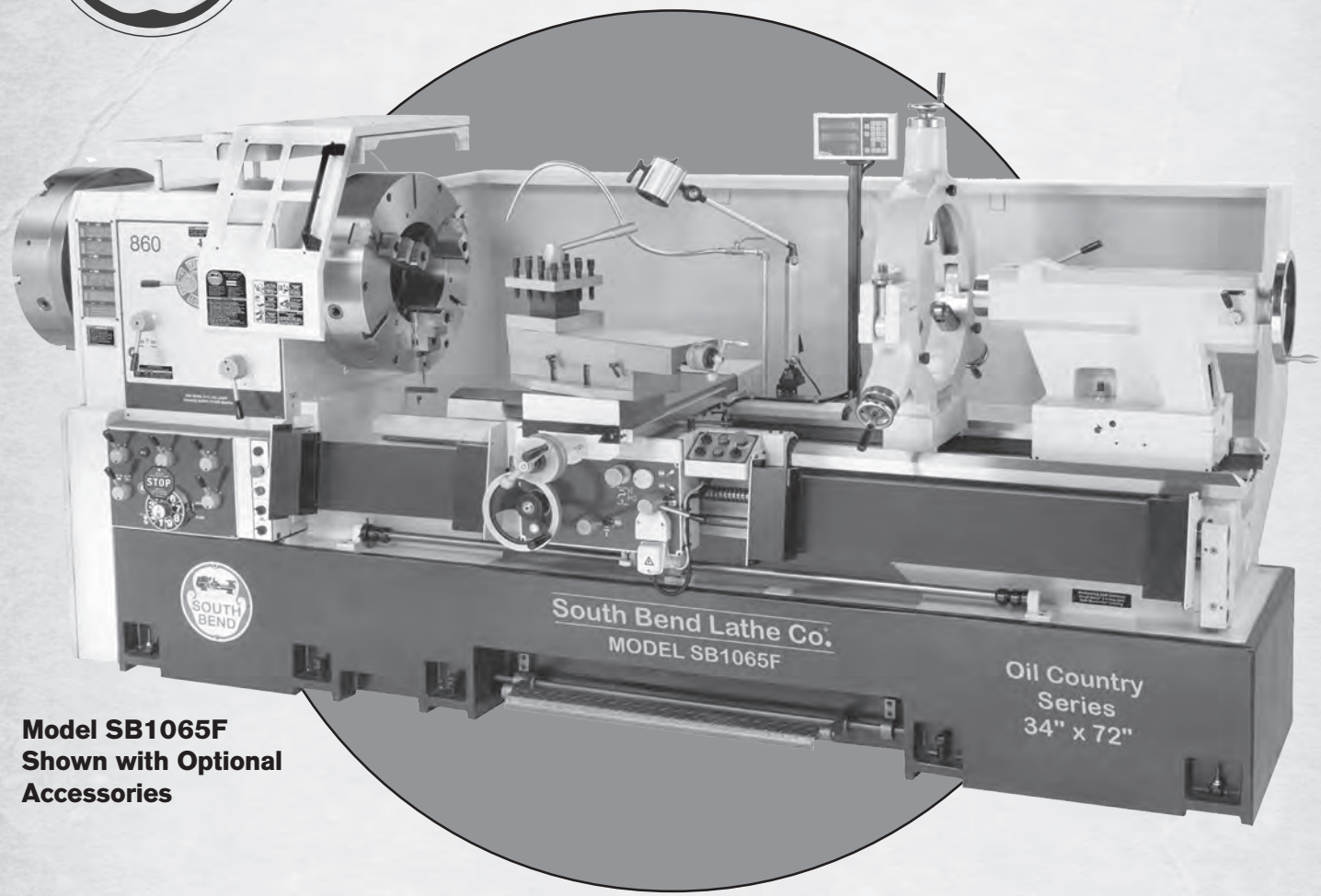
BIG BORE LATHE

MODEL SB1065F 34" X 72"
MODEL SB1066F 34" X 132"
MODEL SB1067F 34" X 212"
MODEL SB1068F 38" X 132"
MODEL SB1069F 38" X 212"
MODEL SB1070F 42" X 132"
MODEL SB1071F 42" X 212"

SOUTH BEND SINCE 1906



Model SB1065F Shown with Optional Accessories

OWNER'S MANUAL

South Bend Tools®

A Tradition of Excellence

C US
175370

For Machines Mfd. Since 07/19 (V1.12.21)

Scope of Manual

This manual helps the reader understand the machine, how to prepare it for operation, how to control it during operation, and how to keep it in good working condition. We assume the reader has a basic understanding of how to operate this type of machine, but that the reader is not familiar with the controls and adjustments of this specific model. As with all machinery of this nature, learning the nuances of operation is a process that happens through training and experience. If you are not an experienced operator of this type of machinery, read through this entire manual, then learn more from an experienced operator, schooling, or research before attempting operations. Following this advice will help you avoid serious personal injury and get the best results from your work.

Manual Feedback

We've made every effort to be accurate when documenting this machine. However, errors sometimes happen or the machine design changes after the documentation process—so the manual may not exactly match your machine. If a difference between the manual and machine leaves you in doubt, contact our customer service for clarification.

We highly value customer feedback on our manuals. If you have a moment, please share your experience using this manual. What did you like about it? Is there anything you would change to make it better? Did it meet your expectations for clarity, professionalism, and ease-of-use?

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Updates

For your convenience, any updates to this manual will be available to download free of charge through our website at:

www.southbendtools.com

Customer Service

We stand behind our machines. If you have any service questions, parts requests or general questions about your purchase, feel free to contact us.

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About This Machine

Foreword

"*The screw cutting engine lathe is the oldest and most important of machine tools and from it all other machine tools have been developed. It was the lathe that made possible the building of the steamboat, the locomotive, the electric motor, the automobile and all kinds of machinery used in industry. Without the lathe our great industrial progress of the last century would have been impossible.*" —**How To Run a Lathe**, 15th Edition, South Bend Lathe.

The lathe represented in this manual is a modern day version of the screw cutting lathes that trace their roots back to the 1700's, which were themselves technological improvements of the bow lathe that can be traced back thousands of years to the ancient Egyptians.

Now, almost 300 years later, these modern "screw cutting" lathes are not just a piece of refined machinery, but a culmination of human ingenuity and knowledge embodied into the design and synergy of thousands of interworking parts—some of which represent the life's work and dreams of many inventors, mechanical engineers, and world-class machinists—including the likes of Leonardo da Vinci, Henry Maudsley, and the founders of South Bend Lathe, John and Miles O'Brien.

And now the torch is passed to you—to take the oldest and most important type of machine tool—and carry on the tradition. As the operator of a South Bend Lathe, you now join the ranks of some very famous and important customers, such as Henry Ford, who used the machines he purchased to help him change the world.

Capabilities

These Big Bore Lathes are built for daily use in busy gas and oil field settings. Loaded with many nice features and high-precision parts, these lathes excel when long drill pipes, shafts, and flanges need to be surfaced, chamfered, or threaded. Thick castings, heavy mass, and quality construction throughout provide the necessary brawn for demanding production and manufacturing tasks.

Features

Looking down the bore of the Big Bore Lathes is like looking straight down the barrel of a huge cannon. With an extra-large 9" spindle bore and inside/outside spindle noses for mounting chucks on both sides of the headstock, these lathes can handle monster-sized workpieces such as large-diameter oil pipes or hydraulic cylinders. They are exquisitely built with ultra-tight tolerances, and the headstocks and gearboxes are assembled in a laboratory-like environment to ensure absolutely pristine bearings and fittings for a lifetime of rugged use. Each lathe is built to order with chucks precision-fitted onto the lathe at the factory.

The beds of these lathes are constructed with Meehanite castings that are hardened and precision-ground in the traditional three V-way prismatic design—long used on South Bend Lathes for its accuracy, durability, and rigidity.

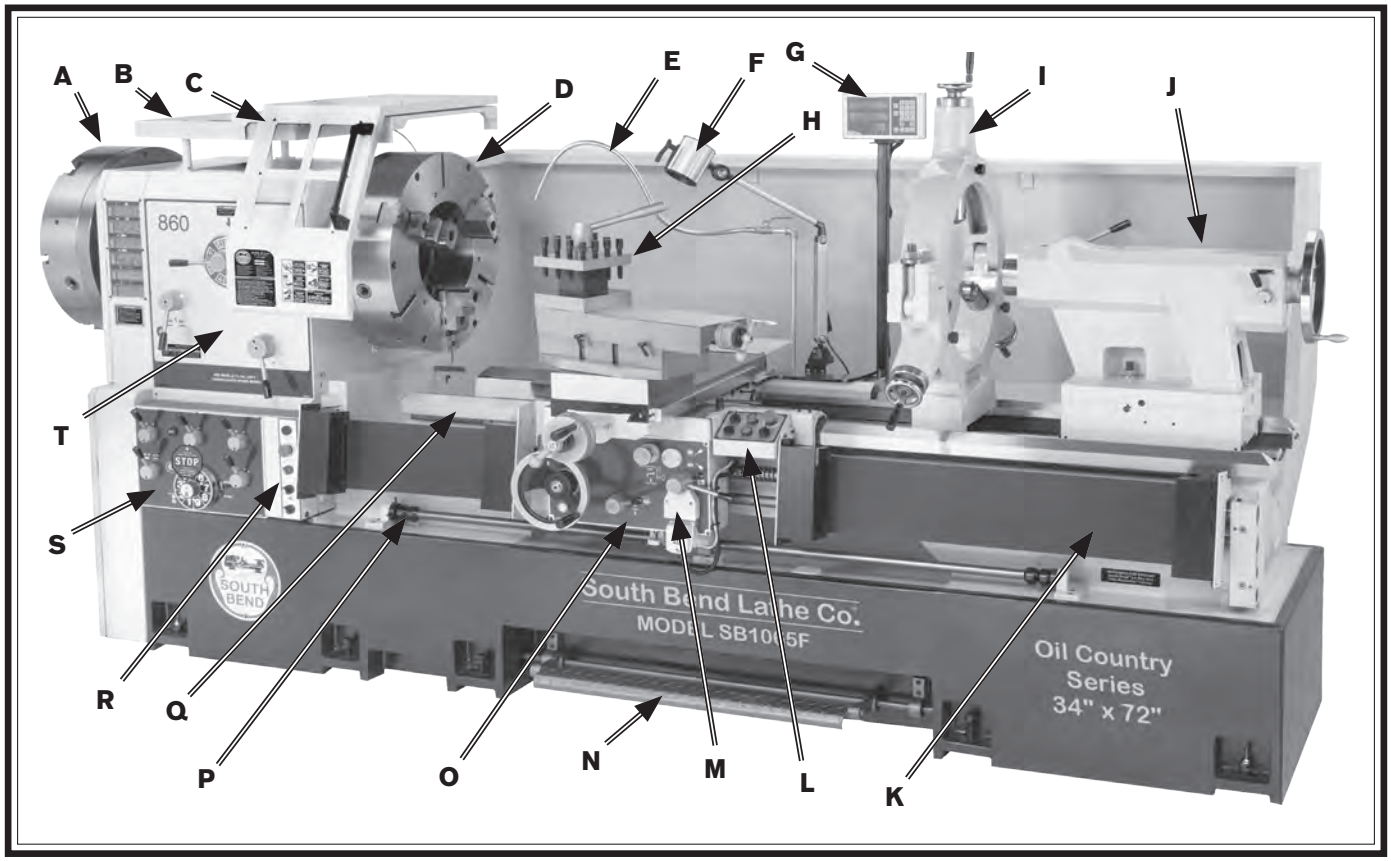
The headstock features gear levers, and the carriage includes an adjustable clutch that disables automatic carriage feed when it contacts the included 4-position apron stop or in the event of a crash.

To further ensure a high degree of accuracy, these lathes are equipped with high-quality spindle bearings and a Fagor DRO. The spindle nose is A2-15 with an MT#7 taper. The tailstock has an MT#6 taper and 10" of quill travel. For easy end drilling of large diameter holes and chamfers with the tailstock handwheel, a 2-speed gearbox is incorporated in the tailstock.

Also included is a remote-mounted control panel on the carriage, and a rapid traverse motor with controls for moving the cross and longitudinal feeds for quick tooling positioning and returns.

These lathes are equipped with two types of brakes: a band-style foot brake and an electric motor brake.

Identification

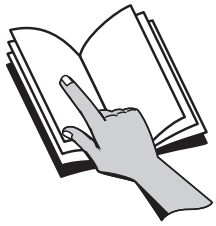


Identification (Model SB1065F shown).

A. Outboard A2-15 Spindle Chuck (Optional)
B. Tool Tray
C. Sliding Chuck Guard w/Safety Switch
D. Inboard A2-15 Spindle Chuck (Optional)
E. Coolant Nozzle & Valve
F. Halogen Work Lamp
G. Fagor DRO Control Panel
H. Four-Way Tool Post (Optional)
I. Steady Rest (Optional)
J. 2-Speed Tailstock w/MT#6 Morse Taper Quill
K. Automatic Retracting Chip Curtain
L. Carriage Control Panel
M. Motorized Quick Traverse Control
N. Foot Brake w/Motor Break
O. Oil Filled Apron
P. Four-Position Apron Stop
Q. Removable Gap
R. Headstock Control Panel
S. Gearbox Feed Controls
T. Headstock Spindle Controls

Description of Controls & Components

Refer to **Figures 1–11** and the following descriptions to become familiar with the features and basic controls of this lathe. This knowledge will be necessary to properly set up the lathe for the test run and spindle break-in.



⚠WARNING

To reduce the risk of serious injury when using this machine, read and understand this entire manual before beginning any lathe operations.

Master Power Switch

The rotary switch shown in **Figure 1** toggles incoming power ***ON*** and ***OFF*** to lathe controls. It also prevents the electrical cabinet door from being opened when the switch is ON.

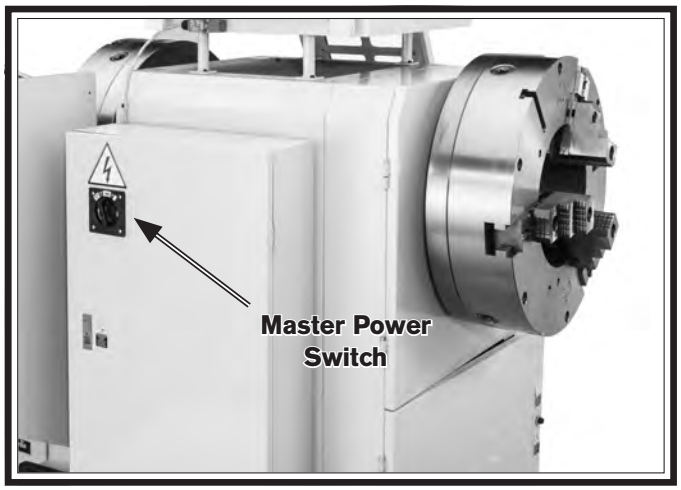


Figure 1. Location of master power switch.

NOTICE

Turning the master power switch to OFF is not a safe alternative to completely disconnecting the machine from power when wiring, servicing, or making repairs.

Headstock

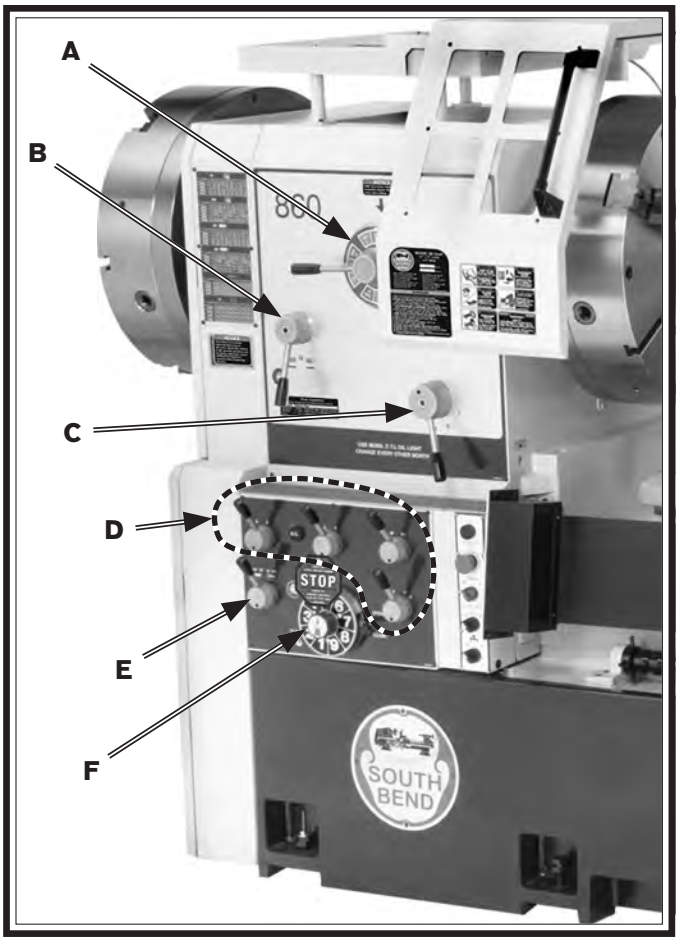


Figure 2. Headstock controls.

A. Spindle Speed Range Hub: Selects one of four spindle speed ranges.

B. Headstock Feed Direction Lever: Controls direction of leadscrew and feed rod rotation.

C. Headstock Range Lever: Shifts headstock into low range, neutral, or high range.

D. Lettered Gearbox Levers: Sets leadscrew and feed rod cutting pitch in relation to spindle rotation for threading and feed operations.

E. Feed Mode Lever: Switches gear range in gearbox between (MP/DP) and (IN/MM) threading or feeding options.

F. Gearbox Speed Dial: Controls leadscrew and feed rod speed for the cutting pitch selected by the lettered gearbox levers.

Control Panels

A. Jog Button: When pressed momentarily motor rotates spindle for chuck positioning and shifting gears.

B. EMERGENCY STOP Button: Stops all machine functions and engages electric brake in Instant Brake Mode regardless of what position Brake Mode switch is set at. Twist EMERGENCY STOP button clockwise to reset.

C. Power Switch: Toggles power for lathe controls. Switch illuminates green when lathe controls receive power.

D. Coolant Pump Switch: Toggles power ON/OFF for coolant pump motor.

E. Brake Mode Switch: Allows for three different modes of brake application based on mass and inertia expected.

Note: *No matter what mode position switch is turned to, the EMERGENCY STOP buttons bypass all selections to automatically apply electric brake in Instant Brake Mode.*

The three brake modes are as follows:

ABS Brake Mode: When in this mode, Spindle Switch is used to turn ***OFF*** spindle motor. Next, the electric brake automatically applies in short, quick cycles.

IMPORTANT: *Used when stopping large/long workpieces that have great amounts of inertia at high speeds. When in this position, electric brake on motor applies and releases within a 6–10 second time period, so not to overheat pulley belts and electric motor brake.*

Note: *In this mode, brake may make a heavy shuttering sound and vibration as brake applies and releases.*

Foot Brake Mode: When in this mode, foot brake is pressed partially down to turn ***OFF*** spindle motor. Next user presses foot pedal remaining distance in a sustained manner to apply band brake.

Figure 3. Headstock control panel.

IMPORTANT: *Used for most normal, slow lathe operations with lighter objects. If you feather-foot brake 3–5 times to prevent overheating band brake, Foot Brake Mode can also be used to stop a slow turning spindle that is holding long or heavy objects.*

Instant Brake Mode: When in this mode, either foot brake or EMERGENCY STOP button turns ***OFF*** spindle motor when pressed. Next, the electric brake fully applies for 6–10 seconds and then releases.

IMPORTANT: *Used for lathe operations that cut small, short, and lightweight workpieces that do not have the ability to build high inertia at fast spindle speeds.*

F. Spindle Direction Switch: Selects clockwise or counterclockwise spindle rotation.

G. Spindle ON Button: Turns lathe spindle ***ON*** and glows green when power is applied.

H. EMERGENCY STOP Button: Stops all machine functions. Twist clockwise to reset.

I. Jog Button: Turns spindle motor ***ON*** while being pressed and held.

J. Spindle OFF Button: Turns lathe spindle ***OFF***.

K. Rapid Traverse Direction Switch: Reverses traverse direction of the selected feed system.

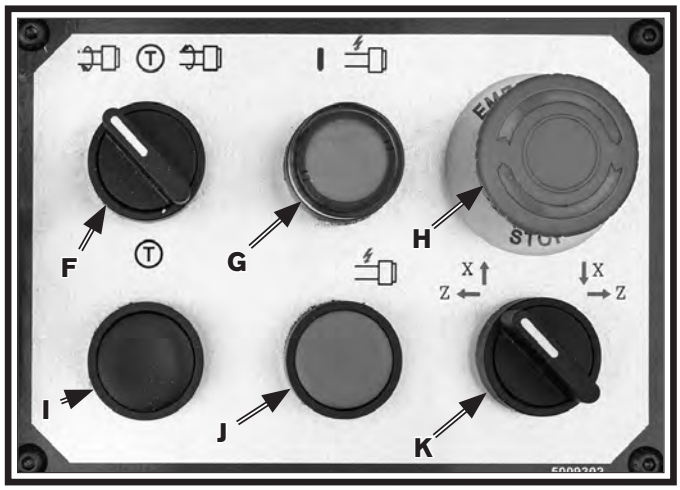


Figure 4. Carriage control panel.

L. Fagor Digital Readout: Refer to Fagor Manual for available operations.

Figure 5. Digital readout and keypad.

Foot Brake

This lathe is equipped with a foot brake (see **Figure 6**) to quickly stop the spindle instead of allowing it to decelerate to a stop on its own.

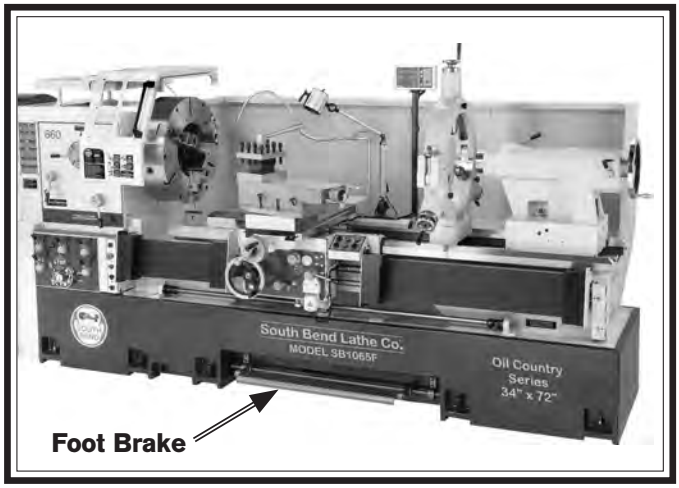


Figure 6. Foot brake and spindle lever.

Pressing the foot brake while the spindle is ***ON*** also cuts power to the motor and can apply the electric brake in different modes that have been pre selected by the Brake Mode switch.

Once after brake is used, you must reset or cycle spindle switches by turning them OFF then back ON again before spindle rotation can be re-started.

Carriage

A. Carriage Handwheel: Moves carriage along bed. Can be disengaged during power feed operations to prevent an entanglement hazard.

B. Cross Slide Handwheel: Moves cross slide toward and away from the workpiece.

C. Feed Selector Knob: Selects cross feed or longitudinal feed for power feed operations and quick traverse operations.

D. Feed ON/OFF Lever: Engages and disengages apron when power feed operations are being used.

E. Carriage Lock Lever: Locks and unlocks carriage from bedways.

F. Half Nut Lever: Engages/disengages half nut for threading operations.

G. Quick Traverse Lever: Engages/disengages quick traverse system with apron.

H. 4-Position Apron Stop: Contacts adjustable apron stop lobes, and disengages apron from feeding operations.

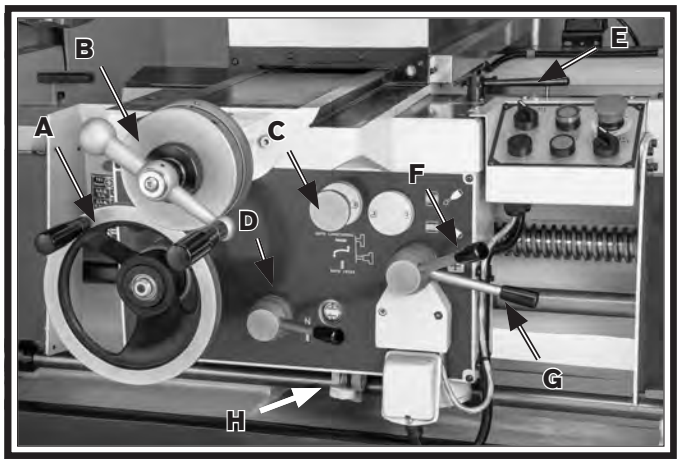


Figure 7. Apron controls.

