C. Tracer Draw Bar
D. Tracer Spindle
E. Micrometer Vertical Adjustment
F. Micrometer Vertical Adjustment Locking Lever
G. Tracer Head Tension Spring
H. Righthand Spindle and Tracer Feed Lever
I. Serrated Feed Lever Coupling — Adjustable
J. Tracer Feed Shaft Thrust Nut
K. Tracer Spindle Guide Key
L. Spindle Nose Retaining Ring
M. Retaining Ring Locking Bolt
N. Spindle Nose

Note: For explanation of "Oil," see paragraph 33i.

Figure 15

Rear View of Tracer Head Assembly

A. Micrometer Vertical Adjustment Housing Clamping Bolt
B. Clamping Bolts Coupling Tracer and Cutter Spindle Feed Shafts
C. Two of Four Hex Head Tracer Head Bolts
D. Locating Dowel for Tracer Head
E. Outer Bearing Set Screw

Note: For explanation of "Oil," see paragraph 33i.

Photo 14

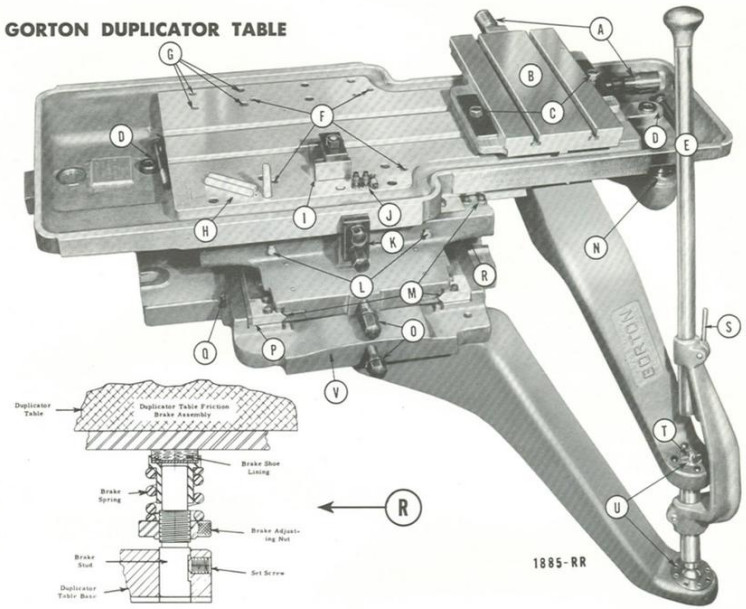


Figure 16

A. Master Table Micrometer Adjusting Screws
B. Master Table and Base — Removable
C. Master Table Clamping Bolts
D. Table and Saddle Locking Bolts and Seats
E. Manual Duplicating Control Lever
F. Four Oil Pipe Plugs for Table Ball Bearings
G. Four of Sixteen Tapped Holes for Hold-Down Studs
H. Three Hold-Down Studs — One in Place (extra)
I. Hold-Down Stud in Use (extra)
J. Slotted Screw Plugs for Tapped Hold-Down Stud Holes
K. Longitudinal Clamping Studs and "U" Strap
L. Two Oil Cups — Two Additional Ones at Rear
M. Ball Bearing Return Blocks — Longitudinal and Cross
N. One of Two Clamping Pads for Table and Saddle Locking Bolts
O. Cross Feed Clamping Studs
P. Adjustable Saddle Gib
Q. One of Four Gib Adjusting Screws
R. Table Friction Brake — See Accompanying Drawing
S. Duplicating Control Lever Lock
T. Oil Cup
U. Adjustable Ball and Socket Joints
V. Duplicator Table Base

Photo 15

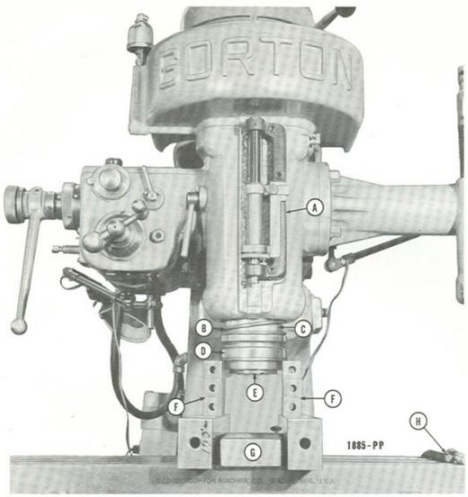


Figure 17

A. Remove Entire Depth Stop Bracket and Key Set in Quill Immediately Behind Bracket
B. Spindle Tension Spring
C. Quill or Spindle Sleeve
D. Spindle Sleeve Bushing
E. Spindle Nose
F. Supporting Parallels
G. Wood Block
H. Clamp Ring Adjusting Screw and Allen Head Wrench

Note: Micrometer Depth Stop Bracket and Stop Should Be Removed. See paragraph 25b.

REMOVING THE SPINDLE

Figure 18

A. Spindle and Spindle Sleeve Partially Removed
B. Spindle Tension Spring Removed
C. Spindle Sleeve Bushing Removed
D. Wood Block

Note: Micrometer Depth Stop Bracket and Stop Should Be Removed. See paragraph 25b.

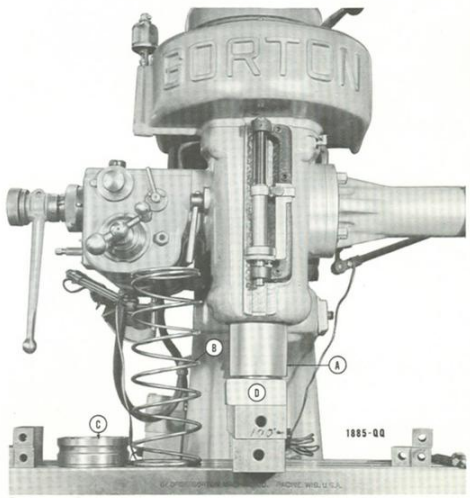
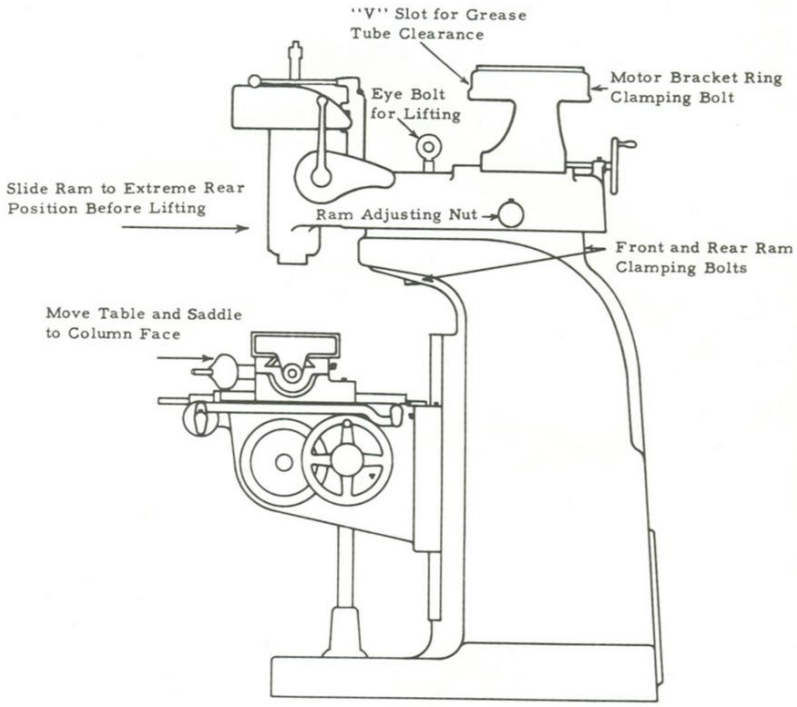


Photo 16

DRAWING A



2516

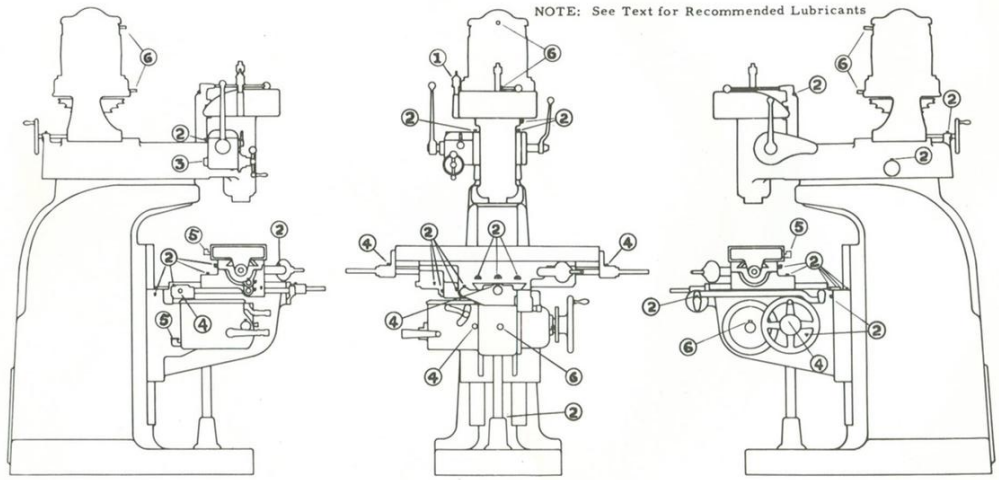
Photo 17

DRAWING B

LUBRICATION CHART FOR GORTON

9-J Super-Speed VERTICAL MILLING MACHINE

NOTE: See Text for Recommended Lubricants



① Keep Oil Cup Filled with Spindle Oil

② Oil Once Each Day with Medium Machine Oil

③ Oil Every Six Months with Gear Oil

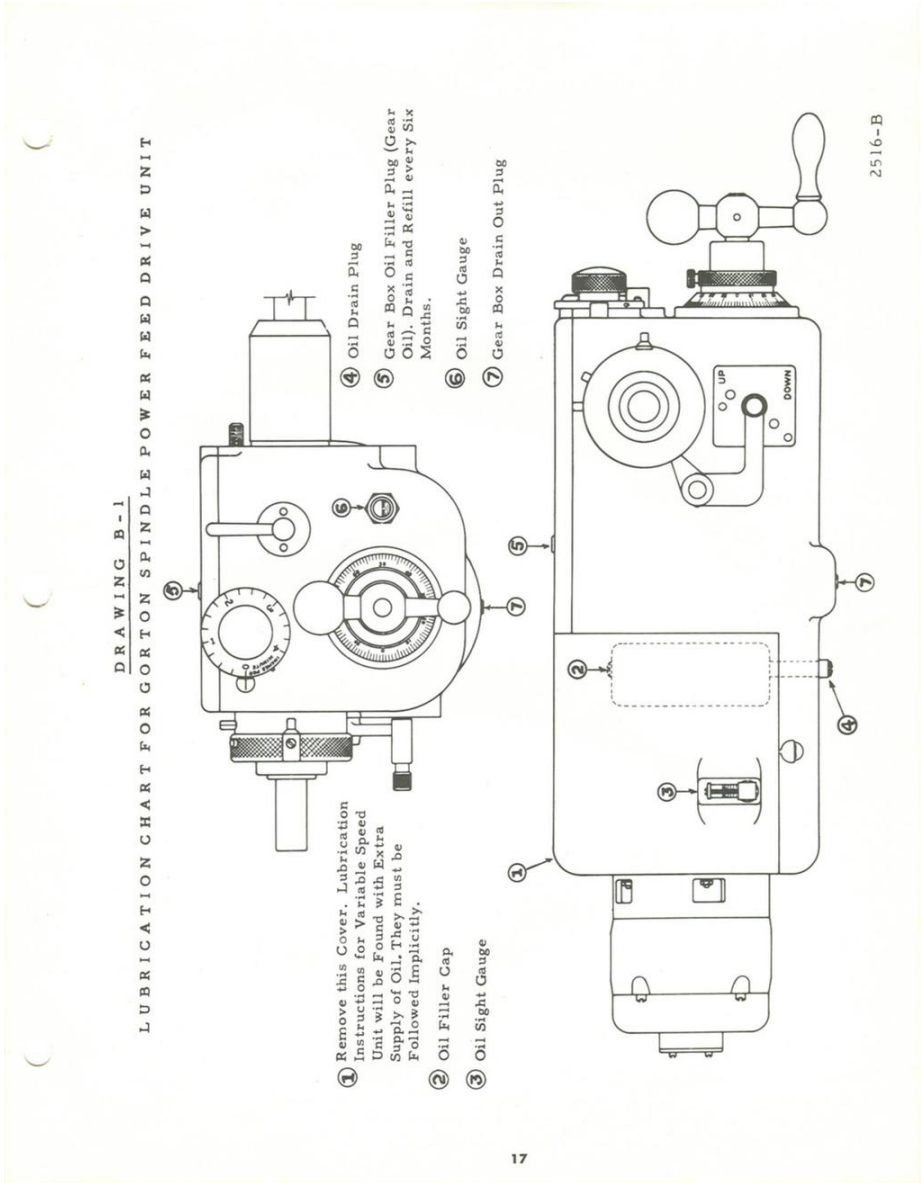
④ Turn Down Grease Cup 2 Turns Once Every Week

⑤ Keep Filled with Medium Machine Oil

⑥ Fill with Grease every 1,000 Hours

2516-A

Photo 18



DRAWING B-1

LUBRICATION CHART FOR GORTON SPINDLE POWER FEED DRIVE UNIT

① Remove this Cover. Lubrication Instructions for Variable Speed Unit will be Found with Extra Supply of Oil. They must be Followed Implicitly.

② Oil Filler Cap

③ Oil Sight Gauge

④ Oil Drain Plug

⑤ Gear Box Oil Filler Plug (Gear Oil). Drain and Refill every Six Months.

⑥ Oil Sight Gauge

⑦ Gear Box Drain Out Plug

UP

DOWN

2516-B

Photo 19

PRELIMINARY OPERATIONS

UNCRATING

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

LOCATING THE MACHINE

2. This machine is easily moved by hoist or shop crane. Put head in normal operating position as shown in drawing A. (If head is too far extended, the machine will not balance properly when lifted.) CAUTION: Make sure that head is securely clamped to column with front and rear ram clamping bolts shown in drawing A. (See paragraph 24.) Place lifting hook in eye bolt on top of ram and move machine to its permanent location.

a. Machine is usually shipped with motor and motor pulleys dismounted. To remount, loosen clamping bolt at rear of motor bracket ring. Wedge can be driven in slot to open ring. Motor is inserted from the top together with motor pulleys.

IMPORTANT: Motor and pulleys have been carefully balanced and aligned. Do not remove pulleys at any time. Be sure to place motor with grease tube on pulley shaft housing toward front where inverted "V" opening is located in motor bracket ring. Remove wedge, tighten clamping bolt and install motor belt.

CLEANING

3. 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 olium spirits, or other grease solvent. Use lintless rags, not cotton waste. Never use an air hose. When machine is clean, give it a light coat of a good grade clean machine oil to prevent rust spots and other corrosion.

Photo 20

FOUNDATION

4. A solid foundation for this machine is advisable for satisfactory operation when doing heavy work or when running at high speeds. The following suggestions should be followed within the limitations of the building.

a. A six-inch concrete foundation or floor is an ideal supporting base. When locating machine on a ground level floor of timber or composition, it is best to cut a hole and build a concrete foundation from the ground up to floor level. On upper floors, place machine directly over a supporting beam or upright pillar, if possible. Otherwise, locate machine as close as practicable to a retaining wall. If concrete base is exceptionally rough or uneven, it should be smoothed out by whatever method is most practical.

b. CAUTION: All locking levers are in locked position when machine leaves factory. They must be released before any attempt is made to move table, saddle or knee either manually or under power. While trying feed of table with longitudinal feed hand wheel and the angular longitudinal hand wheel, if feed feels rough or tight, make adjustment as described in paragraph 31.

LEVELING MACHINE

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

LUBRICATION

6. Refer to drawing B. Fill spindle oil cup with the type of oil specified, using oil can. Unscrew metering unit at top of oil cup and allow one cup of oil to flow down the oil line. Tighten metering unit and adjust according to instructions in paragraph 8.

a. The gear boxes of machines equipped with power table or spindle feeds have been drained before shipment. Before starting, refill,

Photo 21

using the grade of oil specified in drawing B. All power table feed boxes have a large hinge lid oiler at rear of box, with glass inspection hole. Fill with oil until visible in the glass.

7. GENERAL--The machine should be thoroughly cleaned at least once a week--and the scraped ways wiped clean, and oiled. The Gargoyle lubricants recommended are manufactured by Socony-Vacuum Oil Company, Inc., and are universally obtainable in all parts of the world.

CUTTER SPINDLE AND DRIVE PULLEY

8. All bearings of the cutter spindle and drive pulley are lubricated by one sight feed oil cup located at top of drive pulley housing and marked by the figure 1 in drawing B. Use a spindle oil having approximately 125 seconds S. U. Viscosity at 100 F., such as Gargoyle Vacuoline Oil C. A good grade of medium machine oil, such as recommended for other bearings on the machine, may be used if spindle oil is not available but will not give as good results as the latter due to the high speeds at which the cutter spindle turns.

a. The sight feed cup should be kept well supplied with oil and refilled at least once weekly. Before starting up it is important that the shut-off at the top of the cup be turned up vertically to permit oil to flow, otherwise the spindle will receive no lubrication. The feed may be stopped when machine is not in use by turning the shut-off to one side. The cup should be set to feed from one to three drops per hour (no more) as service requires. Too fast a feed will cause oil leakage down onto the work, which is sometimes annoying.

9. All lubrication points in drawing B marked with figure 2 should be lubricated once daily with a good grade of medium machine oil having a viscosity of 275 to 300 seconds S. U. at 100° F., such as Gargoyle Vactra Oil Heavy Medium X is recommended for this purpose.

a. IMPORTANT: Once each week, while spindle is all the way up, wipe clean the spindle splines above drive pulley and apply a few drops of oil in each spline. The micrometer depth stop threads should also be lightly oiled.

b. The oil level in the cutter spindle feed box (hand) should be checked about once every six months by removing the inspection plug at the rear of the hand feed box. Keep box filled to level of this hole using a heavy viscous lubricant such as Gargoyle Cylinder

Photo 22

Oil 600W. See point marked by the figure 3 for filling plug on feed box. At intervals of one to two years it is good practice to drain these compartments of old lubricant, flush and refill with new oil. This will act to remove any water or impurities which may have gained entrance.

c. If machine has power drive to spindle, oil and grease supply should be checked every six months. See drawing B1. The variable drive unit should be lubricated according to the manufacturer's instructions furnished with the machine. Keep gear box filled up to sight gage on front of box with same type of lubricant specified for hand feed box.

TABLE, SADDLE, KNEE ASSEMBLY

10. All hinge lid oilers should be oiled after approximately 8 hours of operation with a good grade of medium machine oil having a viscosity of 275 to 300 seconds S. U. at 100° F., such as Gargoyle Vactra Oil Heavy Medium X. Locations of these oilers are indicated by the figure 2.

a. Once weekly, with knee all the way up, raise elevating screw cover and squirt a few drops of oil on screw, as high as possible. Also saturate the felt wiper on knee with oil. The table and saddle screws should be oiled daily, by running out the table to extreme positions so as to get at screws. Lubricate through oil holes at front of saddle, indicated by the figure 2, taking care to replace plugs.

b. Grease cups are identified by the figure 4. These should be turned down one turn each day of operation and filled weekly. Use high grade ball bearing grease such as Gargoyle Grease BRB No. 1.

c. In machines having power feeds to table, keep the gear box filled to sight gauge level at back of box with medium machine oil the same as recommended for general lubrication of other points. The gauge which has a hinge lid for filling is designated by figure 5. It will prove beneficial to drain the gear box about once yearly, flush out impurities and refill with fresh oil. Both drain plugs located, one under the feed box, the other under the knee, must be removed to drain completely.

ELECTRIC MOTORS

11. The motor serving to drive the spindle, and those to operate the table, spindle feed or coolant pump where used, are equipped

Photo 23

with grease lubricated ball bearings. These are indicated by the figure 6. The grease reservoirs should be filled about every 1000 hours of operation using a high grade ball bearing grease such as Gargoyle Grease BRB No. 1. Never use ordinary cup grease which will not stand up satisfactorily in motors.

a. To lubricate motor bearings, unscrew slotted brass plug in grease tubes indicated by the figure 6, and introduce grease preferably with a low pressure gun. Apply the grease sparingly and never force it into bearings under heavy pressure as this may injure the seals and cause leakage. Should excess lubricant lodge on internal parts of the motor, it may seriously impair efficiency. Always make certain the brass plugs are properly replaced. For further instructions, see tag issued by motor manufacturer and furnished with the machine.

