Instruction Manual

DELTA®
ROCKWELL

11" METAL CUTTING LATHE

PM-1778

FOREWORD

In compiling these instructions we have placed emphasis on the construction features, maintenance, and operation of the basic machine and accessories. Although some fundamental data is given, it is impossible to cover the entire field of lathe operation in these instructions.

INTRODUCTION

The Delta screw cutting lathe you have just purchased has been manufactured to the same precise, exacting standards of quality that has been built into Delta products in the past. It is a precision-built lathe which incorporates construction features designed for ease of operation and continued accuracy for its entire life. Every Delta lathe is thoroughly tested, inspected and aligned before leaving the factory. Factors affecting the precision of this machine will be the wear of moving parts and the abrasive action of dirt, chips, and grinding dust. Rough handling during transportation can also throw the machine out of alignment. Proper leveling of the cabinet and bed casting is of major importance in maintaining the built-in accuracy of the lathe. Eventually, as the lathe has accumulated hours of usage, whether it be on a production job, in a toolroom or in a school class room, adjustments and realignments will be necessary to maintain the machine's accuracy. The frequency of making the adjustments depends upon the type of work performed by the lathe and the amount of precision required in the work.

We offer you this booklet to help you keep your Delta lathe in perfect working condition for its entire life.

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DELTA® Power Tools
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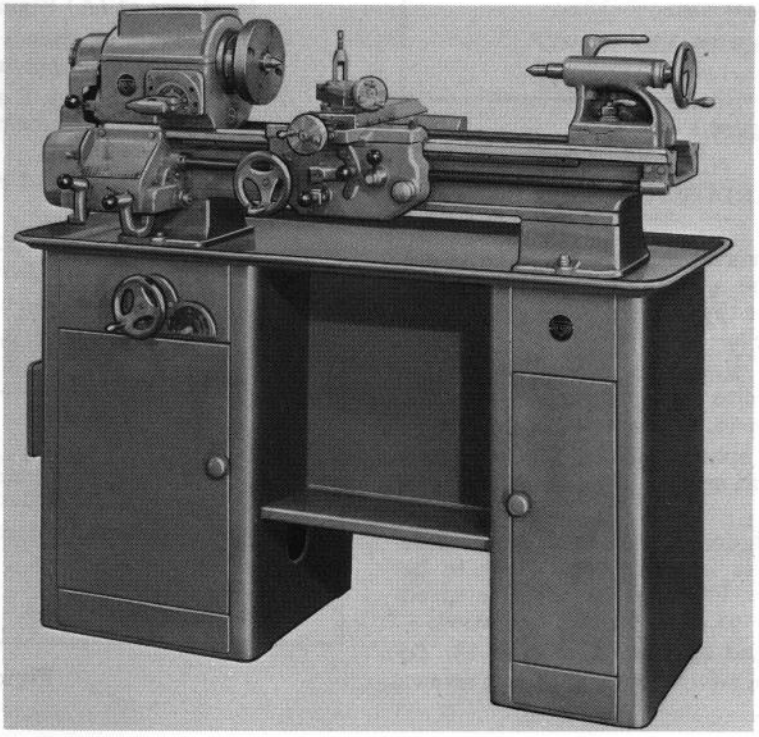
PM-1778

Revised: 3-25-58

25B: Instructions for Metal Cutting Lathe

DELTA METAL CUTTING LATHE



I. Installation

A. SELECTING FLOOR SPACE

It is very important that the lathe be set on a solid foundation. Vibrations transmitted through inadequately constructed floors by adjacent machinery or other sources can influence the accuracy of your lathe. For best results your lathe should be mounted on a concrete floor. A wood floor should be reinforced if required. As a guide, we suggest the anchor bolt plan Figure 1, be used. Lag screws or bolts should be used to secure the lathe to the floor.

B. CLEANING THE LATHE

The ways and all unpainted surfaces have been protected with a coating of rust preventive. This coating should be removed with a soft rag and then the surfaces should be covered with a film of good machine oil.

C. INSTALLING MOTOR

If your lathe was purchased complete with motor, you may disregard these instructions, because the motor has been mounted and motor pulley adjusted, to give correct alignment of the lower variable speed belt.

Before installing your own motor, be sure that the shaft rotation is clockwise when viewed from the pulley end. For easier wiring, the junction box of the motor should be toward the front of the lathe.

1. Place pulley on motor shaft with key in place, but do not tighten set screw.
2. Remove nuts and springs (A) in Figure 13.
3. Set motor on motor plate, install motor mounting bolts, and turn on nuts, finger tight. (A block under the hinged motor plate, will facilitate insertion of four bolts for mounting the motor.)
4. Turn variable speed handwheel (E) Figure 10, counterclockwise until variable speed pulleys (H) Figure 13, are completely lowered.
5. Adjust motor shaft to be parallel with variable speed sheave shaft, outside of motor pulley to be approximately in line with outside of variable speed drive sheave.
6. Secure motor mounting bolts.
7. With a straightedge held on the outside of the variable speed sheave and extending down past the motor pulley, adjust the motor pulley on the motor shaft until the outside of the motor pulley is $\frac{3}{32}''$ from the straightedge. This will give the correct alignment of the lower variable speed drive belt, and the motor pulley set screw may now be tightened down on the key.

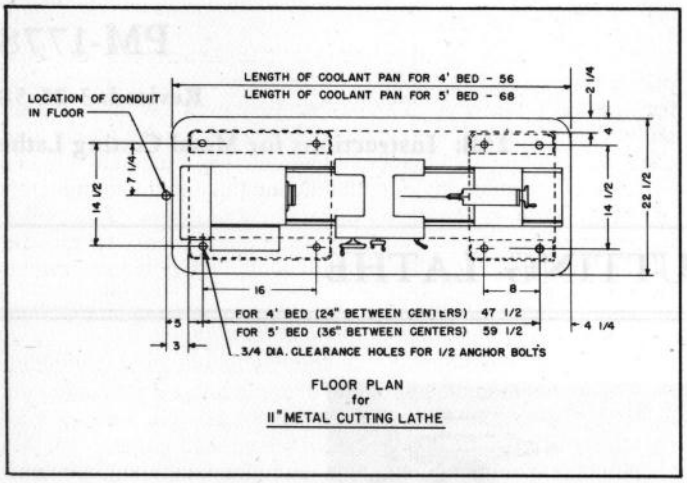


Figure 1

D. INSTALLING VARIABLE SPEED DRIVE BELT

The two No. 25-500 variable speed drive belts are shipped loose and must be assembled in place on the pulleys when installation of the lathe is being made.

To install the variable speed belts:

1. Turn the variable speed drive handwheel (E) Figure 10, and raise the aluminum variable sheaves, (H) Figure 13, to maximum height.
2. Place one variable speed belt (L) Figure 13, on jack shaft pulley and around inner variable speed pulley.
3. Loosen nuts (A) Figure 13, and raise motor base plate to allow lower variable speed belt to be placed over sheaves, lowering the variable speed sheaves sufficiently to assist in this operation.
4. Replace the nuts and springs (A) Figure 13. To obtain final tension, run motor and adjust screws (A).

E. LEVELING THE LATHE

Proper leveling of the lathe is an important factor to consider when setting up the machine. An improperly leveled lathe could exert stresses, causing the lathe to turn and bore tapers by throwing the headstock, bed and ways out of alignment.

Leveling of the lathe is done as follows:

1. Place cabinet on level floor. If rocking occurs, place metal shims between cabinet and floor to eliminate this.
2. Place a level squarely across V-ways at (A) Figure 2.
3. Adjust shims under cabinet at headstock end until bubble on the level is approximately central. Carefully note the exact position of the bubble in relation to graduations on the level.
4. Without turning level end for end, move level to tailstock end of bed and place squarely across V-ways.
5. Adjust shims under cabinet at tailstock end until bubble comes to rest at the same position as when level was at (A) Figure 2.
6. Place level as shown in (B) Figure 2, and shim until bubble is approximately centered.
7. Repeat steps 3, 4, 5 and 6 until level readings at (A), (B) and tailstock Figure 2 are approximately the same.
8. Fasten to floor and recheck steps 3, 4, 5 and 6.

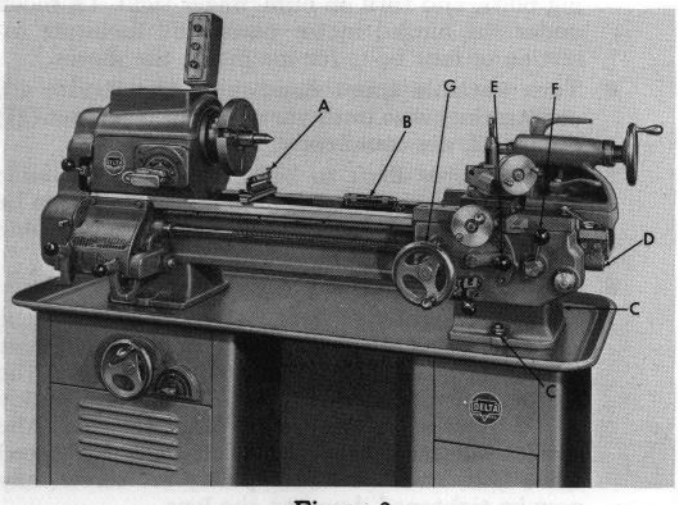


Figure 2

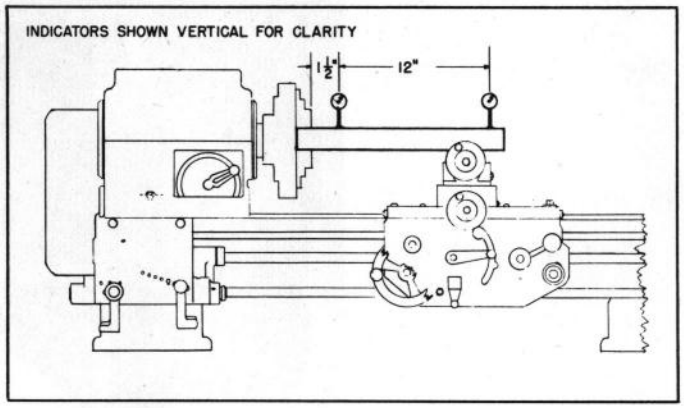


Figure 3

F. ALIGNING BED WAYS PARALLEL TO HEADSTOCK SPINDLE

1. Mount a 4 jaw chuck on the spindle and insert a ground and polished test bar, approximately 1½" to 2" in diameter and about 16" long.
2. True up this test bar by indicating 1½" and 13½" from the chuck, rotating the test bar against an indicator at above spots, see Figure 3. The total indicator reading should not exceed .0005 at either spot.
3. Mount the indicator on the tool post in a horizontal position and move the indicator 12" along the test bar by feeding the carriage. The indicator should not exceed .0005.
4. If adjustment is necessary, it is made by the use of the adjusting screw bushings located at the right hand riser block under tailstock, noting, of course, that you must loosen the bolt, adjust the bushing, then tighten the bolt. Repeat your reading and adjustments until the above tolerance is obtained.

OCCASIONALLY THE LATHE SHOULD BE RECHECKED AND ALIGNMENT ADJUSTMENTS MADE IF NECESSARY. IF, AT ANY TIME, THE LATHE TURNS OR BORES A TAPER, IT IS AN INDICATION THE MACHINE IS NO LONGER IN ALIGNMENT.

G. ELECTRICAL RECOMMENDATIONS

A constant speed, high starting torque, 1 hp, 1725 r.p.m. motor is recommended. The pulley supplied with the lathe is designed to fit a motor shaft $\frac{3}{4}''$ in diameter. These motor pulleys are also available with $\frac{5}{8}''$ and $1''$ bore. The lathe motor mounting plate has been designed to accept motors made in NEMA 203, 204, 224, 182, 184, and Delta $8\frac{1}{2}''$ frames.

Wiring diagrams for Delta switch kits are available from your Delta Dealer.

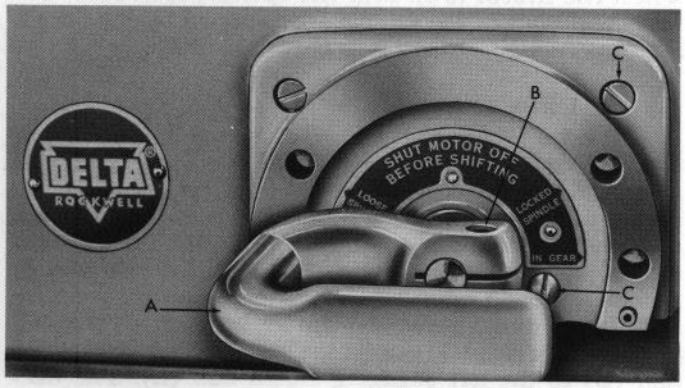


Figure 4

II. Maintenance and Operation

A. LUBRICATION

A lubrication chart is furnished with every lathe. It is attached to the outside of the gear train cover on the left hand side of the headstock.

B. HEADSTOCK

The headstock is the most important unit of the lathe. The headstock, shown in Figure 6, is of high tensile close grained gray iron, one piece construction

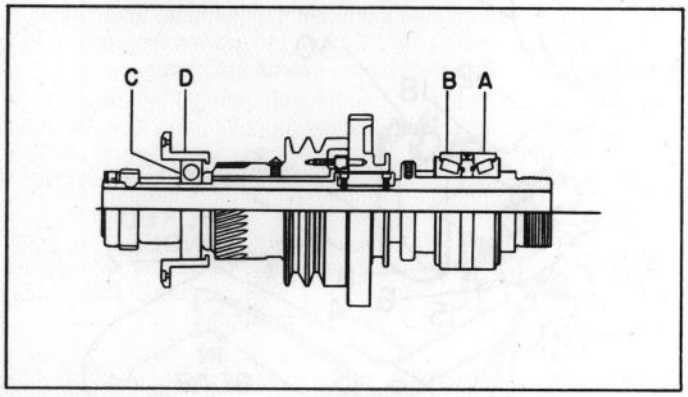


Figure 5

with precision bored bearing seats and accurately machined ways for mounting to the bed.

1. Spindle

The spindle nose is ground after the spindle is assembled into the headstock to assure accuracy. On L-00 tapered, key drive spindle nose models, the internal and external tapers are so ground. On $2\frac{1}{4}$-8 threaded nose models, the internal taper, pilot and face are ground that way.

2. Spindle Bearings

The spindle is mounted in the headstock on two precision preloaded tapered roller bearings and one sealed for life ball bearing. The roller bearings (A and B) as shown in Figure 5, carry the radial and thrust loads and the ball bearing (C) floats in the bearing seat (D) Figure 5, thus compensating for the expansion and contraction of the spindle as it warms up and cools down. The roller bearings are placed close enough together on the spindle so that the amount of expansion and contraction between the bearings is negligible.

3. Adjustment of Spindle Bearings

a. Adjustment of the spindle bearings is not often necessary, but if the spindle should develop end play, or spin too freely, two set screws (A) Figure 6, should be loosened and thrust nut (B) tightened until the end play is removed and the spindle turns with a slight drag. From this point, loosen or back off the thrust nut (B) 10 degrees to provide the proper preload for the bearings. Retighten set screws (A). This

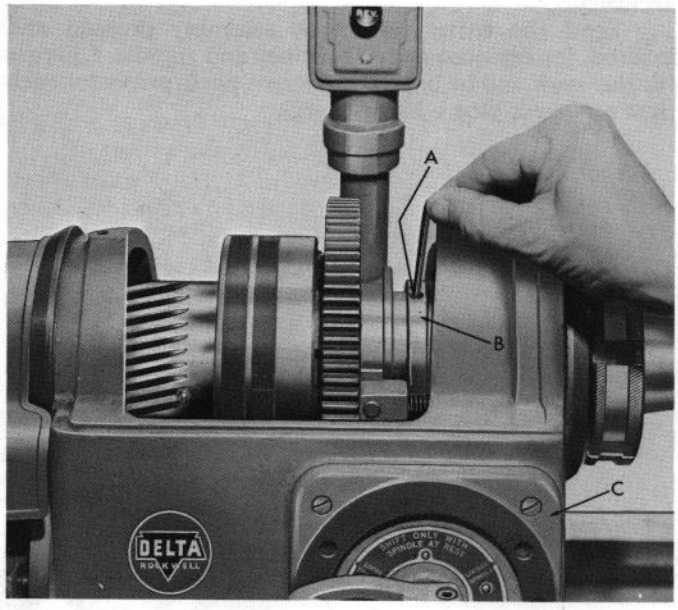


Figure 6

procedure automatically adjusts both roller bearings at the same time. The ball bearing on the outboard end of the spindle requires no adjustment.

b. Should you find the bearings running too "hot," the following procedure should be used to loosen the preload on the roller bearings of the lathe spindle:
Loosen the two set screws (A) Figure 6, and rotate the bearing thrust nut (B) 180 degrees counterclockwise, facing spindle chucking side. With a wooden mallet, strike the chuck end of the spindle, (be sure to protect the threads on the spindle). This impact will move the bearings apart.
Now adjust bearings as described in "a" above.