I. Thread Dial: Depending on how lathe is ordered (Metric or Standard), thread dial indicates when to reapply the half nut lever to resume thread cutting in the same thread after returning tool tip for next deeper cut.

J. Adjustable Feed Clutch Knob: Serves as a safety means to adjust how much torsional load is allowed on feed system before it disengages auto feed.

K. Oil Flow Knob: Adjusts amount of oil that is delivered to lubrication locations.

L. Manual Oil Pump: Draws oil from apron reservoir to lubricate carriage ways through various oil ports with flow adjusted by apron oil flow knob.

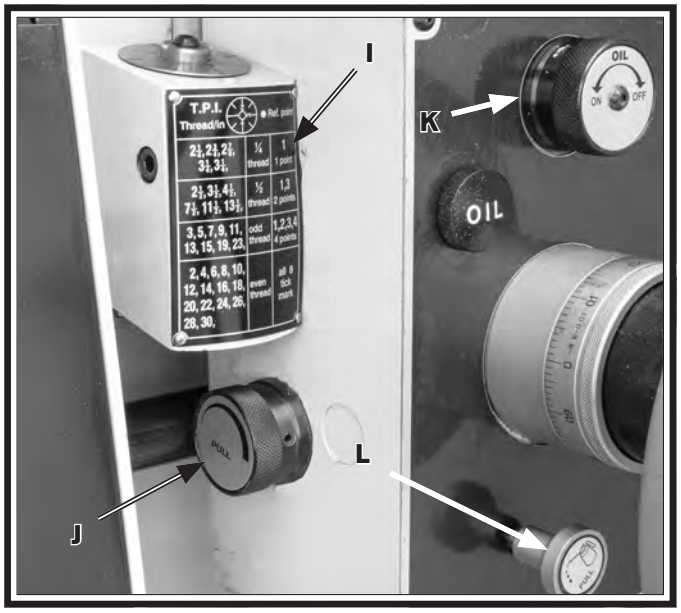


Figure 8. Feed clutch control knob.

Compound Rest & Tool Holder

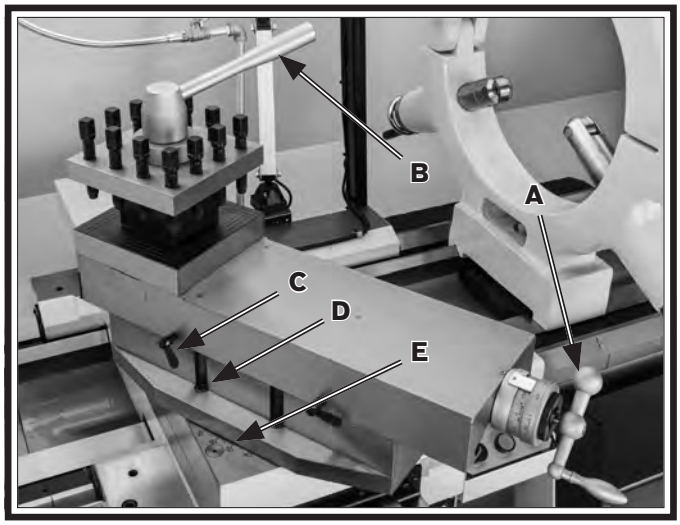


Figure 9. Compound rest and tool holder.

A. Compound Rest Handcrank: Moves tool toward and away from workpiece at preset angle of compound rest.

B. 4-Way Tool Post Lock Lever: Mounts up to four cutting tools at once that can be individually rotated and indexed to the workpiece, then locked in place with lever.

C. Compound Thumb Lock: One of two thumb locks that help hold slide in place and improve rigidity of cut.

D. Compound Locking Capscrews: One of four cap screws that hold compound at angled positions indicated by rosette scale.

E. Compound Rosette: The scale indicates at which angle compound is set to move.

Tailstock

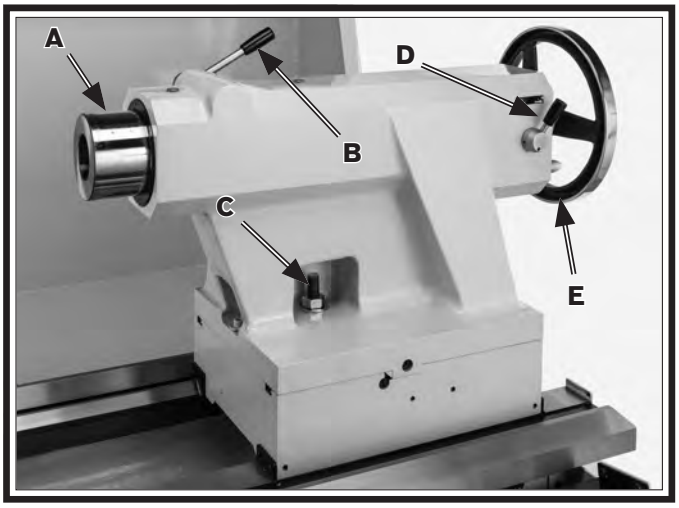


Figure 10 Tailstock controls.

A. Quill: An MT#6 Morse taper, metric and inch scale, and a drift slot to remove tight-fitting tooling are used.

B. Quill Lock Lever: This lever secures quill in position and ensures rigidity.

C. Tailstock Lock Nuts: Two lock nuts at the end of studs secure tailstock in position along bedway by pulling upward on locking plates underneath the ways.

D. Tailstock Hi-Lo Lever: This lever allows for 1:1 movement between handwheel and quill. When lever is in gear reduction position, handwheel operation is made easier for large diameter end drilling operations.

E. Tailstock Handwheel: A cast-iron handwheel moves quill toward or away from spindle.

F. Tailstock Clamp Nut: Two nuts adjust clamping pressure of tailstock to bedways.

G. Offset Scale: Indicates relative distance of tailstock offset from spindle centerline.

H. Offset Lock: Two cap screws clamp together upper and lower halves of tailstock after offset is adjusted.

I. Tailstock Stop: Prevents tailstock from sliding off of ways.

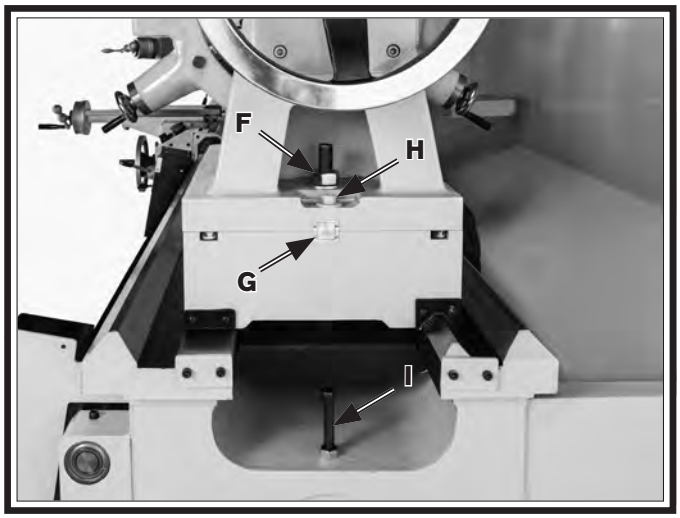


Figure 11. Tailstock rear controls.

Understanding Risks of Machinery

Operating all machinery and machining equipment can be dangerous or relatively safe depending on how it is installed and maintained, and the operator's experience, common sense, risk awareness, working conditions, and use of personal protective equipment (safety glasses, respirators, etc.).

The owner of this machinery or equipment is ultimately responsible for its safe use. This responsibility includes proper installation in a safe environment, personnel training and usage authorization, regular inspection and maintenance, manual availability and comprehension, application of safety devices, integrity of cutting tools or accessories, and the usage of approved personal protective equipment by all operators and bystanders.

The manufacturer of this machinery or equipment will not be held liable for injury or property damage from negligence, improper training, machine modifications, or misuse. Failure to read, understand, and follow the manual and safety labels may result in serious personal injury, including amputation, broken bones, electrocution, or death.

The signals used in this manual to identify hazard levels are as follows:

DANGER	***Death or catastrophic harm WILL occur.***	**CAUTION**	***Moderate injury or fire MAY occur.***
WARNING	***Death or catastrophic harm COULD occur.***	***NOTICE***	***Machine or property damage may occur.***

Basic Machine Safety

Owner's Manual: All machinery and machining equipment presents serious injury hazards to untrained users. To reduce the risk of injury, anyone who uses THIS item MUST read and understand this entire manual before starting.

Personal Protective Equipment: Operating or servicing this item may expose the user to flying debris, dust, smoke, dangerous chemicals, or loud noises. These hazards can result in eye injury, blindness, long-term respiratory damage, poisoning, cancer, reproductive harm or hearing loss. Reduce your risks from these hazards by wearing approved eye protection, respirator, gloves, or hearing protection.

Trained/Supervised Operators Only: Untrained users can seriously injure themselves or bystanders. Only allow trained and properly supervised personnel to operate this item. Make sure safe operation instructions are clearly understood. If electrically powered, use padlocks and master switches, and remove start switch keys to prevent unauthorized use or accidental starting.

Guards/Covers: Accidental contact with moving parts during operation may cause severe entanglement, impact, cutting, or crushing injuries. Reduce this risk by keeping any included guards/covers/doors installed, fully functional, and positioned for maximum protection.

Entanglement: Loose clothing, gloves, neckties, jewelry or long hair may get caught in moving parts, causing entanglement, amputation, crushing, or strangulation. Reduce this risk by removing/securing these items so they cannot contact moving parts.

Mental Alertness: Operating this item with reduced mental alertness increases the risk of accidental injury. Do not let a temporary influence or distraction lead to a permanent disability! Never operate when under the influence of drugs/alcohol, when tired, or otherwise distracted.

Safe Environment: Operating electrically powered equipment in a wet environment may result in electrocution; operating near highly flammable materials may result in a fire or explosion. Only operate this item in a dry location that is free from flammable materials.

Electrical Connection: With electically powered equipment, improper connections to the power source may result in electrocution or fire. Always adhere to all electrical requirements and applicable codes when connecting to the power source. Have all work inspected by a qualified electrician to minimize risk.

Disconnect Power: Adjusting or servicing electrically powered equipment while it is connected to the power source greatly increases the risk of injury from accidental startup. Always disconnect power BEFORE any service or adjustments, including changing blades or other tooling.

Secure Workpiece/Tooling: Loose workpieces, cutting tools, or rotating spindles can become dangerous projectiles if not secured or if they hit another object during operation. Reduce the risk of this hazard by verifying that all fastening devices are properly secured and items attached to spindles have enough clearance to safely rotate.

Chuck Keys or Adjusting Tools: Tools used to adjust spindles, chucks, or any moving/rotating parts will become dangerous projectiles if left in place when the machine is started. Reduce this risk by developing the habit of always removing these tools immediately after using them.

Work Area: Clutter and dark shadows increase the risks of accidental injury. Only operate this item in a clean, non-glaring, and well-lighted work area.

Properly Functioning Equipment: Poorly maintained, damaged, or malfunctioning equipment has higher risks of causing serious personal injury compared to those that are properly maintained. To reduce this risk, always maintain this item to the highest standards and promptly repair/service a damaged or malfunctioning component. Always follow the maintenance instructions included in this documentation.

Unattended Operation: Electrically powered equipment that is left unattended while running cannot be controlled and is dangerous to bystanders. Always turn the power ***OFF*** before walking away.

Health Hazards: Certain cutting fluids and lubricants, or dust/smoke created when cutting, may contain chemicals known to the State of California to cause cancer, respiratory problems, birth defects, or other reproductive harm. Minimize exposure to these chemicals by wearing approved personal protective equipment and operating in a well ventilated area.

Difficult Operations: Attempting difficult operations with which you are unfamiliar increases the risk of injury. If you experience difficulties performing the intended operation, STOP! Seek an alternative method to accomplish the same task, ask a qualified expert how the operation should be performed, or contact our Technical Support for assistance.

Additional Metal Lathe Safety

Serious injury or death can occur from getting entangled in, crushed between, or struck by rotating parts on a lathe! Unsecured tools or workpieces can eject from the chuck and strike nearby operators with deadly force. To minimize the risk of getting hurt or killed, anyone operating this lathe MUST follow the hazards and warnings below.

Rotating Parts. Always keep hands and body at a safe distance from rotating parts—especially those with projecting surfaces. Never hold anything against rotating workpiece, such as emery cloth, that can pull you into lathe.

Guarding. Guards and covers protect against entanglement or flying objects. Always ensure they are properly installed while machine is running.

Adjustment Tools. Remove all chuck keys, wrenches, and adjustment tools before turning lathe ***ON***. A tool left on the lathe can become a deadly projectile when spindle is started.

Safe Clearances. Before starting spindle, verify workpiece has adequate clearance by hand-rotating it through its entire range of motion.

New Setups. Test each new setup by starting spindle rotation at the lowest speed and standing to the side of the lathe until workpiece reaches full speed and you can verify safe rotation.

Spindle Speeds. Using spindle speeds that are too fast for the workpiece or clamping equipment can cause rotating parts to come loose and strike nearby people with deadly force. Always use slow spindle speeds with large or non-concentric workpieces. Never exceed rated RPM of the chuck.

Long Stock Safety. Long stock can whip violently if not properly supported. Always support any stock that extends from the chuck/headstock more than three times its own diameter.

Clearing Chips. Metal chips can be razor sharp. Avoid clearing them by hand or with a rag. Use a brush or vacuum instead.

Chucks. Chucks can be heavy and difficult to hold. During installation and removal, protect your hands and precision bed ways by using a chuck cradle or piece of plywood over the bed ways. Use lifting equipment, as necessary, for large chucks.

Stopping Spindle. Always allow spindle to completely stop on its own, or use a brake, if provided. Never put hands or another object on a spinning workpiece to make it stop faster.

Crashing. A serious explosion of metal parts can occur if cutting tool or other lathe component hits rotating chuck or a projecting part of workpiece. Resulting metal fragments can strike nearby people and lathe will be seriously damaged. To reduce risk of crashing, ALWAYS release automatic feeds after use, NEVER leave lathe unattended, and CHECK all clearances before starting lathe.

Coolant Safety. Coolant can become very toxic through prolonged use and aging. To minimize toxicity, change coolant regularly. When using, position nozzle properly to avoid splashing operator or causing a slipping hazard on floor.

Tool Selection. Cutting with incorrect or dull tooling increases risk of injury from broken or dislodged components, or as a result of extra force required for operation. Always use sharp tooling that is right for the job.

Sanding/Polishing. To reduce entanglement risk, never wrap emery cloth around rotating workpiece. Instead, use emery cloth with the aid of a tool or backing board.

Measuring Workpiece. To reduce risk of entanglement, never measure rotating workpieces.

Additional Chuck Safety

Entanglement. Entanglement with a rotating chuck can lead to death, amputation, broken bones, or other serious injury. Never attempt to slow or stop the lathe chuck by hand, and always roll up long sleeves, tie back long hair, and remove any jewelry or loose apparel BEFORE operating.

Chuck Speed Rating. Excessive spindle speeds greatly increase the risk of the workpiece or chuck being thrown from the machine with deadly force. Never use spindle speeds faster than the chuck RPM rating or the safe limits of your workpiece.

Using Correct Equipment. Many workpieces can only be safely turned in a lathe if additional support equipment, such as a tailstock or steady/follow rest, is used. If the operation is too hazardous to be completed with the lathe or existing equipment, the operator must have enough experience to know when to use a different machine or find a safer way.

Trained Operators Only. Using a chuck incorrectly can result in workpieces coming loose at high speeds and striking the operator or bystanders with deadly force. To reduce the risk of this hazard, read and understand this document and seek additional training from an experienced chuck user before using a chuck.

Chuck Capacity. Avoid exceeding the capacity of the chuck by clamping an oversized workpiece. If the workpiece is too large to safely clamp with the chuck, use a faceplate or a larger chuck if possible. Otherwise, the workpiece could be thrown from the lathe during operation, resulting in serious impact injury or death.

Clamping Force. Inadequate clamping force can lead to the workpiece being thrown from the chuck and striking the operator or bystanders. Maximum clamping force is achieved when the chuck is properly maintained and lubricated, all jaws are fully engaged with the workpiece, and the maximum chuck clamping diameter is not exceeded.

Proper Maintenance. All chucks must be properly maintained and lubricated to achieve maximum clamping force and withstand the rigors of centrifugal force. To reduce the risk of a thrown workpiece, follow all maintenance intervals and instructions in this document.

Disconnect Power. Serious entanglement or impact injuries could occur if the lathe is started while you are adjusting, servicing, or installing the chuck. Always disconnect the lathe from power before performing these procedures.

Preparation Overview

The purpose of the preparation section is to help you prepare your machine for operation. The list below outlines this basic process. Specific steps for each of these points will be covered in detail later in this section.

The typical preparation process is as follows:

1. Unpack lathe and inventory contents of box/crate.
2. Clean lathe and its components.
3. Prepare location where lathe will be installed.
4. Move lathe to the operation location.
5. Level lathe and either bolt it to the floor or place it on mounts.
6. Assemble loose components and make any necessary adjustments or inspections to ensure lathe is ready for operation.
7. Lubricate lathe and verify oil levels are full.
8. Connect lathe to power source.
9. Test run lathe to make sure it functions properly.
10. Prepare lathe for full operation.

Required for Setup

To complete the preparation process, you will need the following items:

For Lifting and Moving

- A forklift or other power lifting device rated for at least 25% more than the shipping weight of the lathe (see **Product Data Sheet**).
- Lifting straps, each rated for at least 25% more than the shipping weight of the lathe.
- Guide rods for steading the load when lifting.
- Two other people for assistance when moving machine.
- Hardwood blocks (refer to **Page 19**).
- Two solid-steel bar stock that are 2½" dia x 4' long to serve as lifting bars.

For Power Connection

- A power source that meets the minimum circuit requirements for this machine (review the **Power Supply Requirements** section on the next Page for details).
- An electrician or qualified service personnel to ensure a safe and code-compliant connection to the power source.

For Cleaning & Assembly

- Precision level 12"
- Cotton rags
- Cleaner/Degreaser (refer to **Page 17**)
- Quality metal protectant oil
- Safety glasses for each person
- Basic hand tools
- Floor mounting hardware (refer to **Page 20**)

Power Supply Requirements

Availability

Before installing the machine, consider the availability and proximity of the required power supply circuit. If an existing circuit does not meet the requirements for this machine, a new circuit must be installed.

To minimize the risk of electrocution, fire, or equipment damage, installation work and electrical wiring must be done by an electrician or qualified service personnel in accordance with all applicable codes.

WARNING

Electrocution or fire may occur if machine is not correctly grounded and attached to the power supply. Use a qualified electrician to ensure a safe power connection.

Full-Load Current Rating

The full-load current rating is the amperage a machine draws at 100% of the rated output power. On machines with multiple motors, this is the amperage drawn by the largest motor or sum of all motors and electrical devices that might operate at one time during normal operations.

Full-Load Rating at 230V 3-PH.....71.6 Amps
Full-Load Rating at 460V 3-PH.....35.8 Amps

The full-load current is not the maximum amount of amps that the machine will draw. If the machine is overloaded, it will draw additional amps beyond the full-load rating.

If the machine is overloaded for a sufficient length of time, damage, overheating, or fire may result—especially if connected to an undersized circuit. To reduce the risk of these hazards, avoid overloading the machine during operation and make sure it is connected to a power supply circuit that meets the requirements in the following section.

Circuit Information

A power supply circuit includes all electrical equipment between the main breaker box or fuse panel in your building and the incoming power connections inside the machine. This circuit must be safely sized to handle the full-load current that may be drawn from the machine for an extended period of time. (If this machine is connected to a circuit protected by fuses, use a time delay fuse marked D.)

CAUTION

For your own safety and protection of property, consult an electrician if you are unsure about wiring practices or applicable electrical codes.

Note: The circuit requirements in this manual are for a dedicated circuit—where only one machine will be running at a time. If this machine will be connected to a shared circuit where multiple machines will be running at the same time, consult a qualified electrician to ensure the circuit is properly sized.

Circuit Requirements 230V/460V

This machine is pre-wired to operate on a 230V power supply circuit. With the SB460VSB1065F conversion kit installed, the machine will operate on 460V. Under both options, this machine must have a power supply circuit that has a verified ground and meets the following requirements:

Nominal Voltage 230V/460V
Cycle .....60 Hz
Phase 3-Phase
Minimum Circuit Rating ..... 90/50 Amps
Connection .....Hardwire w/Locking Switch

Connection Type

As specified in the **Circuit Requirements** section on the previous Page, this machine must be hardwired to the power source, using a locking switch (see **Figure 12**).

This machine must also be connected to a grounded metal permanent wiring system; or to a system with an equipment-grounding conductor. Due to the complexity and high voltage involved, this type of installation MUST be done by an electrician or qualified service personnel.

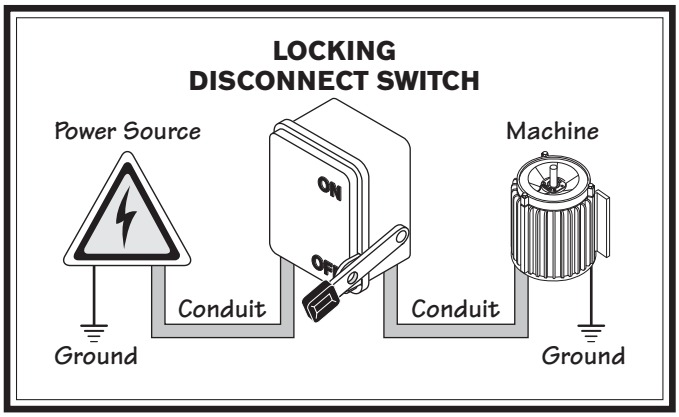


Figure 12. Typical hardwire setup with a locking disconnect switch.

Grounding Requirements

This machine must be grounded! In the event of certain types of malfunctions or breakdowns, grounding provides a path of least resistance for electric current in order to reduce the risk of electric shock.

Improper connection of the equipment-grounding wire can result in a risk of electric shock. The wire with green insulation (with or without yellow stripes) is the equipment-grounding wire. If power cord repair or replacement is necessary, do not connect the equipment-grounding wire to a live (current carrying) terminal.

Check with a qualified electrician or service personnel if you do not understand these grounding requirements, or if you are in doubt about whether the machine is properly grounded. If you ever notice that a cord is damaged or worn, disconnect it from power, and immediately replace it with a new one.

⚠WARNING

Electrocution or fire may occur if machine is grounded incorrectly and attached to the power supply. Have electrician or qualified service person ensure safe power connection.

Phase Converter

IMPORTANT: *DO NOT use a static phase converter to create 3-phase power—it can quickly decrease the life of electrical components on this machine. If you must use a phase converter, only use a rotary phase converter.*

*When connected to a rotary phase converter, power from the manufactured power leg (sometimes called 'the wild wire' or 'manufactured leg') can fluctuate. Make sure that when you connect the lathe to the phase converter you connect the wild wire to the lathe input lead **L2**, and that **L1** and **L3** incoming power do not fluctuate. Fluctuation of power to the transformer may cause magnetic switch chatter and transformer damage and prevent the lathe from starting correctly.*

Unpacking

This item was carefully packaged to prevent damage during transport. If you discover any damage, please immediately call Customer Service at (360) 734-1540 for advice. You may need to file a freight claim, so save the containers and all packing materials for possible inspection by the carrier or its agent.

Inventory

This class of lathes is built specifically to order. To verify that your shipment is complete, please compare your order with the bill of materials sheet from the crate.

Note: *Additional documentation pertaining to the electrical system is shipped inside of the lathe electrical cabinet.*

Cleaning & Protecting

The unpainted surfaces are coated at the factory with a heavy-duty rust preventative that prevents corrosion during shipment and storage. The benefit of this rust preventative is that it works very well. The downside is that it can be time-consuming to thoroughly remove.

Be patient and do a careful job when cleaning and removing the rust preventative. The time you spend doing this will reward you with smooth-sliding parts and a better appreciation for the proper care of the unpainted surfaces.

Although there are many ways to successfully remove the rust preventative, the following process works well in most situations.

