

# This Manual Applies To Clousing 12" Lathes From Serial No. 508890 To 510105

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## TAILSTOCK

The tailstock supports long work, and holds tools for drilling and reaming operations.

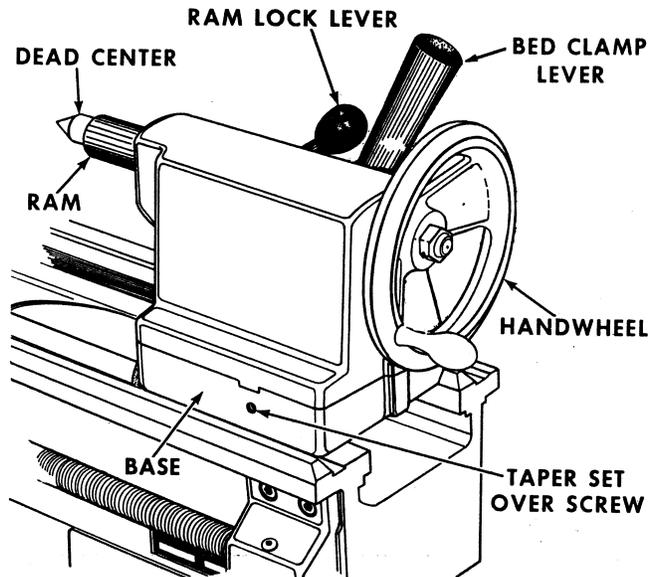


Figure 15

Base is fitted to bed ways to accurately align tailstock and headstock spindles, refer to figure 15. Tailstock slides along the ways, and may be anchored in any position by moving the clamp lever.

Ram is actuated by handwheel -- graduations simplify drilling and boring. Lever locks ram in position. Before inserting center or tools in ram, clean both tapers thoroughly with a clean, dry cloth.

Tailstock may be set over for taper turning by loosening the bed clamp and adjusting the screws on front and rear of tailstock base.

### MOUNTING CHUCKS AND FACE PLATES

Before mounting on lathe, carefully clean the following:

1. Taper on spindle nose.
2. Threads in spindle nose collar.
3. Taper in chuck or face plate.
4. Threads on chuck or face plate.

*Caution:* Chips and dirt may score mating surface causing an inaccurate fit.

To mount face plate or chuck:

1. Rotate spindle until key is up.

2. Lock spindle by:

- (A) Placing back gear knob in engaged position.
- (B) Pushing handwheel pin in.

3. Lock chuck or face plate on spindle nose:

- (A) Slide chuck or face plate on to spindle nose.
- (B) Tighten collar by turning spanner wrench counter-clockwise.

4. Unlock spindle.

NEVER TURN ON POWER WHEN SPINDLE IS LOCKED.

### TO REMOVE CHUCK OR FACE PLATE

1. Lock spindle.

- (A) Place back gear knob in engaged position.
- (B) Push handwheel pin in.

2. Place heavy board across bed to protect ways if chuck is dropped.

3. Loosen collar by turning spanner wrench clockwise.

4. *Carefully* remove chuck or face plate.

5. Unlock spindle.

NEVER TURN ON POWER WHEN SPINDLE IS LOCKED.

### CHUCK MAINTENANCE AND CARE

**PROTECT** -- when not in use, place chuck in a covered box -- don't leave it exposed to dirt or chips -- the accuracy of any chuck can be destroyed if dirt or chips collect in the scroll, threads, jaws, or slots.

**CLEAN and OIL FREQUENTLY** -- Most wear is due to dirt and lack of proper lubrication. Oil chuck jaws and scroll at regular intervals with a light film of clean No. 10 S.A.E. machine oil. *Caution:* Do not apply too much oil -- it collects dust and chips.

### IMPORTANT

**KEEP YOUR LATHE CLEAN** -- Oil and dirt form an abrasive compound which will damage bearing surfaces. Using way lubricant wipe the bed and all machined surfaces with a clean rag at frequent intervals. Use a brush to clean spindle, gear teeth, lead screw threads, etc.

6. Move variable speed control dial to spindle speed desired.
7. Engage carriage controls -- longitudinal power feed lever for feeds, half-nuts for threading.
8. With tool in position, make a "trial run" without touching work to make sure the setup is right.

NOTE: When threading, be sure threading dial is engaged with lead screw. Set clutch kickout to avoid interfering with threading cut.

FOR CLUTCH and BRAKE MODELS -- be sure clutch is disengaged (handle in down position) before starting motor.

### TOOL POST

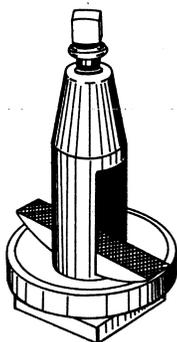


Figure 10

The tool post holds the tool rigidly in position for cutting operations -- refer to figure 10.

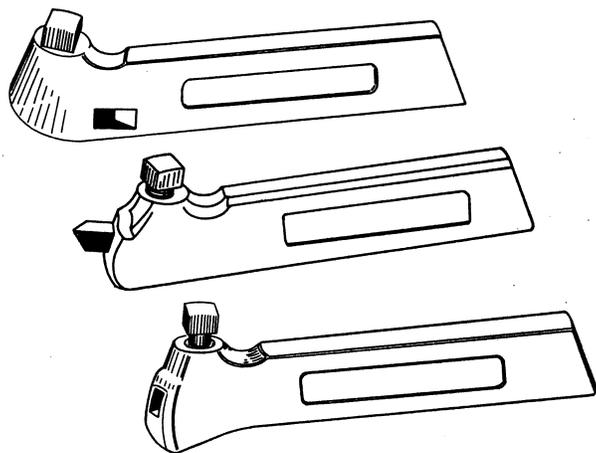


Figure 11

Tool bit holders permit the use of small, inexpensive and replaceable tool bits -- refer to figure 11.

In order to avoid undesirable overhang, tool bits should be clamped so the cutting end of the tool bit is as close to the holder as the work will permit, and, the tool holder should be as far back in the tool post as possible.

The cutting edge of the tool should be placed on lathe center line.

### PROPER POSITION OF TOOL POST SLIDE

For maximum tool support, the front edge of the tool post slide should be positioned flush with the front end of the upper swivel.

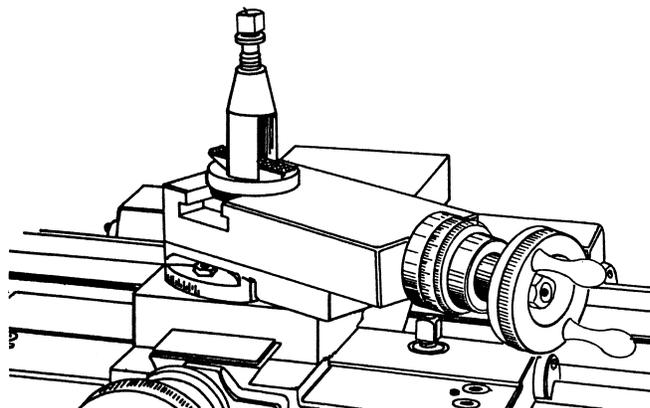


Figure 12

RIGHT -- Tool post slide is flush with front end of the upper swivel, therefore provides maximum tool support -- refer to figure 12.

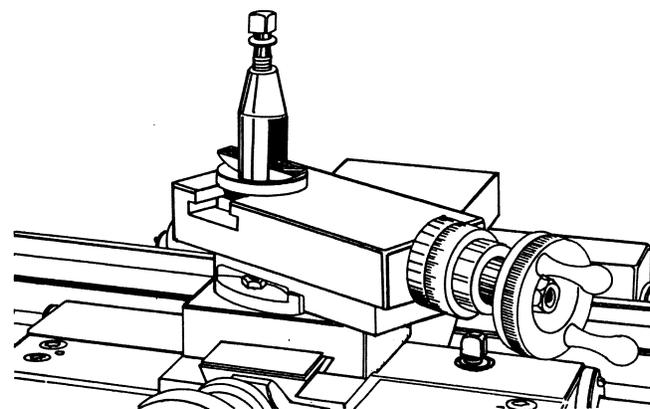


Figure 13

WRONG -- Unnecessary overhang of tool post slide will result in tool chatter, and could cause the tool post slide to break -- refer to figure 13.

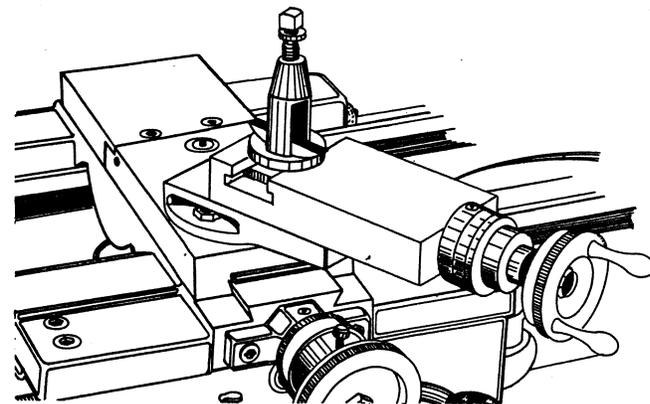


Figure 14

WRONG -- Tool post slide is too far back -- tool overhang is excessive -- refer to figure 14.

CARRIAGE LOCK SCREW locks carriage to bed for facing or cut-off operations. *Caution:* Be sure to release lock before moving carriage.

CARRIAGE HANDWHEEL moves carriage along the bed manually.

CROSS FEED SLIDE AND COMPOUND REST HANDWHEELS move the cross slide and compound rest in and out.

POWER FEED LEVER controls the operation of both power longitudinal feed and power cross feed. Lever has three positions: center is disengaged (neutral for hand feeding), to the left and down engages power cross feeds, to the right and up engages power longitudinal feeds.



*Caution:* The power feed lever and the half-nut lever are interlocked. Half-nuts must be disengaged (half-nut lever in down position) before power feeds can be engaged.

NOTE: Cross feed is  $\frac{1}{2}$  of the rate of longitudinal feed.

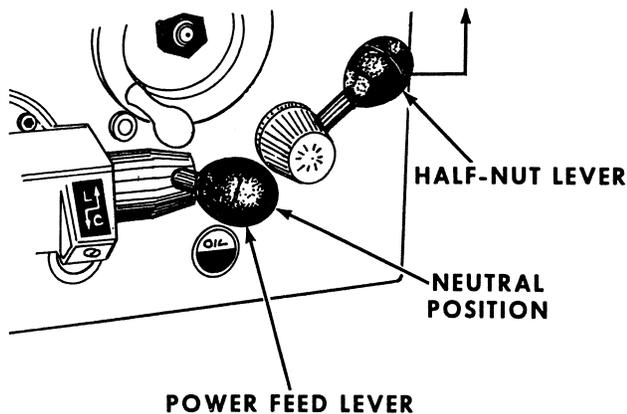


Figure 9

HALF-NUT LEVER engages half-nuts with lead screw for threading -- refer to figure 9.

To engage half-nuts:

1. Move power feed lever to center (disengaged or neutral position).
2. Move half-nut lever to up position.

NOTE: Safety lock prevents engaging feeds and half-nuts at same time -- *do not force levers.*

*Important:* Never use half-nuts for power feeds. Using half-nuts for threading only will maintain the accuracy of the lead screw.

## THREADING DIAL

The threading dial performs the important function of indicating the proper time to engage the half-nut lever so that tool will enter the same groove of the thread on each successive cut.

To maintain the accuracy of the worm gear, loosen clamp screw and swing threading dial away from lead screw when not threading.

When cutting *even-numbered thread* (such as 12, 14, 16, 32, etc., per inch), engage the half-nut lever for the first cut when the stationary mark on the outside of the threading dial is in line with *any* of the marks on rotating portion of the dial. Any dial marking may be used for successive cuts.

When cutting *odd-numbered thread* (such as 7, 9, 11, 23, 27, etc., per inch), engage the half-nut lever for the first cut and all successive cuts when the stationary mark on the threading dial is in line with *any* of the numbered marks on the dial.

When cutting *half-numbered threads* (such as  $4\frac{1}{2}$ ,  $5\frac{1}{2}$ ,  $6\frac{1}{2}$ ,  $11\frac{1}{2}$ , etc., per inch), engage the half-nut lever at the *same* number on the threading dial for *each* cut.

The threading dial cannot be used for metric threads. For these, the half-nut is closed on the lead screw, and remains engaged until the thread is completed. After each cut the tool withdrawal, the tool is brought back to starting point by reversing the spindle.

## SEQUENCE OF ENGAGING CONTROLS FOR THREADS OR FEEDS

1. Disengage power feed and half-nut levers.
2. Set quick-change mechanism:
  - A. Move thread-feed selector handle to the number position indicated on chart -- refer to figure 7.
  - B. Position SLIDING GEAR.
  - C. Position SELECTOR KNOB to A, B, or C -- engaged position is vertical.
3. Shift LEAD SCREW DIRECTION LEVER for direction desired.
4. Select drive -- either direct or back gear -- according to spindle speed required.
5. Start motor.

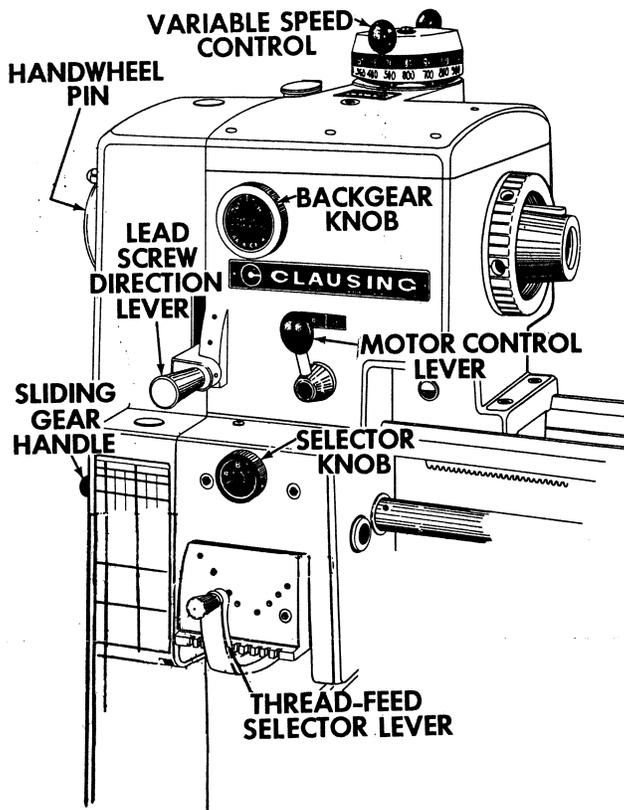


Figure 7

**MOTOR CONTROL LEVER** located on front of headstock controls rotation of lathe spindle. It has three positions -- REVERSE, OFF, and FORWARD -- refer to figure 7.

To reverse rotation of motor and spindle:

1. Move lever to "OFF" position and allow spindle to stop.
2. Move lever to FORWARD or REVERSE position.

*Caution:* Always allow spindle to stop before reversing rotation.

**LEAD SCREW DIRECTION LEVER**, located on front of headstock, has three positions. Center position is neutral -- gear train is disengaged, lead screw does not turn. Lower position moves carriage toward tailstock. Upper position moves carriage toward headstock.

*Caution:* Always stop spindle before shifting lead screw direction lever.

### QUICK-CHANGE GEAR BOX

The quick-change gear mechanism determines the rate of rotation of lead screw in relation to the rpm of the spindle for threading, and for turning and facing operations.

See figure 7 for the location of the controls described below. Their positions for thread or feed selected are shown on chart.

**SLIDING GEAR HANDLE** changes the ratio between the spindle and lead screw. There are two positions -- IN and OUT. Do not shift while spindle is turning.

**THREAD AND FEED SELECTOR HANDLE.** To shift, pull out on handle, drop lever, slide to position desired, raise lever and push in the handle to engage lock pin. If selector handle does not slide easily, turn sliding gear handle while shifting.

**SELECTOR KNOB** has three positions -- A, B, and C. Engaged position is vertical. If knob doesn't shift easily, place lead screw direction lever in neutral (center position), and turn sliding gear handle until knob can be engaged -- do not force.

### CLUTCH AND BRAKE COUNTERSHAFT MODELS

Countershaft has friction clutch and brake for starting, stopping and jogging of spindle without stopping the motor. Moving clutch lever up engages spindle drive -- down disengages it and tightens the brake shoe and stops the spindle. Clutch kickout can be positioned to automatically disengage clutch -- refer to figure 8.

To set clutch kickout, determine stopping point then clamp to clutch control bar so clutch will be completely disengaged at stopping point.

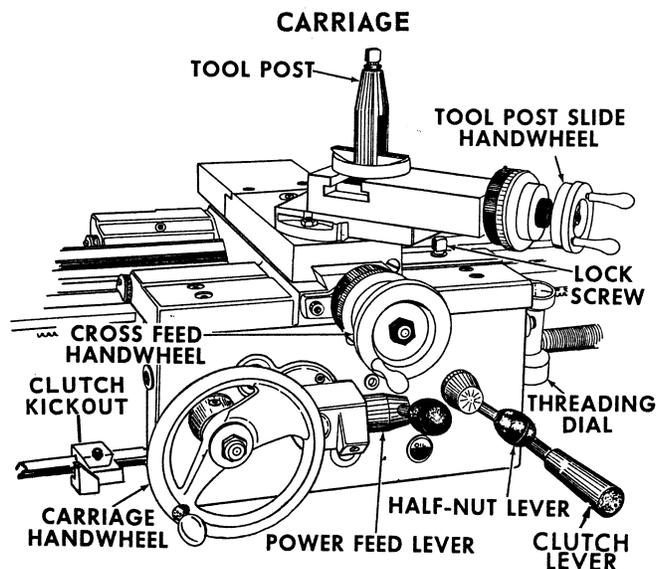


Figure 8

The function of the carriage is to rigidly support the cutting tool, and to move it along or across the bed -- refer to figure 8.

## CONTROLS AND OPERATIONS

Do not operate lathe until you are thoroughly familiar with all controls and their functions. The machine is shipped from factory with gears set for direct drive and carriage locked to bed. Read the instructions carefully. Then, first operate the lathe in back gear -- get the "feel" of the controls -- set up different threads and feeds -- engage the power feeds -- get acquainted with the lathe before you start a job -- it will save time and produce better work.

### HEADSTOCK

The totally enclosed headstock houses and supports the spindle, spindle bearings and driving gears. Gears, shafts, bearings and spindle bearings travel in a bath of oil.

### BACK GEAR CONTROLS

BACK GEAR DRIVE provides the slow spindle speeds from 52 to 280 rpm required for heavy cuts and correct surface speeds for large diameter work.

**IMPORTANT:** The back gear knob should not be moved from one position to another unless motor is in "OFF" position. Spindle must come to a complete stop before changing drives.

To engage the back gear drive:

1. Stop lathe spindle.

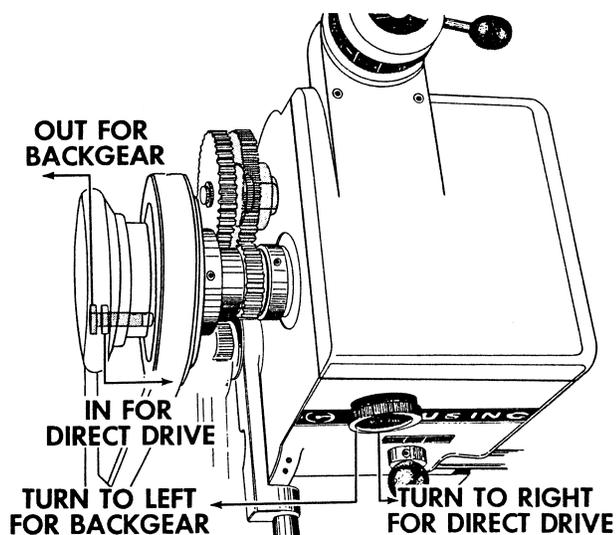


Figure 5

2. Turn back gear knob (figure 5) to the left -- rotate spindle by hand if gears do not mesh.
3. Disengage back gear pin from drive pulley by pulling pin away from headstock.

DIRECT DRIVE provides high spindle speeds from 360 to 2000 rpm.

To engage direct drive:

1. Stop spindle.
2. Turn back gear knob to the right.
3. Engage the back gear pin with drive pulley by pushing pin towards headstock -- rotate wheel if necessary.

### SPINDLE SPEEDS

Speeds are changed hydraulically. Control dial, located on top of the headstock, actuates hydraulic system. Speeds -- between 52 and 280 rpm in back gear drive, and 360 to 2000 rpm in direct drive -- are obtained by turning the dial control.

**Caution:** DO NOT TURN CONTROL DIAL UNLESS MOTOR IS RUNNING -- it makes dial reading incorrect in terms of spindle rpm.

**NOTE:** Hydraulic system, however, is equipped with a by-pass valve that prevents damage if control dial is accidentally turned while motor is not running.