POWER CONNECTION

CONNECTING POWER LEADS

12. Caution: Do not attempt to reverse connections to any one of the individual motors in the machine. It is essential that all motors and control equipment remain phased as they are wired and tested at the Gorton plant.

a. When multi-phase alternating current motors are used in the Gorton milling machine, particular attention must be paid to correct phasing of power leads to assure correct operation of the electrical control equipment and direction of revolution of motors. The machines and control equipment are carefully tested and inspected before shipment to insure correct performance in customer's plant. The electrician connecting up the machine must observe the following precautions to insure correct phasing of power leads and correct operating directions of motors.

13 ELECTRICAL HOOK-UP PROCEDURE

a. Connect line of correct voltage and phase to leads which project from left side of column. Make these connections temporary until motor operating direction is checked.

b. Be sure cover of control panel is closed tightly and locking handle is in "on" position.

Photo 24

c. Notice the keyed shaft (power take-off for longitudinal feed) extending out from front of saddle along left side of knee to front knee bracket. When feed switch button is pushed on control panel on right side of column, this shaft should rotate clockwise according to arrow appearing on front of supporting bracket. If it rotates counter-clockwise, reverse power leads. Re-check direction of rotation of keyed shaft.

d. Before making any adjustments in control box, be sure that incoming voltage to machine is absolutely correct. This machine and all others on the same line should be in operation at this time. To correct variations, see instructions inside of control box.

e. When wiring motor, match colors of wires in flexible cable with colors of "tattle tails" in terminal housing box. Remove these "tattle tails" before making final connections.

MACHINE OPERATION

SPINDLE

Caution: Before starting spindle, be sure that draw bar is removed or that it is firmly engaged in adapter, collet or cutter to prevent serious accident.

14. Be sure that spindle brake lever is released. To start spindle with 2-speed motor, push low speed spindle control button which is the center button on the right side of column. After spindle has attained speed, push the high-speed button, which is the right-hand one.

NOTE! Machine should never be started at high speed.

a. To stop spindle, press the stop button at left and apply spindle brake lever.

SPINDLE SPEED SETTING

15. For various speed settings refer to speed plate attached to right-hand side of ram. To make adjustment, loosen motor bracket locking lever and release belt tension by turning belt adjustment hand wheel counter-clockwise. Put belt in proper position and retighten belt adjustment hand wheel and tighten motor bracket locking lever.

Photo 25

PUTTING INTO USE

16. Be sure inside of spindle nose is clean and dry. Standard spindles have No. 10 Brown and Sharpe taper. When using cutters with this taper, select the draw bar with the square head. This is the adapter draw bar. Insert into spindle from the top, then screw on the draw bar back-up collar (left-hand thread). Insert cutter in nose of spindle, making sure that shank is clean. Draw up cutter by turning square head nut with wrench while spindle brake lever is set until cutter is tight in spindle.

a. To loosen cutter, set the spindle brake lever and apply wrench to square head nut; turn counter-clockwise--tapping wrench is permissible. Initial movement loosens draw bar hold on cutter; continued movement forces cutter out of spindle nose. Do not use hammer on top of draw bar.

17. If adapter is to be used to accommodate Gorton collets, the draw bar with knurled hand wheel must be used. This is the collet draw bar. However, with the adapter draw bar still in place, insert new adapter and draw up tightly. Now remove the adapter draw bar by first removing draw bar back-up collar (left-hand thread), pull out draw bar and replace with the collet draw bar. Next, insert collet or collet and cutter and draw up tight by turning knurled hand wheel clockwise with spanner wrench furnished. To remove cutter and collet, reverse this procedure and follow instructions in paragraph 16a to remove adapter.

SPINDLE--HAND FEED

18. The machine is equipped with vertical feed levers on left and right side of head and micrometer spindle feed box. This unit is equipped with a micrometer spindle feed engagement lever. When this lever is at left, the micrometer feed mechanism is inoperative. To engage micrometer spindle feed, move lever to right. The micrometer feed crank is equipped with an adjustable micrometer dial.

a. A precision micrometer depth stop is mounted on front of spindle housing. It has graduated scale and micrometer dial. This micrometer dial can be locked in any position by tightening the knurled micrometer depth stop lock in the center of depth stop bracket.

Photo 26

19. SPINDLE RETRACTION ADJUSTMENT COLLAR

a. This collar is mounted on spindle feed shaft at left of micrometer spindle feed box and consists of a coil spring fitting around shaft, connected to feed box housing and with an outer casting with a split hub clamped to feed shaft. By loosening the clamp screw and turning collar to left or right, the pressure required to lower the spindle by means of feed lever can be lightened or increased to exactly the desired amount. Before loosening, have spindle in extreme up position.

b. If machine is equipped with power feed to the spindle, refer to figures 8 and 9. In order to adjust the spindle retraction adjustment collar, first remove left-hand spindle feed lever; next, loosen set screw in index dial and remove dial; drive out dowel pin now exposed and remove depth stop adjustment dial. Adjustment can now be made as described in paragraph 19a above. After adjustment, re-assemble depth stop adjustment dial, dowel pin, index dial and feed lever.

SPINDLE--POWER FEED

20. If the machine is equipped with power feed to the spindle, the following instructions will apply.

a. To start power spindle feed motor, press start button so marked on the control panel on right-hand side of column. When hand feed is required, use the micrometer spindle feed mechanism as described in paragraph 18.

b. Before operating with power feed, be sure that the micrometer depth stop dial is in its lowest position and that micrometer spindle feed engagement lever is at right. The rate of feed is now adjusted by turning the spindle feed regulator knob to the desired feed rate. The depth stop adjustment dial on the power feed unit is adjusted for the required depth of spindle travel. This dial is graduated in eighths of an inch.

c. First bring work up to cutter with whatever clearance is required. Next, be sure that the directional feed lever is in the neutral position. Now turn the depth stop adjustment dial counter-clockwise to the desired spindle travel. During this adjustment, the ratchet release pin must be depressed. Engage directional feed lever. Note: when not using the power feed to spindle, be sure that micrometer spindle feed engagement lever is in left-hand position and that depth stop adjustment

Photo 27

dial is set for a feed of 3-1/2 inches, otherwise full vertical travel of spindle is prevented.

POWER FEED LUBRICATION

21. Lubrication instructions are contained in drawing B1.

TABLE, SADDLE AND KNEE--HAND FEED

22. On the standard machine, the table, saddle and knee are all hand fed by hand wheels or cranks, in conjunction with adjustable micrometer dials. The table locking lever is located on the front of saddle; the saddle locking lever is located on the right side of the saddle under the table. The knee locking lever is located at the rear of the right-hand knee gib.

TABLE AND SADDLE--POWER FEED

23. Twelve feeds are available for longitudinal and cross movements of table and saddle, from .6" to 20" per minute. To select any given feed, first start feed motor by pressing button so marked on control panel on right-hand side of column. The high-medium-low feed range selector lever is then engaged in the appropriate position. The feed selector lever is then engaged in the position marked for the feed required. Refer to figure 5 for location of these levers.

a. If hand feed is to be used, the feed selector lever should be engaged in the slot in the lower right-hand corner of feed selector plate, as shown in figure 5.

b. After the feed has been selected, engage the longitudinal power feed lever. Handle is directional. For cross feeding, engage the cross power feed lever which is directional. Permanent limit stops are provided for both cross and longitudinal travel and adjustable stop dogs for all directions of travel are also provided. See figures 5 and 7.

c. The same locking levers for table, saddle and knee are used with power feed as described in paragraph 22.

d. Knee motion is by hand wheel in conjunction with adjustable index dial.

Photo 28

e. POWER FEED BOX SHEARING PINS. Refer to figure 6. Whenever one of these pins shears off, it can be replaced by lining up the two index lines, one on the drive shaft and one on the driven shaft. Insert soft steel shearing pin of 3/32'' dia. by 1-1/8'' long.

MACHINE ADJUSTMENTS

RAM

24. Refer to drawing A. With socket wrench furnished with the machine, loosen front and rear ram clamping bolts. Apply same wrench to ram adjusting nut and position ram as required. Be sure to retighten front and rear ram clamping bolts.

CUTTER SPINDLE

25. The cutter spindle is non-adjustable: 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 should be replaced by bearings of the same type from the George Gorton Machine Co., which will put the spindle in a ''like new'' condition.

a. The cutter spindle is mounted on two sets of pre-loaded super-precision ball bearings, forming a complete unit which may be removed.

IMPORTANT: Instructions in paragraphs 25b through 26e apply to the standard Gorton vertical mill. If spindle of a Gorton duplicator is to be removed, refer to paragraph 26f before reading further.

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, the following instructions will apply.

b. Refer to figures 17 and 18. Bring spindle down approximately 2-1/2 inches. Lock spindle in place with spindle locking lever. Move table to approximately 4 inches below spindle nose. Place wood board on table to protect top. Dismount micrometer depth stop bracket complete by removing 3 socket head cap screws. Next, remove depth stop attached to front of spindle.

Photo 29

c. At top of spindle pulley housing there is a round cover or plate. Remove four screws and take this plate off. Mark spline shaft and housing for correct mating during re-assembly. Secure two wood blocks or parallels of exactly the same height. Place one on each side of the extended spindle nose and under the spindle sleeve bushing which is under spring tension. Now, raise table until the two parallels are in contact with the lower edge of the spindle sleeve bushing.

d. Put match marks on bottom edge of spindle sleeve bushing and lower edge of spindle housing for locating during re-assembly. Remove the clamp ring adjusting screw and drive soft metal wedge in slot at rear of spindle housing thereby releasing the spindle sleeve bushing. The spindle sleeve bushing and retaining spring are now ready for removal by lowering the machine table slowly. Make sure the spindle sleeve bushing follows table movement. Continue lowering table until spindle sleeve bushing and spring are completely free. Remove blocks, spindle sleeve bushing and spring. Place another block of wood under spindle nose; raise table until block comes in contact with spindle nose. Release spindle locking lever and again lower table. As spindle sleeve comes down, spindle feed levers will also come down. (See paragraph 26g.) Note the approximate angle of spindle feed levers when spindle rack and pinion let go. (When re-assembling spindle, the spindle feed levers should be held at the same approximate angle when re-engaging the rack and pinion.) Continue lowering table until the spindle sleeve is completely free of housing.

SPINDLE BEARINGS

26. To replace ball bearings, remove ball bearing nut inside the top of spindle quill or sleeve and large slotted ring nut which is in the lower end of spindle sleeve (left-hand thread). Take off old bearings and replace.

IMPORTANT. Before removing or moving the spacer which separates upper and lower 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.

a. When installing new bearings, place the stamped faces of the two outer rings together; also match the "balance" marks on both inner and outer races. Slide bearings down spindle shaft 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.

Photo 30

b. Insert spindle shaft in spindle sleeve and mount spacer ring. Now install upper set of ball bearings in the same manner as for those at spindle nose. Install locking collar and nut. Tighten this nut, then reverse position of spindle and sleeve and re-install the large slotted ring nut (left-hand thread).

c. Lay spindle assembly on its side in a V-block. Check the run-out on the O. D. of the spline shaft at its end with a dial indicator. This shaft must be concentric within .001" of total indicator reading. If run-out is greater, find the low spot on spline shaft and mark the exposed face of the nut in line with the low spot on the spline shaft. Remove nut and file or scrape at the spot marked, but on the opposite face of the nut until the spline shaft runs within the .001" tolerance.

d. To re-install spindle, reverse above procedure. Make sure that the brass plug at the end of the spindle locking lever shaft is seated so that it does not protrude into the spindle bore. Be sure to refer to paragraph 25c above and match mating marks on spline shaft and housing. Also make sure that spindle feed levers are at approximately the same angle as described in paragraph 25d above.

e. When tightening the clamp ring adjusting screw, be sure that the spindle sleeve bushing is all the way up in spindle housing nose. With spindle feed hand lever, bring quill down 2 or 3 inches. Tighten screw so that quill stays in place. 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 "cocking" of spindle sleeve bushing.

f. SPINDLE REMOVAL FROM DUPLICATOR. Before acting on the instructions contained in paragraphs 25b through 26e, it will be necessary to disconnect the coupling between the spindle feed shaft and tracer head feed shaft by loosening the two clamping bolts identified by the letter "B" in figure 15.

g. When machine is equipped with power feed to the spindle, it is extremely important that the exact position of the hand feed lever be noted when rack and pinion let go. During re-assembly the engagement of rack and pinion must be exact down to the individual tooth, otherwise full range of the power feed to spindle will not be obtained and substantial damage may result.

Photo 31

GIBS

27. Correct adjustments depend almost entirely upon judgment and "feel". If adjustment is too loose, loss of machine accuracy results. Too tight an adjustment squeezes out all lubricant and sliding ways are then subject to excessive wear and scoring.

TABLE GIB

a. This gib is located under the front table bearing slide with the large end at right. There is an adjusting screw here and another at the small end. To adjust, when table gib is loose, back off adjusting screw at small end of gib one-half turn. Tighten screw at large end of gib one-quarter turn. Next, tighten screw at the small end of gib until snug. Try table movement. Repeat to get desired adjustment. To adjust when table gib is too tight, reverse this procedure.

SADDLE GIB

b. The saddle gib is located on the right-hand side of saddle directly below the knee bearing. The large end of gib is at front. Adjust this gib as described in paragraph 27a above.

KNEE GIB

c. The knee gib is located on the right-hand side of the knee directly behind the column dovetail. Tighten or loosen all hexagon nuts uniformly to secure proper operation of this gib.

FEED SCREWS

28.

TABLE SCREW

a. To adjust end play, loosen set screw securing the end thrust nut at the left end of table screw and turn nut right or left to tighten or loosen as required. Retighten set screw. Brass plug should always be in place between set screw and table screw.

b. If too much play eventually develops between the table screw and table nut, it will be necessary to replace the table screw and nut assembly. This is necessary to provide perfect factory fit

Photo 32

between the nut and the screw. To remove this assembly, first remove the thrust nut at the left end of the table screw. Now drive out taper pin at right end of screw. Next, remove the two end brackets on right and left ends of table. Remove all four dowel pins. Then, unscrew the screw from the right end of table, counter-clockwise. Now remove the table gib by unscrewing the gib screw in the large end of the gib. Do not tamper with the other screw.

ALTERNATE METHOD. These instructions are to be followed when table must be removed. However, it is entirely possible to replace table screw nut by sliding table to the left far enough to expose the nut. In this case the table gib remains in place, and care should be taken to support the left end of the table to prevent damage to dovetails from overhang.

NOTE: The first step to take is to examine new screw and nut for burrs. Remove them carefully.

c. Remove the table by sliding off of saddle, either to the right or left. Shop hoist or crane may be used for this. Remove the screws which hold the table nut to the saddle, remove old nut and replace with the new one.

d. Mount new screw in table nut making sure that the alignment between the drive gears is free. Use dial indicator to line up screw with top surface of saddle and front face of saddle. It may be necessary to re-align nut to compensate for misalignment of screw. Remount table on saddle and re-install table gib, making sure that all surfaces are clean.

e. Now mount right end table bracket to table, leaving cap screws lightly snug. Install new collar and taper pin on right end of screw. Re-install the left end table bracket in the same way. Replace the thrust nut assembly on left end of screw and adjust as explained in paragraph 28a above. Using the hand wheel, run the table to its extreme end (right or left) and tighten the cap screws in the bracket closest to the table nut. Now move table to the other extreme position and tighten the other end bracket. To check table performance, run it left and right, making sure that movement is free. It may be necessary to tap the end brackets lightly to secure required freedom of movement. The final operation is to redowel the end brackets using dowels of slightly larger diameter than the original ones if necessary.

Photo 33

29. SADDLE SCREW--HAND FEED

a. To adjust end play, loosen the set screw securing the end thrust nut at the front of cross feed screw and turn nut to right or left to tighten or loosen as required. Retighten set screw.

b. If too much play eventually develops between the saddle screw and saddle nut, it will be necessary to replace the saddle screw and nut assembly. This is necessary to provide perfect factory fit between the nut and the screw.

c. Where shop hoist is available, the following instructions will apply.

d. Remove the four cap screws in front knee bracket. Lock saddle with saddle locking lever. Using hand wheel, turn the saddle screw back and out of nut. Now unlock the saddle and remove the gib screw at front of saddle at large end of gib. Take out the gib. Table and saddle may now be supported by shop hoist and slid forward free of knee as one unit.

e. Remove saddle nut located directly under the middle of the saddle, replace with new nut, taking same precautions as described in previous paragraphs. Remount table and saddle and replace gib. Adjust gib according to description in paragraph 27b above. Remove old saddle screw from front knee bracket. Install new screw in bracket, leaving the four cap screws in a lightly snug position. Remount the thrust nut and adjust for end play. Using hand wheel, run the saddle to its extreme forward position. Tighten the four cap screws and run the saddle back and forth to see if screw runs free. It may be necessary to tap the front knee bracket lightly to secure perfect alignment. Redowel as explained in paragraph 28e above.

30. SADDLE SCREW--POWER FEED

a. To adjust end play, loosen set screw on the thrust nut at front end of cross feed screw and behind the micrometer feed dial. Adjustment is the same as that described in paragraph 29a.

b. If too much play eventually develops between the saddle screw and saddle nut, it will be necessary to replace the saddle screw and nut assembly. This is necessary to provide perfect factory fit between the nut and the screw.

Photo 34

c. When preparing to remove table and saddle, refer to paragraph 29c above.

d. Remove the cross feed and longitudinal drive shear pins--refer to figure 6. Pull out the keyed shaft at left end of front knee bracket. Next, remove the clutch feed lever on the right-hand side of the front knee bracket. Take out the four bracket cap screws. Lock saddle with saddle locking lever. Using the hand wheel, turn screw completely out of nut. Remove the front screw in the saddle gib and take out gib. Table and saddle may now be removed as one unit as described in paragraph 29d.

e. Remove old nut and replace with new nut, taking same precautions as recommended in previous paragraphs. Nut is located underneath and in center of saddle. Remount table and saddle and replace saddle gib. Adjust according to paragraph 27b.

f. Place saddle screw and front knee bracket assembly on bench and remove back cover by taking out two cap screws. Loosen set screw in round nut at outer end of old screw and remove nut. Tap end of screw while backing off nut to provide space for nut removal. Old screw is now withdrawn with gear in place. Gear should be pressed off of old screw and installed on new screw with properly fitted Woodruff key.

g. Apply heavy grease to both gears and re-assemble by reversing above procedure.

h. Remount front knee bracket assembly by screwing in new screw. Tighten the four cap screws to a lightly snug fit. To check alignment of screw and nut, run saddle front and back several times. It may be necessary to tap the front knee bracket lightly to secure the desired alignment. Redowel the bracket with slightly oversize pins, if necessary. Replace both shear pins in longitudinal and cross feed couplings. Remount the clutch feed lever at right of screw.

31. ANGULAR LONGITUDINAL FEED SHAFT

When this machine is to be used as a duplicator with a duplicator table mounted on the machine table, it is necessary to remove the angular longitudinal feed shaft works. This is done by

Photo 35

loosening the two set screws which are located directly under the angular hole. The entire assembly slides out easily. To remount assembly, adjust so that it operates freely with a minimum amount of backlash.

UNIVERSAL HEAD MODEL

32. HEAD AND RAM ASSEMBLY

a. Instructions contained in paragraphs 1 through 14 also apply to this universal head assembly. The following instructions will cover only those features about this universal head which differ from the fixed vertical head assembly.

b. Refer to figures 10, 11 and 12. Belt adjustment is the same as for the vertical head model except that two motor housing clamping bolts--one at right and one at left--must be loosened. Then belt tension is released by sliding the motor forward with motor shifting lever.

c. This universal head assembly also has a micrometer feed box mounted on right of spindle housing. It operates exactly like the one on the fixed head model previously described.

d. The letter "P" shown in figure 12 indicates two of the three hold-down cap screws which serve a double purpose. Two of these screws are located in the top flange of the spindle housing, one at right and one at left. The third one is at rear. These position and hold the aluminum pulley housing in place on top of spindle housing. As shown in figure 12, the spindle nose can be tilted toward operator approximately 12°. For additional angular capacity, follow procedure outlined below.

e. Remove the three hold-down cap screws. Index pulley housing approximately 30° in a clockwise direction. Replace and tighten the three cap screws in tapped holes provided at this position. The spindle nose may now be tilted toward the operator approximately 25°.

f. Refer to figures 10 and 11. To tilt the spindle nose toward or away from operator, loosen universal clamping lever by pulling in counter-clockwise direction. With wrench, turn the hex head bolt which is the universal setting adjustment to right or left as required. This tilts the spindle nose toward or away from the operator. Then retighten the universal clamping lever.