Before cleaning, gather the following:

- Disposable rags
- Cleaner/degreaser (certain citrus-based degreasers work extremely well and they have non-toxic fumes)
- Safety glasses & disposable gloves

Note: Automotive degreasers, mineral spirits, or WD•40 can be used to remove rust preventative. Before using these products, though, test them on an inconspicuous area of a painted surface to make sure they will not damage it.

⚠WARNING

Gasoline and petroleum products have low flash points and can explode or cause fire if used for cleaning. Avoid using these products to remove rust preventative.

⚠CAUTION

Many cleaning solvents are toxic if inhaled. Minimize your risk by only using these products in a well ventilated area.

NOTICE

Avoid chlorine-based solvents, such as acetone or brake parts cleaner that may damage painted surfaces. Always follow the manufacturer's instructions when using any type of cleaning product.

Basic steps for removing rust preventative:

1. Put on safety glasses and disposable gloves.
2. Coat all surfaces that have rust preventative with a liberal amount of your cleaner or degreaser and let them soak for a few minutes.
3. Wipe off the surfaces. If your cleaner or degreaser is effective, the rust preventative will wipe off easily.

Note: To clean off thick coats of rust preventative on flat surfaces, such as beds or tables, use a PLASTIC paint scraper to scrape off the majority of the coating before wiping it off with your rag. (Do not use a metal scraper or it may scratch the surface.)

4. Repeat **Steps 2–3** as necessary until clean, then coat all unpainted surfaces with a quality metal protectant or light oil to prevent rust.

NOTICE

Open the end gear cover and clean the end gears using a stiff brush with mineral spirits. DO NOT get any cleaner or rust preventative on the V-belts or the brake band lining, as it could damage them or make them slip during operations.

Location

Physical Environment

The physical environment where your machine is operated is important for safe operation and longevity of parts. For best results, operate this machine in a dry environment that is free from excessive moisture, hazardous or flammable chemicals, airborne abrasives, or extreme conditions. Extreme conditions for this type of machinery are generally those where the ambient temperature is outside the range of 41°–104°F; the relative humidity is outside the range of 20–95% (non-condensing); or the environment is subject to vibration, shocks, or bumps.

Electrical Installation

Place this machine near an existing power source. Make sure all power cords are protected from traffic, material handling, moisture, chemicals, or other hazards. Make sure to leave access to a means of disconnecting the power source or engaging a lockout/tagout device.

Lighting

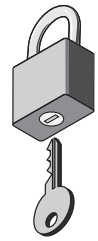
Lighting around the machine must be adequate enough to perform operations safely. Shadows, glare, or strobe effects that may distract or impede the operator must be eliminated.

Weight Load

Refer to the **Machine Specifications** for the weight of your machine. Make sure that the surface upon which the machine is placed will bear the weight of the machine, additional equipment that may be installed on the machine, and the heaviest workpiece that will be used. Additionally, consider the weight of the operator and any dynamic loading that may occur when operating the machine.

Space Allocation

Consider the largest size of workpiece that will be processed through this machine and provide enough space around the machine for adequate operator material handling or the installation of auxiliary equipment. With permanent installations, leave enough space around the machine to open or remove doors/covers as required by the maintenance and service described in this manual.



⚠CAUTION

Children or untrained people may be seriously injured by this machine. Only install in an access restricted location.

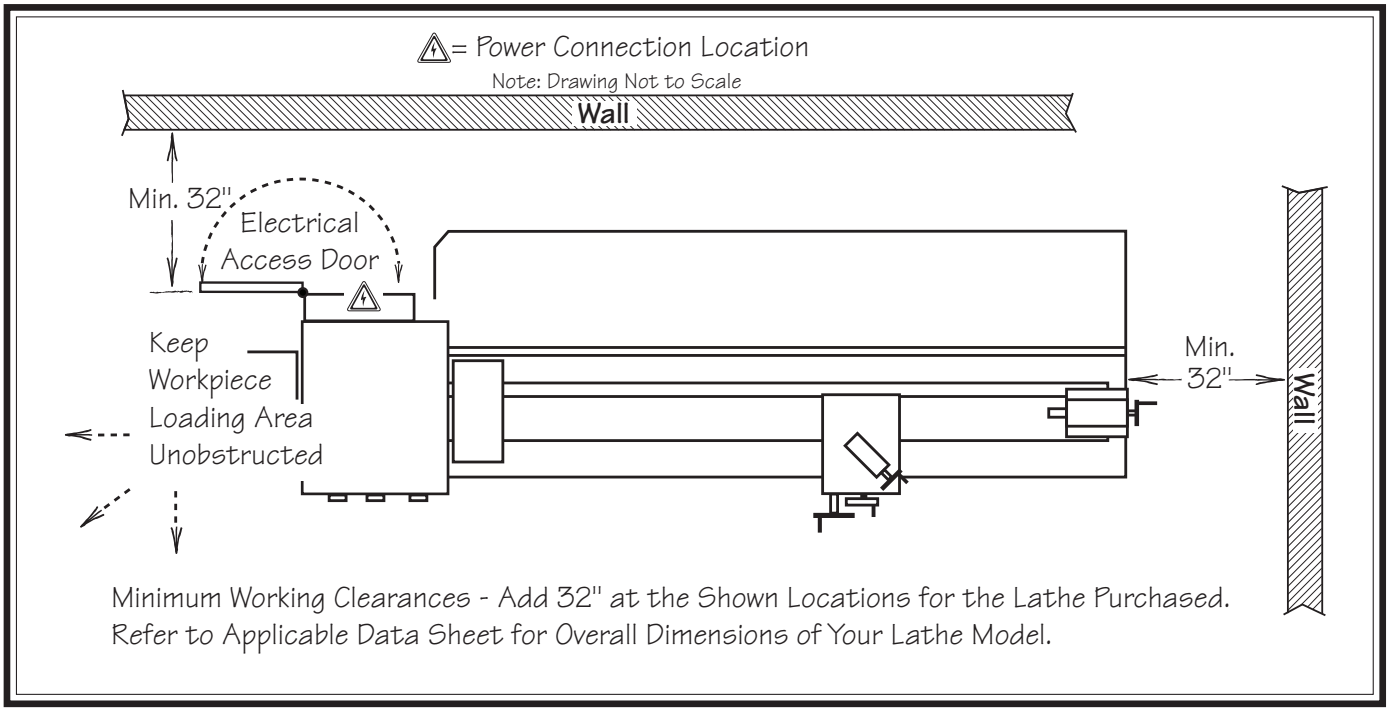
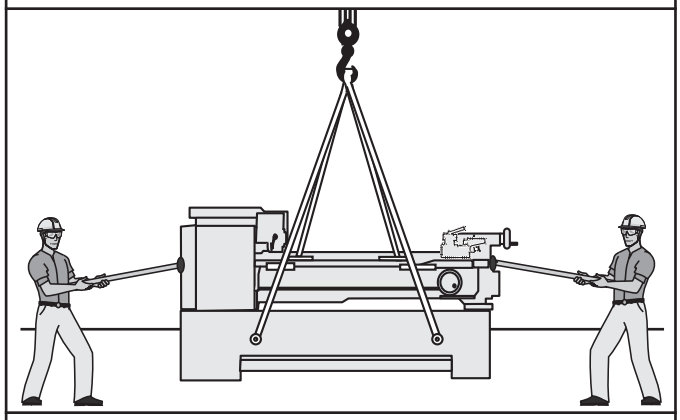


Figure 13. Minimum working clearances (All models).

Lifting & Moving

⚠WARNING



This machine and its parts are heavy! Serious personal injury may occur if safe moving methods are not used. To reduce the risk of a lifting or dropping injury, ask others for help, and use power equipment and guide rods.

Only move and lift this lathe using proper lifting equipment and licensed professionals who are trained at doing such tasks. Each piece of lifting equipment must be rated for far more than the shipping weight of the lathe because of the dynamic loads that may be encountered.

To lift and move lathe:

1. Disassemble shipping crate to completely expose shipping pallet.

2. Unbolt and remove rear splash guard using two lifting bolt holes at top edge.

   Note: *Depending on accessories installed you may have to remove more lathe components from bed. However, we do not recommend removing factory installed chucks.*

3. Remove loose parts from shipping pallet.

4. Move lathe to its prepared location while it is still attached to shipping pallet.

5. Unbolt lathe from shipping pallet.

6. Protect bed and any other lathe surface from potential damage from lifting equipment.

7. Inspect lifting or hoisting machinery, chains, straps, and bars to verify that all equipment is operational and adequately rated.

8. Remove four 2½" diameter lifting hole covers in lathe bed and insert the two lifting bars.

9. Fasten lifting equipment and position blocking in a similar manner as shown in **Figure 14** to keep lifting straps away from leadscrew, feed rod, and spindle rod to prevent bending them during lifting.

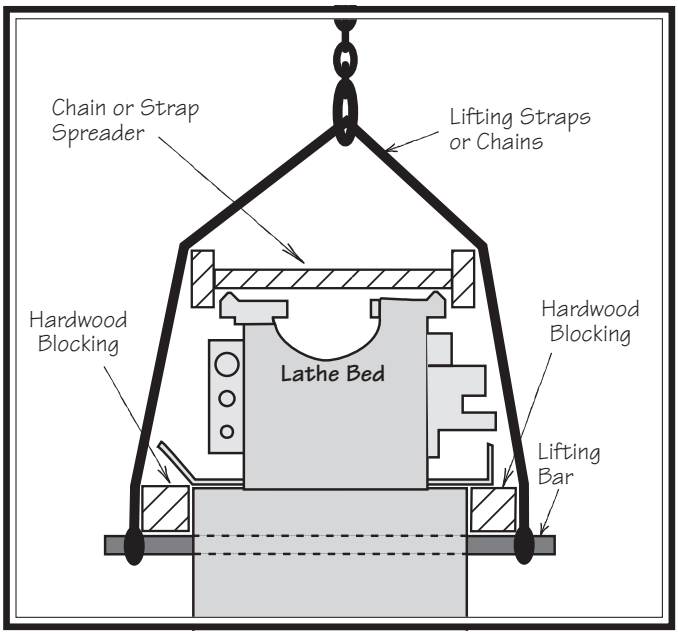


Figure 14. Typical lathe lifting setup.

10. To balance load for lifting, move tailstock and carriage to end of bedway, then lock them in place.

11. Fasten a spreader between straps or chains so that they will stay apart when lifting (see **Figure 15**).

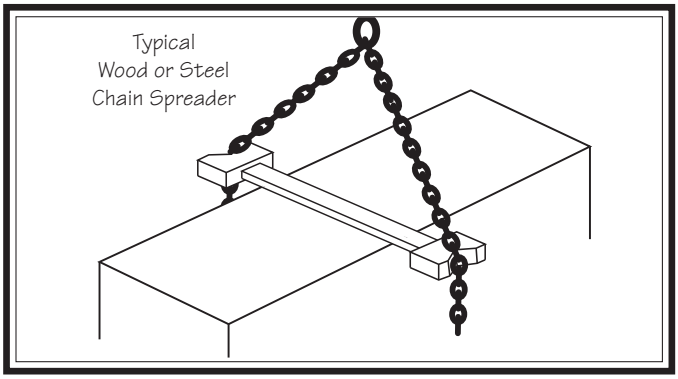


Figure 15. Example of chain or strap spreader.

12. At each end of lathe, have assistants connect guide rods to safely keep lathe from swaying or tipping while lifting.

NOTICE

When lifting lathe with straps, the load will be top heavy. Take extra care to keep load balanced vertically, and only lift it far enough to remove shipping pallet.

13. Raise lathe a couple of inches and check balance of load.

— If load is not safely balanced, immediately lower lathe and resolve issue before attempting to lift it again.

14. Raise lathe enough to clear shipping pallet, carefully remove pallet, then lower lathe into position.

Leveling & Mounting

We highly recommend that this lathe be fastened to the floor using L-type anchor bolts set in concrete that is part of a typical concrete lathe foundation. By doing so, cutting or harmonic vibration will be absorbed by the foundation and not transferred to the workpiece finish. If using anchor bolts set in concrete, the lathe must also be leveled using shims. If using the included lathe feet, the lathe must be leveled using the leveling bolts.

NOTICE

For accurate turning results and to prevent warping cast-iron bed and ways, lathe bedways MUST be leveled from side to side and from front to back on both ends.
Re-check bedways 24 hours after installation, two weeks after that, and then annually to make sure they remain level.

Leveling machinery helps precision components, such as bedways, remain straight and flat during the lifespan of the machine. Components on a machine that is not level may slowly twist due to the dynamic loads placed on the machine during operation.

For best results, use a precision level (see **Figure 16**), that is at least 12" long and sensitive enough to show a distinct movement when a 0.003" shim (approximately the thickness of one sheet of standard newspaper) is placed under one end of the level.

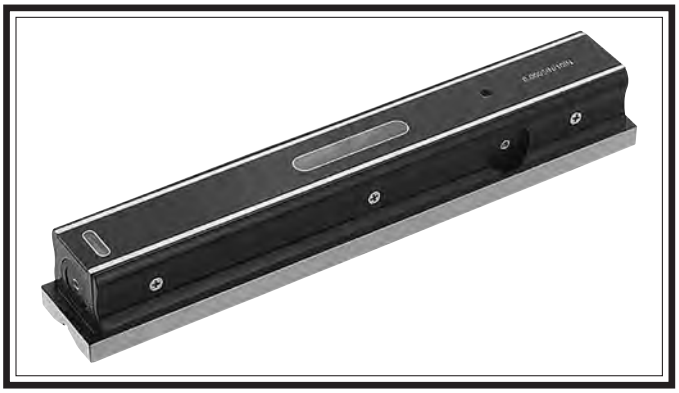


Figure 16. Example of a precision level.

If using the included leveling pads (see **Figure 17**), place them under the six leveling jack bolt locations, then adjust the bolts to level the lathe.

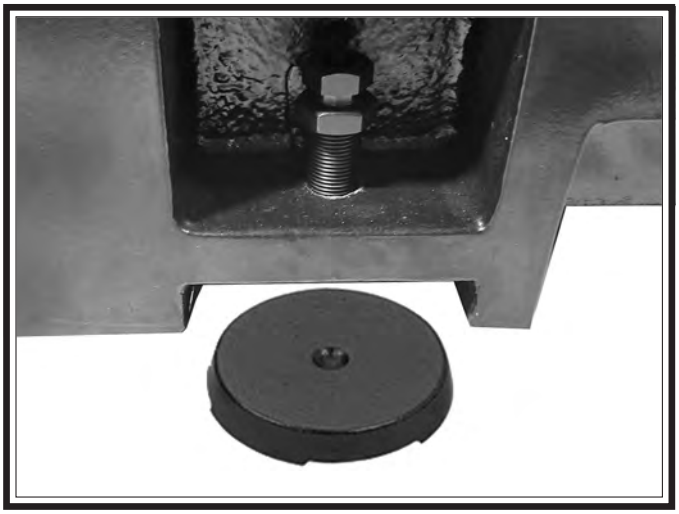


Figure 17. Leveling pad and jack bolt.

NOTICE

Most electrical codes require that machines connected to the power source by fixed conduit MUST be secured to the floor.

Assembly

With the exception of the handwheel handles, the lathe is shipped fully assembled.

To install handwheel handles, thread large handle into carriage handwheel and small handle into cross slide handwheel.

Lubricating Lathe

When the lathe is delivered from the factory, please do not assume that the headstock, gearbox, and apron oil reservoirs have proper amount of oil in them. It is always good practice to drain and refill the oil when receiving new machinery. Damage caused to the bearings and gears from running the lathe without oil in the reservoirs is not covered under warranty.

Refer to the **Lubrication** section, beginning on **Page 42**, for details on how to check, add oil, and prime the headstock oil pump.

In addition to filling the reservoirs, lubricate all other points on the machine at this time. This can be accomplished by following the maintenance schedule on **Page 40**.

Power Connection

After you have reviewed the **Power Supply Requirements** section for guidelines and completed all previous setup instructions, the machine is ready to be connected to the power supply by a licenced electrician.

To connect power supply wires to machine:

1. Make sure master power switch at power supply box is locked-out in the **OFF** position, and then open lathe electrical cabinet door.

2. Refer to **Figure 18** to identify master power switch and hole at bottom right of electrical cabinet for incoming power.

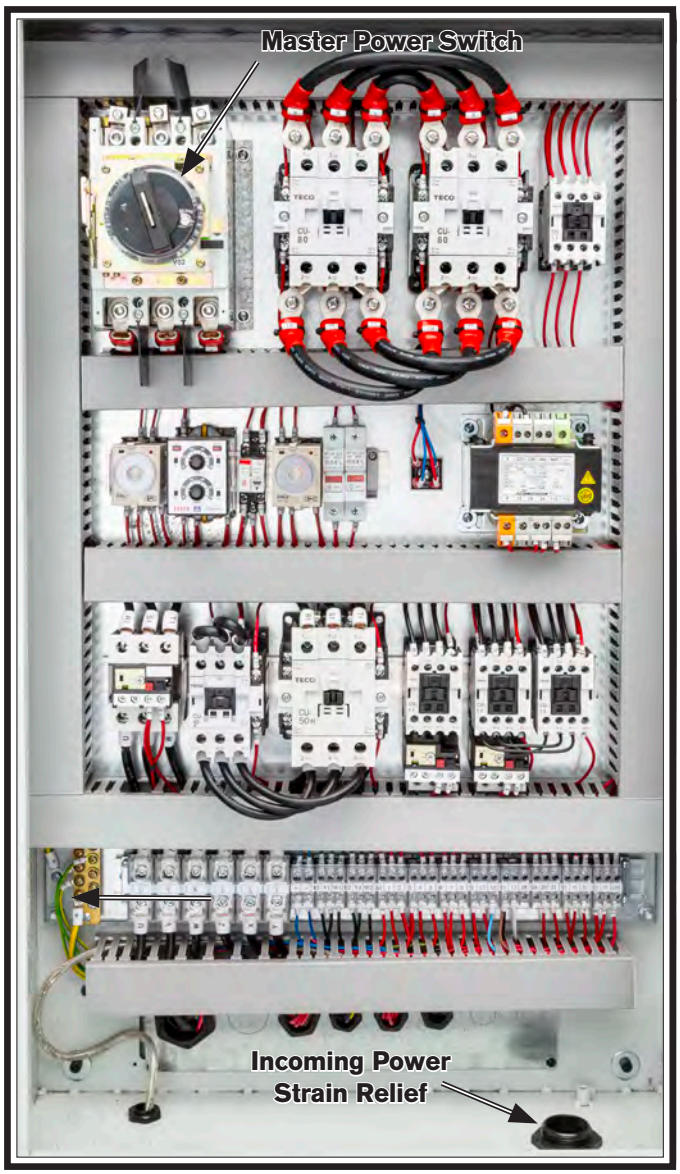


Figure 18. Electrical cabinet.

3. Connect incoming hot wires to upper master power switch terminals and ground wire to ground terminal, as illustrated in **Figure 19**.

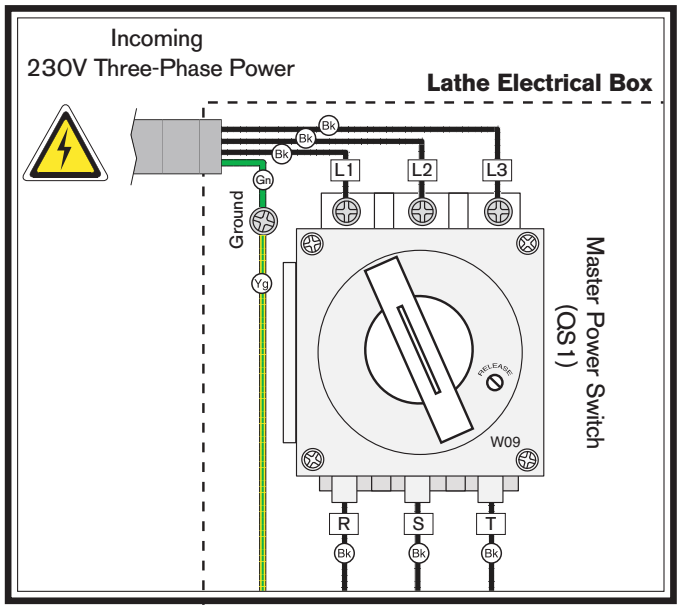


Figure 19. Power connection at master power switch.

4. Make sure wires have enough slack so that they do not bind at terminals.

5. Close and lock main electrical box door and proceed to **Test Run**.

   Note: *Verifying for correct phase polarity is covered in Test Run.*

NOTICE

To avoid unexpected start-up of lathe components, keep the master power switch lever at the power supply box tagged and locked in the OFF position until instructed otherwise in the following test run.

Test Run

After all preparation steps have been completed, test the machine and its safety features. If you discover a problem with the operation of the machine or its safety components, do not operate it further until you have resolved the problem.

Note: *Refer to Troubleshooting on* ***Page 60*** *for solutions to common problems that occur with lathes. If you need additional help, contact our Tech Support at (360) 734-1540.*

Test run consists of verifying that the critical controls and systems listed below work correctly:

- Headstock EMERGENCY STOP Button
- Apron EMERGENCY STOP Button
- Headstock Range Lever
- Spindle Speed Range Hub
- Coolant Pump
- Gearbox and Headstock Operation
- Carriage Locking Mechanism
- Spindle Stop Button
- Apron Stop Button
- Apron Power Button
- Spindle Motor and Phase Polarity
- Apron Spindle Direction Rotation Switch
- Headstock Spindle Direction Rotation Switch
- Brake Operation
- Jog Button
- Chip Guard Safety Switches
- End Cover Safety Switches
- Vibrations, Unusual Noises

⚠WARNING

Serious injury or death can result from using this machine BEFORE understanding its controls and related safety information. DO NOT operate, or allow others to operate, machine until the information is understood.

⚠WARNING

DO NOT start machine until all preceding setup instructions have been performed. Operating an improperly set up machine may result in malfunction or unexpected results that can lead to serious injury, death, or machine/property damage.

To test run machine:

IMPORTANT: *If any problems are found during test run, disconnect lathe from power and refer to* ***Troubleshooting*** *on* ***Page 60*** *for correction before proceeding any further.*

1. Make sure master power switch on rear of machine is turned ***OFF*** (see **Figure 20**).

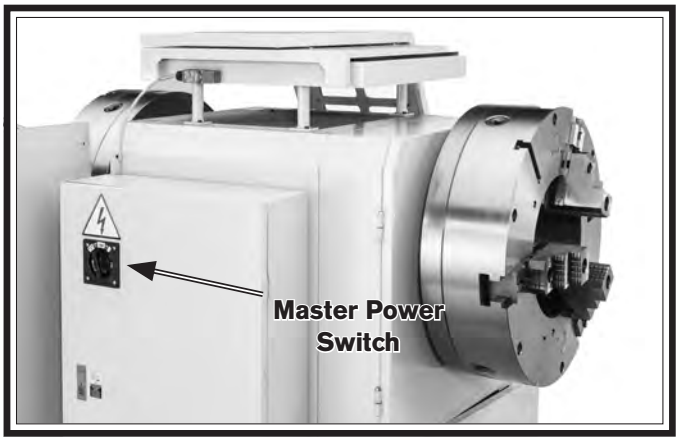


Figure 20. Location of master power switch.

2. Read and understand safety instructions at beginning of manual, take all required safety precautions, and make sure all previous preparation steps discussed in this manual have been followed and completed.

3. Clear away all tools and objects used during assembly, lubrication, and preparation.

4. Make sure chucks and jaws, if installed, are secure and all bolts are in place.

5. Push EMERGENCY STOP button on control panel (see **Figure 21**).

6. Make sure headstock, gearbox, and apron oil levels are at full mark indicated by sight glasses.

7. Turn coolant pump switch to ***OFF*** position, and point coolant nozzle into chip pan.

Figure 21. Headstock control panel.

8. Rotate spindle speed range hub to **20, 85, 500** range, as shown in **Figure 22**.

Note: *You may need to rock spindle back and forth by hand to mesh gears.*

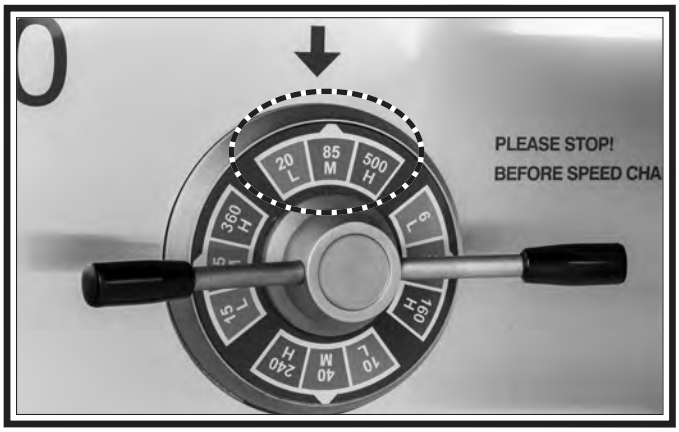


Figure 22. Spindle speed range hub.