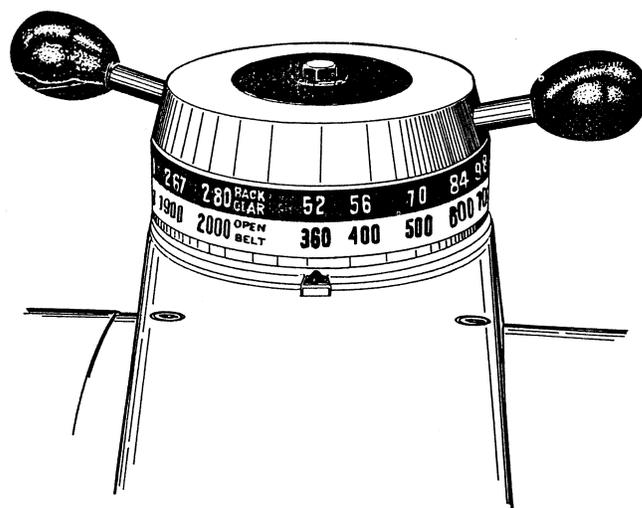


Figure 6

If dial reading is incorrect:

1. Start the motor -- turn variable speed control to 360 rpm (52 rpm if lathe is in back gear) -- refer to figure 6.
2. Hold at this speed, exerting slight pressure for 30 seconds.

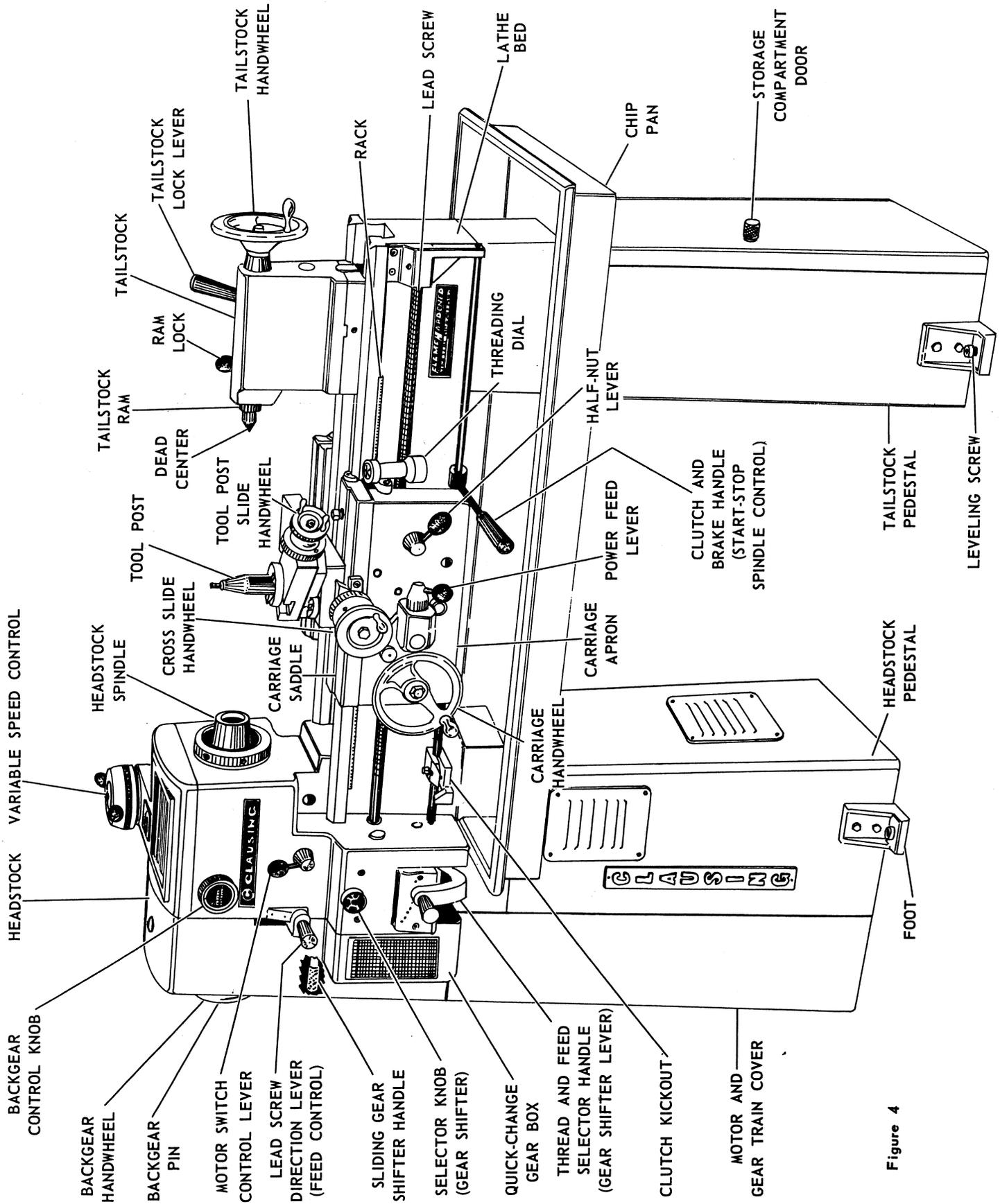


Figure 4

# LUBRICATION CHART - - - 5900 SERIES CLAUSING LATHES

## CODE

**D - DAILY** oil with SHELL TONNA 33 or equivalent.

### WEEKLY

**W1** - Oil with SHELL TONNA 33 or equivalent.

**W2** - Check oil level in window. Remove pipe plug and fill to mark with SHELL TELLUS 27 oil or equivalent.

**W3** - With motor running and variable turned to low speed, fill with SHELL TELLUS 27 oil or equivalent.

**W4** - Check oil level in window. Remove filler plug and fill to mark with SHELL TELLUS 33 or equivalent.

**W5** - Fill countershaft fitting and grease the two fingers with SHELL ALYANIA 2 grease or equivalent.

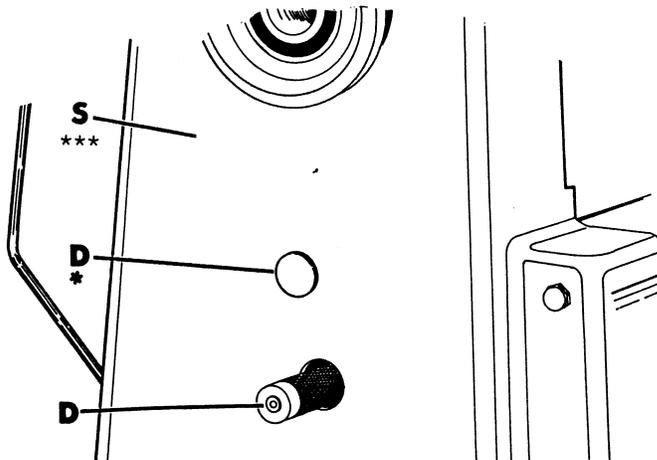
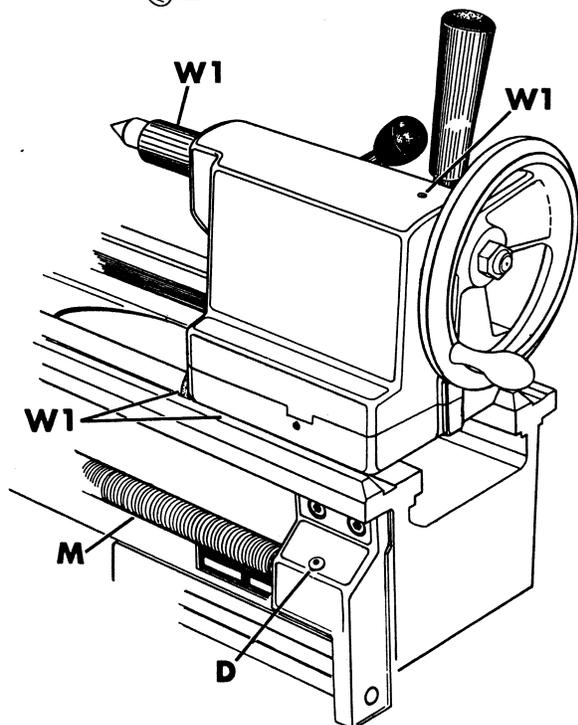
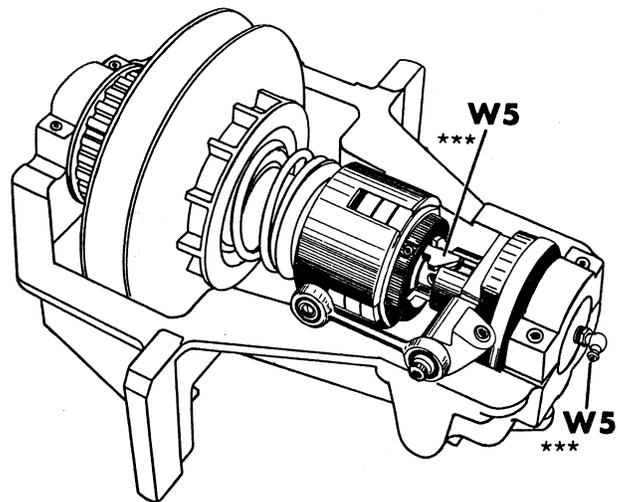
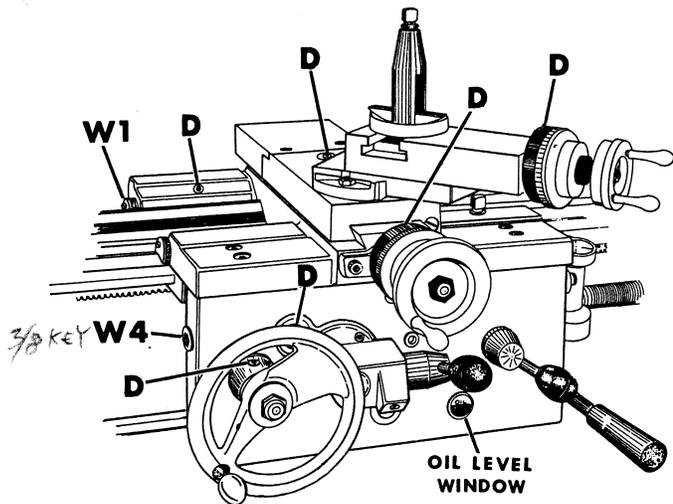
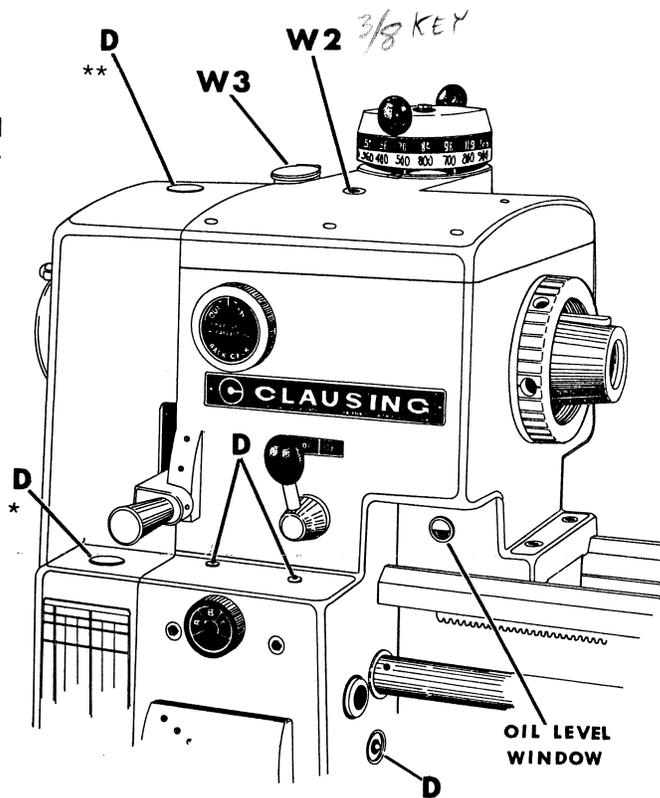
**M - MONTHLY** clean with kerosene, then oil with SHELL TONNA 33 or equivalent.

**S - SEMI ANNUALLY** lubricate quadrant gear teeth with SHELL ALYANIA 2 or equivalent. Remove oil and dirt before applying.

\*Remove plug.

\*\*Remove plug and turn spindle until oiler shows.

\*\*\*Remove cover



## ELECTRICAL CONNECTIONS

The machine is wired at factory -- merely connect power supply to line leads in junction box on back of headstock cabinet. **IMPORTANT:** To reverse rotation of motor interchange any two line leads -- see WIRING INSTRUCTIONS.

Before connecting motor, make sure that voltage and other current requirements of the motor correspond with your power supply. If there is any question, verify your current and voltage by calling your power company.

## ANCHORING LATHE TO FLOOR

**CAUTION: DO NOT SLIDE LATHE ALONG FLOOR.**

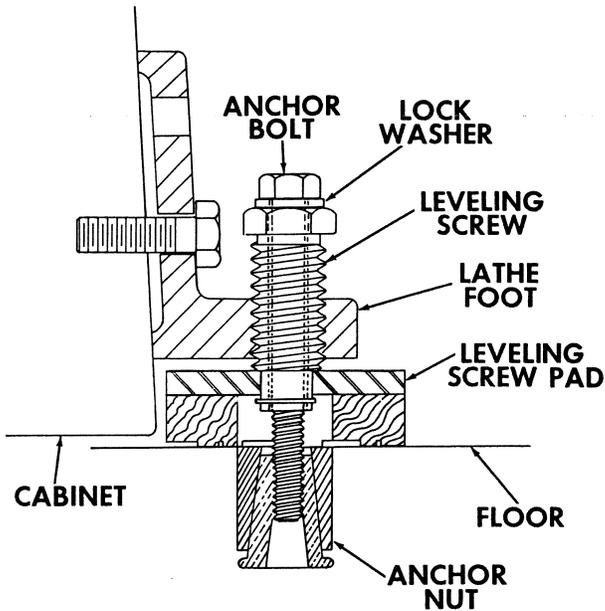


Figure 2

Use anchor bolts to secure lathe to concrete floor -- use lag screws to secure lathe to wood floor -- refer to figure 2.

With a hoist or lift, lower the lathe into position and mark the four leveling screw locations. **DO NOT LOWER LEVELING SCREW PADS.**

Lift machine out of the way, drill holes for anchor nuts and install anchor nuts -- for lag screws drill pilot holes.

Position and lower machine. Turn leveling screws until *no portion* of the lathe cabinet touches the floor -- shim under pads, if necessary.

Start anchor bolts or lag screws -- **DO NOT** tighten until lathe is level -- see Leveling Instructions.

## LEVELING

The lathe should be kept perfectly level at all times. When carelessly mounted, the bed may become twisted. Even a slight amount of twist will move centers out of alignment and result in inaccurate work and excessive wear. Make it a habit to regularly check the level of the bed.

**THIS IS IMPORTANT:**

Use *one* precision level at least 6" long -- level should show a distinct bubble movement when a .003" shim is placed under one end.

Clean the bed ways thoroughly.

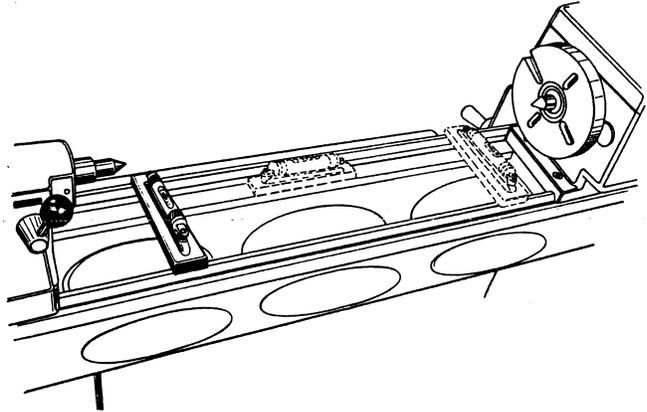


Figure 3

1. First level bed longitudinally, compensate for variations of bubble readings by turning the leveling screws on the cabinet base until bed is level -- refer to Figure 3 for level positions.

2. Next level both ends of the bed. The headstock and the tailstock -- must be checked with the level placed at right angles to the bed. Refer to Figure 3. Use a square to align the level. *Do not turn level end for end.*

Level reading at headstock and tailstock must be identical. Compensate for variations of bubble readings by turning the leveling screws until lathe is level.

**NOTE:** Avoid excessive adjustment of leveling screws by inserting shims between pads and floor.

3. Tighten the four anchoring bolts *not more than* finger-tight, or until the lock washers start to compress -- lag screws should be tightened, then backed off about one-quarter turn.

4. Recheck the level of the lathe -- unequal tightening of anchoring bolts may have pulled the bed out of level. Recheck leveling in 5 days.

Check level of bed at frequent intervals. Chatter -- turning taper -- boring taper -- facing convex or concave is the general result of an improperly leveled lathe.

# INSTALLATION

## FOUNDATION

Your Clausing lathe is a precision machine tool, and requires a solid foundation. The floor must be heavy enough to support the weight of the machine without noticeable deflection, and it must be level. If the floor does not meet these important requirements, a special foundation should be built.

**CONCRETE FLOORS** -- A reinforced concrete floor is the best foundation: it provides a rigid base, minimizes vibration from adjacent machines, and resists deflection.

**WOOD FLOORS** should be carefully checked for strength -- place a precision level on floor where lathe is to be located, and move a hand truck with average load past it. If bubble in level shows noticeable movement, the floor should be reinforced, or cut away and a concrete foundation installed.

## CLEANING

Before moving carriage or tailstock along the ways, use a good grease solvent to remove the rust-proof coating applied to all polished and unpainted surfaces.

Do not use an air hose -- it could force dirt or grit picked up during transit into bearing surfaces.

Use a stiff bristle brush to clean lead screw.

When thoroughly cleaned, cover the unpainted surfaces with a light coating of "Way Lubricant" for proper lubrication.

Frequent cleaning and lubrication is essential to long service life -- see page 5 for instructions.

## MOVING AND LIFTING

Leave lathe on skid -- simplifies moving to final location.

**IMPORTANT:** *DO NOT slide lathe along floor.*  
*DO NOT USE fork lift under chip pan.*

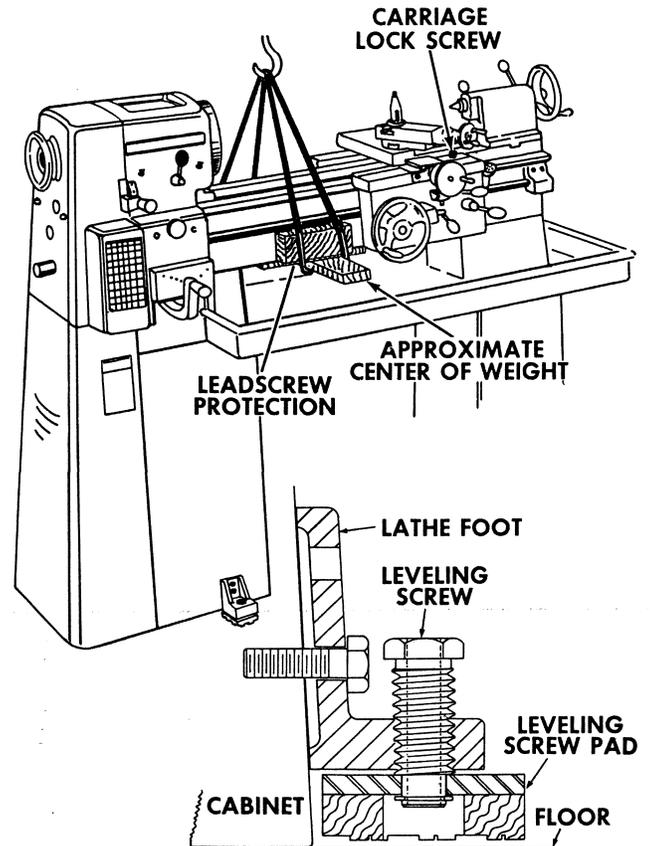


Figure 1

**CAUTION:** *DO NOT LOWER LEVELING SCREW PADS UNTIL LATHE IS READY TO BE LEVELED -- refer to figure 1.*

When using a sling -- clean bed ways, move tailstock to the right-hand end of the bed and lock it in place. To protect lead screw and bed, place a 3/4" thick hardwood board under approximate center of weight load, insert sling as shown in figure 1, and raise machine about one-inch off floor. Make any necessary adjustments for balance by moving carriage along bed. -- Before moving carriage, loosen lock screw -- located on top right side of the carriage.

If a fork lift is used, place 3/4" thick hardwood board under the bed so that the clutch rod will not be bent when the lathe is raised -- do not pick up by chip pan.

Mounting pads do not require anchoring.

Leveling screws are equipped with non-slip mounting pads which eliminate the need for anchoring or bolting machine to floor. Floor must be clean and free of oil.