4. Replacement of Spindle or Tapered Roller Spindle Bearings

If this should ever be necessary we suggest that the entire headstock be returned to the factory where this

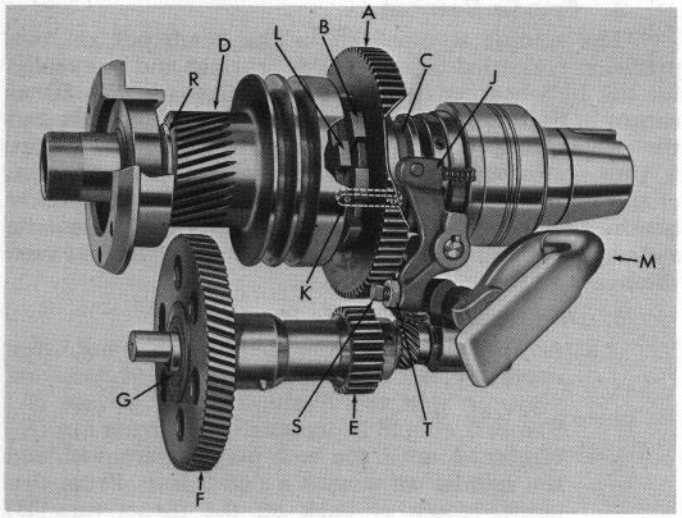


Figure 7

precision work can be performed to restore new machine accuracy.

Send the entire headstock assembly prepaid and insured, for replacement of bearings and spindle. Charges for the work will be based on current parts prices for each part replaced, plus a labor charge.

C. OPERATION OF THE DRIVE SELECTOR

The back gears provide the slow spindle speeds required for heavy cuts and correct surface speeds for large diameter work and threading. The lathe back gearing mechanism is shown in Figure 7. This is totally enclosed in the headstock casting which conserves space and provides maximum safety. Direct drive, loose spindle, locked spindle and back gear drive are obtained by simply shifting lever (A) Figure 4, to the desired position. *Shifting from one position to another must be done only when the motor is off and the spindle is at rest.* The four conditions of the spindle are obtained by the following construction, referring to Figure 7.

1. Direct Drive

The bull gear (A) Figure 7, clutch half (B), and groove ring (C) assembly is mounted on the spindle with a key (K), which restricts the assembly from rotating about the spindle; however, the fit is such that axial movement along the spindle is possible. The integral pulley pinion (D) and clutch half (L) are mounted on precision ground oilite bearings and rotate freely on the spindle. In direct drive the shifter lever arm (J) riding in the groove ring (C) pushes the bull gear, (A) and clutch half (B) to the left engaging clutch half (L). The back gears (E) and (F) mounted on the eccentric shaft (G) remain in the disengaged position.

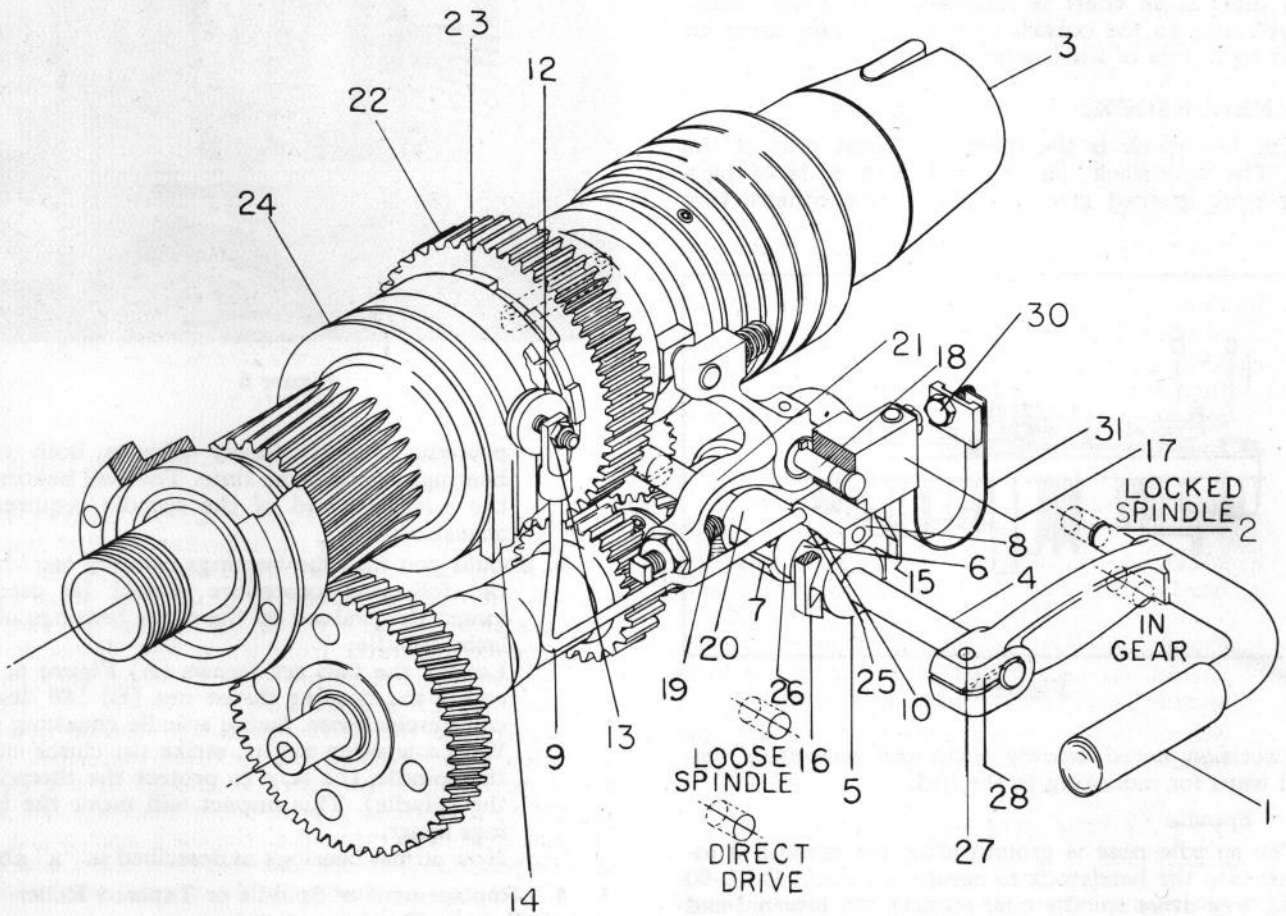


Figure 8

2. Loose Spindle

Loose spindle is in intermediate position where neither the clutch nor back gears are engaged. The spindle is free to turn which facilitates the location of work in chucks, inspection of work or the physical checking of work with indicators or micrometers.

3. Locked Spindle

The spindle is locked when both the clutch and back gears are engaged. In this position, the 6 to 1 reduction ratio of the back gears is directly opposing the direct drive ratio.

4. Back Gear Drive

In back gear, the clutch halves [Figure 7 (B) and (L)] are disengaged and the eccentric shaft (g) is rotated so gear (E) meshes with (A), and (F) meshes with pinion (D). The motion through the gear train is transmitted to the integral pulley and pinion (D) from the variable drive unit, not shown. (D) drives gear (F), (F) drives gear (E), (E) drives gear (A) which is keyed to the spindle by key (K), see Figure 7.

5. CAUTION

The drive selector lever should never be moved while the spindle is turning or the motor is on. The motor should never be started with the lever in locked position. Always check the position of the lever before starting the motor.

6. Adjustment of Back Gears

No adjustment of back gears is necessary, since all the parts are factory fitted and the teeth meshed with proper back lash and the whole assembly dowelled. If, however, the back gears have been disassembled, align the witness marks (A) and (B) Figure 9, to obtain the proper tooth setting when reassembling the back gears.

7. Adjusting Direct Drive Dog Clutch

As previously described, the Delta metal cutting lathe uses a dog clutch instead of a pull pin to engage the direct drive. If, for any reason, this dog clutch will not entirely disengage for loose spindle, or back gear settings, make the following adjustments:

a. Place the lever (A) Figure 4 in a vertical position.
b. Remove two screws, (C) located across bottom of plate Figure 4.
c. Drop lever back into loose spindle position, and then remove lever from shaft by first entirely removing screw (27) and pin (28) of Figure 8.
d. Carefully remove cover (C) Figure 6, after first removing remaining screws, being careful to hold shaft (4) Figure 8, in place so that it will not withdraw along with the cover plate.
e. Make clutch adjustment by turning square head set screw and lock nut (S) and (T) Figure 7.
f. Check clearance by rotating spindle. Spindle should not be engaged by clutch in the loose spindle position mentioned in c above.
g. Secure lock nut and reassemble cover and handle.

D. SAFETY LOCK-OUT FOR DRIVE SELECTOR

It is necessary to have the spindle stationary before moving from one drive condition to another.

In addition to the convenience of the single lever for selecting any drive position, the Delta lathe has a positive foolproof safety lock-out feature which makes damage to the drive impossible, even if a change in drive conditions is attempted with the motor running.

1. Function of Lock-out Feature with Motor Running and Spindle Turning

When the selector handle pin (2) Figure 8, is engaged in the indent for back gear drive, loose spindle or direct drive, it is normally impossible for the operator to pull out of this drive position with the motor running. By a sudden jerk, the lever can sometimes be withdrawn from the locating hole while the motor is running, but no harm can be done, since this action automatically disengages the direct drive dog clutch in the headstock.

The spindle, of course, cannot rotate with the drive selector in the locked position and the motor should not be turned on while in this position because the belts will slip and an excessive load will be thrown on the motor.

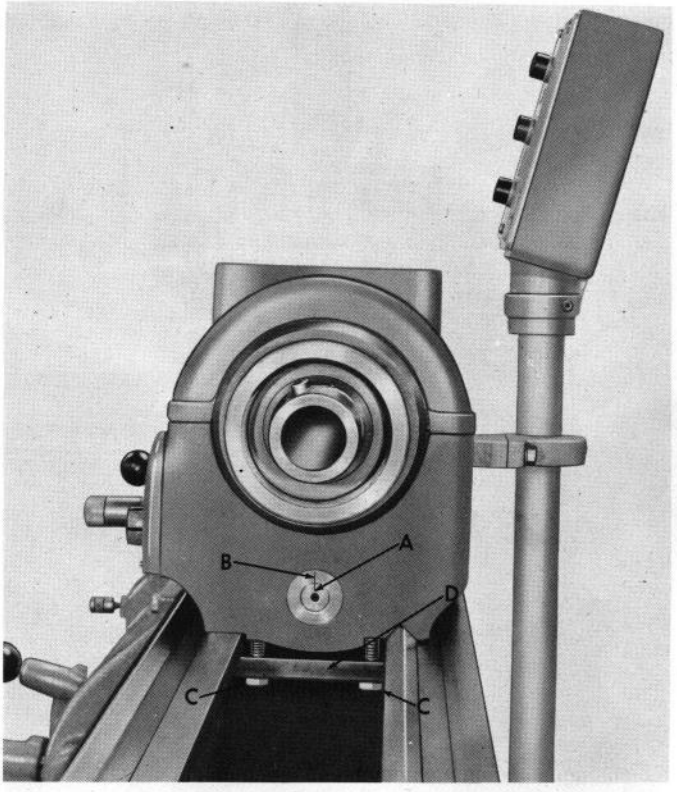


Figure 9

2. Function of Lock-out Feature with the Spindle Stationary and Motor Off

The pin of the drive selector can be disengaged from any position preliminary to selecting another position. If, however, the motor is turned on at this point, after pulling out from one position but before selecting the next position, the safety lock-out feature prevents the inexperienced operator from going into direct drive or lock spindle position by preventing the pin (2) Figure 8, from entering the selected hole.

To restore the drive selector to normal operating condition after reaching the condition described in the above paragraph, the operator should first bring the spindle to a stationary position by shutting the motor off, and then drop into either the back gear or the loose spindle position. The operator can then select whichever drive condition he desires in the normal way with the motor off and spindle stationary.

3. Adjusting the Safety Lock-out for Drive Selector

IMPORTANT ADJUSTMENT, see Figure 8. Brake shoe (12) must be adjusted so that it is not in contact with the belts (14), and not *more* than 1/16" away from the belts, when the motor is turned off and the pin (2) engaged in any one of the four positions.

This adjustment should be visually inspected periodically or checked immediately if it is found that it is possible to disengage drive selector pin from hole, (with the motor running) from the direct drive or back gear position. To adjust, remove headstock cover, loosen nut (13) and turn threaded pad holder (12) in or out to suit mentioned 1/16" dimension. Then tighten nut (13) to lock pad holder (12) in place.

The following adjustment is made at the factory and will rarely or never have to be done by lathe operator. This is the adjustment which causes the stop pawls to be in a "neutral" position. If they are not, the drive selector handle cannot be pulled out of whichever drive

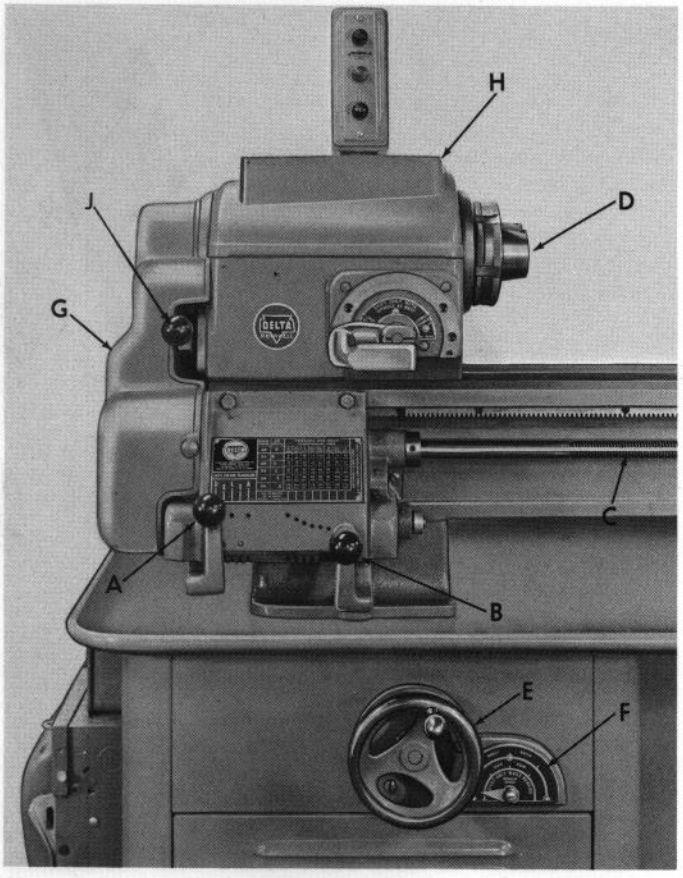


Figure 10

position is being used, even if the spindle is stationary.

If necessary to make the adjustment, leave the drive selector in any one of the four positions and, with the motor turned off, remove handle (1) Figure 8, by entirely removing screw (27), remove pin (28), remove cover plate (C) Figure 6, being careful to hold shaft (4) in place so that it will not withdraw along with the cover plate. Then move the flat spring (31) up or down as the case may be. This is done by loosening the screw (30) which holds one end of the flat spring (31) against the headstock body casting. The two pawls (15) and (16) must be equally spaced on either side of the cam (5).

Reassemble cover and handle.

E. QUICK CHANGE GEAR BOX

48 threads from 4 to 224 per inch can be made by shifting levers (A) and (B) Figure 10, and by changing

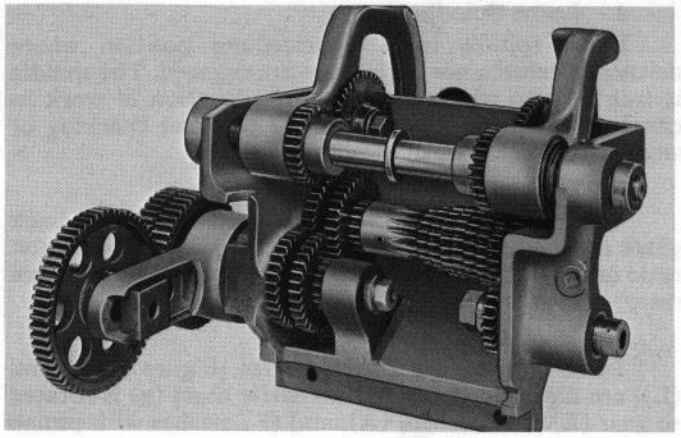


Figure 11

one independent gear on the gear train. Changing from **24 to 48 tooth gear enables** the user to obtain the 8 **coarse threads 4 through 7½.**

The quick change gear box functions as a control which correlates the r.p.m. of the lead screw (C) Figure 10, with the r.p.m. of the spindle (D) for any selected threading operation. It also makes available a wide range of power feeds for the carriage and cross slide. Figure 11 is an interior view of the quick change gear box.

