

OPERATION AND
MAINTENANCE MANUAL

SOUTH BEND FOURTEEN

BULLETIN 7014-A

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SECTION 1 SAFETY INSTRUCTIONS

We urge that this machine be operated and equipped in strict accordance with all local, state and federal safety regulations. One good reference is National Safety Council Data Sheet 264 "Engine Lathes" which is available from

National Safety Council
425 N. Michigan Ave.
Chicago, Ill. 60611

Don't neglect your responsibility to see that this machine is operated, maintained, and equipped with total regard for operator safety. No one can be responsible for your neglect but you.

SAFETY CONSIDERATIONS IN OPERATING A LATHE

- | | |
|--|---|
| <ol style="list-style-type: none">1. Study this manual before attempting to run the machine.2. Be alert for loose, worn, or broken parts. Report all of these items and any unusual noise or action of the machine to your supervisor.3. Keep your lathe properly maintained. Perform all maintenance in accordance with this manual.4. Make sure this lathe is lubricated as outlined in this manual.5. Keep your lathe clean. Keep the work areas of the lathe clear of piled up chips.6. Never wear loose clothing or jewelry which could become entangled in the machine or work piece. | <ol style="list-style-type: none">7. Never lay tools on the machine where they might interfere with the operation of the machine or where they might become entangled in the work, chuck or chips.8. Always check the tightness of the chuck mounting, the rigidity of the work piece mounting and all adjustments and clamps before starting the machine.9. Be alert whenever operating the machine. If talking is necessary, stop the lathe and step aside until the conversation is completed.10. Never reach into the work area of the machine while the spindle is turning.11. Wear safety glasses for eye protection. |
|--|---|

SECTION 2 PREPARATION FOR USE

LOCATION

Although the quality of the work turned out by any machine tool depends principally upon the skill of its operator, it is important to provide the best possible environment for both man and machine. Lighting is very important, natural North light is ideal, but artificial light can be very satisfactory if harsh shadows are eliminated.

Your new 14" Lathe should be located in a warm and dry area which provides adequate clearance on all sides, and is free from shop traffic. Vibration is very undesirable for a lathe. A site on a concrete ground floor is the most desirable. Other floors can be satisfactory if they are sufficiently rigid or can be braced to provide a solid foundation.

UNCRATING

As soon as the machine is received, look for any signs of damage on the skid, crate, and wrapping. Then look for any signs of damage on the machine. If found, notify the carrier and the shipper immediately, and save the damaged packing to substantiate any claims which might arise.

Remove all packing materials and crating except the mounting skid to which the lathe is bolted; then prepare the foundation for the lathe.

Do not discard any wrappings before looking through them closely for shipping documents, instructions, and small parts shipped with the machine. Check off all items against the bill of lading.

