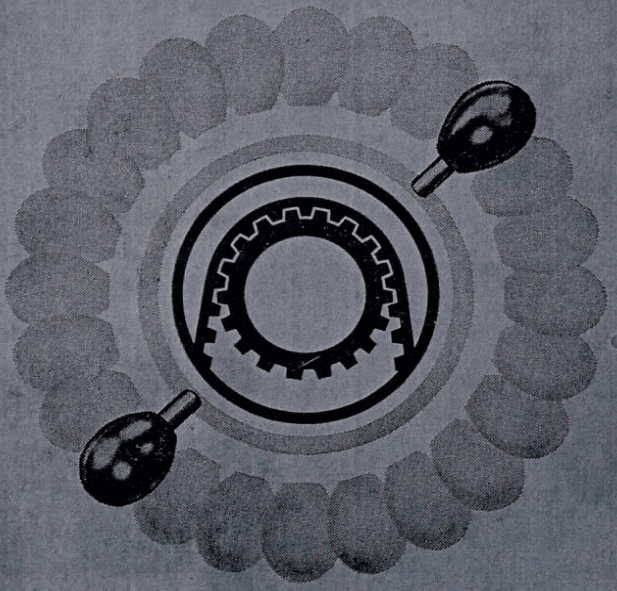
CLAUSING
REPLACEMENT PARTS #(219)533-0371

OPERATING INSTRUCTIONS
and
PARTS LIST

CLAUSING 12

12-inch LATHES - 5900-series



CLAUSING

DIVISION OF ATLAS PRESS COMPANY

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WARRANTY

Clausing machine tools are guaranteed against defects in material and workmanship for a period of one year from date of sale to original purchaser. Liability shall be limited to replacing, free of charge, f.o.b. factory, any such parts proving defective within the period of this warranty, but Clausing will not be responsible for transportation charges or other charges, loss or damages.

Clausing machine tools are guaranteed to equal or excel the standards of accuracy as represented. Clausing reserves the right to make changes in design and construction without notice, and without making changes in products previously manufactured.

CLAUSING DIV.,
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IMPORTANT --- YOUR CLAUSING WARRANTY is NOT effective unless this card is returned ----

Your Warranty ➧➧➧➧ THIS IS YOUR PERMANENT RECORD

MACHINE SERIAL NO: 504800 MODEL NO: 5914

NAME OF PURCHASER DABCO TOOL & DIE CO.

STREET 14721 W 11 MILE RD

CITY, ZONE, STATE OAK PARK. MICH. 48237

PURCHASED FROM NATIONAL SALES

DATE PURCHASED

JEAN LOGAN

CLAUSING DIV., ATLAS PRESS CO., KALAMAZOO, MICH.

PHONE: Area Code 616 345-7155

PRICE $2.00

PRINTED IN U.S.A.

This Manual Applies To Clausing 12" Lathes From Serial No. 502467 To _____

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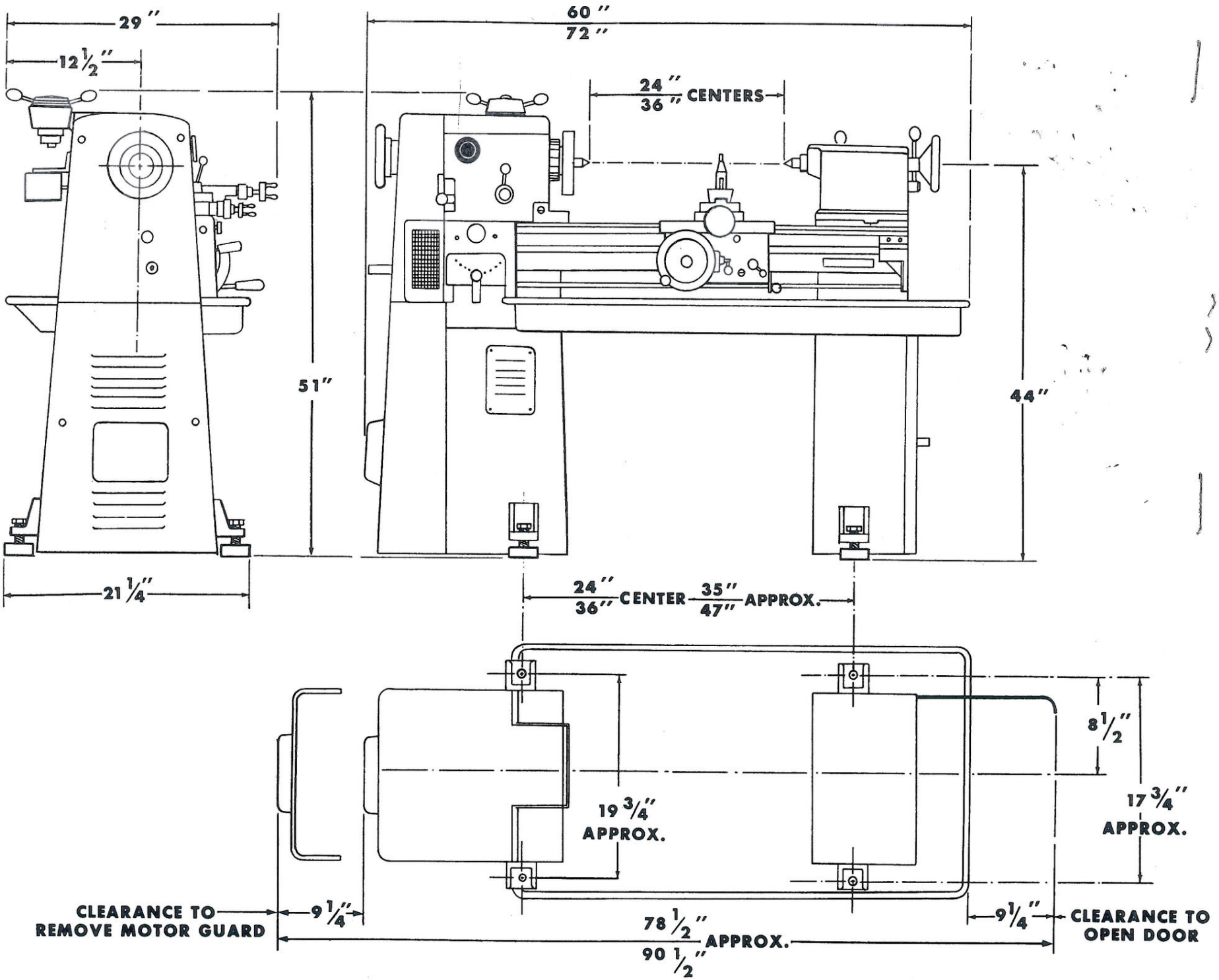
GENERAL DIMENSIONS -- 5900 SERIES CLAUSING LATHES



INSTRUCTIONS and PARTS

CLAUSING

DIVISION, ATLAS PRESS COMPANY
KALAMAZOO, MICHIGAN 49001

WIRING INSTRUCTIONS

for

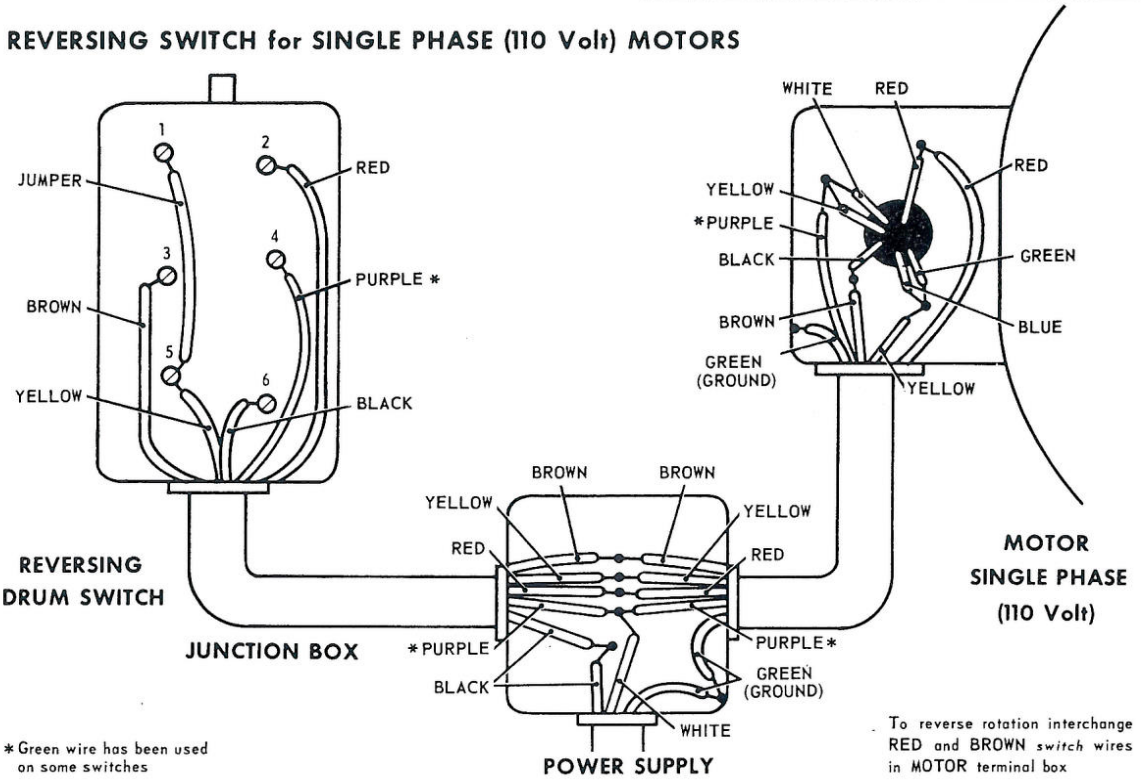
4900-series
Serial Numbers from 400971

5900-series
Serial Numbers from 500817

CLAUSING LATHES

AUGUST 1963 FILE NO. 710-041-2

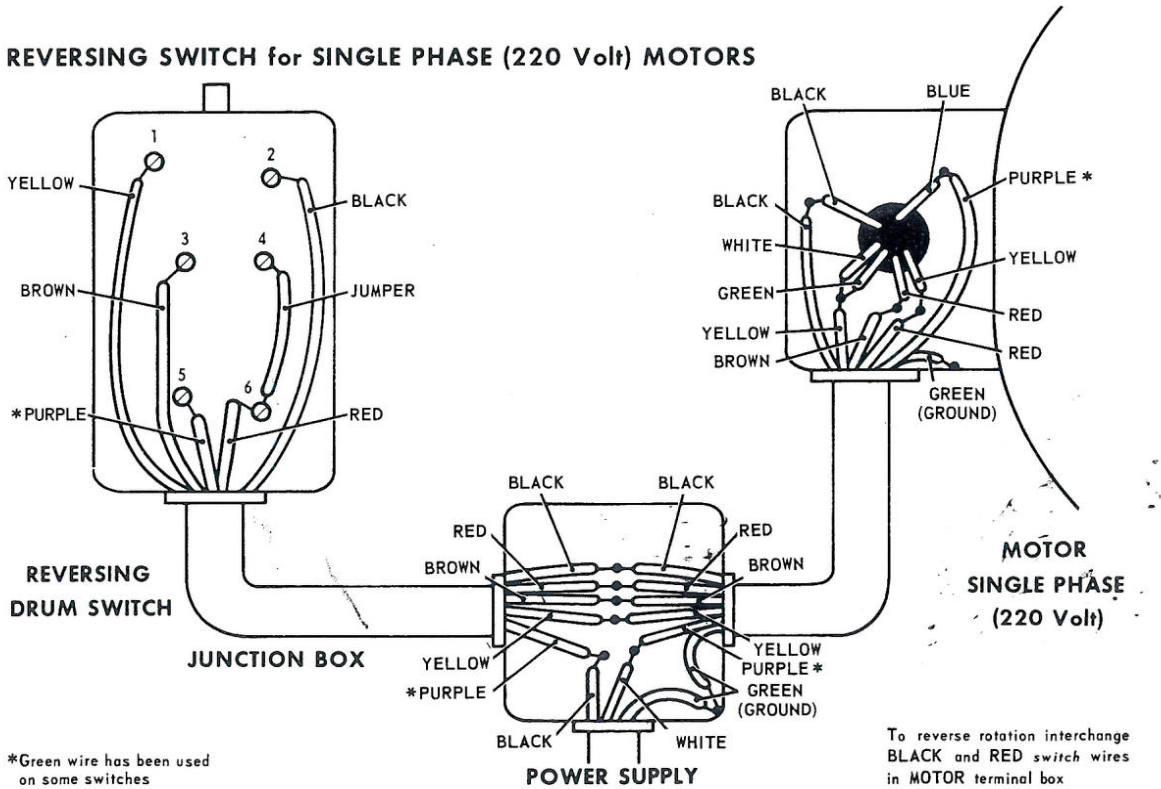
REVERSING SWITCH for SINGLE PHASE (110 Volt) MOTORS



*Green wire has been used on some switches

To reverse rotation interchange RED and BROWN *switch* wires in MOTOR terminal box

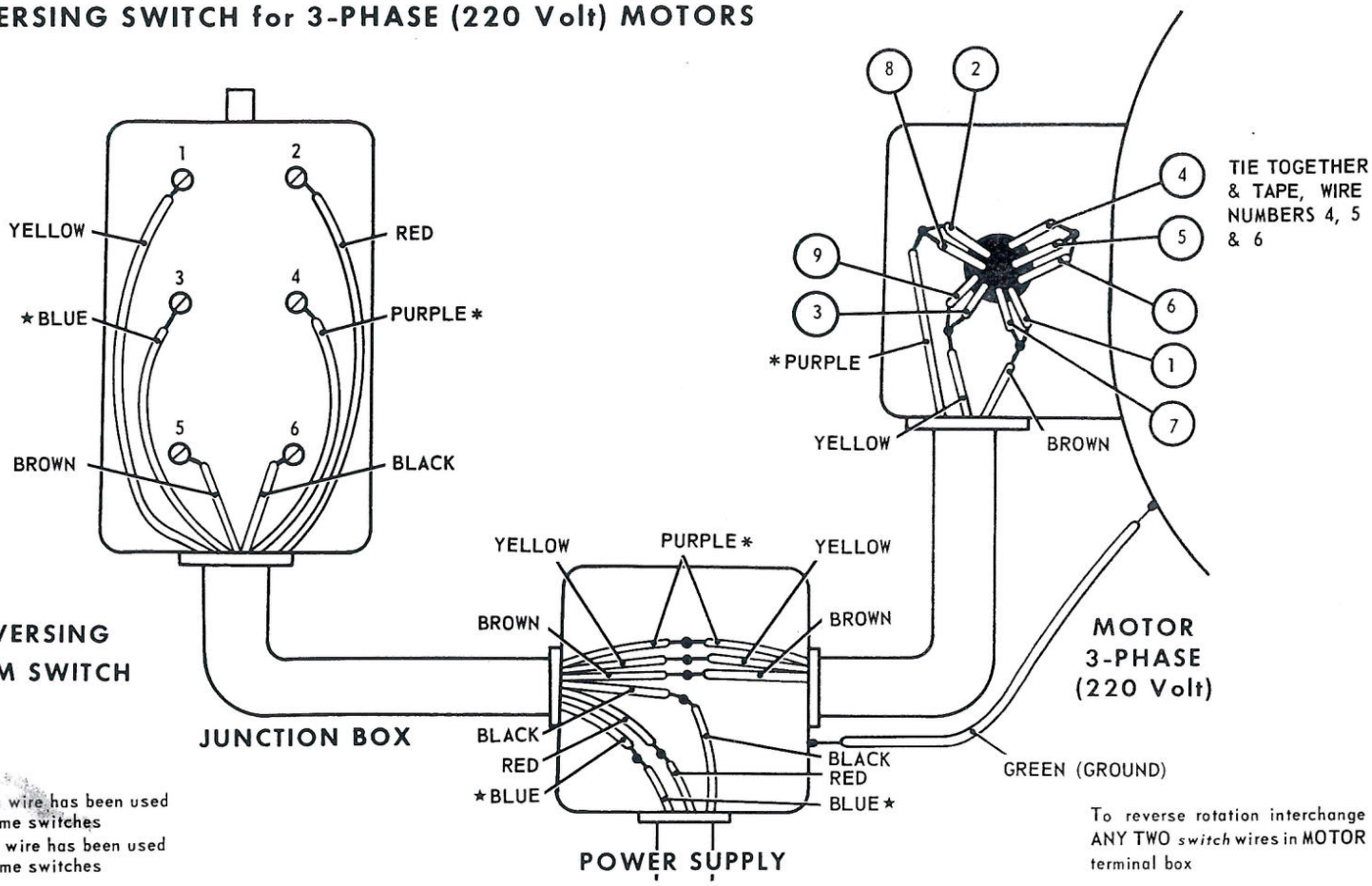
REVERSING SWITCH for SINGLE PHASE (220 Volt) MOTORS



*Green wire has been used on some switches

To reverse rotation interchange BLACK and RED *switch* wires in MOTOR terminal box

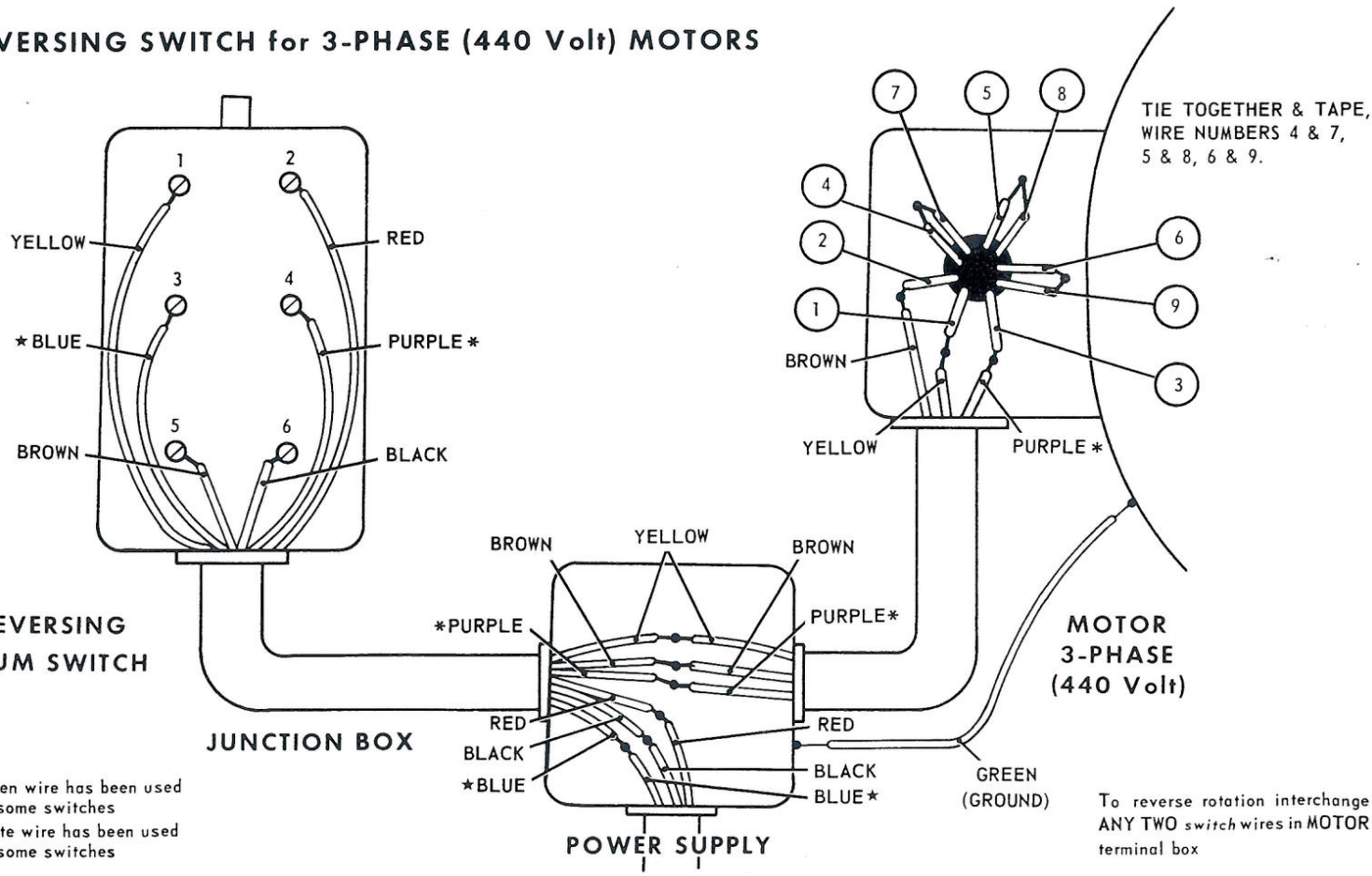
REVERSING SWITCH for 3-PHASE (220 Volt) MOTORS



★ Green wire has been used on some switches
★ White wire has been used on some switches

To reverse rotation interchange ANY TWO *switch* wires in MOTOR terminal box

REVERSING SWITCH for 3-PHASE (440 Volt) MOTORS



★ Green wire has been used on some switches
★ White wire has been used on some switches

To reverse rotation interchange ANY TWO *switch* wires in MOTOR terminal box

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.

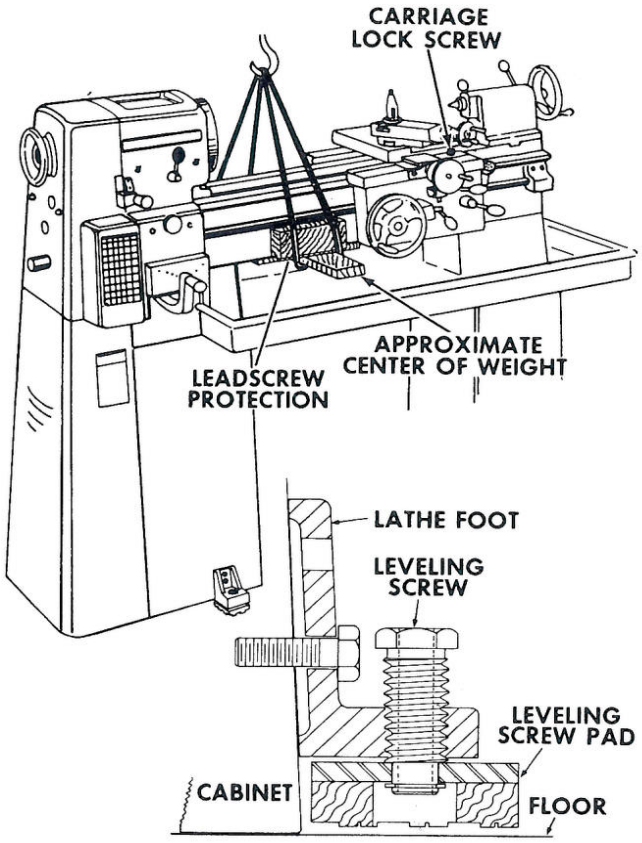


Figure 1

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.

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.

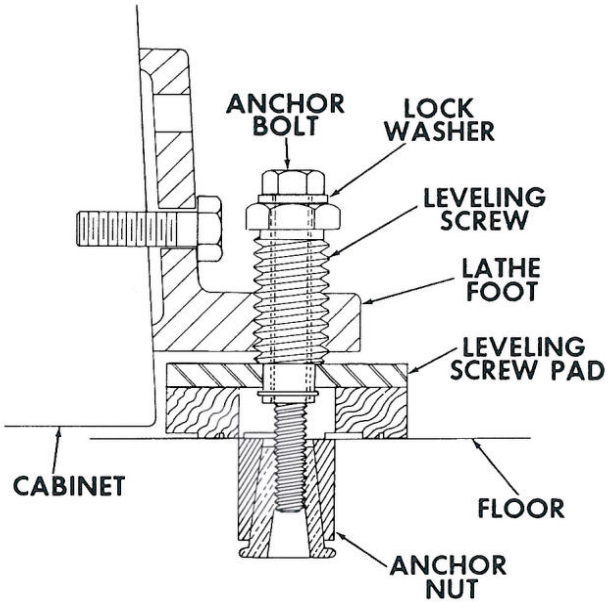


Figure 2

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.