Photo 36

g. To tilt spindle nose to left or right, loosen swivel clamping lever in a counter-clockwise direction. With wrench turn hex head bolt which is the swivel setting adjustment to right or left as required. Retighten swivel clamping lever. The graduated ring for forward and backward motions is calibrated in degrees, 45° each way from "0". The graduated ring for left and right motions is calibrated in degrees 90° each way from "0"

LUBRICATION

h. Two oil cups and two pipe plugs are shown in figure 11 which are in addition to corresponding lubrication points on the fixed vertical head assembly. Use medium grade machine oil in oil cups once daily. Use oil of 600W viscosity in the two pipe plugs--approximately one-half pint. Inspect yearly.

WARNING. Never lubricate edges of clamping surfaces adjoining the graduated rings.

ADJUSTMENTS

i. To adjust universal clamping adjustment if looseness develops, loosen universal clamping lever. Remove set screws in both outer and inner spanner nuts of the universal clamping adjustment. With spanner wrench or steel pin, loosen outer spanner nut. With same wrench or pin tighten inner spanner nut. Continue to adjust until looseness is remedied. Retighten universal clamping lever. Insert and tighten set screws.

j. If looseness develops during right or left swivelling, loosen swivel locking lever, then turn slotted right-hand swivel clamping adjustment stud approximately one-half turn counter-clockwise. Tighten swivel locking lever. If still loose, continue the above until adjustment is satisfactory. Now turn right-hand slotted swivel clamping adjustment stud in a clockwise direction approximately the same amount as left-hand swivel clamping adjustment stud was backed out. Tighten swivel locking lever.

DIE AND MOLD DUPLICATING MODEL

TRACER HEAD

33. If this machine is a standard Gorton Die and Mold Duplicator, the tracer head has already been properly installed at the factory.

Photo 37

If, however, this machine is a standard Gorton vertical mill, the following instructions will explain how to install, operate and adjust a tracer head.

a. With cover plate removed from tracer head mounting pad on right-hand side of spindle housing, notice that pad has been scraped in at the factory to be parallel to the cutter spindle. It may be necessary to scrape in the mounting face of the tracer head to assure an accurate "sweep" of tracer spindle nose above table.

b. Refer to figures 14 and 15. Remove tracer spindle guide key. This permits drawing out the entire tracer spindle assembly from the tracer spindle housing. Remove tension spring. Next, loosen outer bearing set screw and remove hand feed lever shaft complete.

c. Examine surfaces of mounting faces--wipe clean and remove any burrs. Mount tracer head shaft housing on scraped pad on ram with four hex head tracer head bolts furnished with tracer head assembly. Replace tracer spindle assembly in tracer spindle housing without tension spring. Allow this assembly to seat itself in its lowest position. Clamp dial indicator to tracer spindle nose for 10" sweep of table. Sweep the machine table. Tolerance should be from .0005" to .001" depending upon individual requirements.

d. After noting deviations from required tolerances, the top or bottom of the tracer head mounting face should be scraped to bring tracer spindle to the position required. To compensate for any "front-to-back" error, rotate the tracer head casting either clockwise or counter-clockwise. When correct position has been achieved, tighten four hex head tracer head bolts firmly.

e. Line ream locating dowel holes for 5/8" dowel while head casting is in place. Note--holes should be finished for a press fit in ram and a push fit in tracer head bracket. Now press dowel home in the ram. Reassemble tracer spindle assembly with tension spring. Insert in tracer spindle housing and replace tracer spindle guide key. Remount tracer head to ram, engaging dowel in hole in tracer head bracket. Tighten four hex head tracer head bolts firmly.

f. Make sure that clamping bolts in coupling at end of hand feed lever shaft are loose. Remove coupling and mount on end of cutter spindle feed shaft. Now remount tracer spindle hand

Photo 38

feed lever shaft and tighten outer bearing set screw. Lock the cutter spindle in the up position.

g. It is now necessary to connect the tracer spindle to the cutter spindle through its feed shaft in such a way that the positive upper cutter spindle stop will also act as a stop for the tracer spindle. The tracer spindle guide key should never be used as a stop.

h. Position the tracer spindle with the tracer spindle guide key approximately 1/4" below its upper limit. With the tracer spindle in this position, center the two clamping bolts coupling tracer and cutter feed shafts in the cored holes at back of tracer head housing. Tighten these bolts firmly. Release spindle locking lever. The tracer spindle is now ready to use.

LUBRICATION

i. Two oil cups are shown in figure 14. The oil cup at left should be filled once daily with spindle oil; the one on the tracer head outer bearing should be filled daily with medium machine oil. The oil hole shown in figure 15 should receive medium machine oil once daily. A few drops of oil should occasionally be applied to the threaded portion of the tracer spindle.

ADJUSTMENTS

j. There are two vertical adjustments which can be made to compensate for differences between the work piece and master. The first or rough vertical adjustment is made by first locking the cutter spindle and loosening the outer clamping bolt coupling tracer and cutter spindle feed shafts. Use tracer hand feed lever to position tracer spindle nose. Retighten clamping bolt. Fine adjustments are made with the micrometer vertical adjustment.

k. Figures 14 and 15 together with preceding paragraphs apply to the Gorton tracer heads No. 705-2, 736-2 and 745-1.

l. SPECIAL TRACER HEAD FOR UNIVERSAL MODEL. Tracer head 1018-1 which fits only this universal head is essentially the same as tracer heads for the fixed vertical model. Therefore, instructions below cover only those operations which specifically apply to this tracer head as contrasted with tracer heads fitting fixed vertical head mills.

Photo 39

IMPORTANT: Before reading further, be sure to use dial indicator at spindle nose to make certain that spindle head is in true vertical position.

m. Refer to figure 10. Notice that the micrometer feed box for the universal head is located on the right side of the spindle housing. Remove three cap screws on top and remove feed box cover. Now remove the two bolts on either side of feed shaft inside feed box, which attach feed box to spindle housing pad. Remove feed box, spindle feed shaft, pinion gear and hand feed lever as one unit.

n. Now insert replacement feed shaft so that pinion gear engages rack. The old feed shaft should not be used. This short end of the feed shaft should slide home with a "slip" fit. Slide large feed shaft bearing on to feed shaft, the short end toward the pilot hole in spindle housing. Be sure oil hole in bearing is in upper position near oil cup in top of spindle housing pad.

o. Dis-assemble tracer head according to paragraph 33b through 33h.

p. Slide bare tracer head casting on to feed shaft bearing until snug with spindle housing pad. Use "U" clamp to hold firmly in position. Insert tracer spindle assembly in tracer spindle housing without tension spring as described specifically in paragraph 33c and sweep table to position the tracer head mounting face. Now, transfer four 17/32" dia. cap screw holes and two 19/64" dia. dowel pin holes.

q. Remove tracer head and drill the four cap screw holes and tap for 1/2"--13 N. C. thread. Holes should be drilled through. Remount tracer head on spindle head pad, re-sweep for final positioning and tighten four cap screws. Dowel in place. All other necessary operations are as described in paragraph 33b through 33h.

LUBRICATION

r. See paragraph 33i.

ADJUSTMENTS

s. See paragraph 33j.

Photo 40

DUPLICATOR TABLE

34. If this machine is a standard Gorton Die and Mold Duplicator, the duplicator table was mounted on the machine table at the factory. If, however, this machine is a standard Gorton vertical mill, the following instructions will apply.

a. See paragraph 31 for instructions on how to remove the angular longitudinal feed shaft works. Do not attempt to mount duplicator table while this angular longitudinal feed shaft is in place. Be sure to remove right-hand adjustable stop dog on machine table and lay it aside or park it next to the left-hand adjustable stop dog at the extreme left end of table slot.

b. When mounting or dismounting the duplicator table on or off of machine table, a shop hoist or crane should be used. Use heavy rope, not chain or wire cable. Locate duplicator table with the "U" slots at either end over machine table "T" slots. Lower gently and clamp in place, being sure that keys on the underside of duplicator table base are engaged in the center "T" slot of machine table. Mount on center of machine table.

c. Refer to figure 16. The duplicator table assembly is made up of: 1, the duplicator table proper (heat-treated aluminum alloy); 2, the master table and base with micrometer adjusting screws and clamping bolts; 3, saddle which, with the duplicator table, makes possible longitudinal motion; 4, duplicator table base which, with the saddle, makes possible the cross or transverse motion; 5, manual duplicating control lever attached to the two drop arms.

d. Locate work piece on the duplicator table with its center under the center of the cutter spindle. Two methods of clamping the work piece are available. Two 1/2" "T" slots running longitudinally 1-5/8" either side of center may be used or any of the sixteen tapped holes for 7/16" hold-down studs. If "T" slots are used, Gorton type (elongated) nuts should be used to prevent distortion of table top.

e. Mount the master, pattern or template on the master table and clamp in place. Next, loosen the two master table clamping bolts and position master table so that center of master is under the center of the tracer spindle. Tighten the master table clamping bolts. For final positioning, the two master table micrometer adjusting screws may be used.

Photo 41

f. To provide free movement of the duplicator table in all directions, remove table and saddle locking bolts and plug the holes. Loosen longitudinal clamping studs and remove "U" strap. If cross movement only is desired, leave this "U" strap clamped tightly in place. If longitudinal movement only is desired, remove "U" strap and insert from below on the cross feed clamping studs, then tighten the studs.

g. For operator convenience, the manual duplicating control lever is adjustable for height by loosening duplicating control lever lock.

LUBRICATION

h. In the duplicator table top are four oil pipe plugs marked "oil". These serve the endless stream of ball bearings on which the table moves. Oil once a week with spindle oil in an amount sufficient to come up to the oil pipe plug.

i. On the front and back side of the saddle are two oil cups which serve the endless stream of ball bearings on which the saddle moves. Lubricate as described in paragraph 34h above. CAUTION. It is extremely necessary that no grit or foreign matter is permitted to get into the oil pipe plugs in table top or into the oil cups on front and rear of saddle.

j. The oil cup on the upper ball and socket joint at the bottom of the right-hand drop arm should be lubricated with medium machine oil daily. In addition a few drops of oil should be applied to the master table micrometer adjusting screw threads.

ADJUSTMENTS

k. DUPLICATOR FRICTION BRAKE. This is located as indicated by the letter "R" in figure 16. A cross section drawing is also shown. If less braking action is desired, the brake adjusting nut is turned down. If more braking action is required, turn it up.

l. When play or looseness develops in the adjustable ball and socket joints, back off four set screws equally in cup of lower ball joint. Tighten the four cap screws equally. Continue until looseness is taken up. To adjust upper ball and socket joint, follow the same procedure. In this case the set screws are in the cup underneath joint.

Photo 42

m. To adjust for looseness in table, loosen the two screws in the two ball bearing return blocks at back of table. Loosen the five hold-down bolts on top of ball track. Loosen two jamb nuts on adjustable table gib and take up on the two gib adjusting screws. All loosening and tightening in this operation should be uniform. Now tighten jamb nuts and retighten the five hold-down bolts on top of ball track together with the two screws in the top of both ball bearing return blocks. Check for continued looseness with dial indicator. Looseness is indicated by "snap" movement of needle. Slow needle movement indicates distortion, not looseness.

n. To adjust for looseness between saddle and base, follow the same procedure as described immediately above with the ball tracks running crosswise between saddle and base.

o. After gib adjustments, check the joints between ball bearing return blocks and the ends of the ball races to see that they are tight so that no foreign matter can get into ball races.

p. If table ball bearings become "sticky" after continued use, it is desirable to flush them thoroughly with kerosene. Remove the four oil pipe plugs in table top and flush until balls operate freely. Move table continually while flushing. Relubricate with spindle oil until oil has replaced kerosene. In the case of the saddle balls, follow the same procedure, using the two oil cups on the front of the saddle and the two on the rear.

q. Figure 16 together with the preceding paragraphs apply to the Gorton duplicator tables 704-1 and 744-1.

AUXILIARY EQUIPMENT

35. COOLANT SYSTEM

If machine includes a coolant system, access to the coolant pump, motor and tank is through coolant compartment cover at rear of column. See figure 13. To put into operation, fill coolant tank up to fill mark on pump casting. Press coolant motor starting button so marked on control panel on right-hand side of column. Coolant should flow when nozzle is turned on.

a. When installing a coolant system in a standard Gorton mill or duplicator, refer to figure 1 and figure 13. In figure 1, you will see a plugged hole to the left of the letter "H". This is for the

Photo 43

coolant return line coming from the back edge of machine table at the extreme left end. Note the other hole in figure 1 to the right of the trade mark medallion. This is for the coolant feed line coming from the coolant pump through a hose to the coolant nozzle.

b. Install coolant tank and pump assembly through opening at rear of column base with pump unit entering first. Attach coolant feed line after dropping connection end through upper hole in column casting. Make connection to vertical feed pipe of pump. Attach nozzle clamp to stud extending from left side of ram just behind micrometer feed box. Unscrew plug from tapped bushing in hole at left of "H" in figure 1. Screw in street "L" on the outside of column. Adjust so that this fitting is in horizontal position and pointing to front of machine.

c. Screw short nipple into tapped bushing inside coolant compartment. Screw on elbow so that it points down and then screw threaded pipe into lower part of elbow so that pipe extends into coolant tank.

d. Attach return hose to table by threaded fitting. Install two part union in street "L" on the outside of column and join hex head hose fitting and tighten.

e. Have electrician hook pump motor to power supply and have him check for correct rotation of pump motor. This is indicated by arrow on housing.

LUBRICATION

f. See paragraph 11.

ADJUSTMENTS

g. None.

NOTICE

If it becomes desirable to install dial indicators and end measuring rods in the field, the George Gorton Machine Co., will provide tooling to simplify accurate installation at nominal cost.

Photo 44

ASSEMBLY DRAWINGS

AND

PARTS IDENTIFICATION

The following pages are furnished for ready identification of all parts in the various assemblies. This section is arranged in the same order as the preceding section, viz:

1. Fixed Head Vertical Mill (including both hand and power feed to spindle and hand and power feed to table and saddle)
2. Universal Head and Ram Assembly
3. Duplicator Tracer Heads
4. Duplicator Tables
5. Coolant System

IMPORTANT

Always furnish the serial number and/or model number of machine, duplicator table or tracer head when ordering replacement parts. Serial numbers on Gorton mills and duplicators are located on small pads near the top of the column in the rear. Serial numbers on Gorton duplicator tables are located on front edge of table base at left end. Model numbers for tracer heads are located on top of the tracer head feed shaft housing.

Photo 45

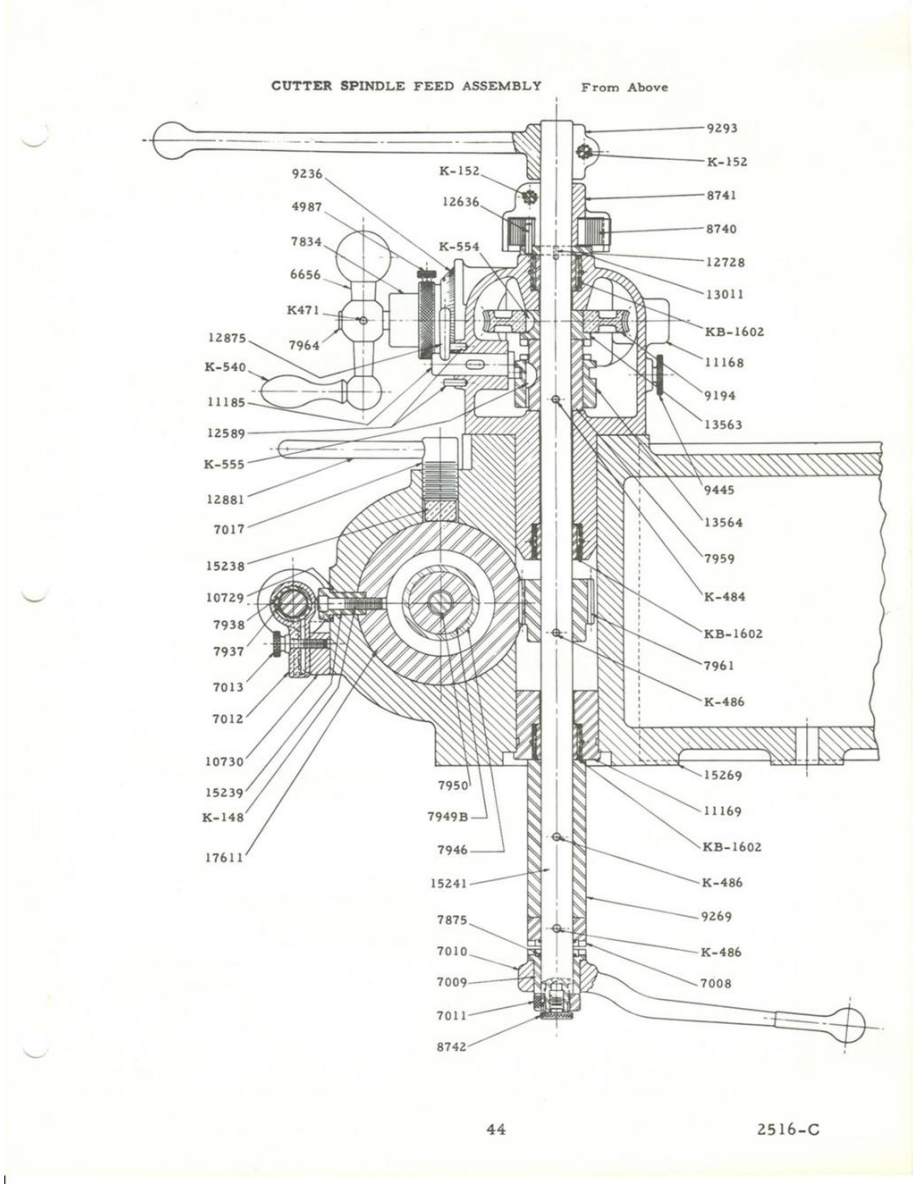

CUTTER SPINDLE FEED ASSEMBLY
From Above
9293
K-152
8741
8740
12728
13011
KB-1602
11168
9194
13563
9445
13564
7959
K-484
KB-1602
7961
K-486
15269
11169
KB-1602
K-486
9269
K-486
7008
9236
4987
7834
6656
K471
7964
12875
K-540
11185
12589
K-555
12881
7017
15238
10729
7938
7937
7013
7012
10730
15239
K-148
17611
K-152
12636
K-554
7950
7949B
7946
15241
7875
7010
7009
7011
8742