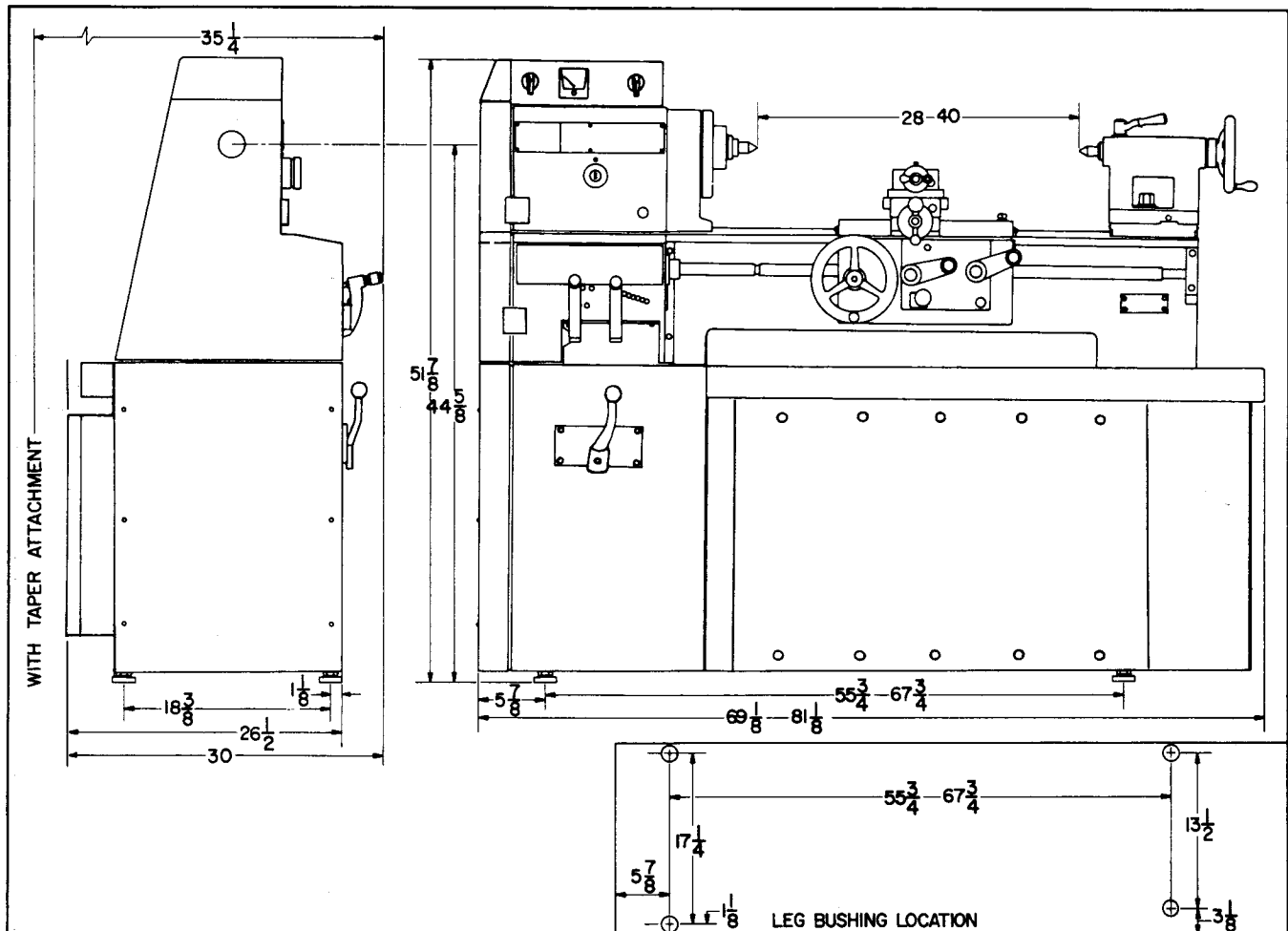


Figure 1 — Dimensional Diagram (Approx. Dimensions)

CAUTION

Do not move the carriage, tailstock, or cross slide until the lathe has been thoroughly cleaned and lubricated as instructed in the following section.

INITIAL CLEANING

The lathe must be cleaned after uncrating to ensure that the carriage cross slide and tailstock will not be damaged by being moved along dirty ways. Remove all protective wrappings and brush all machined surfaces with a degreasing solvent to soften the coating of protective grease. Wipe all surfaces dry with a clean cloth, and lubricate the lathe as instructed below before moving the tailstock or carriage and before connecting power to the motor.

CAUTION

Do not use compressed air to blow off dust or dirt or to evaporate solvent after cleaning. An air blast tends to drive abrasive particles into inaccessible places where they produce unnecessary wear or other damage.

INITIAL LUBRICATION

After the initial cleaning, it is advisable to manually lubricate all wear surfaces with a good machine oil. Check the oil level in all reservoirs and lubricate all points as described on the lubrication chart which is on the front of the gear box.

ANCHOR BOLTING

Four 1/2" anchor bolts may be installed in the floor beneath each leg of the lathe. Each should project from the floor at least 3". Anchor bolts set in a concrete floor should be sunk about 6" deep. Lag screws can be used when mounting the lathe to a wooden floor, but bolts anchored to 1/2" thick plates on the underside of the floor are preferable.

LIFTING LATHE

Remove the end panels to gain access to the bolts which secure the lathe to its shipping skid. Remove the shipping bolts. The leveling bushings and support pads should be installed as shown below.

The lathe may be picked up with a fork lift under the base. If a hoist and sling is used, blocks should be placed between the sides of the bed and the sling to avoid putting pressure on the lead screw.

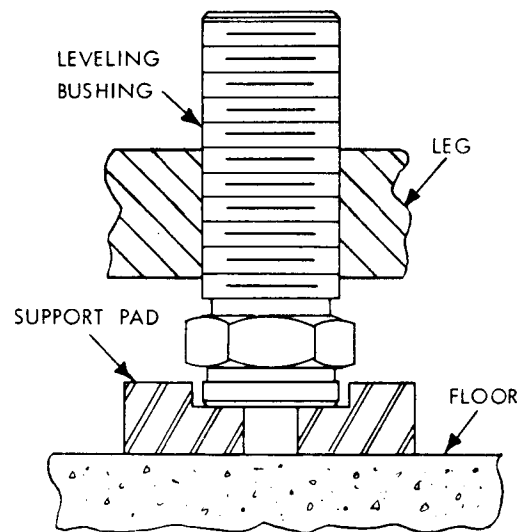


Figure 2 — Leveling Leg Bushing

LEVELING

Careful leveling of the lathe is essential to its accurate operation. This machine is equipped with four leveling bushings (2 at the headstock end and 2 at the tailstock end). Use a South Bend 12" Precision Level (Cat. No. CE2218) or equal. A carpenter's level or the level in a machinist's combination square is not accurate enough.

The following procedure should be followed:

- A. Place the level across the bed ways near the headstock.
- B. Adjust the two leveling bushings which are at the headstock end until the level shows the bed to be level.
- C. Place the level across the bed way at the tailstock end. Do not turn the level end for end.

- D. Adjust the two leveling bushings at the tailstock end until the bed is level.
- E. Recheck and readjust as above until the bed is level in both places.