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KALAMAZOO, MICHIGAN 49001

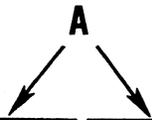
# 130-025-12 THREADING CHART

for

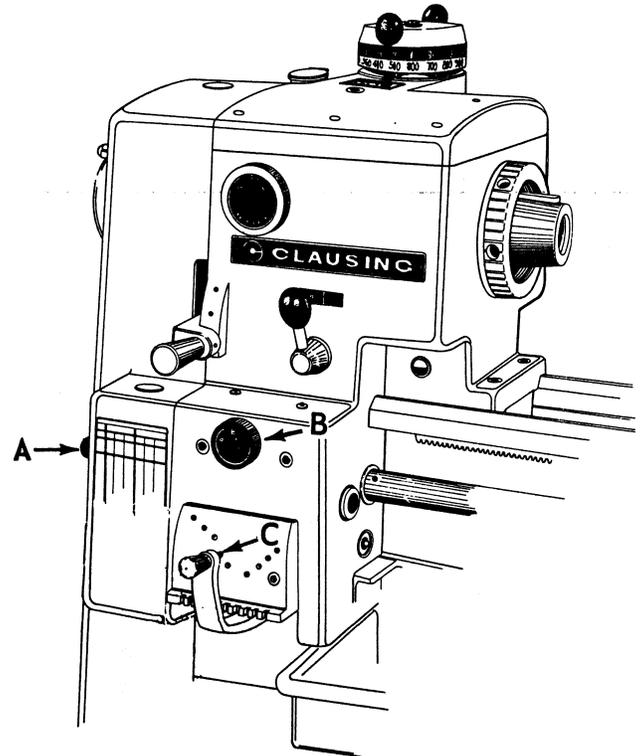
5900 SERIES CLAUSING 12" LATHES

JUNE 1967

FILE 130-025-12



G ↓ I	SLIDE GEAR IN			SLIDE GEAR OUT		
	B	C	A	B	C	A ← B
1	4 .0367	8 .0183	16 .0092	32 .0046	64 .0022	128 .0011
2	4 1/2 .0326	9 .0163	18 .0081	36 .0041	72 .0020	144 .00094
3	5 .0293	10 .0147	20 .0073	40 .0036	80 .0018	160 .00092
4	5 1/2 .0267	11 .0134	22 .0066	44 .0033	88 .0017	176 .00083
5	5 3/4 .0255	11 1/2 .0127	23 .0063	46 .0031	92 .0016	184 .00079
6	7 .0209	14 .0105	28 .0052	56 .0026	112 .0013	224 .00065
7	6 3/4 .0218	13 1/2 .0109	27 .0054	54 .0027	108 .00136	216 .00068
8	6 1/2 .0226	13 .0113	26 .0056	52 .0028	104 .0014	208 .0007
9	6 .0244	12 .0122	24 .0061	48 .003	96 .0015	192 .00076



### LEGEND

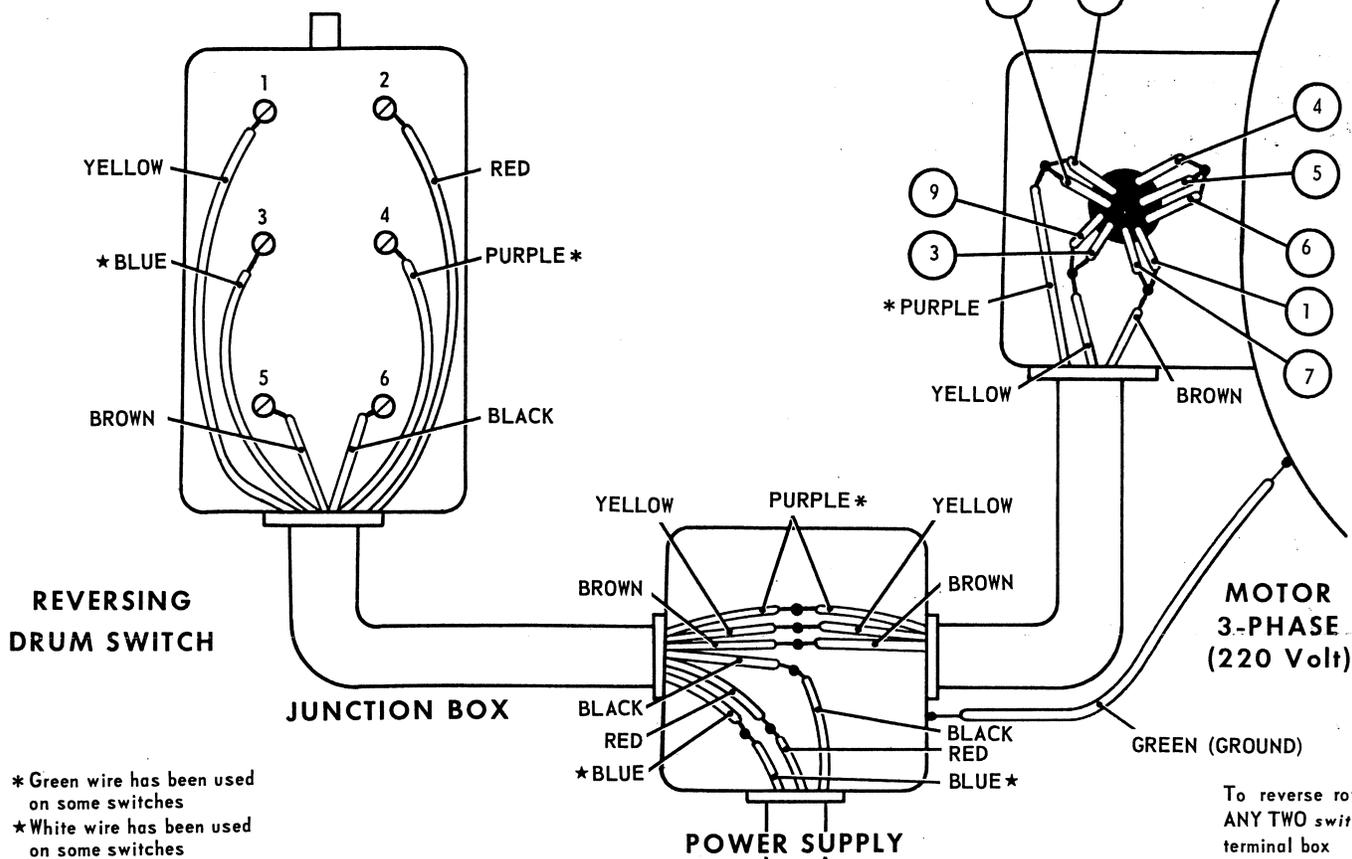
A. GEAR SHIFTER HANDLE changes ratio between spindle and lead screw. There are two positions - IN and OUT. Do not shift while spindle is turning.

B. GEAR SHIFTER KNOB has three positions - B, C or A. Engaged position is vertical. If knob doesn't shift easily, place lead screw direction lever in neutral (center position), and turn sliding gear handle until knob can be engaged - do not force.

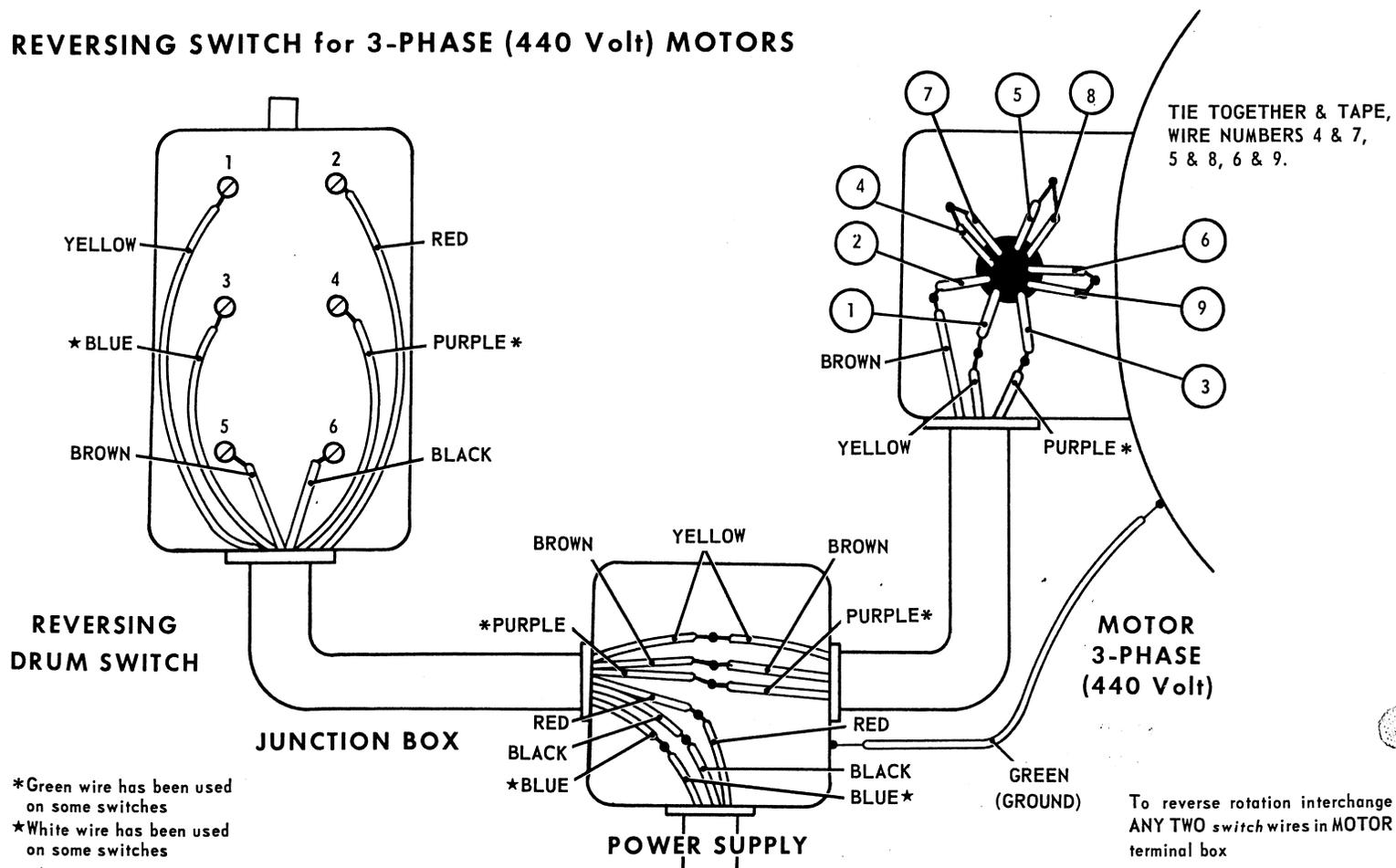
C. GEAR SHIFTER LEVER. To shift, pull out on handle, drop lever, slide to position desired, raise lever and push in handle to engage lock pin. If thread-feed selector handle does not slide easily, turn sliding gear shifter handle (A) while shifting.

**CROSS FEED 1/2 OF LONGITUDINAL**

## REVERSING SWITCH for 3-PHASE (220 Volt) MOTORS



## REVERSING SWITCH for 3-PHASE (440 Volt) MOTORS





CLAUSING CORPORATION  
KALAMAZOO, MICHIGAN 49001

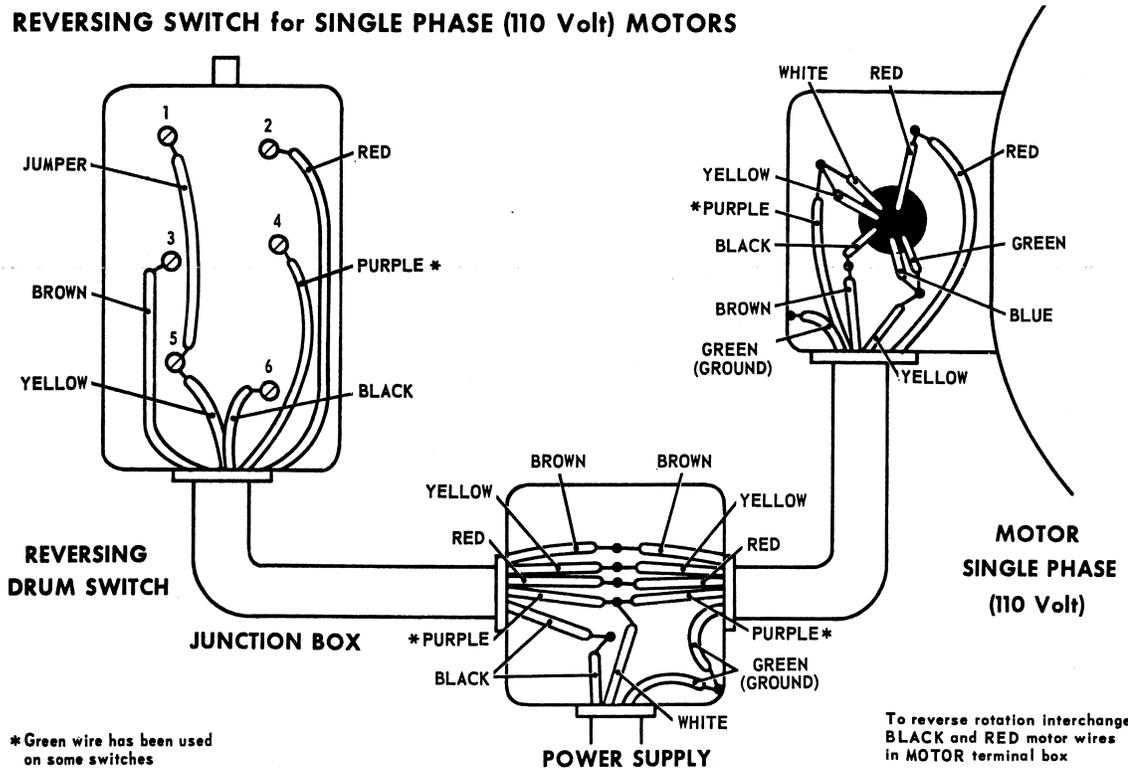
# WIRING INSTRUCTIONS

for  
4900-series  
Serial Numbers from 400971  
5900-series  
Serial Numbers from 500817

## CLAUSING LATHES

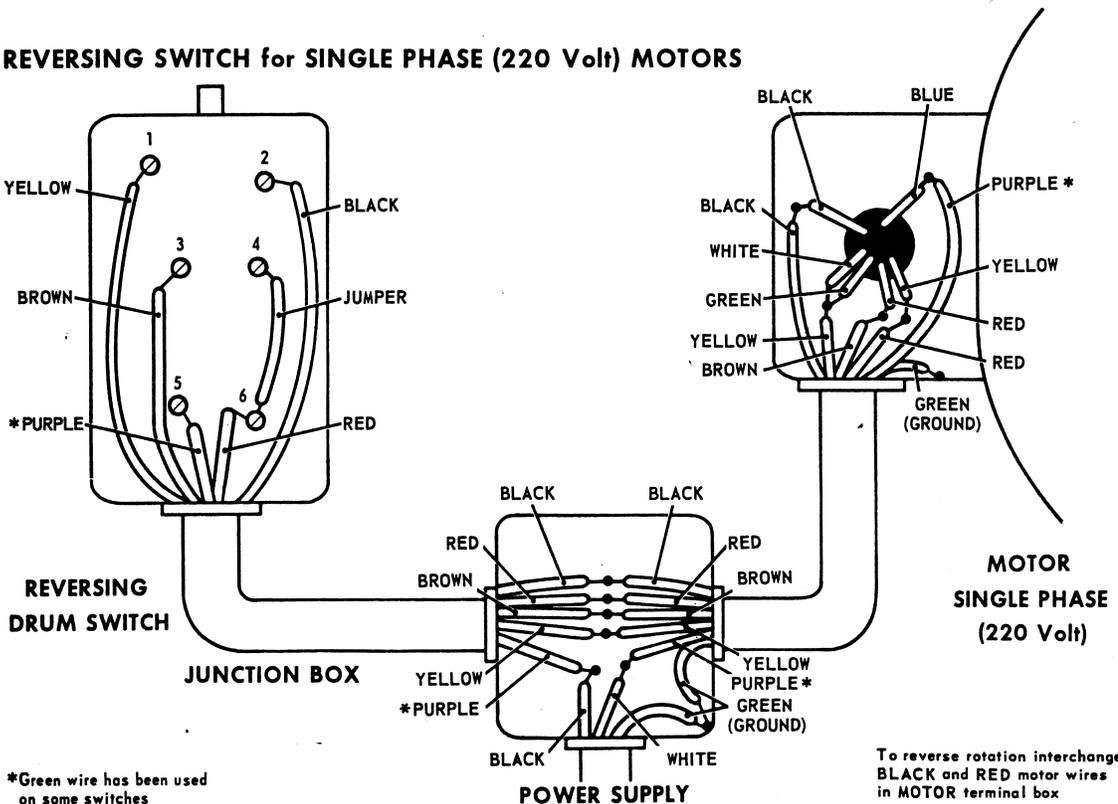
DEC. 15, 1971 FILE NO. 710-041-2

### REVERSING SWITCH for SINGLE PHASE (110 Volt) MOTORS



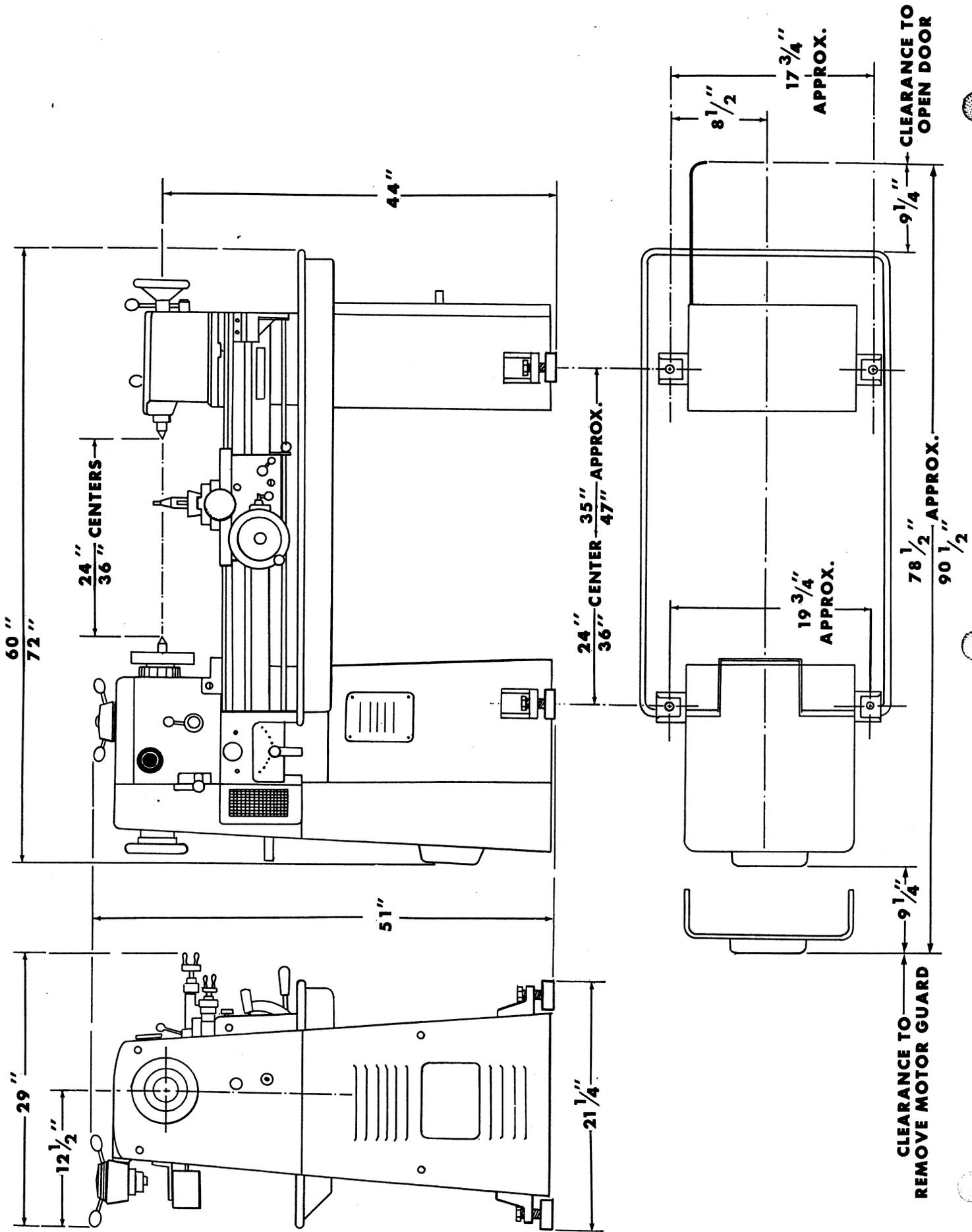
\*Green wire has been used on some switches

### REVERSING SWITCH for SINGLE PHASE (220 Volt) MOTORS



\*Green wire has been used on some switches

GENERAL DIMENSIONS -- 5900 SERIES CLAUSING LATHES



# MAINTENANCE AND ADJUSTMENTS

## PREVENTIVE MAINTENANCE

The lathe should be kept clean and properly lubricated at all times.

Don't use your lathe for a work bench. Don't leave tools on bed ways.

Always shut off power before leaving lathe.

Recheck level of the bed frequently.

Lock tailstock to bed ways before turning between centers.

Before threading, clean chips and dirt from lead screw, and oil lightly.

Securely lock tool in position before taking a cut.

## CLUTCH ADJUSTMENT

Adjusting clutch -- if the countershaft clutch slips when spindle drive is engaged, adjust as follows:

1. Remove front cover.

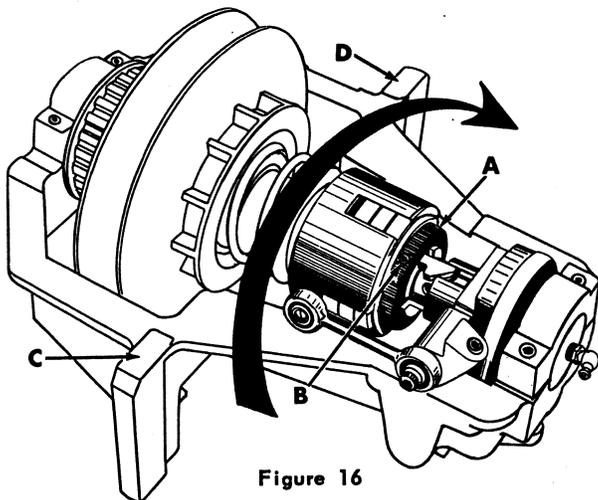


Figure 16

2. Loosen the lock screw (B, fig. 16) in the adjusting ring (A).
3. Turn the adjusting ring in a clockwise direction approximately 1/8 turn. **DO NOT OVER-TIGHTEN** -- just enough to prevent slipping.