9. Move headstock range lever (see **Figure 23)** to **L** position. By doing so, 20 RPM shown on spindle speed range dial will be selected.

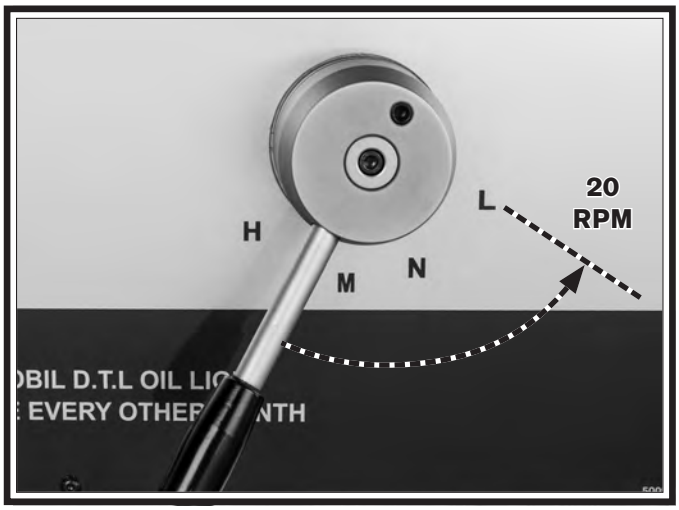


Figure 23. Headstock range lever.

10. To ensure carriage or cross slide do not unexpectedly move during test run, pull up on half nut and power feed ON/OFF levers (see **Figure 24**).

11. Unlock carriage lock and use carriage handwheel to move carriage back and forth to ensure it is disengaged from leadscrew and feed rod.

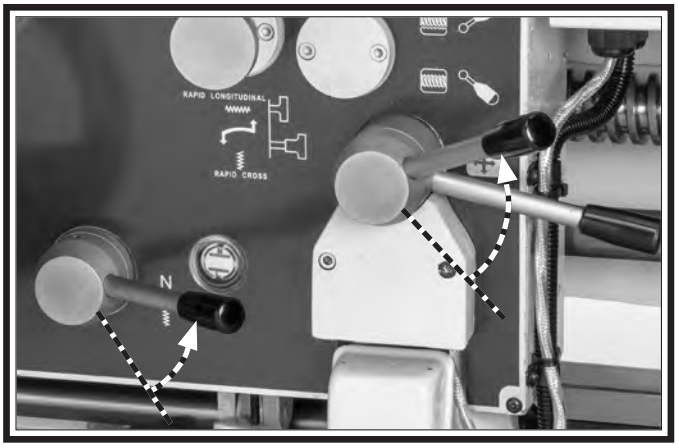


Figure 24. Power feed and half nut levers.

12. Move feed direction lever (see **Figure 25)** to **N** (neutral position), to disengage gearbox and apron from headstock operations.

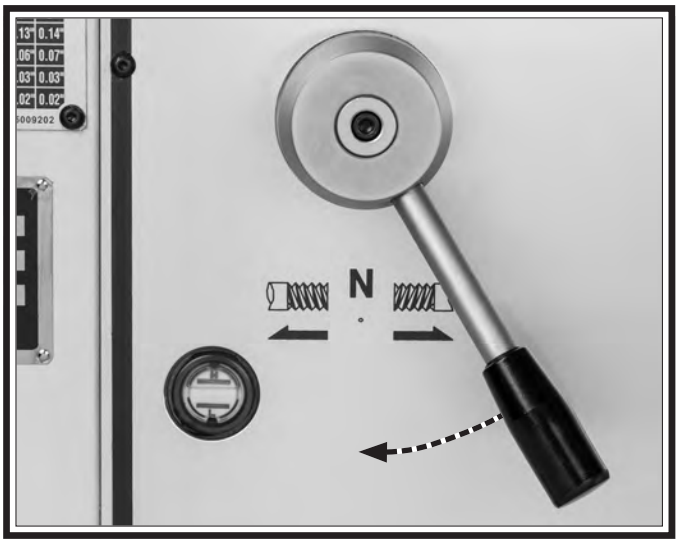


Figure 25. Feed direction lever.

13. If not already done so; connect lathe to power supply (refer to **Power Connection** on **Page 21**).

14. Turn ***ON*** power supply to lathe, and turn ***ON*** master power switch on lathe electrical box.

15. On both headstock and carriage control panels (see **Figures 26–27**), rotate EMERGENCY STOP buttons clockwise to verify that they are in popped-out position.

16. On headstock control panel, turn power switch ***ON*** (see **Figure 26)**.

Figure 26. Headstock control panel.

17. On carriage control panel, turn Spindle Rotation switch to left for normal rotation (see **Figure 27)**.

18. On carriage control panel, push green Spindle ON button (see **Figure 27)**.

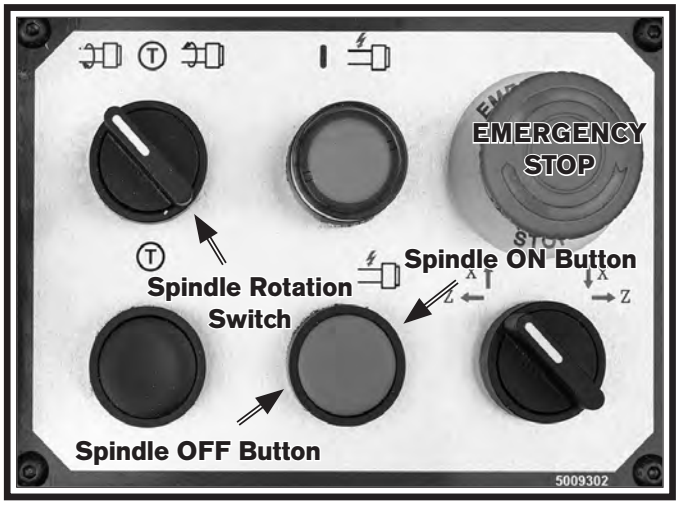


Figure 27. Carriage control panel.

19. Observe direction of chuck rotation; it should match direction printed on control panel.

— If spindle rotates in opposite direction, lathe is out of phase. To correct, swap positions of power supply wires **L1** and **L3** shown in **Figure 19** on **Page 22**.

20. Observe lathe and listen for any abnormal noises or vibration. The lathe should run smoothly.

21. On carriage control panel, push EMERGENCY STOP button to stop lathe.

— If lathe does not stop, turn the main power switch ***OFF***, and refer to **Troubleshooting** on **Page 60** for correction before proceeding.

22. Reset EMERGENCY STOP button and restart lathe.

23. On headstock control panel, push EMERGENCY STOP button, and lathe should again stop.

— If lathe does not stop, turn the main power switch ***OFF***, and refer to **Troubleshooting** on **Page 60** for correction before proceeding.

24. On carriage control panel, turn Spindle Rotation switch for reverse rotation.

25. Reset EMERGENCY STOP buttons and restart lathe.

26. Observe direction of chuck rotation; it should now match reverse direction printed on control panel.

27. On carriage control panel, push Spindle OFF button and spindle should stop.

28. Restart lathe and press foot brake; spindle should come to a quick stop.

29. On both control panels, press Jog button to bump spindle.

30. Restart lathe and press foot brake; lathe should quickly stop.

31. Test chip guard safety switch by moving guard to open position and try to start lathe. The lathe should *not* start.

32. Test lower-headstock door safety switch by opening door and trying to start lathe. The lathe should not start.

33. Use coolant pump switch to start pump, and test coolant flow.

34. If no problems are found, lathe is ready for use.

Note: *For DRO operation, refer to Fagor Manual.*

Spindle Break-In

No break-in required. This machine has had its spindle bearings broken in at the factory and is ready for full use after machine setup and test run.

Recommended Adjustments

The following adjustments have been made at the factory. However, because of the many variables involved with shipping, we recommend that you at least verify the following adjustments to ensure the best possible results from the lathe.

Step-by-step instructions for these adjustments can be found on the Pages referenced below.

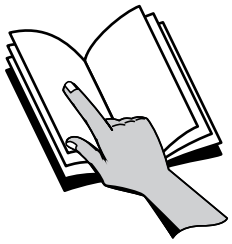
Factory adjustments that should be verified:

- **Align Tailstock** (**Page 28**).
- **Compound Rest/Cross Slide Backlash** (**Page 50**).
- **Compound Rest/Cross Slide Gib** (**Page 51**).
- **Half Nut Clamping** (**Page 53**).
- **Leadscrew/Feed Rod End Play** (**Page 53**).
- **Foot Brake/Motor Brake** (**Page 54**).
- **V-belts** (**Page 55**).

Operation Overview

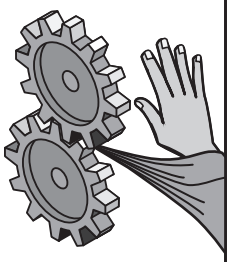
The purpose of this overview is to provide the novice machine operator with a basic understanding of how the machine is used during operation, so they can more easily under-stand the controls discussed later in this manual.

Note: *Due to the generic nature of this overview, it is not intended to be an instructional guide for performing actual machine operations. To learn more about specific operations and machining techniques, seek training from people experienced with this type of machine, and do additional research outside of this manual by reading "how-to" books, trade magazines, or websites.*



WARNING

To reduce the risk of serious injury when using this machine, read and understand this entire manual before beginning any operations.



WARNING

Loose hair, clothing, or jewelry could get caught in machinery and cause serious injury or death. Keep these items away from moving parts at all times to reduce this risk.

WARNING

To reduce risk of eye or face injury from flying chips, always wear approved safety glasses and face shield when operating this lathe.

To complete a typical operation, the operator does the following:

1. Puts on safety glasses and face shield, rolls up sleeves, removes jewelry, and secures any clothing, jewelry, or hair that could get entangled in moving parts.
2. Examines workpiece to make sure it is suitable for turning, then securely mounts workpiece in lathe.
3. Installs applicable tooling, aligns it with workpiece, then backs it away to establish a safe startup clearance.
4. Clears all setup tools from lathe and verifies that foot brake is unobstructed for full pedal travel.
5. Disengages carriage lock and ensures carriage is free to slide.
6. Checks for safe clearances by rotating workpiece by hand at least one full revolution.
7. Moves slides to where they will be used during operation.
8. Sets correct spindle speed for operation.
9. If using power feed, selects proper feed rate for operation.
10. Turns master power switch ***ON***, selects spindle rotation direction.
11. Resets EMERGENCY STOP buttons and starts lathe.
12. Turns on coolant if applicable.
13. Powers up DRO, uses carriage handwheels or power feed options to move tooling into workpiece for operations.
14. When finished cutting, shuts down lathe and removes workpiece.
15. Returns power feed levers to Neutral or their disengaged positions.

Tailstock

The tailstock is typically used to support long workpieces by means of a live or dead center. It can also be used to hold a drill or chuck to bore holes in the center of a part. An important feature of this tailstock is that it is equipped with a hand crank gear reduction box and lever (see **Figure 28**). When moved to the Low position, the handwheel operates with additional torque for center drilling large diameter holes in the end of a workpiece. When in High position, the handwheel operates at a typical ratio.

Graduated Dial

Increments.....0.001"
Quill Travel One Revolution (High).....0.200"
Quill Travel One Revolution (Low).....0.065"

Quill Scale Increments

Inch .....(0–9⅝" (1⁄16" graduations)
Metric.....0–245 mm (1mm graduations)

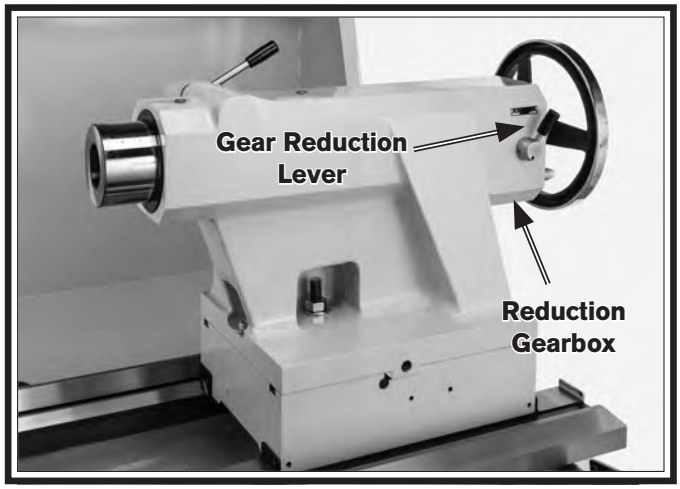


Figure 28. Tailstock reduction box and lever.

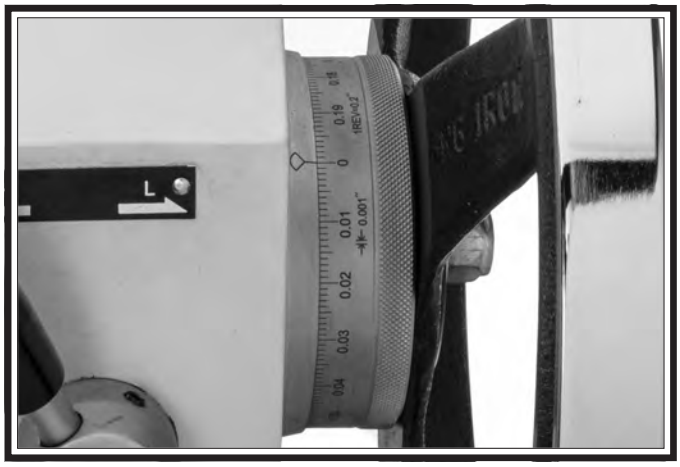


Figure 29. Tailstock graduated dial.

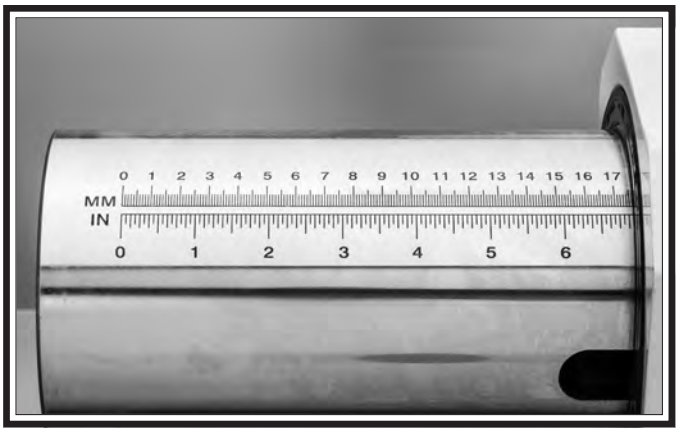


Figure 30. Quill scale (1⁄16" and 1mm graduations).

Offsetting/Aligning Tailstock

The tailstock can be offset from the spindle centerline for turning tapers, and realigned again. Move the tailstock top casting toward the front of the lathe to machine a slight taper at the tailstock end. Conversely, position the tailstock top casting toward the back of the lathe to cut a taper at the spindle end.

Note: *The marks on the offset indicator are arbitrary. For a precise offset, use a dial indicator to check quill movement while adjusting the screws.*

Tools Needed	Qty
Hex Wrench 8mm	1
Box-End Wrench 32mm	1

To offset tailstock:

1. Loosen both hex nuts (see **Figure 31**) to release clamping pressure between tailstock and lathe bed.

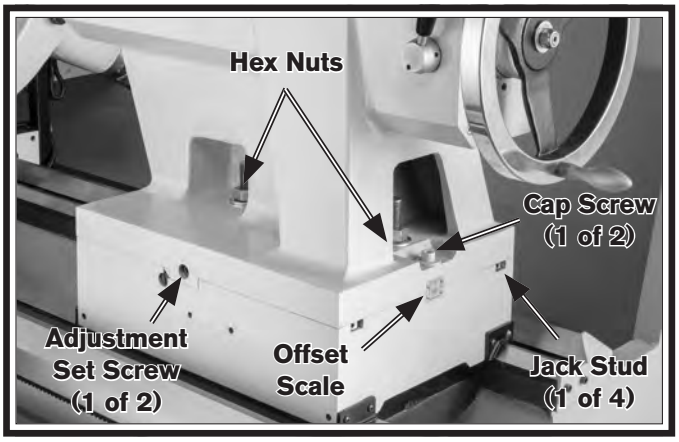


Figure 31. Tailstock offset controls.

2. Loosen cap screws (see **Figure 31**) at both ends of tailstock to release clamping pressure between top and bottom tailstock castings.

3. Rotate adjustment set screws (see **Figure 31**) in opposite directions for desired offset shown on offset scale (see **Figures 32–33**).

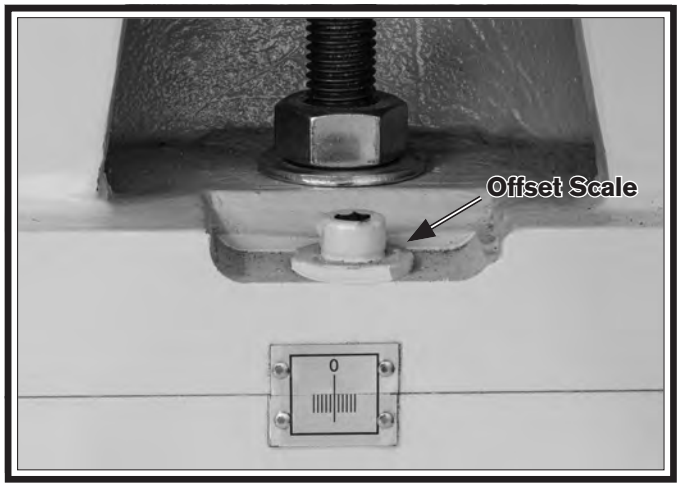


Figure 32. Offset scale (1mm graduations).

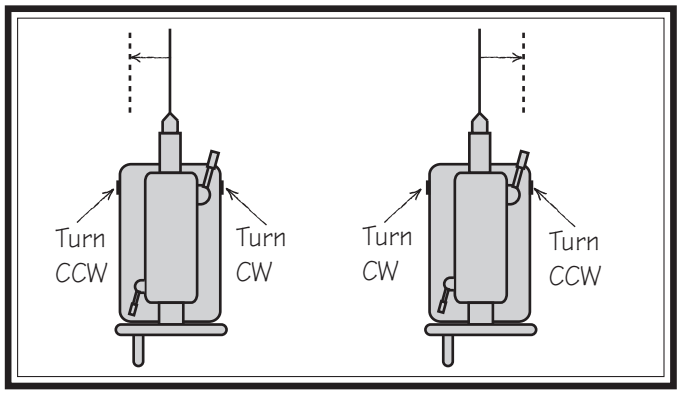


Figure 33. Tailstock offset adjustment.

4. Tighten cap screws (see **Figure 31**) at both ends of tailstock to lock top and bottom tailstock castings together.

5. Retighten clamping hex nuts (see **Figure 31**) to secure tailstock to lathe bed and recheck offset adjustment.

Note: *At each corner of tailstock there is a jack screw adjuster and a locking set screw (see **Figure 31**). The jack screws tilt or raise tailstock centerline with spindle. The factory has adjusted these, and readjustment is not typically required for the life of the lathe.*

Removing Tooling

1. Use a shop rag to hold tool.

2. Rotate tailstock handwheel counterclockwise until tool is forced out of quill.

   — If tool does not come loose by retracting quill, extend quill and use a drift key in slot shown in **Figure 34** to remove tool.

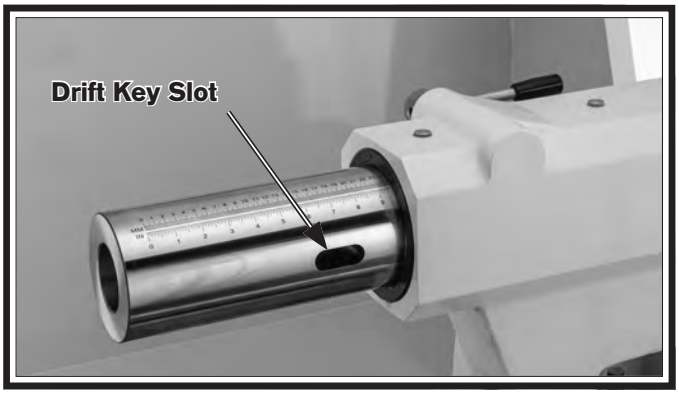


Figure 34. Drift key slot.

Chucks & Faceplates

This lathe is equipped with one or two factory installed chucks that are of various jaw counts or faceplate styles. These chucks or face plates and back plates mount as inboard or outboard chucks, or any combination of the two on the A2-15 lathe spindle. Depending on the type of accessory chuck you have purchased, please refer to the manufacturer's manual for their removal, installation, and maintenance instructions.

Steady Rest

The steady rest is an optional accessory on this lathe. If you have purchased a steady rest please refer to the manufacturer's manual for its removal, installation, and maintenance instructions.

Spindle Speed

The headstock is equipped with two levers that are used to set spindle speed. The first and largest lever (with speed dial) is for speed selection (see **Figure 37**), and the second lever is for range selection (see **Figure 36**). Using a combination of the two controls provides 12 available speeds between 6 and 500 RPM.

Note: *A third forward/reverse lever (see **Figure 35**) is for selecting spindle rotation direction. When it is shifted and spindle rotates the opposite direction, so does the driven gearbox and feed system that is downstream from the headstock.*

Figure 35. Headstock controls.

Selecting Spindle Speed

1. Make sure spindle is turned ***OFF*** and has come to a complete stop.

2. Move Range lever (see **Figure 26**) to **N** for neutral.

   Note: *You may have to use Jog button to unload gearbox and allow gears to mesh when disengaging and engaging levers.*

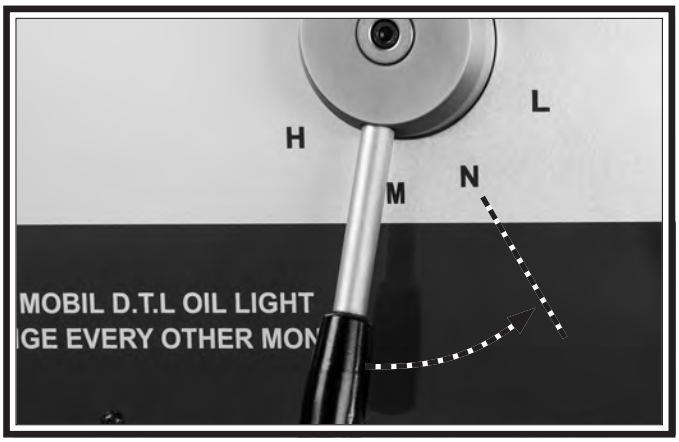


Figure 36. Headstock range lever.

3. Rotate Speed lever to align arrow in headstock to any one of four speed group selections each enclosed by a box on speed dial. For example, **20L**, **85M**, **500H** is selected in **Figure 37**.

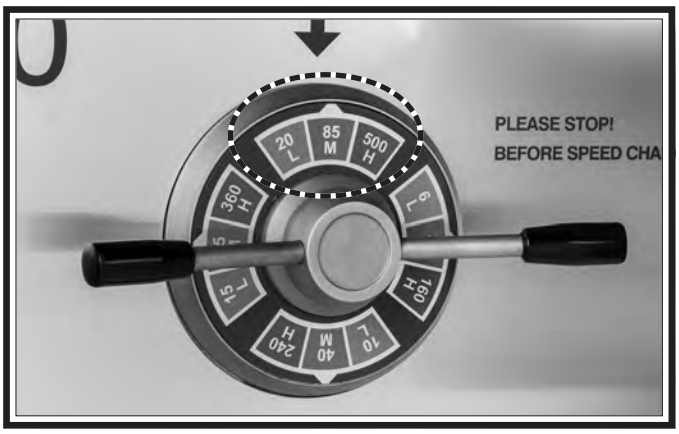


Figure 37. Spindle speed range hub.

4. Now move Range lever to **L**, **M**, or **H**.
   L will give you **20 RPM**
   M will give you **85 RPM**
   H will give you **500 RPM**

5. Repeat this procedure for other three speed groups when needed.

Manual Feed

The handwheels shown in **Figure 38** allow the operator to manually move the cutting tool.