ELECTRICAL HOOKUP

The power supply should conform to the voltage requirements which are shown on the tag which is attached to the junction box which is on the rear side of the base.

The power should be connected to the three wires which are inside the junction box. If spindle rotation is the reverse of that shown on the switch plate, reverse any two leads of the supply.

SECTION 3 OPERATION

SCOPE

This section is provided to help the operator become familiar with the usage and function of the various controls on this Lathe.

See Fig. 3 to identify and locate the various Lathe components.

It is beyond the scope of this manual to provide detailed instructions for turning out each of the many types of work of which the 14" Lathe is capable. It is assumed that the reader is already familiar with the use of screw-cutting lathes.

TURNING ON THE DRIVE

To turn on the machine, simply move the switch which is in the panel on the top of the headstock to "Forward" or "Reverse". This selects the direction of spindle rotation and turns on the spindle.

SELECTING SPINDLE SPEEDS

To select the high or low spindle speed ranges (50 to 300 rpm or 300 to 1800 rpm), put the speed range selector lever (on the base next to the gear box) in either high or low. There is a neutral position on this handle midway between high and low. Do not change speed ranges while the motor is on.

To set the speed in either range, turn the motor on. Note the speed indicated on the speed indicator (in the middle of the panel which is on top of the head). To increase the speed, push the speed indicator switch up. When the desired speed is reached, push the switch into the centered position. To decrease the speed, push the switch down until the desired speed is reached and then push the switch to the centered position. Note: The speed cannot be changed unless the motor is running.

SELECTING FEED AND THREAD DIRECTION

The feed and thread direction is controlled by the knob which is on the front of the headstock. When the knob is set at "Forward-RH", the lathe will cut right hand threads, feed toward the headstock or feed out. When set at "Reverse-LH", it will cut left hand threads, feed toward the tailstock or in. Do not change direction while motor is on.

SELECTING FEED AND THREAD PITCH

To select the feed or thread pitch desired, locate that feed or pitch on the chart which is on the front of the gear box and note the accompanying letter and number. Move the left hand tumbler so that its plunger goes into the hole under the letter required and move the right hand tumbler so that its plunger goes in the hole which is under the number required. Do not change ranges while motor is on.

SELECTING & ENGAGING FEEDS

To feed in the longitudinal direction, put the lever on the apron in the upper hole. To feed on the cross slide, put the lever on the apron in the lower hole. To engage feed, pull the clutch handle (at the bottom center of the apron) up. To disengage feed, push it down.

ENGAGING FOR THREADS

To engage for threading, put the selector lever in the center (neutral) position. Pull up on the half nut handle. To disengage threading, push the half nut handle down.

NOTE

The controls in the apron are interlocked so that the half nuts cannot be closed until the selector lever is in neutral.

HEADSTOCK, APRON AND TRANSMISSION OIL LEVEL WINDOWS

Three oil level windows are provided. One is located in the lower right hand corner of the headstock; one, located in the right hand corner of the apron; the other, located in the right hand corner of the transmission. All three reservoirs should be kept full.

Recommended lubricants are described on a plate fastened to the gear box. For more detailed instructions on lubrication see Section 4.

TAILSTOCK

To position the tailstock on the bed, loosen the clamp nut, slide to position and retighten. To extend or retract the spindle, release the spindle binding lever (15) (to the right) and turn the handwheel. To lock, push the lever to the left. The spindle extends to a maximum of 4 1/4". The tailstock can be set over 15/16" for taper turning, by adjusting screws (17).