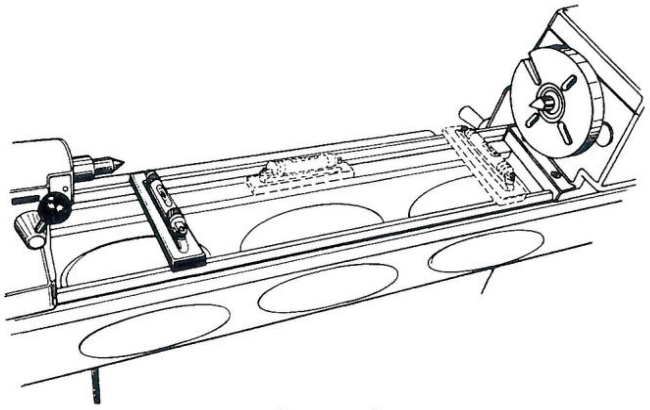


Figure 3

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.

LUBRICATION CHART - - - 5900 SERIES CLAUSING LATHES

CODE

D-DAILY oil with TEXACO WAY LUBRICANT "D" or equivalent.

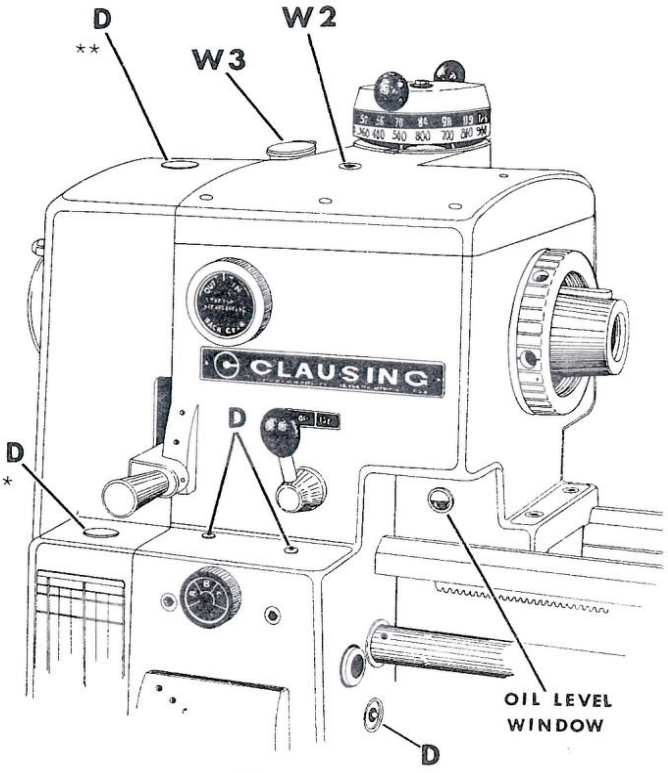
WEEKLY

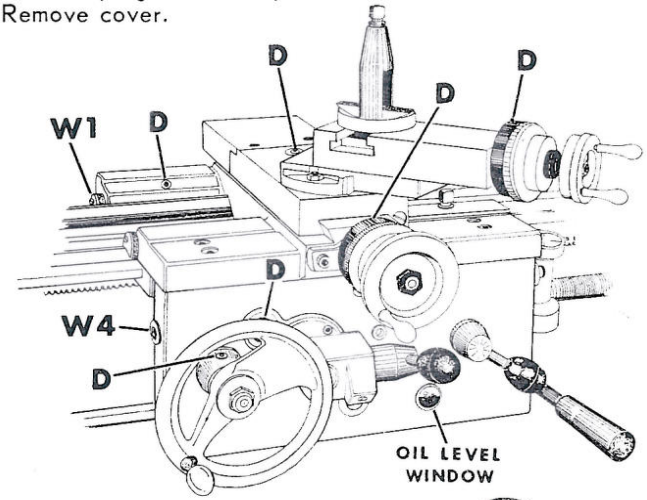
- **W1** - Oil with TEXACO WAY LUBRICANT "D" or equivalent.
- **W2** - Check oil level in window. Remove pipe plug and fill to mark with TEXACO REGAL PC-R&O oil or equivalent.
- **W3** - With motor running and variable dial turned to low speed, fill with TEXACO REGAL PC-R&O oil or equivalent.
- **W4** - Check oil level in window. Remove filler plug and fill to mark with TEXACO REGAL OIL "G" or equivalent.
- **W5** - Fill countershaft fitting and grease the two fingers with TEXACO MARFAX H.D. #2 grease or equivalent.

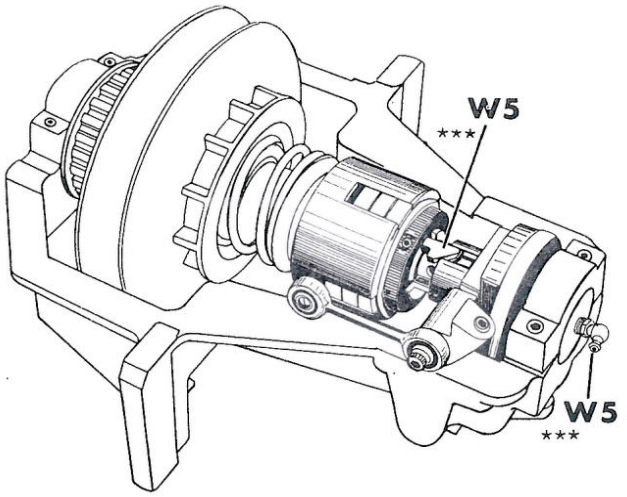
M-MONTHLY clean with Kerosene, then oil with TEXACO WAY LUBRICANT "D" or equivalent.

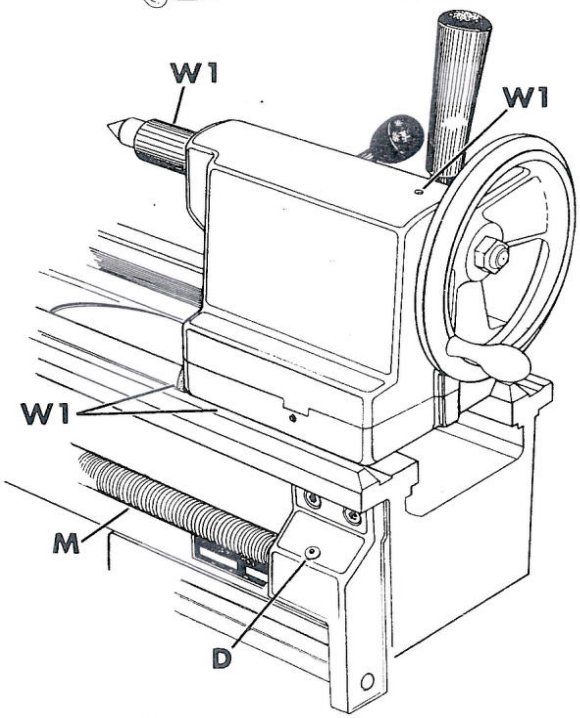
S-SEMIANNUALLY lubricate quadrant gear teeth with TEXACO CRATER No. 2X Fluid or equivalent. Remove oil and dirt before applying.

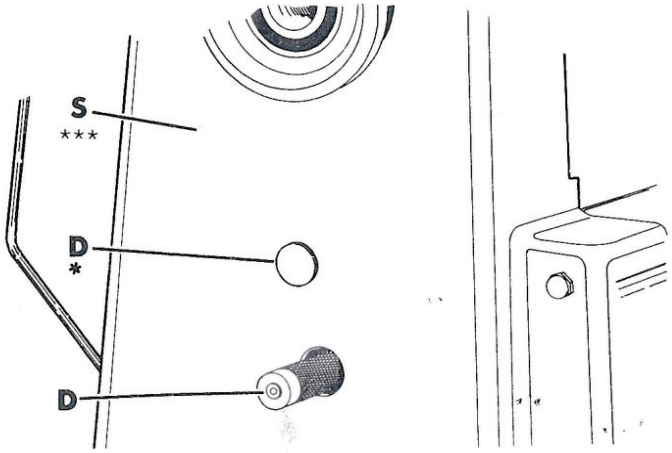
*Remove plug.
**Remove plug and turn spindle until oiler shows.
***Remove cover.











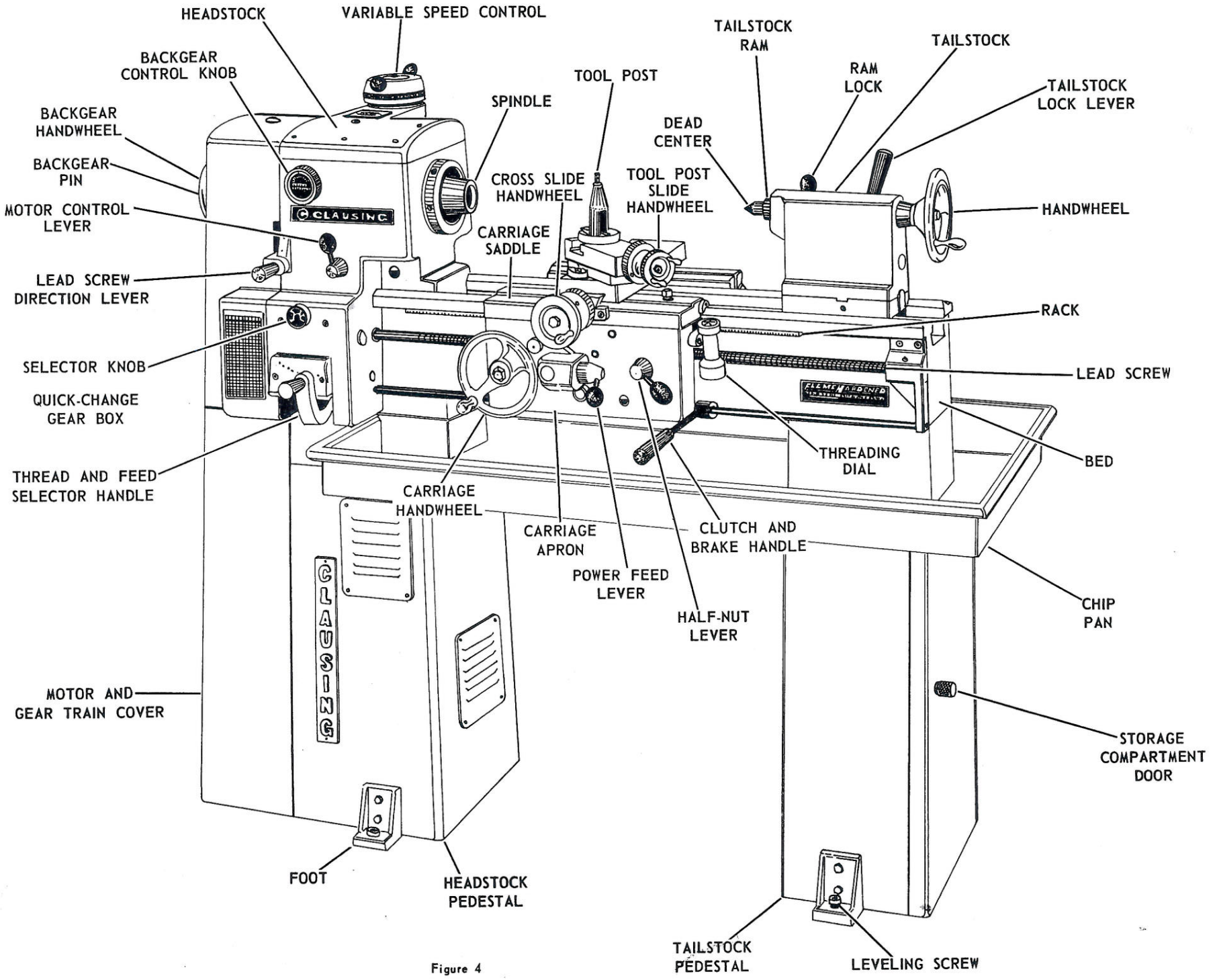

HEADSTOCK
VARIABLE SPEED CONTROL
BACKGEAR CONTROL KNOB
BACKGEAR HANDWHEEL
BACKGEAR PIN
MOTOR CONTROL LEVER
LEAD SCREW DIRECTION LEVER
SELECTOR KNOB
QUICK-CHANGE GEAR BOX
THREAD AND FEED SELECTOR HANDLE
SPINDLE
TOOL POST
CROSS SLIDE HANDWHEEL
CARRIAGE SADDLE
TOOL POST SLIDE HANDWHEEL
TAILSTOCK RAM
RAM LOCK
TAILSTOCK
TAILSTOCK LOCK LEVER
DEAD CENTER
HANDWHEEL
RACK
LEAD SCREW
THREADING DIAL
BED
CARRIAGE HANDWHEEL
CARRIAGE APRON
CLUTCH AND BRAKE HANDLE
POWER FEED LEVER
HALF-NUT LEVER
CHIP PAN
MOTOR AND GEAR TRAIN COVER
STORAGE COMPARTMENT DOOR
FOOT
HEADSTOCK PEDESTAL
TAILSTOCK PEDESTAL
LEVELING SCREW
CLAUSING

Figure 4

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.

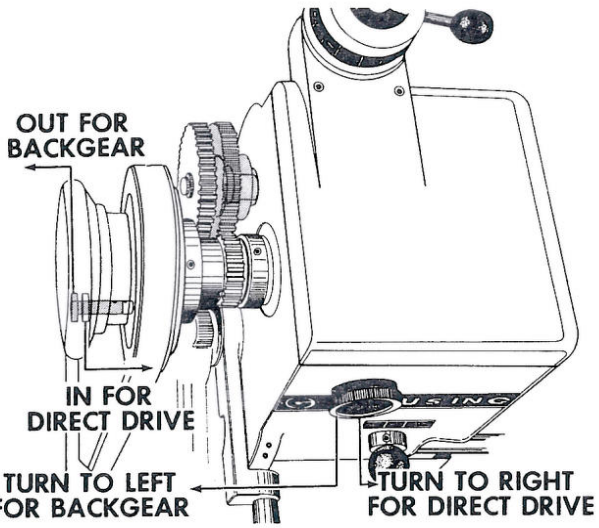


Figure 5

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 accidently turned while motor is not running.

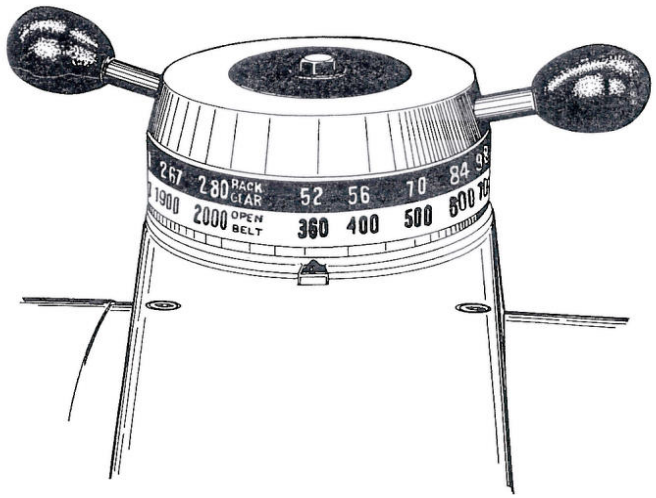


Figure 6

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.

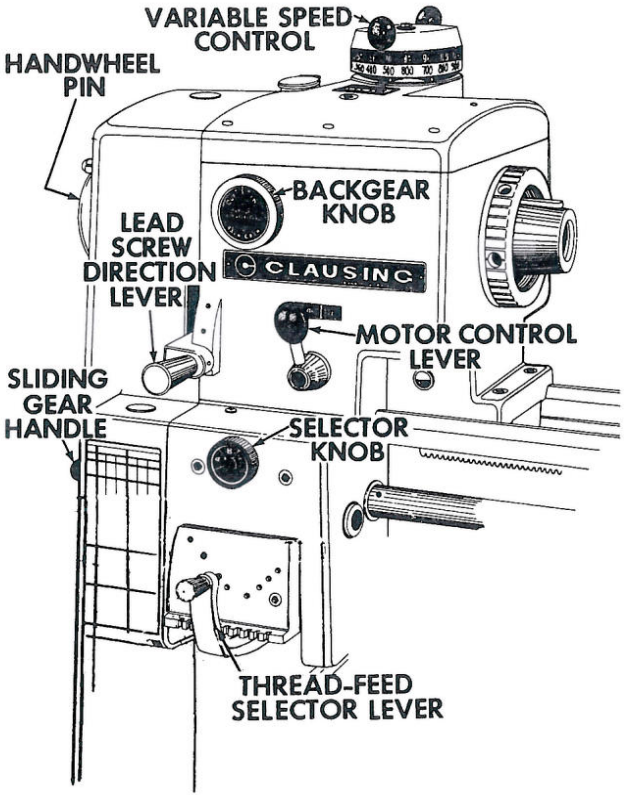


Figure 7

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 -- refer to figure 8.

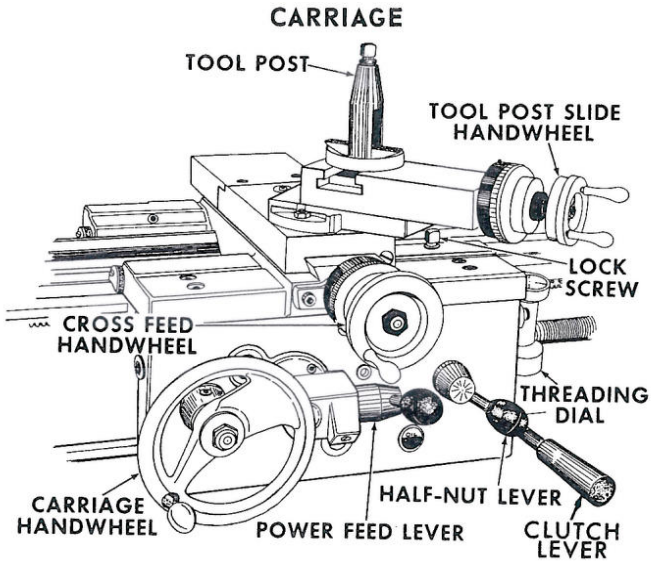


Figure 8

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.

5910

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 ½ of the rate of longitudinal feed.

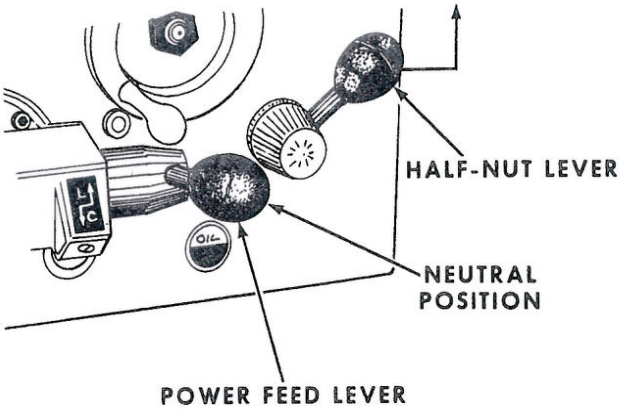


Figure 9

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 4½, 5½, 6½, 11½, 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.

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 set up is right.

NOTE: When threading, be sure threading dial is engaged with lead screw.

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

TOOL POST

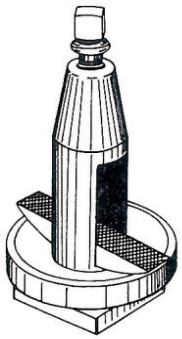


Figure 10

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

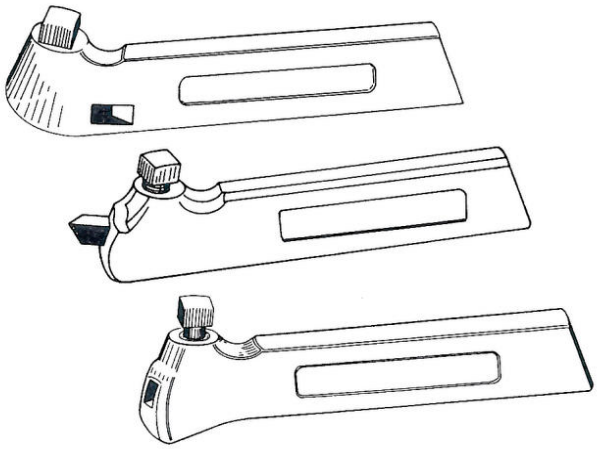


Figure 11

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.

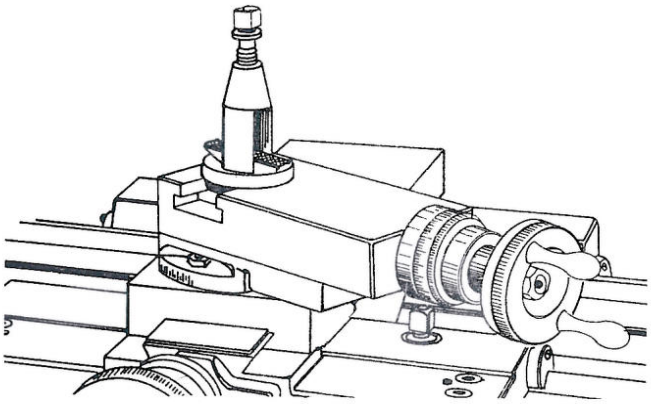


Figure 12

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

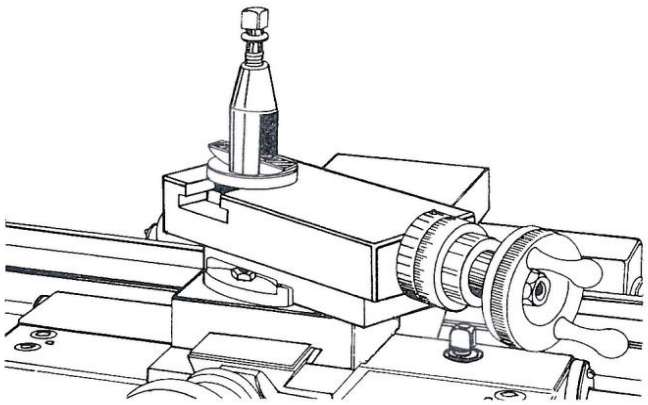


Figure 13

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.