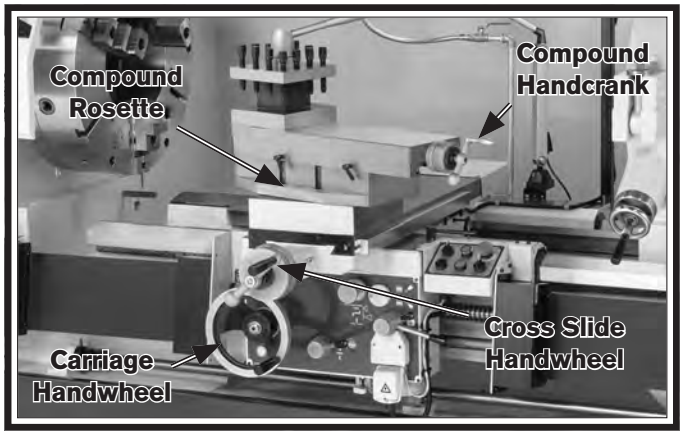


Figure 38. Carriage controls.

Carriage Handwheel

The carriage handwheel moves the carriage left or right along the bed. It has a graduated dial with 0.010" increments, and one full revolution moves the carriage 1.00". Pulling the handwheel out disengages it, and folding it inward back into the handwheel during power feed operations—helps prevent entanglement hazards.

Graduated Dial (see **Figure 39**)
One full rotation moves the carriage 1.00"
Inch Graduations .....0.010"
Metric Graduations..... N/A

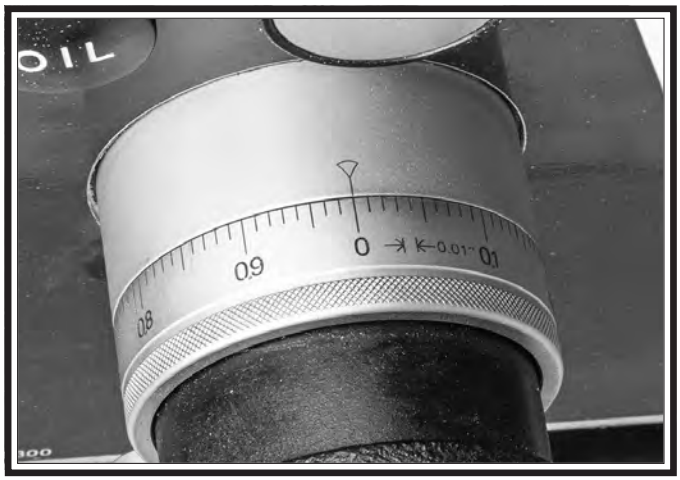


Figure 39. Carriage handwheel scale.

Cross Slide Handwheel

The cross slide handwheel moves the tool toward and away from the workpiece using an indirect-read graduated dial. The indirect-read dial indicates half of the total amount of material that has been removed. For example, if you move the handwheel 0.005" inward, you will reduce workpiece diameter by 0.010".

Pull the handwheel out to disengage it, and fold the hand crank lever in during power feed operations—to help prevent entanglement hazards.

Graduated Dial (see **Figure 40**)
One full rotation moves the cross slide 0.4" or 10.16mm.
Inch Graduations .....0.002"
Metric Graduations.....0.04mm

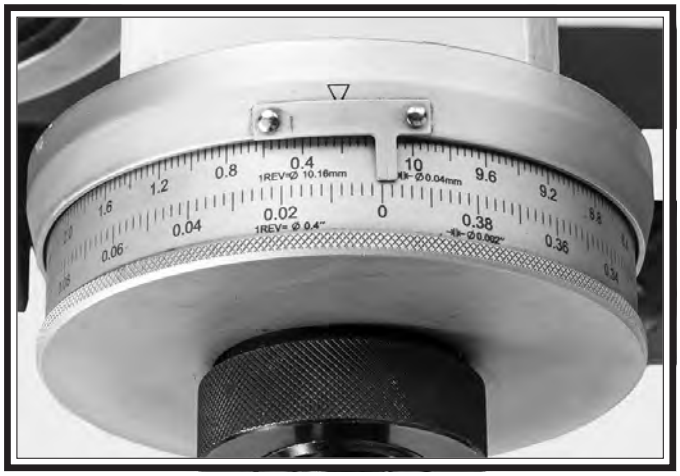


Figure 40. Cross slide handwheel scale.

Compound Rest Rosette

The compound rest handcrank moves the cutting tool parallel along the set angle shown on the compound rest (see **Figure 41**). The compound rest angle is set by hand-rotating it and securing in place with cap screws.

The compound rest rosette is laid out using 1° angle graduations.

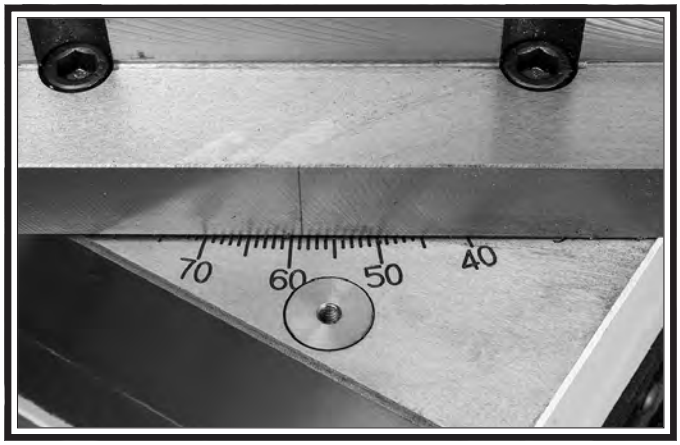


Figure 41. Compound rest rosette.

Compound Rest Handcrank

The compound rest handcrank uses an indirect-read graduated dial that indicates half of the total amount of material that has been removed. For example, if you move the handcrank 0.005", you will reduce workpiece diameter by 0.010".

Graduated Dial (see **Figure 42**)
One 360° degree rotation moves compound 0.200" or 0.051mm.
Inch Graduations .....0.002"
Metric Graduations.....0.05mm

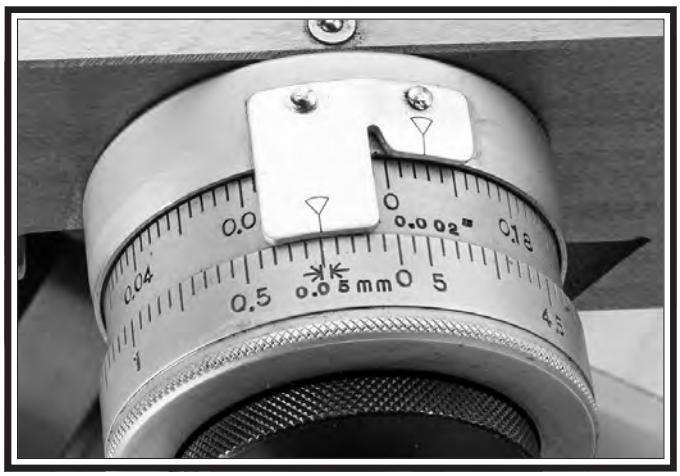


Figure 42. Compound rest graduated dial.

Quick Traverse

This lathe is equipped with an electric quick traverse motor for returning or repositioning the carriage or cross slide. By first unlocking the carriage and half nut, and selecting longitudinal or cross feed with the feed selector knob; the quick traverse operation is engaged by holding the traverse motor lever (see **Figure 43**) up or down from its spring-loaded neutral position.

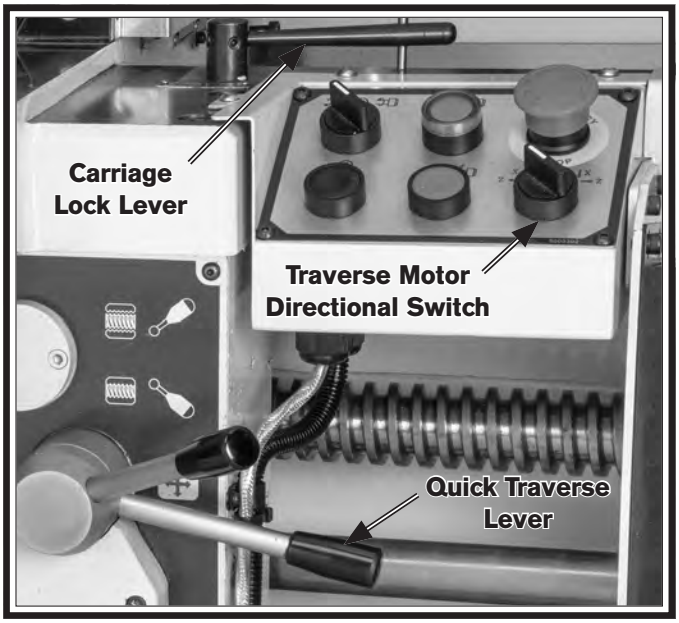


Figure 43. Quick traverse controls.

Quick Traverse (Longitudinal Feed)

1. Manually back tool out of cut.
2. Unlock Carriage Lock lever (see **Figure 43**).
3. Move half nut lock lever down to disengage.
4. Push Feed Selector knob (see **Figure 46** on **Page 34**) in for rapid longitudinal travel selection.
5. Verify that carriage longitudinal travel is unobstructed.
6. Turn traverse motor directional switch (see **Figure 44**) to the desired rapid traverse direction.
7. Hold quick traverse lever (see **Figure 43**) in its up position for motorized travel.

Quick Traverse (Cross Feed)

1. Manually back tool out of cut.

2. Pull Feed Selector knob out for rapid cross slide selection.

3. Verify that cross slide cross travel is unobstructed.

4. Turn traverse motor directional switch (see **Figure 44**) to the desired rapid traverse direction.

Figure 44. Carriage control panel.

5. Hold quick traverse lever (see **Figure 43**) in its up position for motorized travel.

Power Feed

Both the carriage and cross slide have power feed capability when the carriage is engaged with the feed rod. The rate that these components move (feed rate) is controlled by the headstock and gearbox lever positions.

The Feed Direction lever (see **Figure 45**) on the headstock reverses the rotation of the headstock gearbox, and the direction of carriage and cross slide feed.

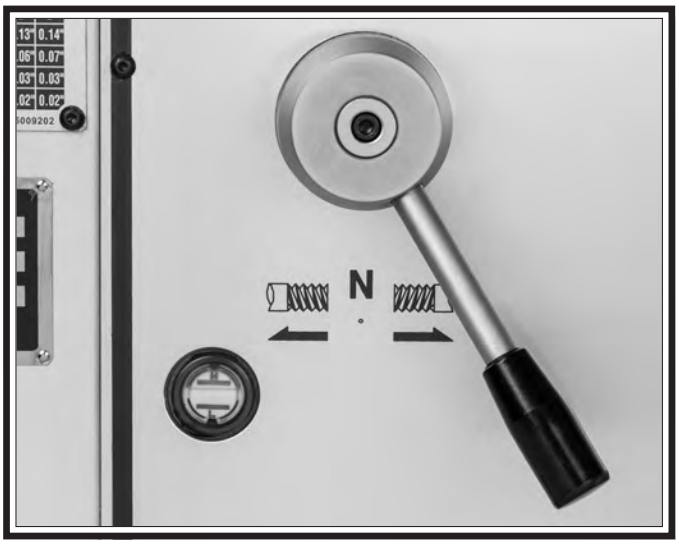


Figure 45. Feed direction lever.

Feed rate and spindle speed must be considered together. Keep in mind that the feed rate is expressed in the amount of travel per revolution of the spindle. The sources you use to determine the optimum spindle speed for an operation will also provide the optimal feed rate to use with that spindle speed.

Often, the experienced machinist will use the feeds and speeds given in their reference charts or web calculators as a starting point, then make minor adjustments to the feed rate (and sometimes spindle speed) to achieve the best results.

The carriage can alternatively be driven by the leadscrew for threading operations (refer to **Inch-Thread Dial** on **Page 36)**.

Power Feed Controls

Use **Figures 46–47** and the following descriptions to become familiar with the locations and functions of the controls that you will use to set up the correct power feed for your operation.

Feed Selector Knob: Selects the carriage or cross slide for power feed operations and quick traverse operations (see **Figure 46**).

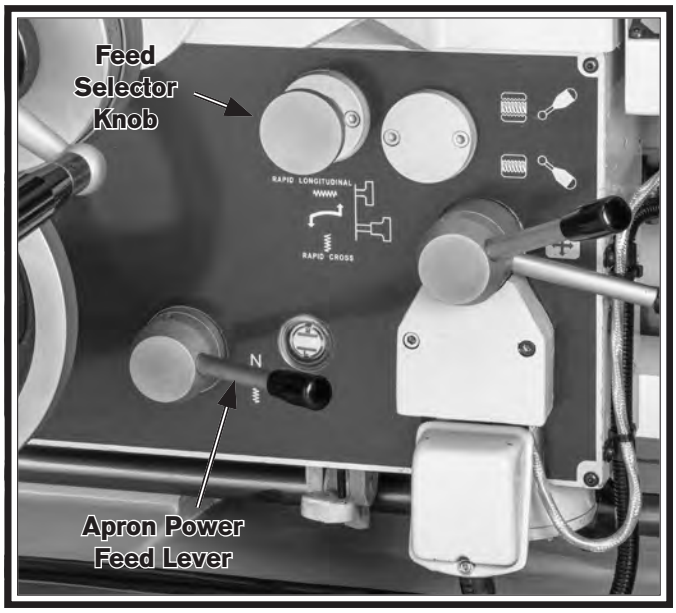


Figure 46. Feed selector knob.

Note: *When the knob is pulled out, the cross slide is selected, and when the knob is pushed in, the carriage is selected.*

Note: *When using this control, you may need to rock the handwheel of the component being engaged so that the apron gears will mesh.*

Apron Power Feed Lever: Changes power feed direction (see **Figure 46**). This lever quickly switches the power feed axis between longitudinal and cross feed operations.

NOTICE

Pay attention to your selected lever combinations. Depending on the combined configuration of the feed direction lever on the headstock and the Feed Direction knob and lever on the apron, the actual direction of power feed will respectively change from the printed indicators on the machine!

Feed Clutch Knob: Adjusts how easily the feed clutch will disengage the feed rod in order to prevent overload when the carriage contacts a feed stop, micro carriage stop, or in the event of a crash. Tightening this knob (see **Figure 47**) completely disables this cone-type clutch. A shear pin that may or may not break before damage occurs.

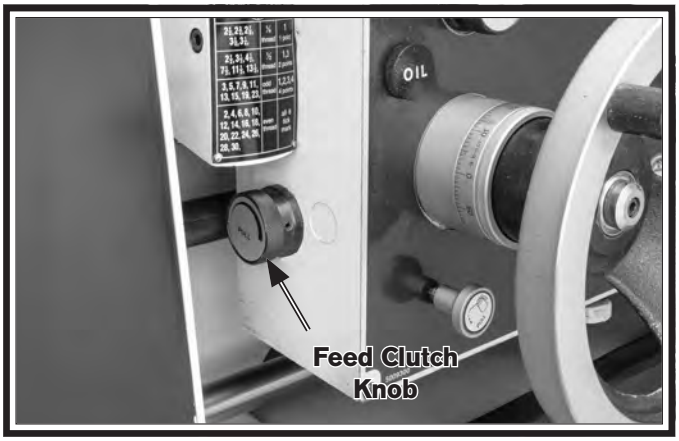


Figure 47. Adjustable feed clutch knob.

Note: *The feed clutch setting will depend on variables of the longitudinal or cross feed cutting operations, such as depth of cut, feed rate, workpiece material, and other considerations. Finding the ideal clutch setting is a matter of trial-and-error, and experience.*

To Adjust Feed Clutch:

1. Turn lathe ***OFF*** and engage apron power feed lever (see **Figure 46**) for your feed operation.

2. Pull feed clutch knob outward and rotate it clockwise through the clicks until tight.

3. Pull feed clutch knob outward, loosen three full turns, then release the knob.

4. Disengage apron power feed lever; clutch tension is now adjusted to a conservative setting.

   Note: *As needed during feeding operations, fine tune the adjustment to establish consistent feeding without disengagement, while still providing overload protection.*

Setting Power Feed Rate

The power feed rate chart displays the settings for the headstock feed controls where feed rates are in decimal inches (see **Figure 48**).

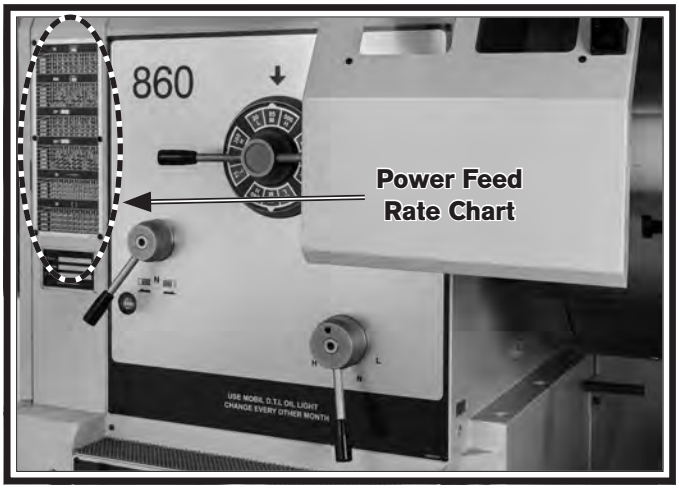


Figure 48. Power feed rate chart.

Using the controls on the gearbox, follow along with the example below to clearly understand how to set the lathe for the desired feed rate.

Example: Longitudinal Feed Rate of 0.22"/rev

1. On feed rate chart, find Longitudinal **IN** (Inch) feed rate **0.22"**, shown in **Figure 50**.

2. Move Feed Mode lever to **IN MM** position shown in **Figure 49**.

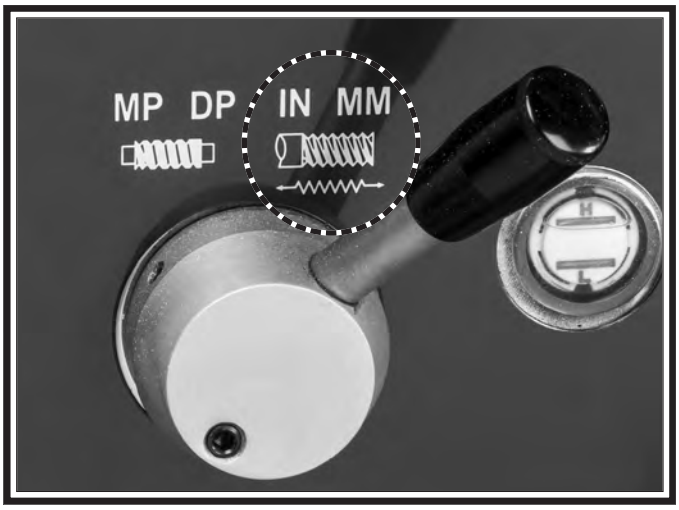
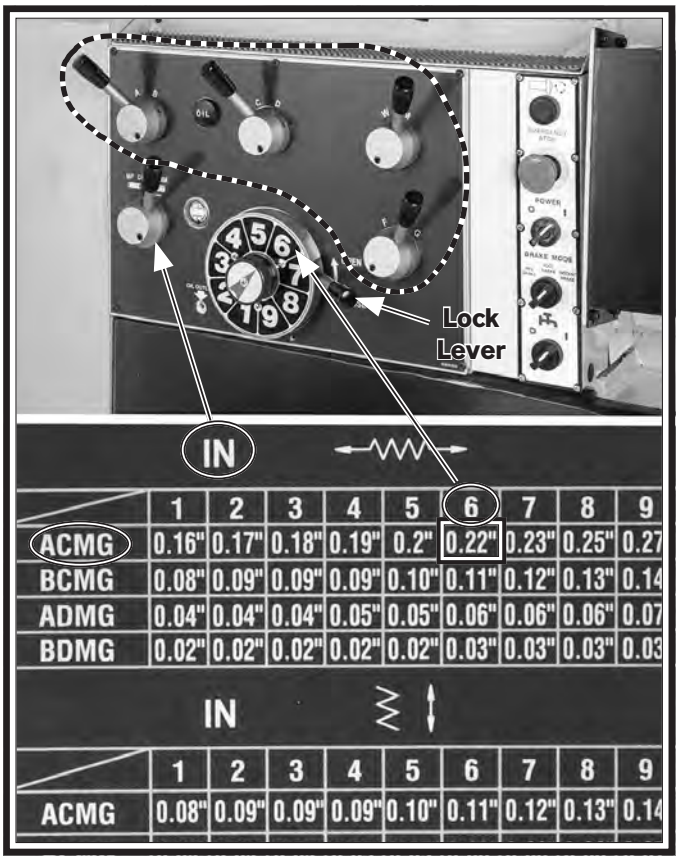


Figure 49. Feed mode lever (IN MM mode).

3. Read left and top of chart to find control positions that are needed for your feed rate. In this example they are **ACMG 6**.

4. Move each of four gearbox levers (see **Figure 50**) to required letter positions **A**, **C**, **M**, and **G** that were indicated on chart.

5. Move lock lever for Numbered Gear Dial (see **Figure 51**) to **OPEN** position, rotate knob to **6**, and then lock dial by moving lock lever to **CLOSE** position.



	1	2	3	4	5	6	7	8	9
ACMG	0.16"	0.17"	0.18"	0.19"	0.2"	0.22"	0.23"	0.25"	0.27
BCMG	0.08"	0.09"	0.09"	0.09"	0.10"	0.11"	0.12"	0.13"	0.14
ADMG	0.04"	0.04"	0.04"	0.05"	0.05"	0.06"	0.06"	0.06"	0.07
BDMG	0.02"	0.02"	0.02"	0.02"	0.02"	0.03"	0.03"	0.03"	0.03

	1	2	3	4	5	6	7	8	9
ACMG	0.08"	0.09"	0.09"	0.09"	0.10"	0.11"	0.12"	0.13"	0.14

Figure 50. Setting feed rate (0.22").

The lathe is now set for a 0.22" longitudinal feed rate. The process is the same for setting the cross feed rate and threading selections.

Refer to Feed Chart in **Figure 51** for all available feeds.

IN

	1	2	3	4	5	6	7	8	9
ADWF	2	$2\frac{1}{4}$	$2\frac{3}{8}$	$2\frac{1}{2}$	$2\frac{3}{4}$	$2\frac{7}{8}$	3	$3\frac{1}{4}$	$3\frac{1}{2}$
BDWF	4	$4\frac{1}{2}$	$4\frac{3}{4}$	5	$5\frac{1}{2}$	$5\frac{3}{4}$	6	$6\frac{1}{2}$	7
ACWF	8	9	$9\frac{1}{2}$	10	11	$11\frac{1}{2}$	12	13	14
BCWF	16	18	19	20	22	23	24	26	28

MM

	1	2	3	4	5	6	7	8	9
ACME	8	9	9.5	10	11	11.5	12	13	14
BCME	4	4.5	4.75	5	5.5	5.75	6	6.5	7
ADME	2	2.25	/	2.5	2.75	/	3	3.25	3.5
BDME	1	/	/	1.25	/	/	1.5	/	1.75
BDMH	0.8	0.9	0.95	1	1.1	1.15	1.2	1.3	1.4

DP

	1	2	3	4	5	6	7	8	9
ADWF	4	$4\frac{1}{2}$	$4\frac{3}{4}$	5	$5\frac{1}{2}$	$5\frac{3}{4}$	6	$6\frac{1}{2}$	7
BDWF	8	9	$9\frac{1}{2}$	10	11	$11\frac{1}{2}$	12	13	14
ACWF	16	18	19	20	12	23	24	26	28
BCWF	32	36	38	40	44	46	48	52	56

MP

	1	2	3	4	5	6	7	8	9
ACME	4	4.5	4.75	5	5.5	5.75	6	6.5	7
BCME	2	2.25	/	2.5	2.75	/	3	3.25	3.5
ADME	1	/	/	1.25	/	/	1.5	/	1.75
BDME	0.5	/	/	/	/	/	0.75	/	/
BDMH	0.4	/	/	/	/		0.6	/	/

IN

	1	2	3	4	5	6	7	8	9
ACMG	0.16"	0.17"	0.18"	0.19"	0.2"	0.22"	0.23"	0.25"	0.27"
BCMG	0.08"	0.09"	0.09"	0.09"	0.10"	0.11"	0.12"	0.13"	0.14"
ADMG	0.04"	0.04"	0.04"	0.05"	0.05"	0.06"	0.06"	0.06"	0.07"
BDMG	0.02"	0.02"	0.02"	0.02"	0.02"	0.03"	0.03"	0.03"	0.03"

IN

	1	2	3	4	5	6	7	8	9
ACMG	0.08"	0.09"	0.09"	0.09"	0.10"	0.11"	0.12"	0.13"	0.14"
BCMG	0.04"	0.04"	0.04"	0.05"	0.05"	0.06"	0.06"	0.06"	0.07"
ADMG	0.02"	0.02"	0.02"	0.02"	0.02"	0.03"	0.03"	0.03"	0.03"
BDMG	0.01"	0.01"	0.01"	0.01"	0.01"	0.01"	0.01"	0.02"	0.02"

5009202

Figure 51. Threading and feed rate chart.