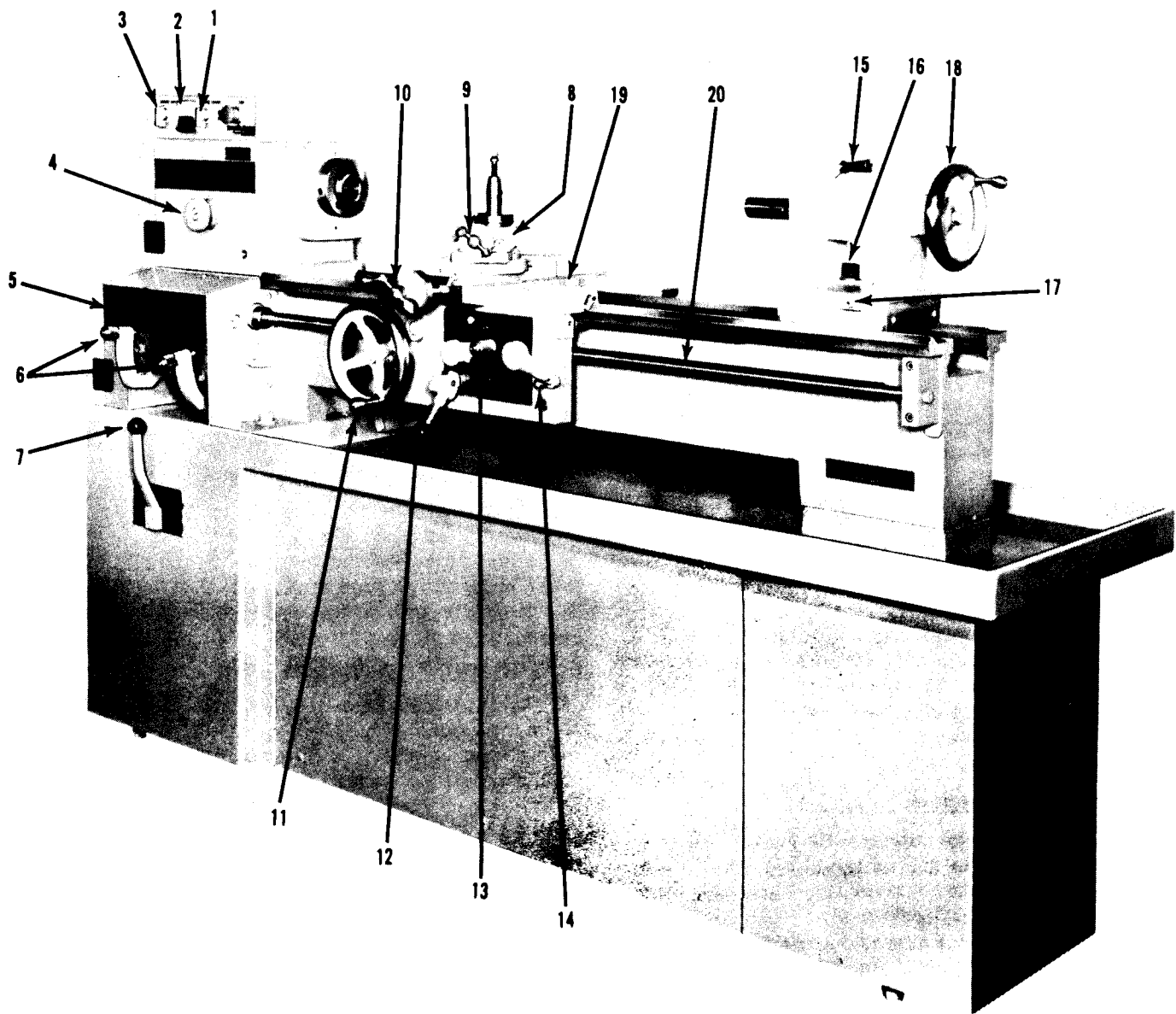


Figure 3 — Major Components

- | | |
|-----------------------------------|-------------------------------------|
| 1. Motor Switch | 11. Apron Handwheel |
| 2. Speed Indicator | 12. Apron Feed Clutch Control |
| 3. Speed Selector Switch | 13. Apron Feed Change Lever |
| 4. Feed & Thread Direction Knob | 14. Half Nut Lever |
| 5. Thread Feed Chart | 15. Tailstock Spindle Locking Lever |
| 6. Feed-Thread Selection Tumblers | 16. Tailstock Clamp Nut |
| 7. High-Low Speed Change Lever | 17. Tailstock Set Over Screws |
| 8. Compound Rest | 18. Tailstock Handwheel |
| 9. Compound Feed Ball Crank | 19. Saddle Lock |
| 10. Cross Feed Ball Crank | 20. Lead Screw |

THREAD DIAL INDICATOR

The thread dial indicates relative position of lead screw, spindle and carriage through gear meshing with lead screw, thus allowing disengagement of half nuts at end of threading cut, returning the carriage quickly to the starting point by hand without reversing the lathe spindle and re-engaging half nuts in correct position for subsequent cuts.

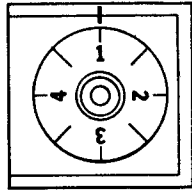


Figure 4

Thread must be started with a graduation on dial lined with witness mark on frame of indicator as follows:

For all even numbered threads close half nuts at any line on dial, or each $1/8$ revolution.

For all odd numbered threads, close the half nuts at any numbered line on dial or each $1/4$ revolution.

For all threads involving one-half of a thread per inch, such as $4\ 1/2$, close the half nuts at the lines numbered one or three or each $1/2$ revolution.

For all threads involving one-fourth of a thread in each inch, such as $4\ 3/4$, return to the original starting point before closing half nuts.

For all other threads, including $1\ 3/8$, $1\ 7/16$, $1\ 5/8$, $1\ 11/16$, $1\ 7/8$, $2\ 7/8$ and $3\ 3/8$ from the gear box index plate, the thread dial indicator cannot be used. (Leave half nuts engaged when cutting these threads and return to starting point by reversing the lathe spindle.)