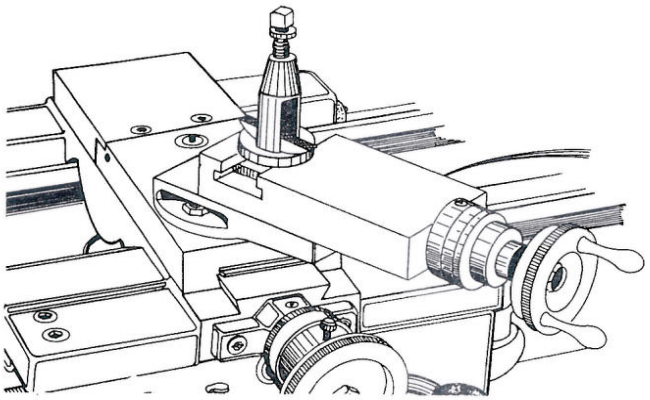


Figure 14

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

TAILSTOCK

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

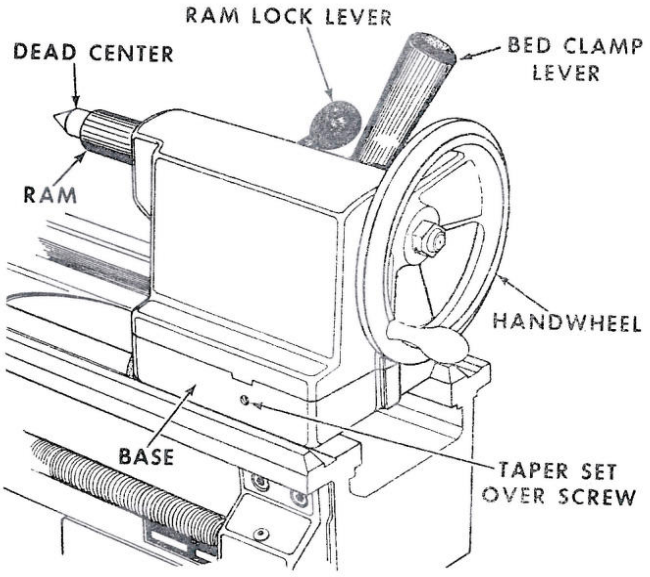


Figure 15

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.

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.

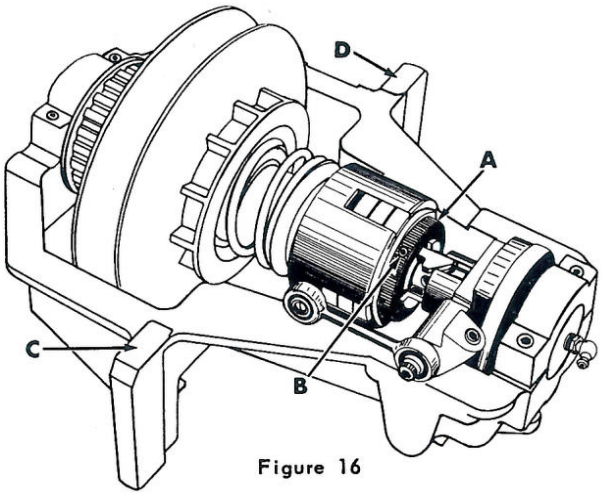


Figure 16

2. Loosen the lock screw (B, fig. 16) in the adjusting ring (A).
3. Turn the adjusting ring in a counterclockwise direction, when viewed from spindle pulley end. *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.

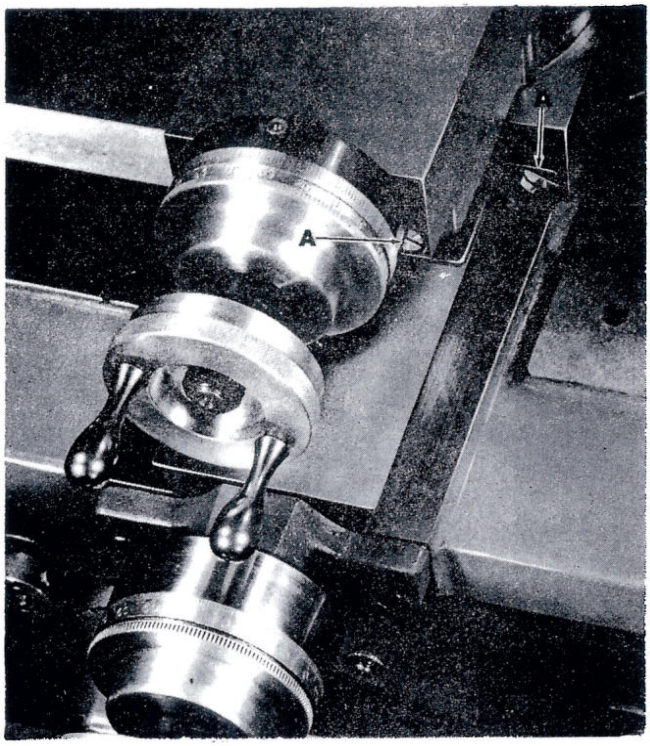


Figure 17

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 ½'' 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.

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:

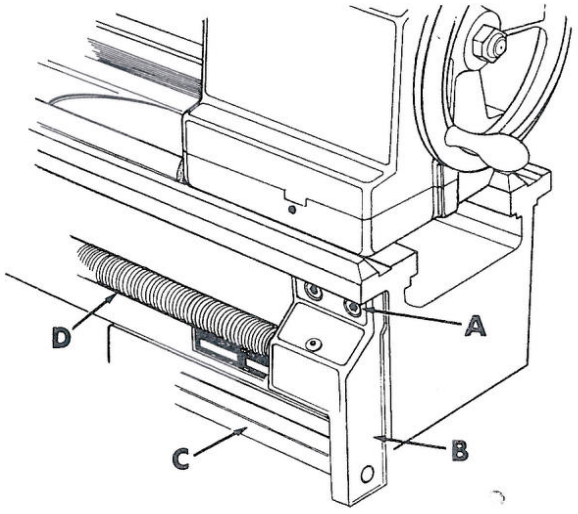


Figure 18

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.

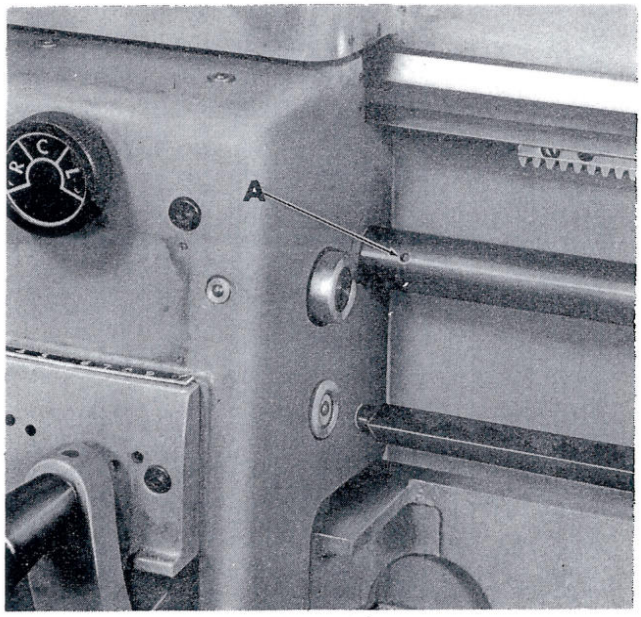


Figure 19

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.
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.

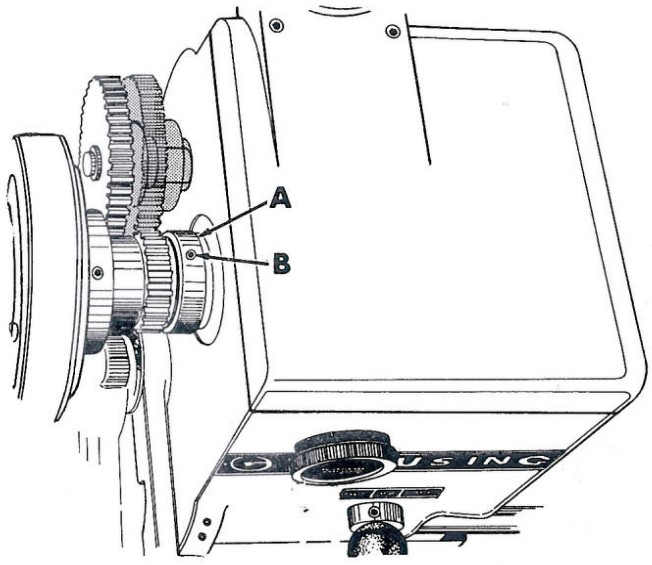


Figure 20

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.

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.

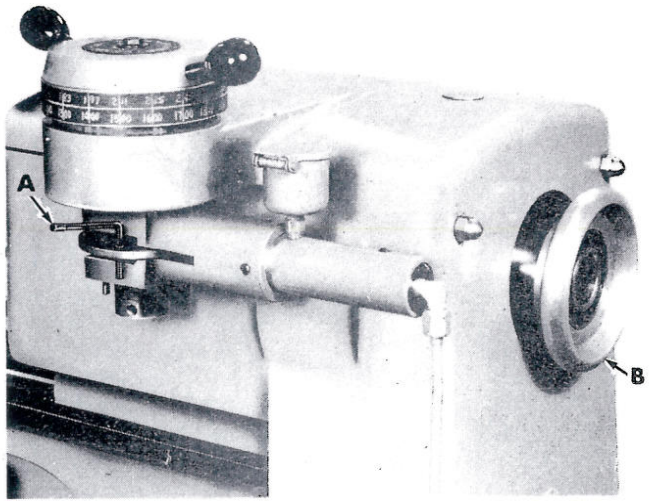


Figure 21

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).

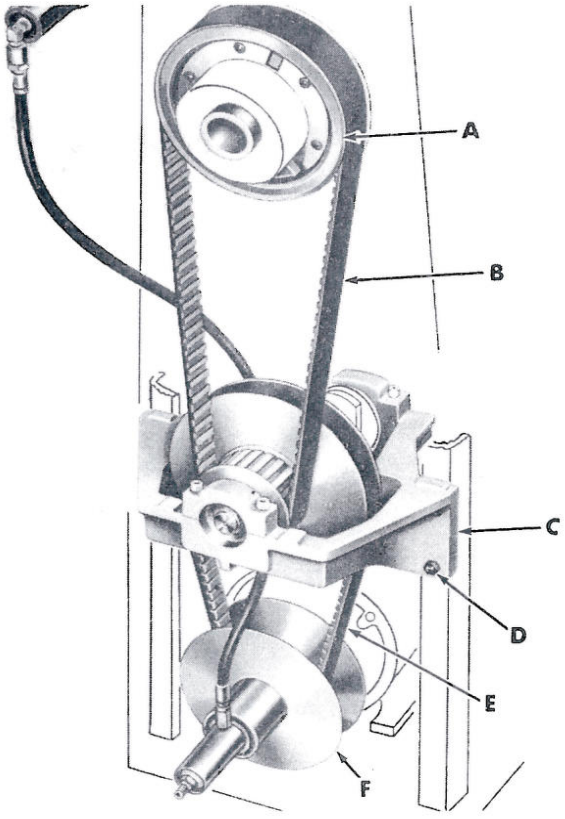


Figure 22

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.

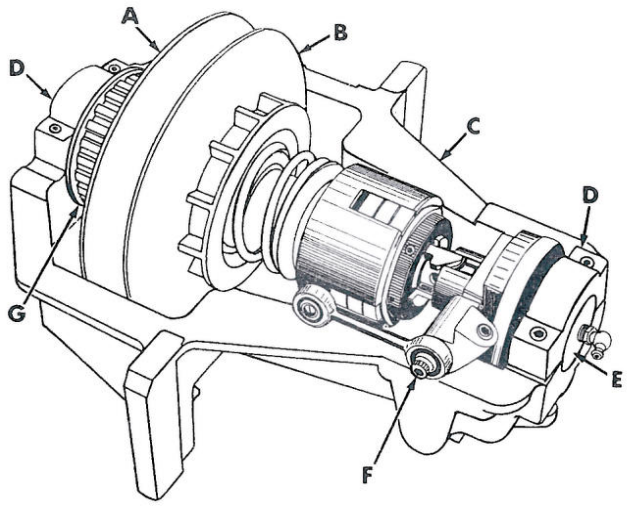


Figure 23

5. Thru front cover opening, remove 5/16"-18 hex cap screw (F) (fig. 23) and spacer from clutch linkage.

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.

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.

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:

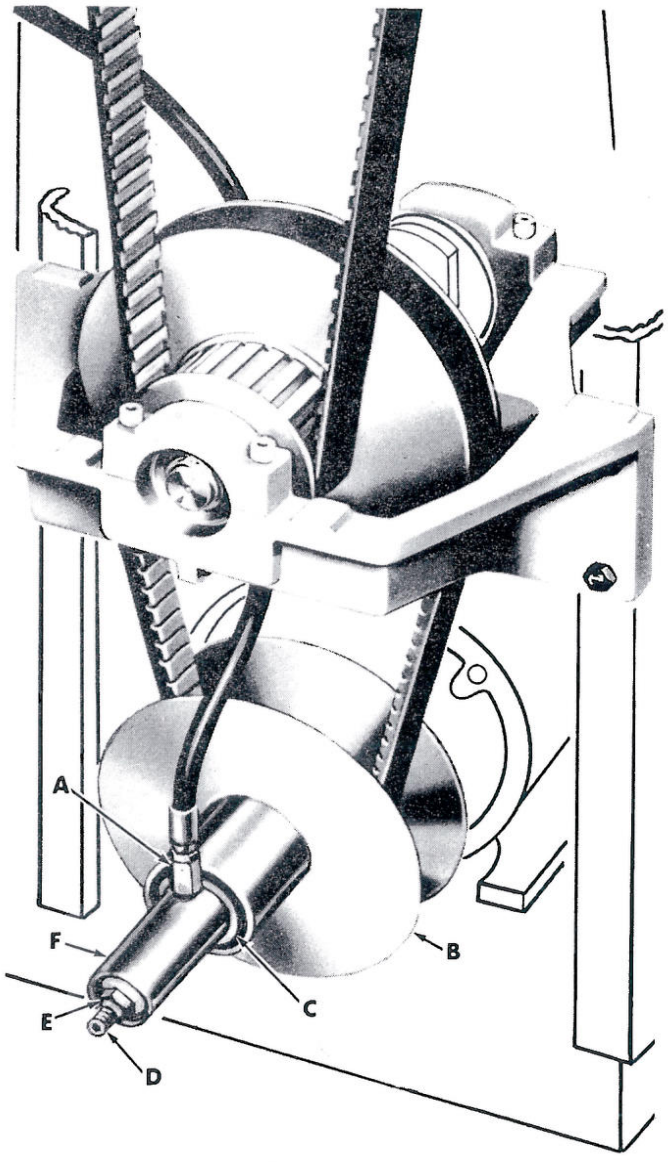


Figure 24

1. Hold nut (E, fig. 24) with wrench, and turn shaft (D) with a socket set screw wrench -- 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. 22) 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. 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. 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. 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).
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.
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 UPPER VARIABLE CONTROL CYLINDER

1. With lathe running, turn variable speed dial to highest range (280 or 2000 rpm), then turn motor off.

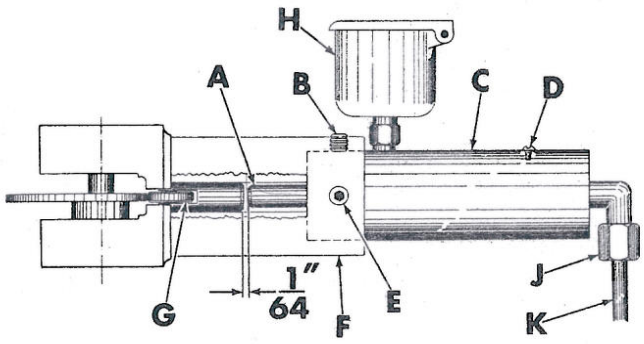


Figure 25

2. Remove nut (J, fig. 25) on end of variable control cylinder -- catching oil in pan.
3. Remove set screws (B) and (E) in variable cam housing (F).
4. Pull out upper variable control cylinder (C).
5. Remove the oil from old variable control cylinder oil reservoir (H).
6. While holding variable speed dial against low speed stop, slide new control cylinder (C) into variable housing (F) until variable plunger (A) is about 1/64" from cam roller plunger (G). Lock in place with set screws (B) and (E).
7. Install hydraulic line (K) and tighten nut (J).
8. Remove bleeder screw (D) and fill oil reservoir.
9. Keeping oil reservoir filled, hold variable dial against low speed stop until oil runs out bleeder hole – it takes a few minutes for oil to run down.
10. Replace bleeder screw (D).
11. Start lathe motor. Hold variable control against low speed stop for 30 seconds - turn variable dial to highest speed – then back to lowest speed. 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.
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.

12. Permanently mark variable control cylinder location:

A. Remove set screw (E).
B. With a 1/4-inch drill, spot the cylinder for the 5/16" set screw (E).

NOTE: This drill mark simplifies future positioning of cylinder.

C. Replace set screw (E).

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 (D, fig. 24) to nut (E). NOTE: *Record this dimension.*
3. Disconnect fitting (A) and drain oil from unit.
4. While holding shaft (D) with a socket set screw wrench, remove nut (E) and washer.
5. Remove, sleeve from hydraulic cylinder.
6. Pull hydraulic cylinder (F) and outer half of variable pulley (B) off the shaft (D).
7. Press hydraulic cylinder (F) with bearing (C) from variable pulley (B).
8. Replace the two "O" rings on shaft (D).
9. Press new hydraulic cylinder with bearing into variable pulley hub (B), then slide the assembly onto shaft (D) and pulley hub.
10. Install sleeve and washer on shaft (D).
11. Start nut (E) on shaft (D).
12. Hold the shaft in place with a socket set screw wrench and then turn nut onto rod until distance from the end shaft (D) to nut (E) is the same as step 3.
13. Start fitting (A) onto hydraulic cylinder (F).
14. Fill oil reservoir.
15. Keep oil reservoir filled, hold variable dial against low speed stop until oil runs out around fitting (A) – it takes a few minutes for oil to run down.
16. Tighten fitting (A).
17. 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.
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.

PARTS INDEX

For Lathes From Serial No. 502467 To _____

INSTRUCTIONS FOR ORDERING REPAIR PARTS

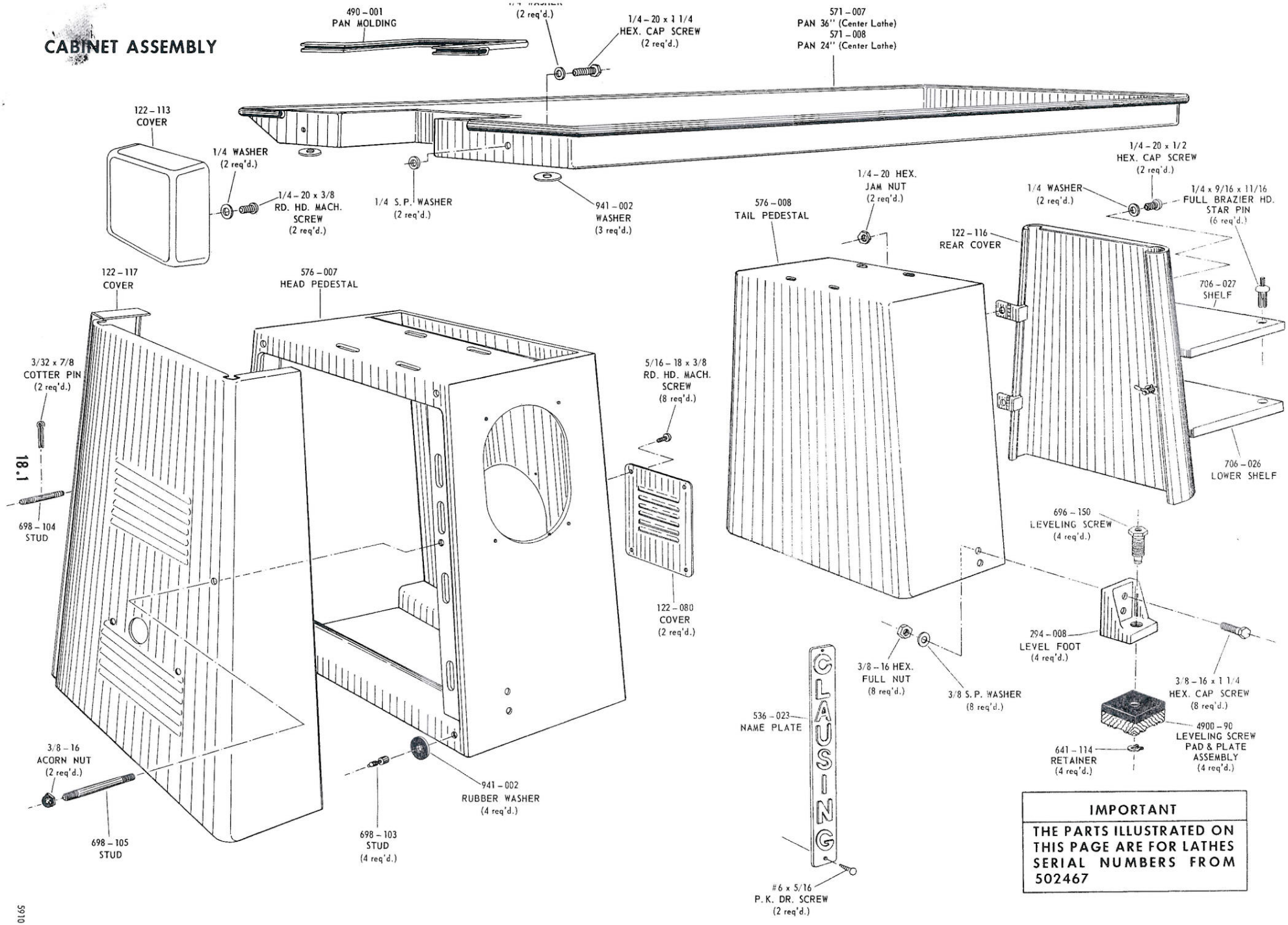
It is important to furnish the following information in addition to QUANTITY required:

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.