Photo 46

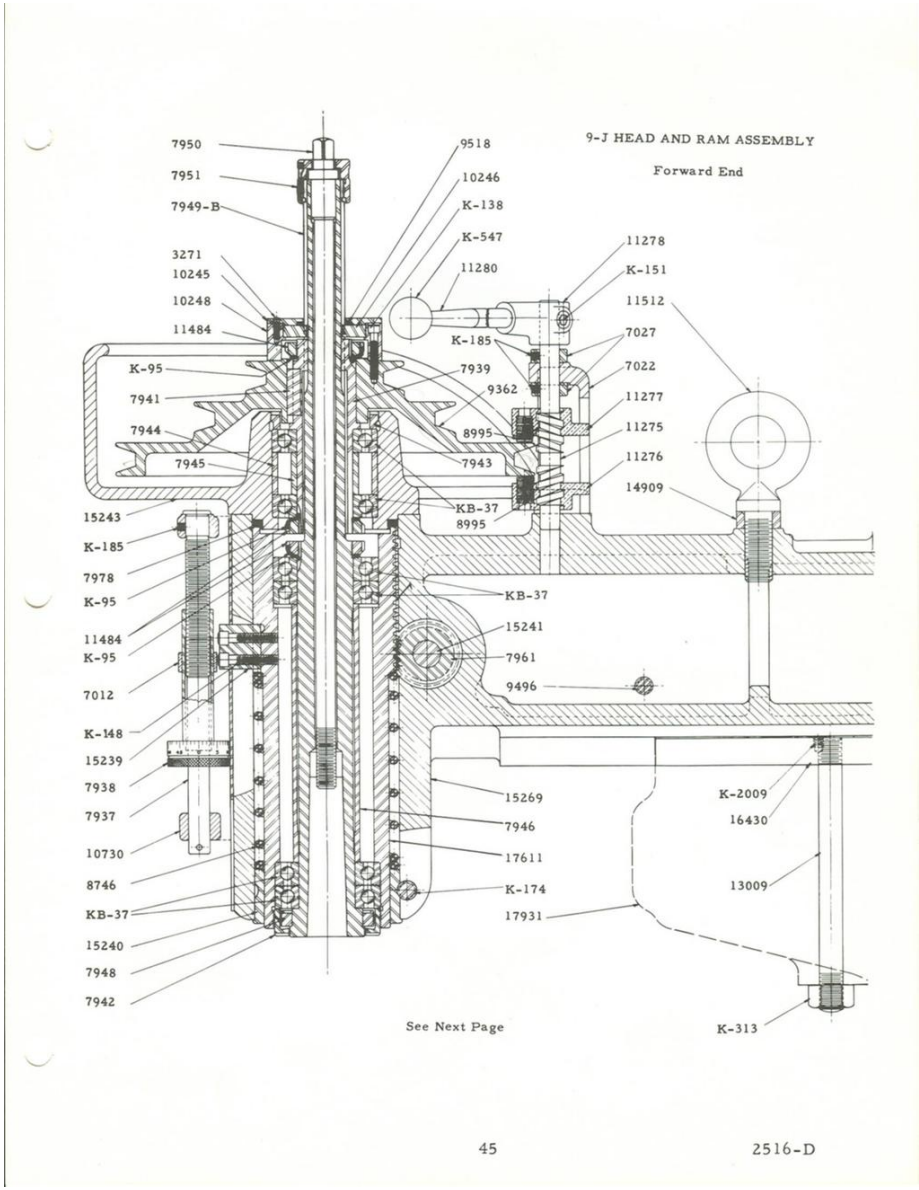
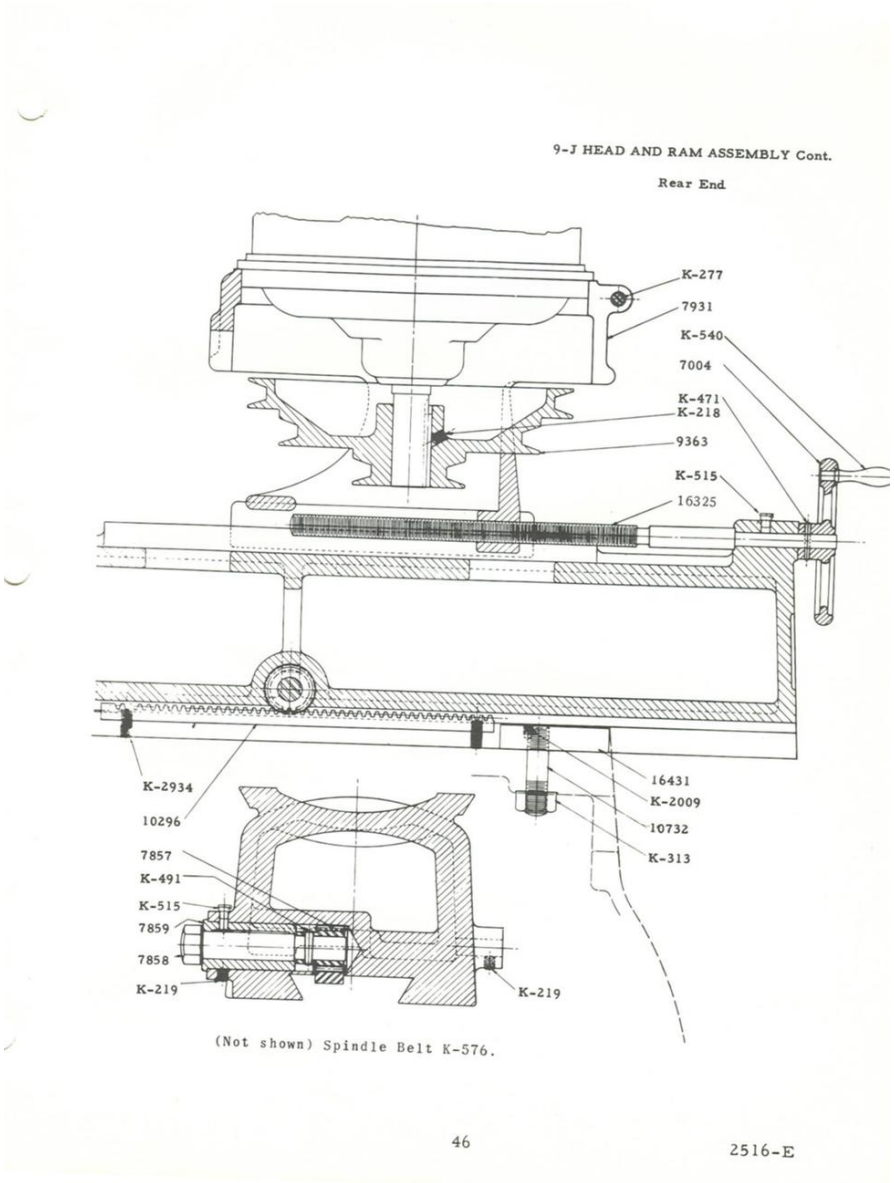

9-J HEAD AND RAM ASSEMBLY
Forward End
7950
7951
7949-B
3271
10245
10248
11484
K-95
7941
7944
7945
15243
K-185
7978
K-95
11484
K-95
7012
K-148
15239
7938
7937
10730
8746
KB-37
15240
7948
7942
9518
10246
K-138
K-547
11280
K-185
7939
9362
8995
7943
KB-37
8995
KB-37
15241
7961
9496
15269
7946
17611
K-174
17931
11278
K-151
11512
7027
7022
11277
11275
11276
14909
K-2009
16430
13009
K-313
See Next Page
45
2516-D

Photo 47



9-J HEAD AND RAM ASSEMBLY Cont.

Rear End

K-277
7931
K-540
7004
K-471
K-218
9363
K-515
16325
K-2934
10296
7857
K-491
K-515
7859
7858
K-219
16431
K-2009
10732
K-313
K-219

(Not shown) Spindle Belt K-576.

Photo 48

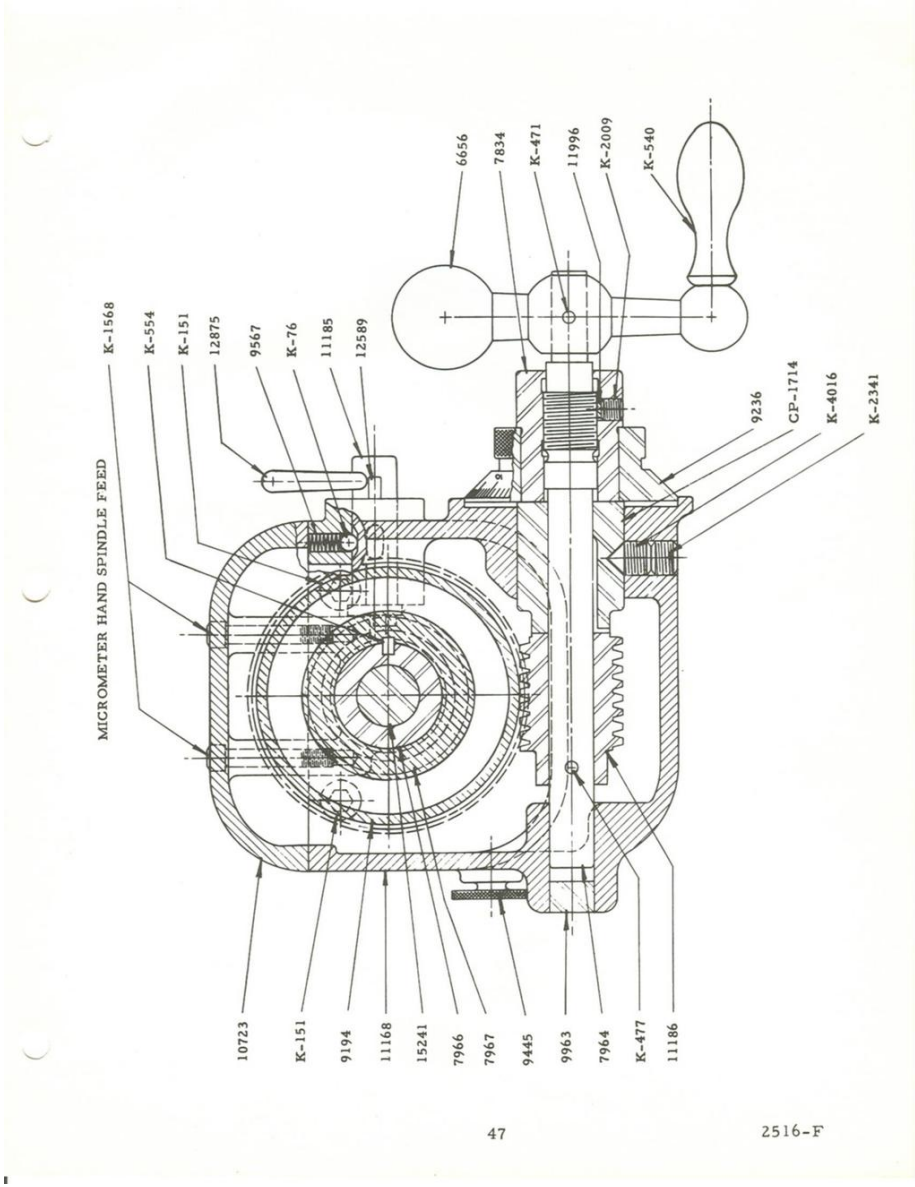

MICROMETER HAND SPINDLE FEED
K-1568
K-554
K-151
12875
9567
K-76
11185
12589
6656
7834
K-471
11996
K-2009
K-540
9236
CP-1714
K-4016
K-2341
10723
K-151
9194
11168
15241
7966
7967
9445
9963
7964
K-477
11186
47
2516-F

Photo 49

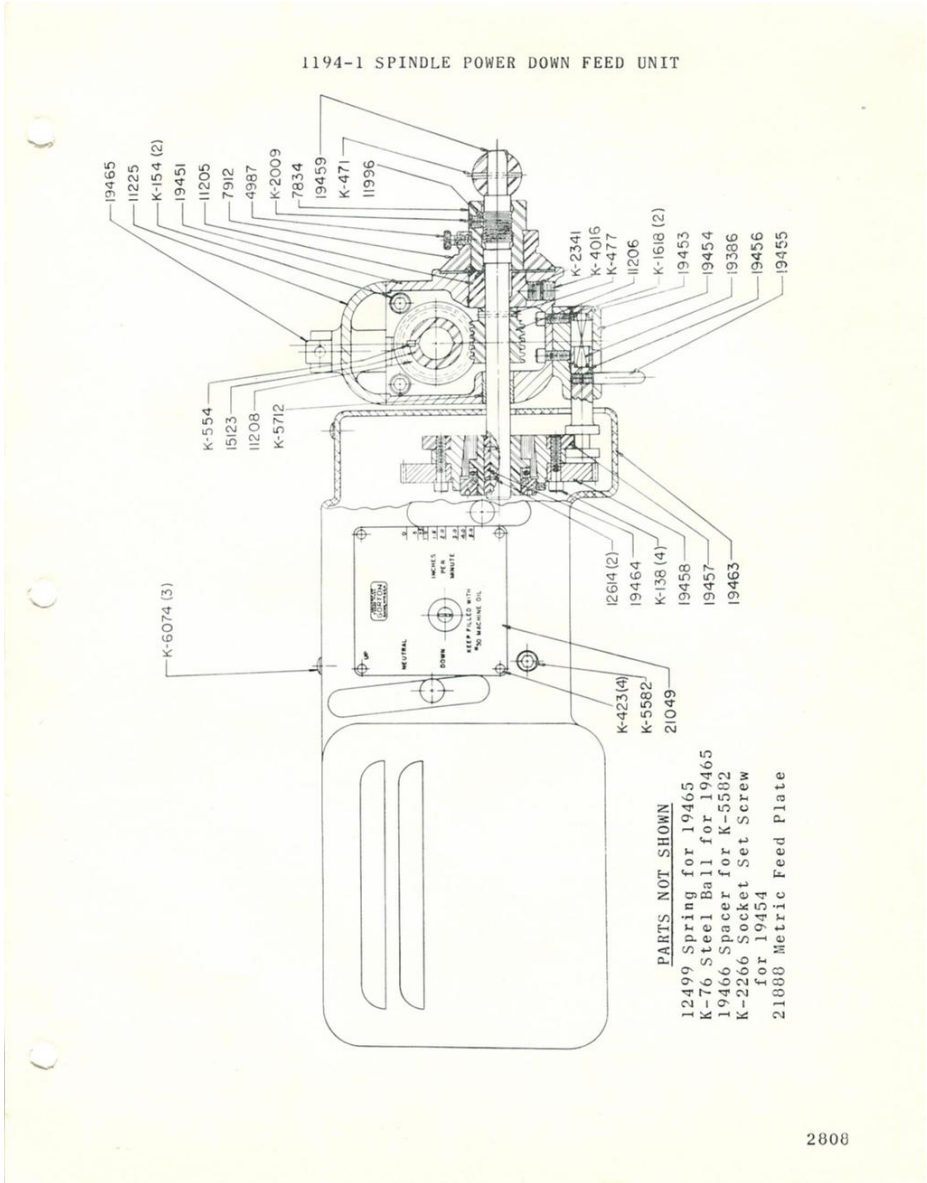

1194-1 SPINDLE POWER DOWN FEED UNIT
19465
11225
K-154 (2)
19451
11205
7912
4987
K-2009
7834
19459
K-471
11996
K-554
15123
11208
K-5712
K-6074 (3)
K-2341
K-4016
K-477
11206
K-1618 (2)
19453
19454
19386
19456
19455
12614 (2)
19464
K-138 (4)
19458
19457
19463
K-4231(4)
K-5582
21049
PARTS NOT SHOWN
12499 Spring for 19465
K-76 Steel Ball for 19465
19466 Spacer for K-5582
K-2266 Socket Set Screw
for 19454
21088 Metric Feed Plate
2808

Photo 50

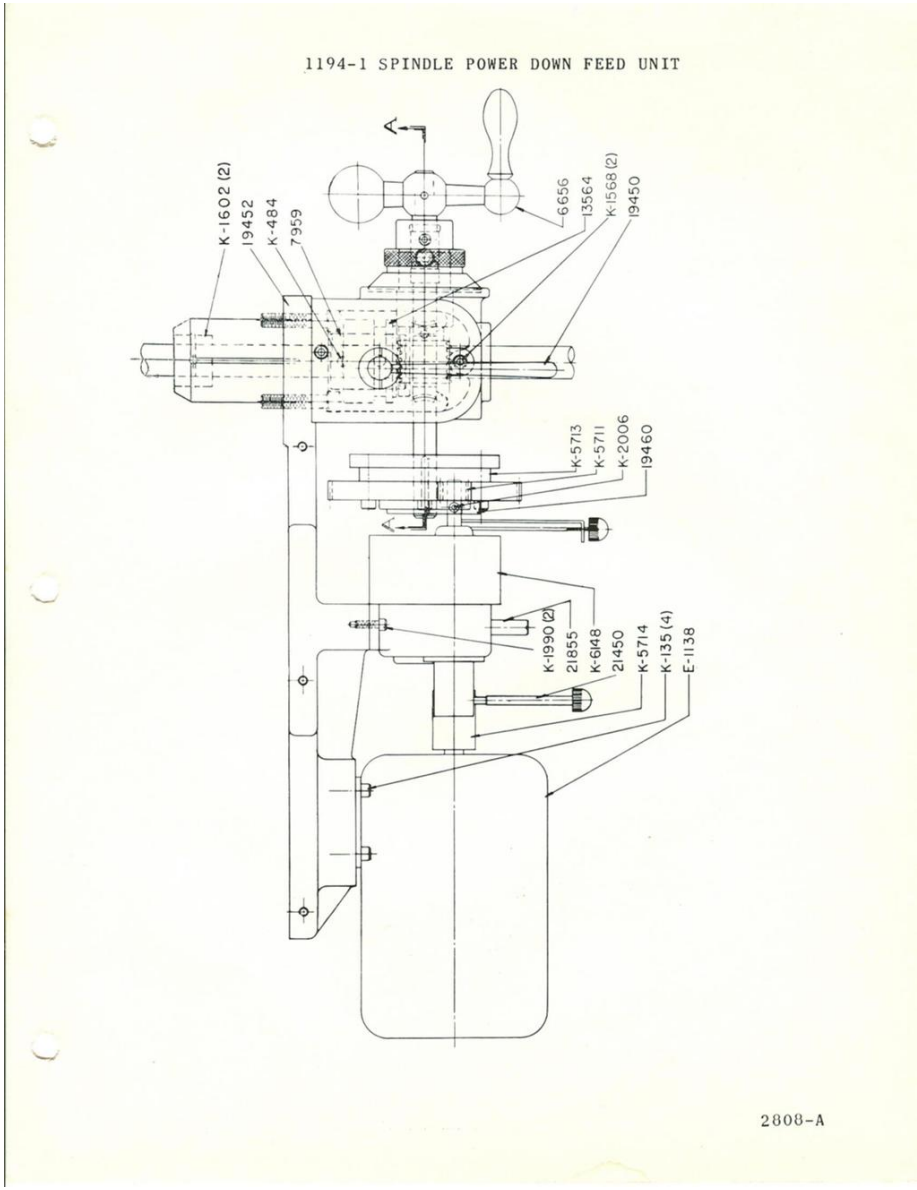

1194-1 SPINDLE POWER DOWN FEED UNIT
K-1602 (2)
19452
K-484
7959
6656
13564
K-1568 (2)
19450
K-5713
K-5711
K-2006
19460
K-1990 (2)
21855
K-648
21450
K-5714
K-135 (4)
E-1138
2808-A