TAPER ATTACHMENT

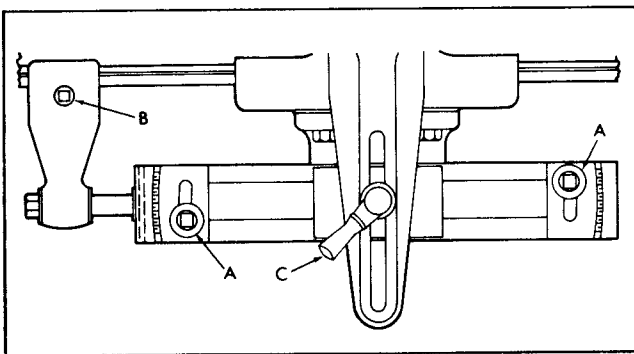


Figure 5 — Taper Attachment

The South Bend telescopic taper attachment is permanently mounted on the lathe carriage and is always ready for use. It does not interfere with any lathe operations. The swivel bar is graduated in degrees and in inches per foot. The maximum taper is $3\ 1/2$ " per foot and the maximum travel is $9\ 1/4$ " at one setting. To use the taper attachment, follow these steps:

1. Position the carriage in proper relation to the work. (Be sure the length of the cut does not exceed the travel of the taper attachment).
2. Loosen square head screws "A", set swivel bar to required angle in degrees or taper per foot and lock screws "A".
3. Adjust cross feed screw for required diameter.
4. Tighten bed clamp screw "B".
5. Tighten binder clamp "C".

Engage feed with tool ahead of the beginning of the cut to be sure all the backlash is removed before tool starts to cut.

To change from taper to straight turning, follow these steps:

1. Loosen binder clamp "C"
2. Loosen bed clamp "B"

SECTION 4 LUBRICATION

HEADSTOCK

Pressure lubrication is provided by an automatic pump which circulates oil from the reservoir in the base of the headstock to the spindle bearings. The oil level in the reservoir should be 1/2 up on the sight window located at the lower right hand of the front of the headstock.

GEAR BOX

The gear box is oiled through three ball oilers on top of the gear box, which provides lubrication direct to the bearings and shafts. Oil daily with a good quality machine oil of 150 - 240 viscosity.

CARRIAGE

All apron gears are self-lubricated from the apron reservoir. The apron oil level should be 1/2 up on the sight window located on the right front of the apron. Lubrication of half nuts, cross feed screws, cross slide ways, taper attachment, bedways and all other moving parts of this assembly is accomplished by hand oiling and should be done daily. See Fig. 6.

When taper attachment is not in use, the machined surfaces of the taper attachment should be protected with a coat of rust preventive oil to prevent tarnishing.

TAILSTOCK

Two ball type oilers are provided in the top of the barrel in the tailstock. A good grade machine oil of the recommended viscosity applied here will lubricate the tailstock spindle screw and thrust bearing.

This is only a partial listing of the many oil companies and their grades of machine oils that conform to our specifications. You may use the chart for comparative purposes to procure the proper grade of machine oil from any

LUBRICATION INSTRUCTION PLATE

Condensed instructions for lubricating the lathe are given in tabular form on instruction plate mounted on the front of the gearbox. Expanded instructions for carrying out the recommendations on the plate are provided in the lubrication chart Fig. 6.

DAILY CARE OF THE LATHE

Each day before beginning work on the 14" Lathe, the operator should clean and lubricate the machine as described in the chart to keep it in tiptop working condition. Neglect of this routine will harm much more than just the appearance of the machine. Rust or accumulations of chips, dust and oxidized lubricants can damage the precision ground way surfaces in a short time, and will destroy the accuracy of the lathe. In the event the lathe is used more than one shift per day, the daily procedures described should be repeated at the beginning of each shift.

The South Bend lubricants recommended in this manual have been determined after more than 60 years of experience with the engineering of precision machine tools. Order lubricants by catalog numbers from your South Bend distributor.

oil company.

Oils developed for automotive crank case lubrication are not recommended for machine tool lubrication.

RECOMMENDED LUBRICANTS

Company Name	Viscosity 140-170 at 100° F Headstock Transmission	Viscosity 150-240 Gearbox—Apron	Viscosity 240-500 Saddle—Compound Feed Screw— Bedway End Gearing—Tailstock	Ball Bearing Grease Belt Tension Pulley
South Bend Lathe	Cat. No. CE7053—1 qt.	Cat. No. CE1602—1 qt.	Cat. No. CE1603—1 qt.	
	Cat. No. CE7054—1 gal.	Cat. No. CE2018—1 gal.	Cat. No. CE2019—1 gal.	
American Oil Co.	Indust. Oil # 15	Indust. Oil # 15	Indust. Oil # 31	Rykon Grease # 2
Socony Mobil Oil Co.	Mobil DTE Oil, Lt. Wt.	Gg. Vactra Oil, Light	Gg. Vactra oil, Heavy Medium	Mobilux Grease # 2
Citgo	Pacemaker # 1 Hyd. Oil	Sentry Oil # 5	Sentry Oil # 8	Trojan M2 Grease
South Penn Oil Co.	Pennbell # 1 Hyd. Oil	Pennbell # 3 Hyd. Oil	Pennbell # 3 Hyd. Oil	Pennzoil Multi-Lub. # 303
Texaco, Inc.	Texaco Regal AR & O	Texaco Regal PCR & O	Texaco PCR & O	Multifax Grease # 2
Shell Oil Co.	Shell Tellus Oil # 27	Shell Vitra # 27	Shell Vitra # 33	Shell Alvania Grease # 2