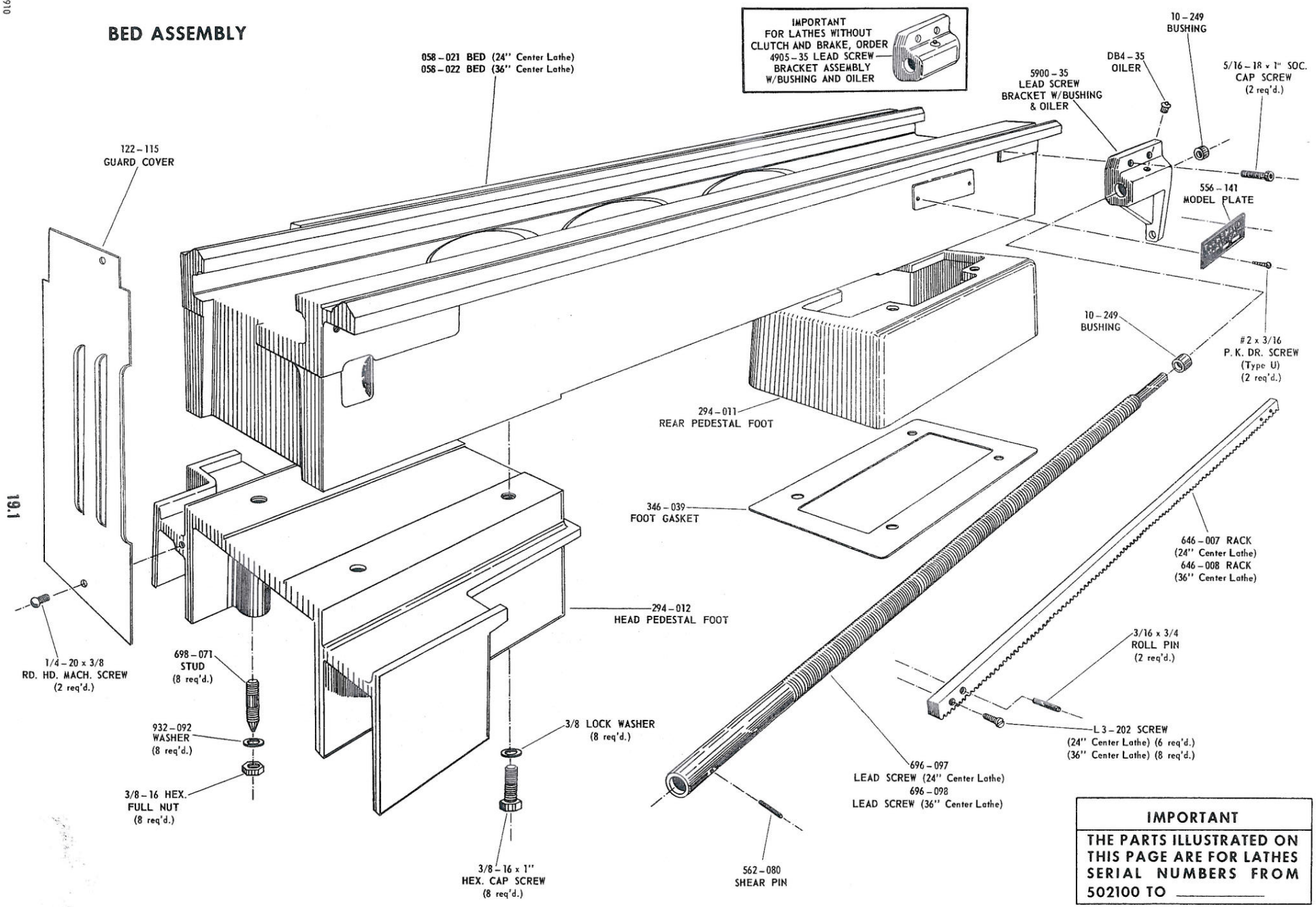
CABINET ASSEMBLY



IMPORTANT

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

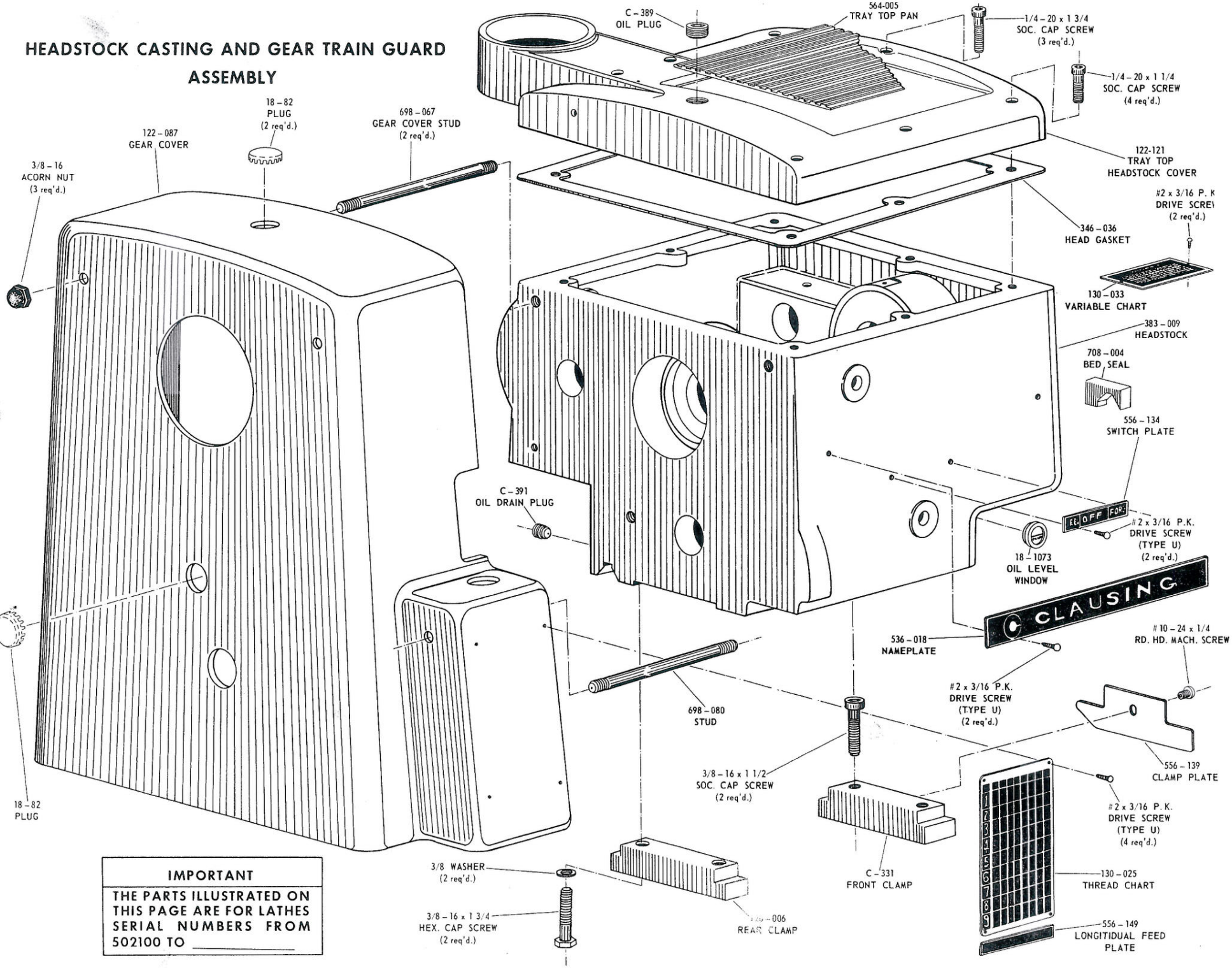
BED ASSEMBLY



IMPORTANT

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

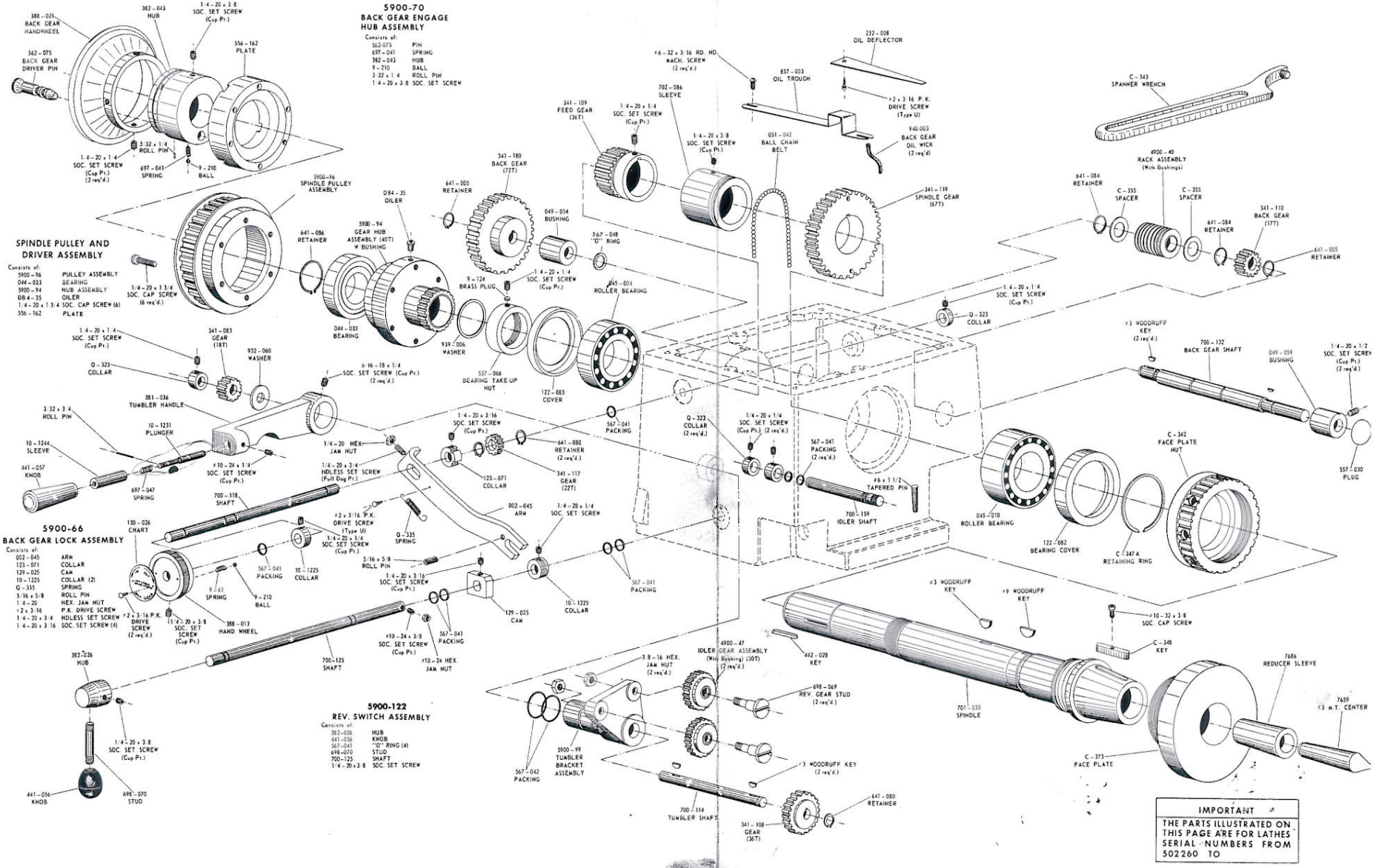
HEADSTOCK CASTING AND GEAR TRAIN GUARD ASSEMBLY



IMPORTANT

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

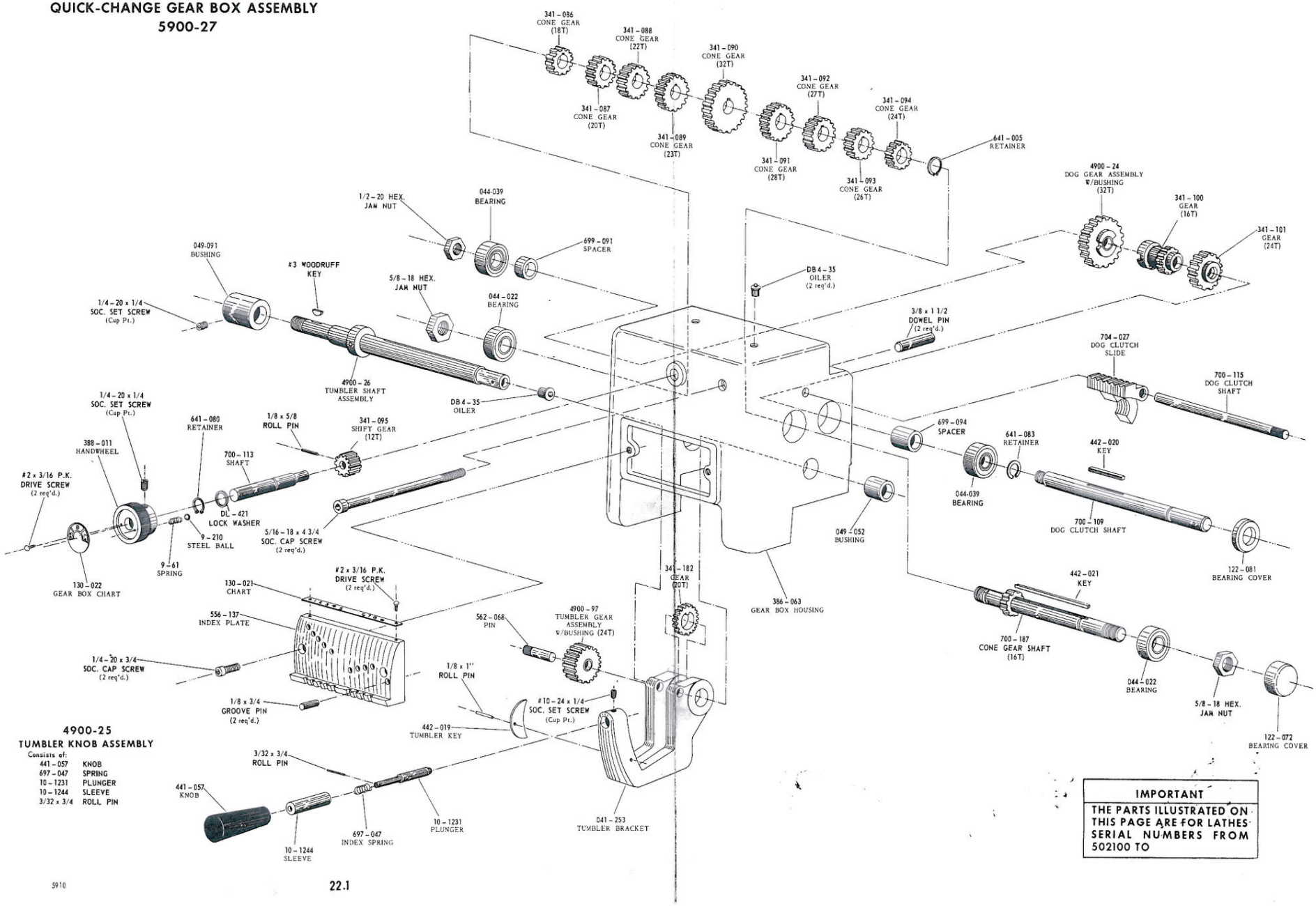
HEADSTOCK ASSEMBLY



IMPORTANT

THE PARTS ILLUSTRATED ON THIS PAGE ARE FOR LATHES SERIAL NUMBERS FROM 502260 TO

QUICK-CHANGE GEAR BOX ASSEMBLY
5900-27



4900-25
TUMBLER KNOB ASSEMBLY

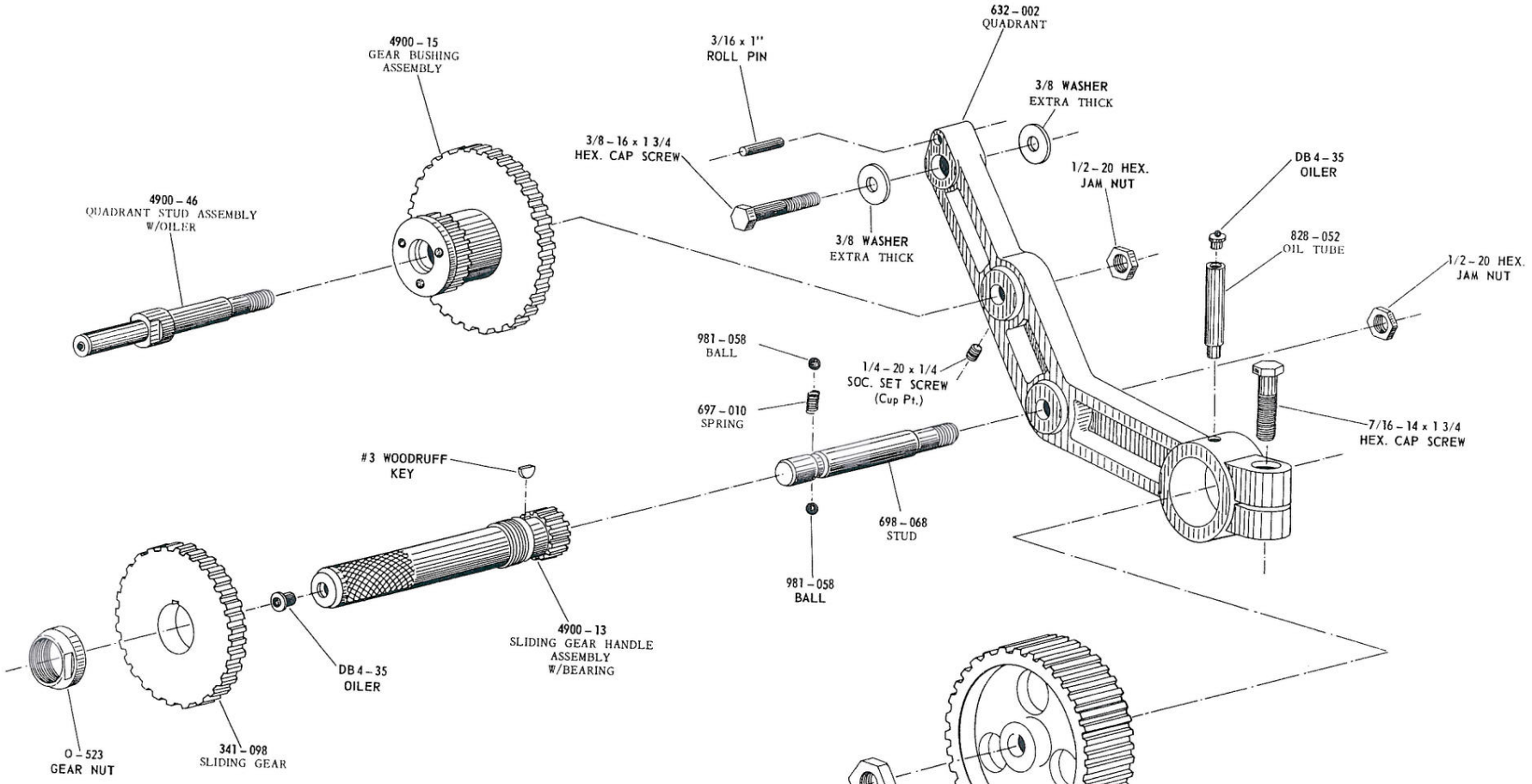
Consists of:

441 – 057	KNOB
697 – 047	SPRING
10 – 1231	PLUNGER
10 – 1244	SLEEVE
3/32 x 3/4	ROLL PIN

IMPORTANT

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

QUADRANT ASSEMBLY
NO. 4900-29



4900-14
SLIDING GEAR ASSEMBLY

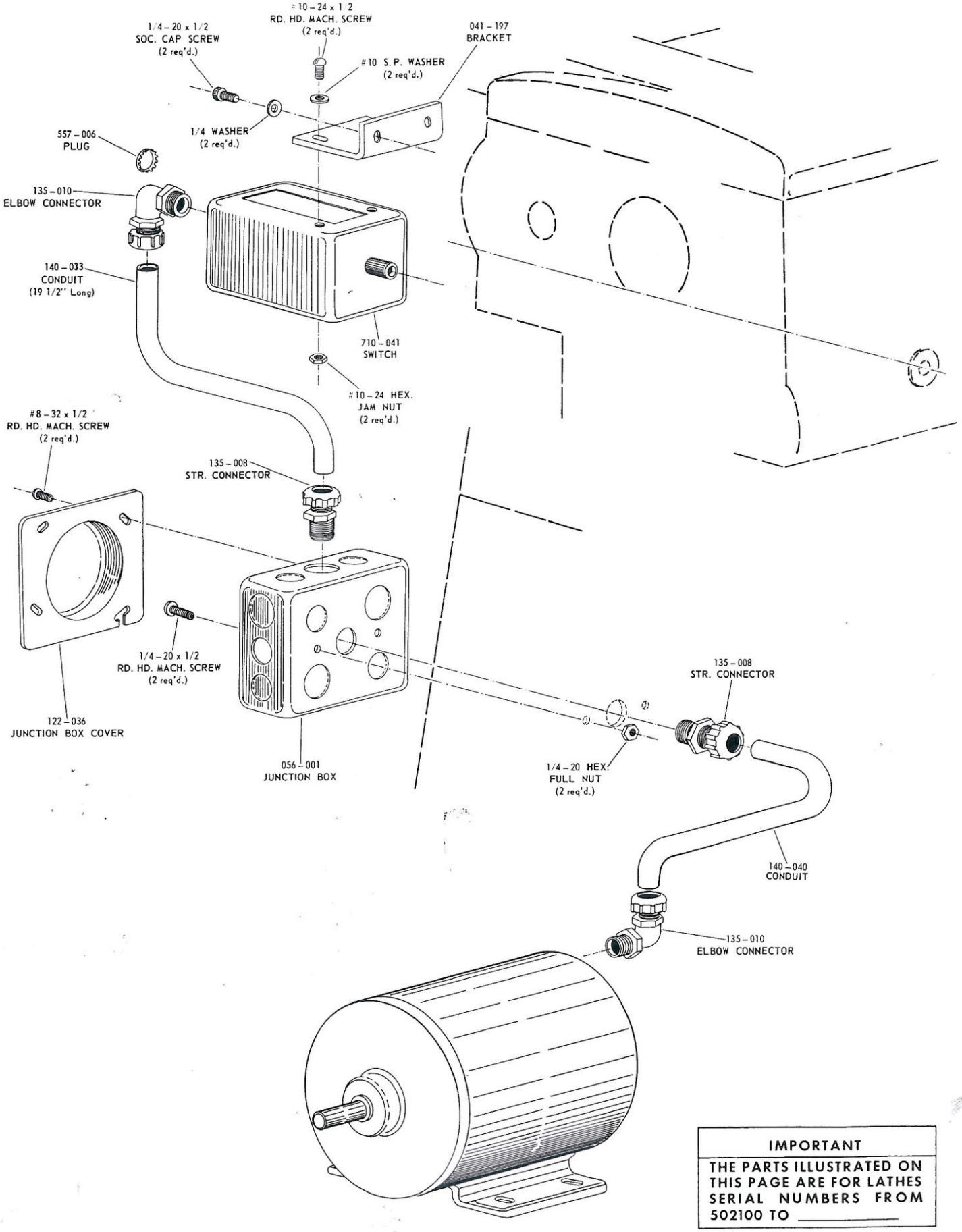
Consists of:

341 – 098	GEAR
4900 – 13	GEAR ASSEMBLY
DB 4 – 35	OILER
Q – 523	NUT
#3	WOODRUFF KEY

IMPORTANT

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

ELECTRICAL ASSEMBLY



IMPORTANT

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

COUNTERSHAFT ASSEMBLY W/O CLUTCH

5905-115 COUNTERSHAFT SPINDLE ASSEMBLY W/O CLUTCH

Consists of:

044 – 017	BEARING (2)
238 – 003	DRIVER
382 – 055	HUB
442 – 046	PULLEY KEY
442 – 052	KEY
442 – 053	DRIVER KEY
641 – 011	RETAINER (2)
641 – 071	RETAINER
699 – 142	SPACER
701 – 052	SPINDLE
5900 – 40	C'SHAFT PULLEY ASSEM.
5900 – 46	C'SHAFT VARI. PULLEY ASSEM.
699-146	SPACER

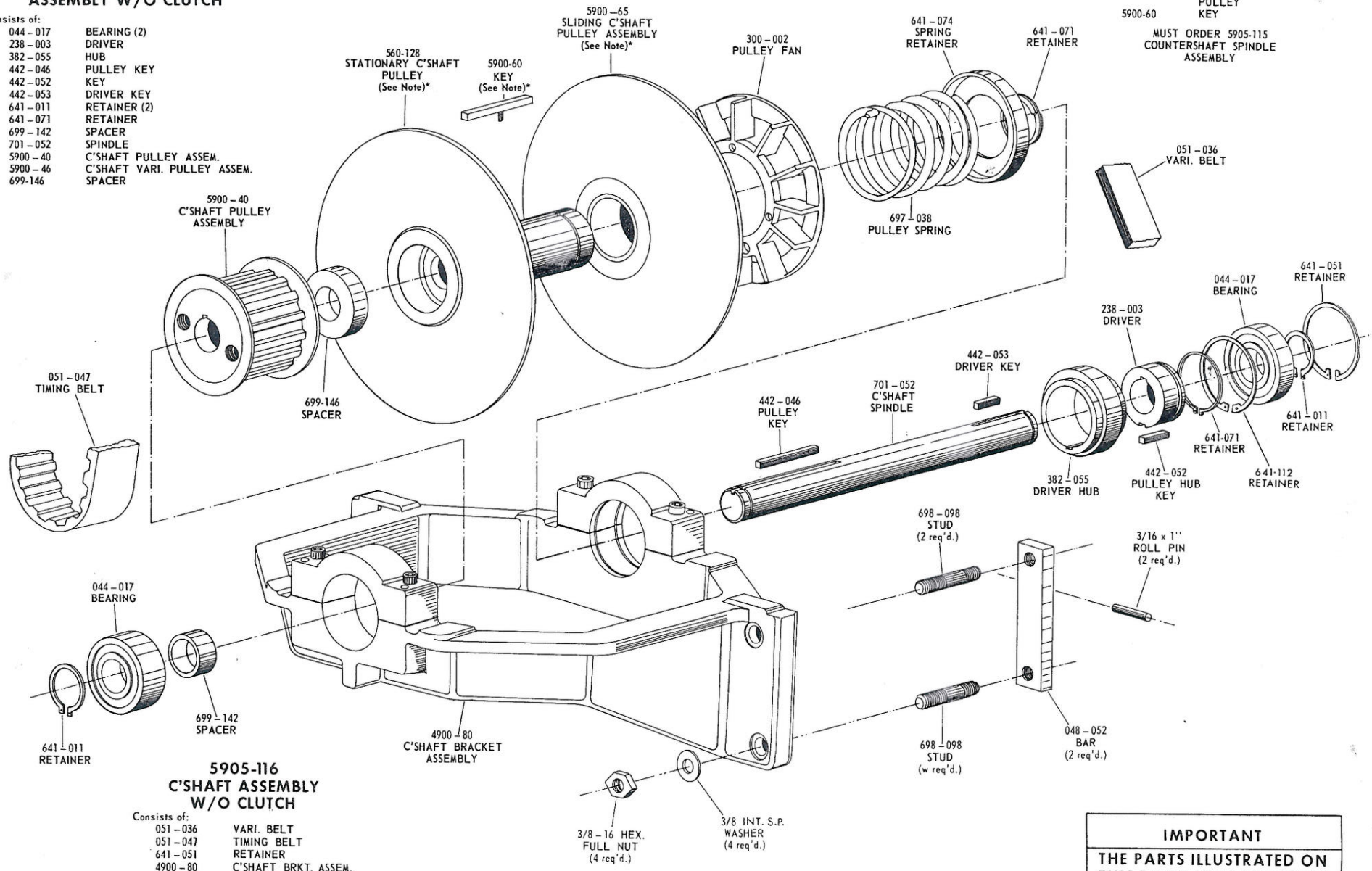
NOTE*
MUST ORDER 5905-115 COUNTERSHAFT SPINDLE ASSEMBLY FOR REPAIR.