When lever (J) Figure 10, is in upper position, the carriage moves to the right or the compound slide moves "out" (away from the lathe). When the lever is in the lower position the carriage moves to the left or the compound slide moves "in" (toward the lathe), and when the lever is in the center position, it is neutral and the lead screw remains stationary.

CAUTION: LEVERS A, B AND J FIGURE 10, SHOULD BE MOVED ONLY WHEN MOTOR IS TURNED OFF.

1. Shear Pin

If the carriage should accidently be power fed into headstock or tailstock, a shear pin is provided to prevent damage to the lead screw or apron gears.

Should you shear the pin, loosen set screw (A) Figure 12, and push collar (B) Figure 12, to the right exposing shear pin (C). Match the marks on the lead screw (D) Figure 12, with the drive shaft (E) Figure 12. Remove the broken pieces of shear pin, and insert the new shear pin — MCL-511. Move collar (B) back to shoulder of housing and tighten set screw (A) Figure 12.

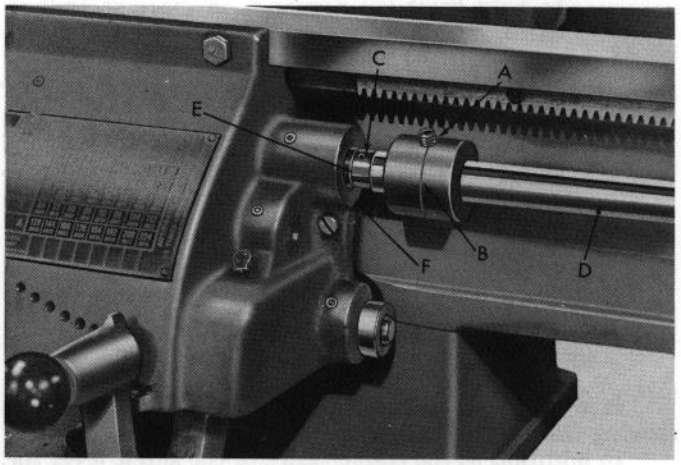


Figure 12

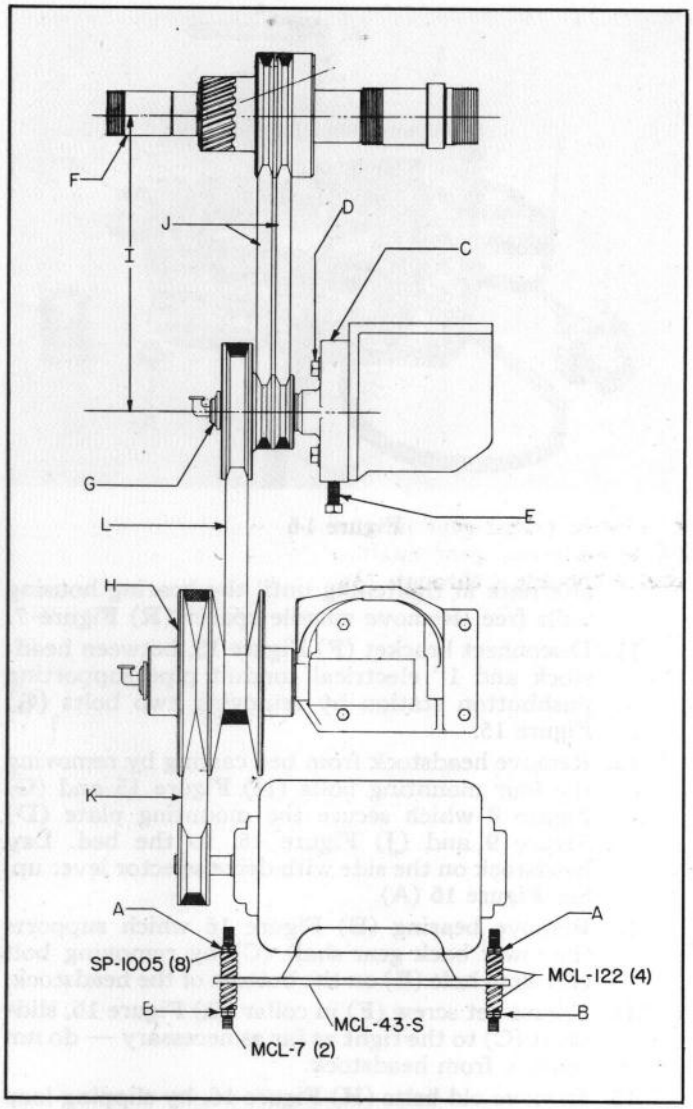


Figure 13

To remove end play from lead screw, place handle (E) Figure 2 in middle notch, move handle (F) Figure 2, down to thread cutting position. Loosen set screw (A) Figure 12, and move collar (B) Figure 12, against boss of casting (F) Figure 12. Turn handwheel (G) Figure 2, clockwise applying light pressure. After clockwise rotation of handwheel (G) Figure 2 has stopped, tighten set screw (A) Figure 12, keeping collar against the end of the casting boss (F) Figure 12.

F. VARIABLE SPEED DRIVE

The infinite number of speed ranges between 45 and 1550 spindle r.p.m. obtainable by the use of the variable speed drive makes it one of the most versatile means of power transmission available. The lower portion of the speed range is accomplished by the 6:1 reduction through the back gears (E) and (F) Figure 7. The spindle speeds in back gear are 45 to 240 r.p.m. **CAUTION:** CHANGING OF SPEEDS ON THE VARIABLE DRIVE IS ACCOMPLISHED BY ROTATING HANDWHEEL (E) FIGURE 10, ONLY WHEN MOTOR IS ON AND THE VARIABLE DRIVE SHEAVES ARE IN MOTION.

The aluminum variable drive sheaves are mounted on two precision bronze bearings. The sheave assembly is confined on the pulley shaft and the lateral movement for proper belt alignment is accomplished by a cam whose positive action maintains this condition for any setting on the speed indicator dial (F) Figure 10. This construction feature eliminates oscillation of the variable drive sheaves on the shaft, a common fault of free floating type sheaves found in most variable drives of this type, this, in turn, reduces the amount of vibration, noise, and bearing wear.

1. Tightening Spindle Belts

If the upper spindle drive belts require adjustment the jackshaft mounting bracket (C) Figure 13, must be shifted up or down. Loosen nuts (A) on the motor mounting plate so the variable drive belts (K) and (L) have considerable play. Loosen the mounting bolts (D) on the jackshaft bracket (C) approximately one-half turn. Tension adjusting screw (E) is provided to regulate the center distance (I) between shafts (F) and (G), this in turn governs the tension in the spindle drive V-belts (J) operating between the upper jackshaft (G) and the spindle (F). Make adjustment with screw (E) and retighten mounting bolts (D). Follow procedure ID4 to tighten the variable drive belts.

2. Changing Spindle V-Belts

The V-belts (J) Figure 13, are of the highest quality and are engineered to give maximum life. They are oil and heat resistant and their resilient characteristics are such that a minimum amount of stretch is experienced under continuous load.

To change the V-belts, the following steps should be taken:

1. Set drive selector lever (A) Figure 4, to direct drive position.
2. To remove variable drive belts, unscrew nuts (A) Figure 13, raise motor and remove lower belt (K).

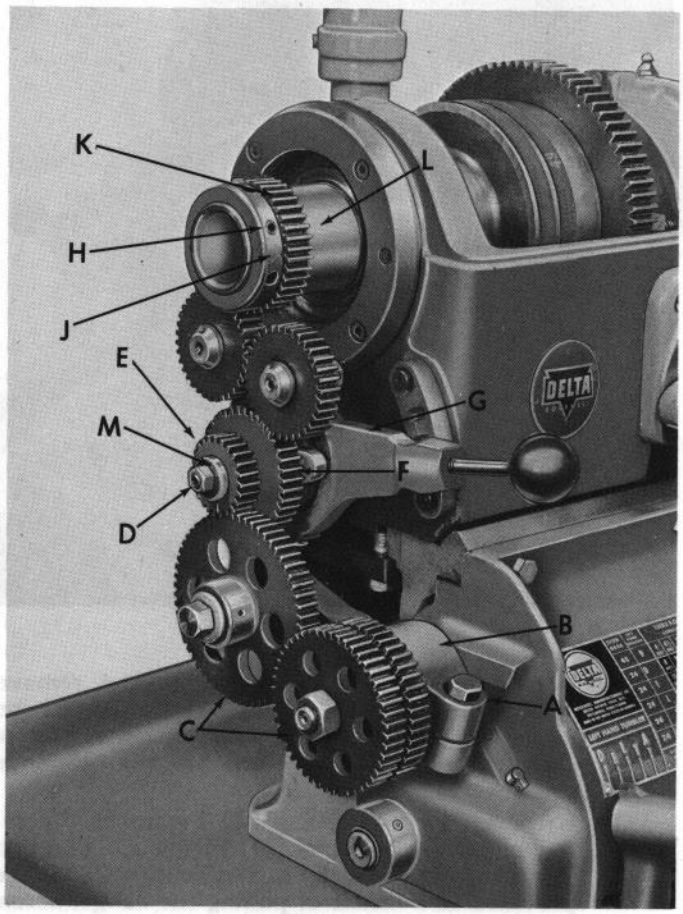


Figure 14

Turn variable speed drive handwheel (E) Figure 10, and raise the aluminum variable drive sheaves (H) Figure 13, remove upper variable drive belt (L) Figure 13.

3. Crank aluminum sheaves (H) Figure 13, to low position.
4. Remove upper jackshaft by loosening bolts (D) Figure 13 several turns — DO NOT REMOVE. Remove tensioning screw (E). Lift bracket (C) to complete up position to permit removal of bracket by pulling toward front of cabinet passing the clamp bolts (D) through the rearward slots provided in the casting.
5. Remove bracket and pulley assembly (C) from belts (J) Figure 13.
6. Remove gear cover (G) Figure 10, and headstock cover (H) Figure 10.
7. Loosen bolt (A) Figure 14, of the gear train (C). This allows intermediate gear bracket (B) to be rotated counterclockwise disengaging the gear train.
8. Remove nut (D) Figure 14, washer (M), compound gears (E), and (F), reversing gear bracket (G). Remove shoulder bushing (A) Figure 15, by removing 3 screws (B) Figure 15.

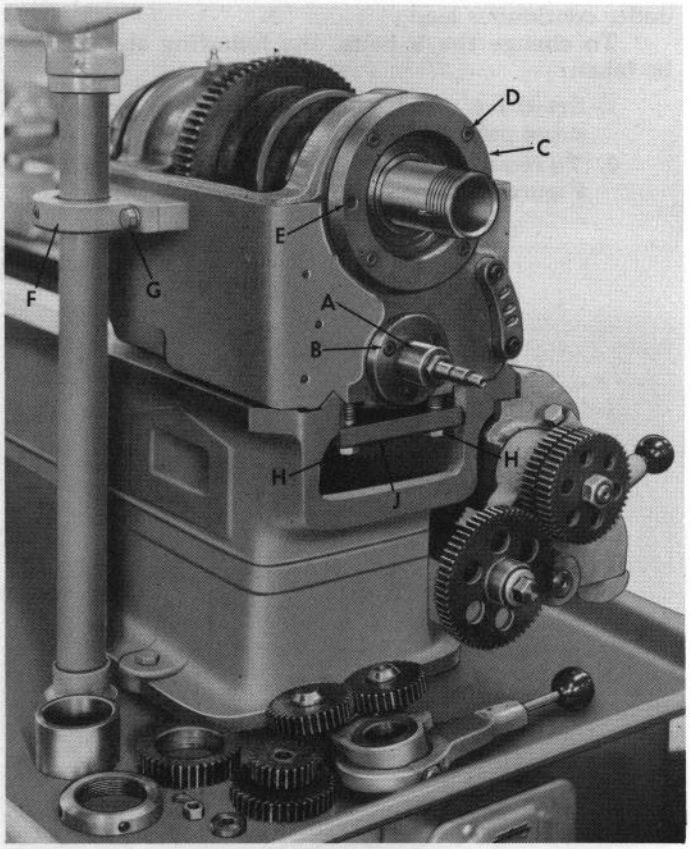


Figure 15

9. Loosen set screw (H) Figure 14 and remove spindle nut (J). CAUTION: Care should be taken not to lose the brass plug below set screw (H). Remove gear (K) and its key. Remove spacer (L) Figure 14.
10. Remove bearing housing (C) Figure 15, by removing four set screws (D) Figure 15. The two $\frac{3}{8}$-16 tapped holes (E) in the housing flange are provided as a means of pulling the flange. Screw two $\frac{3}{8}$-16 x 2″ bolts in these tapped holes and alternate in tightening until the bearing housing pulls free. Remove spindle spacer (R) Figure 7.

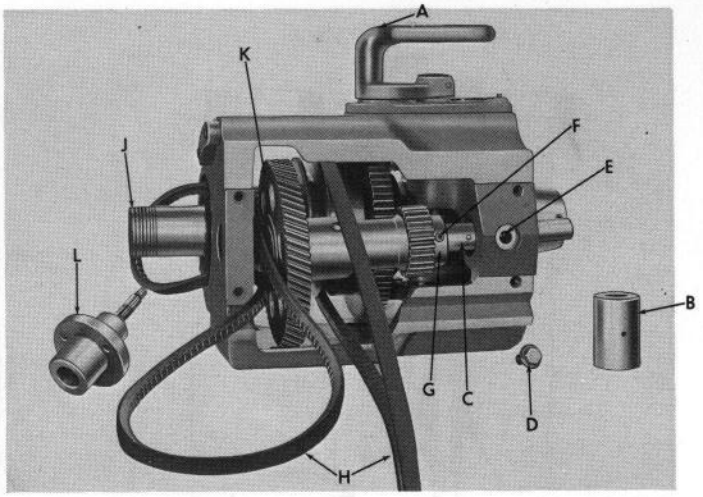


Figure 16

11. Disconnect bracket (F) Figure 15, between headstock and 1″ electrical conduit pipe supporting pushbutton station by removing two bolts (G) Figure 15.
12. Remove headstock from bed casting by removing the four mounting bolts (H) Figure 15 and (C) Figure 9 which secure the mounting plate (D) Figure 9 and (J) Figure 15, to the bed. Lay headstock on the side with drive selector lever up. See Figure 16 (A).
13. Remove bearing (B) Figure 16 which supports the lower back gear shaft (C) by removing bolt (D) from hole (E) on the bottom of the headstock.
14. Loosen set screw (F) in collar (G) Figure 16, slide shaft (C) to the right as far as necessary — do not remove from headstock.
15. Remove old belts (H) Figure 16, by slipping loop through outboard spindle bearing hole past the end of the spindle (J) and back through hole and down past back gears (K).
16. Reverse procedure to assemble new matched V-belt, our Cat. No. 25-502 around spindle pulleys.
17. To reassemble, fasten shoulder bushing (L) Figure 16 to headstock.
18. Put selector lever (A) Figure 16, into direct drive position.