NOTE: If adjusting ring is turned too tightly -- clutch will not engage when clutch lever is moved up.

4. Retighten lock screw.

## ADJUSTING CARRIAGE BEARING PLATES

Bearing plates on the carriage, which bear on the underside of both the front and back bed ways, anchor the carriage firmly to the bed in a vertical direction. Bearing plates have shims of varying thickness for adjustment of possible wear.

## CROSS SLIDE AND COMPOUND SLIDE GIB ADJUSTMENT

Gibs are properly adjusted, when tool post slide and cross slide move with a slight drag.

To adjust the tapered gibs:

1. Shift power feed lever to neutral position.
2. Loosen the rear adjusting screw several turns.



Figure 17

3. Turn front adjusting screw (A, fig. 17) until tight, then back off about one-half turn -- slide should move with a slight drag.
4. Retighten the rear adjusting screw.

## TENSIONING TIMING BELT

1. Loosen slightly the four hex nuts holding the countershaft bracket to pedestal.
2. With a soft hammer, tap on bottom or top of countershaft bracket until belt is properly tensioned.

NOTE: Properly tensioned, timing belt should depress approximately 1/2" with light finger pressure -- too much tension causes excessive wear.

3. Measure to make sure that points (C & D, fig. 16) on countershaft bracket are the same distance from top of head pedestal.
4. Tighten the four hex nuts securely.
5. Recheck belt tension.

## NO. 7118 MICRO CARRIAGE STOP

The carriage stop indicates the proper stopping point of the carriage for accurate duplicate work.

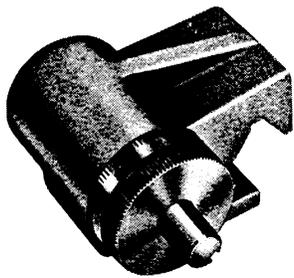


Figure 4

The stop clamps to front bed way of lathe -- clean ways before installing. Micrometer dial, graduated in thousandths, permits exact settings, refer to figure 4.

Micro carriage stop does not automatically disengage carriage feed -- carriage should always be fed manually the last part of the cut.

If carriage runs into the stop under power feed, it may break the stop or damage the lathe.

## NO. 7529 THREAD CUTTING STOP

The thread cutting stop indicates the proper depth at which to stop the cross feed. It is especially valuable for threading and turning down a rough diameter. The thread cutting stop is mounted on the cross slide dovetail, either in front of or behind the compound rest.

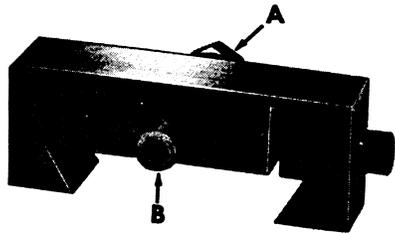


Figure 5

An adjustable screw (B, fig. 5) and lock nut (A) permit accurate setting. In mounting the cross slide stop on the cross slide dovetail, first remove the guard. Then clean the dovetail ways and clamp the stop in the approximate position required. Turn the adjusting screw into exact position and lock with the knurled nut. Place a small piece of paper or cardboard over the cross feed screw to keep it free from dirt and chips during the cutting operation.

During threading operations or whenever the tool is feed in with the compound, the cross feed is used only to back the tool out of the end of each cut. The thread cutting stop, combined with the micrometer graduations of the cross feed control handle on the lathe, assure an accurate "zero" reading before the compound rest feed is advanced for the next cut.

*Do not force cross slide against the stop.*

## NO. 7002 MILLING ATTACHMENT

Equips lathe for face milling, cutting keyways and slots, milling dovetails, squaring shafts, making dies and moulds, etc. Quickly and easily installed by removing compound rest and clamping base of milling attachment in its place.

The attachment can be swiveled to hold work at any angle -- loosening the two lock screws releases it for turning.

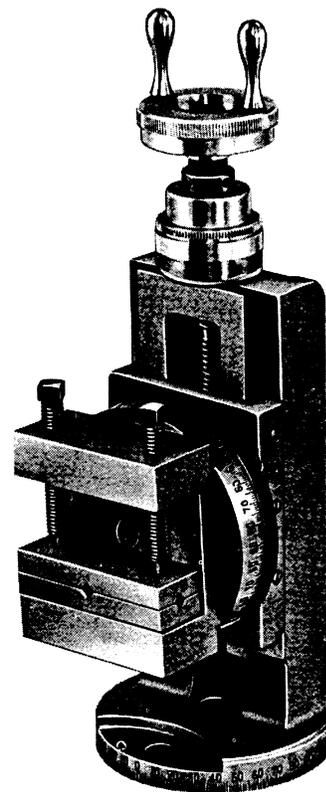


Figure 6

Position of vise is controlled by handwheel with micrometer graduated collar, refer to figure 6. Vise slide is graduated in degrees. Vise can be quickly set at any angle.

A milling cutter holder or collet attachment is recommended for holding the milling cutter -- chucks are not satisfactory for such use.

Cutting speeds for milling should be approximately 2/3 of the speeds used for general turning. When milling, take light cuts and use a slow even feed. Never force the work into the cutter.

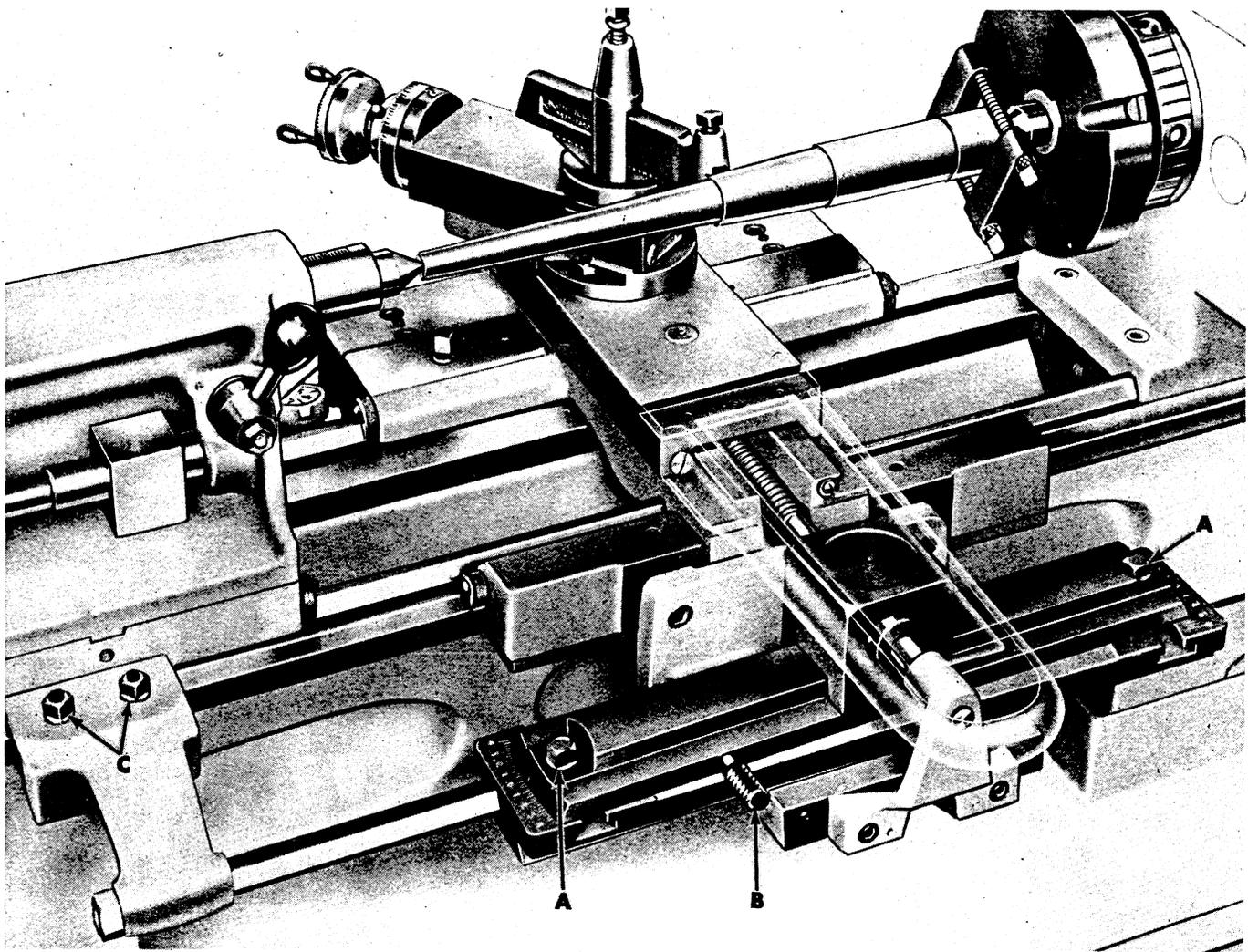


Figure 3

## NO. 7214 TELESCOPIC TAPER ATTACHMENT

The Clausing telescopic taper attachment is of sturdy construction, precision machined and easy to operate. Capacity is 4" maximum taper per foot and 10" maximum travel at one setting.

### TO OPERATE:

1. Mount work in the lathe – whenever possible the cut should be from the small diameter toward the large diameter.
2. Set point of tool bit on exact center line.
3. Lathe cross slide and taper slide should move freely, but with no up or down play. Adjust the tension with the gib screws in the cross slide and support bracket.
4. Position taper attachment so it is about in the center of the work. Lock clamp bracket to lathe bed.
5. Move the carriage by hand to make sure there is sufficient travel to complete the taper cut. If there isn't, adjust the compound rest, move the carriage or the taper attachment to a different position.
6. Set the taper bar to taper desired – graduations on left end of bar are marked in degrees (graduations indicate included angle) – the right end in inches per foot.
7. To set the attachment for taper desired –
  - A. Loosen the two lock screws (A, fig. 3) on each end of taper bar.
  - B. Turn taper adjusting screw (B) to taper desired.
  - C. Tighten the two taper bar lock screws (A).
  - D. Be sure clamp bracket (C) is locked to lathe bed.
8. Engage feed with tool approximately 1" away from beginning of cut to be sure backlash is removed before tool commences to cut.

Caution: When taper attachment is not in use, loosen clamp (C) so it will slide freely along lathe bed with the movement of the carriage and lock taper bar at zero degrees.

## LATHE ATTACHMENTS

Lathe attachments fall into two general classes: (1) Those which increase speed and accuracy of general lathe operations: (2) Those which equip the lathe to handle work such as milling, grinding, etc., which usually require a single purpose machine.

### NO. 7211 FOLLOWER REST

The follower rest provides support for long, slender work mounted between centers.

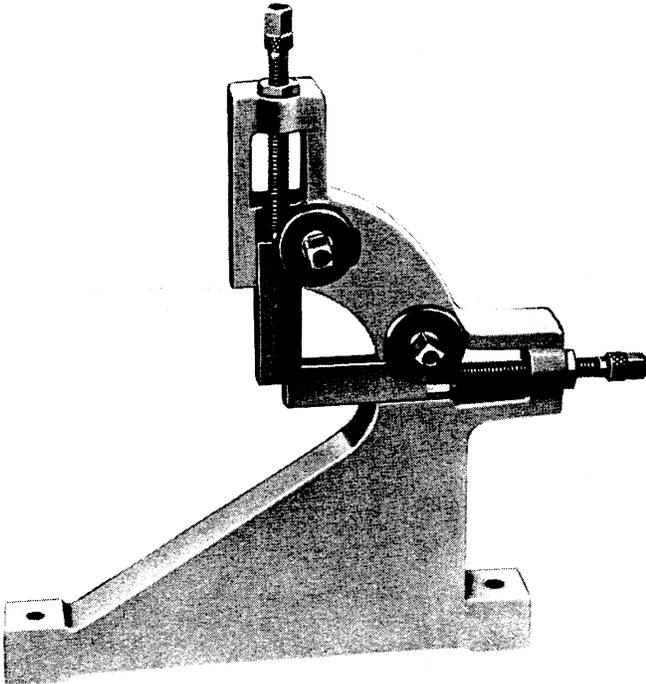


Figure 1

The two adjustable jaws hold the work in rigid position, preventing it from springing away from tool -- refer to figure 1.

The jaws must be accurately positioned to form a true bearing for the work, allowing it to turn freely but without play. The following method is recommended for most work: First, clean saddle dovetail ways. Mount work in lathe, remove the cross feed screw chip guard, and clamp the follower rest to the dovetail. Start the first cut and turn approximately one inch. Adjust both jaws to the turned diameter, making sure they do not bind or twist the work piece -- cellophane paper is sometimes inserted between jaws and work to obtain proper clearance. After both jaws have been properly adjusted, tighten the adjusting screw lock nuts and the jaw clamp screws.

During the cutting operation, apply plenty of lubricant on the work at the point of bearing with the jaws. After each cut the jaws must be adjusted to the new diameter being turned.

### NO. 7212 STEADY REST

The steady rest supports long work during turning, boring or threading operations.

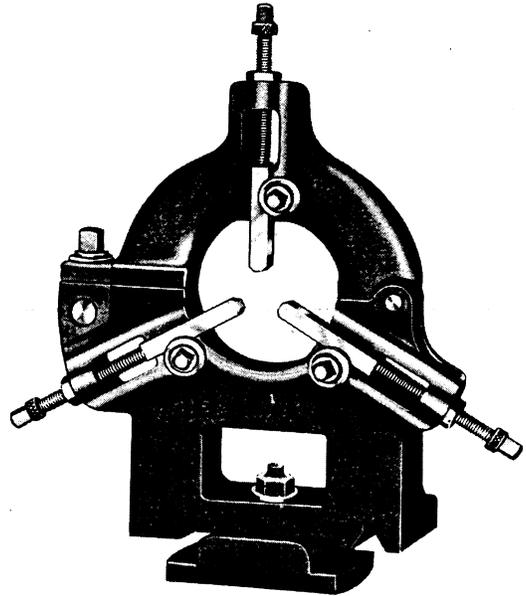


Figure 2

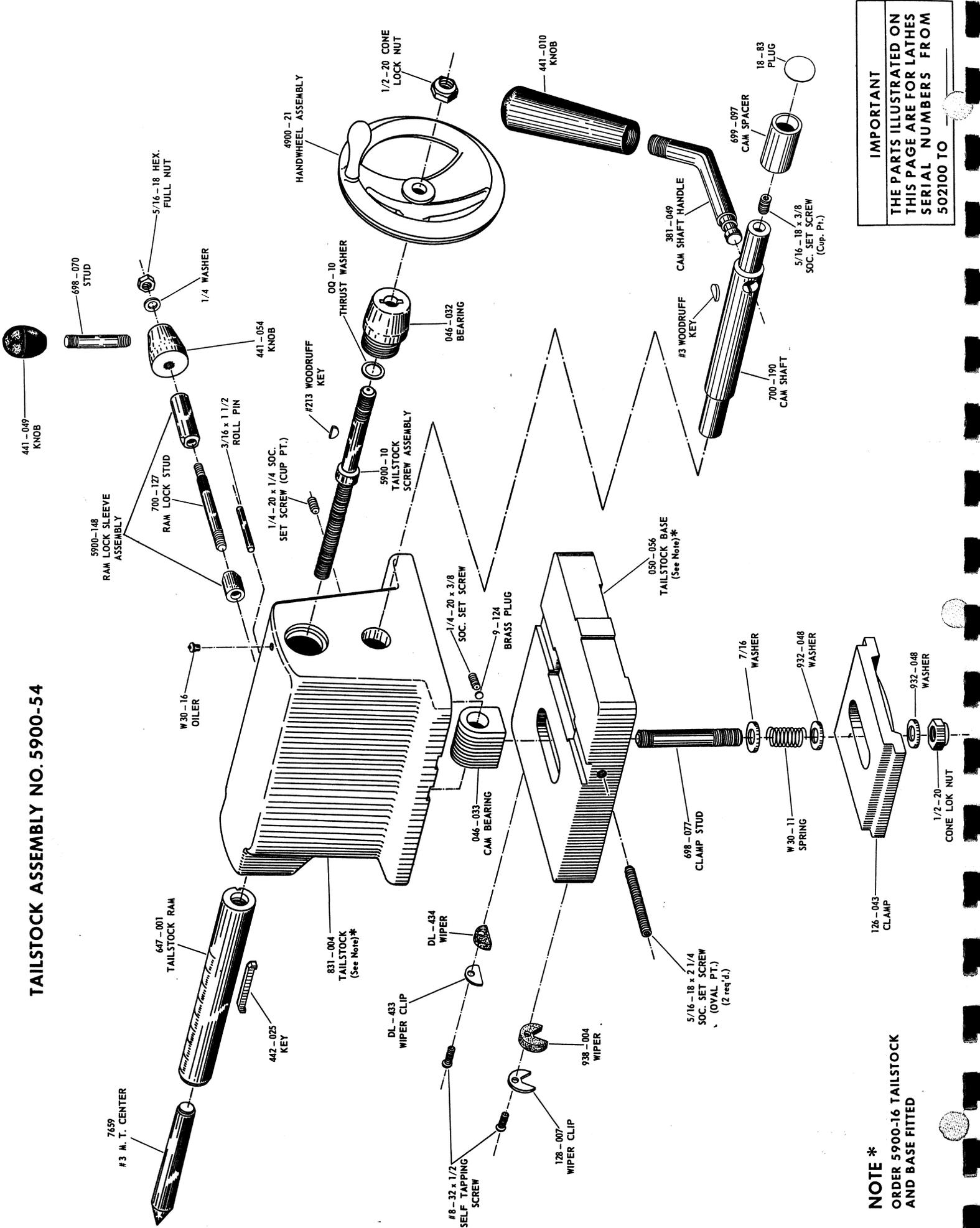
The base clamps to the lathe bed ways -- the adjustable jaws form a bearing for the work and hold it in exact position -- refer to figure 2.

Work that is less than  $3/4$ " diameter and machined more than 5 or 6 inches away from headstock should be supported by a steady rest.

Accurate positioning of the steady rest jaws to the work is important. The jaws must form a true bearing for the work, allowing it to turn freely but without play. To install, clean the bed ways, mount work in lathe, then clamp steady rest to lathe bed close to headstock. Adjust bottom jaws first -- then bring top jaw into light contact with work -- cellophane paper is sometimes used between the jaws and the work to obtain proper clearance. After all three jaws have been properly adjusted, tighten the adjusting screw lock nuts and the jaw clamp screws. Slide the steady rest near the point where the work is to be machined and clamp it to the bed. During the cutting operation, apply plenty of lubricant on the work at the point of bearing with the jaws.

Scoring is usually caused by the top jaw being too tightly clamped, or by lack of oil. Chatter is caused by the top jaw being too loose.