5900-46 C'SHAFT VARI. PULLEY ASSEMBLY (SEE NOTE)*

Consists of:

300 – 002	FAN
641 – 071	RETAINER
641 – 074	SPRING RETAINER
697 – 038	PULLEY SPRING
5900 – 65	SLIDING C'SHAFT PULLEY ASSEMBLY
560-128	STAT. C'SHAFT PULLEY
5900-60	KEY

MUST ORDER 5905-115 COUNTERSHAFT SPINDLE ASSEMBLY



5905-116 C'SHAFT ASSEMBLY W/O CLUTCH

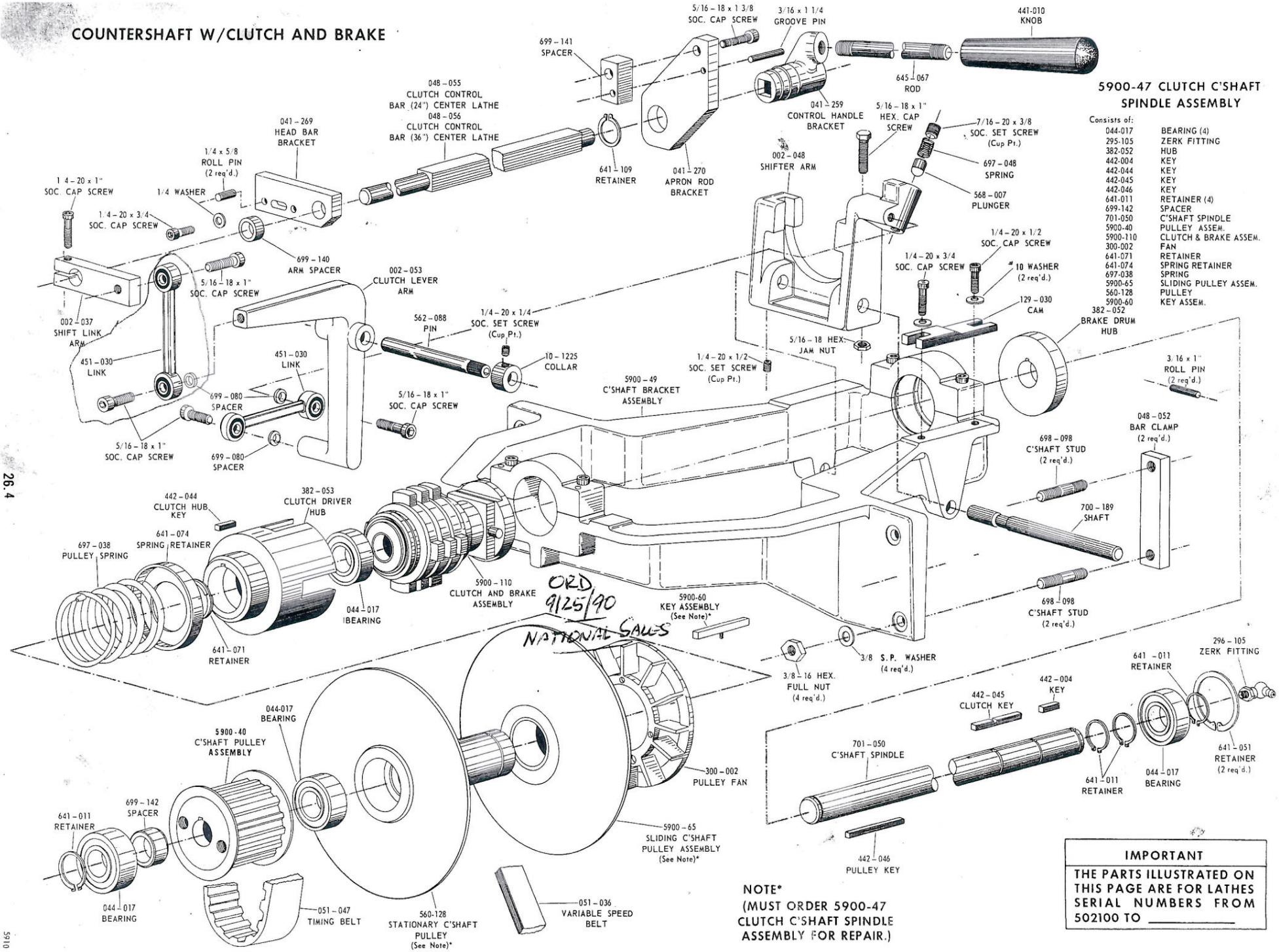
Consists of:

051 – 036	VARI. BELT
051 – 047	TIMING BELT
641 – 051	RETAINER
4900 – 80	C'SHAFT BRKT. ASSEM.
5905 – 115	C'SHAFT SPINDLE ASSEM.
641-112	RETAINER

IMPORTANT

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

COUNTERSHAFT W/CLUTCH AND BRAKE



5900-47 CLUTCH C'SHAFT SPINDLE ASSEMBLY

Consists of:

044-017	BEARING (4)
295-105	ZERK FITTING
382-052	HUB
442-004	KEY
442-044	KEY
442-045	KEY
442-046	KEY
641-011	RETAINER (4)
699-142	SPACER
701-050	C'SHAFT SPINDLE
5900-40	PULLEY ASSEM.
5900-110	CLUTCH & BRAKE ASSEM.
300-002	FAN
641-071	RETAINER
641-074	SPRING RETAINER
697-038	SPRING
5900-65	SLIDING PULLEY ASSEM.
560-128	PULLEY
5900-60	KEY ASSEM.

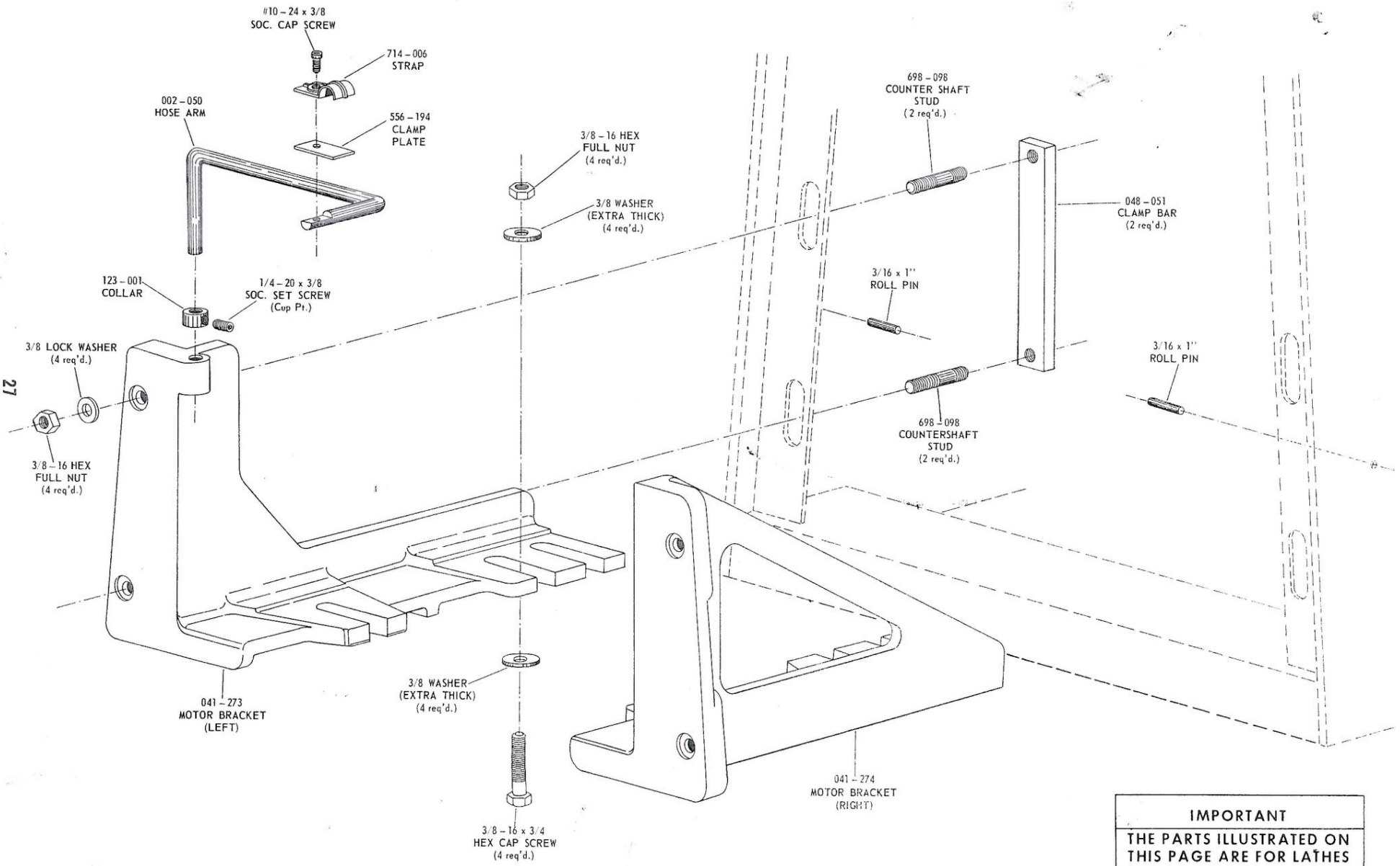
ORD 9/25/90 NATIONAL SALES

NOTE*
(MUST ORDER 5900-47 CLUTCH C'SHAFT SPINDLE ASSEMBLY FOR REPAIR.)

IMPORTANT

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

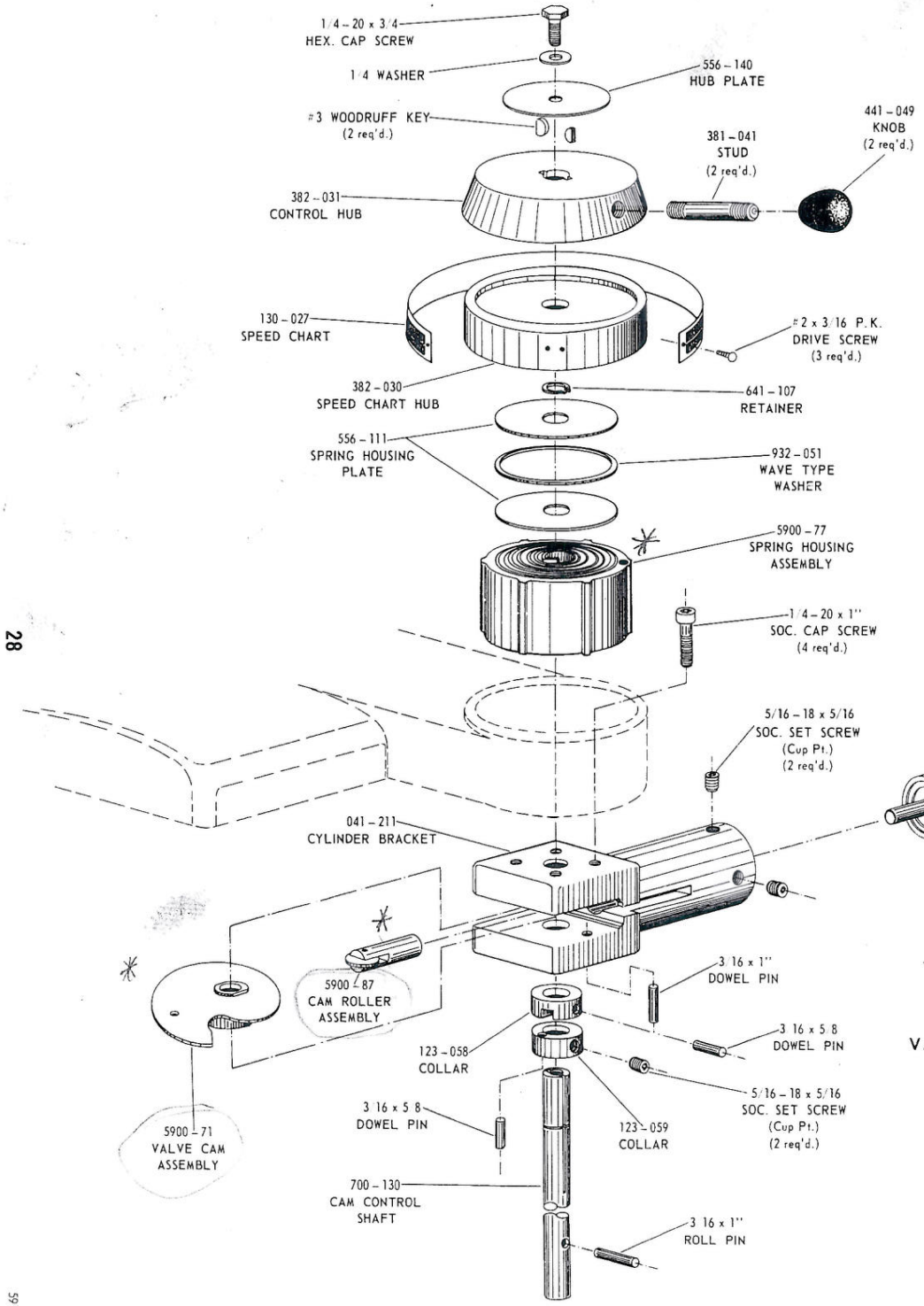
MOTOR BASE ASSEMBLY



IMPORTANT

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

VARIABLE SPEED CONTROL



5900-76
SPEED CHART HUB ASSEMBLY

Consists of:

130 – 027	CHART
382 – 030	HUB
#2 x 3/16 P.K.	DRIVE SCREW (3)

5900-72
VALVE CAM AND BRACKET ASSEMBLY

Consists of:

041 – 211	BRACKET
123 – 058	COLLAR
123 – 059	COLLAR
5900 – 71	CAM ASSEMBLY
700 – 130	SHAFT
3/16 x 5/8	DOWEL PIN (2)
3/16 x 1"	DOWEL PIN
5900 – 87	CAM ROLLER ASSEMBLY
5/16 – 18 x 5/16	SOC. SET SCREW (4)
3/16 x 1"	ROLL PIN

IMPORTANT

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

VARIABLE SPEED MOTOR PULLEY ASSEMBLY

272-4020

5900-125
MOTOR VARI-PULLEY ASSEMBLY

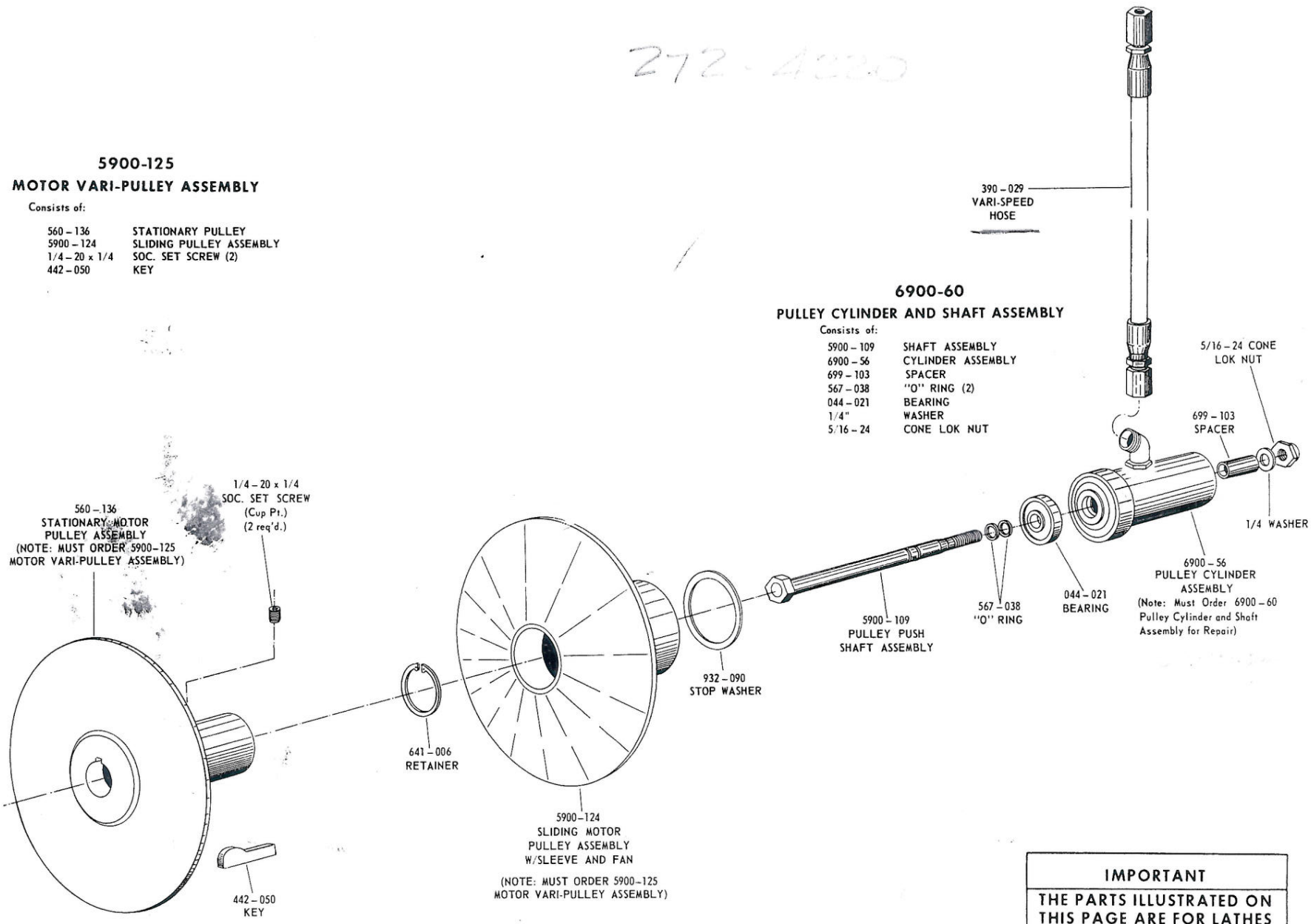
Consists of:

560 – 136	STATIONARY PULLEY
5900 – 124	SLIDING PULLEY ASSEMBLY
1/4 – 20 x 1/4	SOC. SET SCREW (2)
442 – 050	KEY

6900-60
PULLEY CYLINDER AND SHAFT ASSEMBLY

Consists of:

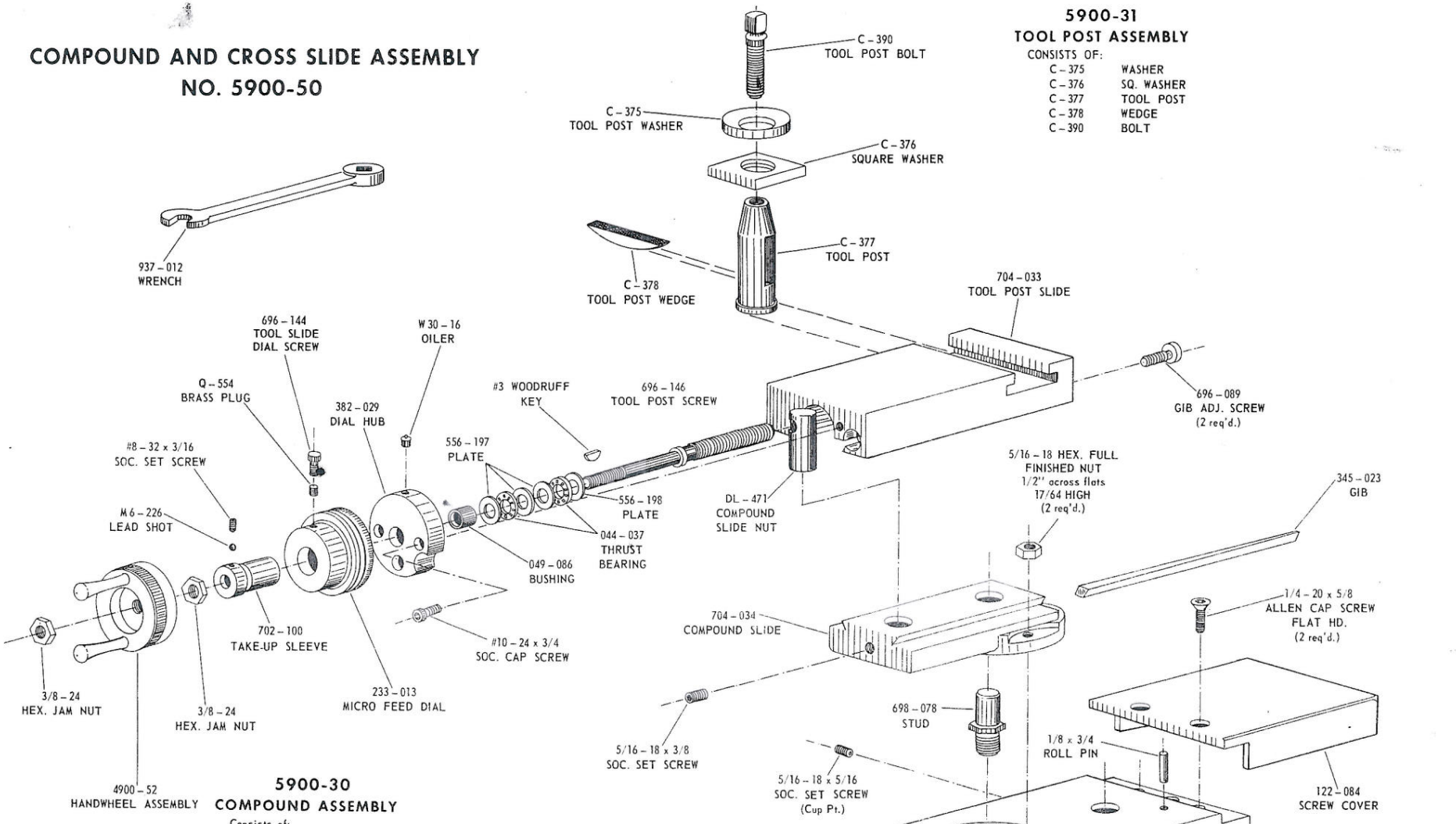
5900 – 109	SHAFT ASSEMBLY
6900 – 56	CYLINDER ASSEMBLY
699 – 103	SPACER
567 – 038	"O" RING (2)
044 – 021	BEARING
1/4"	WASHER
5/16 – 24	CONE LOK NUT