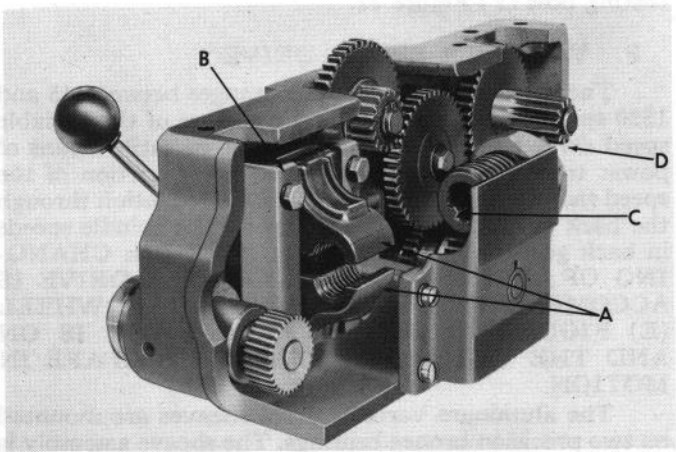


Figure 17

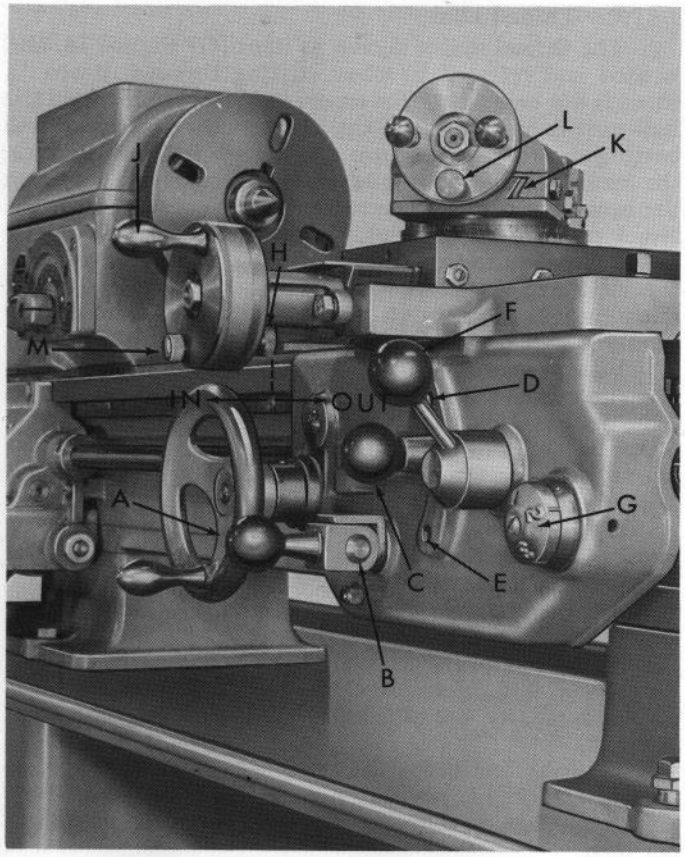


Figure 18

19. Push shaft (C) Figure 16, into shoulder bushing (L).
20. Replace bearing (B) and bolt (D) Figure 16. Care must be taken to see that witness mark is pointing toward the spindle nose.
21. Check to see if witness mark on shaft (A) Figure 9 and bearing (B) Figure 9, coincide — if not, remove bolt (D) and bearing (B) Figure 16, and repeat steps 19 and 20 rotating the shaft until the helix gears mesh in the correct position so that the witness marks coincide.
22. When witness marks coincide insert and fasten bearing (B) Figure 16, with bolt (D) Figure 16. Move back gears to left side and back up with collar (G) and tighten (F) Figure 16.
23. Replace spindle spacer (R) Figure 7 with chamfered side toward bearing race.
24. Insert extended loose ends of belts (H) Figure 16, through bed and chip pan opening while placing headstock on bed ways.
25. Reach through cabinet door and pull belts down.
26. Assemble mounting plate (D) and bolt (C) Figure 9 and plate (J) and bolt (H) Figure 15. End of head casting should be approximately flush with end of ways of bed, before tightening above screws.
27. Remove two bolts in hole (E) Figure 15 and assemble bearing housing and bearing (C) over spindle and enter into headstock bore. Carefully start the bearing housing into the head casting and approximately line up holes (D) with tapped holes in headstock. Since this is a light press fit, it will be necessary to use a rubber mallet around the flange, driving the housing flange tight against the headstock. To line up the bolt holes for bolts (D) Figure 15, insert $\frac{3}{8}$-16 machine screw into hole (E). Hold a piece of hard wood against the side of the machine screw and pound on this wooden block to rotate the housing to desired location. Assemble four screws (D) Figure 15 and remove above mentioned $\frac{3}{8}$" machine screw.
28. The bearing in the housing is a light press fit on the lathe spindle. Move this bearing into place. One method is to thread the bearing nut (J) Figure 14, against this bearing using the spacer and gear (L) and (K) as spacers to force bearing into place. Then remove spanner nut and gear.
29. Assemble key and gear (K) Figure 14, spanner nut (J) and replace brass plug and set screw (H). Tighten nut on spindle as tight as possible and lock with set screw (H). Note: bearing will not bind since it "floats" on outer race — see description B2, page 3 and Figure 5.
30. Finish assembling the balance of the gear train, switch bracket (F) Figure 15, gear train cover, and headstock cover.
31. Assemble variable drive in reverse order to the above instructions.

G. CARRIAGE

The lathe carriage includes the apron, saddle, cross slide, compound rest and tool post. The importance of the carriage cannot be over-emphasized for it is the unit which supports and controls the motion of the tool.

1. Apron

The apron is of double-wall construction for increased strength and rigidity and has an oil sump which supplies oil to lubricate the gears, half-nuts and lead screw. Figure 17 is a view of the interior of the apron showing the half-nuts (A) half-nut shoes (B) which are slidably mounted into the apron wall, the keyed lead screw worm (C) and the gearing (D).

To make repairs to the apron it is advisable to remove the carriage from the bed. First, remove the tailstock, then unbolt the right hand bearing support bracket cap screws which hold the apron to the saddle and which are located on the top of the saddle. Loosen these three cap screws enough so that the apron will drop about a half or three-quarters of an inch. Move the carriage to the right and off the lathe bed. When reassembling the apron, be sure to engage the key in the worm gear (C) Figure 17, into the keyway in the lead screw and move the carriage onto the bed. When retightening the three cap

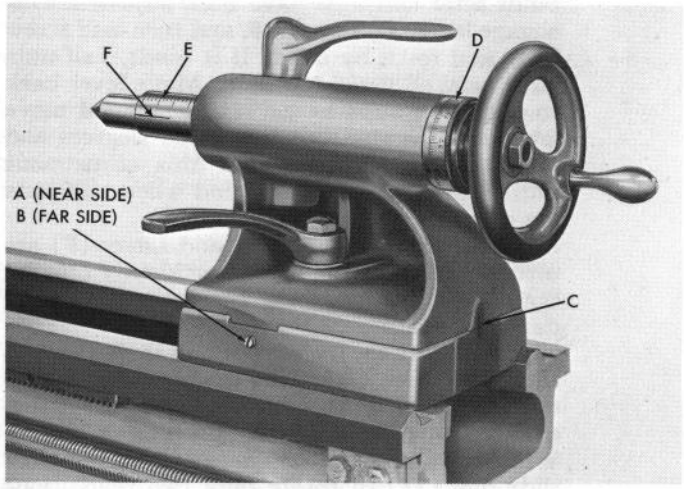


Figure 19

screws move the apron handwheel back and forth to allow the lead screw and pinion in apron to mesh.

a. Adjusting Clutch

Clutch (A) Figure 18, controls both longitudinal motion of the carriage and the feeding of the cross slide. It may be adjusted by loosening set screw (B) Figure 18, and rotating handle (A) clockwise full turns, not half turns, until proper tensioning is secured, retighten set screw (B). If, however, this adjustment is too tight and one full turn counterclockwise proves to be too loose, a half turn is necessary. This means that the angle type stop must be rotated so as to have the stop part on top for proper operation of the clutch control knob. To do this, loosen set screw (B) and rotate handle (A) and angle stop together until disengaged from clutch shaft (not shown). Do not lose the relative position of the stop to the control knob when disengaged, but carefully rotate the stop ½ turn and reassemble to clutch shaft and adjust as above mentioned.

Shifter lever (C) Figure 18, is moved upward to lock in hole (D) to feed the carriage and is moved downward to lock in hole (E) to traverse the cross slide. The center position, as shown in the picture is the neutral position, used when the half-nuts are to be engaged for threading.

Lever (F) Figure 18, is moved downward to close half-nuts (A) Figure 17. This lever is used when making threads.

b. Adjusting Half-Nuts

The hub of handle lever (F) Figure 18, has a hidden stop built in it. This stop has two functions: it limits the travel of the lever as well as holding the lever at either of its two extreme positions. The half-nuts can be adjusted for wear by closing them in further on the threads of the lead screw. To adjust: first, close the half-nuts by turning lever (F) in clockwise direction as far as it will go. Loosen set screws in the hub of the lever, allowing hub to turn freely on shaft.

CAUTION: To retain the stop parts of the hub in their proper place, always keep the hub against the apron. With the half-nuts closed, move lever (F) counterclockwise a few degrees and retighten the set screws. Move lever to close half-nuts and check lead screw to see if it binds after half-nuts have been adjusted. Disengage lever (B) Figure 10, and turn lead screw back and forth by hand. If it binds, half-nuts have been adjusted too tight. Move lever back to open half-nuts, loosen set screws and move lever in clockwise direction a few degrees and retighten set screws. Make this adjustment until lead screw does not bind when half-nuts are closed.

Shifter lever (C) Figure 18 and Lever (F) are interlocked so as to prevent accidently moving both levers into working position and causing damage to lathe.

The shifter knob, for the built-in thread stop is shown by item (H). This built-in thread stop operates when in the "in" position and is disengaged when in the "out" position as shown. While the stop is in the "in" position the cross slide dial (J) can rotate only two revolutions in either direction.

2. Thread Dial

The thread dial is shown as item (G) Figure 18, and is used and referred to when cutting threads. When ¼ threads are being cut, (for example 5¾ threads) drop the half-nuts in on any one of the four numbers of the thread cutting dial. However, you must drop the half-nuts on the lead screw, for subsequent passes across the stock, on the same number you started with. If you start with the No. 1 position on the dial, you must keep dropping the half-nuts when the thread cutting dial indicates the No. 1 position. If you start with No. 2, you must use No. 2 position, etc. As stated above, any one of the four numbers can be used when starting to cut ¼ threads.

When cutting ½ threads (for example 4½ threads), you can start on any one of the four numbers. After you have once started, you must make subsequent passes by dropping the half-nuts on either the same number you started with or the number opposite it on the dial. For example, if you start with No. 1, subsequent passes can be made by dropping the half-nuts in either the No. 1 or No. 3 position, and if No. 2 is used, half-nuts can be dropped in the No. 2 or 4 position. If you start with No. 4, the No. 4 and No. 2 position can be used, etc.

If the thread being cut is an odd number per inch, that is 5, 7, 9, 11, etc., you can start with any number on the dial and on subsequent passes, you can drop the half-nuts on any one of the four numbers, that is 1, 2, 3, and 4.

If the thread being cut is an even number per inch, that is 4, 6, 8, 10, etc. you can start with any numbers on the dial, same as when cutting odd number of threads per inch.

If the number of threads being cut is 8, or any multiple of 8, that is, 8, 16, 24, 32, 40, 48, 56, etc., it is not necessary to read the thread cutting dial. Just drop the half-nuts on the lead screw anytime, which also applies to subsequent passes that might be made.

This does not mean that the thread cutting dial cannot be used when cutting these threads, the dial can be used if the operator so desires.

3. Saddle

The cross slide on the saddle is gibbed to provide for adjustments. The cross feed screw is power fed as described above. A large diameter micrometer collar is provided for ease of reading and operation. This direct reading micrometer collar is graduated in increments of .001" each, which means that if the diameter of a part is to be made .001" smaller, turning the collar one increment, or .001" will give the proper diameter, although the tool would be advanced only .0005". For threading operations, it is convenient to have a threading stop to regulate the distance the cross slide can be moved from the work at the end of the threading operation and to the

Pitch or Threads per Inch	Example	Position for Subsequent Passes
¼ Pitch	5¾ Threads per inch	Same position only
½ Pitch	4½, 5½, 6½, 11½	Opposite positions only — 2 Positions
Odd Pitch	5, 7, 9, 11, 13, 23	Any of 4 Positions
Even Pitch	4, 6, 8, 10, 12, 14, 16, etc. through 224	Any of 4 Positions
Pitches in Multiples of 8	8, 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, 96, etc.	Drop in any position, Thread cutting dial need not be used.

work at the beginning of the next cut. The built-in stop (H) Figure 18, is provided for this purpose.

4. Compound Slide

The compound feed slide is gibbed, (K) Figure 18, and should be adjusted periodically to maintain a precision fit on the dovetail ways. The base of the compound is graduated in 180 degrees and can be rotated to any position in the horizontal plane. The compound slide is so constructed that when in the maximum forward position on its swivel base, the tool post does not overhang. This gives the tool holder maximum support for all positions for the compound. The compound slide also has a large direct reading micrometer collar, which is graduated in increments of .002″, which means that if the diameter of the part is to be made .002″ smaller, turning the collar one increment, or .002″, will give the proper diameter, although the tool would be advanced only .001″. (Please note that if the compound is other than 90 degrees to axis of work piece, the amount removed from the diameter is the product of the sine of the angle).

The three witness marks on the compound adjacent to the micrometer collar are to be used as a vernier. By using the vernier, the operator can read .001″ increments on the dial, or in other words, read the half way between the markings on the dial. If the operator desires to reduce the diameter .041″, he loosens knob (L) Figure 18, a half turn, rotates calibrated sleeve until zero mark lines up with the center witness mark, then tightens the knob (L). Then turn the handwheel on the compound clockwise slowly until the figure .040″ is opposite the center witness mark and continue to move clockwise one-half space. The witness mark on the *left* will now line up the .044″ marking on the dial, see sketch "A" below.

The center witness mark of the vernier, is now lined up half way between the .040″ and .042″ mark on the dial, or that is, set at .041″.

For increasing the diameter, say .041″ repeat the above directions for zeroing in the calibrated sleeve, then subtract .041″ from the .200″ total dial reading. This leaves .159″, or a dial reading of 159 if desired. Now turn the handle counterclockwise until the .160″ figure is opposite the center witness mark and continue one-half space, using the witness mark on the right to line up the .156″ marking on the dial. The center witness mark of the vernier is now lined up half way between the .158″ and .160″ mark on the dial, or that is, set at .159″, see sketch "B" below.

H. TAILSTOCK

The tailstock as illustrated in Figure 19 has been ruggedly designed and the ram accurately machined with a No. 3 M.T. hole for centers or other tools. To assure proper alignment when mounted to the bed, the tailstock and the tailstock base are assembled prior to machining the ways. The tailstock can be set over ¾″ either direction for turning tapers. By adjusting set screws (A) and (B) Figure 19, the proper amount of taper per foot can be obtained. The spacing of the witness marks (C) on the rear of the tailstock indicate the amount of setover. CAUTION: *For straight turning the witness marks must coincide.*

A collar (D) graduated in thousands of an inch indicates the amount of feed on the ram. It is located adjacent to the handwheel and is a large micrometer collar for ease in reading. The ram has graduations in 1/16″ for further convenience (E) Figure 19.

The witness mark (F) Figure 19, on the ram of the tailstock is on the centerline. This mark helps the operator to position the cutting tool at the proper height, and is especially helpful when cutting threads or using a cut-off tool.

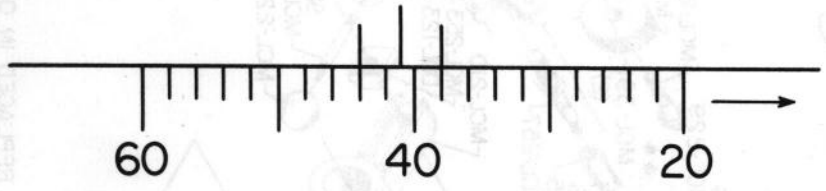
J. LATHE BED

To provide the proper foundation for the lathe it is necessary for the bed to be properly designed. Sufficient section thickness for rigidity, the elimination of warpage, and adequate bed width to support the headstock, carriage and tailstock are of major importance. The bed is of high tensile alloy cast iron, heat treated prior to machining for stress relief. The prismatic "V" ways and flat ways are precision ground to assure perfect alignment of the headstock, carriage, and tailstock.

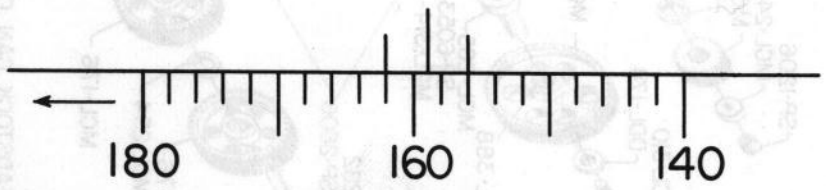
To maintain the accuracy of the lathe, certain precautions must be exercised — do not use the lathe bed as an anvil — place a board across the ways and below the spindle in the headstock, so that the ways will not be damaged in case chucks or other tools are dropped when mounting to or removing from the spindle — always keep the ways well oiled and free from dirt.