Photo 51

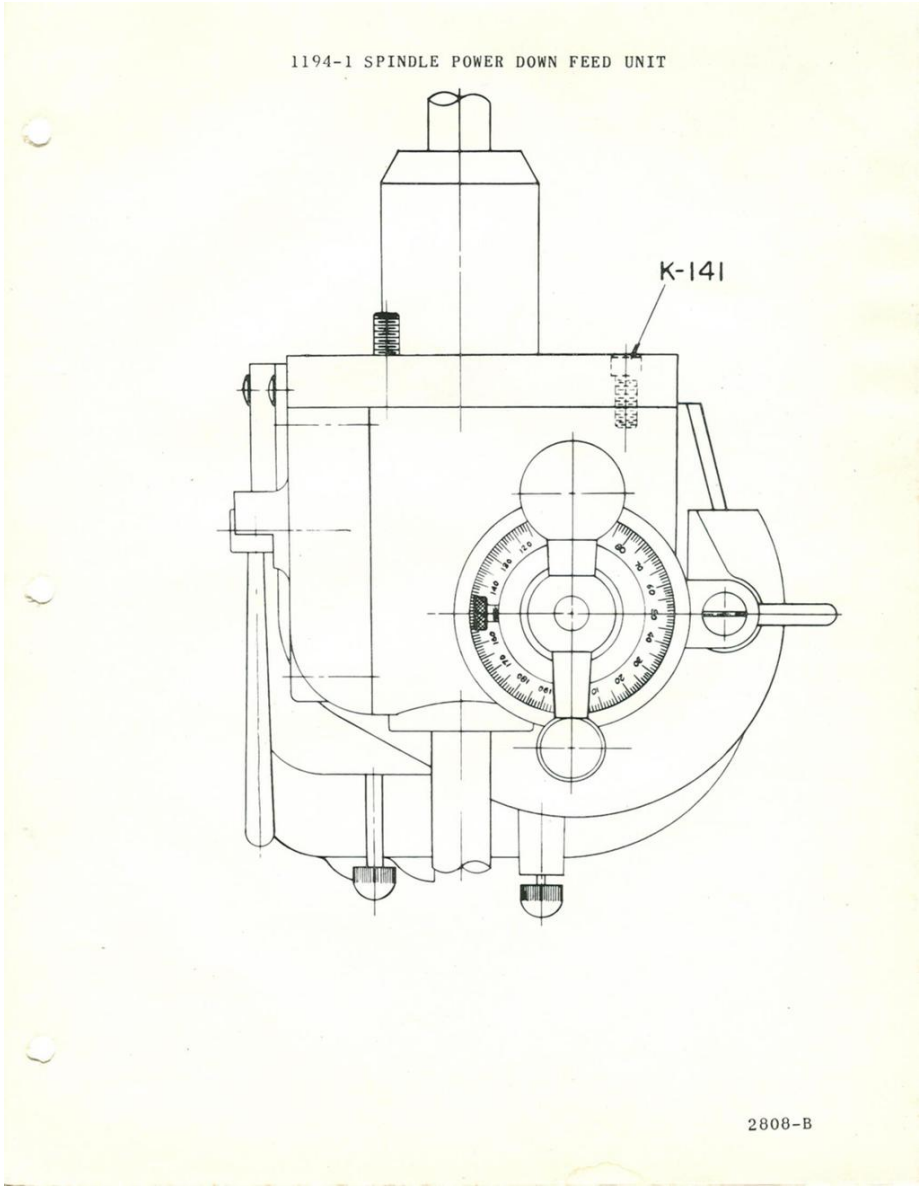
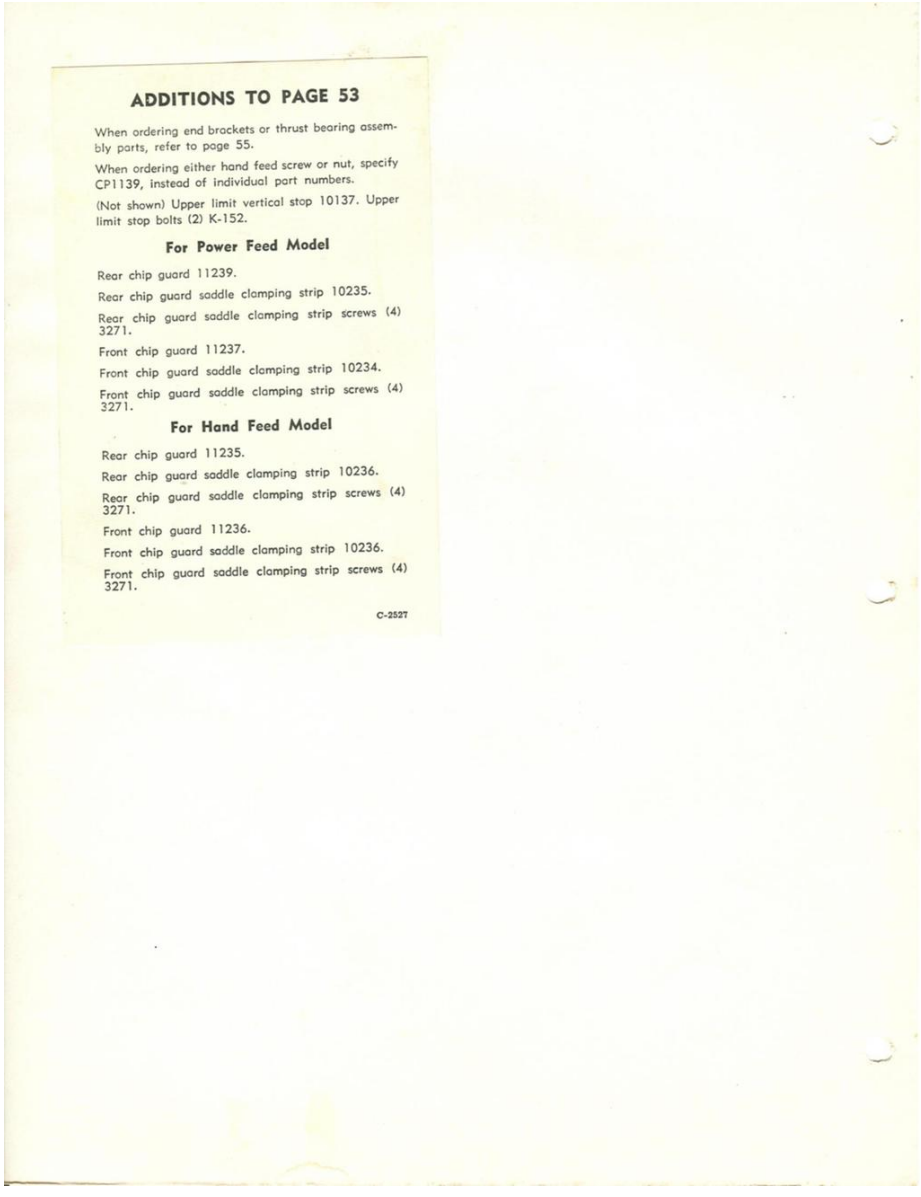


Photo 52



ADDITIONS TO PAGE 53

When ordering end brackets or thrust bearing assembly parts, refer to page 55.

When ordering either hand feed screw or nut, specify CP1139, instead of individual part numbers.

(Not shown) Upper limit vertical stop 10137. Upper limit stop bolts (2) K-152.

For Power Feed Model

Rear chip guard 11239.

Rear chip guard saddle clamping strip 10235.

Rear chip guard saddle clamping strip screws (4) 3271.

Front chip guard 11237.

Front chip guard saddle clamping strip 10234.

Front chip guard saddle clamping strip screws (4) 3271.

For Hand Feed Model

Rear chip guard 11235.

Rear chip guard saddle clamping strip 10236.

Rear chip guard saddle clamping strip screws (4) 3271.

Front chip guard 11236.

Front chip guard saddle clamping strip 10236.

Front chip guard saddle clamping strip screws (4) 3271.

C-2527

Photo 53

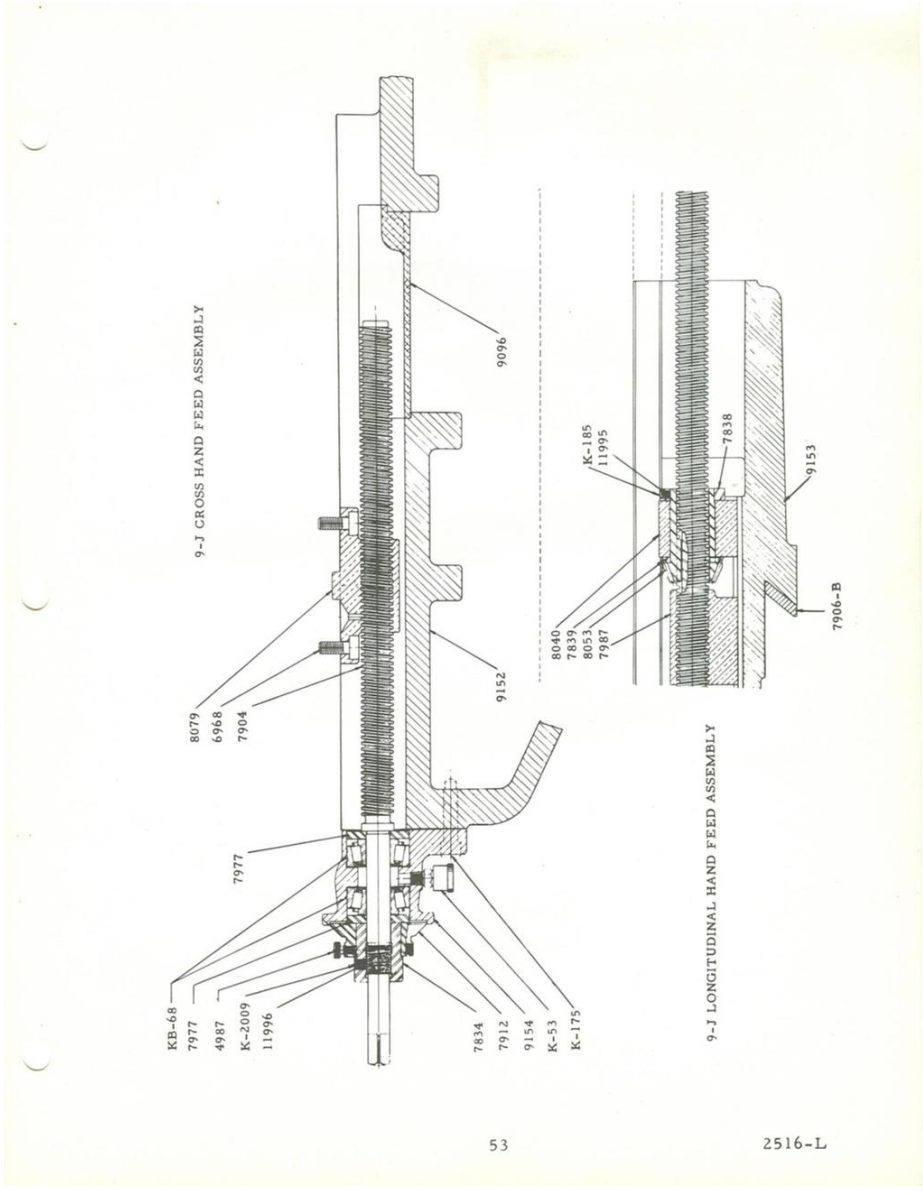

9-J CROSS HAND FEED ASSEMBLY
9096
9152
8079
6968
7904
7977
KB-68
7977
4987
K-2009
11996
7834
7912
9154
K-53
K-175
9-J LONGITUDINAL HAND FEED ASSEMBLY
K-185
11995
7838
9153
7906-B
8040
7839
8053
7987
53
2516-L

Photo 54

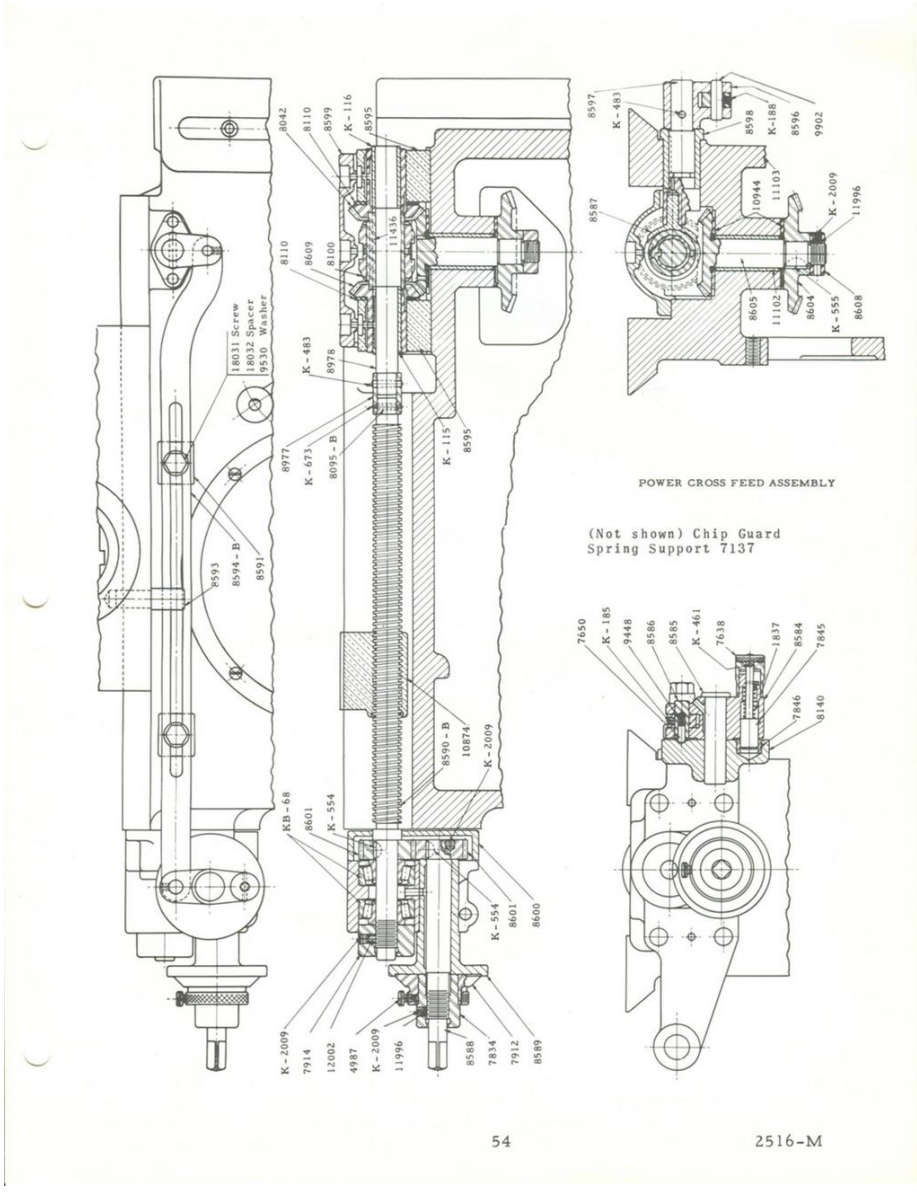

POWER CROSS FEED ASSEMBLY
(Not shown) Chip Guard
Spring Support 7137
18031 Screw
18032 Spacer
9530 Washer
8042
8110
8599
K-116
8595
8609
8100
11436
K-483
8978
8977
K-673
8095-B
K-115
8595
8593
8594-B
8591
KB-68
8601
K-554
8590-B
10874
K-2009
K-554
8601
8600
K-2009
7914
12002
4987
K-2009
11996
8588
7834
7912
8589
8597
K-483
8598
K-188
8596
9902
8587
10944
11103
K-2009
11996
8605
11102
8604
K-555
8608
7650
K-185
9448
8586
8585
K-461
7638
1837
8584
7845
7846
8140

Photo 55

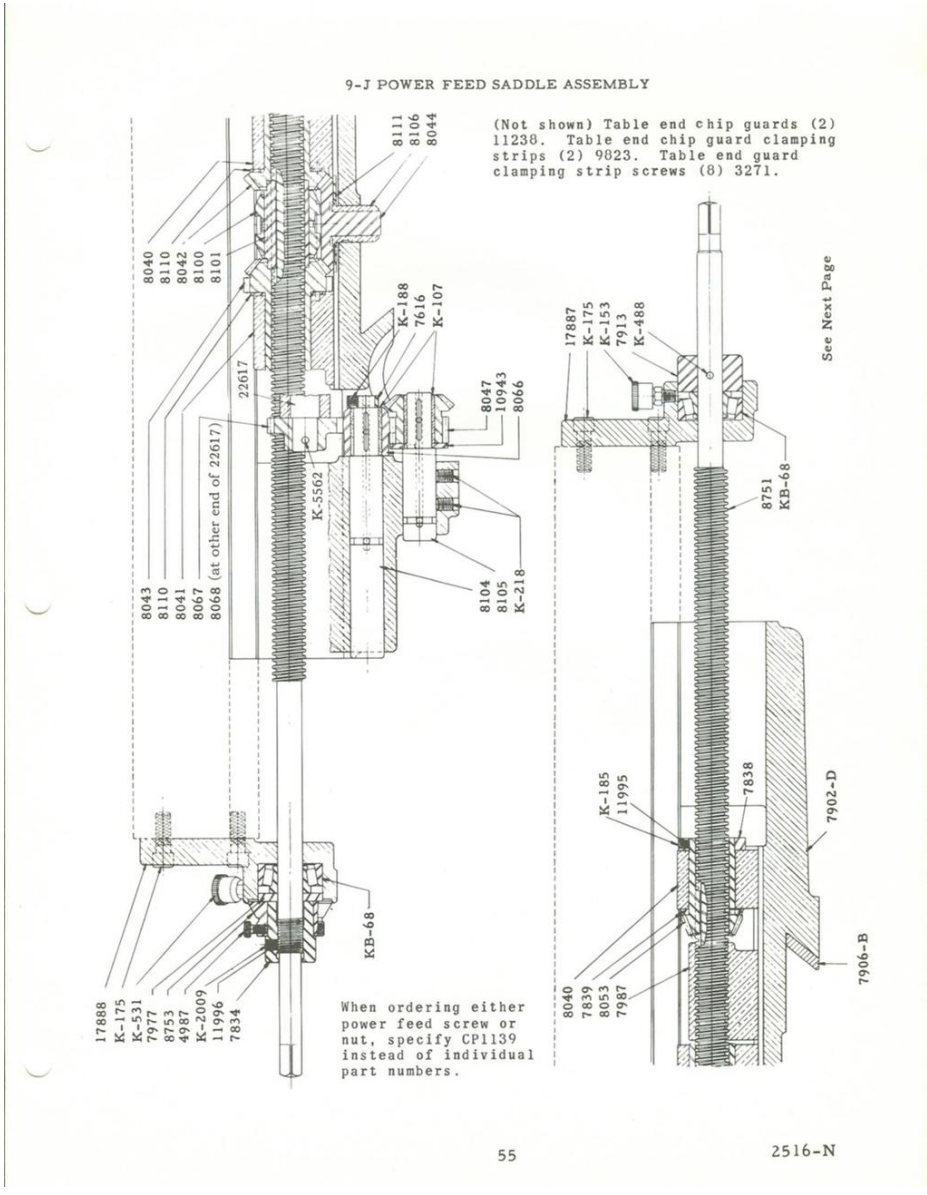

9-J POWER FEED SADDLE ASSEMBLY
(Not shown) Table end chip guards (2) 11238. Table end chip guard clamping strips (2) 9823. Table end guard clamping strip screws (8) 3271.
See Next Page
When ordering either power feed screw or nut, specify CP1139 instead of individual part numbers.
55
2516-N

Photo 56

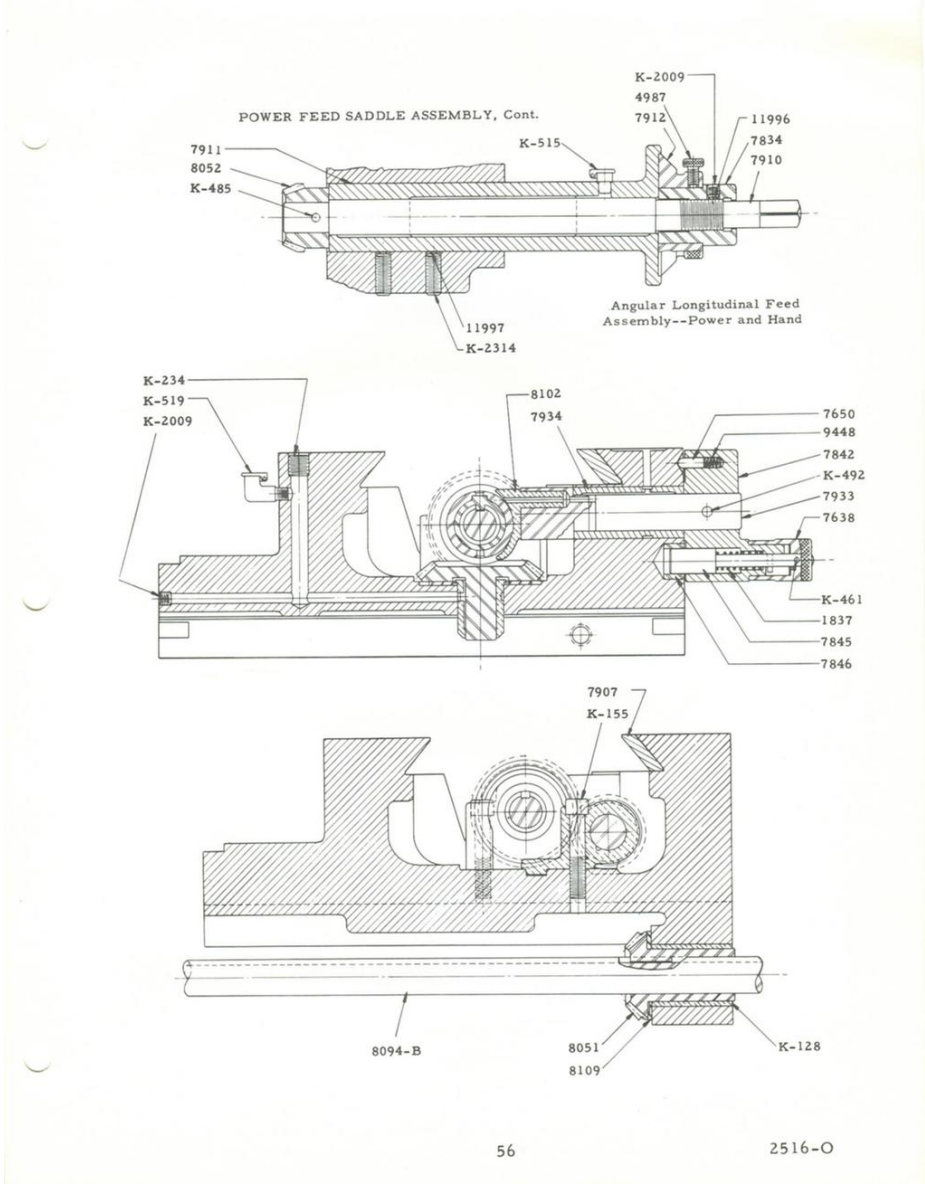

POWER FEED SADDLE ASSEMBLY, Cont.
K-2009
4987
7912
11996
7834
7910
K-515
7911
8052
K-485
11997
K-2314
Angular Longitudinal Feed
Assembly--Power and Hand
K-234
K-519
K-2009
8102
7934
7650
9448
7842
K-492
7933
7638
K-461
1837
7845
7846
7907
K-155
8094-B
8051
8109
K-128
56
2516-O