IMPORTANT

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

COMPOUND AND CROSS SLIDE ASSEMBLY NO. 5900-50



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
COMPOUND ASSEMBLY

Consists of:

704 – 034	SLIDE
704 – 033	SLIDE
702 – 050	SLEEVE
696 – 089	SCREW (2)
696 – 088	SCREW
4900 – 52	HANDWHEEL ASSEMBLY
382 – 029	HUB
345 – 023	GIB
233 – 013	DIAL
049 – 058	BUSHING
W 30 – 16	OILER
Q – 554	PLUG
M 6 – 226	SHOT
696 – 144	DIAL SCREW
DL – 471	NUT
#3 WOODRUFF	KEY
3/8 – 24	HEX. JAM NUT (2)
5/16 – 18 x 3/8	SOC. SET SCREW
#8 – 32 x 3/16	SOC. SET SCREW
#10 – 24 x 3/4	SOC. CAP SCREW
044 – 037	BEARING (2)
556 – 197	PLATE (3)
556 – 198	PLATE

IMPORTANT

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

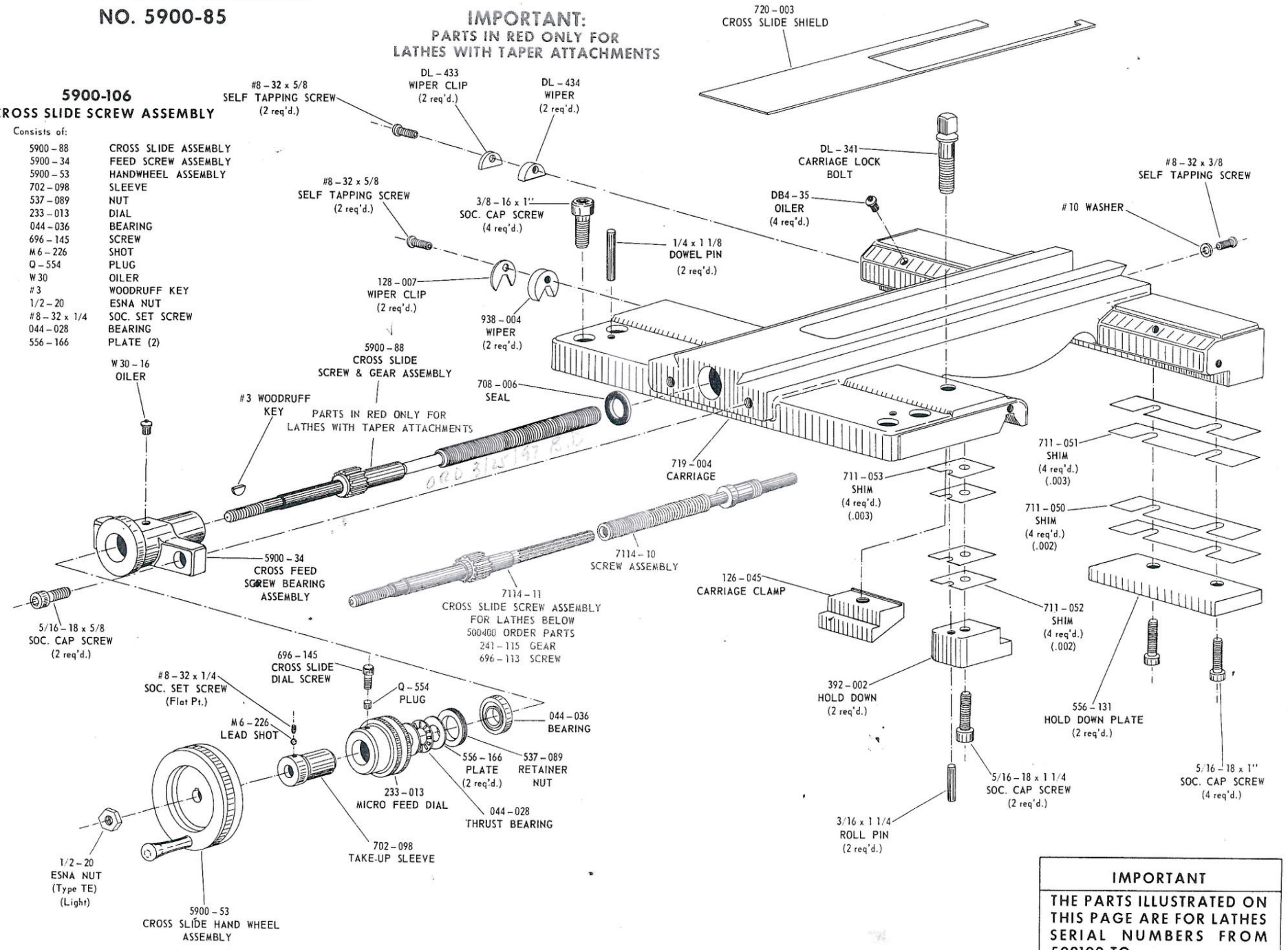
CARRIAGE SADDLE ASSEMBLY
NO. 5900-85

IMPORTANT:
PARTS IN RED ONLY FOR LATHES WITH TAPER ATTACHMENTS

5900-106
CROSS SLIDE SCREW ASSEMBLY

Consists of:

5900 – 88	CROSS SLIDE ASSEMBLY
5900 – 34	FEED SCREW ASSEMBLY
5900 – 53	HANDWHEEL ASSEMBLY
702 – 098	SLEEVE
537 – 089	NUT
233 – 013	DIAL
044 – 036	BEARING
696 – 145	SCREW
M 6 – 226	SHOT
Q – 554	PLUG
W 30	OILER
# 3	WOODRUFF KEY
1/2 – 20	ESNA NUT
#8 – 32 x 1/4	SOC. SET SCREW
044 – 028	BEARING
556 – 166	PLATE (2)

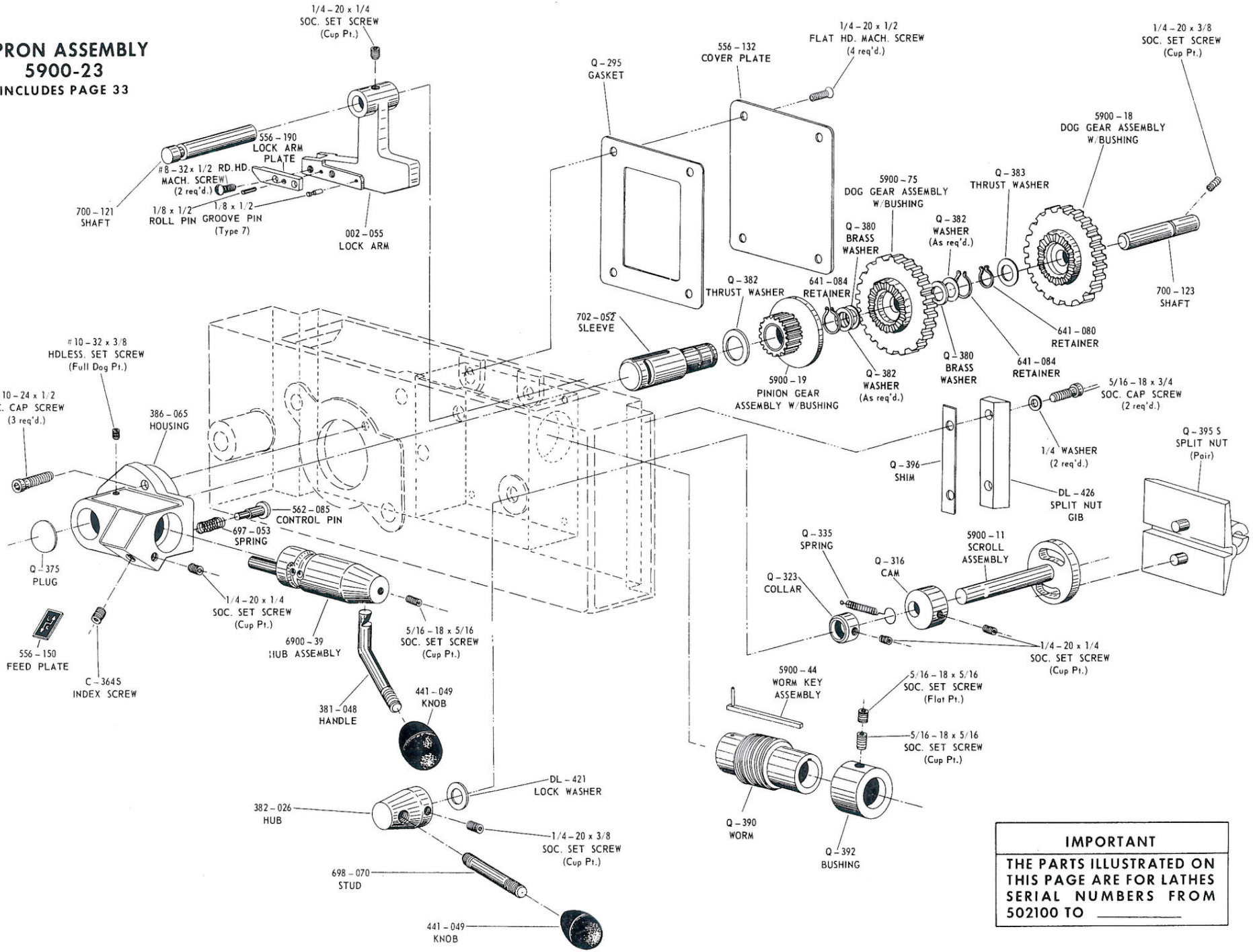


IMPORTANT

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

APRON ASSEMBLY
5900-23

INCLUDES PAGE 33



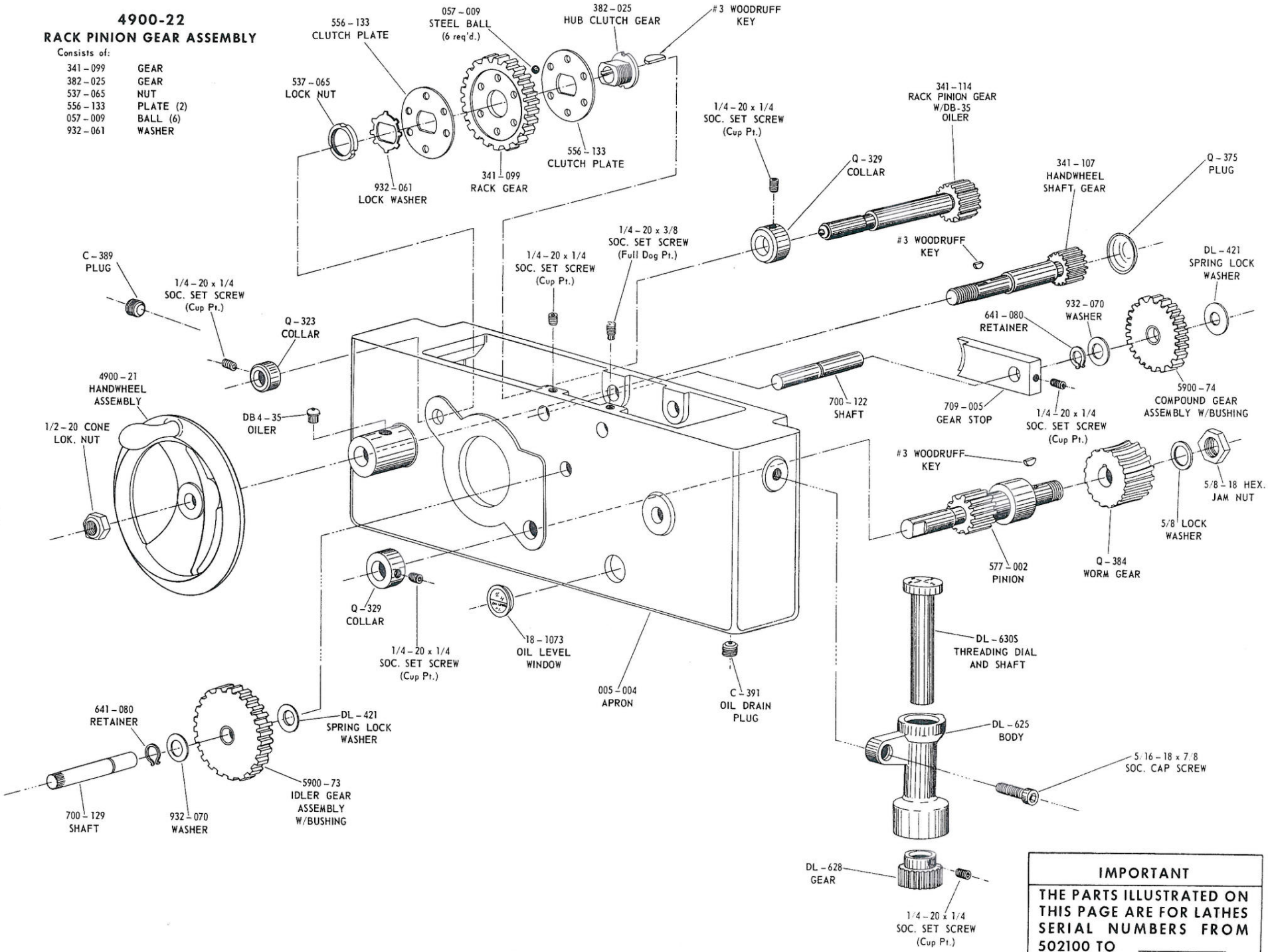
IMPORTANT

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

4900-22
RACK PINION GEAR ASSEMBLY

Consists of:

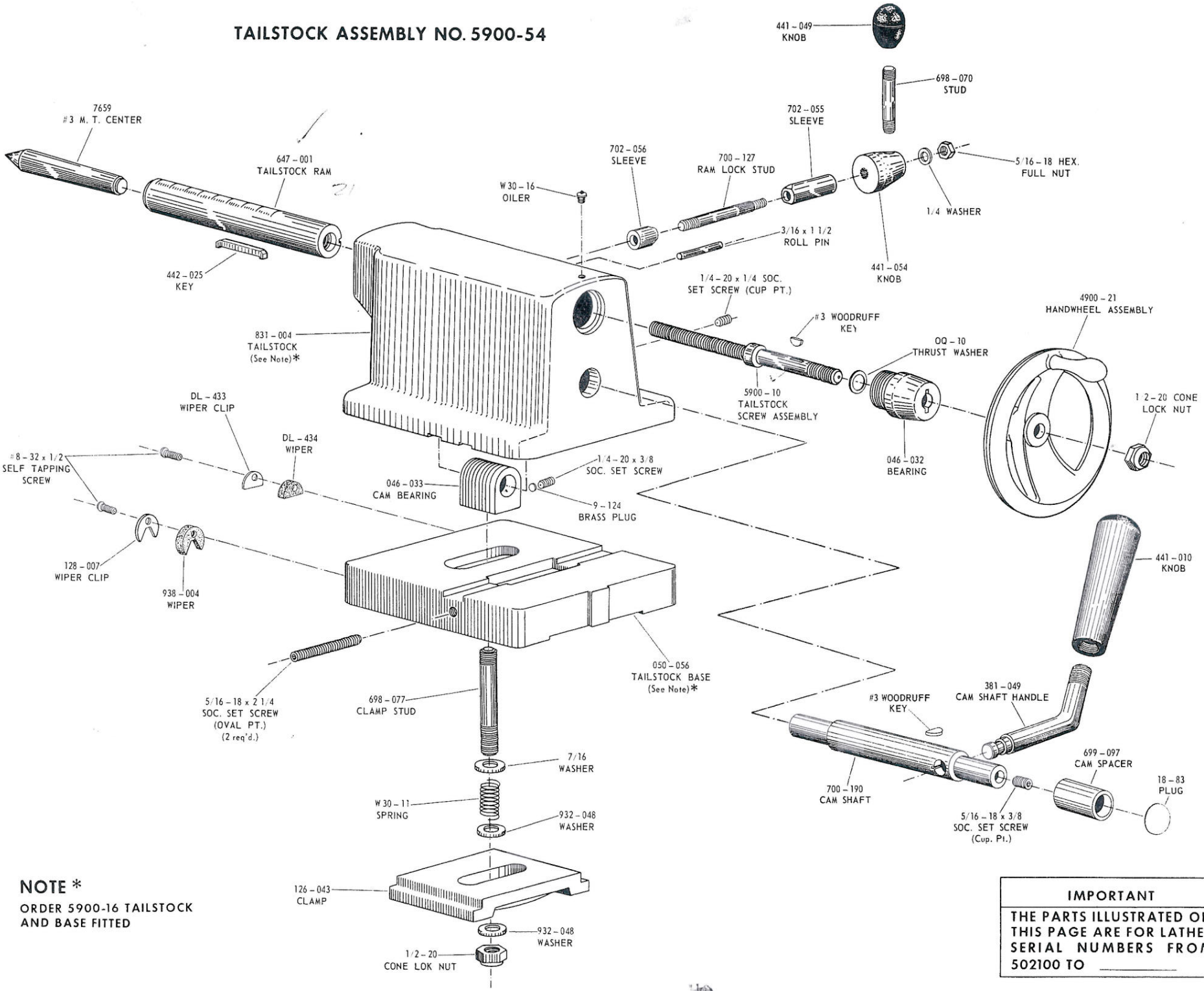
341 – 099	GEAR
382 – 025	GEAR
537 – 065	NUT
556 – 133	PLATE (2)
057 – 009	BALL (6)
932 – 061	WASHER



IMPORTANT

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

TAILSTOCK ASSEMBLY NO. 5900-54



NOTE *

ORDER 5900-16 TAILSTOCK AND BASE FITTED

IMPORTANT

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

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. 7108 FOLLOWER REST

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

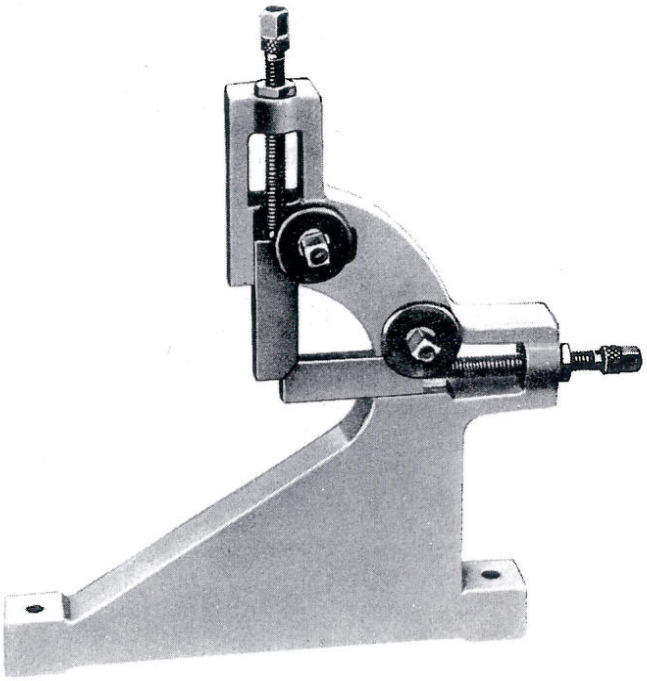


Figure 26

The two adjustable jaws hold the work in rigid position, preventing it from springing away from tool -- refer to figure 26.

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. 7109 STEADY REST

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

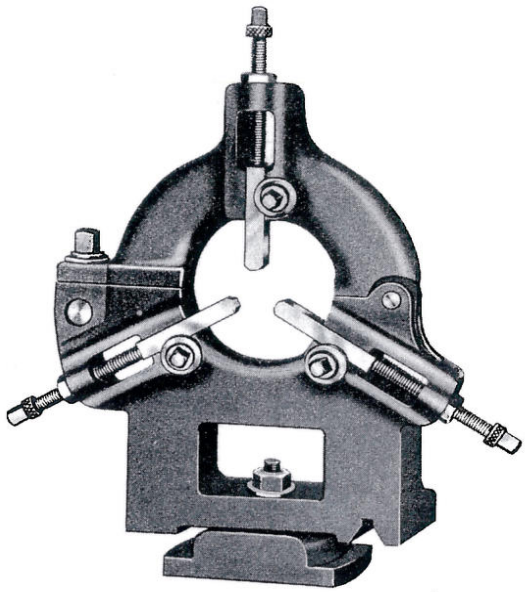


Figure 27

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 27.

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.

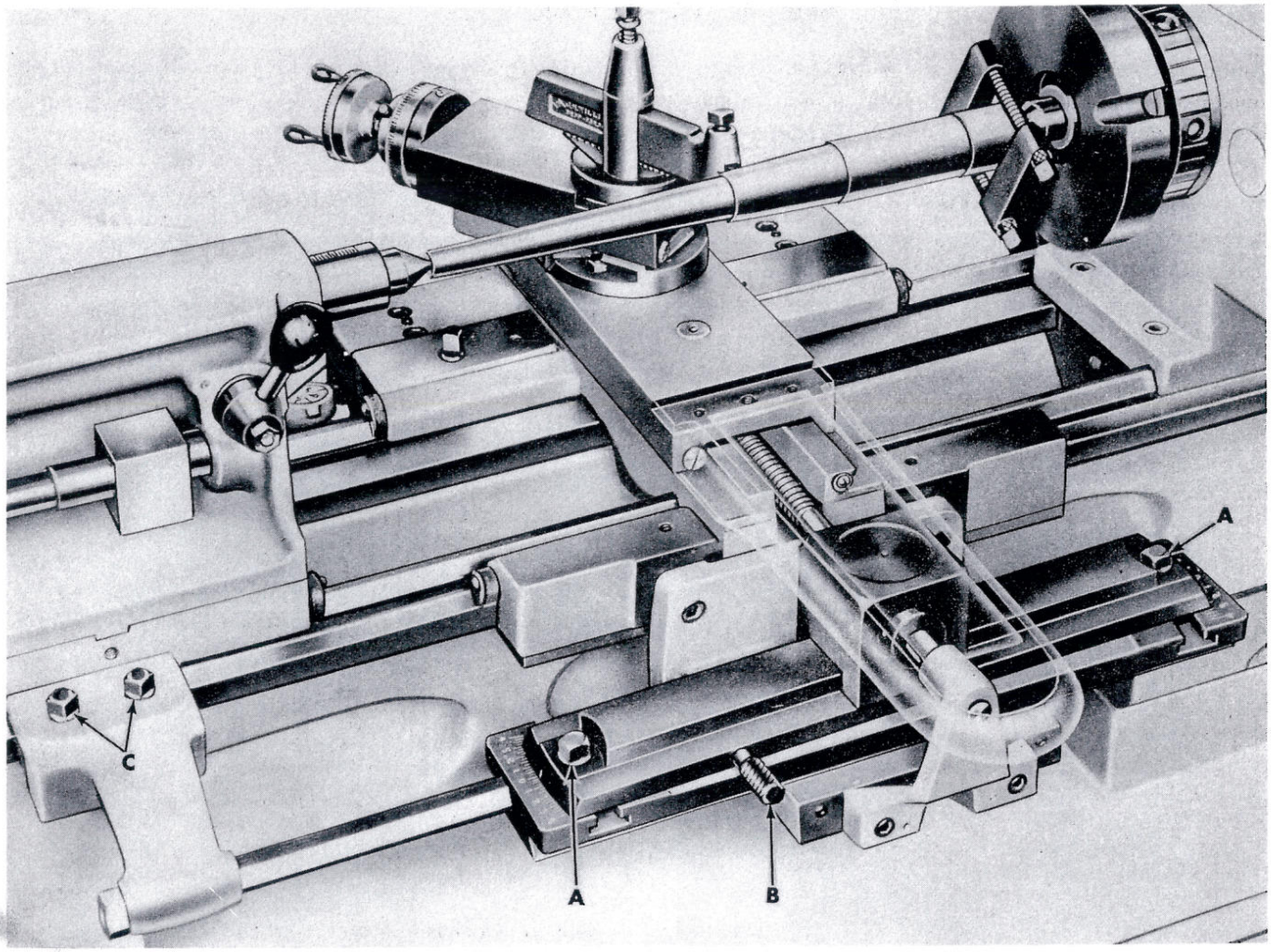


Figure 28

NO. 7114 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. 28) 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.