1. Cabinet

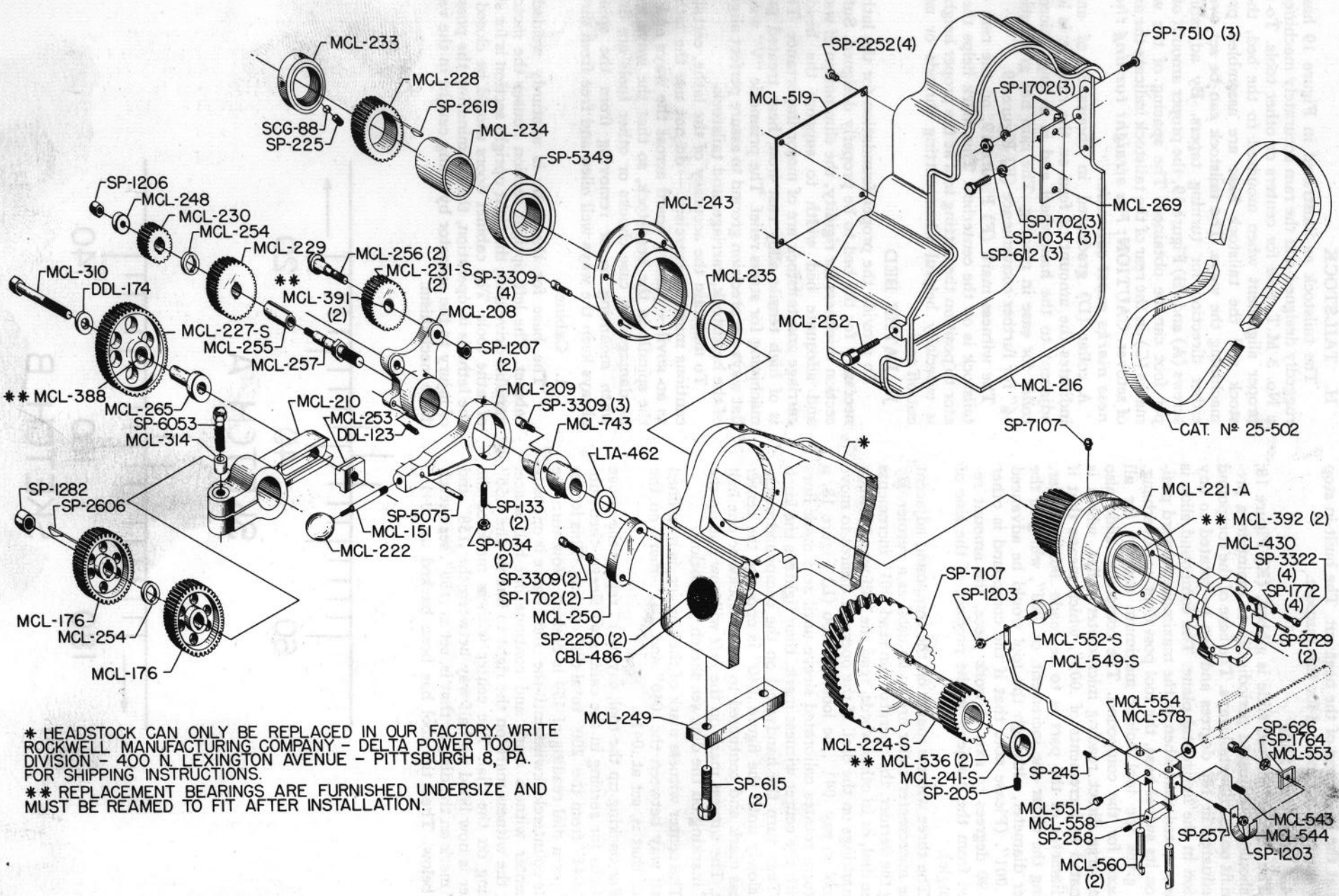
The base for the lathe is a sturdy welded steel cabinet. The left upright section houses the motor and variable drive unit, the right upright section is for storage of lathe tools. The cabinet doors should be closed when the lathe is in operation, thus eliminating the possibility of injury to the operator by being caught in the variable drive mechanism.



SKETCH A

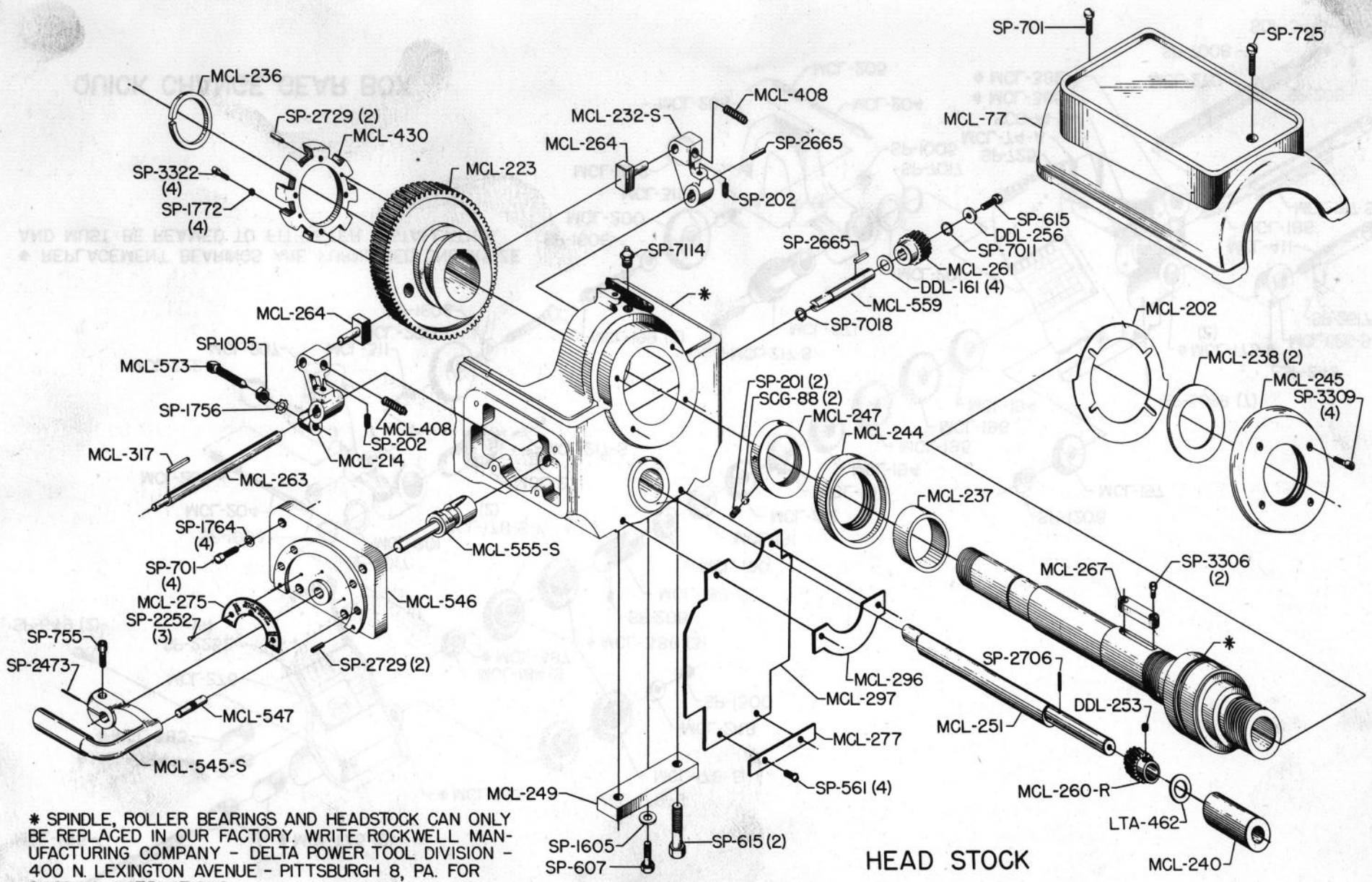


SKETCH B



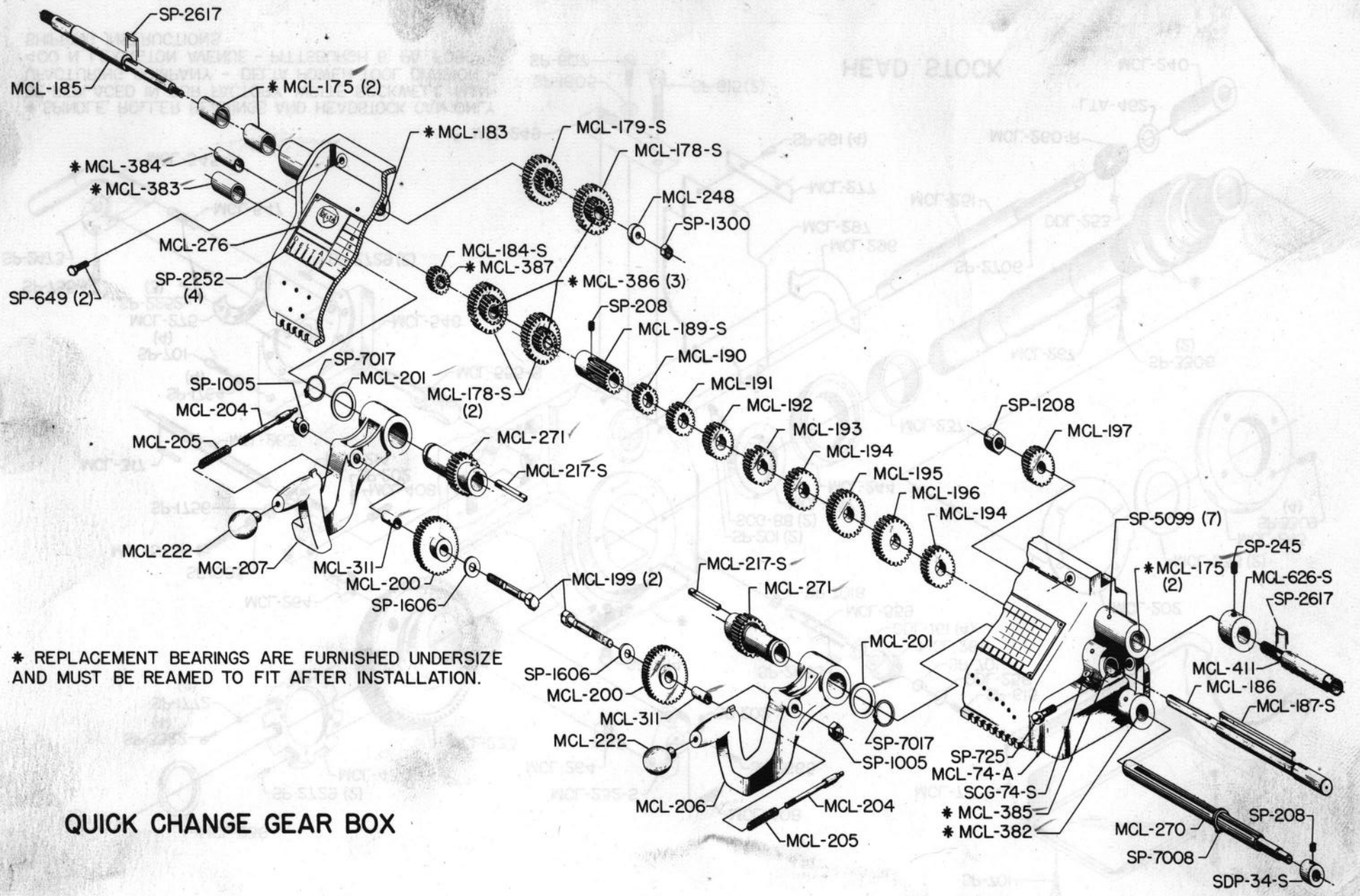
* HEADSTOCK CAN ONLY BE REPLACED IN OUR FACTORY. WRITE ROCKWELL MANUFACTURING COMPANY - DELTA POWER TOOL DIVISION - 400 N. LEXINGTON AVENUE - PITTSBURGH 8, PA. FOR SHIPPING INSTRUCTIONS.

** REPLACEMENT BEARINGS ARE FURNISHED UNDERSIZE AND MUST BE REAMED TO FIT AFTER INSTALLATION.



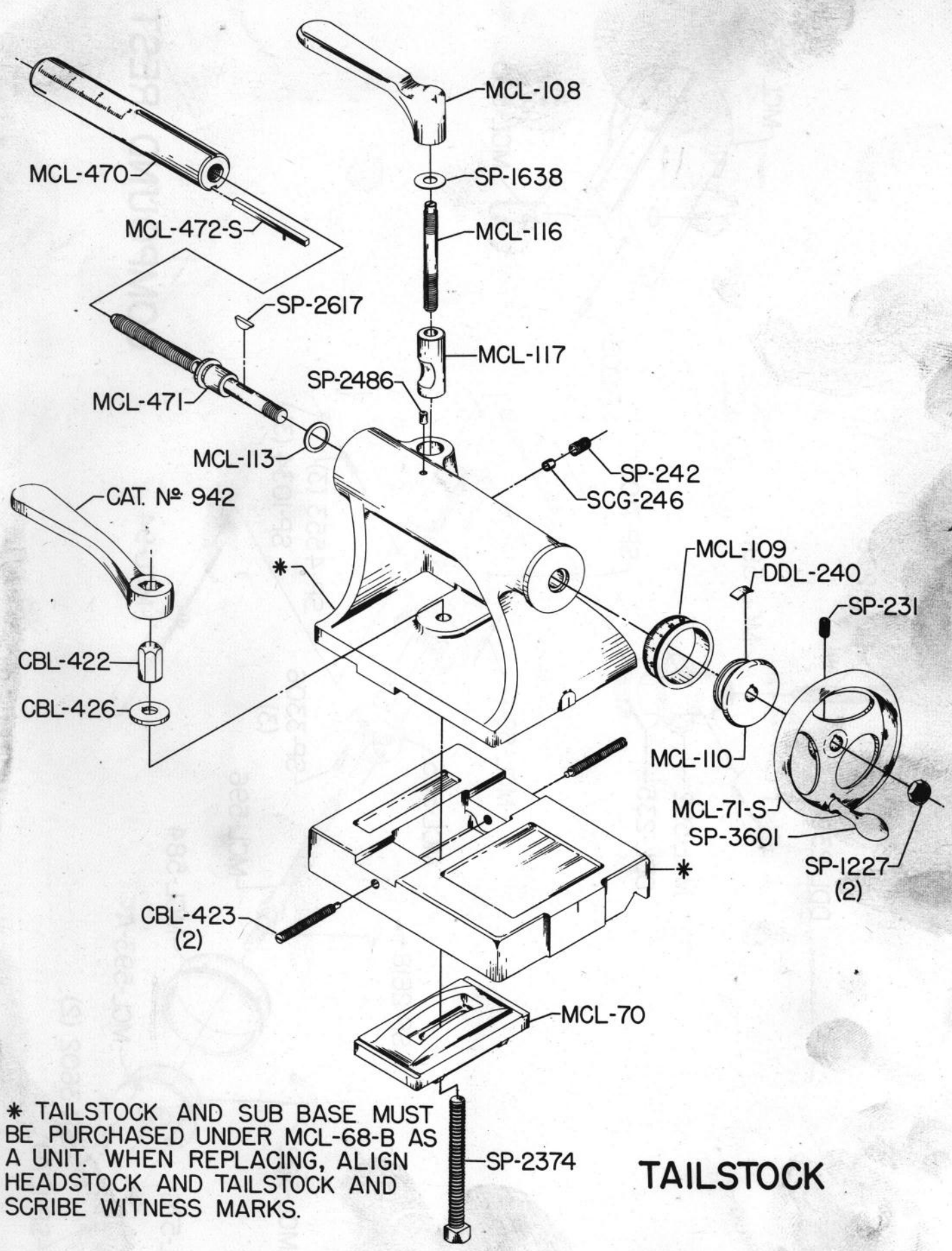
HEAD STOCK

* SPINDLE, ROLLER BEARINGS AND HEADSTOCK CAN ONLY BE REPLACED IN OUR FACTORY. WRITE ROCKWELL MANUFACTURING COMPANY - DELTA POWER TOOL DIVISION - 400 N. LEXINGTON AVENUE - PITTSBURGH 8, PA. FOR SHIPPING INSTRUCTIONS.