# TAILSTOCK ASSEMBLY NO. 5900-54

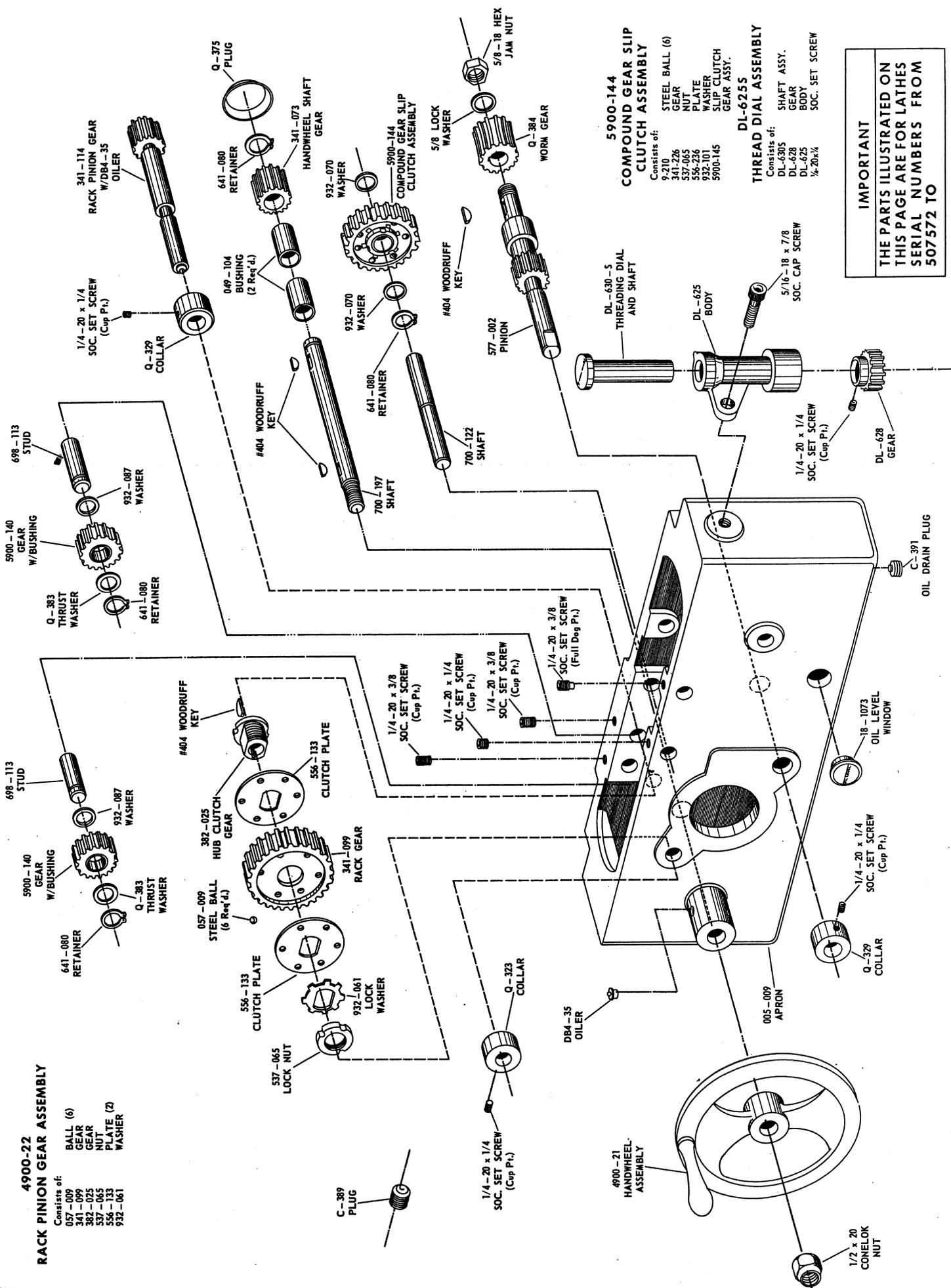


**IMPORTANT**  
 THE PARTS ILLUSTRATED ON  
 THIS PAGE ARE FOR LATHES  
 SERIAL NUMBERS FROM  
 502100 TO \_\_\_\_\_

**NOTE \***  
 ORDER 5900-16 TAILSTOCK  
 AND BASE FITTED

### 4900-22 RACK PINION GEAR ASSEMBLY

- Consists of:  
 BALL (6)  
 GEAR  
 GEAR  
 NUT  
 PLATE (2)  
 WASHER  
 057-009  
 341-099  
 382-025  
 537-065  
 556-133  
 932-061



### 5900-144 COMPOUND GEAR SLIP CLUTCH ASSEMBLY

- Consists of:  
 STEEL BALL (6)  
 GEAR  
 NUT  
 PLATE  
 WASHER  
 SLIP CLUTCH  
 GEAR ASSY.  
 9-210  
 341-226  
 537-065  
 556-236  
 932-101  
 5900-145

### DL-6255 THREAD DIAL ASSEMBLY

- Consists of:  
 SHAFT ASSY.  
 DL-630S  
 DL-628  
 DL-625  
 1/2-20x1/4  
 SOC. SET SCREW

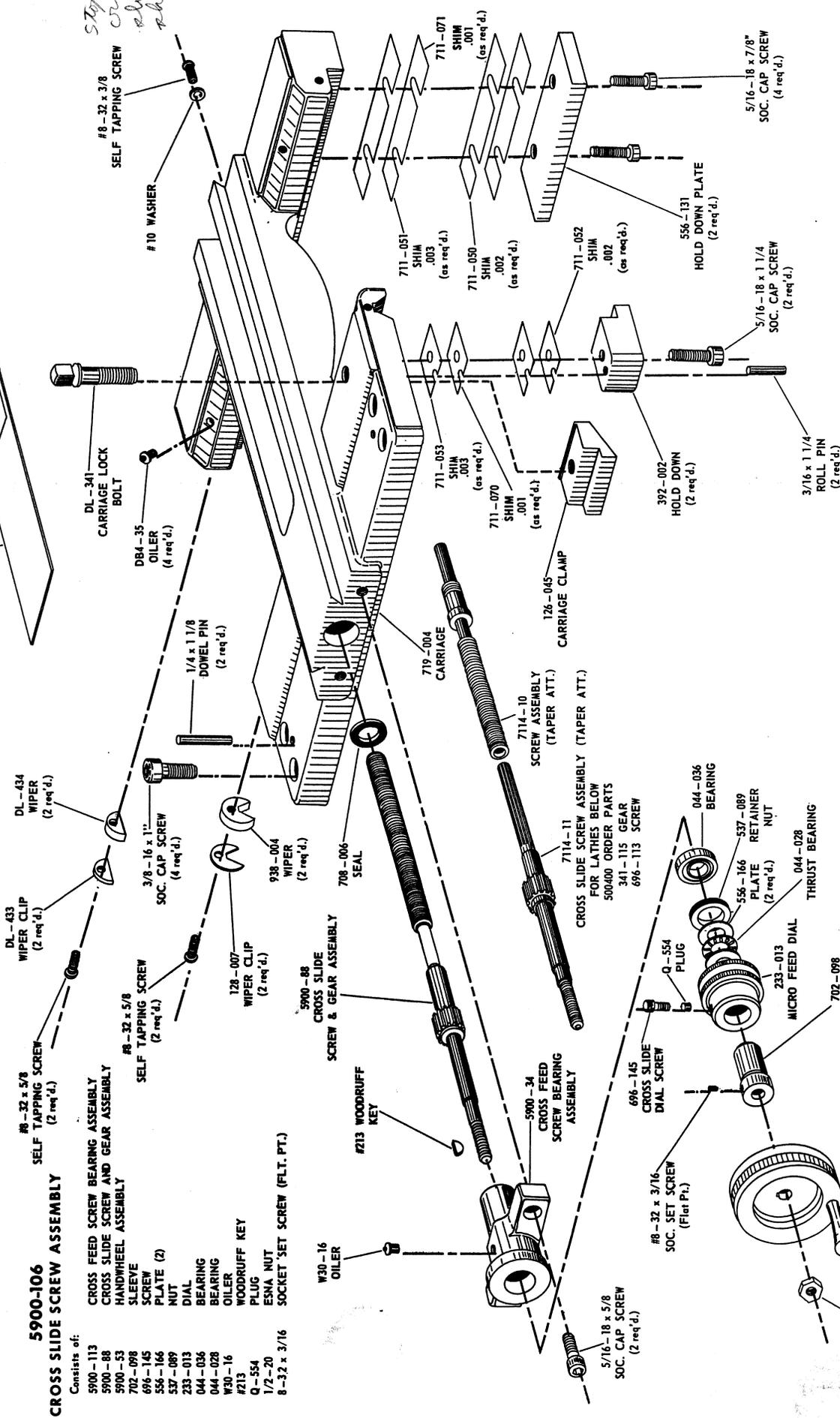
**IMPORTANT**  
 THE PARTS ILLUSTRATED ON  
 THIS PAGE ARE FOR LATHES  
 SERIAL NUMBERS FROM  
 507572 TO



# CARRIAGE SADDLE ASSEMBLY 5900-1004

## 5900-106 CROSS SLIDE SCREW ASSEMBLY

- Consists of:
- 5900-113 CROSS FEED SCREW BEARING ASSEMBLY
  - 5900-88 CROSS SLIDE SCREW AND GEAR ASSEMBLY
  - 5900-53 HANDWHEEL ASSEMBLY
  - 702-098 SLEEVE
  - 696-145 SCREW
  - 556-166 PLATE (2)
  - 537-089 NUT
  - 233-013 DIAL
  - 044-036 BEARING
  - 044-028 BEARING
  - W30-16 OILER
  - #213 WOODRUFF KEY
  - Q-554 PLUG
  - ESNA NUT
  - SOCKET SET SCREW (FLT. PT.)
  - 1/2-20
  - 8-32 x 3/16

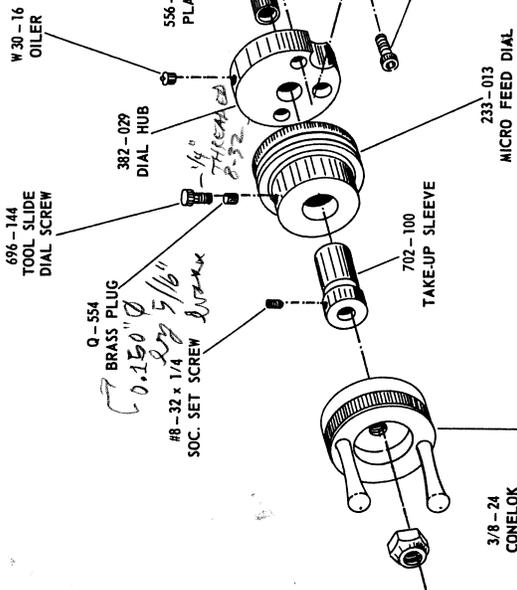
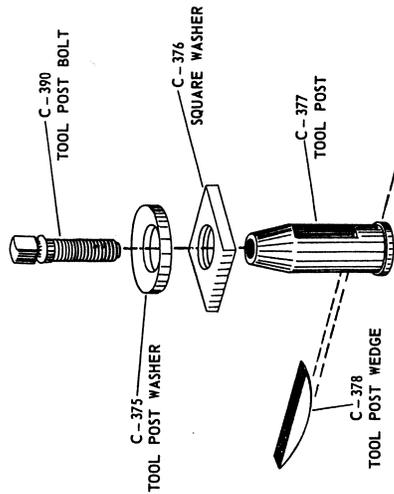


**IMPORTANT**  
THE PARTS ILLUSTRATED ON  
THIS PAGE ARE FOR LATHES  
SERIAL NUMBERS FROM  
502100 TO

# COMPOUND AND CROSS SLIDE ASSEMBLY 5900-1003

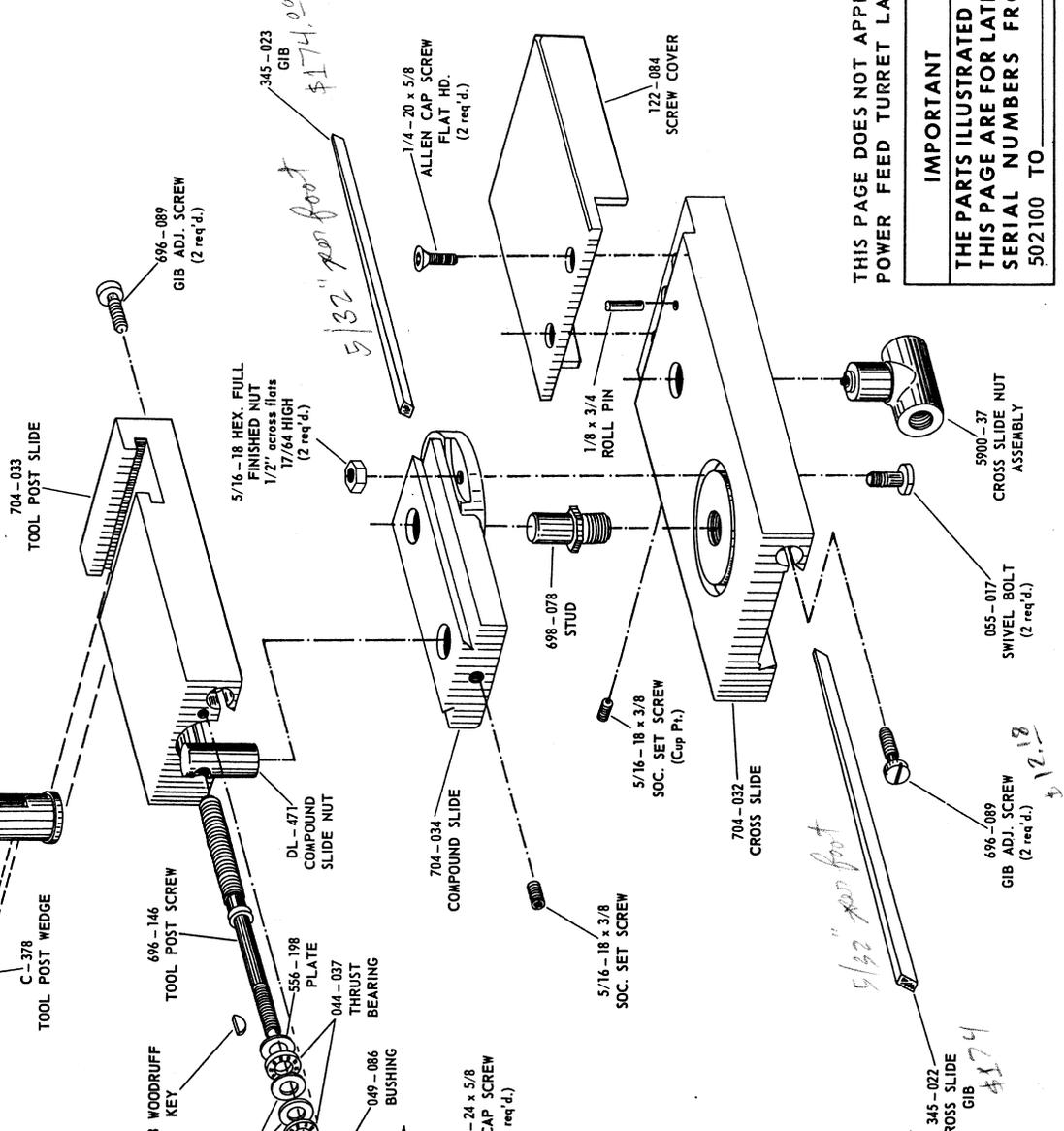
## 5900-31 TOOL POST ASSEMBLY

- CONSISTS OF:  
 C-375 WASHER  
 C-376 SQ. WASHER  
 C-377 TOOL POST  
 C-378 WEDGE  
 C-390 BOLT



## 5900-30 HANDWHEEL ASSEMBLY COMPOUND ASSEMBLY

- Consists of:  
 704-034 SLIDE  
 704-033 SLIDE  
 702-100 SLEEVE  
 696-089 SCREW (2)  
 696-146 SCREW  
 4900-52 HANDWHEEL ASSEMBLY  
 382-029 HUB  
 345-023 GIB  
 233-013 DIAL  
 049-086 BUSHING  
 W30-16 OILER  
 Q-554 PLUG  
 696-144 DIAL SCREW  
 DL-471 NUT  
 #213 WOODRUFF KEY  
 3/8-24 CONE LOCK NUT  
 5/16-18 x 3/8 SOC. SET SCREW  
 #8-32 x 1/4 SOC. SET SCREW (2)  
 #10-24 x 5/8 SOC. CAP SCREW (2)  
 044-037 BEARING (2)  
 556-197 PLATE (3)  
 556-198 PLATE



THIS PAGE DOES NOT APPLY TO  
POWER FEED TURRET LATHES.

**IMPORTANT**  
 THE PARTS ILLUSTRATED ON  
 THIS PAGE ARE FOR LATHES  
 SERIAL NUMBERS FROM  
 502100 TO \_\_\_\_\_

# VARIABLE SPEED MOTOR PULLEY ASSEMBLY 5900-1002

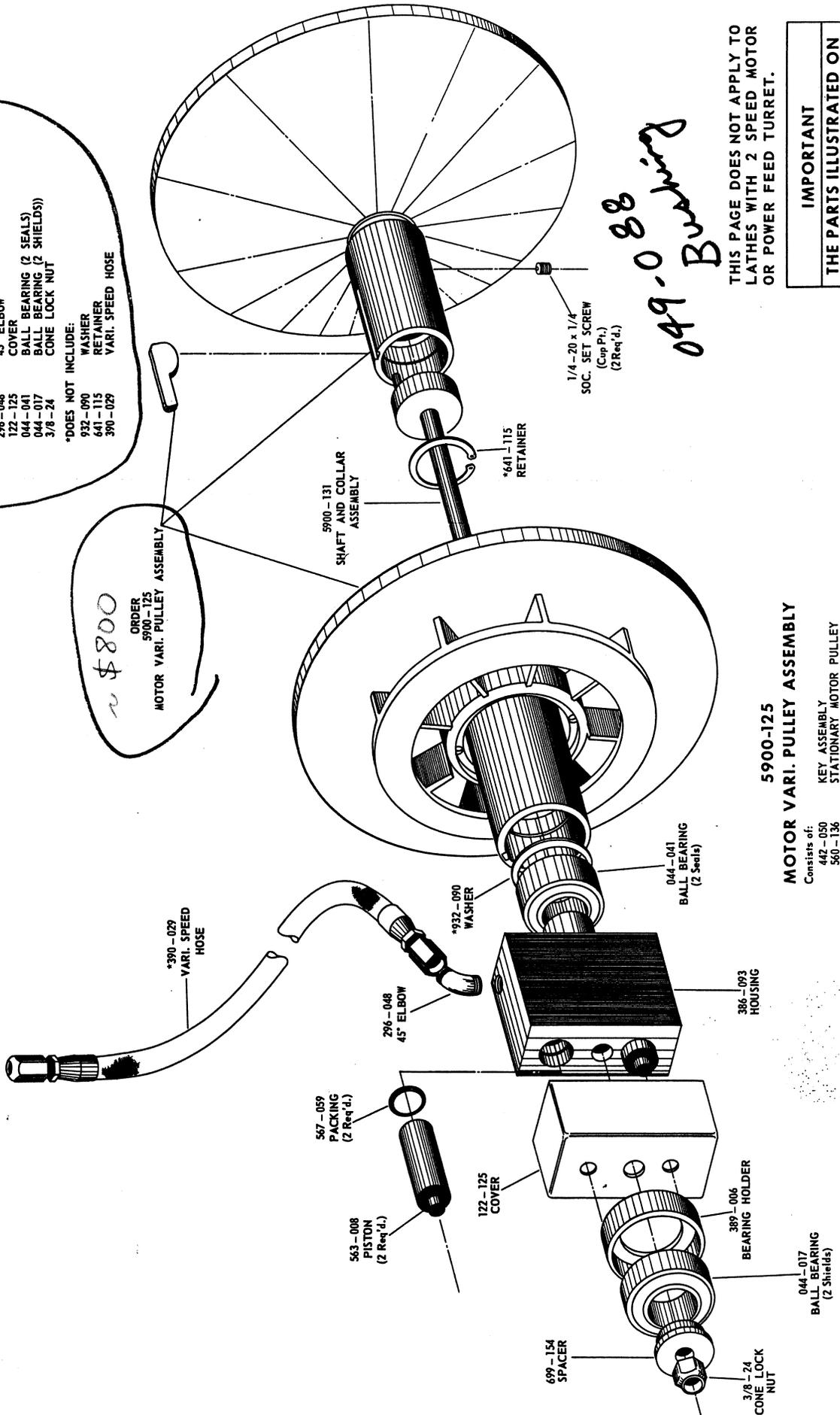
## 5900-132 CYLINDER AND SHAFT ASSEMBLY

- Consists of:
- 5900-131 SHAFT AND COLLAR ASSEMBLY
  - 699-154 SPACER
  - 567-059 PACKING (2)
  - 563-008 PISTON (2)
  - 389-006 BEARING HOLDER
  - 386-093 HOUSING
  - 296-048 45° ELBOW
  - 122-125 COVER
  - 044-041 BALL BEARING (2 SEALS)
  - 044-017 BALL BEARING (2 SHIELDS)
  - 3/8-24 CONE LOCK NUT

\*DOES NOT INCLUDE:  
 932-090 WASHER  
 641-115 RETAINER  
 390-029 VARI. SPEED HOSE

~\$800  
 ORDER 5900-125  
 MOTOR VARI. PULLEY ASSEMBLY

049-088 Bushing



THIS PAGE DOES NOT APPLY TO LATHES WITH 2 SPEED MOTOR OR POWER FEED TURRET.

**IMPORTANT**  
 THE PARTS ILLUSTRATED ON THIS PAGE ARE FOR LATHES SERIAL NUMBERS FROM 505856 TO

## 5900-125 MOTOR VARI. PULLEY ASSEMBLY

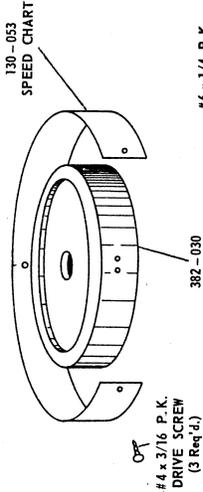
- Consists of:
- 442-050 KEY ASSEMBLY
  - 560-136 STATIONARY MOTOR PULLEY
  - 5900-124 SLIDING MOTOR PULLEY ASSEMBLY
  - 1/4-20 x 1/4 SOC. SET SCREW (2)

# VARIABLE SPEED CONTROL

NOTE: Parts Shown in Red are for lathes with 2-SPEED Motors only.

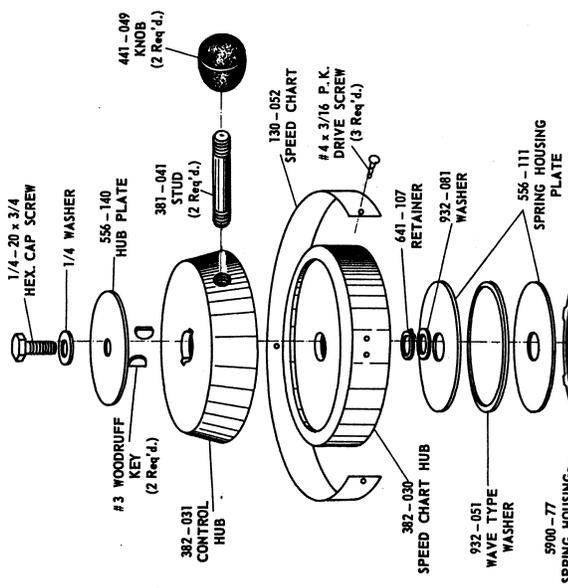
## 5920-15 SPEED CHART HUB ASSEMBLY

- Consists of:  
 HUB 382-030  
 SPEED CHART 130-053  
 DRIVE SCREW (3) #4 x 3/16 P.K.