Photo 57

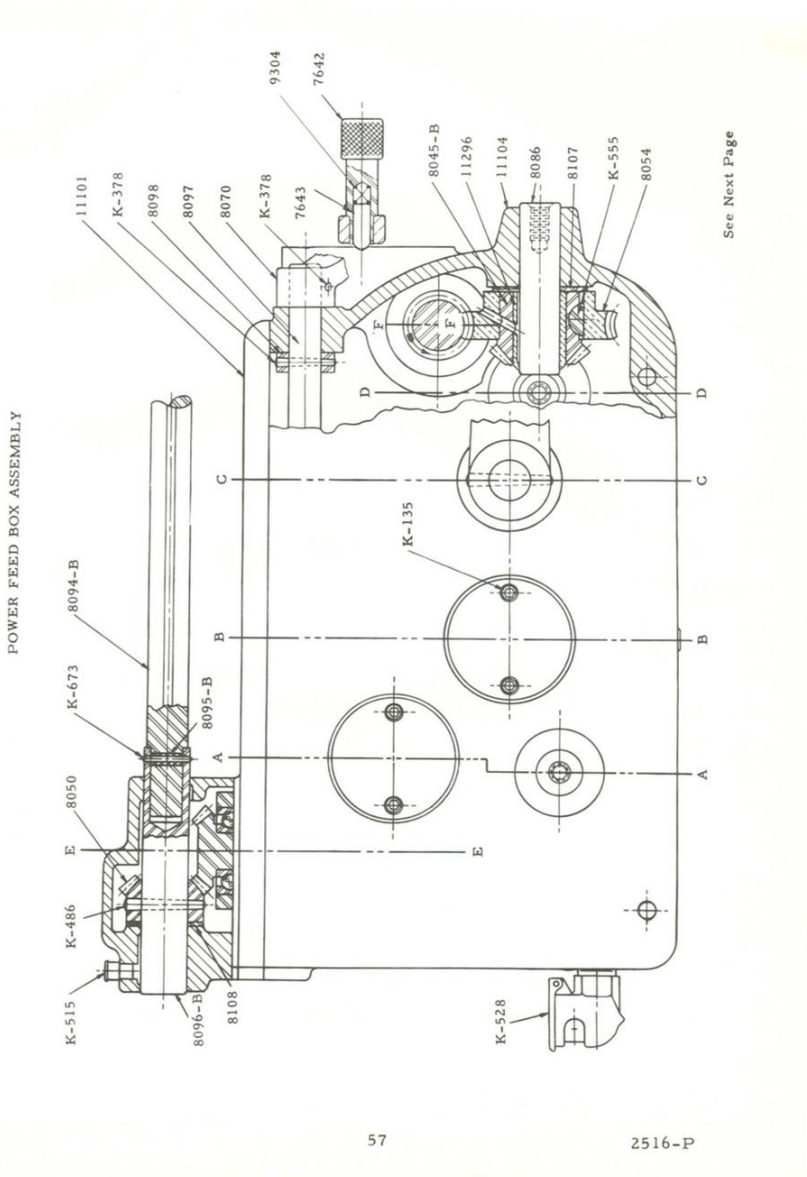

POWER FEED BOX ASSEMBLY
11101
K-378
8098
8097
8070
K-378
7643
9304
7642
8045-B
11296
11104
8086
8107
K-555
8054
See Next Page
K-135
8094-B
K-673
8095-B
8050
K-486
K-515
8096-B
8108
K-528
A
B
C
D
E
F
57
2516-P

Photo 58

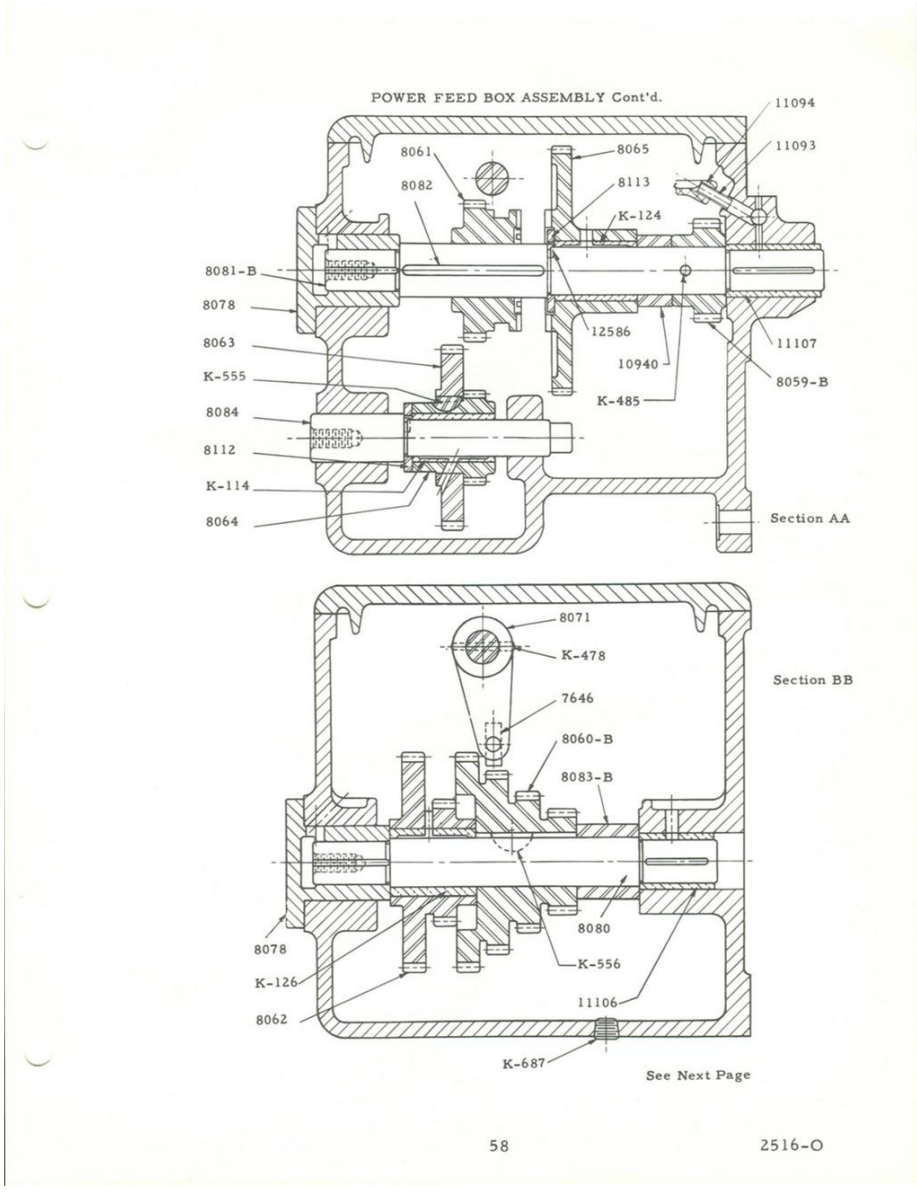

POWER FEED BOX ASSEMBLY Cont'd.
11094
11093
8061
8065
8082
8113
K-124
8081-B
8078
8063
K-555
8084
8112
K-114
8064
12586
10940
K-485
11107
8059-B
Section AA
8071
K-478
Section BB
7646
8060-B
8083-B
8078
K-126
8062
8080
K-556
11106
K-687
See Next Page
58
2516-O

Photo 59

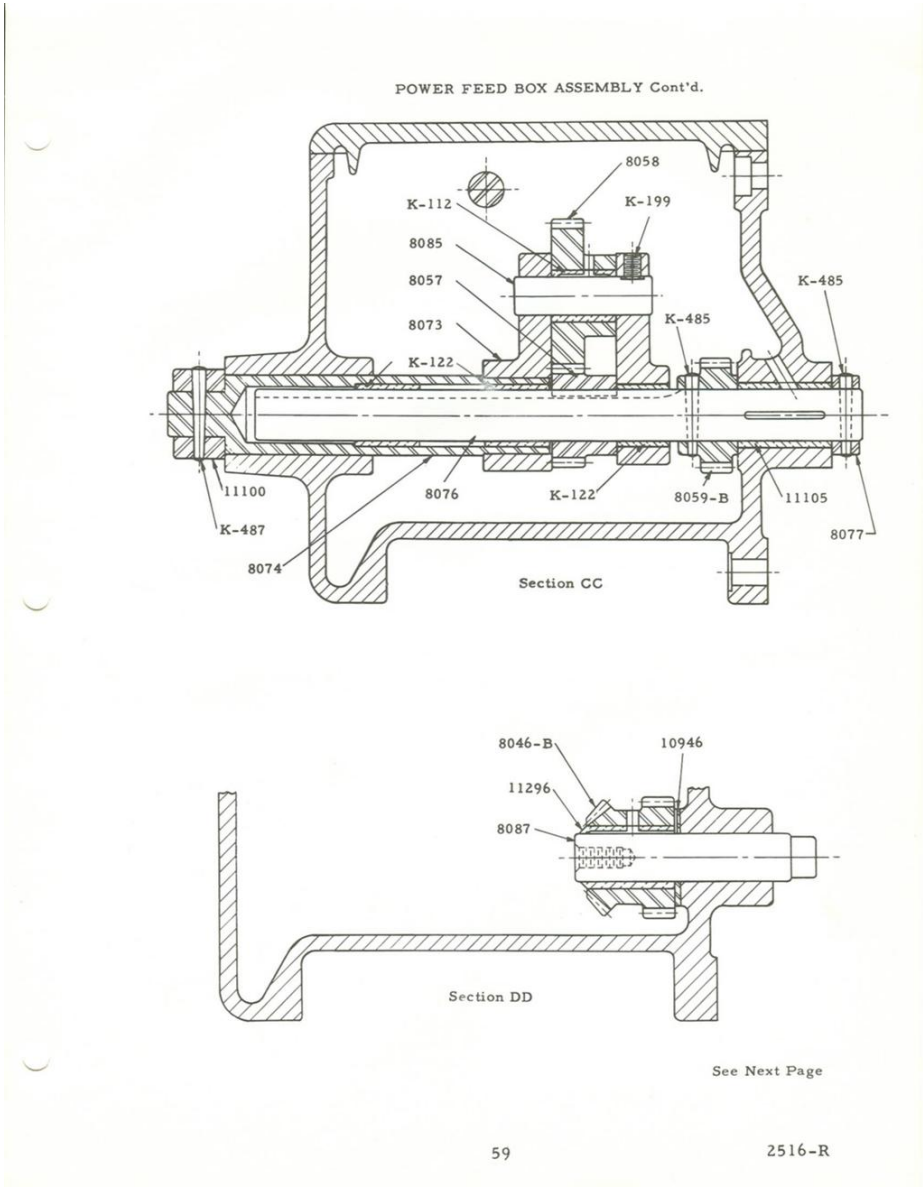

POWER FEED BOX ASSEMBLY Cont'd.
8058
K-112
K-199
8085
8057
8073
K-122
K-485
K-485
11100
K-487
8074
8076
K-122
8059-B
11105
8077
Section CC
8046-B
10946
11296
8087
Section DD
See Next Page
59
2516-R

Photo 60

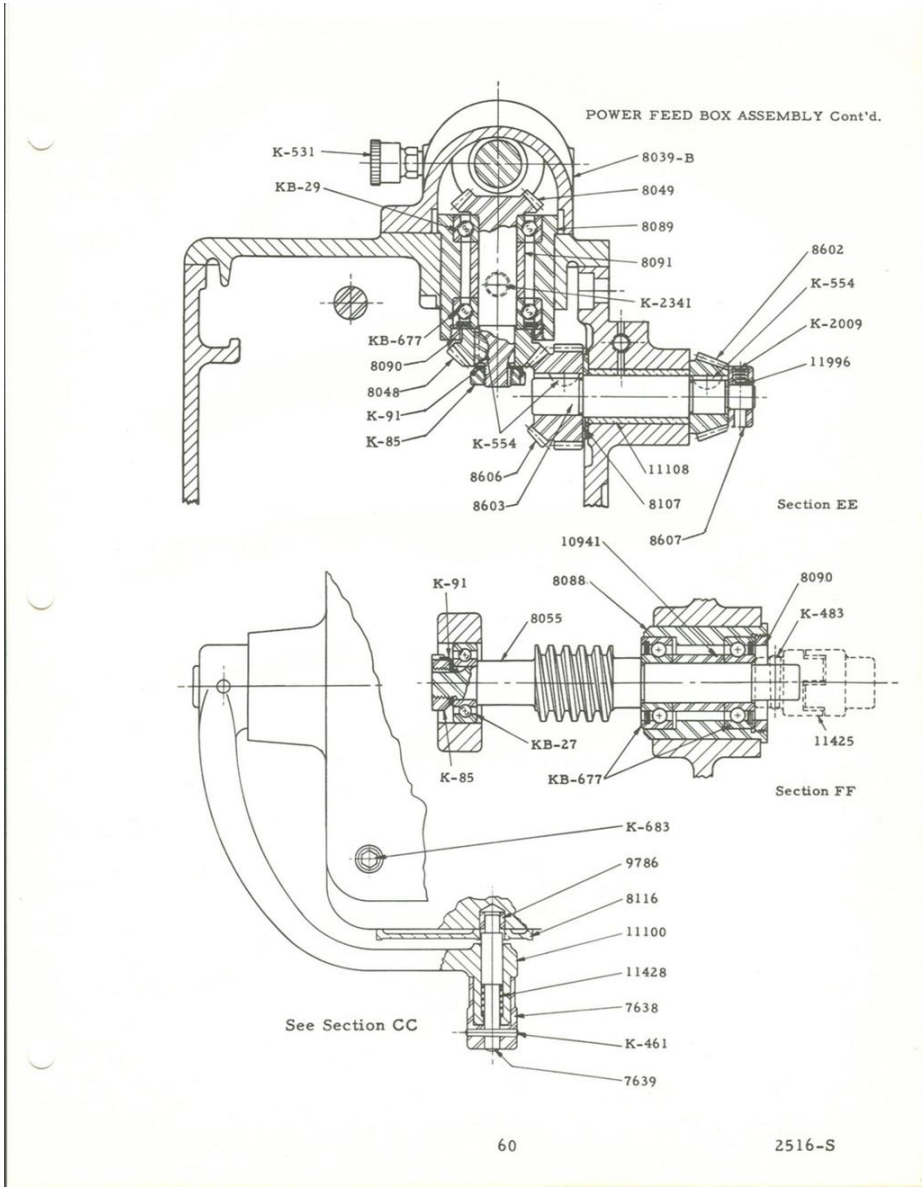

POWER FEED BOX ASSEMBLY Cont'd.
K-531
KB-29
8039-B
8049
8089
8091
K-2341
8602
K-554
K-2009
11996
KB-677
8090
8048
K-91
K-85
K-554
8606
8603
11108
8107
8607
Section EE
10941
K-91
8088
8090
K-483
8055
KB-27
K-85
KB-677
11425
Section FF
K-683
9786
8116
11100
11428
7638
K-461
7639
See Section CC
60
2516-S

Photo 61

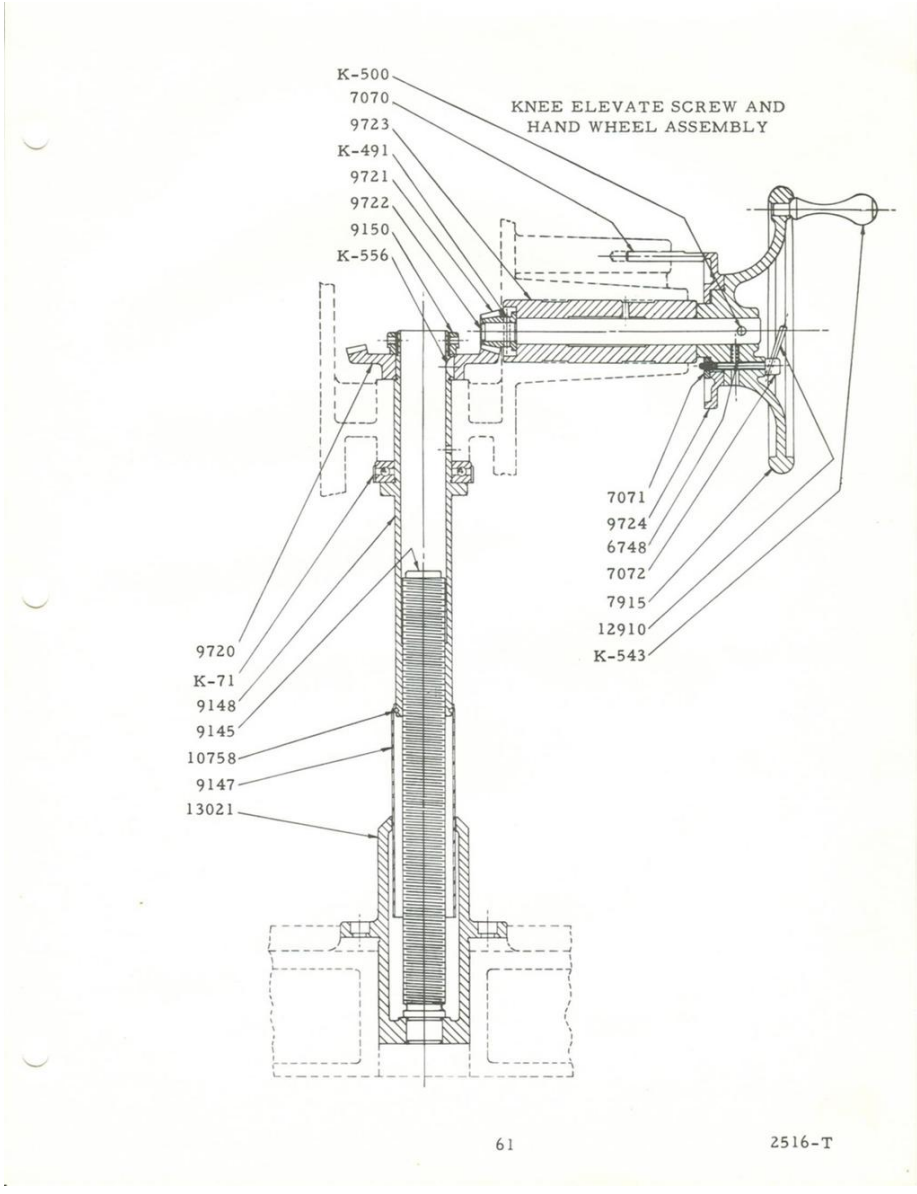
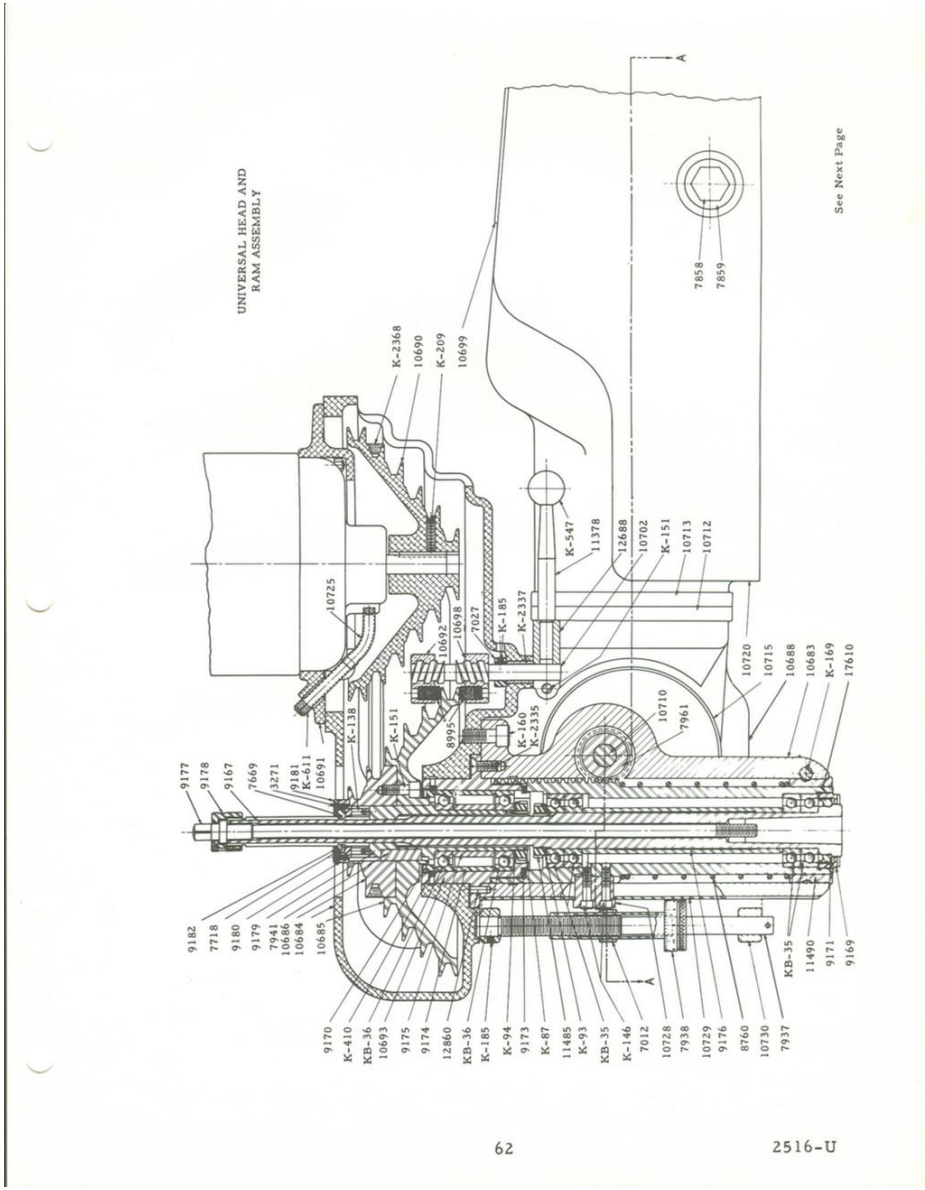