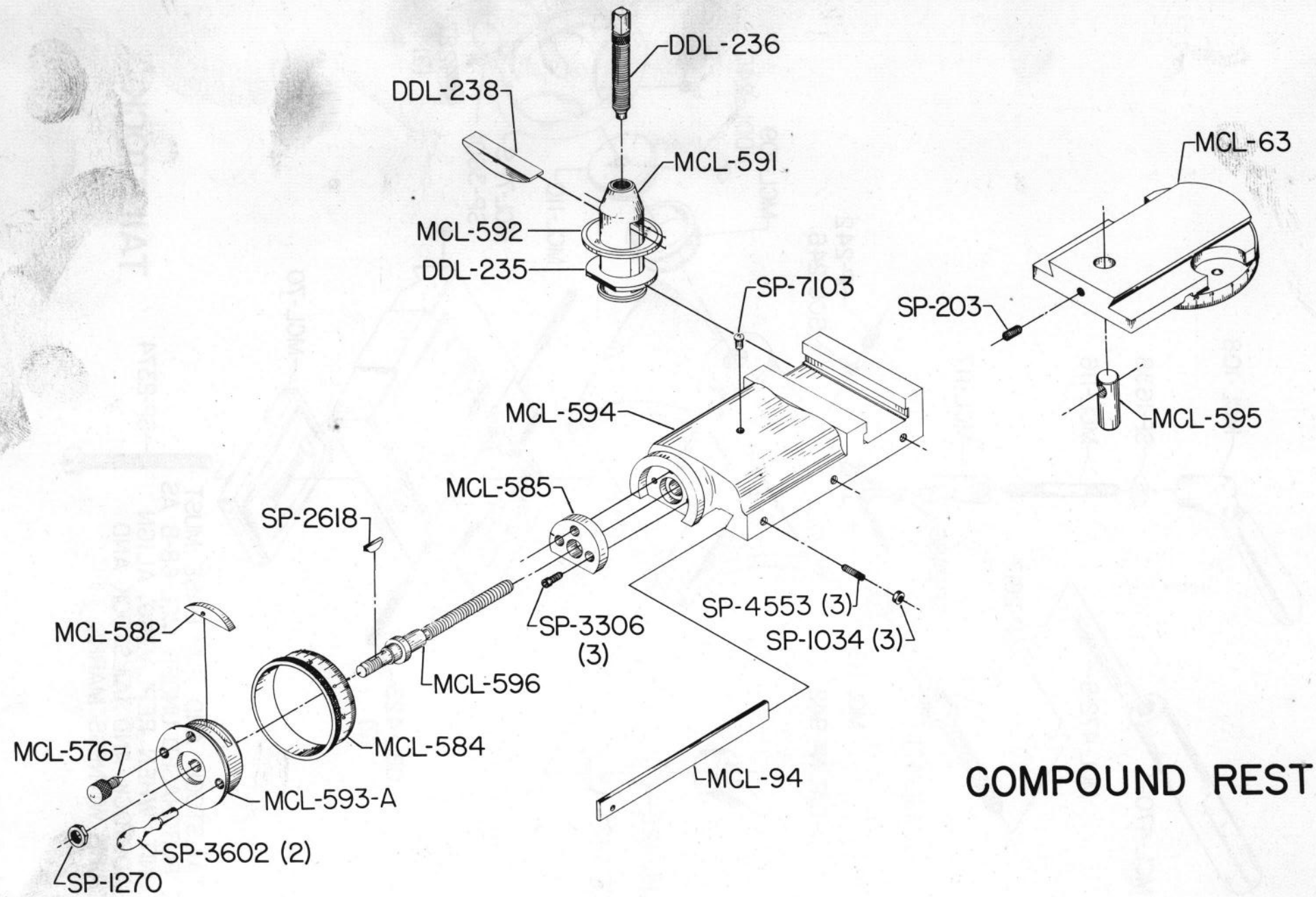
* REPLACEMENT BEARINGS ARE FURNISHED UNDERSIZE AND MUST BE REAMED TO FIT AFTER INSTALLATION.

QUICK CHANGE GEAR BOX

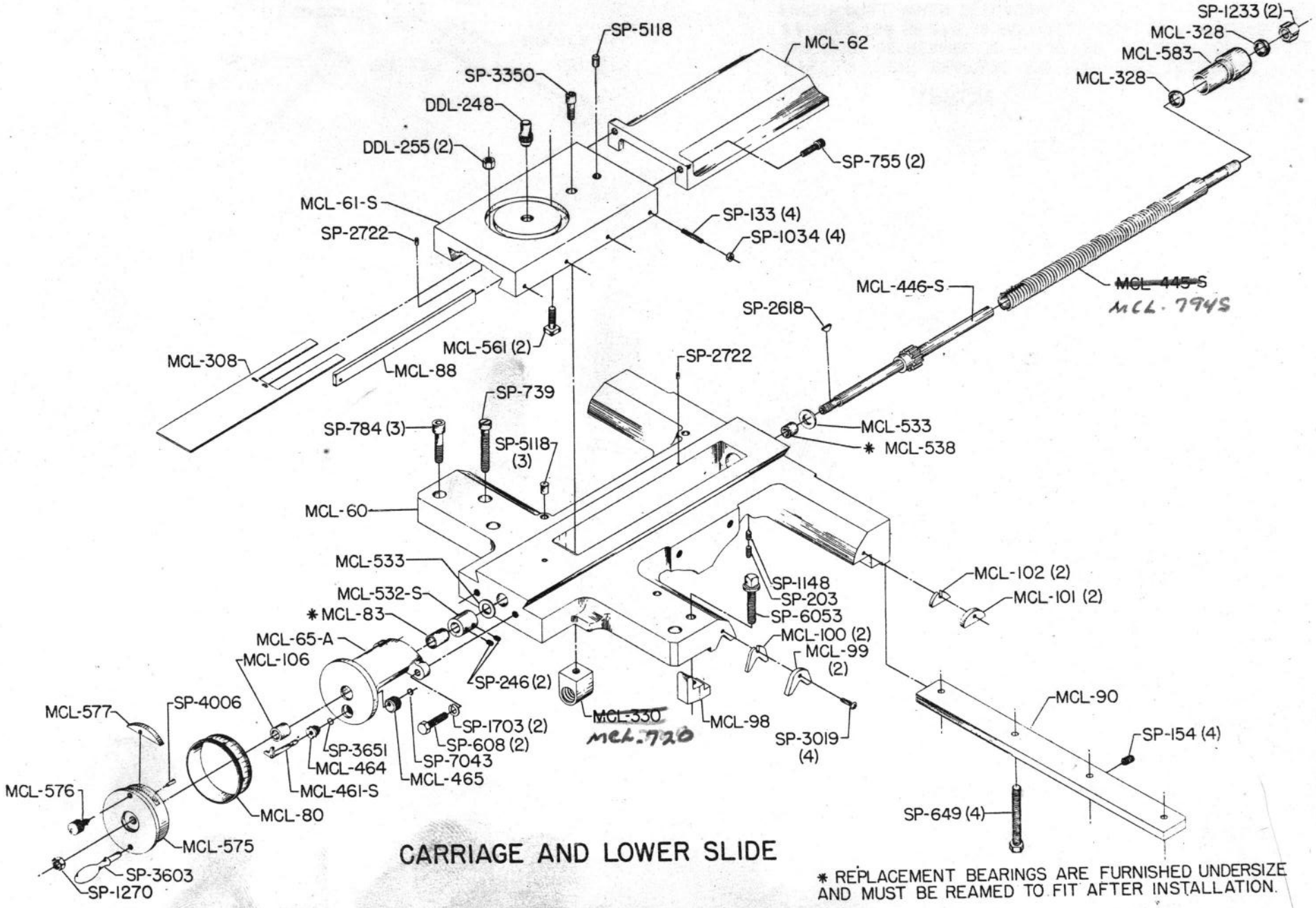


* TAILSTOCK AND SUB BASE MUST BE PURCHASED UNDER MCL-68-B AS A UNIT. WHEN REPLACING, ALIGN HEADSTOCK AND TAILSTOCK AND SCRIBE WITNESS MARKS.

TAILSTOCK

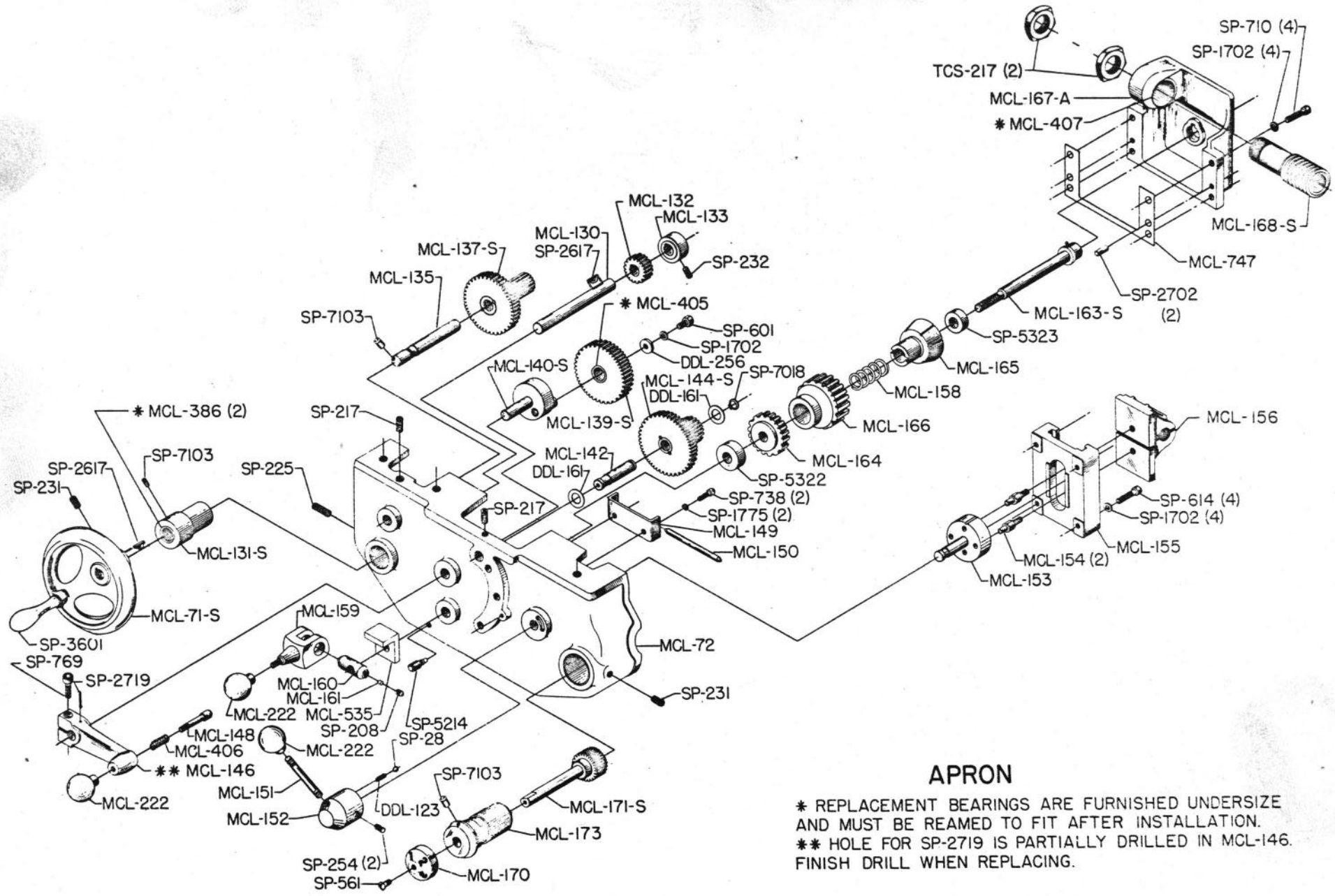


COMPOUND REST



CARRIAGE AND LOWER SLIDE

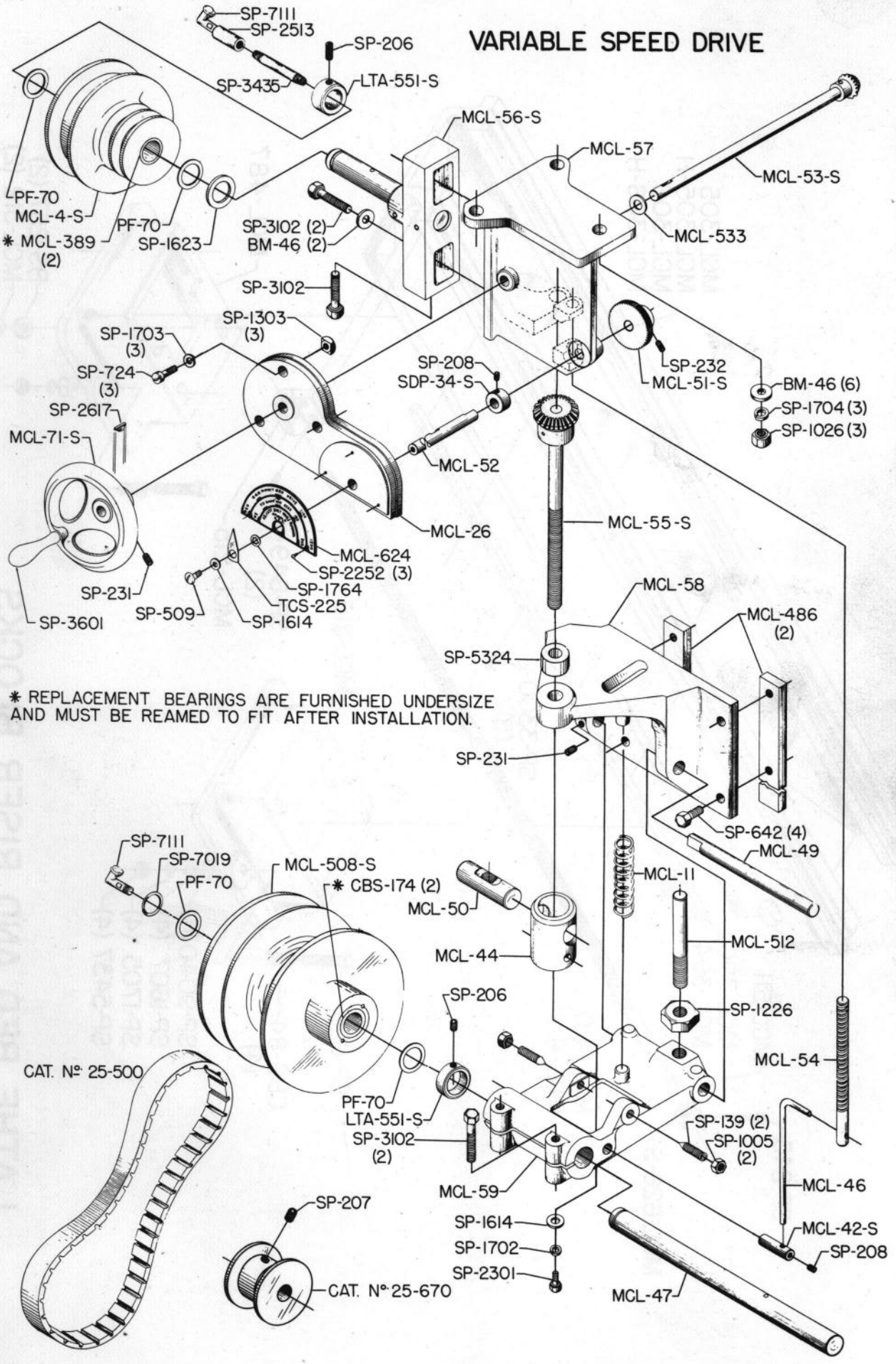
* REPLACEMENT BEARINGS ARE FURNISHED UNDERSIZE AND MUST BE REAMED TO FIT AFTER INSTALLATION.