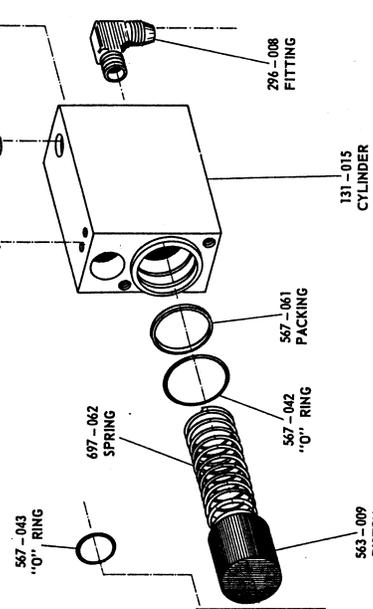
## 5900-147 SPEED CHART HUB ASSEMBLY

- Consists of:  
 HUB 382-030  
 SPEED CHART 130-052  
 DRIVE SCREW (3) #4 x 3/16 P.K.



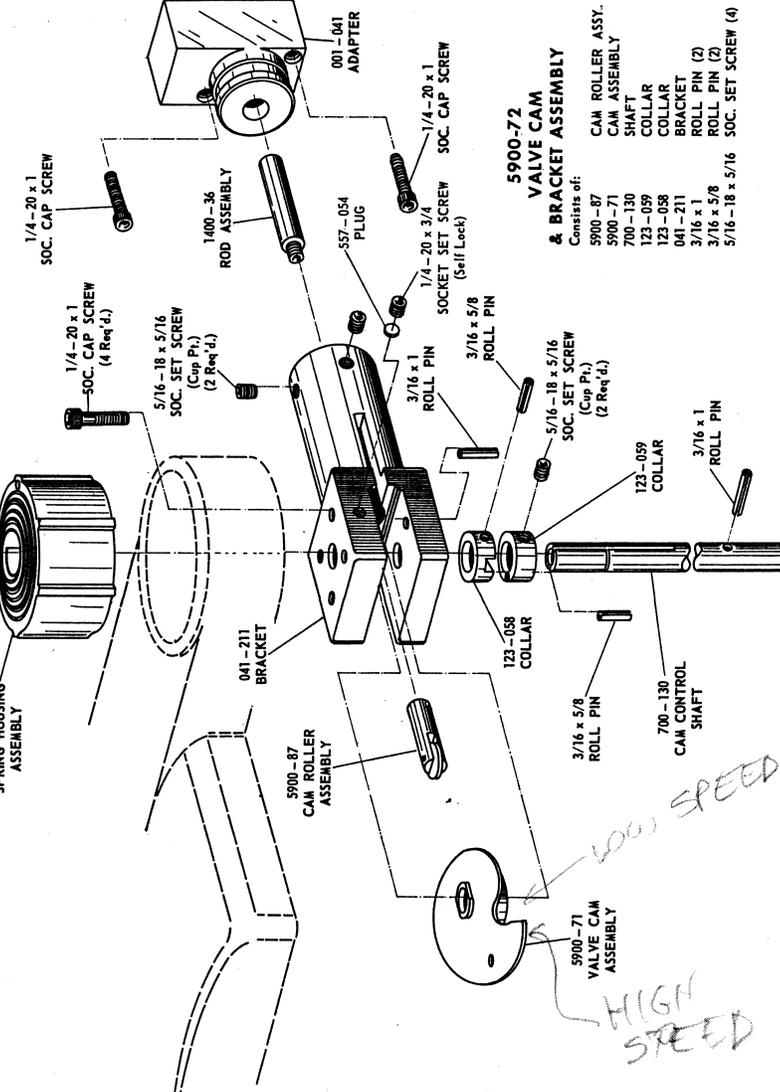
## 1400-33 UPPER CYLINDER ASSEMBLY

- Consists of:  
 ROD ASSEMBLY 1400-36  
 OIL LEVEL WINDOW 935-003  
 SPRING 697-062  
 PACKING "O" RING 567-043  
 PACKING "O" RING 567-042  
 PACKING "V" 567-061  
 PISTON 563-009  
 OILER (TYPE G) 296-008  
 FITTING 294-008  
 CYLINDER 131-015  
 ADAPTER 001-041  
 DRIVE SCREW (2) #6 x 1/4 P.K.  
 SOC. CAP SCREW (2) 1/4-20 x 1



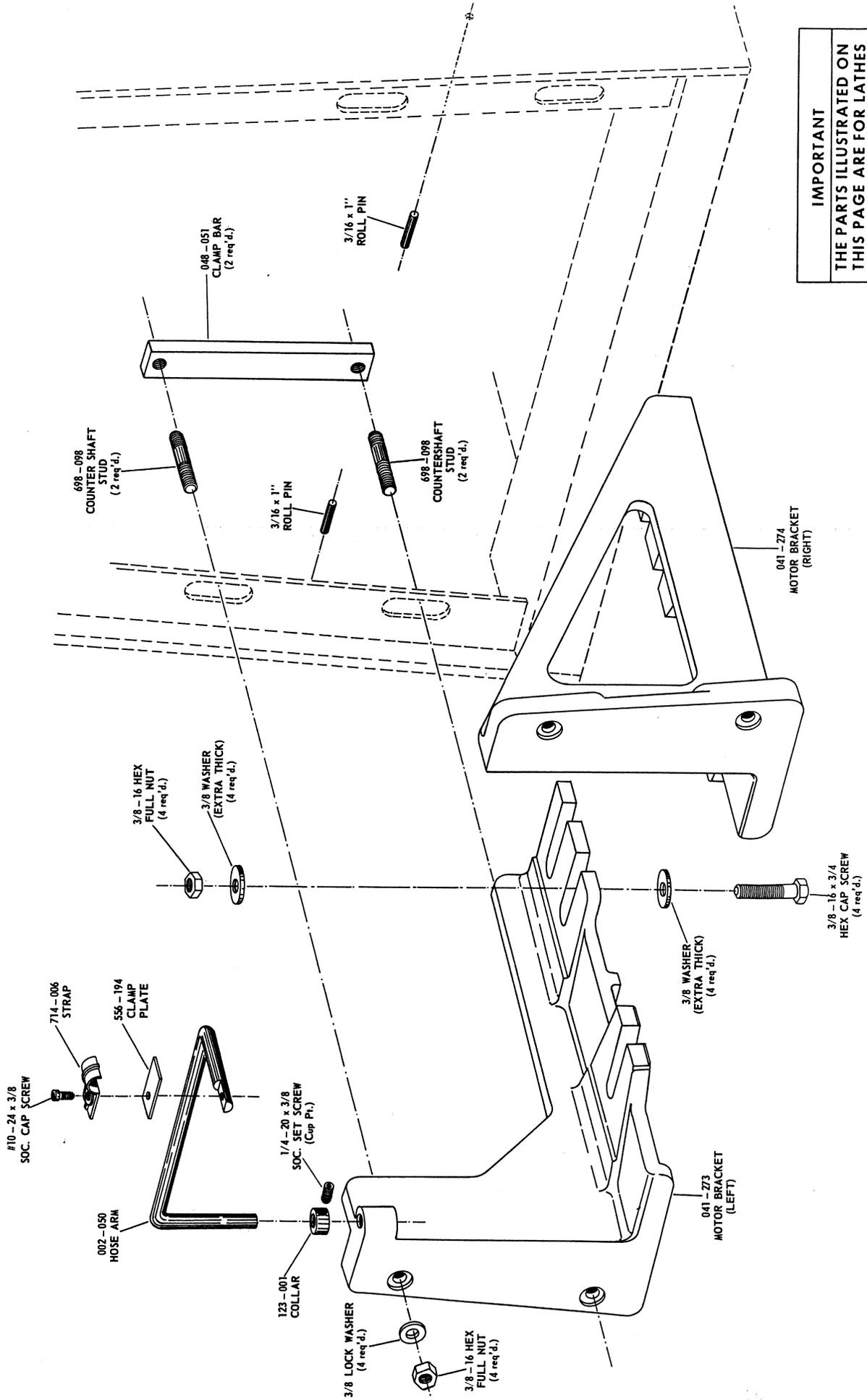
## 5900-72 VALVE CAM & BRACKET ASSEMBLY

- Consists of:  
 CAM ROLLER ASSY. 5900-87  
 CAM ASSEMBLY 5900-71  
 SHAFT 700-130  
 COLLAR 123-059  
 BRACKET 041-211  
 ROLL PIN (2) 3/16 x 1  
 ROLL PIN (2) 3/16 x 5/8  
 SOC. SET SCREW (4) 1/4-20 x 1



**IMPORTANT**  
 THE PARTS ILLUSTRATED ON THIS PAGE ARE FOR LATHES SERIAL NUMBERS FROM 508890 TO

# MOTOR BASE ASSEMBLY



**IMPORTANT**  
 THE PARTS ILLUSTRATED ON  
 THIS PAGE ARE FOR LATHES  
 SERIAL NUMBERS FROM  
 502100 TO \_\_\_\_\_



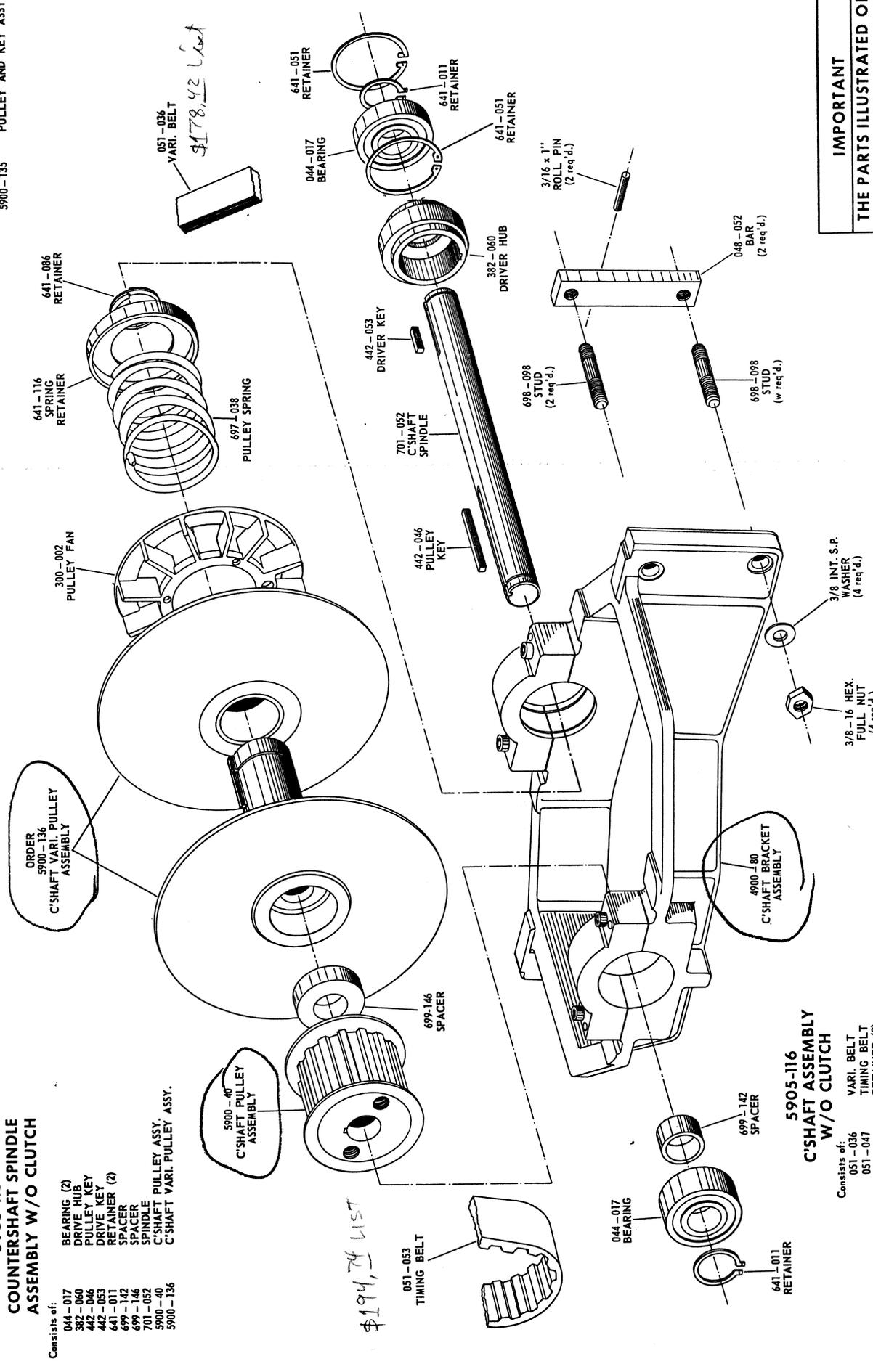
**5900-136  
C'SHAFT VARI. PULLEY  
ASSEMBLY**

- Consists of:  
 300-002 FAN  
 641-086 RETAINER  
 641-116 SPRING  
 697-038 PULLEY SPRING  
 5900-65 SLIDING C'SHAFT  
 5900-135 PULLEY AND KEY ASSY.

**COUNTERSHAFT ASSEMBLY W/O CLUTCH  
5900-1006**

**5905-115  
COUNTERSHAFT SPINDLE  
ASSEMBLY W/O CLUTCH**

- Consists of:  
 044-017 BEARING (2)  
 382-060 DRIVE HUB  
 442-046 DRIVE KEY  
 641-011 RETAINER (2)  
 699-142 SPACER  
 701-052 SPINDLE  
 5900-40 C'SHAFT PULLEY ASSY.  
 5900-136 C'SHAFT VARI. PULLEY ASSY.

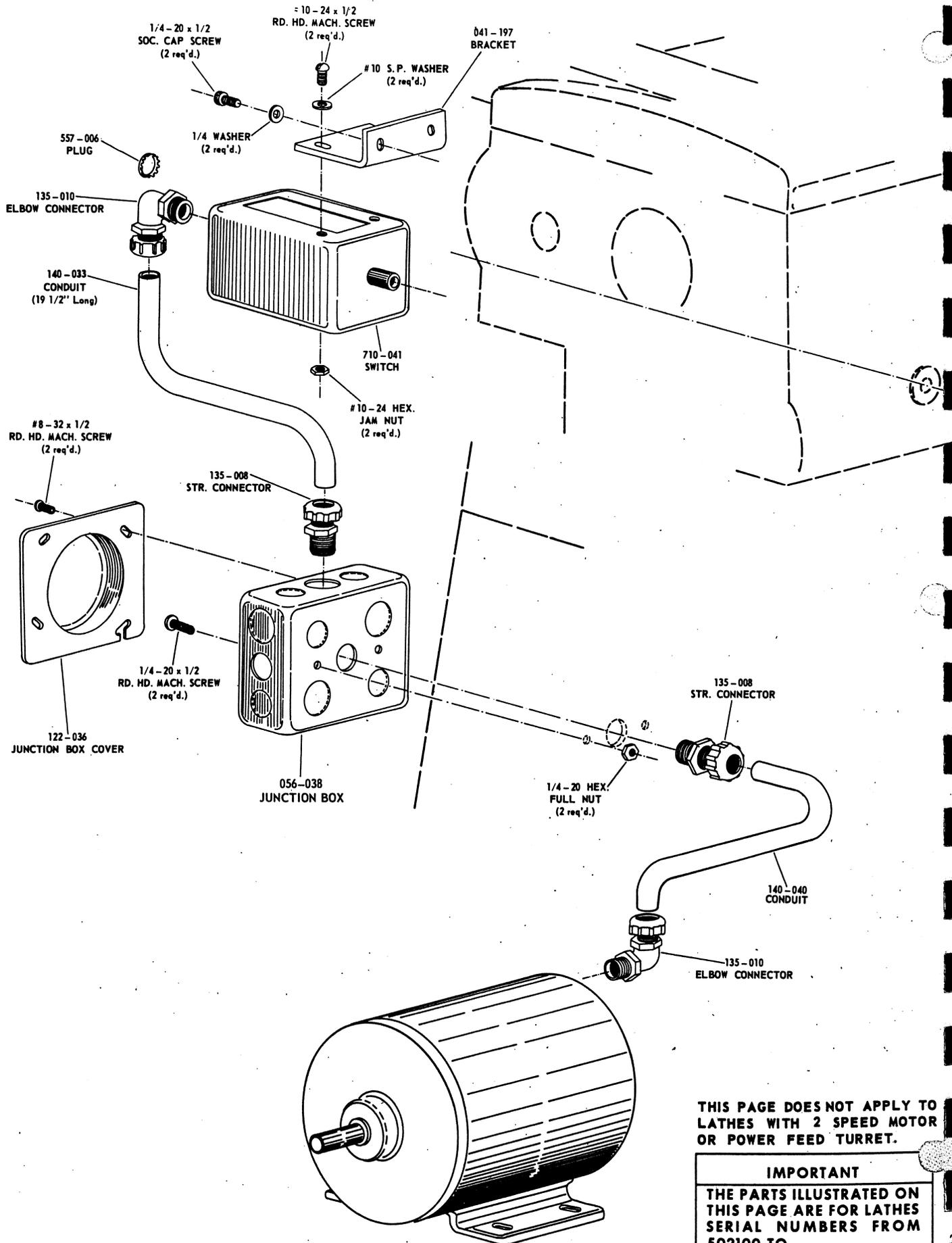


**5905-116  
C'SHAFT ASSEMBLY  
W/O CLUTCH**

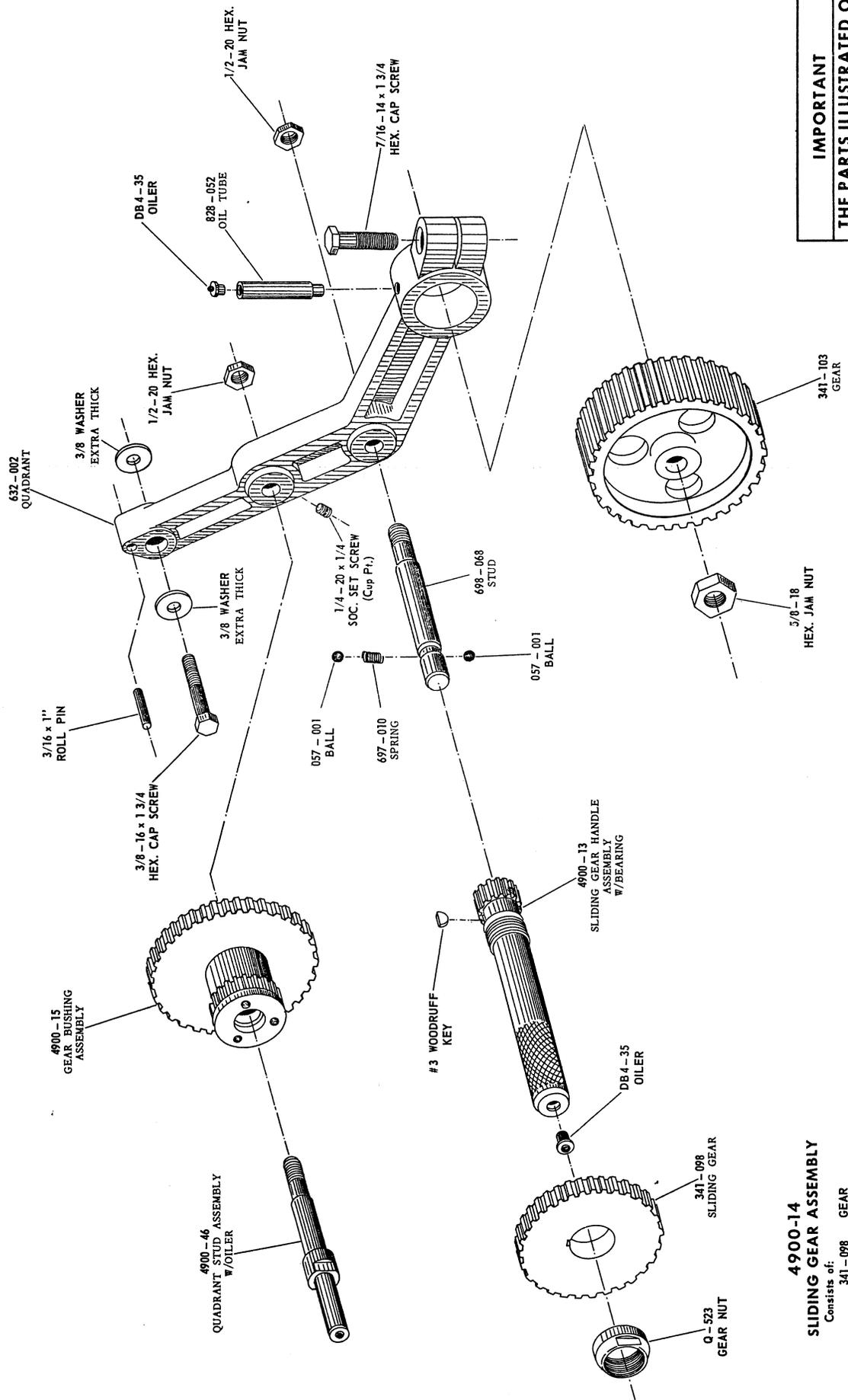
- Consists of:  
 051-056 VARI. BELT  
 051-047 TIMING BELT  
 641-051 RETAINER (2)  
 4900-80 C'SHAFT BRKT. ASSEM.  
 5905-115 C'SHAFT SPINDLE ASSEM.