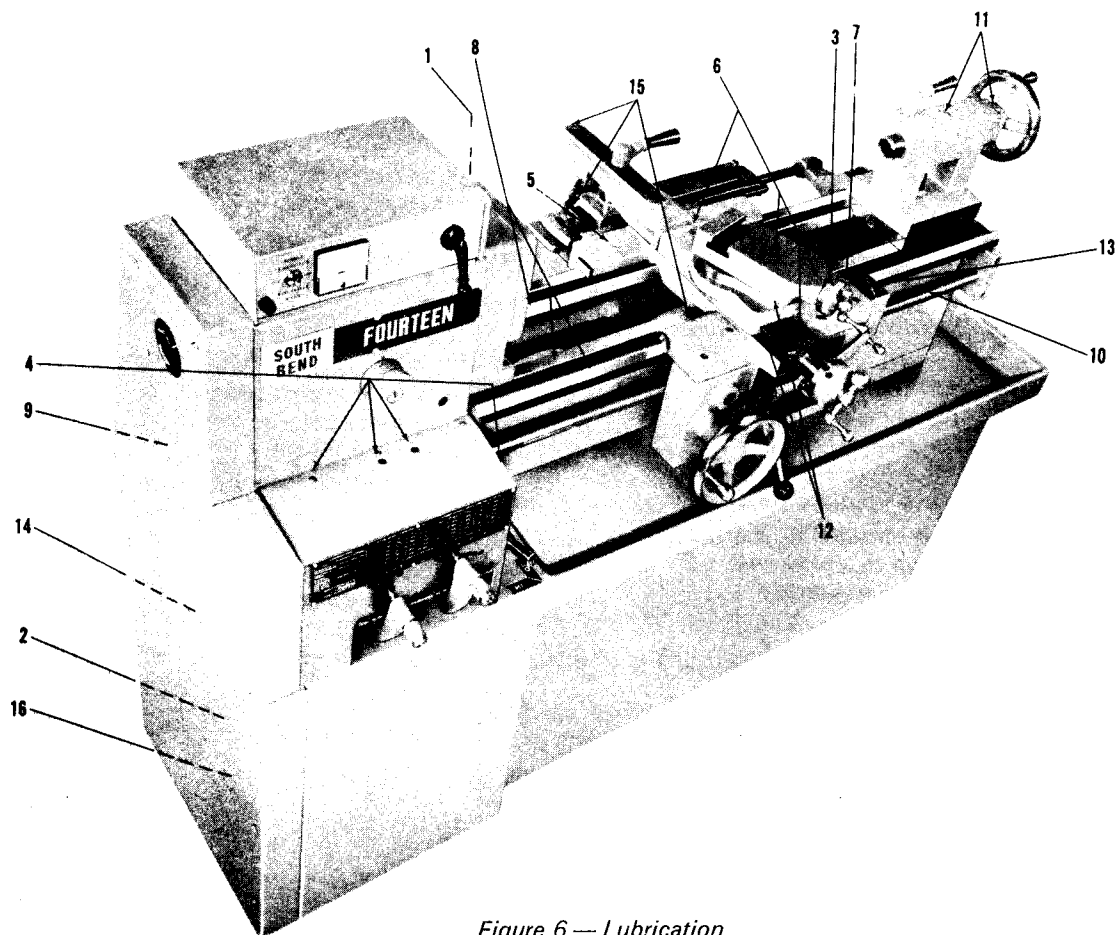


Figure 6 — Lubrication

LUBRICATION POINT	UNIT LUBRICATED	TYPE OF LUBRICANT	INTERVAL	INSTRUCTIONS
1	Headstock	*140-170	Keep Full	*Check oil level in sight window
2	Transmission	*140-170	Keep Full	Level should be ½ Full
3	Apron	*150-240	Keep Full	Drain and refill every 6 months
4	Gear Box	150-240	Daily	Use Pump Oil Can
5	Saddle	240-500	Daily	Use Pump Oil Can
6	Compound & Feed Screws	240-500	Daily	Use Pump Oil Can
7	Half Nuts	240-500	Daily	Use Pump Oil Can
8	Bedways	240-500	Daily	Use Pump Oil Can
9	End Gearing	240-500	Daily	Oil Can
10	Lead Screw	240-500	Daily	Clean Threads Before Oiling Use Pump Oil Can
11	Tailstock	240-500	Daily	Use Pump Oil Can
12	Carriage & Compound Dovetails	240-500	Daily	Pump Oil Can
13	Thread Dial	240-500	Daily	Pump Oil Can
14	Belt Tension Pulley Bearing	B/B Grease	6 months	Fitting
15	Taper Attach.	240-500	Daily	Pump Oil Can
16	Motor Bearings	B/B Grease	Every 2 years	Follow Instruction Tag Attached to Motor

SECTION 5 MAINTENANCE

INSPECTION AND ADJUSTMENTS

The 14" Lathe is designed to operate with a minimum of attention for many years. The adjustments and inspections described in the following paragraphs are all that will normally be required to accommodate wear and maintain the precision of the machine. None of the operations described here will require more than half an hour's time by a competent machinist, and most of them can be performed with common hand tools by the lathe operator.