Inch-Thread Dial

The numbers on the thread dial are used with the thread dial chart on the thread dial body. The chart indicates when to engage the half nut for specific inch threading selected on the feed chart, as shown in **Figure 52**.

The thread dial gear must be engaged with the leadscrew for this to function. Loosen the cap screw on the side of the thread dial (see **Figure 53**), pivot the dial gear toward the leadscrew so that it properly meshes with the leadscrew threads, then re-tighten the cap screw.

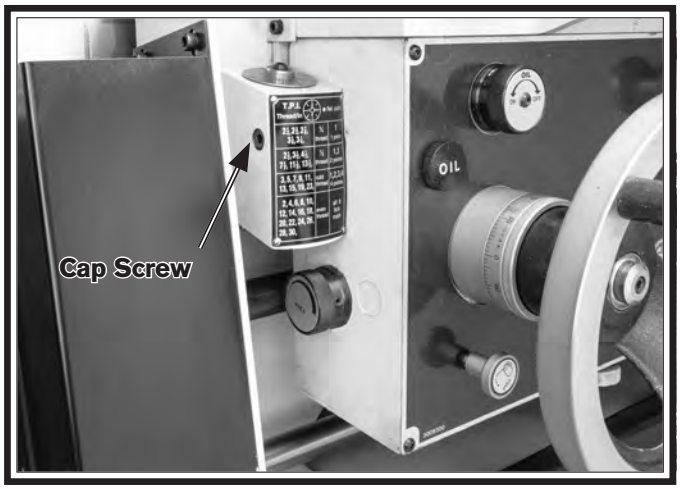


Figure 52. Thread dial engaged with the leadscrew.

⚠CAUTION

Attempting to engage the half nut while the cross slide or carriage is engaged with the feed rod could cause severe damage to the lathe. Never attempt to engage the half nut while the feed control lever is engaged.

NOTICE

When threading, we recommend using the slowest speed possible and avoiding deep cuts, so you can more easily disengage the half nut to prevent an apron crash!

Inch-Thread Dial Chart

Find the TPI (Threads Per Inch) that you want to cut in the left column of the thread dial chart (see **Figure 53**), then reference the dial numbers to the right of it. The dial numbers indicate when to engage the half nut for a specific thread pitch. The thread dial chart can also be found on the front of the thread dial housing.

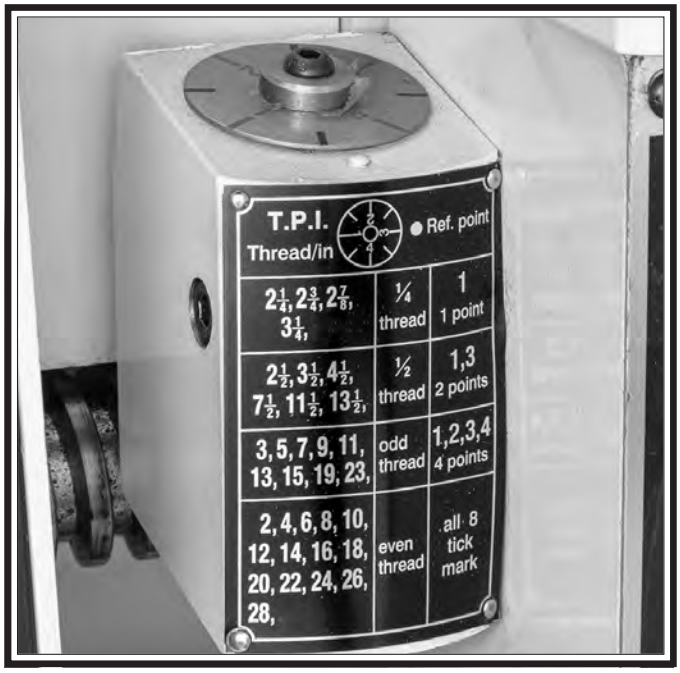


Figure 53. Thread dial chart.

Note: *The thread dial is not used for metric threading, or diametral and modular pitches. With these, you must leave the half nut engaged until the turning is complete.*

The following examples explain how to use the thread dial chart for inch threads.

Even Thread (TPI)

Use any position shown on thread dial when cutting even threads (see **Figure 54**).

TPI	Positions:
2, 4, 6, 8,10,12 14,16,18,20,22 24,26,28	All 8

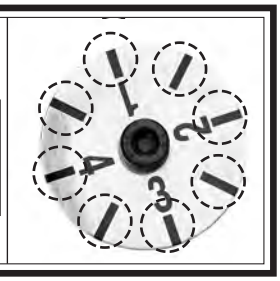


Figure 54. Thread dial positions for even threads.

¼ Fractional Thread (TPI)

Use **1** on the thread dial when cutting ¼ fractional threads (see **Figure 55**).

TPI	Positions:
2¼, 2¾, 2⅞, 3¼	1 Only

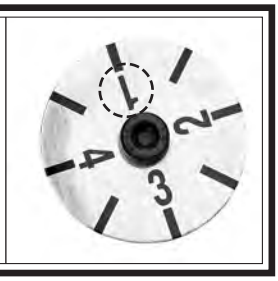


Figure 55. Thread dial positions for ¼ fractional threads.

½ Fractional Thread (TPI)

Use **1** and **3** on the thread dial when cutting ½ fractional threads (see **Figure 56**).

TPI	Positions:
2½, 3½, 4½, 7½, 11½, 13½	1 or 3

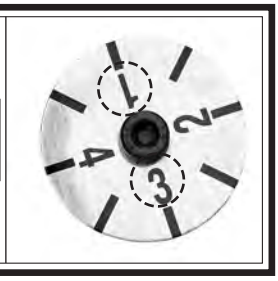


Figure 56. Thread dial positions for ½ fractional threads.

Odd Numbered (TPI)

Use **1**, **2**, **3**, **4** positions on the thread dial when cutting odd threads (see **Figure 57**).

TPI	Positions:
3, 5, 7, 9, 11, 13, 15, 19, 23	1, 2, 3, 4

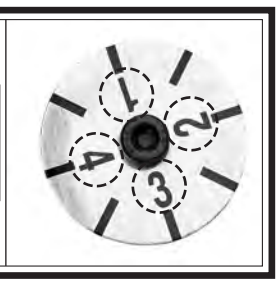


Figure 57. Thread dial positions for odd threads.

Four-Position Apron Stop

⚠CAUTION

This four-position apron stop system is only made to disengage the apron from the feed rod. When the leadscrew is engaged for threading operations, the four-position apron stop will not disengage the apron—you must manually disengage the apron from the feed rod with the half nut lever or the apron will crash into the chuck.

NOTICE

Every time you readjust the stop eccentrics, always manually test your apron stop setting before you rely on apron stop system to automatically disengage the apron.

Use the four-position apron stop for disengaging the apron automatically at up to four different apron locations.

You can tighten each eccentric in place on the rod at different rotated positions, so the eccentric corresponds with a number on the dial. Depending on which number you turn the stop selection dial to (see **Figure 58**), the rod will align the toe of the stop eccentric to where you want the apron to stop. When the apron reaches that point, the crown of the stop eccentric will depress the clutch release lever and disengage the apron from feed rod and stopping the apron.

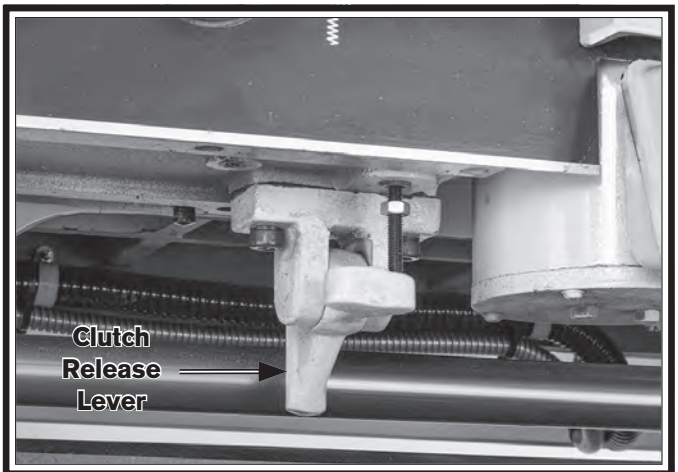
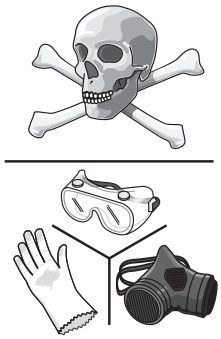


Figure 58. Four-position apron stop mechanism.

Coolant System

When the coolant pump is turned ***ON***, the fluid is delivered through the nozzle attached to the carriage. The flow is controlled by the valve lever at the base of the nozzle.

Refer to **Coolant Service** on **Page 48** for detailed instructions on how to add or change fluid. Check the coolant regularly and promptly change it when it becomes rancid, or as recommended by the fluid manufacturer.



⚠WARNING

BIOLOGICAL & POISON HAZARD!

Use the correct personal protection equipment when handling coolant. Follow federal, state, and fluid manufacturer requirements for proper disposal.

⚠CAUTION

Running pump without adequate fluid in coolant tank may permanently damage it, and which will not be covered under warranty.

To use coolant system:

1. Make sure coolant tank is properly serviced and filled with appropriate fluid, and that you are wearing necessary personal protection equipment.

2. Position coolant nozzle for your operation.

3. Turn coolant pump switch on control panel to ***ON*** position.

4. Adjust flow of coolant by using valve lever near base of nozzle hose.

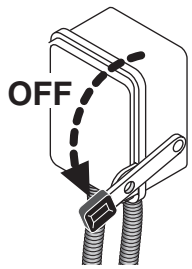
   IMPORTANT: *Promptly clean any splashed fluid from floor to avoid a slipping hazard.*

Accessories

This section includes critical accessories available for your lathe, which may be available through your local South Bend Tool Co. dealer. If you do not have a dealer in your area, please call us at (360) 734-1540 or email us at **cs@southbendtools.com**.

P/N	Description	SB1065F	SB1066F	SB1067F	SB1068F	SB1069F	SB1070F	SB1071F
SB1072	A2-15 25" 3 Jaw Chuck Direct Mount	X	X	X	X	X	X	X
SB1073	A2-15 Outboard Spindle Backplate	X	X	X	X	X	X	X
SB1074	A2-15 32" Face Plate	X	X	X	X	X	X	X
SB1075	A2-15 36" Face Plate	X	X	X	X	X	X	X
SB1076	A2-15 40" Face Plate	X	X	X	X	X	X	X
SB1077	Follow Rest w/Rollers (Clamping: 30~160mm)	X	X	X				
SB1078	Follow Rest w/Rollers (Clamping: 30~160mm)				X	X		
SB1079	Follow Rest w/Rollers (Clamping: 30~160mm)						X	X
SB1081	16" Steady Rest w/ Rollers (Clamping: 200~380mm)	X	X	X	X	X	X	X
SB1082	20" Steady Rest w/ Rollers (Clamping: 270~490mm)	X	X	X	X	X	X	X
SB1083	24-½ " Steady Rest w/ Rollers (Clamping: 290~590mm)	X	X	X	X	X	X	X
SB1084	28-½" Steady Rest w/ Rollers (Clamping: 340~700mm)	X	X	X	X	X	X	X
SB1085	Taper Turning Attachment	X	X	X	X	X	X	X
SB1086	Four-Position Apron Stop	X	X	X	X	X	X	X
SB1087	Micro Carriage Stop	X	X	X	X	X	X	X
SB1088	MT6 Heavy Duty Live Center	X	X	X	X	X	X	X
SB1089	Quick Change Post	X	X	X	X	X	X	X

Maintenance Schedule



⚠WARNING

Always disconnect power to the machine before performing maintenance. Failure to do this may result in electrocution or accidental startup injury.

For optimum performance from this machine; we strongly recommend all operators make a habit of following the daily maintenance procedures. To help ensure maintenance actions are done regularly, use the checklist provided on **Page 41**.

Ongoing

The condition of machine components should be carefully observed at all times to minimize the risk of injury or machine damage. If any of the conditions below are observed, stop the lathe immediately, disconnect power, and correct the condition before resuming operations:

Check For

- Loose mounting bolts or fasteners.
- Worn, frayed, cracked, or damaged wires.
- Guards removed.
- EMERGENCY STOP buttons not working.
- A reduction in braking speed or efficiency.
- Oil level not visible in sight glasses.
- Coolant not flowing out.
- Damaged or malfunctioning components
- Check for Any other unsafe condition.

Daily, Before Operations

- Check/add headstock oil (**Page 42**).
- Check/add gearbox oil (**Page 43**).
- Check/add apron oil (**Page 43**).
- Check/add coolant (**Page 48**).
- Lubricate ways (**Page 45**).
- Add oil to ball oilers (**Page 45**).
- Clean/lubricate leadscrew (**Page 45**).
- Ensure carriage lock lever is loose (**Figure 7** on **Page 7**).

Daily, After Operations

- Depress EMERGENCY STOP button and turn master switch to **OFF** position. power switch (to prevent accidental startup).
- Vacuum/clean all chips and swarf from bed, slides, and chip drawer.
- Wipe down all unpainted or machined surfaces with an oiled rag.
- Ensure carriage lock lever is loose (**Figure 7** on **Page 7**).

Monthly or As Needed

- Drain and clean coolant tank, then add new fluid (**Page 48**).

Yearly

- Check/add headstock oil (**Page 42**).
- Check/add gearbox oil (**Page 43**).
- Check/add apron oil (**Page 43**).
- Lubricate end gears (**Page 46**).
- Check/level bedway (**Page 20**).

Cleaning & Protecting

We recommend that the cleaning routine be planned into your workflow schedule, so that adequate time is set aside to do the job right.

Typically, the easiest way to clean swarf from the bed ways and chip drawer is to use a wet/dry shop vacuum that is dedicated for this purpose. The small chips left over after vacuuming can be wiped out with a slightly oiled rag. Avoid using compressed air to blow off chips, as it may drive them deeper into moving surfaces and could cause sharp chips to fly into your face or hands.

Besides the ways, all other unpainted and machined surfaces should be wiped down daily to keep them rust-free and in top condition. This includes any surface that is vulnerable to rust if left unprotected (especially any parts that are exposed to water-soluble coolant). Typically, a thin film of oil is all that is necessary for protection.

Maintenance Chart

South Bend Tool Co.® Lathe Monthly Maintenance Checklist

Item \ Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Lubrication																															
Ways																															
Ball Oilers																															
Leadscrew																															
Unpainted Surfaces																															
Inspection																															
Headstock Oil Level																															
Gearbox Oil Level																															
Apron Oil Level																															
Coolant Level																															
Coolant Condition		**Refer to coolant manufacture's instructions for more information regarding coolant condition, replacement, disposal, and safety.**																													

Use this chart to keep track of the maintenance performed on your lathe. Cross out or initial the "Day" box for each item on the list. If the box is blacked out, maintenance is not required for that item on that day. Use the maintenance poster included with your lathe as a quick reference guide when performing the maintenance items.

Annual Service

Once every year, or more often with heavy use, perform these service items. Keep track of when you last performed your annual service and when you'll need to perform it again.

Date of last annual service:	
Date of next annual service:	

Service Item	✓
Change Gearbox Oil	
Change Headstock Oil	
Change Apron Oil	
Change Coolant	

Make copies of this page to use each month. Keep each chart as a maintenance record for your lathe.

SOUTH BEND SINCE 1906

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Lubrication

Headstock

The headstock has a splash-and-spray lubrication system. The oil is thrown to upper oil catch grooves with drilled bores that direct oil to the three spindle bearing packs. Under heavy use, or once every 3 years under light use, the top headstock cover should be unbolted and removed, and the oil catches and their bores cleaned to ensure oil always reaches the spindle bearings. At this time, many machinists elect to tighten up spindle bearings with a slight preload by normal means just to remove any end play that may have developed over time.

Oil Type .....Mobil D.T.E. Light or ISO #32 Equiv.
Amount ..... 57 Quarts
Check/Add Frequency ..... Daily
Change Frequency ..... 6 Months

Changing Headstock Oil

The headstock oil must be changed after receiving lathe and completing test run. Thereafter, change it annually (or every six months with heavy service or extreme working conditions).

Items Needed	Qty
5-Gallon Waste Oil Bucket with Lid	1
6" Long ¼" Pipe with Drain Hose	1
Hex Wrench 4mm	1
Mineral Spirits	As Needed
Rags	As Needed

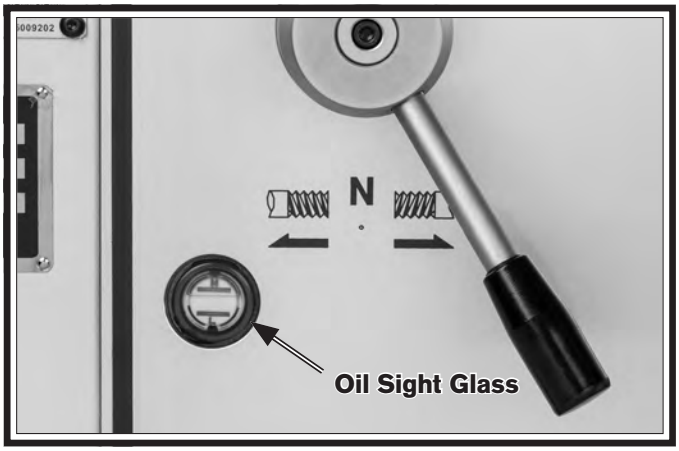


Figure 59. Headstock oil level sight glass.

To change the headstock oil:

1. Run headstock so it reaches a warm oil temperature.
2. DISCONNECT LATHE FROM POWER!
3. Remove drain pipe plug (see **Figure 60**) and thread in 6" pipe section to serve as a oil drain spout.
4. Allow oil to drain and re-install plug.
5. Remove oil fill cap shown in **Figure 60**, and refill oil to full mark shown on sight glass in **Figure 59**.
6. Re-install oil fill cap.

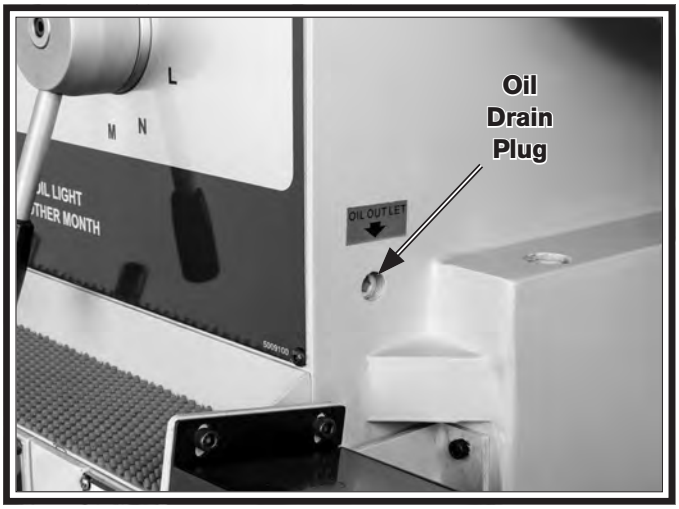


Figure 60. Headstock oil drain plug.

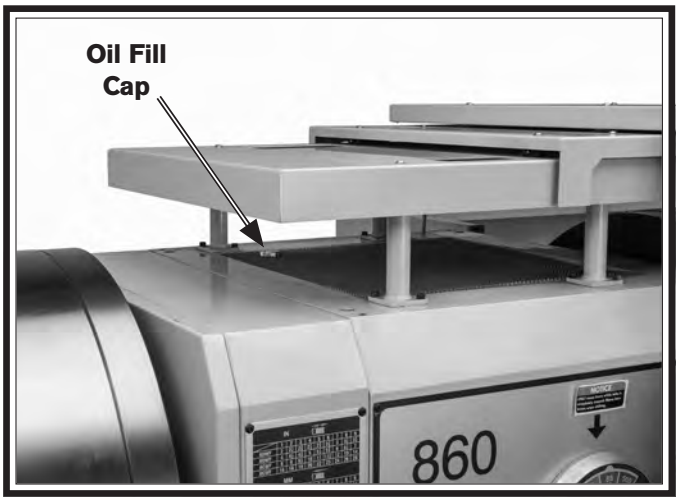


Figure 61. Headstock fill cap.

Gearbox

All components inside of the gearbox are lubricated by a splash-and-spray lubrication system, and oil level is verified daily before use by means of a sight glass on the face of the gearbox (see **Figure 62**).

Oil Type .....Tellus Omala 150 or ISO 68 Equiv.
Oil Amount ..... 5.8 Quarts
Change Frequency 6-Months

Changing Gearbox Oil

The gearbox oil must be changed after receiving the lathe and completing thee test run. Thereafter, change it annually (or every six months with heavy service or extreme working conditions).

Items Needed	Qty
5-Gallon Waste Oil Bucket with Lid	1
6" Inch Long ¼" Pipe	1
Hex Wrench 4mm	1
Mineral Spirits	As Needed
Rags	As Needed

Figure 62. Gearbox oil sight glass and plugs.

To change gearbox oil:

1. Run gearbox until it reaches a warm oil temperature.
2. DISCONNECT LATHE FROM POWER!
3. Remove oil drain plug (see **Figure 62**) and thread in the 6" pipe section to serve as a oil drain pipe.
4. Allow oil to drain and re-install plug.
5. Remove fill plug (see **Figure 62**) and refill oil to full mark shown on sight glass.
6. Re-install fill cap.

Apron

All components inside of the apron are lubricated by a splash-and-spray lubrication system and oil level is verified daily before use by means of a sight glass on the face of the apron (see **Figure 63**).

IMPORTANT: *Keep in mind that apron hand-pump oiler draws oil from apron reservoir. Check and add oil before lathe use.*

Drain and Flush Frequency ..... Every 6 Months

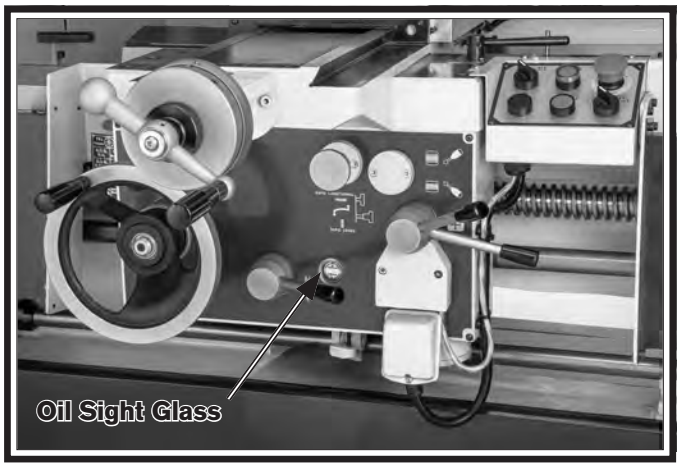


Figure 63. Location of apron oil sight glass.

Draining Oil & Flushing Apron

Since the apron oil reservoir supplies the hand-pump oiler, the oil is constantly being refreshed when the reservoir is filled. However, small metal particles may accumulate at the bottom of the reservoir with normal use. Therefore, to keep the reservoir clean, drain and flush it at least once a year.