**IMPORTANT**  
 THE PARTS ILLUSTRATED ON  
 THIS PAGE ARE FOR LATHES  
 SERIAL NUMBERS FROM  
 505856 TO

# ELECTRICAL ASSEMBLY



# QUADRANT ASSEMBLY NO. 4900-29



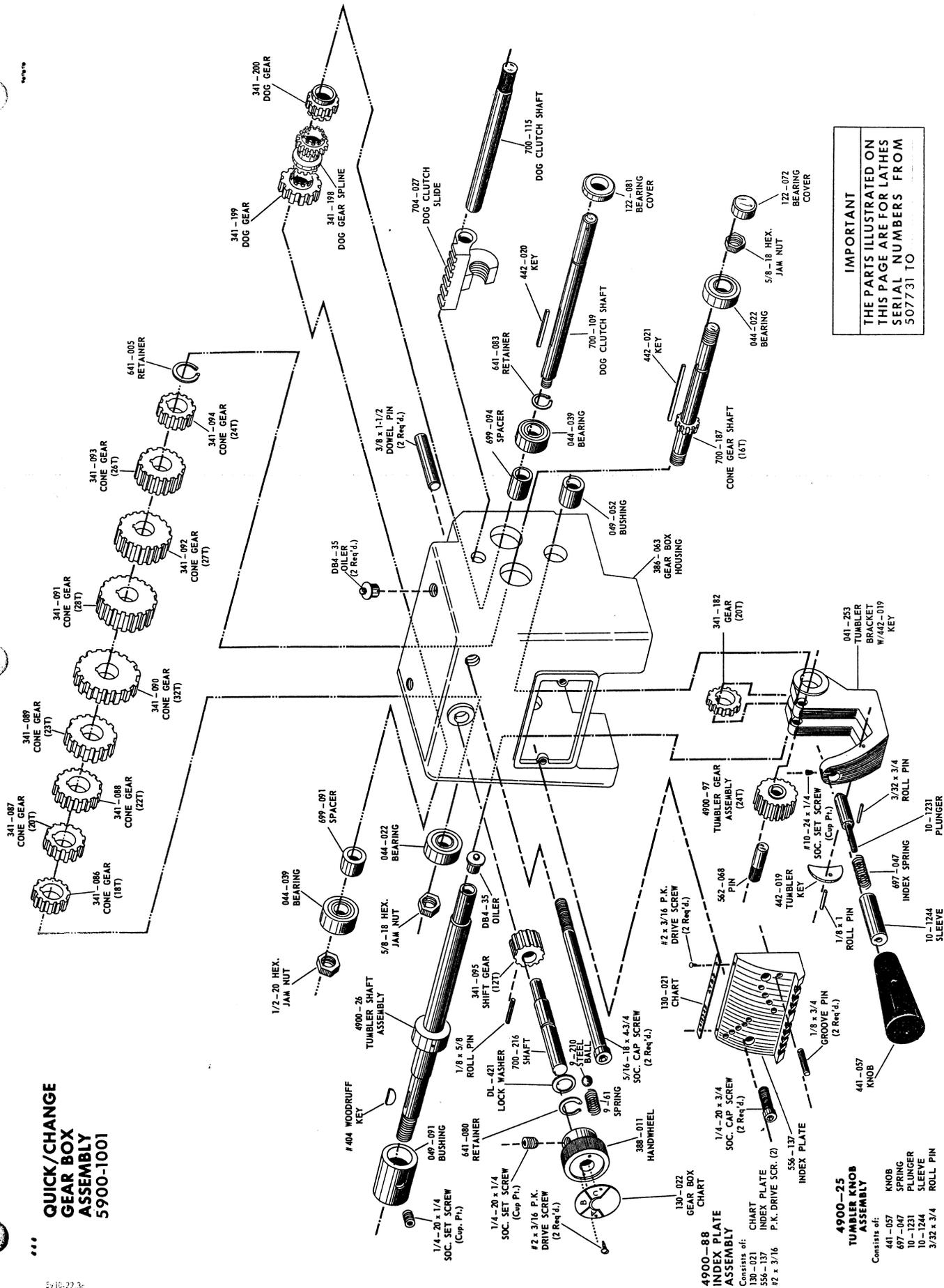
**IMPORTANT**  
THE PARTS ILLUSTRATED ON  
THIS PAGE ARE FOR LATHES  
SERIAL NUMBERS FROM  
502100 TO

**4900-14**  
**SLIDING GEAR ASSEMBLY**  
Consists of:  
341-098 GEAR  
4900-13 GEAR ASSEMBLY  
DB4-35 OILER  
Q-523 NUT  
#3 WOODRUFF KEY

**QUICK/CHANGE  
GEAR BOX  
ASSEMBLY  
5900-1001**

5-10-22-3c

5910



**IMPORTANT**  
THE PARTS ILLUSTRATED ON  
THIS PAGE ARE FOR LATHES  
SERIAL NUMBERS FROM  
507731 TO

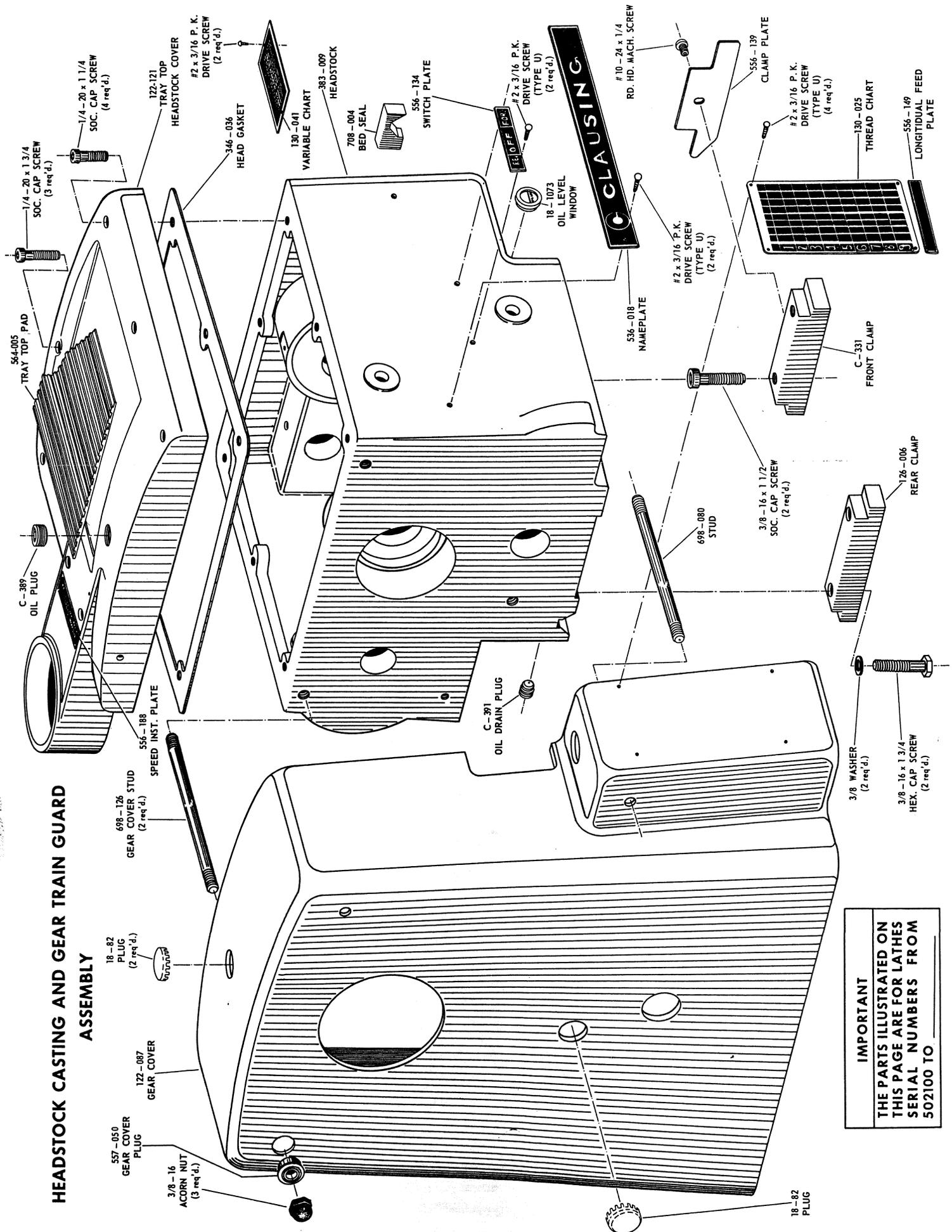
**4900-88  
INDEX PLATE  
ASSEMBLY**  
Consists of:  
130-021 INDEX PLATE  
556-137 P.K. DRIVE SCR. (2)  
#2 x 3/16

**4900-25  
TUMBLER KNOB  
ASSEMBLY**  
Consists of:  
441-057 KNOB  
697-047 SPRING  
10-1231 PLUNGER  
10-1244 SLEEVE  
3/32 x 3/4 ROLL PIN

**4900-97  
TUMBLER GEAR  
ASSEMBLY**  
Consists of:  
4900-97 TUMBLER GEAR ASSEMBLY (24T)  
562-068 PIN  
442-019 TUMBLER KEY  
#10-24 x 1/4 SOC. SET SCREW (Cup Pt.)  
1/8 x 1 ROLL PIN  
3/32 x 3/4 ROLL PIN  
10-1231 PLUNGER  
10-1244 SLEEVE

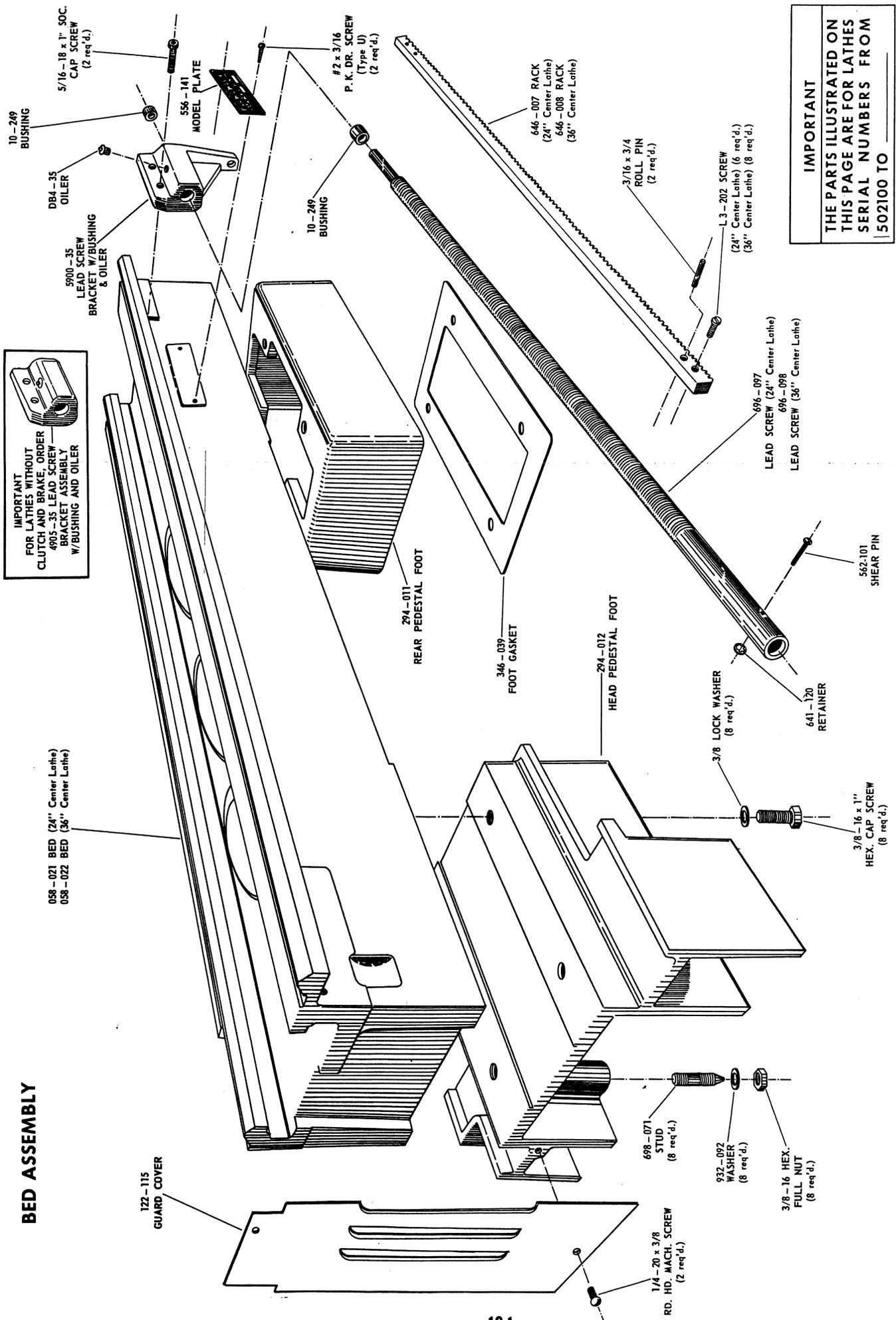


# HEADSTOCK CASTING AND GEAR TRAIN GUARD ASSEMBLY



**IMPORTANT**  
 THE PARTS ILLUSTRATED ON THIS PAGE ARE FOR LATHES SERIAL NUMBERS FROM 502100 TO

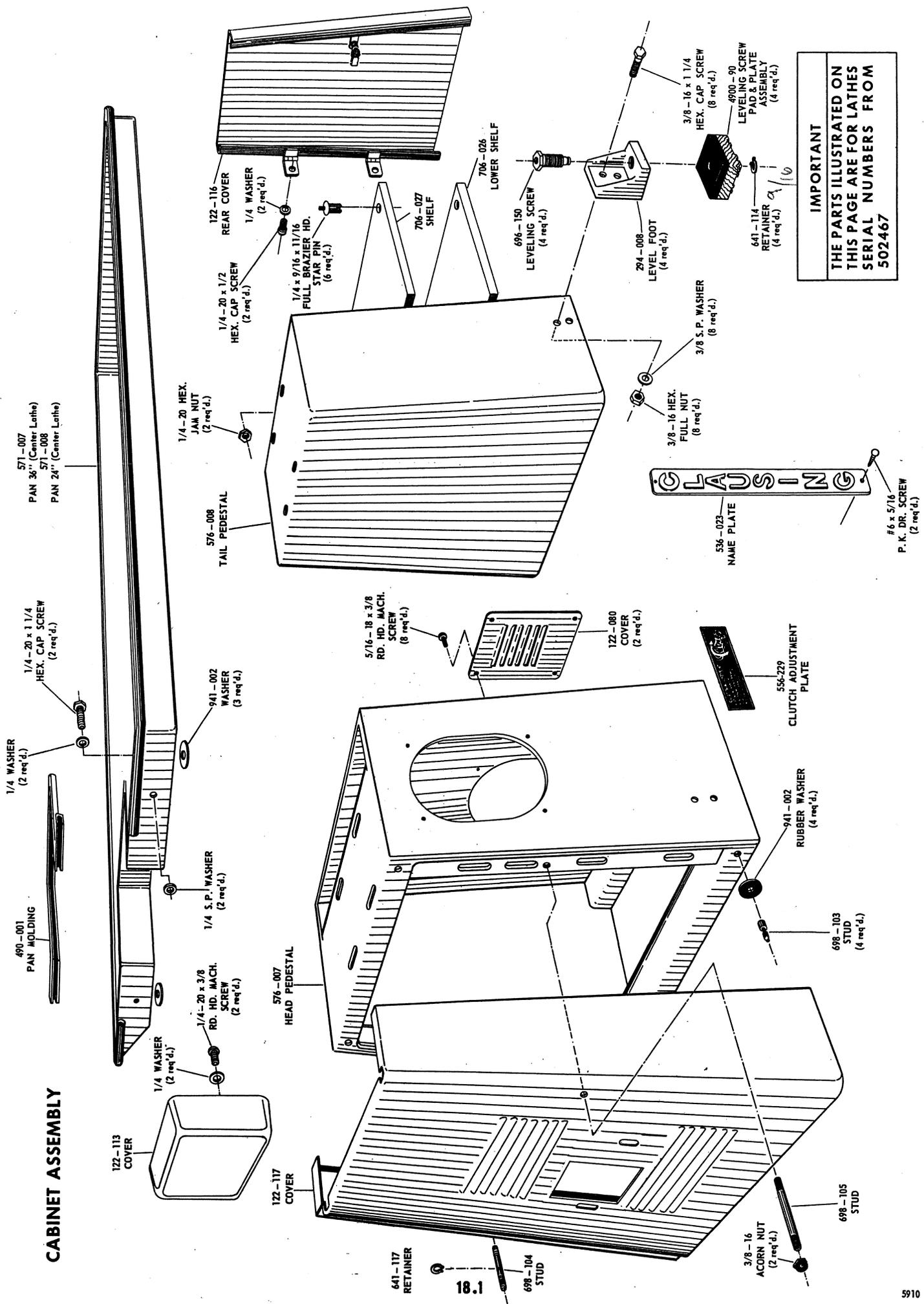
# BED ASSEMBLY



**IMPORTANT**  
 FOR LATHES WITHOUT  
 CLUTCH AND BRAKE, ORDER  
 4905-35 LEAD SCREW  
 BRACKET ASSEMBLY  
 W/BUSHING AND OILER

**IMPORTANT**  
 THE PARTS ILLUSTRATED ON  
 THIS PAGE ARE FOR LATHES  
 SERIAL NUMBERS FROM  
 1502100 TO \_\_\_\_\_

# CABINET ASSEMBLY



**IMPORTANT**  
 THE PARTS ILLUSTRATED ON  
 THIS PAGE ARE FOR LATHES  
 SERIAL NUMBERS FROM  
 502467

# PARTS INDEX

For Lathes From Serial No. 508890 To \_\_\_\_\_

Cabinet .....	18.1
Bed .....	19.1
Headstock Casting and Gear Train Guard .....	20.1
Headstock .....	21.2
Quick-Change Gear Box .....	22.3
Gear Train .....	23
Electrical Assembly .....	24
Countershaft .....	25.5
Countershaft with Clutch and Brake .....	26.5
Motor Base Assembly .....	27
Variable Speed Control .....	28.1
Variable Speed Motor Pulley .....	29.3
Cross Slide .....	30
Carriage .....	31
Apron .....	32.3 & 33.4
Tailstock .....	34.1

## INSTRUCTIONS FOR ORDERING REPAIR PARTS

It is important to furnish the following information in addition to QUANTITY required:

1. PART NUMBER
2. PART NAME
3. MODEL and SERIAL NUMBER of machine tool – you'll find both on the metal plate attached to machine – note illustration below.



NOTE: Screws and nuts shown without part numbers should be purchased locally.

We reserve the right to make changes in design and specifications without notice.

## REPLACING UPPER VARIABLE CONTROL CYLINDER

1. Start lathe and turn speed control (A, Fig. 25) to top speed. Stop lathe and remove hydraulic hose (E) (use container to catch oil).

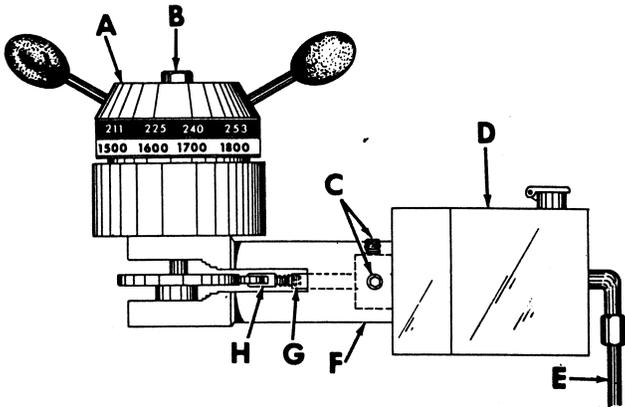


FIGURE 25

2. Loosen the two set screws (C) and remove upper cylinder (D) and rod assembly (G) from housing (F).
3. Insert set screw end of new rod assembly (G) into housing (F). Hold the rod firmly against cam roller (H) and turn speed control (A) against low speed stop.

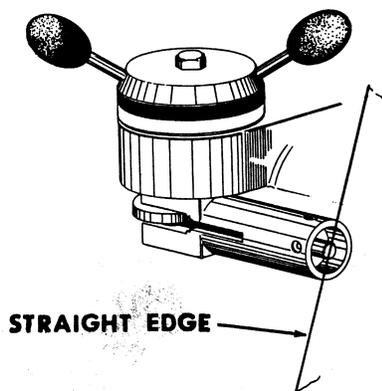


FIGURE 26

4. The end of rod (G) must be flush with face of housing (F) – use a straightedge to check as shown in Figure 26.
5. Remove rod (G, Fig. 25) from housing (F) and insert rod into upper cylinder (D) making sure socket set screw end is exposed.
6. Hold speed control (A) firmly against low speed stop while mounting upper cylinder (D) against housing (F) – secure with set screws (C).

**IMPORTANT:** Upper cylinder assembly must be solidly against housing face.

7. Install hydraulic line (E).

8. Fill cylinder with hydraulic oil. Start lathe and turn speed control to low speed stop and hold. Oil will drain from reservoir and bleed system. Add oil until reservoir is full. Turn speed control to high speed stop and return to low speed stop. Continue this cycle adding oil as needed (check sight window) until system is bled completely.