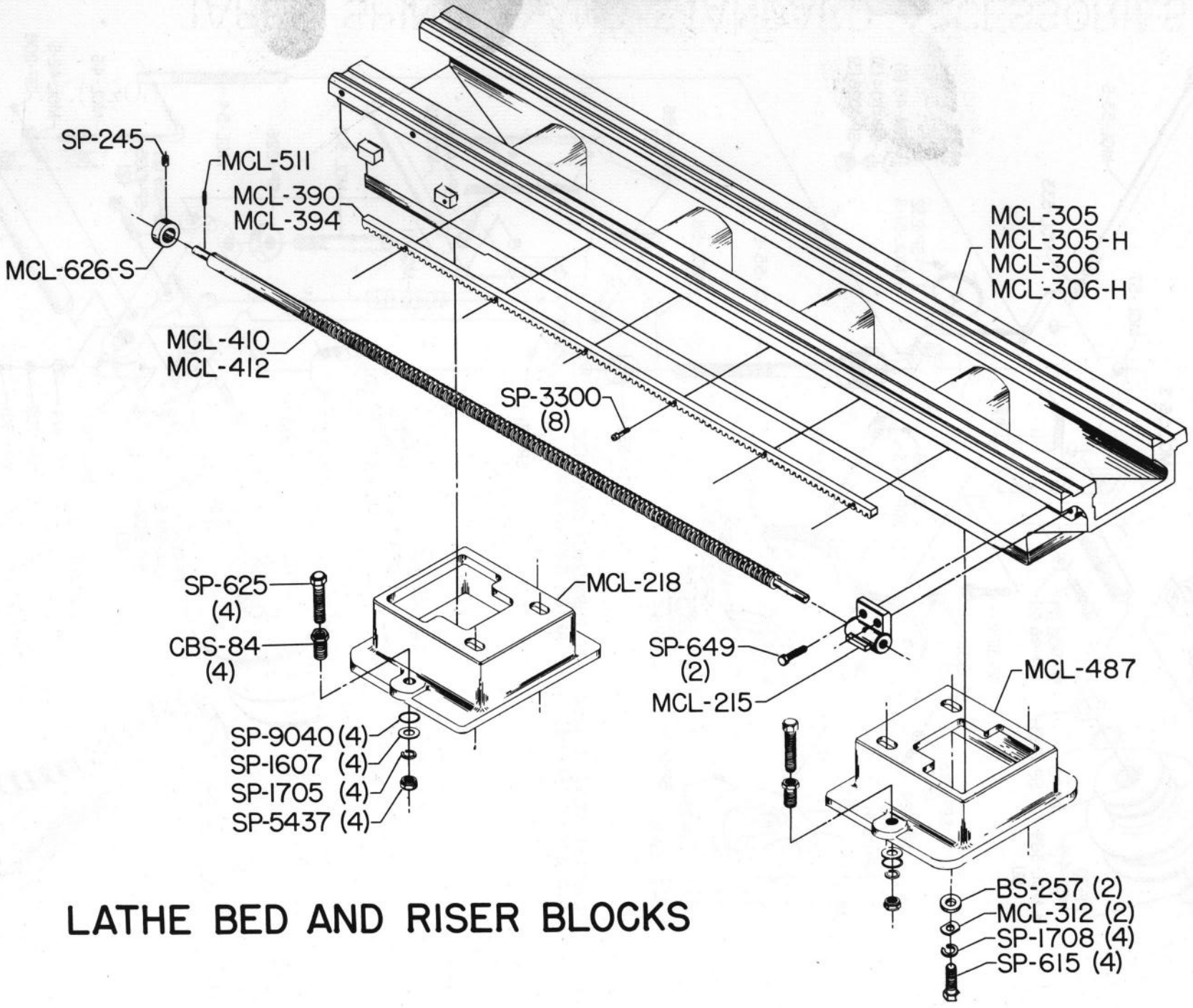


APRON

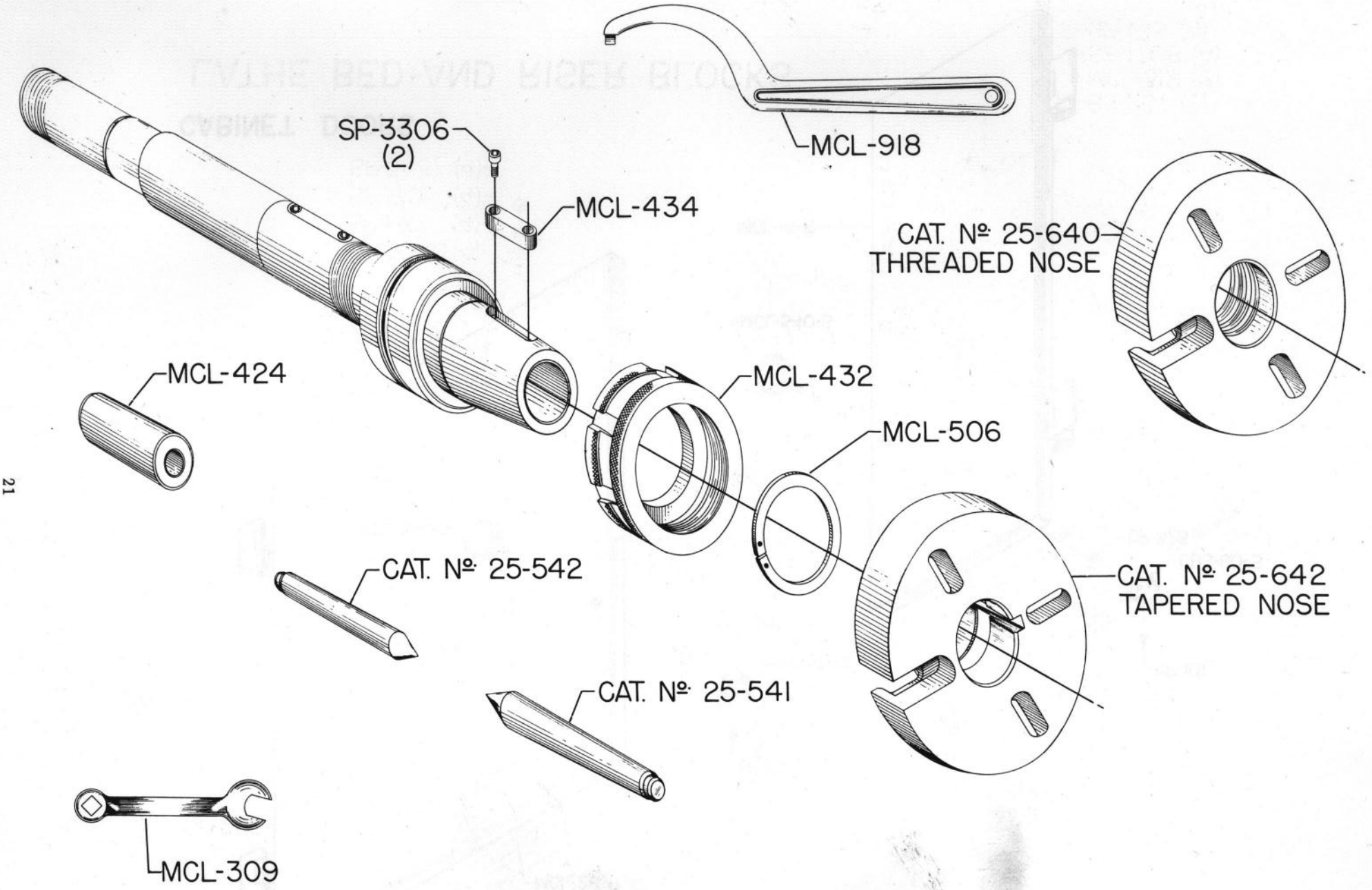
* REPLACEMENT BEARINGS ARE FURNISHED UNDERSIZE AND MUST BE REAMED TO FIT AFTER INSTALLATION.
** HOLE FOR SP-2719 IS PARTIALLY DRILLED IN MCL-146. FINISH DRILL WHEN REPLACING.

VARIABLE SPEED DRIVE

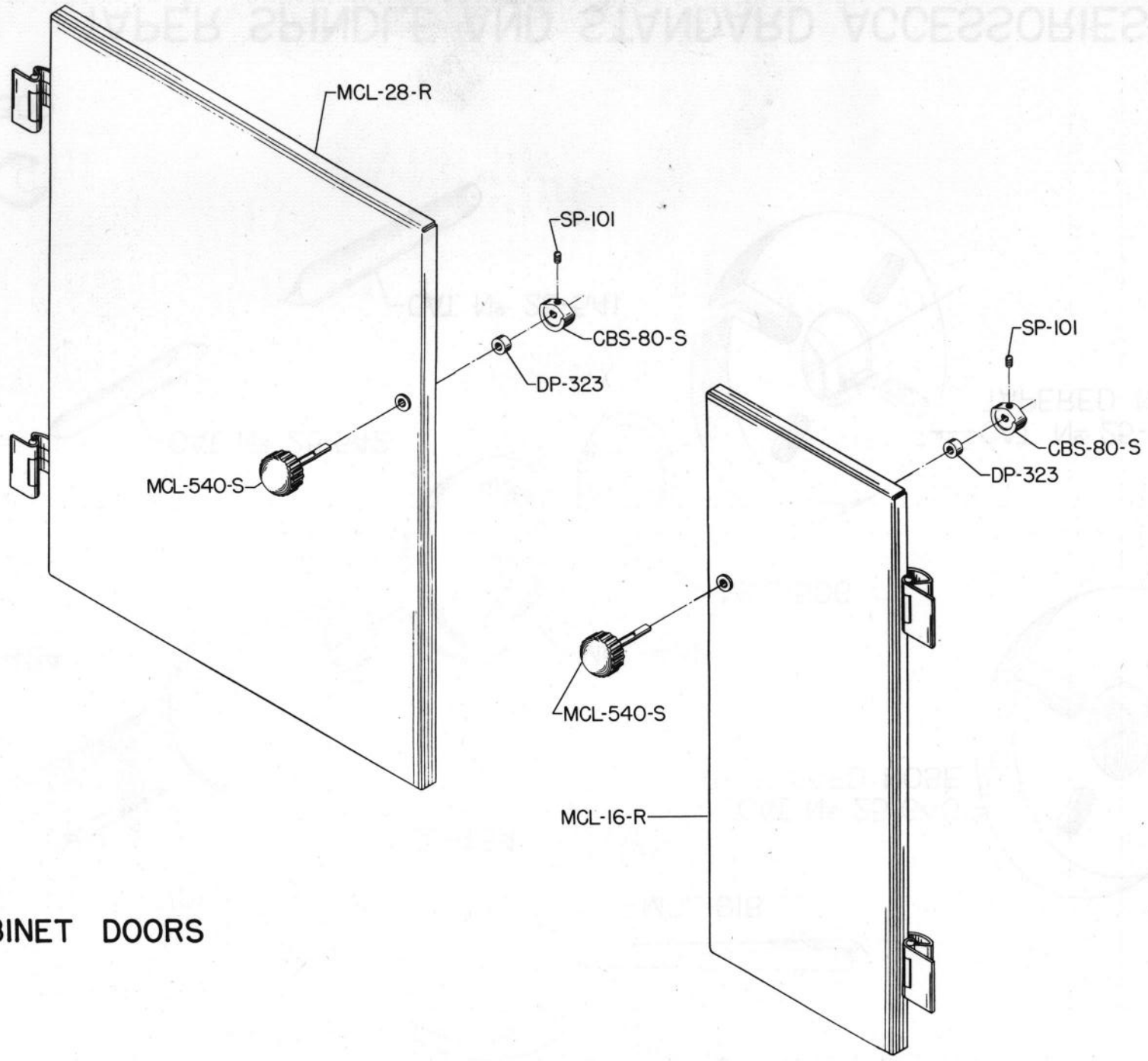




LATHE BED AND RISER BLOCKS



TAPER SPINDLE AND STANDARD ACCESSORIES



CABINET DOORS

REPLACEMENT PARTS LIST

IMPORTANT: Give both the Part Number and the Description of each item when ordering from this list; also the Serial Number of the machine on which the parts are to be used.

HEADSTOCK

Part No.	Description	Number Required
CBL-486	Name Plate	2
DDL-123	Coil Spring	1
DDL-161	1/2" I.D. 7/8" O.D., x 1/32" Fiber Washer	4
DDL-174	29/64" I.D. 1" O.D., 1/8" Steel Washer	1
DDL-256	17/64" I.D. 11/16" O.D., x 5/64" Steel Washer	2
LTA-462	3/4" Fiber Washer	2
MCL-77	Headstock Cover	1
MCL-151	Handle Stud	1
MCL-176	Gear	2
MCL-202	Front Bearing Gasket	1
MCL-208	Reversing Gear Bracket	1
MCL-209	Reversing Gear Lever	1
MCL-210	Gear	1
MCL-214	Sliding Gear Arm	1
MCL-216	Guard	1
MCL-221-A	Pulley, including:	1
	MCL-392 — Bearing	2
MCL-222	Knob	1
MCL-223	Spindle Gear	1
MCL-224-S	Back Gear, including:	1
	MCL-536 — Bearing	2
	SP-7107 — Oiler	1
MCL-227-S	Intermediate Gear, including:	1
	MCL-388 — Bearing	1
MCL-228	Change Spindle Gear	1
MCL-229	Gear	1
MCL-230	Gear	1
MCL-231-S	Reversing Gear, including:	2
	MCL-391 — Bearing	2
MCL-232-S	Sliding Gear Arm, including:	1
	SP-202 — 1/4-20 x 1/2" Set Screw	1
MCL-233	Rear Collar Nut	1
MCL-234	Spacer Spindle	1
MCL-235	Spacer	1
MCL-236	Spacer	1
MCL-237	Spacer	1
MCL-238	Grease Seal Washer	2
MCL-240	Bushing	1
MCL-241-S	Collar, including:	1
	SP-205 — 5/16-18 x 1/4" Set Screw, Cup Pt.	1
MCL-243	Rear Bearing Retainer	1
MCL-244	Rear Bearing Seal	1
MCL-245	Front Bearing Seal	1
MCL-247	Collar Nut	1
MCL-248	Stud Gear Washer	1
MCL-249	Clamp Block	2
MCL-250	Positioning Bracket	1
MCL-251	Back Gear Shaft	1
MCL-252	Knurled Knob	1
MCL-253	"T" Nut	1
MCL-254	Spacer	1
MCL-255	Bushing	1
MCL-256	Stud for Reversing Gear	2
MCL-257	Stud	1
MCL-260-R	Lower Shifter Gear, including:	1
	DDL-253 — 1/4-28 x 3/16" Set Screw Fl. Pt.	1
MCL-261	Upper Shifter Gear	1
MCL-264	Shifter Arm Shoe	2
MCL-265	Bearing	1
MCL-267	Large Spindle Gear Key	1
MCL-269	Hinge	1
MCL-275	Instruction Plate	1
MCL-277	Instruction Plate	1
MCL-296	Retainer Plate	1
MCL-297	Splash Guard	1
MCL-310	Idler Bolt	1
MCL-314	Spacer	1
MCL-317	Key	1
MCL-408	Clutch Spring	2
MCL-430	Clutch	2
MCL-519	Lubrication Chart	1
MCL-543	Torsion Spring	1
MCL-544	Return Spring	1
MCL-545-S	Handle, including:	1
	MCL-547 — Pin	1
MCL-546	Back Gear Shifter Cover	1
MCL-549-S	Pad	1
MCL-553	Clamp Plate	1
MCL-554	Pivot Block	1
MCL-555-S	Locking Cam	1
MCL-558	Cam Follower	1
MCL-559	Shaft	1
MCL-560	Pivot Arm	2
MCL-573	Sq. Hd. Set Screw	1
MCL-578	Shim Washer	1
MCL-743	Shaft for Stud Gear	1
SCG-88	Plug for Set Screw	3
SP-133	1/4-20 x 1" Set Screw	2
SP-201	5/16-18 x 5/16" Set Screw	2
SP-202	1/4-20 x 1/2" Set Screw	1
SP-225	5/16-18 x 1/4" Set Screw	1
SP-245	#10-32 x 1/4" Set Screw, Cone Pt.	1
SP-257	#10-32 x 1/2" Set Screw, Cone Pt.	1
SP-258	#8-32 x 5/16" Set Screw, Cone Pt.	1
SP-551	#10-32 x 1/4" Rd. Hd. Mach. Screw	1
SP-607	5/16-18 x 3/4" Hex. Hd. Cap Screw	1
SP-612	1/4-20 x 5/8" Hex. Hd. Cap Screw	3
SP-615	7/16-14 x 1 3/4" Hex. Hd. Cap Screw	2
SP-626	1/4-20 x 3/4" Hex. Hd. Cap Screw	1
SP-701	1/4-20 x 3/4" Fil. Hd. Mach. Screw	4
SP-725	1/4-20 x 1" Fil. Hd. Mach. Screw	1
SP-755	1/4-20 x 3/4" Soc. Hd. Cap Screw	1
SP-1005	3/8-16 Hex. Jam Nut	1
SP-1034	1/4-20 Hex. Nut (Jam)	5
SP-1203	#10-32 Hex. Nut	1
SP-1206	5/16-24 S.A.E. Hex. Nut	1
SP-1207	3/8-24 Hex. Nut	2
SP-1282	1/2-13 Hex. Nut	1
SP-1605	3/8" Steel Washer	1
SP-1702	1/4" Lockwasher	8
SP-1756	3/8" Lockwasher	1
SP-1764	1/4" Int. Tooth Lockwasher	4
SP-1772	Shakeproof Lockwasher	8
SP-2250	#4 x 3/16" Drive Screw	2
SP-2252	#2 x 3/16" Drive Screw	7
SP-2473	5/64 x 7/8" Groove Pin	1
SP-2606	Hi-Pro Key	1
SP-2619	#404 Hi-Pro Key	1
SP-2665	1/8 x 1/8 x 5/8" Straight Key	1
SP-2706	3/16 x 1" Roll Pin	1
SP-2829	3/16 x 1/2" Roll Pin	2
SP-3306	#8-32 x 3/8" Soc. Hd. Cap Screw	2
SP-3309	1/4-20 x 5/8" Soc. Hd. Cap Screw	13
SP-3322	#10-24 x 1/2" Soc. Hd. Cap Screw	8
SP-5073	3/32 x 9/16" Roll Pin	1
SP-5349	Bearing	1
SP-6053	Sq. Hd. Set Screw	1
SP-7011	Retainer Ring	1
SP-7018	Retainer Ring	1
SP-7107	Oiler	1
SP-7114	Grease Fitting	1
SP-7510	1/4-20 Truss Hd. Mach. Screw	3
#25-502	V-belt	1

REPLACEMENT PARTS LIST — (Continued)