Items Needed **Qty**

Oil Type .....Shell Tellus T-68 or Equivalent
Oil Amount ..... 2½ Quarts
Hex Wrench 5mm 1

To flush and change apron oil:

1. Place a catch pan under apron drain plug shown in **Figure 64**.

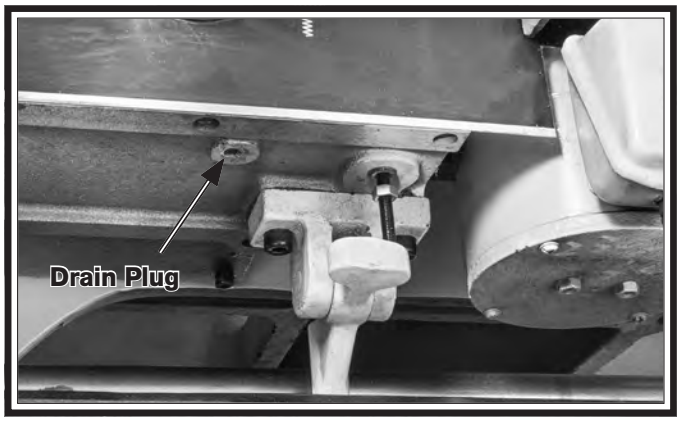


Figure 64. Apron drain plug.

2. Remove fill plug (see **Figure 65**), and remove drain plug using a 5mm hex wrench.

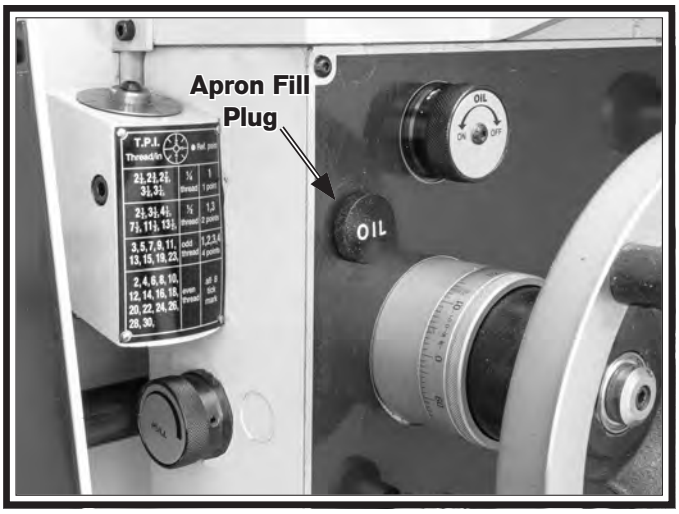


Figure 65. Apron oil fill and flow control.

3. Allow reservoir to fully drain and re-install drain plug.
4. Overfill apron until oil runs out of fill port and re-install fill plug.
5. Operate apron working through all of its functions back and forth for several minutes.
6. Turn ***OFF*** lathe and drain and refill apron to full level indicated on sight glass.
7. The apron is now flushed of loose particles.

Hand-Pump Oiler

The hand-pump oiler shown in **Figure 67** lubricates the saddle ways. The pump draws oil from the apron reservoir and then forces it through drilled passages to the way guides.

Oil Amount ..... As Needed
Lubrication Frequency..... Daily

To use hand-pump oiler:

1. Based on temperature and viscosity of the oil, rotate oil dial (**Figure 66**) to increase or decrease amount of oil distributed when hand pump is used.

Figure 66. Apron oil fill and flow control.

2. Pull pump knob out for two or three seconds so it fills, and then push it in.

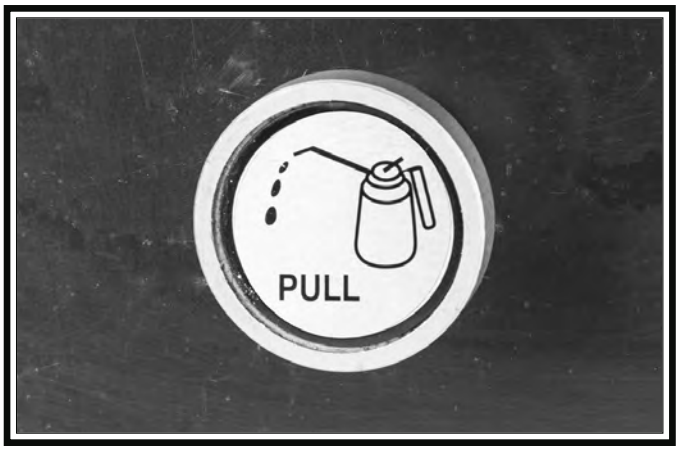


Figure 67. Hand-pump oiler knob.

3. Repeat this process while moving carriage and cross slide through their full range of movement to distribute oil along ways.

4. Lubricate guides before and after operating lathe. If lathe is in a moist or dirty environment, increase lubrication interval.

Longitudinal Leadscrew

Mineral Spirits ..... As Needed
Oil Type .....Shell Tellus T-68 or Equivalent
Oil Amount ..... As Needed
Lubrication Frequency.....Daily or As Needed

To lubricate leadscrew:

Make sure to move the carriage out of the way, so you can clean and lubricate the entire length of the leadscrew.

1. Using a stiff brush and mineral spirits clean leadscrew threads and dry with a clean rag.

2. Using a brush, apply a thin coat of oil along length of the leadscrew ensuring to reach down into the thread valley.

Ball Oilers

Proper lubrication of ball oilers is done with a pump-type oil can that has a plastic or rubberized cone tip. Do not use oilers with metal needle or lance tips, as the metal tip can push the ball too far into the oiler, break the spring seat, and lodge the ball in the oil galley.

Oil Type .....Shell Tellus T-68 or Equivalent
Oil Amount ..... As Needed
Pump Oil Can w/Plastic or Rubber Cone Tip 1
Lubrication Frequency..... Before and After Use

To lubricate ball oilers:

Lubricate ball oilers before and after machine use, and more frequently under heavy use.

1. Wipe ball oiler surface clean removing all metal and abrasives.

2. Push rubber or plastic tip of oil can nozzle against ball oiler to create a hydraulic seal.

3. Pump oil can once or twice. If you see sludge and contaminants coming out of lubrication area, keep pumping oil can until oil is clear.

4. Wipe away excess oil.

Note: *Cross feed has one ball oiler next to the hand crank scale, and the compound has four. See locations in* ***Figures 68*** *and* ***69****.*

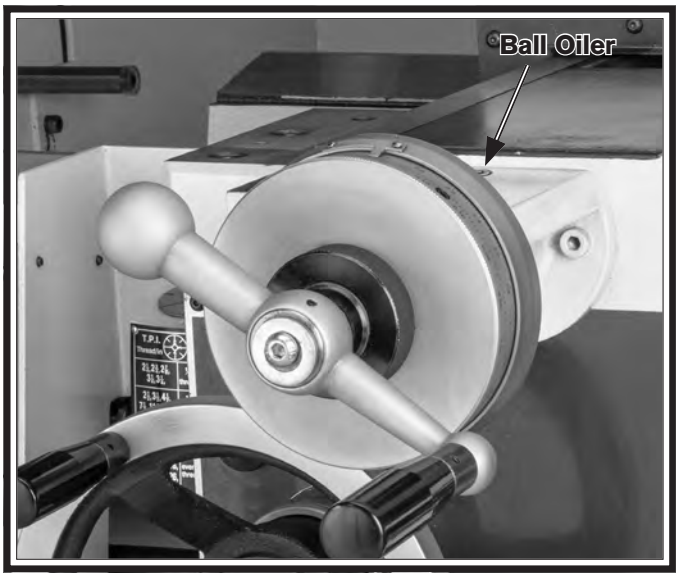


Figure 68. Carriage ball oiler.

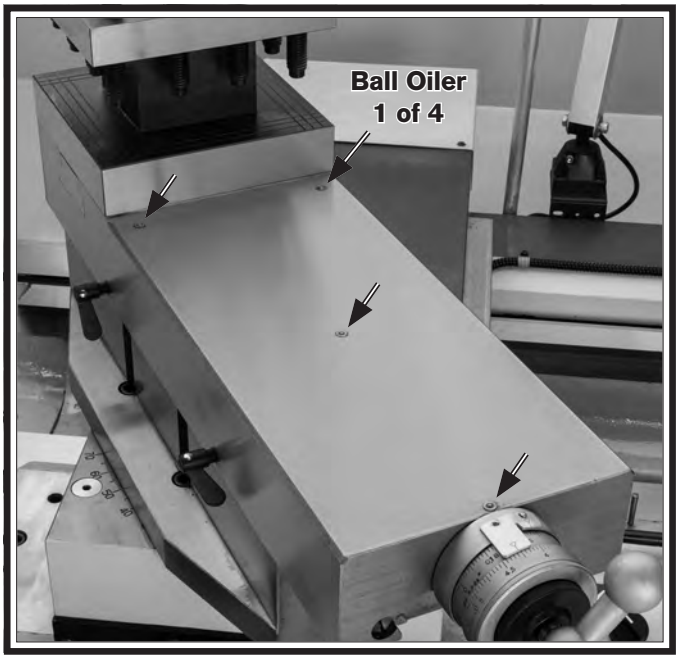


Figure 69. Compound ball oilers.

End Gears

The end gears, shown in **Figure 70**, should always have a thin coat of heavy grease to minimize corrosion, noise, and wear. Make sure to wipe away excess grease that could be thrown onto the V-belts and reduce optimal power transmission from the motor.

Grease Type..... NLGI#2
Frequency ..... Annually or When Changing

Figure 70. End gears.

Handling & Care

Make sure to clean and lubricate any gears you install or change. Be very careful during handling and storage—the grease coating on the gears will easily pick up dirt or debris, which can then spread to the other gears and increase the rate of wear.

Make sure end gear cover remains installed whenever possible to keep gears free of dust or debris from outside environment.

Tailstock Gearbox

The tailstock on this lathe requires its gearbox is cleaned and lubricated at least once a year.

Note: *The two brass plugs at the top of the tailstock (see **Figure 71**) do not cover fill ports. These knurled plugs only serve as dust covers for threaded lifting-eye locations.*

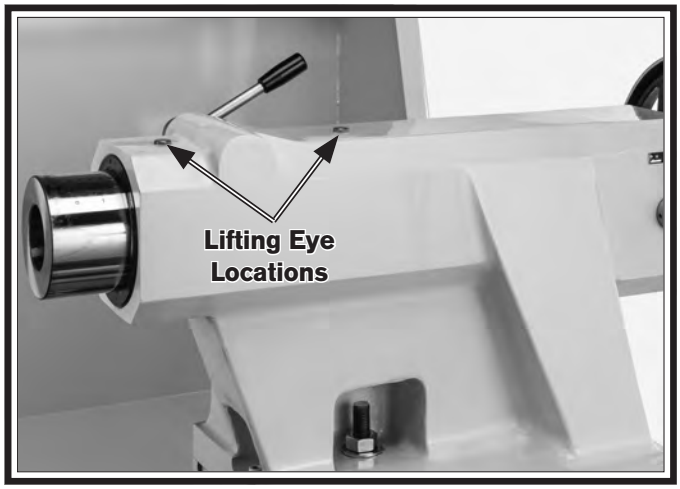


Figure 71. Tailstock lifting-eye fastening locations.

Frequency ..... Annually or When Changing
Grease Type ..... NLGI#2
Small Stiff Brush for Grease 1
Hex Wrench 3mm 1
Mineral Spirits ..... As Needed
Rags ..... As Needed

To lubricate gearbox:

1. Remove four cap screws and gearbox access cover.

2. Clean gears and teeth (see **Figure 72**) using mineral spirits, brush, and rags.

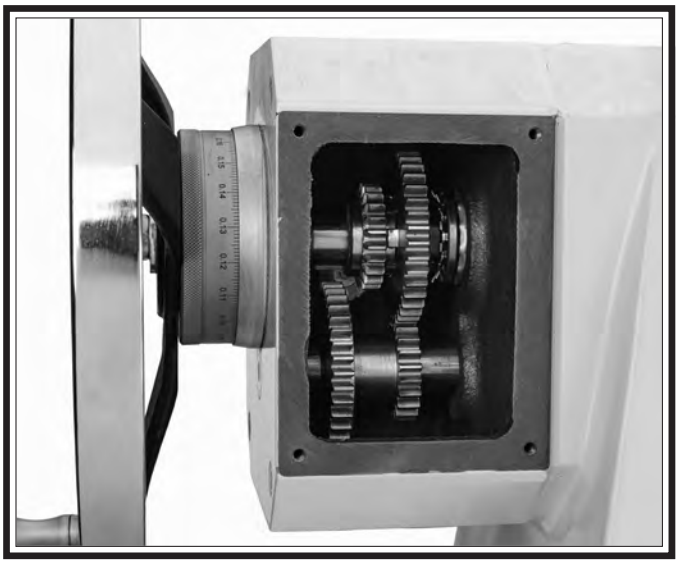


Figure 72. Tailstock two-speed gearbox.

3. Wipe sides of gears with a light coat of grease to prevent surface rust.

4. Apply a generous coat of grease to gear teeth and rotate controls to distribute grease.

5. Re-install access cover.

Coolant Service

The coolant system consists of an integral coolant reservoir (part of lathe base), pump, and flexible nozzle. The pump pulls fluid from the reservoir and sends it to the valve (see **Figure 73**), which controls the flow of coolant to the nozzle. As the fluid leaves the cutting area, it drains back into the tank through the catch tray and chip screen shown in **Figure 74**.

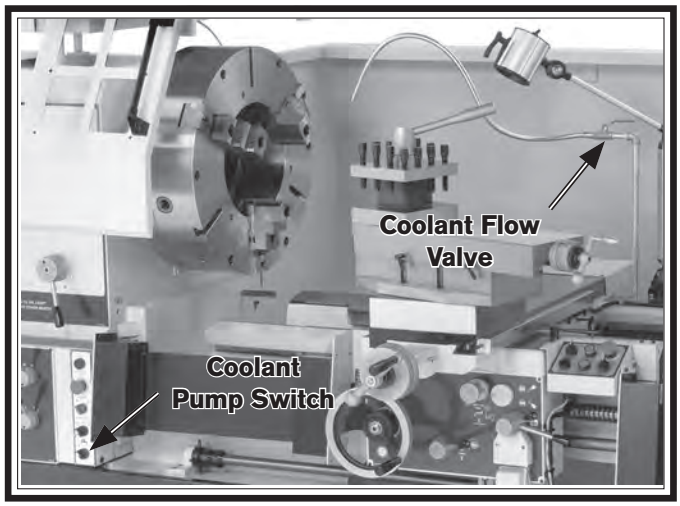
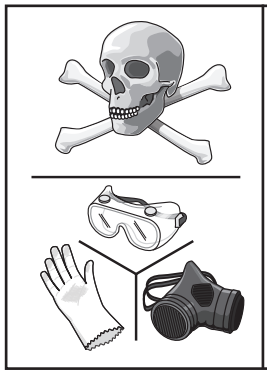


Figure 73. Coolant controls.

Hazards

As coolant ages and gets used, dangerous microbes can proliferate and create a biological hazard. Minimize risk of exposure to this hazard by replacing the old fluid on a monthly basis, or as indicated by the fluid manufacturer.

Remember, when working with coolant you MUST minimize exposure to your skin, eyes, and lungs by wearing the proper PPE, such as splash-resistant safety goggles, long-sleeve, waterproof gloves, protective clothing, and a NIOSH—approved respirator.



⚠WARNING

BIOLOGICAL & POISON HAZARD!

Use the correct personal protection equipment when handling coolant. Follow federal, state, and fluid manufacturer requirements for proper disposal.

Coolant Replacement

Although most swarf from machining operations is screened out of coolant before it returns to the tank, small particles will accumulate at the bottom of the tank as sludge.

To prevent the sludge from being pulled into the pump and damaging it, the pump's suction tube is positioned a couple inches from the bottom of the reservoir and fitted with a fine screen. This design works well when the tank is regularly cleaned; however, if too much sludge is allowed to accumulate before the tank is cleaned, the pump will inevitably begin recirculating the sludge and become damaged. Change coolant annually or according to fluid manufacturer.

To change coolant:

1. DISCONNECT LATHE FROM POWER!
2. Put on PPE.
3. Clean chip screen, wipe out lathe chip tray, and remove reservoir access plate shown in **Figure 74**.

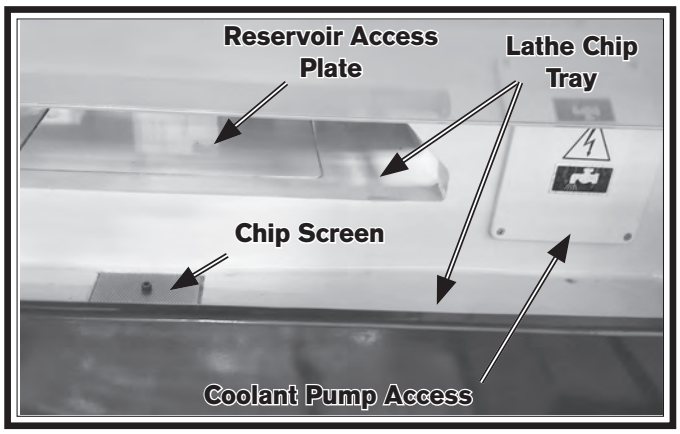


Figure 74. Coolant system access and components.

4. Pump out old coolant into sealable 5-gallon buckets.
5. Remove reservoir access plate shown in **Figure 74** and remove pump.
6. Clean-out reservoir and pump intake screen using mineral spirits.
7. Using clean rags, dry out reservoir completely.

8. Re-install pump and access plate.

   Tip: *Leave one or more magnets at bottom of reservoir to collect metal chips and make cleanup easier next time. This will also help keep small metal chips out of pump.*

9. Install new coolant and reservoir *access* plate.

10. Connect lathe to power and point nozzle into chip tray.

NOTICE

Running the coolant pump without adequate fluid in the tank may permanently damage it, which will not be covered under warranty.

11. Drain and flush coolant system and purge lines with compressed air.

12. Tag waste containers as HAZARDOUS and dispose of according to applicable rules and regulations.

Machine Storage

To prevent the development of rust and corrosion, the lathe must be properly prepared if it will be stored for a long period of time. Doing this will ensure the lathe remains in good condition for later use.

Items Needed	Qty
Way Oil	As Needed
Desiccant Bags	As Needed
Sheet Plastic or Tarp	As Needed
Tarp Tiedown Straps	As Needed

To prepare lathe for storage:

1. Run lathe and bring all gearboxes to operating temperature, then drain and refill them with clean oil.

2. Pump out old coolant, then add a few drops of way oil and blow out lines with compressed air.

3. DISCONNECT LATHE FROM POWER!

4. Thoroughly clean all unpainted, bare metal surfaces, then apply a liberal coat of way oil, heavy grease, or rust preventative. Take care to ensure these surfaces are completely covered but that rust preventative or grease is kept off of painted surfaces.

5. Lubricate machine as outlined in lubrication section. Be sure to use an oil can to purge all ball oilers and oil passages with fresh oil.

6. Loosen or remove V-belts so they do not become stretched during storage period.

   IMPORTANT: *Be sure to place a maintenance note near power button as a reminder that belts have been loosened or removed.*

7. Place a few moisture-absorbing desiccant packs inside of electrical box.

8. Cover lathe with sheet plastic or tarp and place it in a dry area that is out of direct sunlight and away from hazardous fumes, paint, solvents, or gas. Fumes and sunlight can bleach or discolor paint and make chuck guard cloudy.

9. Every six months, rotate by hand all gear-driven components a few times in several gear selections. This will keep bearings, bushings, gears, and shafts well lubricated and protected from corrosion—especially during winter months.

10. Slide carriage, tailstock, and steady rest down lathe bed to make sure that way spotting is not beginning to occur.

Backlash Adjustments

Backlash is the amount of free play felt while changing rotation directions with the handwheel. This can be adjusted at the leadscrew half nut. Before beginning any adjustment, make sure that all associated components have been cleaned and lubricated.

IMPORTANT: *Avoid the temptation to overtighten the adjustment screws. Overtightening will cause excessive wear to the nut and leadscrew. Reducing backlash to less than 0.002" is impractical and introduces premature wear.*

Compound Rest

Tools Needed	Qty
Hex Wrench 3mm	1
Open-End Wrench 10mm	1

The compound rest backlash is adjusted by loosening both jam nuts and tightening the set screws shown in **Figure 75**. When these screws are adjusted against the leadscrew nut, they offset part of the nut to remove play between the nut and leadscrew.

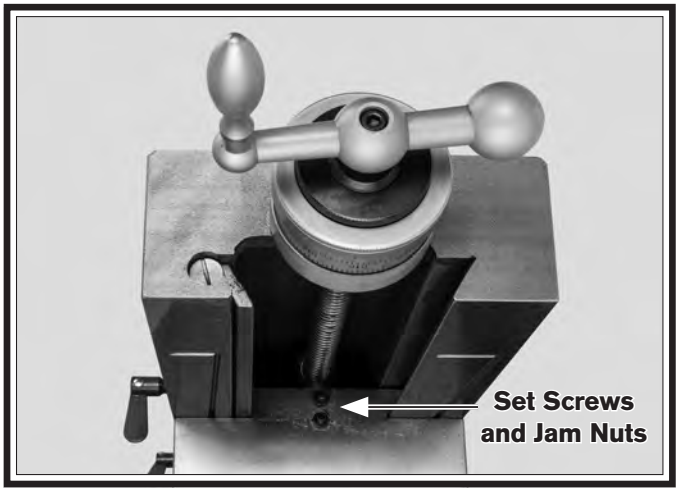


Figure 75. Compound rest leadscrew adjustment.

To adjust backlash, rock the handwheel back and forth, while tightening the screws slowly until the backlash is approximately 0.002"–0.003", as indicated on the graduated dial.

Note: *If you end up adjusting the nut too tight, loosen the set screws, tap the compound rest a few times with a rubber or wooden mallet, and turn the handwheel slowly back and forth until it moves freely—then try again.*

Cross Slide

Tools Needed	Qty
Hex Wrench 4mm	1
Hex Wrench 5mm	1

The cross slide backlash is adjusted by tightening or loosening the cap screws shown in **Figure 76**. These screws draw a wedge-type nut against the leadscrew and main nut.

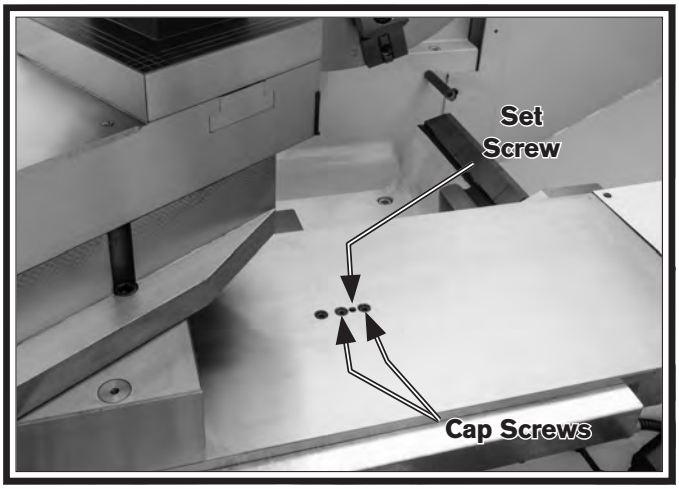


Figure 76. Cross slide backlash adjustment screws.

If the adjustment is too tight, loosen the cap screws a couple of turns, and tap the cross slide a few times with a rubber or wooden mallet as you turn the handle back and forth slowly until the handle turns freely.

To readjust the backlash, rock the handle back and forth, and slowly, in an alternating pattern, tighten the screws slowly until the backlash is reduced to approximately 0.002", as indicated on the handwheel dial.

Gib Adjustments

When adjusting the compound rest, cross slide, and carriage gib screws (see **Figures 77–78**), the goal is to remove looseness in the ways without causing the slides to bind. Loose gibs will cause a poor finish on the workpiece, and over-tightening may cause premature wear on the slide, leadscrew, and nut.

Compound Rest

The compound rest uses a tapered piece of iron which is held in position by two gib screws at opposing ends of the gib.

Tools Needed	Qty
Standard Flat-Tip Screwdriver #3	1

The front and rear gib adjustment screws are turned in opposite directions from each other (one screw clockwise and the other counterclockwise, or visa versa), the single gib will be pushed fore or aft to fill the loose void in the way. Thus, the play in the slide is removed. If more play is needed, adjust the screws so the gib is moved and held in the opposite direction.