KNEE ELEVATE SCREW AND
HAND WHEEL ASSEMBLY
K-500
7070
9723
K-491
9721
9722
9150
K-556
7071
9724
6748
7072
7915
12910
K-543
9720
K-71
9148
9145
10758
9147
13021
61
2516-T

Photo 62


UNIVERSAL HEAD AND
RAM ASSEMBLY
See Next Page
A
A
7858
7859
K-2368
10690
K-209
10699
10725
K-138
K-151
8995
10692
10698
7027
K-185
K-2337
K-160
K-2335
K-547
11378
12688
10702
K-151
10713
10712
10720
10715
10688
10683
K-169
17610
10710
7961
9177
9178
9167
7669
3271
9181
K-611
10691
9182
7718
9180
9179
7941
10686
10684
10685
9170
K-410
KB-36
10693
9175
9174
12860
KB-36
K-185
K-94
9173
K-87
11485
K-93
KB-35
K-146
7012
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10729
9176
8760
10730
7937
KB-35
11490
9171
9169
62
2516-U

Photo 63

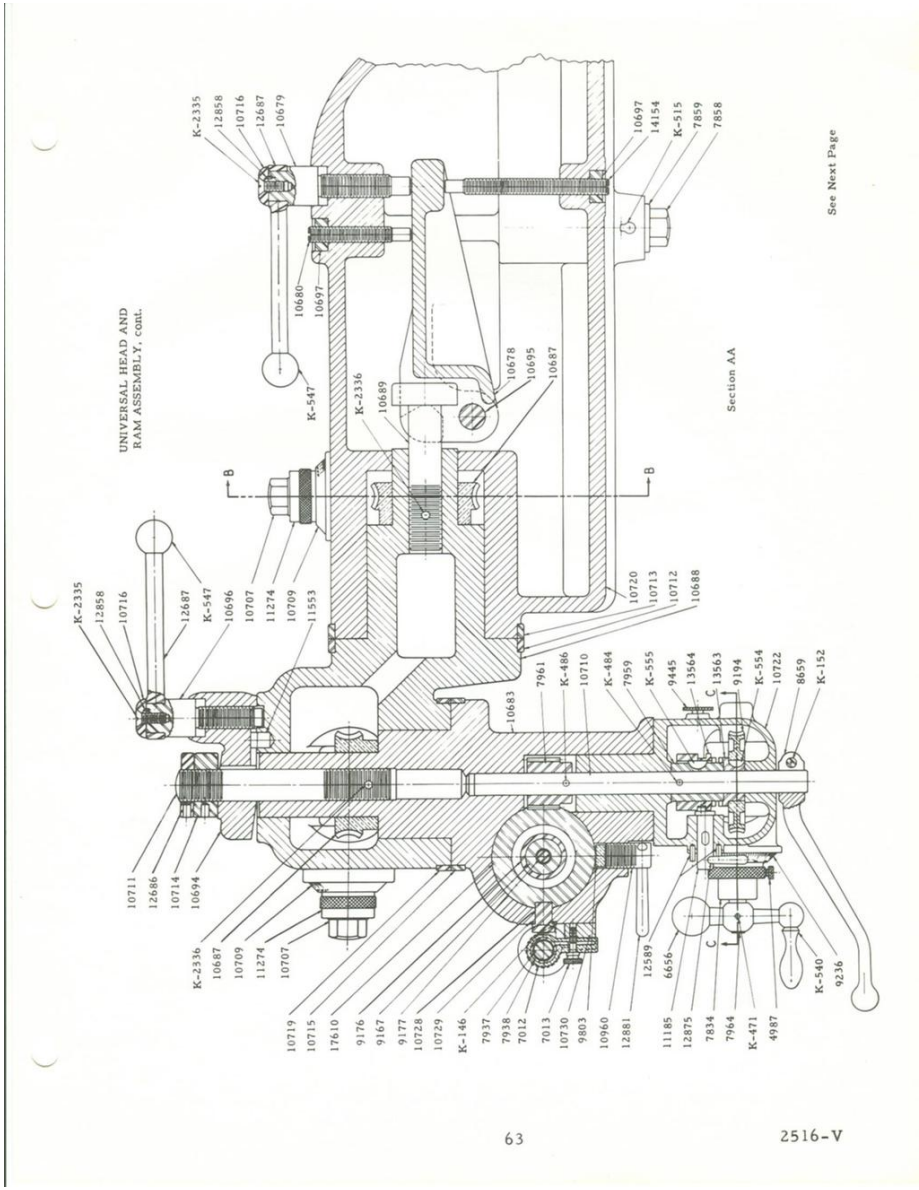

UNIVERSAL HEAD AND RAM ASSEMBLY. cont.
Section AA
See Next Page
K-2335
12858
10716
12687
10679
10697
14154
K-515
7859
7858
10680
10697
K-547
K-2336
10689
10678
10695
10687
B
B
K-2335
12858
10716
12687
K-547
10696
10707
11274
10709
11553
10720
10713
10712
10688
10683
7961
K-486
10710
K-484
7959
K-555
9445
13564
C
13563
9194
K-554
10722
8659
K-152
10711
12686
10714
10694
K-2336
10687
10709
11274
10707
10719
10715
17610
9176
9167
9177
10728
10729
K-146
7937
7938
7012
7013
10730
9803
10960
12881
12589
6656
11185
12875
7834
7964
K-471
4987
C
K-540
9236

Photo 64

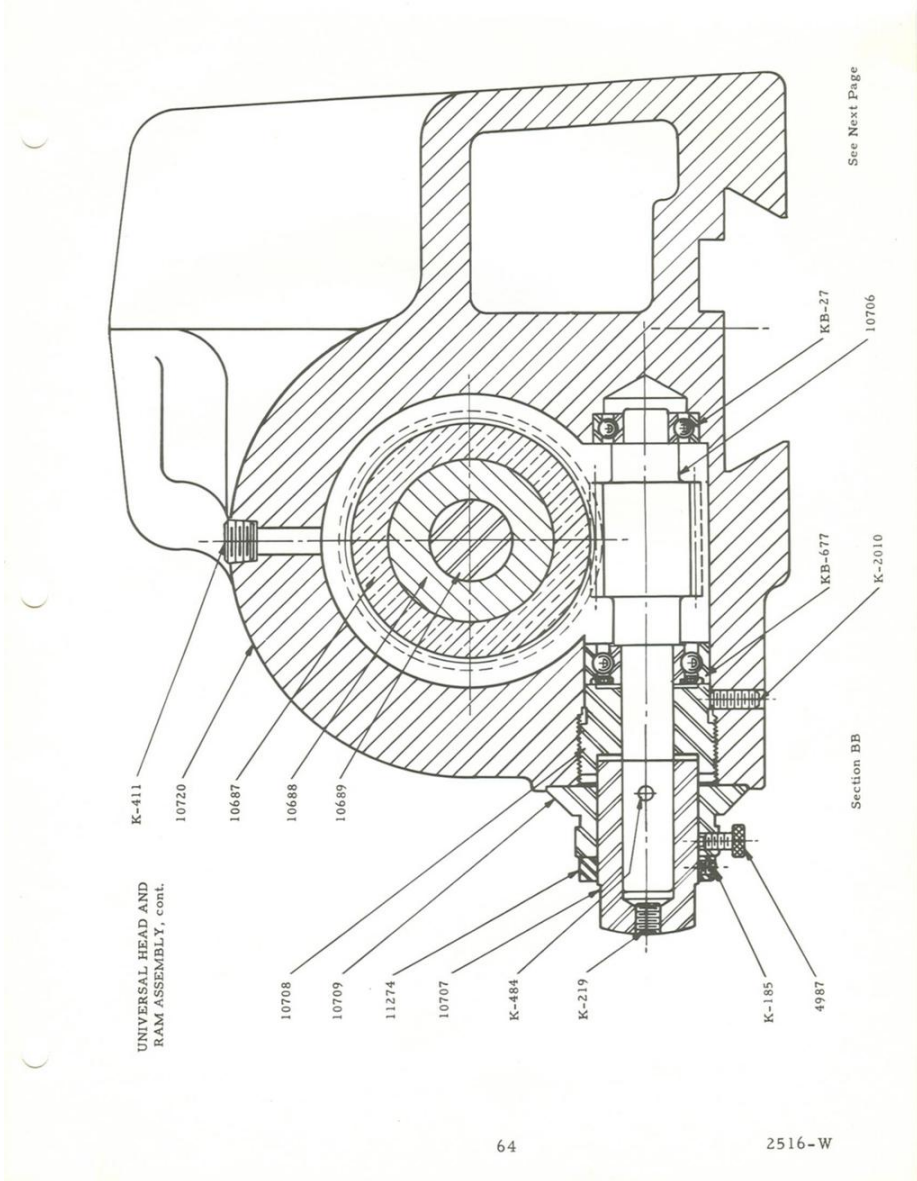

See Next Page
KB-27
10706
KB-677
K-2010
Section BB
K-411
10720
10687
10688
10689
10708
10709
11274
10707
K-484
K-219
K-185
4987
UNIVERSAL HEAD AND
RAM ASSEMBLY, cont.
64
2516-W

Photo 65

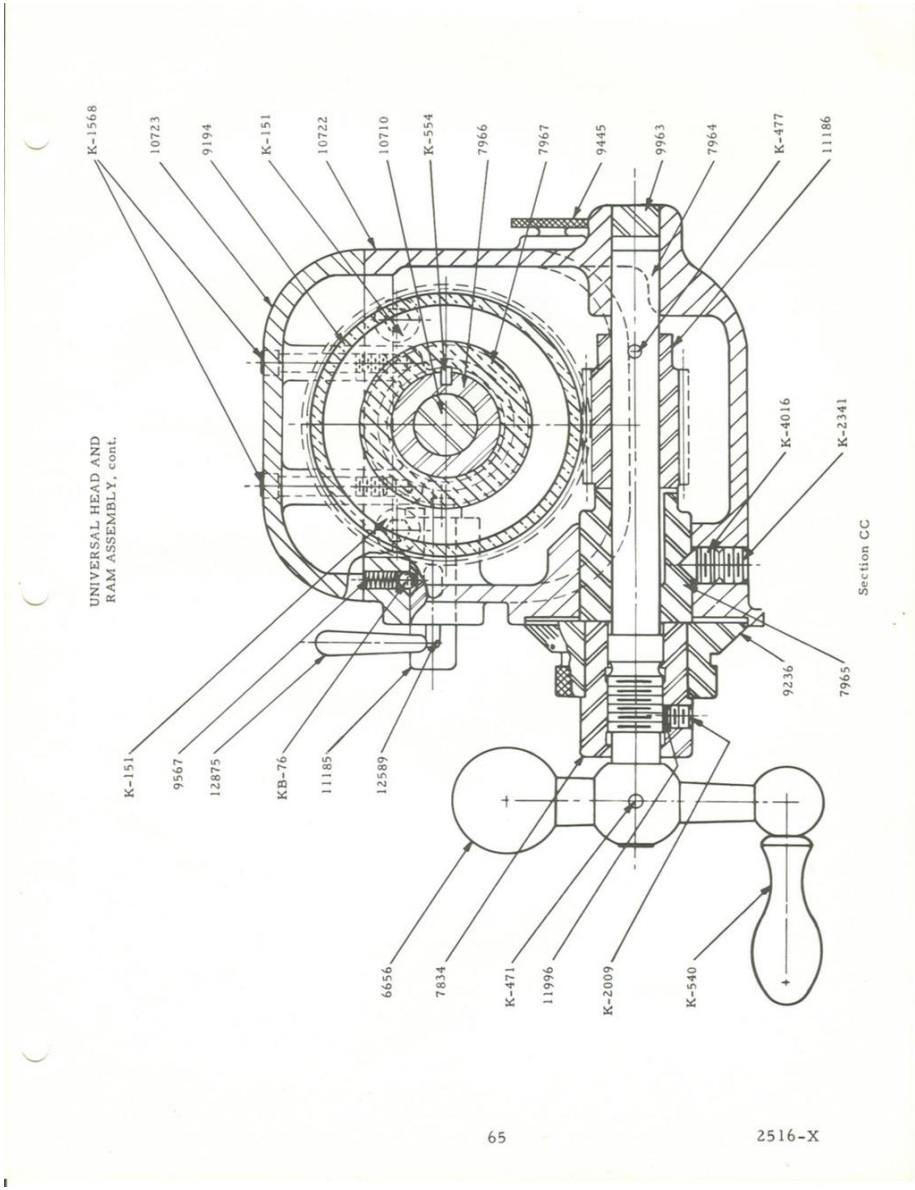

UNIVERSAL HEAD AND
RAM ASSEMBLY, cont.
K-1568
10723
9194
K-151
10722
10710
K-554
7966
7967
9445
9963
7964
K-477
11186
K-4016
K-2341
Section CC
K-151
9567
12875
KB-76
11185
12589
9236
7965
6656
7834
K-471
11996
K-2009
K-540
65
2516-X

Photo 66

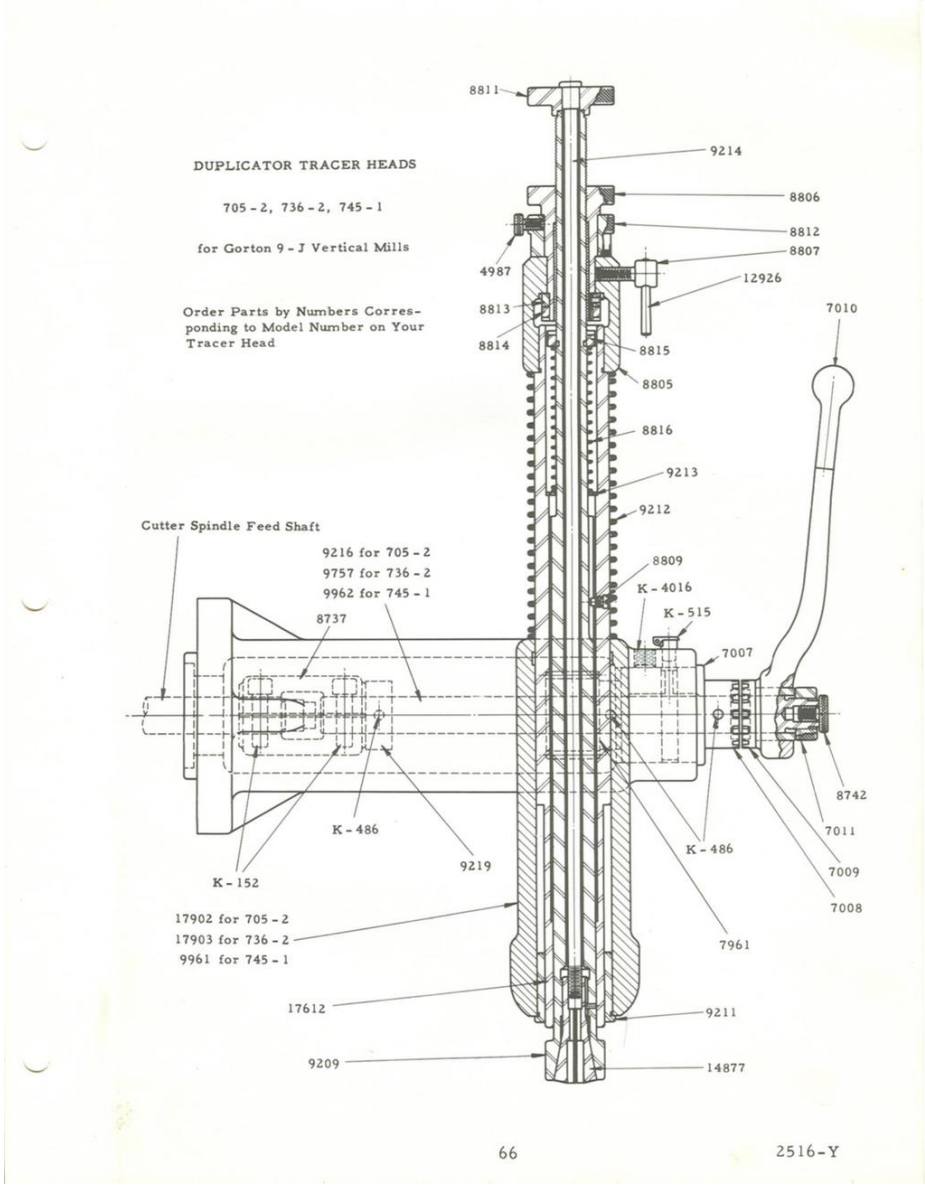

DUPLICATOR TRACER HEADS
705 - 2, 736 - 2, 745 - 1
for Gorton 9 - J Vertical Mills
Order Parts by Numbers Corresponding to Model Number on Your Tracer Head
8811
9214
8806
8812
8807
12926
4987
8813
8814
8815
8805
8816
9213
9212
8809
K - 4016
K - 515
7007
7010
Cutter Spindle Feed Shaft
9216 for 705 - 2
9757 for 736 - 2
9962 for 745 - 1
8737
K - 486
9219
K - 152
17902 for 705 - 2
17903 for 736 - 2
9961 for 745 - 1
17612
9209
9211
14877
7961
8742
7011
7009
7008
66
2516-Y