QUICK CHANGE GEAR BOX

Part No.	Description	Number Required
MCL-74-S	Quick Change Gear Box, including:	1
	MCL-74-A — Quick Change Gear Box, including:	1
	MCL-175 — Bearing	4
	MCL-183 — Bearing	1
	MCL-382 — Bearing	1
	MCL-383 — Bearing	1
	MCL-384 — Bearing	1
	MCL-385 — Bearing	1
	MCL-178-S Compound Idler Gear, Including	3
	MCL-386 — Bearing	3
	MCL-179-S — Compound Drive Gear	1
	MCL-184-S Gear, Including:	1
	MCL-387 — Bearing	1
	MCL-185 — Shaft for Drive Gears	1
	MCL-186 — Shaft for Cone Gears	1
	MCL-187-S — Key for Cone Gears	1
	MCL-189-S — Cone Gear, including:	1
	SP-208 — 1/4" Set Screw, Cup Pt.	1
	MCL-190 — Second Cone Gear	1
	MCL-191 — Third Cone Gear	1
	MCL-192 — Fourth Cone Gear	1
	MCL-193 — Fifth Cone Gear	1
	MCL-194 — Sixth Cone Gear	2
	MCL-195 — Seventh Cone Gear	1
	MCL-196 — Eighth Cone Gear	1
	MCL-197 — Gear	1
	MCL-199 — Idler Bolt	2
	MCL-200 — Idler Gear	2
	MCL-201 — Spacer Washer	2
	MCL-204 — Index Pin	2
	MCL-205 — Spring for Index Pin	2
	MCL-206 — Shifter Level R.H.	1
	MCL-207 — Shifter Level L.H.	1
	MCL-217-S — Shifter Gear Key	2
	MCL-222 — Knob	2
	MCL-248 — Stud Gear Washer	1
	MCL-270 — Shifter Shaft	1
	MCL-271 — Shifter Gear	2
	MCL-276 — Instruction Plate	1
	MCL-311 — Idler Gear Bearing	1
	MCL-411 — Lead Screw Drive	1
	MCL-626-S — Set Collar, including:	1
	SP-425 — #10-32 x 1/4" Set Screw	1
	SCG-74-S — Oiler	1
	SDP-34-S — Set Collar, including:	1
	SP-208 — 1/4-20 x 1/4" Set Screw Cup Pt.	1
	SP-649 — 5/16-18 x 1" Hex. Hd. Cap Screw	2
	SP-725 — 1/4-20 x 1" Fil. Hd. Mach. Screw	1
	SP-1105 — 3/8-16 Hex. Jam Nut	1
	SP-1208 — 1/4-20 Hex. Nut	1
	SP-1300 — 5/16-18 Hex. Nut	1
	SP-1606 — 7/16" Steel Washer	2
	SP-2252 — #2 x 3/16" Drive Screw	4
	SP-2617 — Key	1
	SP-5099 — Roll Pin	7
	SP-7008 — Retainer Ring	1
	SP-7017 — Retainer Ring	1

TAILSTOCK

CBL-422	Acorn Nut	1
CBL-426	Washer	1
DDL-240	Spring	1
MCL-68-B	Tailstock and Sub-Base, including:	1
	CBL-423 — 5/16-18 x 2 1/8" H'dless Set Screw	2
MCL-70	Clamp	1
MCL-71-S	Handwheel, Including:	1
	SP-231 — 5/16-18 x 3/8" H'dless Set Screw	1
	SP-3601 — Handle	1
MCL-108	Handle Wrench	1
MCL-109	Micrometer Collar	1
MCL-110	Micrometer Collar Spacer	1
MCL-113	Thrust Washer	1
MCL-116	Stud	1
MCL-117	Clamp Sleeve	1
MCL-470	Ram	1
MCL-471	Adjusting Screw	1
MCL-472-S	Tailstock Ram Key	1
SCG-246	Plug	1
SP-242	3/8-16 x 1/2" Set Screw	1
SP-1227	1/2-20 Hex. Jam Nut	2
SP-1638	7/16" Washer	1
SP-2374	1/2-13 x 4" Sq. Hd. Mach. Bolt	1
SP-2486	Oiler	1
SP-2617	Key	1
#942	Wrench	1

COMPOUND RESTS

DDL-235	Swivel Washer	1
DDL-236	Tool Post Screw	1
DDL-238	Adjusting Gib	1
MCL-63	Swivel Saddle	1
MCL-94	Upper Slide Gib	1
MCL-576	Screw Lock	1
MCL-582	Locking Wedge	1
MCL-584	Graduated Collar	1
MCL-585	Stop Collar	1
MCL-591	Tool Post	1
MCL-592	Tool Post Washer	1
MCL-593-A	Handwheel, including:	1
	SP-3602 — Handle	2
MCL-594	Compound Slide	1
MCL-595	Upper Slide Feed Nut	1
MCL-596	Upper Slide Feed Screw	1
SP-203	1/4-20 x 3/8" Set Screw, Fl. Pt.	1
SP-1034	1/4-20 Hex. Jam Nut	3
SP-1270	3/8-24 Hex. Jam Nut	1
SP-2618	Key	1
SP-3306	#8-32 x 3/8" Soc. Hd. Cap Screw	3
SP-4553	#1/4-20 Set Screw	3
SP-7103	Oiler	1

CARRIAGE AND LOWER SLIDE

Part No.	Description	Number Required
DDL-255	5/16-18 Hex. Jam Nut	2
MCL-60	Saddle	1
MCL-61-S	Lower Slide, including:	1
	DDL-248	1
MCL-62	Lower Slide Ext. Cover	1
MCL-65-A	Lower Feed Screw Flange, including:	1
	MCL-83 — Bearing	1
	MCL-106 — Bushing	1
MCL-80	Micrometer Collar	1
MCL-88	Lower Slide Gib	1
MCL-90	Clamp Plate	1
MCL-98	Clamp Block	1
MCL-99	Front Wiper Retainer	2
MCL-100	Front Wiper	2
MCL-101	Rear Wiper Retainer	2
MCL-102	Rear Wiper	2
MCL-308	Way Cover	1
MCL-328	29/64" I.D. 47/64" O.D., x 3/32" Lead Sc. Washer	2
MCL-330	Lead Screw Nut	1
MCL-445-S	Lead Screw	1
MCL-461-S	Sub-Assembly of Index	1
MCL-464	Nut for Index Cam	1
MCL-465	Thumb Knob	1
MCL-532-S	Set Collar, including:	1
	SP-246 — #10-32 x 3/16" Set Screw Cup Pt.	2
MCL-533	33/64" I.D. 7/8" O.D., Steel Washer	1
MCL-538	1/2" I.D. 5/8" O.D. x 23/64" Bushing	1
MCL-561	Swivel Saddle "T" Bolt	2
MCL-575	Handwheel	1
MCL-576	Screw Lock	1
MCL-577	Locking Wedge	1
MCL-583	Bushing	1
MCL-446-S	Lower Feed Shaft	1
SP-133	1/4-20 x 1" Set Screw	4
SP-184	#10-32 x 3/8" H'dless Set Screw, Cup Pt.	1
SP-203	1/4-20 x 3/8" Set Screw Fl. Pt.	1
SP-608	5/16-18 x 7/8" Hex. Hd. Cap Screw	2
SP-694	3/8-24 x 2 1/2" Hex. Cap Screw	4
SP-739	3/8-16 x 3/4" Fil. Hd. Cap Screw	1
SP-755	1/4-20 x 3/4" Soc. Hd. Cap Screw	2
SP-784	3/8-16 x 1 1/4" Soc. Head Cap Screw	3
SP-1034	1/4-20 Hex. Jam Nut	4
SP-1148	1/4-20 Set Screw	1
SP-1233	7/16-20 Hex. Jam Nut	2
SP-1270	3/8-24 Hex. Jam Nut	1
SP-1703	5/16" Lockwasher	2
SP-2618	Key	1
SP-2722	1/16 x 1/4" Roll Pin	2
SP-3019	#6-32 x 1/2" Drive Screw	4
SP-3350	5/16-18 x 1/2" Soc. Hd. Cap Screw	1
SP-3603	Handle	1
SP-3651	"O" Ring	1
SP-4006	Dowel Pin	1
SP-5116	Oiler	4
SP-6053	Sq. Hd. Screw	1
SP-7043	Retainer Ring	1

APRON

Part No.	Description	Number Required
DDL-123	Coil Spring	1
DDL-161	1/2" I.D., 7/8" O.D. x 1/32" Fiber Washer	1
DDL-256	17/64" I.D. 11/16" O.D. x 5/64" Steel Washer	2
MCL-71-S	Handwheel, Including:	1
	SP-231 — 5/16-18 x 3/8" H'dless Set Screw	1
	SP-3601 — Handle	1
MCL-72	Apron	1
MCL-130	Shaft for Handwheel	1
MCL-131-S	Sleeve, Including:	1
	MCL-386 — Bearing	2
MCL-132	Gear for Handwheel	1
MCL-133	Collar for Handwheel	1
MCL-135	Rack Pinion Shaft	1
MCL-137-S	Compound Gear	1
MCL-139-S	Eccentric Gear, Including:	1
	MCL-405 — Bearing	1
MCL-140-S	Eccentric Assembly	1
MCL-142	Shaft for Compound Gear	1
MCL-144-S	Compound Gear	1
MCL-146	Eccentric Handle	1
MCL-148	Indexing Pin	1
MCL-149	Guide Plate Lock Pin	1
MCL-150	Lock Pin	1
MCL-152	Hub	1
MCL-153	Cam for Half-nut	1
MCL-154	Screw	2
MCL-155	Half-nut Shoe	1
MCL-156	Half-nut (furnished in pairs)	1
MCL-158	Clutch Spring	1
MCL-159	Clutch Handle	1
MCL-160	Swivel Pin for Clutch	1
MCL-161	Brass Plug	1
MCL-163-S	Shaft Stop Collar for Clutch	1
MCL-164	Transmission	1
MCL-165	Clutch	1
MCL-166	Worm Wheel	1
MCL-167-A	Worm Gear Cover, Including:	1
	MCL-407 — Bearing	1
MCL-168-S	Worm Gear	1
MCL-170	Dial	1
MCL-171-S	Shaft and Gear	1
MCL-173	Sleeve Timing Gear	1
MCL-222	Knob	2
MCL-406	Spring for Eccentric	1
MCL-535	Bracket	1
MCL-747	Gasket	1
TCS-217	Lock Nut	2
SP-28	1/4" Dia. Steel Ball	1
SP-208	1/4-20 x 1/4" Set Screw, Cup Pt.	1
SP-217	5/16-18 x 1/2" Set Screw	2
SP-225	5/16-18 x 1/4" Set Screw	1
SP-231	5/16-18 x 3/8" Set Screw	1
SP-232	1/4-20 x 3/8" Set Screw	1
SP-254	5/16-24 x 3/8" Set Screw, Cup Pt.	2
SP-561	#10-32 Rd. Hd. Screw	2
SP-601	1/4-20 x 3/8" Hex. Hd. Cap Screw	1
SP-614	1/4-20 x 1 1/4" Hex. Hd. Cap Screw	4
SP-710	1/4-20 x 7/8" Fil. Hd. Mach. Screw	4
SP-738	#10-24 x 1/2" Fil. Hd. Mach. Screw	2
SP-769	1/4-28 x 3/4" Soc. Hd. Cap Screw	1
SP-1702	1/4" Lockwasher	9
SP-1775	Int. Tooth Lockwasher	2
SP-2617	Key	2
SP-2702	1/4 x 5/8" Roll Pin	2
SP-2719	1/8 x 1" Roll Pin	1
SP-5214	Oiler	1
SP-5322	Bearing	1
SP-5323	Bearing	1
SP-7018	Retainer Ring	1
SP-7103	Oiler	3

REPLACEMENT PARTS LIST—(Continued)

VARIABLE SPEED DRIVE

Part No.	Description	Number Required
BM-46	25/64" I.D. 15/16" O.D. x 1/8" Steel Washer	8
LTA-551-S	Collar, including:	2
	SP-206 — 5/16-18 x 5/16" Set Screw	1
MCL-4-S	Jack Shaft Pulley, Variable Speed, Including:	1
	MCL-389 — Bearing	1
MCL-7	Stud	2
MCL-11	Arm Spring	1
MCL-26	Bearing Plate, Speed Ind.	1
MCL-42-S	Pivot Pin, including:	1
	SP-208 — 1/4-20 x 1/4" Set Screw, Cup Pt.	1
MCL-43-S	Motor Plate	1
MCL-44	Link Adj. Screw Nut	1
MCL-46	Link Speed Ind.	1
MCL-47	Variable Speed Pulley Shaft	1
MCL-49	Mounting Bracket Shaft	1
MCL-50	Nut Adj. Screw	1
MCL-51-S	Speed Indicator Gear, including:	1
	SP-232 — 1/4-20 x 3/8" Set Screw	1
MCL-52	Shaft Speed Ind.	1
MCL-53-S	Bevel Pinion Shaft	1
MCL-54	Speed Ind. Rack	1
MCL-55-S	Adj. Screw	1
MCL-56-S	Jack Shaft	1
MCL-57	Pulley Bracket	1
MCL-58	Bracket Pulley Arm	1
MCL-59	Variable Speed Pulley Bracket	1
MCL-71-S	Handwheel, Including:	1
	SP-231 — 5/16-18 x 3/8" H'dless Set Screw	1
	SP-3601 — Handle	1
MCL-122	Spring	4
MCL-486	Reinforcing Bracket	2
MCL-508-S	Variable Speed Pulley, Including:	1
	CBS-174 — Bearing	2
MCL-512	Guide Pin	1
MCL-533	Washer	1
MCL-624	Dial Speed Indicator	1
PF-70	Fiber Washer	4
SDP-34-S	Collar, including:	1
	SP-208 — 1/4-20 x 1/4" Set Screw, Cup Pt.	1
TCS-225	Pointer	1
SP-139	3/8-16 x 1 1/4" Set Screw, Cone Pt.	2
SP-231	5/16-18 x 3/8" Set Screw	1
SP-509	1/4-20 x 1/2" Rd. Hd. Mach. Screw	1
SP-642	3/8-16 x 1" Hex. Hd. Cap Screw	4
SP-724	5/16-18 x 7/8" Fil. Hd. Mach. Screw	3
SP-1005	3/8-16 Hex. Jam Nut	10
SP-1026	3/8-16 Hex. Nut	3
SP-1226	5/8-8 Hex. Jam Nut	1
SP-1303	5/16-18 Square Nut	3
SP-1614	9/32" I.D. 5/8" O.D. x .065 Washer	2
SP-1623	1" I.D. 1 1/2" O.D. x 1/8" Steel Washer	1
SP-1702	1/4" Lockwasher	1
SP-1703	5/16" Lockwasher	3
SP-1704	3/8" Lockwasher	3
SP-1764	1/4" I.D. 15/32" O.D. x .025 Int. Lockwasher	1
SP-2252	#2 x 3/16" Drive Screw	3
SP-2301	1/4-20 x 1/2" Hex. Hd. Screw	1
SP-2513	1/8" Coupling	1
SP-2617	Key	1
SP-3102	3/8"-16 x 1 3/8" Hex. Hd. Cap Screw	5
SP-3435	1/8" x 2 1/2" Galv. Nipple	1
SP-5324	Bearing	1
SP-7019	Retainer Ring	1
#25-500	V-Belt	2
SP-7111	Oiler	2
#25-670	Motor Pulley, including:	1
	SP-207 — 5/16-18 x 1/2" Set Screw	1

LATHE BED AND RISER BLOCKS

BS-257	29/64" I.D. 1 1/4" O.D. x 7/32" Steel Washer	2
CBS-84	1/2" I.D. x 3/4" 16 Thd. Bushing, Hex. Hd.	4
MCL-215	Rear Bearing	1
MCL-218	Riser Block	1
MCL-305	4' — Lathe Bed	1
MCL-305-H	4' — Flame Hardened Lathe Bed	1
MCL-306	5' — Lathe Bed	1
MCL-306-H	5' — Flame Hardened Lathe Bed	1
MCL-312	Washer	2
MCL-390	Gear Rack for 4' — Lathe Bed	1
MCL-394	Gear Rack for 5' — Lathe Bed	1
MCL-410	24" Lead Screw	1
MCL-412	36" Lead Screw	1
MCL-487	Riser Block	1
MCL-511	Shear Pin	1
MCL-626-S	Collar, including:	1
	SP-245 — #10-32 x 1/4" Set Screw Cone Pt.	1
SP-615	7/16-14 x 1 3/4" Hex. Hd. Cap Screw	4
SP-625	7/16-14 x 2 1/4" Hex. Hd. Cap Screw	4
SP-1607	1/2" Steel Washer	4
SP-1705	1/2" Lockwasher	4
SP-1716	7/16" Lockwasher	4
SP-3300	#10-24 x 5/8" Soc. Hd. Cap Screw	8
SP-5437	7/16"-14 Hex. Nut	4
SP-9040	'O' Ring	4

CABINET DOORS

CBS-80-S	Cam, including:	2
	SP-101 — 1/4-20 x 1/4" Screw	2
DP-323	5/16" I.D. 5/8" O.D. x 1/4" Collar	2
MCL-16-R	Door with Hinge Attached	1
MCL-28-R	Door with Hinge Attached	1
MCL-540-S	Handle	2

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