NO. 7118 MICRO CARRIAGE STOP

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

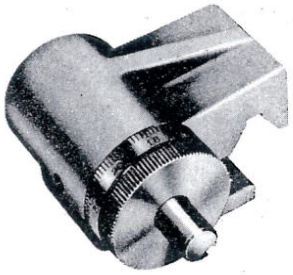


Figure 29

The stop clamps to front bed way of lathe -- clean ways before installing refer to figure 29. Micrometer dial, graduated in thousandths, permits exact settings.

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.

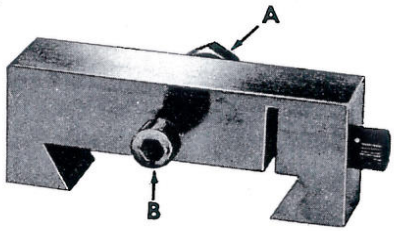


Figure 30

An adjustable screw (B, fig. 30) 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.

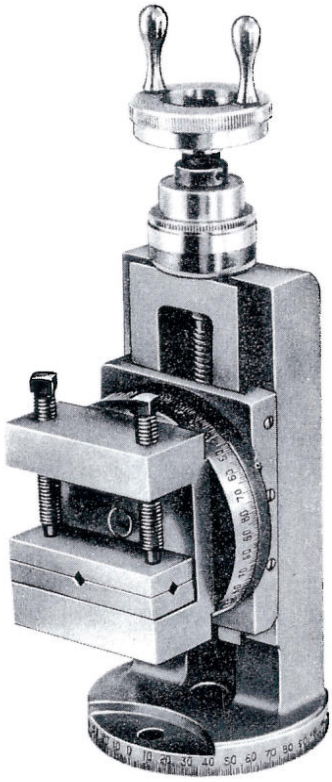


Figure 31

Position of vise is controlled by handwheel with micrometer graduated collar, refer to figure 31. Vise slide is graduated in degrees. Vise can be quickly set at any angle.

A milling cutter holder or collect 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.

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.

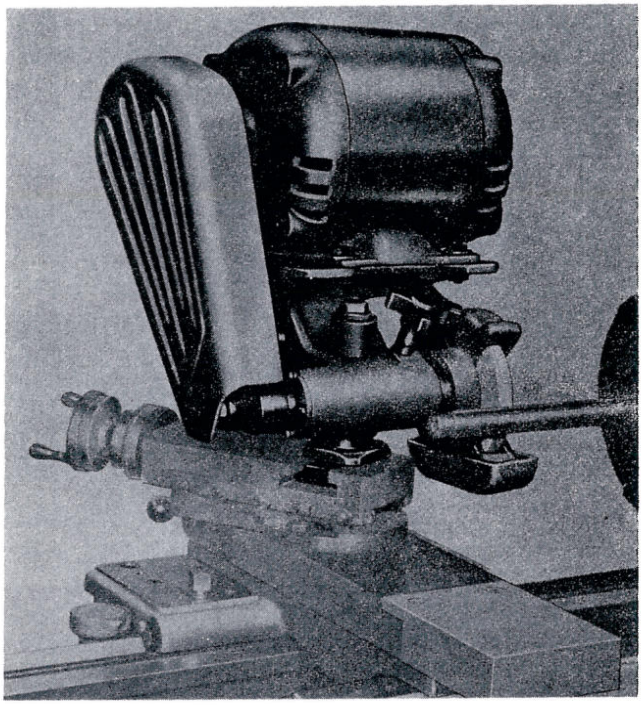


Figure 32

For most operations, grinder spindle is on the exact center line of lathe -- refer to figure 32.

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.

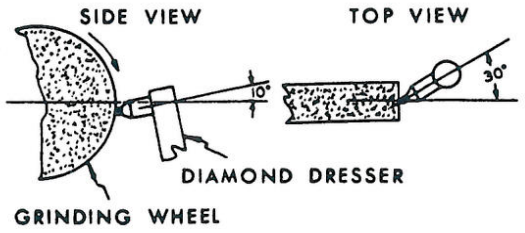


Figure 33

The diamond point should be at an angle and slightly below center as shown in figure 33. 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.

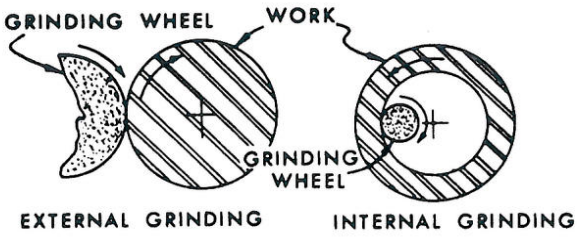


Figure 34

The rotation of the lathe spindle shown in figure 34 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.

APPENDIX

MACHINISTS TABLES

DECIMAL EQUIVALENTS

FRACTION	INCHES	M/M
1/64	.01563	.397
1/32	.03125	.794
3/64	.04688	1.191
1/16	.06250	1.588
5/64	.07813	1.984
3/32	.09375	2.381
7/64	.10938	2.778
1/8	.12500	3.175
9/64	.14063	3.572
5/32	.15625	3.969
11/64	.17188	4.366
3/16	.18750	4.763
13/64	.20313	5.159
7/32	.21875	5.556
15/64	.23438	5.953
1/4	.25000	6.350
17/64	.26563	6.747
9/32	.28125	7.144
19/64	.29688	7.541
5/16	.31250	7.938
21/64	.32813	8.334
11/32	.34375	8.731
23/64	.35938	9.128
3/8	.37500	9.525
25/64	.39063	9.922
13/32	.40625	10.319
27/64	.42188	10.716
7/16	.43750	11.113
29/64	.45313	11.509
15/32	.46875	11.906
31/64	.48438	12.303
1/2	.50000	12.700

FRACTION	INCHES	M/M
33/64	.51563	13.097
17/32	.53125	13.494
35/64	.54688	13.891
9/16	.56250	14.288
37/64	.57813	14.684
19/32	.59375	15.081
39/64	.60938	15.478
5/8	.62500	15.875
41/64	.64063	16.272
21/32	.65625	16.669
43/64	.67188	17.066
11/16	.68750	17.463
45/64	.70313	17.859
23/32	.71875	18.256
47/64	.73438	18.653
3/4	.75000	19.050
49/64	.76563	19.447
25/32	.78125	19.844
51/64	.79688	20.241
13/16	.81250	20.638
53/64	.82813	21.034
27/32	.84375	21.431
55/64	.85938	21.828
7/8	.87500	22.225
57/64	.89063	22.622
29/32	.90625	23.019
59/64	.92188	23.416
15/16	.93750	23.813
61/64	.95313	24.209
31/32	.96875	24.606
63/64	.98438	25.003
1	1.00000	25.400

CLAUSING

DIVISION OF ATLAS PRESS COMPANY

THREAD CUTTING TABLES

No phase of lathe operation is more interesting or profitable than the cutting of screws and threads; and no operation requires more care and study. The thread cutting range of the modern lathe is practically unlimited.

Every lathe comes equipped for cutting threads in the following standards: National Coarse (U.S.S.), National Fine (S.A.E.), Acme, Square, and Whitworth.

THREAD CUTTING TERMS

MAJOR DIAMETER – The largest diameter of the thread of either the screw or the nut.

MINOR DIAMETER – The smallest diameter of the thread of either the screw or the nut.

PITCH DIAMETER – On a straight screw thread, the diameter of an imaginary cylinder, the surface of which would pass through the threads at such points as to make equal the width of the threads and the width of the spaces cut by the surface of the cylinder.

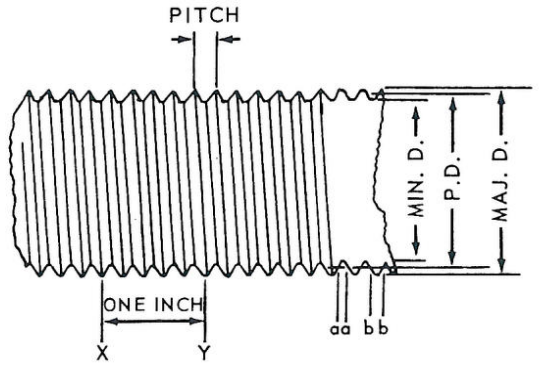


Figure A

In Figure A the lines representing the diameter "PD," are located so as to make spaces "aa" and "bb" equal. On a 60° Vee-type thread and on National Form threads, the pitch diameter is simply the major diameter less the depth of the thread.

DEPTH OF THREAD – One-half the difference between the major diameter and the minor diameter. In lathe work, the DOUBLE DEPTH OF THREAD, which is the difference between the major and minor diameters, is a quite common term. Thus, knowing the major diameter required, subtracting from it the double depth of thread for the required pitch, gives the minor diameter.

For information on single and double depth of National Form threads, see chart ---- "SINGLE DEPTH AND DOUBLE DEPTH OF NATIONAL FORM THREADS".

PITCH – The distance from a point on a screw thread to a corresponding point on the next thread, measured parallel to the axis (refer to Figure A).

THREADS PER INCH – The number of complete threads in the space of one inch. In Figure A, the distance between points X and Y represents one inch, and there are five threads per inch.

LEAD – The distance a screw thread advances axially in one turn. On a single thread screw, the lead and the pitch are identical; on a double thread screw, the lead is twice the pitch; on a triple thread screw, the lead is three times the pitch, etc.

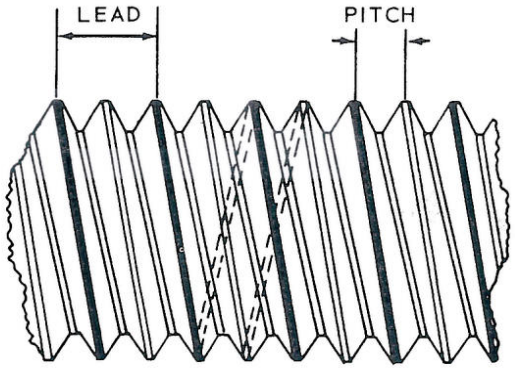


Figure B

Figure B shows a double thread screw. There are two separate grooves or helices around the screw, each of which advances twice the pitch in a single turn. If the pitch of this screw is 1/8 inch, the lead is 1/4 inch.

SINGLE DEPTH AND DOUBLE DEPTH OF NATIONAL FORM THREADS

THIS TABLE SHOWS

(I) Single Depth and Double Depth for National Form Threads cut with a NATIONAL FORM TOOL.

(II) Single Depth and Double Depth of NF Threads cut with a 60° V-type VEE FORM TOOL, making a V-bottom but leaving top of thread with proper amount of flat.

The two right-hand columns give proper Depth of Compound Feed to obtain correct depth of thread with compound rest set at 29°.

		(I) When Cut with NATIONAL FORM TOOL		(II) When Cut with VEE FORM TOOL		Depth of Compound Feed Single Depth	
Threads per Inch	Pitch Inches	Single Depth of Thread	Double Depth of Thread	Single Depth of Thread	Double Depth of Thread	N. F. Tool	Vee Form Tool
4	.2500	.1624	.3248	.1894	.3789	.186	.216
4½	.2222	.1443	.2887	.1684	.3368	.165	.193
5	.2000	.1299	.2598	.1516	.3031	.148	.173
5½	.1818	.1181	.2362	.1378	.2755	.135	.157
6	.1667	.1083	.2165	.1263	.2525	.124	.144
7	.1429	.0928	.1856	.1082	.2165	.106	.123
8	.1250	.0812	.1624	.0947	.1894	.093	.108
9	.1111	.0722	.1443	.0842	.1684	.083	.095
10	.1000	.0650	.1299	.0758	.1515	.074	.087
11	.0909	.0590	.1181	.0689	.1377	.067	.078
12	.0833	.0541	.1083	.0631	.1263	.062	.072
13	.0769	.0500	.0999	.0583	.1166	.057	.067
14	.0714	.0464	.0928	.0541	.1082	.053	.062
16	.0625	.0406	.0812	.0473	.0947	.046	.054
18	.0556	.0361	.0722	.0421	.0842	.041	.047
20	.0500	.0325	.0650	.0379	.0758	.037	.043
22	.0454	.0295	.0590	.0345	.0690	.034	.038
24	.0417	.0271	.0541	.0316	.0632	.031	.036
27	.0370	.0241	.0481	.0281	.0562	.028	.032
28	.0357	.0232	.0464	.0270	.0541	.027	.031
30	.0333	.0217	.0433	.0253	.0506	.025	.029
32	.0313	.0203	.0406	.0237	.0474	.023	.027
36	.0278	.0180	.0361	.0211	.0421	.021	.024
40	.0250	.0162	.0325	.0189	.0379	.019	.021
44	.0227	.0148	.0295	.0172	.0345	.017	.020
48	.0208	.0135	.0271	.0157	.0315	.015	.018
50	.0200	.0130	.0260	.0151	.0303	.015	.017
56	.0179	.0116	.0232	.0135	.0271	.013	.016
64	.0156	.0101	.0203	.0118	.0237	.012	.014
72	.0139	.0090	.0180	.0105	.0210	.010	.012
80	.0125	.0081	.0162	.00945	.0189	.009	.011
96	.0104	.0068	.0136	.00901	.01802	.008	.010

NOTE: USING NATIONAL FORM TOOL Minor Diameter = Major Diameter *minus* Double Depth of Thread in National Form Tool column.

USING VEE FORM TOOL Minor Diameter = Major Diameter *minus* Double Depth of Thread in Vee Form Tool column.

60° V-TYPE THREAD DIMENSIONS

WITH SIZES OF TAP DRILL AND CLEARANCE DRILL

NATIONAL COARSE THREAD SERIES

(FORMERLY U. S. STANDARD)

Nominal Size	Threads per Inch	Major Diameter Inches	Minor Diameter Inches	Pitch Diameter Inches	Tap Drill for 75% Thread †	Clearance Drill Size *
1	64	.0730	.0527	.0629	53	47
2	56	.0860	.0628	.0744	50	42
3	48	.0990	.0719	.0855	47	36
4	40	.1120	.0795	.0958	43	31
5 (1/8)	40	.1250	.0925	.1088	38	29
6	32	.1380	.0974	.1177	36	25
8	32	.1640	.1234	.1437	29	16
10	24	.1900	.1359	.1629	25	13/64"
12	24	.2160	.1619	.1889	16	7/32"
1/4"	20	.2500	.1850	.2175	7	17/64"
5/16"	18	.3125	.2403	.2764	F	21/64"
3/8"	16	.3750	.2938	.3344	5/16"	25/64"
7/16"	14	.4375	.3447	.3911	U	29/64"
1/2"	13	.5000	.4001	.4500	27/64"	33/64"
9/16"	12	.5625	.4542	.5084	31/64"	37/64"
5/8"	11	.6250	.5069	.5660	17/32"	41/64"
3/4"	10	.7500	.6201	.6850	21/32"	49/64"
7/8"	9	.8750	.7301	.8028	49/64"	57/64"
1"	8	1.0000	.8376	.9188	7/8"	1 1/64"
1 1/8"	7	1.1250	.9394	1.0322	63/64"	1 9/64"
1 1/4"	7	1.2500	1.0644	1.1572	1 7/64"	1 17/64"
1 3/8"	6	1.3750	1.1585	1.2667	1 7/32"	1 25/64"
1 1/2"	6	1.5000	1.2835	1.3917	1 11/32"	1 33/64"
1 3/4"	5	1.7500	1.4902	1.6201	1 9/16"	1 49/64"
2"	4 1/2	2.0000	1.7113	1.8557	1 25/32"	2 1/32"
2 1/4"	4 1/2	2.2500	1.9613	2.1057	2 1/32"	2 9/32"
2 1/2"	4	2.5000	2.1752	2.3376	2 1/4"	2 17/32"
2 3/4"	4	2.7500	2.4252	2.5876	2 1/2"	2 25/32"
3"	4	3.0000	2.6752	2.8376	2 3/4"	3 1/32"
3 1/4"	4	3.2500	2.9252	3.0876	3"	3 9/32"
3 1/2"	4	3.5000	3.1752	3.3376	3 1/4"	3 17/32"
3 3/4"	4	3.7500	3.4252	3.5876	3 1/2"	3 25/32"
4"	4	4.0000	3.6752	3.8376	3 3/4"	4 1/32"

† Refer to tables of "DIAMETERS OF NUMBERED DRILLS" and "DIAMETERS OF LETTERED DRILLS" for sizes.

* Clearance drill makes hole with standard clearance for diameter of nominal size.

60° V-TYPE THREAD DIMENSIONS

WITH SIZES OF TAP DRILL AND CLEARANCE DRILL

NATIONAL FINE THREAD SERIES

(FORMERLY S. A. E.)

Nominal Size	Threads per Inch	Major Diameter Inches	Minor Diameter Inches	Pitch Diameter Inches	Tap Drill for 75% Thread †	Clearance Drill Size *
0	80	.0600	.0438	.0519	3/64"	51
1	72	.0730	.0550	.0640	53	47
2	64	.0860	.0657	.0759	50	42
3	56	.0990	.0758	.0874	45	36
4	48	.1120	.0849	.0985	42	31
5 (1/8)	44	.1250	.0955	.1102	37	29
6	40	.1380	.1055	.1218	33	25
8	36	.1640	.1279	.1460	29	16
10	32	.1900	.1494	.1697	21	13/64"
12	28	.2160	.1696	.1928	14	7/32"
1/4"	28	.2500	.2036	.2268	3	17/64"
5/16"	24	.3125	.2584	.2854	I	21/64"
3/8"	24	.3750	.3209	.3479	Q	25/64"
7/16"	20	.4375	.3726	.4050	25/64"	29/64"
1/2"	20	.5000	.4351	.4675	29/64"	33/64"
9/16"	18	.5625	.4903	.5264	33/64"	37/64"
5/8"	18	.6250	.5528	.5889	37/64"	41/64"
3/4"	16	.7500	.6688	.7094	11/16"	49/64"
7/8"	14	.8750	.7822	.8286	13/16"	57/64"
1"	14	1.0000	.9072	.9536	15/16"	1 1/64"
1 1/8"	12	1.1250	1.0168	1.0709	1 3/64"	1 9/64"
1 1/4"	12	1.2500	1.1418	1.1959	1 11/64"	1 17/64"
1 3/8"	12	1.3750	1.2668	1.3209	1 19/64"	1 25/64"
1 1/2"	12	1.5000	1.3918	1.4459	1 27/64"	1 33/64"

† Refer to tables of "DIAMETERS OF NUMBERED DRILLS" and "DIAMETERS OF LETTERED DRILLS" for sizes.

* Clearance drill makes hole with standard clearance for diameter of nominal size.

60° V-TYPE THREAD DIMENSIONS

WITH SIZES OF TAP DRILL AND CLEARANCE DRILL

FRACTIONAL SIZES

NATIONAL SPECIAL THREAD SERIES

Nominal Size	Threads per Inch	Major Diameter Inches	Minor Diameter Inches	Pitch Diameter Inches	Tap Drill for 75% Thread †	Clearance Drill Size *
1/16"	64	.0625	.0422	.0524	3/64"	51
5/64"	60	.0781	.0563	.0673	1/16"	45
3/32"	48	.0938	.0667	.0803	49	40
7/64"	48	.1094	.0823	.0959	43	32
1/8"	32	.1250	.0844	.1047	3/32"	29
9/64"	40	.1406	.1081	.1244	32	24
5/32"	32	.1563	.1157	.1360	1/8"	19
5/32"	36	.1563	.1202	.1382	30	19
11/64"	32	.1719	.1313	.1516	9/64"	14
3/16"	24	.1875	.1334	.1604	26	8
3/16"	32	.1875	.1469	.1672	22	8
13/64"	24	.2031	.1490	.1760	20	3
7/32"	24	.2188	.1646	.1917	16	1
7/32"	32	.2188	.1782	.1985	12	1
15/64"	24	.2344	.1806	.2073	10	1/4"
1/4"	24	.2500	.1959	.2229	4	17/64"
1/4"	27	.2500	.2019	.2260	3	17/64"
1/4"	32	.2500	.2094	.2297	7/32"	17/64"
5/16"	20	.3125	.2476	.2800	17/64"	21/64"
5/16"	27	.3125	.2644	.2884	J	21/64"
5/16"	32	.3125	.2719	.2922	9/32"	21/64"
3/8"	20	.3750	.3100	.3425	21/64"	25/64"
3/8"	27	.3750	.3269	.3509	R	25/64"
7/16"	24	.4375	.3834	.4104	X	29/64"
7/16"	27	.4375	.3894	.4134	Y	29/64"
1/2"	12	.5000	.3918	.4459	27/64"	33/64"
1/2"	24	.5000	.4459	.4729	29/64"	33/64"
1/2"	27	.5000	.4519	.4759	15/32"	33/64"
9/16"	27	.5625	.5144	.5384	17/32"	37/64"
5/8"	12	.6250	.5168	.5709	35/64"	41/64"
5/8"	27	.6250	.5769	.6009	19/32"	41/64"
11/16"	11	.6875	.5694	.6285	19/32"	45/64"
11/16"	16	.6875	.6063	.6469	5/8"	45/64"
3/4"	12	.7500	.6418	.6959	43/64"	49/64"
3/4"	27	.7500	.7019	.7259	23/32"	49/64"
13/16"	10	.8125	.6826	.7476	23/32"	53/64"
7/8"	12	.8750	.7668	.8209	51/64"	57/64"
7/8"	18 **	.8750	.8028	.8389	53/64"	57/64"
7/8"	27	.8750	.8269	.8509	27/32"	57/64"
15/16"	9	.9375	.7932	.8654	53/64"	61/64"
1"	12	1.0000	.8918	.9459	59/64"	1 1/64"
1"	27	1.0000	.9519	.9759	31/32"	1 1/64"
1 5/8"	5 1/2	1.6250	1.3888	1.5069	1 29/64"	1 41/64"
1 7/8"	5	1.8750	1.6152	1.7451	1 11/16"	1 57/64"
2 1/8"	4 1/2	2.1250	1.8363	1.9807	1 29/32"	2 5/32"
2 3/8"	4	2.3750	2.0502	2.2126	2 1/8"	2 13/32"

† Refer to tables of "DIAMETERS OF NUMBERED DRILLS" and "DIAMETERS OF LETTERED DRILLS" for sizes.

* Clearance drill makes hole with standard clearance for diameter of nominal size.