Photo 67

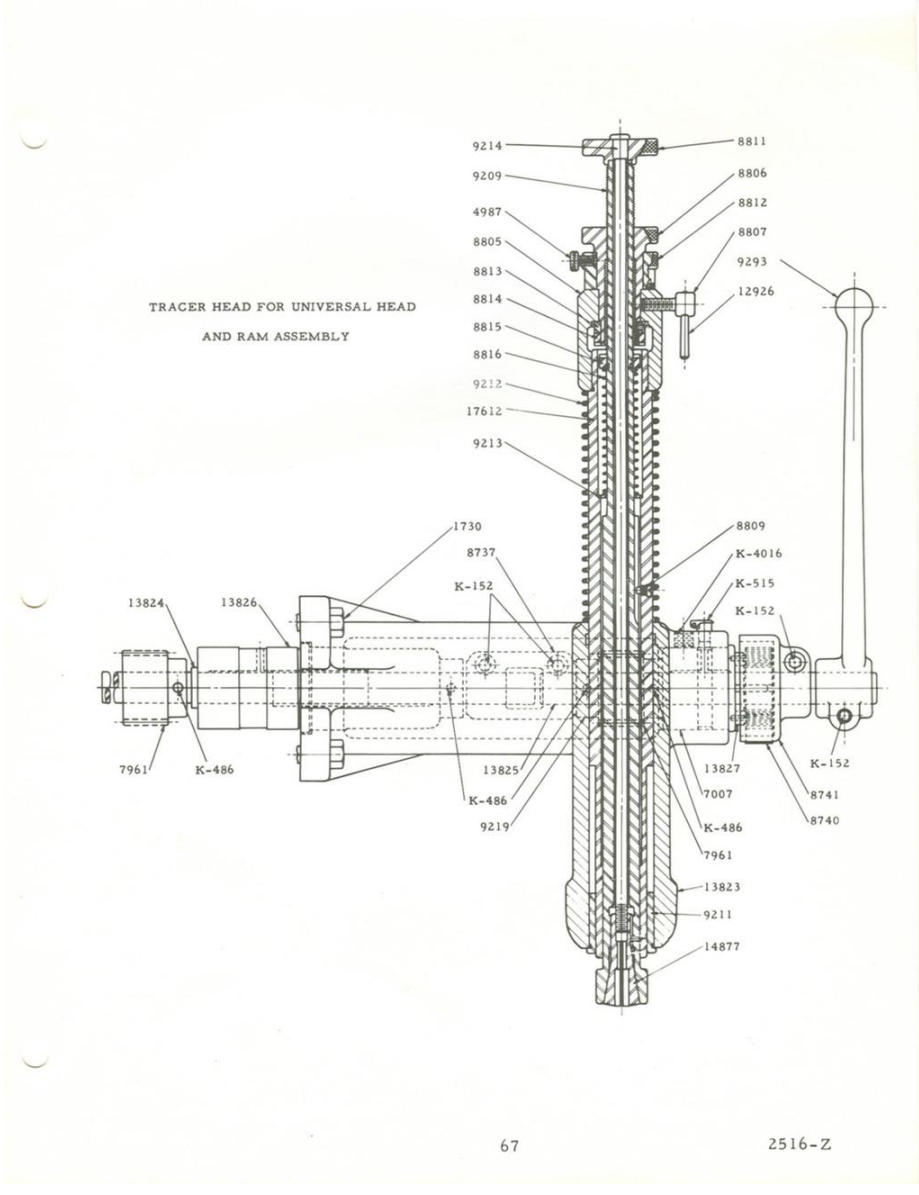

TRACER HEAD FOR UNIVERSAL HEAD
AND RAM ASSEMBLY
9214
9209
4987
8805
8813
8814
8815
8816
9212
17612
9213
1730
8737
K-152
13824
13826
7961
K-486
13825
K-486
9219
8809
K-4016
K-515
K-152
13827
7007
K-486
7961
13823
9211
14877
K-152
8741
8740
8811
8806
8812
8807
9293
12926
67
2516-Z

Photo 68

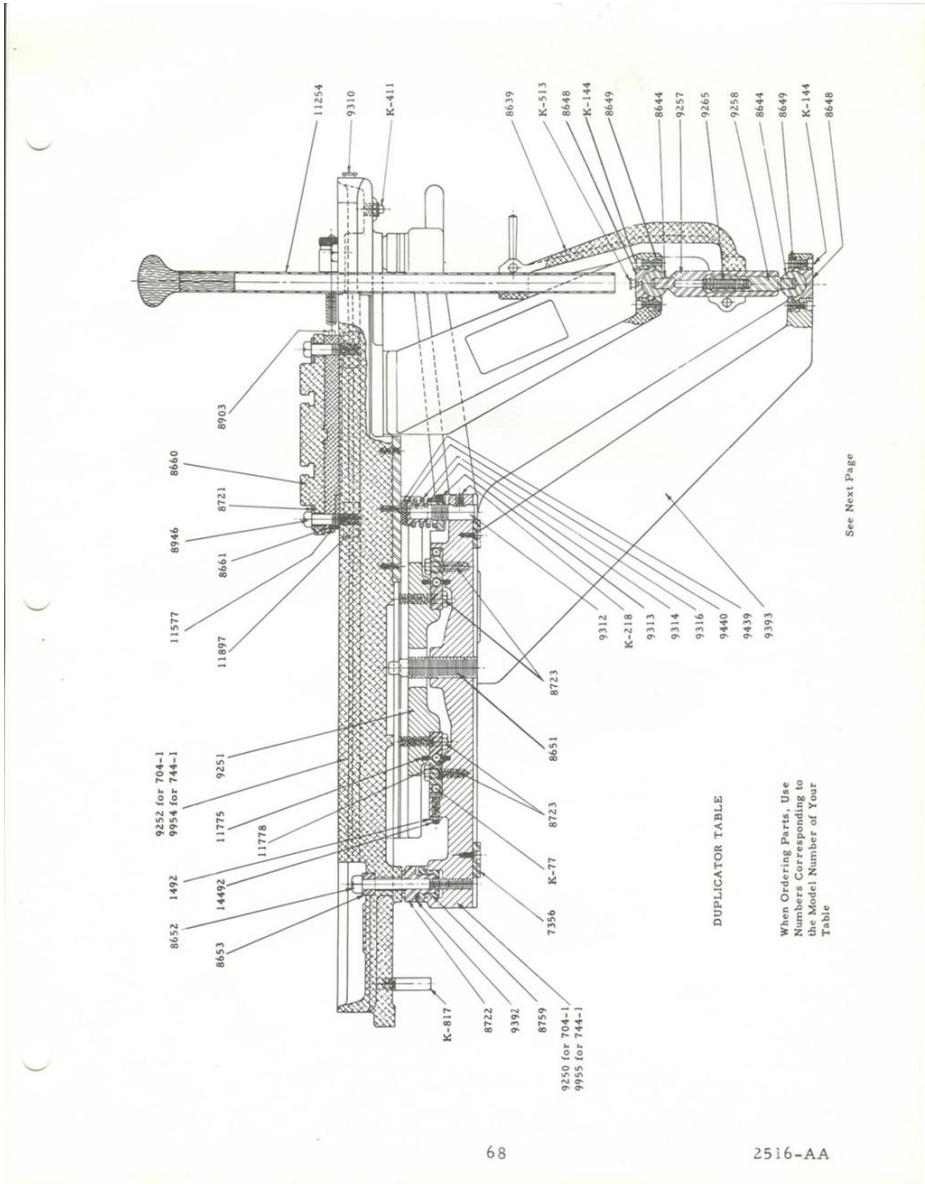

11254
9310
K-411
8639
K-513
8648
K-144
8649
8644
9257
9265
9258
8644
8649
K-144
8648
8903
8660
8721
8946
8661
11577
11897
9312
K-218
9313
9314
9316
9440
9439
9393
See Next Page
8723
9252 for 704-1
9954 for 744-1
9251
11775
11778
1492
14492
8652
8653
8651
8723
K-77
7356
DUPLICATOR TABLE
When Ordering Parts, Use Numbers Corresponding to the Model Number of Your Table
K-817
8722
9392
8759
9250 for 704-1
9955 for 744-1

Photo 69

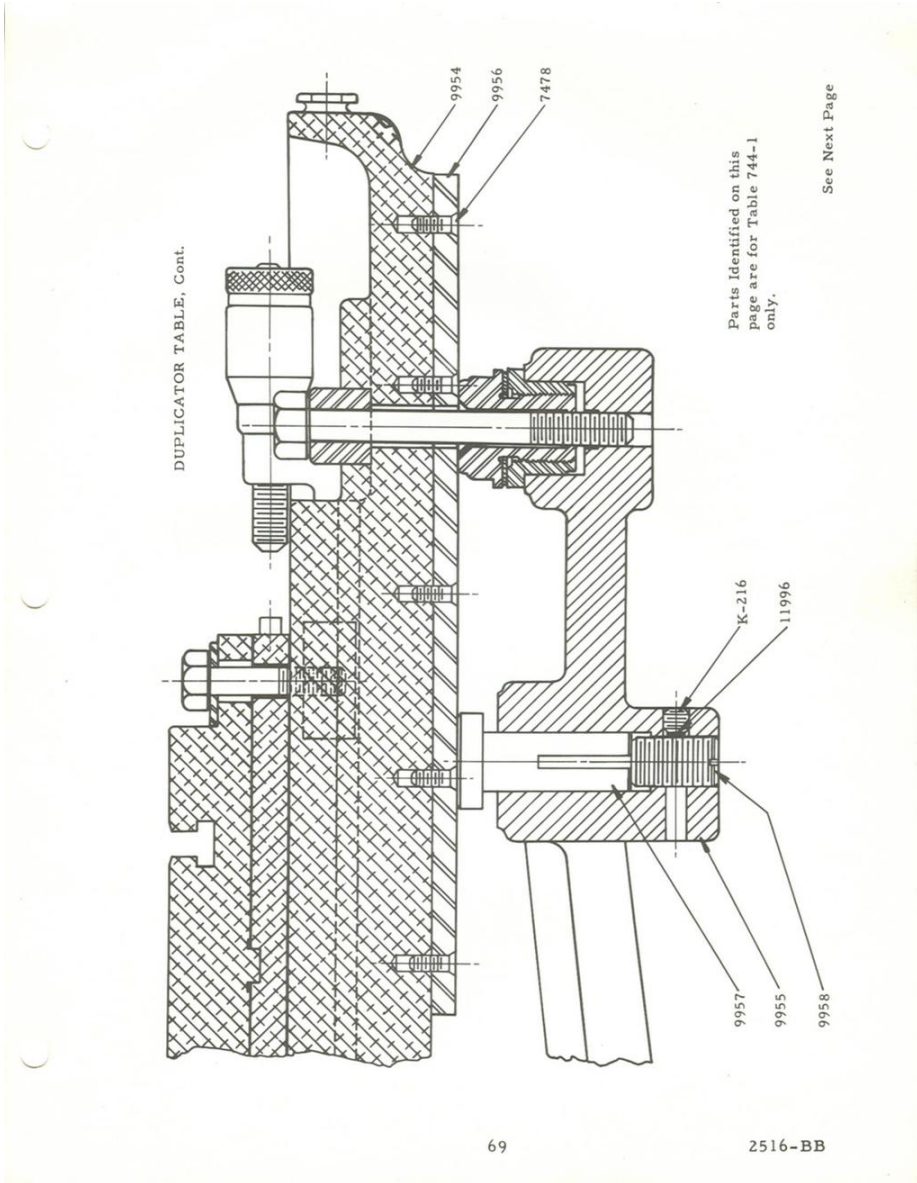
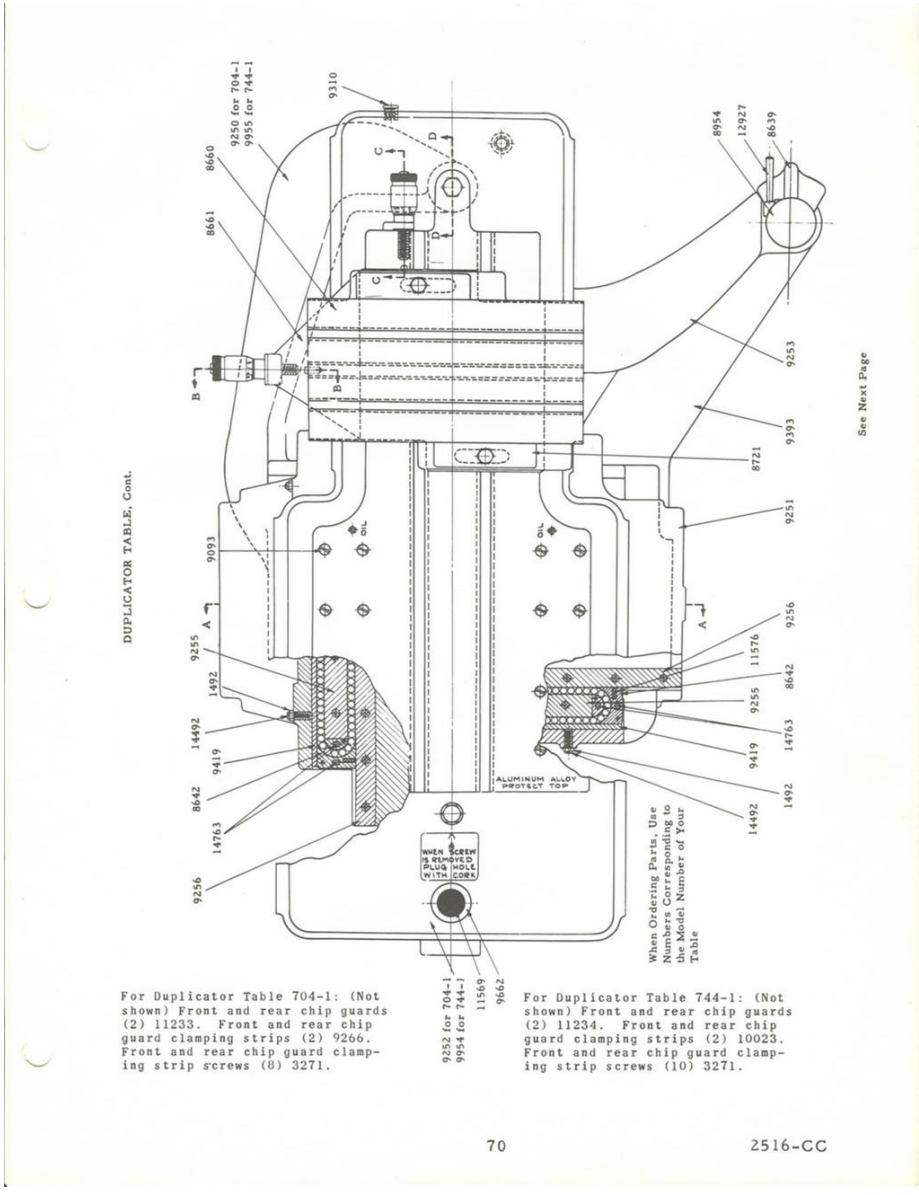
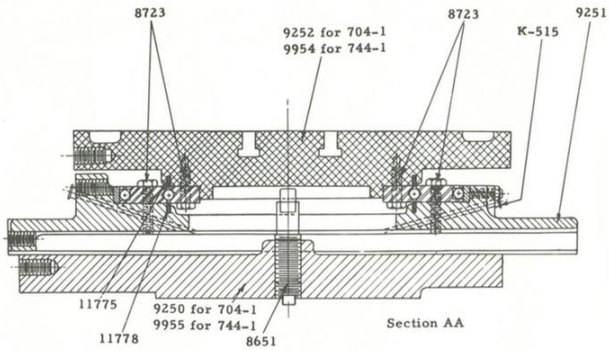

DUPLICATOR TABLE, Cont.
9954
9956
7478
Parts identified on this page are for Table 744-1 only.
See Next Page
K-216
11996
9957
9955
9958
69
2516-BB

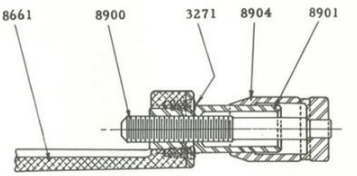
Photo 70


DUPLICATOR TABLE, Cont.
9310
9250 for 704-1
9955 for 744-1
8660
8661
8954
12927
8639
9253
9393
8721
9251
9093
9255
1492
14492
9419
8642
14763
9256
11576
ALUMINUM ALLOY PROTECT TOP
WHEN SCREW IS REMOVED PLUG HOLE WITH CORK
9252 for 704-1
9954 for 744-1
11569
9662
See Next Page
When Ordering Parts, Use Numbers Corresponding to the Model Number of Your Table
For Duplicator Table 704-1: (Not shown) Front and rear chip guards (2) 11233. Front and rear chip guard clamping strips (2) 9266. Front and rear chip guard clamping strip screws (8) 3271.
For Duplicator Table 744-1: (Not shown) Front and rear chip guards (2) 11234. Front and rear chip guard clamping strips (2) 10023. Front and rear chip guard clamping strip screws (10) 3271.
70
2516-CC



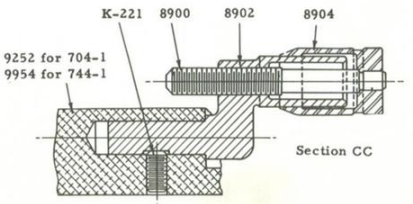
Section AA

DUPLICATOR TABLE, Cont.

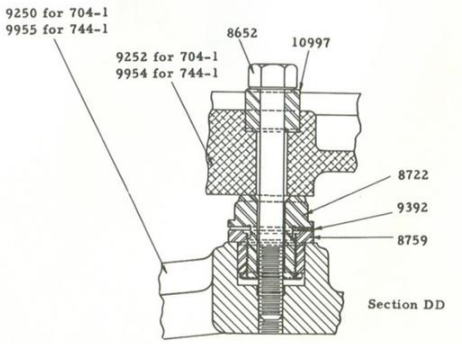


Section BB

When Ordering Parts, Use Numbers Corresponding to the Model Number of your Table



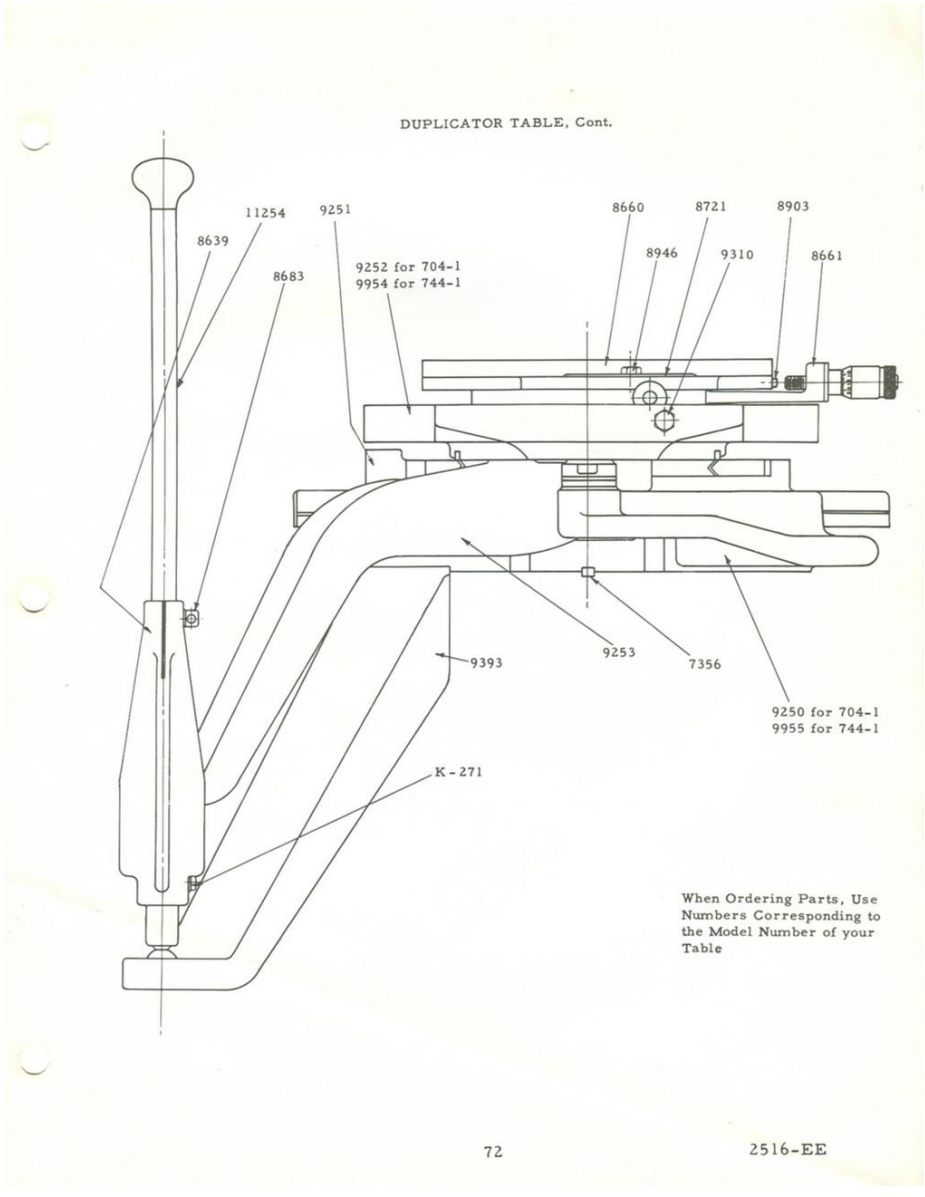
Section CC



Section DD

See Next Page

Photo 72


DUPLICATOR TABLE, Cont.
11254
9251
8639
8683
9252 for 704-1
9954 for 744-1
8660
8721
8903
8946
9310
8661
9393
9253
7356
9250 for 704-1
9955 for 744-1
K-271
When Ordering Parts, Use Numbers Corresponding to the Model Number of your Table
72
2516-EE