SADDLE GIB CLEARANCE ADJUSTMENT

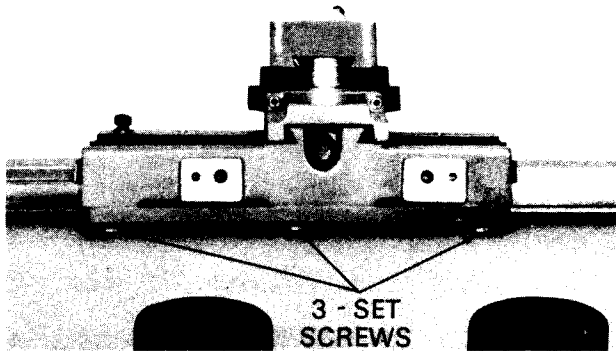


Figure 7 — Saddle Gib Adjustment

The V way of the lathe bed keeps the saddle permanently aligned in the horizontal plane, but occasional adjustments may be required to compensate for wear of the saddle surfaces.

The saddle gib adjustment is located on the rear of the saddle. To take up excessive play tighten the three socket head screws. Move the carriage back and forth and adjust until a slight drag is felt, then back off just enough until it disappears. Fig. 7.

DRIVE BELT TENSION

This is adjusted by moving the idler pulley which is behind the cover on the left end of the headstock. The belts should be tensioned such that when you push on the long span (front) of the belts with 9 or 10 pounds, the belts will deflect $7/16$ ". Fig. 8.

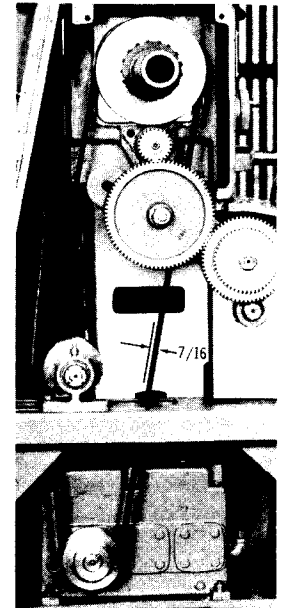


Figure 8 — Drive Belt Tension Adjustment

CROSS SLIDE GIB ADJUSTMENT

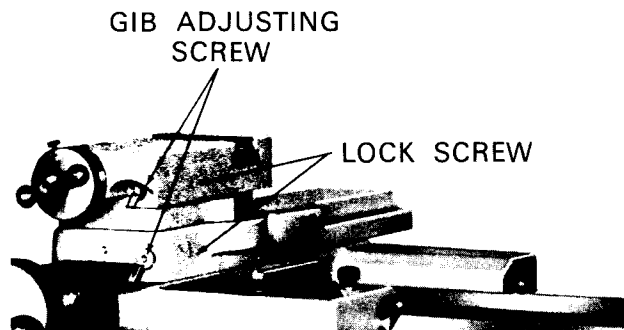


Figure 9 — Cross Slide Gib Adjustment

The dovetail in the saddle which guides the cross slide across the lathe during cross-feeding and taper turning operations is subject to a certain amount of wear which can be compensated for by means of a tapered gib on the right side. No play should be detectable in the cross slide. If found, take up the slack by means of the two screws provided in the right front of the compound rest base. Fig. 9.

First, loosen the lock screw, then turn the gib adjustment screw inward as required until no play is detectable, but not so far as to restrict the free movement of the compound rest base across the saddle. Retighten the set screw to lock the gib in the desired adjustment.

COMPOUND REST TOP GIB ADJUSTMENT

To eliminate play in the dovetail of the compound rest top, first loosen the lock screw in the right hand side of the compound rest top. Fig. 9. Then while turning the feed screw back and forth with one hand, turn the gib adjusting screw inward until no play is detectable but not far enough to restrict free movement, then retighten set screw.