## REPLACING LOWER VARIABLE CONTROL CYLINDER

1. With lathe running, turn variable speed dial to highest range (280 or 2000). Then, turn motor off.
2. Measure distance from end of shaft (J, Fig. 24) to locknut (H). **NOTE:** Record this dimension.
3. Disconnect fitting (K) and drain oil from unit.
4. While holding variable pulley (F) from rotating remove locknut (H).
5. Pull dual hydraulic cylinder (G) and outer half of variable pulley (F) off the shaft (J).
6. Press dual hydraulic cylinder (G) with bearing (L) from variable pulley (F).
7. Slide new dual hydraulic cylinder with bearing into variable pulley hub (F), then slide the assembly onto shaft (J).
8. Start locknut (H) on shaft (J).
9. Hold the variable pulley so it will not rotate and then turn locknut (H) onto shaft (J) until distance from the end of the shaft (J) to locknut (H) is the same as step 2.
10. Start fitting (K) onto hydraulic cylinder (G). **NOTE:** Do not tighten.
11. Fill oil reservoir.
12. Keep oil reservoir filled, hold variable dial against low speed stop until oil runs out around fitting (K) – it takes a few minutes for oil to run down.
13. Tighten fitting (K).
14. Start lathe motor. Hold variable control against low speed stop for 30 seconds – turn variable dial to highest speed – then back to lowest speed a few times. Control should stay at 52 rpm.

**NOTE:** Watch dial for a few seconds. If it doesn't remain at 52 rpm, the hydraulic system must be bled to remove trapped air.

To remove air from hydraulic system:

- A. Run variable to highest speed.
- B. Loosen bleeder screw (D, Fig. 25) a few turns until oil starts coming out around the screw. *No bleeder is fitted.*
- C. Retighten bleeder screw.
- D. Turn variable dial to low speed, stop and release – pointer should remain at 52 rpm.

**NOTE:** If dial moves, repeat steps A, B, and C.

18. Hold variable control against low speed stop for 30 seconds, then turn through entire range.
19. Check adjustment of variable drive belt -- refer to ADJUSTING VARIABLE DRIVE BELT.
20. Replace belt guards and front cover.

### ADJUSTING VARIABLE DRIVE BELT

With motor on, turn variable control dial to HIGHEST SPEED -- use a tachometer to check spindle speed.

If tachometer doesn't register approximately 2000 rpm:

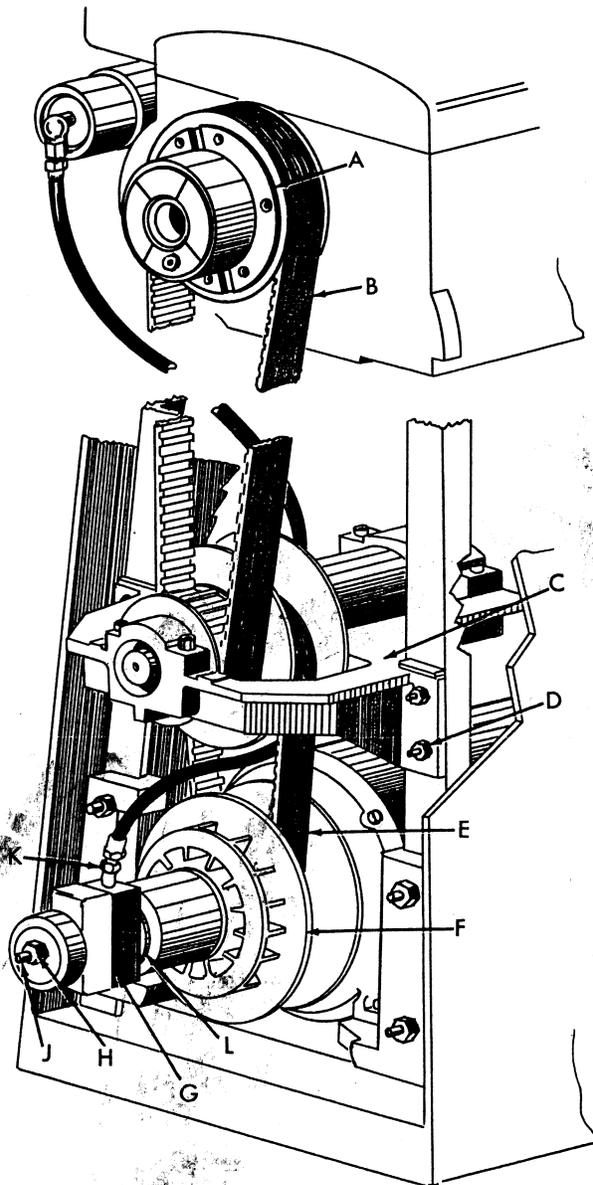


Figure 24

1. Holding variable pulley (F fig. 24) so it will not rotate, turn lock nut (H) -- clockwise if speed is too low, counter-clockwise if speed is too high.

If tachometer is not available: Belt should be flush with out side of motor pulley at high speed and flush with outside of countershaft pulley at low speed.

*Motor base brackets are bolted and doweled for permanent alignment.*

### REPLACING TIMING BELT

1. With lathe running, turn variable dial to highest speed -- 2000 rpm in open belt or 280 rpm in back gear. Then turn off motor.
2. Remove spindle handwheel (B) (fig. 21), belt guards and front cover.
3. Turn variable dial back to lowest speed and lock dial in place with pin (A).
4. Pull on outer sheave of lower variable motor pulley (F) (fig. 24) until variable belt (E) is loose.
5. Thru front cover opening, remove 5/16"-18 hex cap screw (F) (fig. 23) and spacer from clutch linkage.
6. Remove four hex nuts (D) (fig. 24). Raise countershaft (C) slightly and slip timing belt (B) off spindle pulley (A). Lower countershaft and slip variable belt (E) off variable motor pulley (F).
7. Place countershaft on bench.
8. Remove bearing caps (D) (fig. 23), snap rings and countershaft spindle (E) from bracket (C).
9. Remove timing belt from countershaft pulley (G).
10. Place new timing belt on countershaft pulley (G).
11. Install spindle in countershaft bracket and secure in place with snap rings and bearing caps (D). **IMPORTANT:** Make sure variable belt is in place before installing bearing caps.
12. Position the countershaft (C) (fig. 24) so variable belt (E) can be slipped on motor pulley (F), then raise countershaft so timing belt (B) can be slipped on spindle pulley (A).
13. Place countershaft assembly on the four mounting studs (D), then snug up the four hex nuts. Refer to Tensioning Timing Belt Steps 2-5. (P.12-1)
14. Thru front cover opening, install 5/16"-18 hex cap screw and spacer in clutch linkage.
15. Remove lock pin (A, fig. 21) from variable cam housing.
16. Start lathe motor.
17. Hold variable control against low speed stop for 30 seconds, then turn through entire range.
18. Replace belt guards and front cover.

## REPLACING VARIABLE SPEED BELT

1. With lathe running, turn variable dial to highest speed -- 2000 rpm in open belt or 280 rpm in back gear. Then turn off motor.

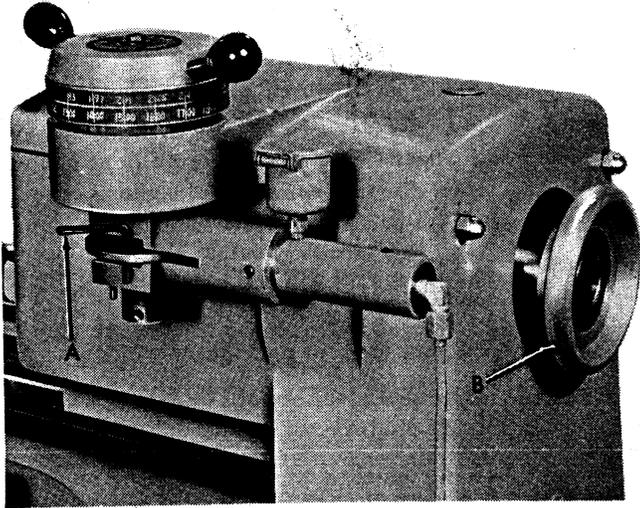


Figure 21

2. Remove spindle handwheel (B) (fig. 21), belt guards and front cover.
3. Turn variable dial back to lowest speed and lock dial in place with pin (A). *Won't fit, wire speed handle to collet cover.*

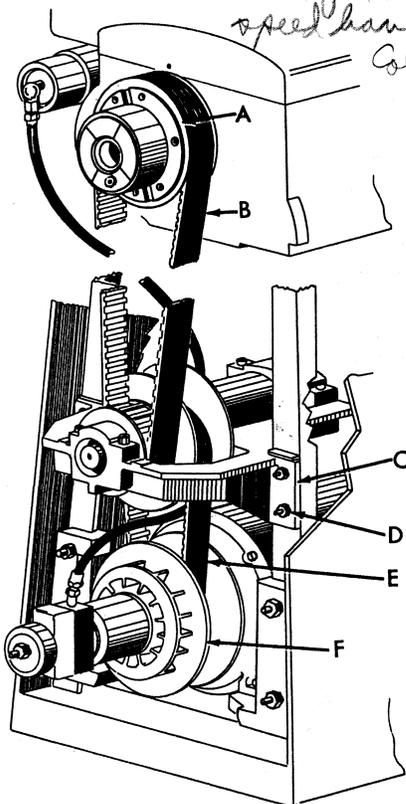


Figure 22

4. Holding variable dial against low speed stop, pull on outer sheave of lower variable motor pulley (F) (fig. 22) until variable belt (E) is loose.

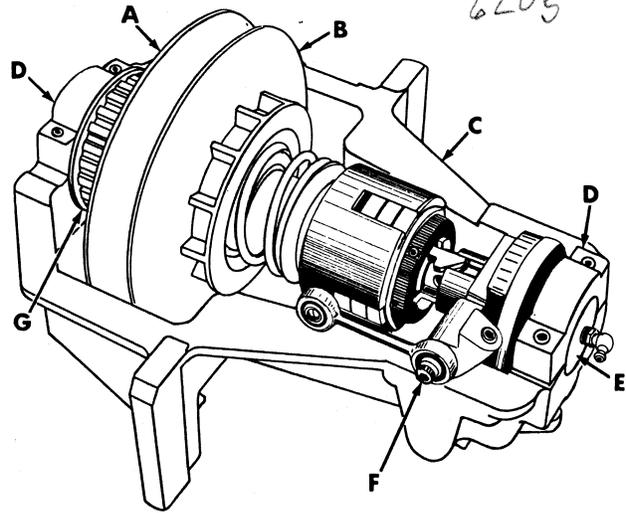


Figure 23

5. Thru front cover opening, remove 5/16"-18 hex cap screw (F) (fig. 23) and spacer from clutch linkage. *Use 1/4" hex key.*
6. Remove four hex nuts (D) (fig. 22). Raise countershaft (C) slightly and slip timing belt (B) off spindle pulley (A). Lower countershaft and slip variable belt (E) off variable motor pulley (F).
7. Place countershaft on bench.
8. Remove bearing caps (D) (fig. 23), snap rings and countershaft spindle (E) from bracket (C).
9. Twist variable belt off countershaft pulley. CAUTION: Variable pulley is spring loaded and will snap closed when belt is removed.
10. Place new variable belt on countershaft pulley.
11. Install spindle in countershaft bracket and secure in place with snap rings and bearing caps (D). IMPORTANT: Make sure timing belt is in place before installing bearing caps. *and VS belt.*
12. Standing on countershaft bracket, pull variable belt into bottom of variable pulley sheaves (A & B).
13. Position the countershaft (C) (fig. 22) so variable belt (E) can be slipped on motor pulley (F), then raise countershaft so timing belt (B) can be slipped on spindle pulley (A).
14. Place countershaft assembly on the four mounting studs (D), then snug up the four hex nuts. Refer to Tensioning Timing Belt steps 2-5.
15. Thru front cover opening, install 5/16"-18 hex cap screw and spacer in clutch linkage.
16. Remove lock pin (A, fig. 21) from variable cam housing.
17. Start lathe motor.

## REPLACING SHEAR PIN IN LEAD SCREW

Shear pin, located at gear box end of lead screw, protects lead screw and gear box against overload.

To replace broken shear pin:

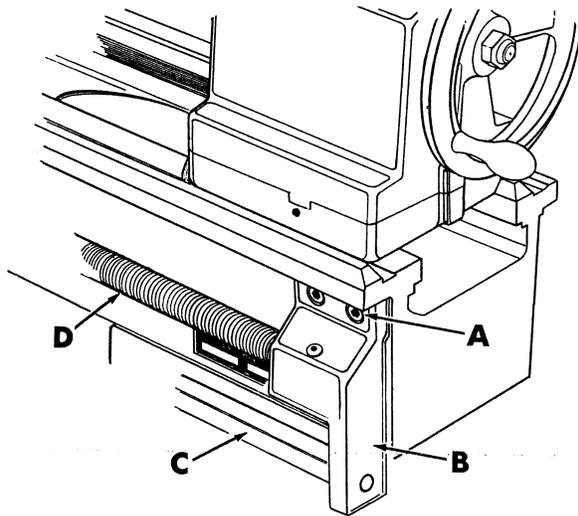


Figure 18

1. Remove two socket cap screws (A, fig. 18) from lead screw bracket (B). Remove bracket from lead screw (D) and clutch rod (C).
2. Engage half-nuts, turn carriage handwheel toward tailstock, pulling lead screw from gear box shaft. Disengage half-nuts and remove lead screw.

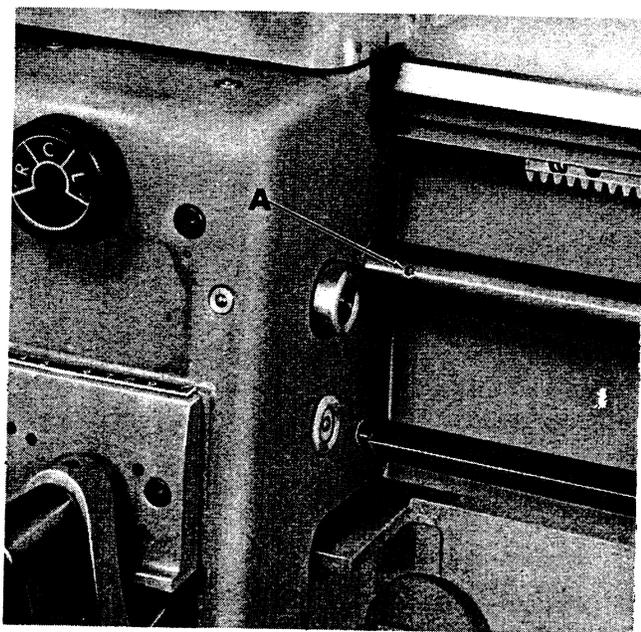


Figure 19

3. Remove sheared pin (A, fig. 19) from gear box shaft and lead screw.
4. Slide lead screw over gear box shaft -- check alignment of shear pin holes with punch -- turning lead screw 180° if necessary -- and install new shear pin with retainer.

5. Replace lead screw bracket -- CAUTION: Do not tighten the two socket cap screws.
6. Move carriage to tailstock end of bed, engage half-nuts to align lead screw and clutch rod, then tighten the two socket cap screws.

## ADJUSTING SPINDLE BEARINGS

Spindle bearings have been preloaded at factory and seldom require adjusting. Follow these instructions should adjustment be necessary:

1. Make adjustment only when spindle is at operating temperature -- run spindle at medium speed for one hour with 6" driving plate mounted on spindle.
2. Disengage back gear pin from drive pulley by pulling pin away from headstock.
3. Turn back gear knob to the right.
4. Move lead screw direction knob to vertical (NEUTRAL) position.
5. Give driving plate a sharp spin with your hand.

NOTE: If preload is correct -- drive plate should rotate about one turn.

To adjust:

1. Remove spindle handwheel and upper belt guard.

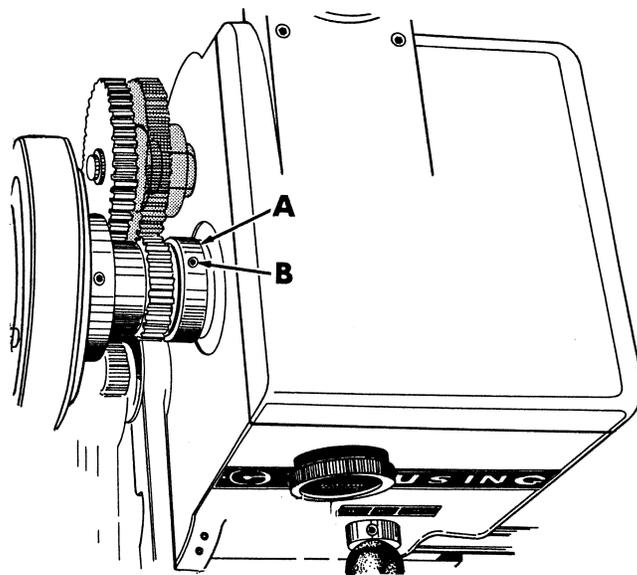


Figure 20

2. Loosen set screw (B) (fig. 20) in bearing adjusting nut (A) and tighten nut with spanner wrench until spindle end play has been removed.
3. Give driving plate a sharp spin with your hand -- drive plate should rotate about one turn. If it doesn't, adjust nut (A) and recheck.
4. Tighten set screw (B) in adjusting nut.
5. Replace guard and handwheel.

## NO. 7651 TOOL POST GRINDER

The tool post grinder is used for both external and internal finishing whenever precision and a polished surface are required. Grinder mounts in tool post slide of lathe compound rest.

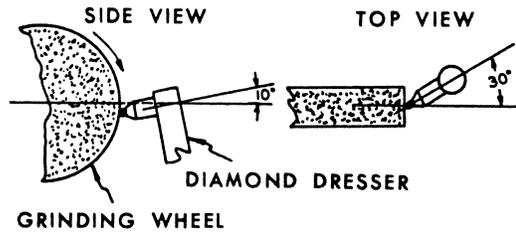


Figure 8

The diamond point should be at an angle and slightly below center as shown in figure 8. Run the wheel back and forth, taking light cuts until the diamond cuts evenly and has removed the glazed surface from the wheel. For a fine, accurate finish, the grinding wheel must be dressed before each operation.

The grinder has two spindle speeds, low speed for external grinding and high speed for internal grinding.

**WARNING:** *Never run the large grinding wheel at the higher speed -- this speed is for internal grinding wheels only.*

When grinding, work must rotate in a direction opposite that of the grinding wheel.

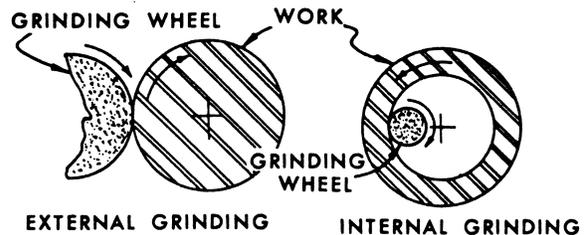


Figure 9

The rotation of the lathe spindle shown in figure 9 must be clockwise (reverse) for external grinding, and counterclockwise (forward) for internal grinding.

External Grinding -- the work should be turned as close to the final finish size as possible before the grinding operation is begun -- grinding is a finishing operation.

With work and grinder in proper position, take light cuts across the entire length of work. The finishing cut should be less than .001 inch.

Internal Grinding -- be sure to remove the external wheel before mounting internal grinding wheel. When grinding internally, take light cuts and feed in very slowly because of overhang of grinding wheel and arbor. After the last cut, allow the wheel to pass back and forth across work several times without advancing feed.

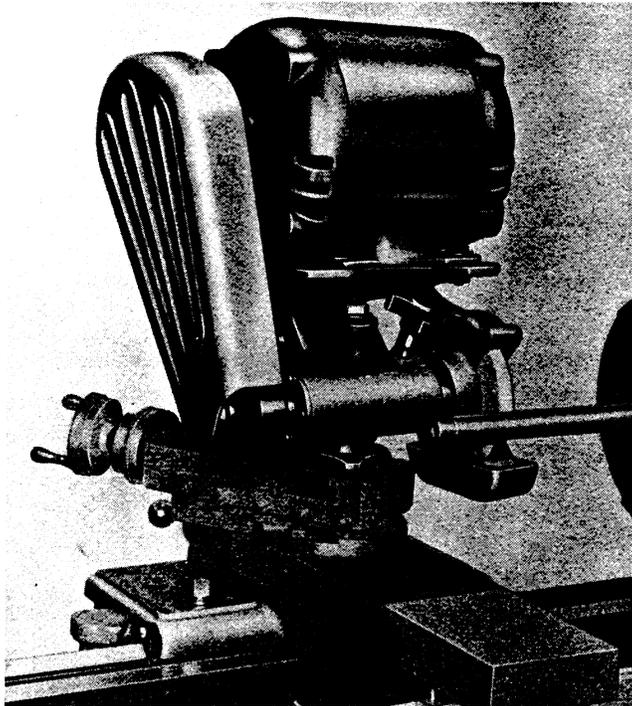


Figure 7

For most operations, grinder spindle is on the exact center line of lathe -- refer to figure 7.

When grinding a surface parallel to lathe center line, set the compound rest at 0 and feed the carriage back and forth by hand or by power feed. When grinding at an angle, the compound rest is set at the proper angle and the grinder is fed back and forth with the compound rest feed.

**IMPORTANT:** Protect the lathe from grinding dust.

Grinding dust is a mixture of abrasive dust and fine particles of steel. This dust is extremely abrasive -- when allowed to remain on the lathe bed ways and cross slide it can cause rapid wear. Always cover the bed ways and cross slide during grinding operations. After grinding, thoroughly clean the bed ways and carriage dovetails, and apply plenty of clean oil.

Before grinding, dress the wheel.

The dressing tool mounts in a holder clamped to lathe bed.