** Standard spark plug size.

60° V-TYPE THREAD DIMENSIONS

WITH SIZES OF TAP DRILL AND CLEARANCE DRILL

INTERNATIONAL STANDARD—METRIC

Major Diameter m/m	Pitch m/m	Minor Diameter m/m	Pitch Diameter m/m	Tap Drill for 75% Thread m/m	Tap Drill for 75% Thread † No. or Inches	Clearance Drill Size *
2.0	.40	1.48	1.740	1.6	1/16"	41
2.3	.40	1.78	2.040	1.9	48	36
2.6	.45	2.02	2.308	2.1	45	31
3.0	.50	2.35	2.675	2.5	40	29
3.5	.60	2.72	3.110	2.9	33	23
4.0	.70	3.09	3.545	3.3	30	16
4.5	.75	3.53	4.013	3.75	26	10
5.0	.80	3.96	4.480	4.2	19	3
5.5	.90	4.33	4.915	4.6	14	15/64"
6.0	1.00	4.70	5.350	5.0	9	1/4"
7.0	1.00	5.70	6.350	6.0	15/64"	19/64"
8.0	1.25	6.38	7.188	6.8	H	11/32"
9.0	1.25	7.38	8.188	7.8	5/16"	3/8"
10.0	1.50	8.05	9.026	8.6	R	27/64"
11.0	1.50	9.05	10.026	9.6	V	29/64"
12.0	1.75	9.73	10.863	10.5	Z	1/2"
14.0**	1.25	12.38	13.188	13.0	33/64"	9/16"
14.0	2.00	11.40	12.701	12.0	15/32"	9/16"
16.0	2.00	13.40	14.701	14.0	35/64"	21/32"
18.0**	1.50	16.05	17.026	16.5	41/64"	47/64"
18.0	2.50	14.75	16.376	15.5	39/64"	47/64"
20.0	2.50	16.75	18.376	17.5	11/16"	13/16"
22.0	2.50	18.75	20.376	19.5	49/64"	57/64"
24.0	3.00	20.10	22.051	21.0	53/64"	31/32"
27.0	3.00	23.10	25.051	24.0	15/16"	1 3/32"
30.0	3.50	25.45	27.727	26.5	1 3/64"	1 13/64"
33.0	3.50	28.45	30.727	29.5	1 11/64"	1 21/64"
36.0	4.00	30.80	33.402	32.0	1 17/64"	1 7/16"
39.0	4.0	33.80	36.402	35.0	1 3/8"	1 9/16"
42.0	4.50	36.15	39.077	37.0	1 29/64"	1 43/64"
45.0	4.50	39.15	42.077	40.0	1 37/64"	1 13/16"
48.0	5.00	41.50	44.752	43.0	1 11/16"	1 29/32"

† Refer to tables of "DIAMETERS OF NUMBERED DRILLS" and "DIAMETERS OF LETTERED DRILLS" for sizes.

* Clearance drill makes hole with standard clearance for diameter of nominal size.

** Standard spark plug size.

60° V-TYPE THREAD DIMENSIONS

WITH SIZES OF TAP DRILL AND CLEARANCE DRILL

MACHINE SCREW SIZES

NATIONAL SPECIAL THREAD SERIES

Nominal Size	Threads per Inch	Major Diameter Inches	Minor Diameter Inches	Pitch Diameter Inches	Tap Drill for 75% Thread †	Clearance Drill Size *
1	56	.0730	.0498	.0614	54	47
4	32	.1120	.0714	.0917	45	31
4	36	.1120	.0759	.0940	44	31
5 (1/8)	36	.1250	.0889	.1070	40	29
6	36	.1380	.1019	.1200	34	25
7	30	.1510	.1077	.1294	31	21
7	36	.1510	.1149	.1330	1/8"	21
8	30	.1640	.1207	.1423	30	16
8	40	.1640	.1315	.1478	28	16
9	24	.1770	.1229	.1499	29	13
9	30	.1770	.1337	.1553	27	13
9	32	.1770	.1364	.1567	26	13
10	28	.1900	.1436	.1668	23	13/64"
10	30	.1900	.1467	.1684	22	13/64"
12	32	.2160	.1754	.1957	13	7/32"
14	20	.2420	.1770	.2095	10	17/64"
14	24	.2420	.1879	.2149	7	17/64"

† Refer to tables of "DIAMETERS OF NUMBERED DRILLS" and "DIAMETERS OF LETTERED DRILLS" for sizes.

* Clearance drill makes hole with standard clearance for diameter of nominal size.

STRAIGHT PIPE THREADS

AMERICAN STANDARD FORM

Nominal Pipe Size	Threads per Inch	Major Diameter Inches	Minor Diameter Inches	Pitch Diameter Inches	Tap Drill for Full Thread
1/8"	27	.4044	.3451	.3748	11/32"
1/4"	18	.5343	.4455	.4899	7/16"
3/8"	18	.6714	.5826	.6270	37/64"
1/2"	14	.8356	.7213	.7784	23/32"
3/4"	14	1.0460	.9318	.9889	59/64"
1"	11 1/2	1.3082	1.1690	1.2386	1 5/32"
1 1/4"	11 1/2	1.6530	1.5138	1.5834	1 1/2"
1 1/2"	11 1/2	1.8919	1.7527	1.8223	1 47/64"
2"	11 1/2	2.3658	2.2267	2.2963	2 7/32"
2 1/2"	8	2.8622	2.6622	2.7622	2 5/8"
3"	8	3.4885	3.2885	3.3885	3 1/4"
3 1/2"	8	3.9888	3.7888	3.8888	3 3/4"
4"	8	4.4871	4.2871	4.3871	4 1/4"

DIAMETERS OF NUMBERED DRILLS

Drill No.	Diameter Inches	Drill No.	Diameter Inches	Drill No.	Diameter Inches
80	.0135	53	.0595	26	.1470
79	.0145	52	.0635	25	.1495
78	.0160	51	.0670	24	.1520
77	.0180	50	.0700	23	.1540
76	.0200	49	.0730	22	.1570
75	.0210	48	.0760	21	.1590
74	.0225	47	.0785	20	.1610
73	.0240	46	.0810	19	.1660
72	.0250	45	.0820	18	.1695
71	.0260	44	.0860	17	.1730
70	.0280	43	.0890	16	.1770
69	.0292	42	.0935	15	.1800
68	.0310	41	.0960	14	.1820
67	.0320	40	.0980	13	.1850
66	.0330	39	.0995	12	.1890
65	.0350	38	.1015	11	.1910
64	.0360	37	.1040	10	.1935
63	.0370	36	.1065	9	.1960
62	.0380	35	.1100	8	.1990
61	.0390	34	.1110	7	.2010
60	.0400	33	.1130	6	.2040
59	.0410	32	.1160	5	.2055
58	.0420	31	.1200	4	.2090
57	.0430	30	.1285	3	.2130
56	.0465	29	.1360	2	.2210
55	.0520	28	.1405	1	.2280
54	.0550	27	.1440		

DIAMETERS OF LETTERED DRILLS

Drill Letter	Diameter Inches	Drill Letter	Diameter Inches	Drill Letter	Diameter Inches
A	.2340	I	.2720	Q	.3320
B	.2380	J	.2770	R	.3390
C	.2420	K	.2810	S	.3480
D	.2460	L	.2900	T	.3580
E	.2500	M	.2950	U	.3680
F	.2570	N	.3020	V	.3770
G	.2610	O	.3160	W	.3860
H	.2660	P	.3230	X	.3970
				Y	.4040
				Z	.4130

CIRCUMFERENCES AND AREAS OF CIRCLES FROM 1/64 TO 19 7/8, IN INCHES

Diameter	Circumference	Area	Diameter	Circumference	Area	Diameter	Circumference	Area
1/64	.0491	.0002	6	18.8496	28.2744	13	40.8408	132.733
1/32	.0982	.0008	6 1/8	19.2423	29.4648	13 1/8	41.2335	135.297
1/16	.1964	.0031	6 1/4	19.6350	30.6797	13 1/4	41.6262	137.887
1/8	.3927	.0123	6 3/8	20.0277	31.9191	13 3/8	42.0189	140.501
3/16	.5890	.0276	6 1/2	20.4204	33.1831	13 1/2	42.4116	143.139
1/4	.7854	.0491	6 5/8	20.8131	34.4717	13 5/8	42.8043	145.802
5/16	.9817	.0767	6 3/4	21.2058	35.7848	13 3/4	43.1970	148.490
3/8	1.1781	.1105	6 7/8	21.5985	37.1224	13 7/8	43.5897	151.202
7/16	1.3745	.1503						
1/2	1.5708	.1964	7	21.9912	38.4846	14	43.9824	153.938
9/16	1.7672	.2485	7 1/8	22.3839	39.8713	14 1/8	44.3751	156.700
5/8	1.9635	.3068	7 1/4	22.7766	41.2826	14 1/4	44.7678	159.485
11/16	2.1598	.3712	7 3/8	23.1693	42.7184	14 3/8	45.1605	162.296
3/4	2.3562	.4418	7 1/2	23.5620	44.1787	14 1/2	45.5532	165.130
13/16	2.5525	.5185	7 5/8	23.9547	45.6636	14 5/8	45.9459	167.990
7/8	2.7489	.6013	7 3/4	24.3474	47.1731	14 3/4	46.3386	170.874
15/16	2.9452	.6903	7 7/8	24.7401	48.7071	14 7/8	46.7313	173.782
1	3.1416	.7854	8	25.1328	50.2656	15	47.1240	176.715
1 1/8	3.5343	.9940	8 1/8	25.5255	51.8487	15 1/8	47.5167	179.673
1 1/4	3.9270	1.2272	8 1/4	25.9182	53.4563	15 1/4	47.9094	182.655
1 3/8	4.3197	1.4849	8 3/8	26.3109	55.0884	15 3/8	48.3021	185.661
1 1/2	4.7124	1.7671	8 1/2	26.7036	56.7451	15 1/2	48.6948	188.692
1 5/8	5.1051	2.0739	8 5/8	27.0963	58.4264	15 5/8	49.0875	191.748
1 3/4	5.4978	2.4053	8 3/4	27.4890	60.1322	15 3/4	49.4802	194.828
1 7/8	5.8905	2.7612	8 7/8	27.8817	61.8625	15 7/8	49.8729	197.933
2	6.2832	3.1416	9	28.2744	63.6174	16	50.2656	201.062
2 1/8	6.6759	3.5466	9 1/8	28.6671	65.3968	16 1/8	50.6583	204.216
2 1/4	7.0686	3.9761	9 1/4	29.0598	67.2008	16 1/4	51.0510	207.395
2 3/8	7.4613	4.4301	9 3/8	29.4525	69.0293	16 3/8	51.4437	210.598
2 1/2	7.8540	4.9087	9 1/2	29.8452	70.8823	16 1/2	51.8364	213.825
2 5/8	8.2467	5.4119	9 5/8	30.2379	72.7599	16 5/8	52.2291	217.077
2 3/4	8.6394	5.9396	9 3/4	30.6306	74.6621	16 3/4	52.6218	220.354
2 7/8	9.0321	6.4918	9 7/8	31.0233	76.589	16 7/8	53.0145	223.655
3	9.4248	7.0686	10	31.4160	78.540	17	53.4072	226.981
3 1/8	9.8175	7.6699	10 1/8	31.8087	80.516	17 1/8	53.7999	230.331
3 1/4	10.2102	8.2958	10 1/4	32.2014	82.516	17 1/4	54.1926	233.706
3 3/8	10.6029	8.9462	10 3/8	32.5941	84.541	17 3/8	54.5853	237.105
3 1/2	10.9956	9.6211	10 1/2	32.9868	86.590	17 1/2	54.9780	240.529
3 5/8	11.3883	10.3206	10 5/8	33.3795	88.664	17 5/8	55.3707	243.977
3 3/4	11.7810	11.0447	10 3/4	33.7722	90.763	17 3/4	55.7634	247.450
3 7/8	12.1737	11.7933	10 7/8	34.1649	92.886	17 7/8	56.1561	250.948
4	12.5664	12.5664	11	34.5576	95.033	18	56.5488	254.470
4 1/8	12.9591	13.3641	11 1/8	34.9503	97.205	18 1/8	56.9415	258.016
4 1/4	13.3518	14.1863	11 1/4	35.3430	99.402	18 1/4	57.3342	261.587
4 3/8	13.7445	15.0330	11 3/8	35.7357	101.623	18 3/8	57.7269	265.183
4 1/2	14.1372	15.9043	11 1/2	36.1283	103.869	18 1/2	58.1196	268.803
4 5/8	14.5299	16.8002	11 5/8	36.5211	106.139	18 5/8	58.5123	272.448
4 3/4	14.9226	17.7206	11 3/4	36.9138	108.434	18 3/4	58.9050	276.117
4 7/8	15.3153	18.6655	11 7/8	37.3065	110.754	18 7/8	59.2977	279.811
5	15.7080	19.6350	12	37.6992	113.098	19	59.6904	283.529
5 1/8	16.1007	20.6290	12 1/8	38.0919	115.466	19 1/8	60.0831	287.272
5 1/4	16.4934	21.6476	12 1/4	38.4846	117.859	19 1/4	60.4758	291.040
5 3/8	16.8864	22.6907	12 3/8	38.8773	120.277	19 3/8	60.8685	294.832
5 1/2	17.2788	23.7583	12 1/2	39.2700	122.719	19 1/2	61.2612	298.648
5 5/8	17.6715	24.8505	12 5/8	39.6627	125.185	19 5/8	61.6539	302.489
5 3/4	18.0642	25.9673	12 3/4	40.0554	127.677	19 3/4	62.0466	306.355
5 7/8	18.4569	27.1086	12 7/8	40.4481	130.192	19 7/8	62.4393	310.245

CIRCUMFERENCES AND AREAS OF CIRCLES FROM 20 TO 40⅞, IN INCHES

Diameter	Circumference	Area	Diameter	Circumference	Area	Diameter	Circumference	Area
20	62.8320	314.160	27	84.8232	572.557	34	106.814	907.922
20⅛	63.2247	318.099	27⅛	85.2159	577.870	34⅛	107.207	914.611
20¼	63.6174	322.063	27¼	85.6086	583.209	34¼	107.600	921.323
20⅜	64.0101	326.051	27⅜	86.0013	588.571	34⅜	107.992	928.061
20½	64.4028	330.064	27½	86.3940	593.959	34½	108.385	934.822
20⅝	64.7955	334.102	27⅝	86.7867	599.371	34⅝	108.778	941.609
20¾	65.1882	338.164	27¾	87.1794	604.807	34¾	109.171	948.420
20⅞	65.5809	342.250	27⅞	87.5721	610.268	34⅞	109.563	955.255
21	65.9736	346.361	28	87.9648	615.754	35	109.956	962.115
21⅛	66.3663	350.497	28⅛	88.3575	621.264	35⅛	110.349	969.000
21¼	66.7590	354.657	28¼	88.7502	626.798	35¼	110.741	975.909
21⅜	67.1517	358.842	28⅜	89.1429	632.357	35⅜	111.134	982.842
21½	67.5444	363.051	28½	89.5356	637.941	35½	111.527	989.800
21⅝	67.9371	367.285	28⅝	89.9283	643.549	35⅝	111.919	996.783
21¾	68.3298	371.543	28¾	90.3210	649.182	35¾	112.312	1,003.790
21⅞	68.7225	375.826	28⅞	90.7137	654.840	35⅞	112.705	1,010.822
22	69.1152	380.134	29	91.1064	660.521	36	113.098	1,017.878
22⅛	69.5079	384.466	29⅛	91.4991	666.228	36⅛	113.490	1,024.960
22¼	69.9006	388.822	29¼	91.8918	671.959	36¼	113.883	1,032.065
22⅜	70.2933	393.203	29⅜	92.2845	677.714	36⅜	114.276	1,039.195
22½	70.6860	397.609	29½	92.6772	683.494	36½	114.668	1,046.349
22⅝	71.0787	402.038	29⅝	93.0699	689.299	36⅝	115.061	1,053.528
22¾	71.4714	406.494	29¾	93.4626	695.128	36¾	115.454	1,060.732
22⅞	71.8641	410.973	29⅞	93.8553	700.982	36⅞	115.846	1,067.960
23	72.2568	415.477	30	94.2480	706.860	37	116.239	1,075.213
23⅛	72.6495	420.004	30⅛	94.6407	712.763	37⅛	116.632	1,082.490
23¼	73.0422	424.558	30¼	95.0334	718.690	37¼	117.025	1,089.792
23⅜	73.4349	429.135	30⅜	95.4261	724.642	37⅜	117.417	1,097.118
23½	73.8276	433.737	30½	95.8188	730.618	37½	117.810	1,104.469
23⅝	74.2203	438.364	30⅝	96.2115	736.619	37⅝	118.202	1,111.844
23¾	74.6130	443.015	30¾	96.6042	742.645	37¾	118.595	1,119.244
23⅞	75.0057	447.690	30⅞	96.9969	748.695	37⅞	118.988	1,126.669
24	75.3984	452.390	31	97.3896	754.769	38	119.381	1,134.118
24⅛	75.7911	457.115	31⅛	97.7823	760.869	38⅛	119.773	1,141.591
24¼	76.1838	461.864	31¼	98.1750	766.992	38¼	120.166	1,149.089
24⅜	76.5765	466.638	31⅜	98.5677	773.140	38⅜	120.559	1,156.612
24½	76.9692	471.436	31½	98.9604	779.313	38½	120.952	1,164.159
24⅝	77.3619	476.259	31⅝	99.3531	785.510	38⅝	121.344	1,171.731
24¾	77.7546	481.107	31¾	99.7458	791.732	38¾	121.737	1,179.327
24⅞	78.1473	485.979	31⅞	100.138	797.979	38⅞	122.130	1,186.948
25	78.5400	490.875	32	100.531	804.250	39	122.522	1,194.593
25⅛	78.9327	495.796	32⅛	100.924	810.545	39⅛	122.915	1,202.263
25¼	79.3254	500.742	32¼	101.316	816.865	39¼	123.308	1,209.958
25⅜	79.7181	505.712	32⅜	101.709	823.210	39⅜	123.700	1,217.677
25½	80.1108	510.706	32½	102.102	829.579	39½	124.093	1,225.420
25⅝	80.5035	515.726	32⅝	102.494	835.972	39⅝	124.486	1,233.188
25¾	80.8962	520.769	32¾	102.887	842.391	39¾	124.879	1,240.981
25⅞	81.2889	525.838	32⅞	103.280	848.833	39⅞	125.271	1,248.798
26	81.6816	530.930	33	103.673	855.301	40	125.664	1,256.640
26⅛	82.0743	536.048	33⅛	104.065	861.792	40⅛	126.056	1,264.506
26¼	82.4670	541.190	33¼	104.458	868.309	40¼	126.449	1,272.397
26⅜	82.8597	546.356	33⅜	104.851	874.850	40⅜	126.842	1,280.312
26½	83.2524	551.547	33½	105.244	881.415	40½	127.235	1,288.252
26⅝	83.6451	556.763	33⅝	105.636	888.005	40⅝	127.627	1,296.217
26¾	84.0378	562.003	33¾	106.029	894.620	40¾	128.020	1,304.206
26⅞	84.4305	567.267	33⅞	106.422	901.259	40⅞	128.413	1,312.219

CLAUSING

TEST REPORT, FOR 5900-series LATHE

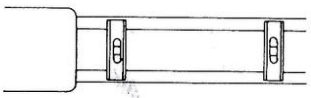
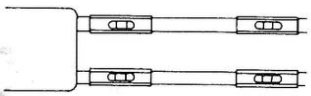
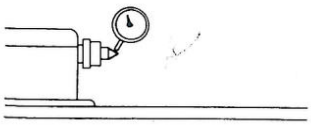
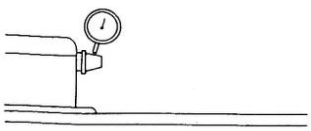
MODEL NO. 5914 SERIAL NO. 504800 TESTED BY NO. 18

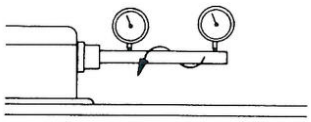
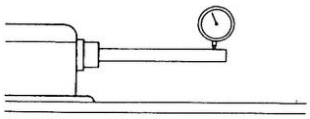
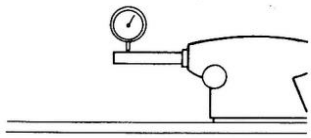
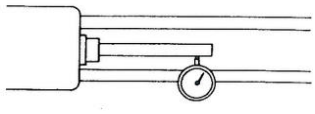
IMPORTANT

Your new lathe has been inspected for proper adjustment, operation, and performance within the following limits by an inspector and machine tester.

To obtain the maximum accuracy and service built into this machine, carefully mount and level the lathe by following instructions in the Manual furnished.

When writing us about this lathe, please give BOTH the Model Number and Serial Number, and the number of the tester.

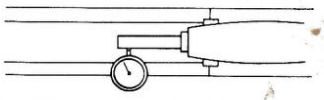
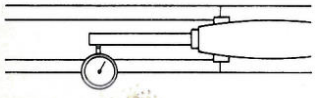
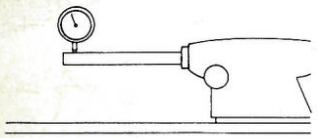
TEST	LIMIT	ACTUAL
1 **BED LEVEL (Transverse Direction)** 	When Using Precision Level All Readings to Be Within 0.0005 in 12 In.	.0005
2 **BED LEVEL (Longitudinal Direction)** 	When Using Precision Level Along Bed Maximum Reading to Be Within 0.001 in 12 In.	.001
3 **SPINDLE CENTER RUNOUT** 	Total Indicator Reading 0 to 0.0008	.0007
4 **SPINDLE NOSE RUNOUT** 	Total Indicator Reading 0 to 0.0003	.0001

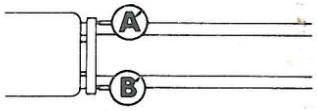
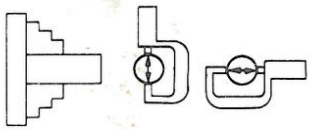
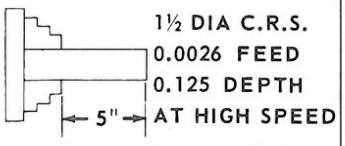
TEST	LIMIT	ACTUAL
5 **SPINDLE TAPER RUNOUT** 	Total Indicator Reading at End of 12 In. Test Bar 0 to 0.0006 at End of Spindle Nose 0 to 0.0003	.0004 .0001
6 **HEADSTOCK ALIGNMENT (Vertical)** 	High at End of 12 In. Test Bar 0 to 0.0005	.0005
7 **TAILSTOCK SPINDLE ALIGNMENT (Vertical)** 	High at End of Spindle When Fully Extended 0 to 0.0008	.0006
8 **HEADSTOCK ALIGNMENT (Horizontal)** 	At End of 12 In. Test Bar 0 to ± 0.0003	+.0003

(Continued on Other Side)

CLAUSING

TEST REPORT, FOR 5900-series LATHE (continued)

TEST	LIMIT	ACTUAL
9 TAILSTOCK SPINDLE ALIGNMENT (Horizontal) 	Forward at End of Spindle When Fully Extended 0 to 0.0005	.0001
10 TAILSTOCK TAPER ALIGNMENT (Horizontal) 	End of 12 In. Test Bar 0 to ± 0.0005	+.0002
11 TAILSTOCK TAPER ALIGNMENT (Vertical) 	High at End of 12 In. Test Bar 0 to 0.001	.0006

TEST	LIMIT	ACTUAL
12 A-CROSS SLIDE ALIGNMENT B-FACE PLATE RUNOUT 	To Face Concave Only on 12 In. Diameter 0 to 0.0005 On Face at Diameter 0 to 0.0005	.0001 .0002
13 LATHE MUST TURN ROUND WITH WORK MOUNTED IN CHUCK 	0.0003	.0003
14 RUNNING TEST FOR SMOOTH OPERATION 	Lathe Must Take Cut Without Chatter	OK
15 BACK LASH ON CROSS FEED SCREW	0.004	.0004

INSPECTED BY Bill NO. _____

DATE 11-8-66

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