ADJUSTING APRON FEED CLUTCH

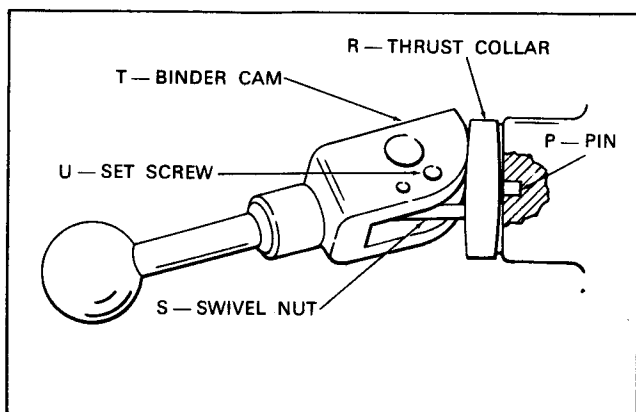


Figure 10 — Clutch Adjustment

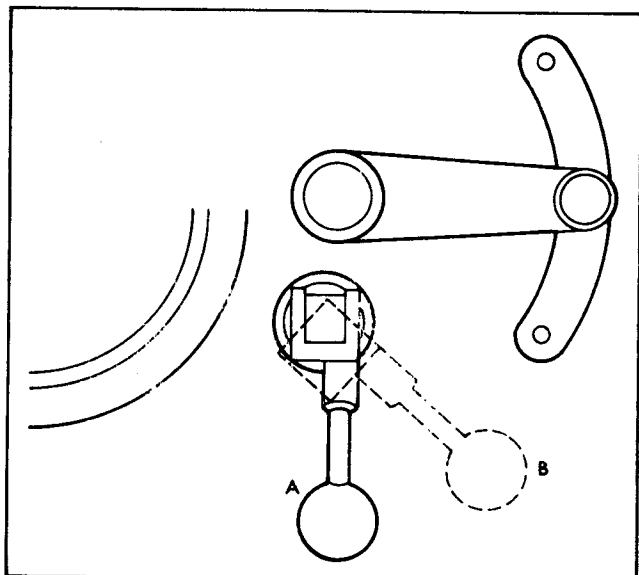


Figure 11 — Clutch Lever Adjustment

TO ADJUST CLUTCH

1. With allen wrench, loosen set screw "U" and turn clutch lever clockwise until clutch engages in proper position. (See Figs. 10-11). Clutch lever should not go beyond the perpendicular to the thrust collar "R".
2. Clutch lever should be just tight enough to stay engaged in a heavy cut. If clutch is too loose, repeat the steps outlined above. If too tight, turn clutch lever counter-clockwise in steps outlined above.

TO ADJUST DIRECTION OF CLUTCH LEVER SWING

1. After binder cam "T" is adjusted to proper position, it may not be as in "A" Fig. 11.
2. To return binder to position "A", unscrew binder cam "T" so there is enough clearance between binder and thrust collar "R" to disengage pin from rear of collar "R".
3. Rotate collar "R" and threaded shaft until pin "P" engages in proper hole (holes are spaced 90° apart).
4. Retighten binder cam "T" to proper position and tighten set screw "U" as much as possible.

ADJUSTING MICRO LIMIT SWITCHES

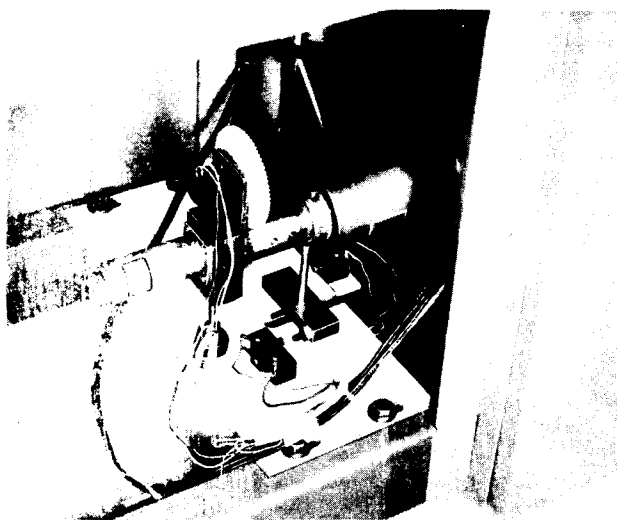


Figure 12 — Micro Limit Switches Adjustment

To adjust micro switch on the high speed range, turn on the main drive motor. Turn item 1 by hand, away from sheave until it won't go any further, then back off approximately 1/4 turn. Loosen the jam nut on micro limit switch, item 2 and adjust set screw to make contact with switch so speed change motor will stop just before reaching maximum rpm. Tighten jam nut.

To adjust the micro switch on the low speed range, turn item 1 by hand toward the sheave until there is approx. 1/32" clearance between item 1 and item 3. Adjust the set screw on micro switch, item 4, using the same procedure as above.

SPINDLE SPEED CALIBRATION

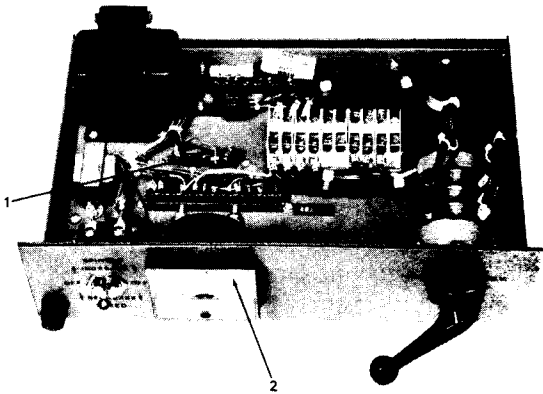


Figure 13

When spindle speed calibration is required under normal operating conditions, with spindle actually running 1200 rpm, adjust "R1" trim resistor until meter reads 1200.

To adjust "R1", loosen screw "1" and move the slider back and forth until speed indicator "2" reads 1200 RPM, tighten lock screw "1".

Refer to electrical wiring diagram furnished with lathe.



Turn power off when adjusting R1.

REPLACEMENT PARTS AND SERVICE

Should replacement parts or service ever be needed for this machine, please specify the serial number of this machine. The serial number is stamped between the front ways of the machine at the tailstock end of the lathe.