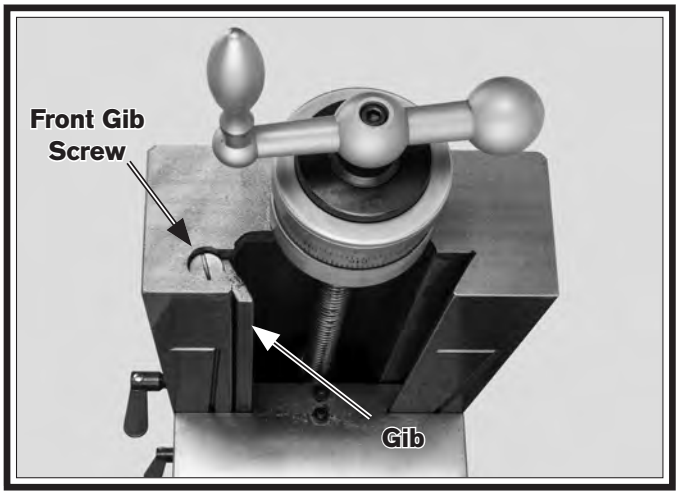


Figure 77. Compound rest leadscrew adjustment.

Cross Slide

The cross slide uses a tapered piece of iron which is held in position by two gib screws at opposing ends of the gib.

Tools Needed	Qty
Standard Flat-Tip Screwdriver #3	1

The front and rear gib adjustment screws are turned in opposite directions from each other (one screw clockwise and the other counterclockwise, or visa versa), the single gib will be pushed fore or aft to fill the loose void in the way. Thus, the play in the slide is removed. If more play is needed, adjust the screws so the gib is moved and held in the opposite direction.

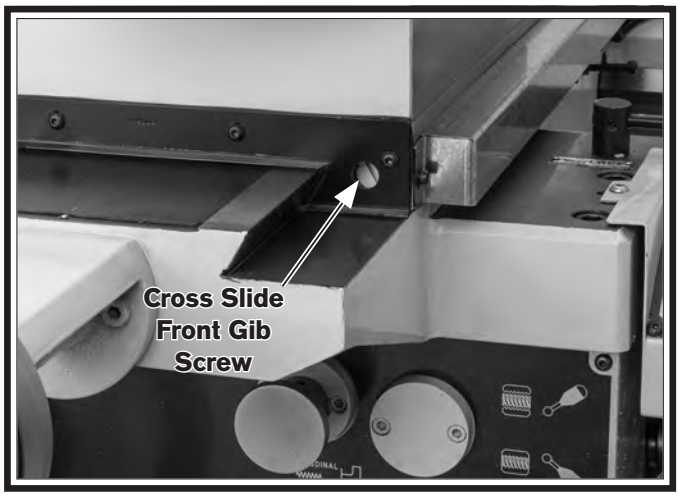


Figure 78. Cross slide gib adjustment screw.

Tailstock

The tailstock offset gib will rarely ever need to be adjusted, but if it does, follow these steps.

Tools Needed	Qty
Standard Flat Screwdriver #3	1
Wrench 32mm	1
Hex Wrench 10mm	1
Hex Wrench 8mm	1

1. Using a 32mm wrench; loosen both clamp nuts under tailstock upper casting (see **Figure 79**) to release clamping pressure between tailstock and lathe bed.

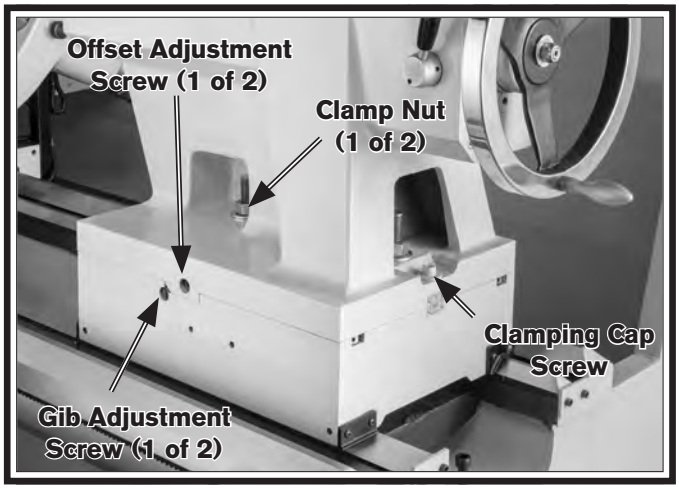


Figure 79. Tailstock gib adjustment.

2. Loosen both clamping cap screws at either end of tailstock (see **Figure 79**) to release clamping pressure between two tailstock halves.

3. Using an 8mm hex wrench, test gib adjustment by using offset adjustment cap screws.

4. Use a flat head screwdriver to adjust gib in or out.

5. When you are satisfied with setting, retighten clamping hex bolts.

Carriage

The carriage uses flat non tapered gibs. The carriage saddle has "V-grooves" that sit on top of v-shaped bedways. The underside of these bedways are flat where the "flat gibs" rub against.

Tools Needed	Qty
Hex Wrench 5mm	1
Wrench 13mm	1

These gibs are considered to be correctly adjusted when the saddle rear gib screws (see **Figure 80**) are slightly pre-loading the gibs against the flat side of the way. Adjustment is made by loosening the jam nuts and tightening set screws to the desired preload.

Note: *Depending on the accessories ordered with your lathe, access to gib screws may require removal of those accessories.*

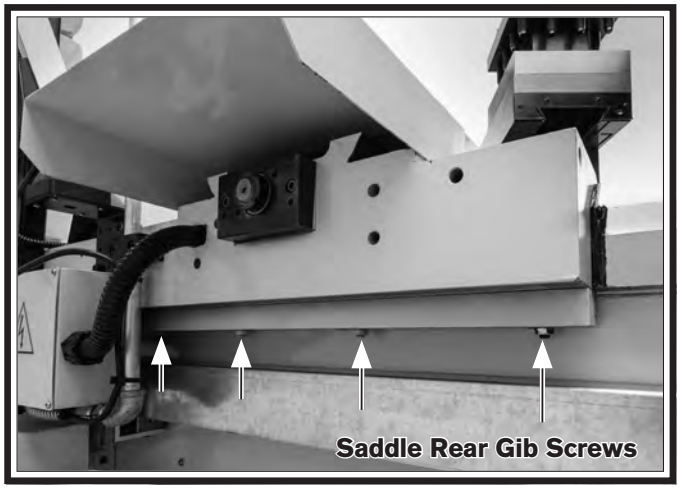


Figure 80. Rear saddle gib screws.

Half Nut Clamping

The clamping pressure of the half nut is fully adjustable with a gib that can be loosened or tightened by a set screw. Use this procedure to adjust the half nut when it becomes loose from wear, or if too tight for your preferences. A half nut that is too loose will make it difficult to produce accurate work. A half nut that is too tight will increase the rate of wear on itself and the leadscrew.

Tools Needed	Qty
Hex Wrench 3mm	1

To adjust half nut:

1. Disengage half nut using its lever.

2. Tighten half nut adjustment set screw (see **Figure 81**) in small increments until it is snug.

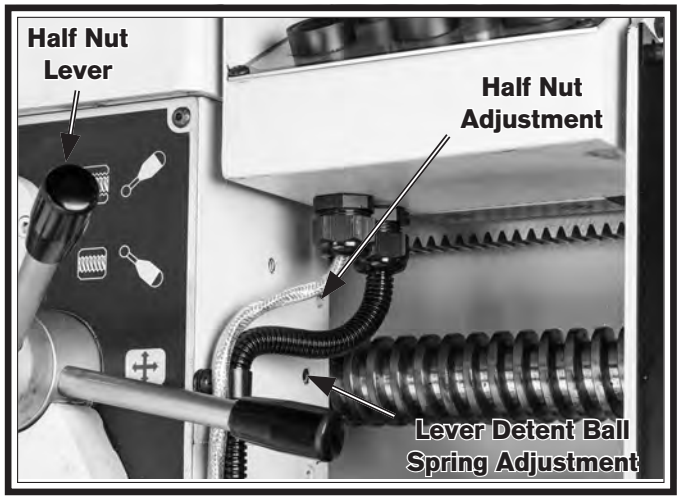


Figure 81. Half nut gib adjustment.

3. Engage/disengage half nut several times and notice how it feels. If lever feels difficult to fully engage, loosen adjustment screw slightly until halfnut allows lever to fully engage.

   Note: *The goal of adjustment is to tighten the adjustment screw until the lever has a slight drag at the end of its travel as it clamps around the leadscrew. If tension is felt at the beginning of lever travel, the adjustment is too tight and must be loosened slightly.*

Leadscrew & Feed Rod End Play Adjustment

The leadscrew and feed rod use lubricated and sealed bearings, and should last many years.

If for any reason replacement is required, the bearing block shown in **Figure 82** can be removed from the lathe and slid off of the ends of the shafts. Then the old bearings can be pulled from the shafts and new ones installed.

Tools Needed	Qty
Hex Wrenches 6, 8, 10mm	1 Ea.
Wooden Mallet	1

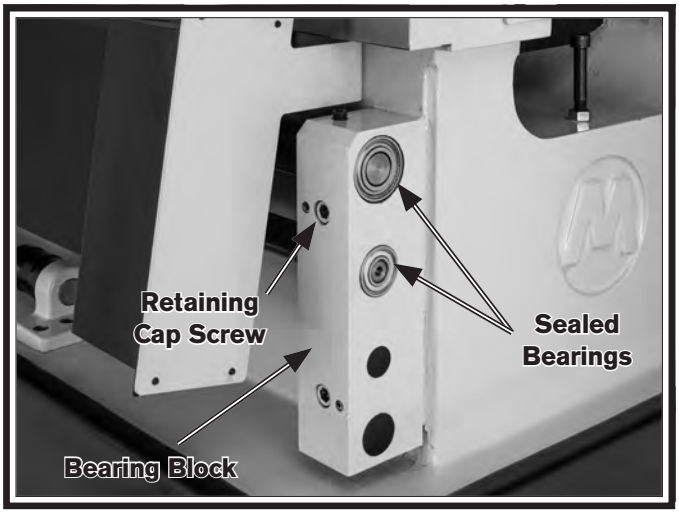


Figure 82. Leadscrew feed rod bearing block.

Brake Service

This lathe has two braking systems. One is a non-adjustable electric motor brake located at the tail-end of the spindle motor (see **Figure 84**); the second is an adjustable band and hub brake connected to the pulley end of the motor (see **Figure 83**).

When the user presses the foot pedal, mechanical linkage pulls on a brake band that applies friction to one side of the polished V-belt drive hub. As the brake band wears, the adjustment is made at the threaded stud. When the brake band becomes worn to the point where the rivet heads are no less than 0.005" away from contacting the hub, then brake band replacement is required.

Tools Needed	Qty
Hex Wrench 8mm	1
Open-End Wrench 14mm	1
Approved Respirator for Each Person	1
Safety Glasses for Each Person	1

Adjusting Brake Band

1. DISCONNECT LATHE FROM POWER!

2. Put on a respirator and eye protection to protect yourself from hazardous brake dust.

3. Remove motor access plate below outboard chuck.

4. Using a vacuum with HEPA filter, remove any built-up brake and belt dust.

5. If brake band is worn and requires replacement, un-thread stud end, disconnect spring at brake band anchor eye (see **Figure 83**) and install a new brake band.

6. At brake band adjustment stud, use a 14mm wrench to adjust nuts and pull brake band closer to hub.

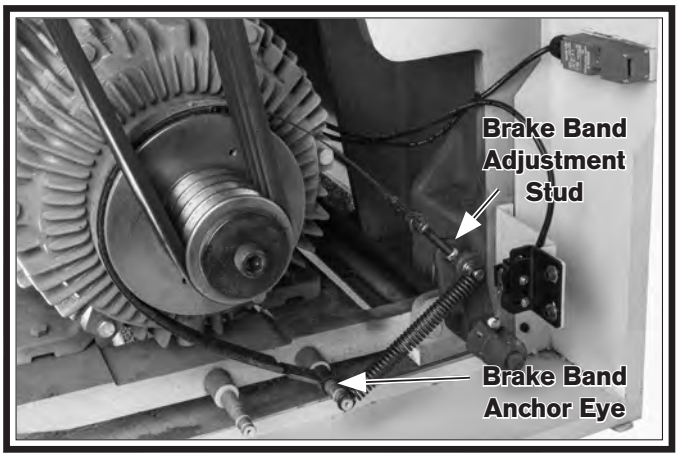


Figure 83. Band brake system.

7. When adjusted correctly:

   — There should be approximately ¾" free play at foot pedal.

   — When fully applied there should be no less than 1" clearance between floor and lowest part of pedal.

   IMPORTANT: *If foot brake pedal contacts floor when applying, full braking will not occur.*

8. When satisfied with your adjustment, tighten nuts and close lower door before adjusting brake micro switch.

   If it is suspected that electric brake (see **Figure 84**) on motor requires service or repair, motor assembly must be taken to a motor service shop that is familiar with motor brake service and repair.

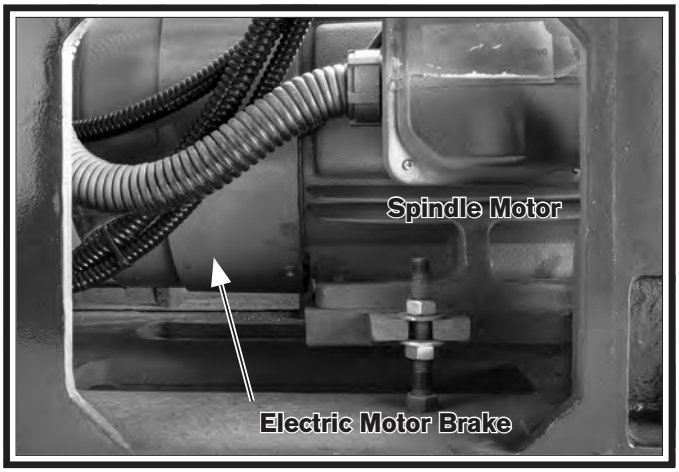


Figure 84. Motor brake system.

Adjusting Brake Micro Switch

The foot brake on this lathe is equipped with a micro switch that kills motor power before the band brake attempts to slow down the motor and spindle.

The brake micro switch has a roller arm that is positioned next to a brake lobe (see **Figure 85**).

With the band brake in adjustment and the foot pedal fully released; maintain the switch adjustment to keep a 1mm gap between the lobe and the micro switch roller.

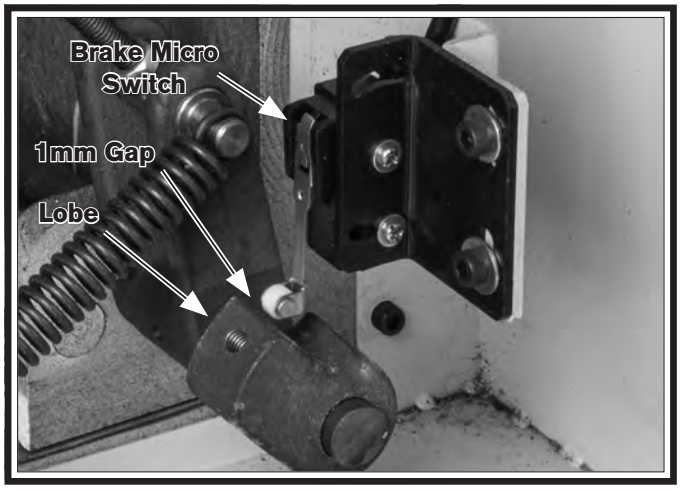


Figure 85. Brake micro switch.

Adjusting V-Belts

The matched set of V-belts stretch and wear with use, so check the tension on a monthly basis to ensure optimal power transmission. Replace all of the V-belts as a matched set if any of them show signs of glazing, fraying, or cracking.

Tools Needed	Qty
Hex Wrench 8mm	1
Open-End Wrench 24mm	1

To adjust V-belts:

1. DISCONNECT LATHE FROM POWER!

2. Open motor access door below outboard chuck.

3. Adjust hex nuts on motor mount jack bolts (see **Figure 86)** to tilt motor mount plate up or down to adjust V-belt tension.

   — When correctly tensioned, each belt should have about ¾" deflection when pressed firmly in the center.

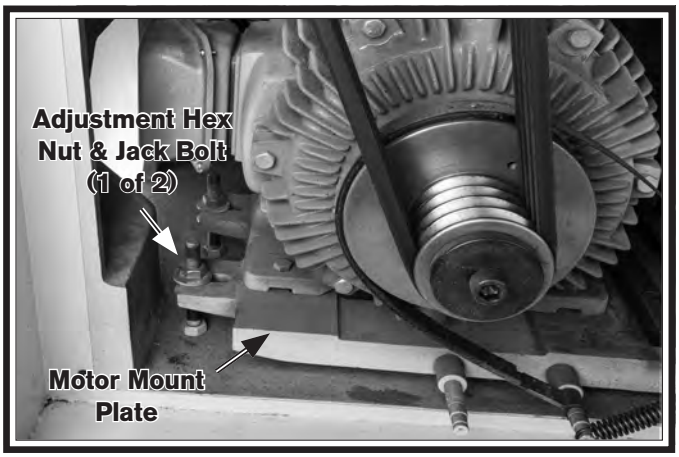


Figure 86. Pivoting motor mount plate.

4. Tighten hex nuts against both sides of motor mount plate to prevent it from moving out of adjustment during operation, then re-install access covers.

5. Close and tighten motor access door cap screw.

Replacing Shear Pins

The leadscrew and feed rod shafts are each inserted into the bores of two gearbox output hubs and locked to the hubs by means of soft metal shear pins.

In the case of a carriage crash or feed system overload, the shear pins are designed to break to help protect internal lathe components. In the event of a shear pin break, eliminate the cause of the crash or overload and replace the shear pin as outlined below.

⚠ CAUTION

Do not fabricate your own shear pins. Only use South Bend shear pins for this lathe.

Tools Needed	Qty
Hex Wrenches 5, 10mm	1 Ea.
Phillips Head Screwdriver #2	1
Thin Bladed Gasket Scraper	1
Dowel Punch ¼"	1
Dowel Punch ½"	1
Small Hammer	1
Safety Goggles	1
Light Machine Oil	As Needed

To Replace Shear Pins:

1. DISCONNECT LATHE FROM POWER!

2. Put on safety goggles.

3. Remove two cap screws holding retractable curtain support bracket (see **Figure 87**) to lathe headstock, and carefully set aside.

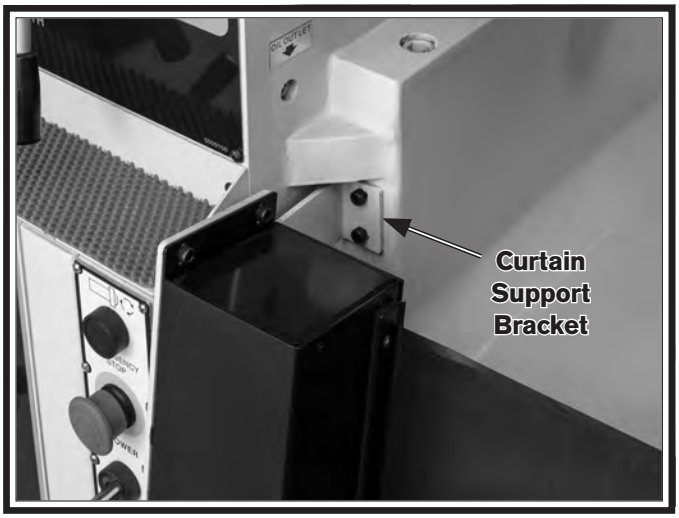


Figure 87. Chip curtain assembly.

4. Remove ten faceplate screws (see **Figure 88**) on control box.

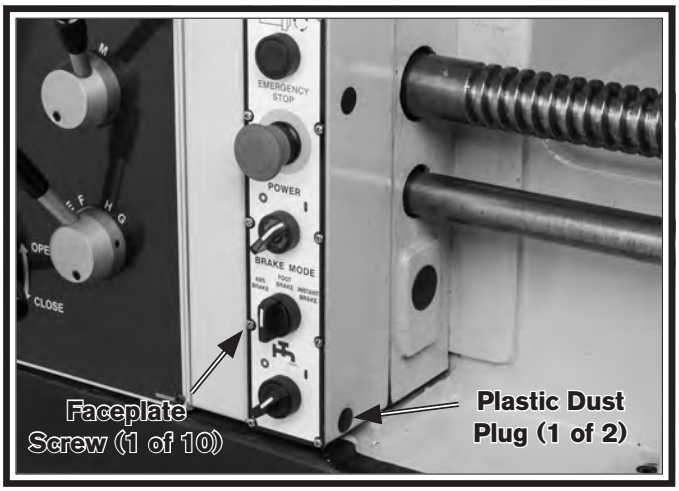


Figure 88. Shear pin access.

5. Using a thin bladed gasket scraper inserted under lip of plastic plug, remove two plastic dust plugs (see **Figure 88**) mounted on side of control box.

6. Insert 5mm hex wrench through hole previously covered by plastic cap and remove both control box cap screws (see **Figure 89**) and ground wire.

Figure 89. Shear pin access.

7. Carefully lift control box out of the way to expose area containing shear pins.

8. Remove two cap screws holding bearing block (see **Figure 90**) to side of bed.

Note: *Removing bearing block allows for leadscrew and feed rod movement out of their bores, so broken pieces of shear pin can be removed.*

9. Work leadscrew or feed rod out of its bore to expose ends of broken shear pin.

10. Rotate shaft and hub so smaller end of tapered bore or pin is facing you.

11. Use a ¼" dowel punch and hammer to lightly tap out broken shear pin pieces.

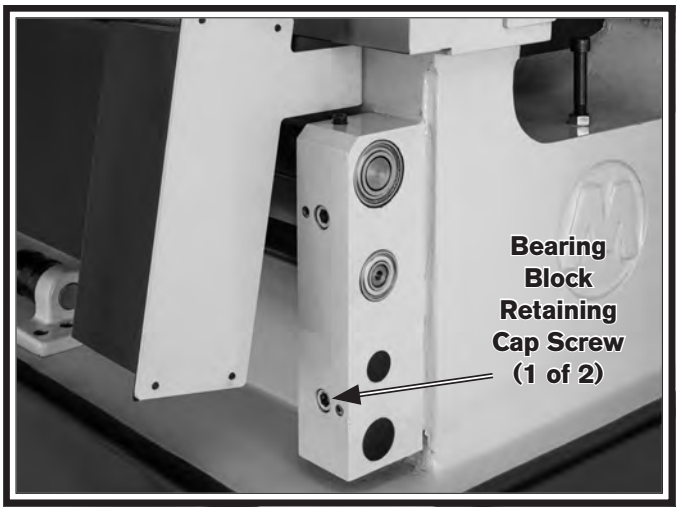


Figure 90. Leadscrew feed rod bearing block.

12. Remove any burrs and galling, then re-install leadscrew or feed rod into their bores.

13. Keeping in mind that bores are tapered, align tapered shear pin hole and tap new shear pin into hole using ½" dowel punch and hammer.

Note: *The feed rod and leadscrew use different sized shear pins.*

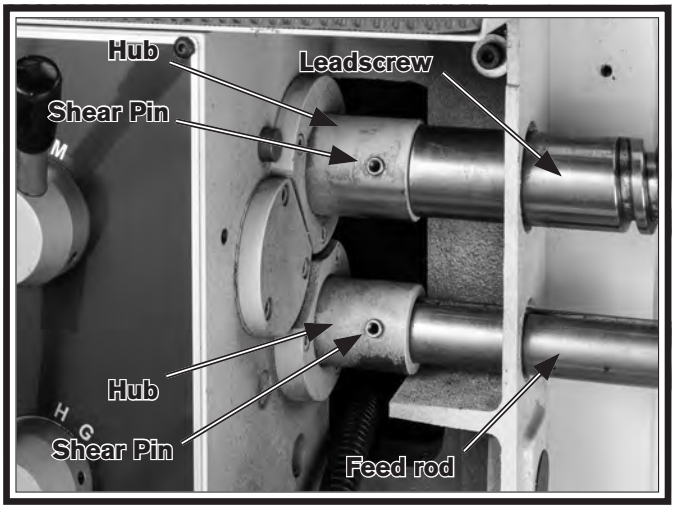


Figure 91. Shear pin location.

14. Re-assemble lathe in reverse order making sure to re-install previously removed ground wire.

Removing/Installing Gap Insert

The gap insert directly under the spindle (see **Figure 92**) can be removed to create additional space for turning large diameter parts.

IMPORTANT: *The gap insert was installed, then ground flush with the bed at the factory to ensure a precision fit and alignment. If the gap insert is removed, it may be difficult to re-install with the same degree of accuracy.*

Figure 92. Gap insert location.

Tools Needed	Qty
Hex Wrenches 10, 14mm	1 Ea.
Wrench 19mm	1
Wood or Dead-Blow Hammer	1
Safety Glasses	1
Light Machine Oil	As Needed

Removing Gap Insert

1. Remove (4) cap screws in gap bed, shown in **Figure 93**.

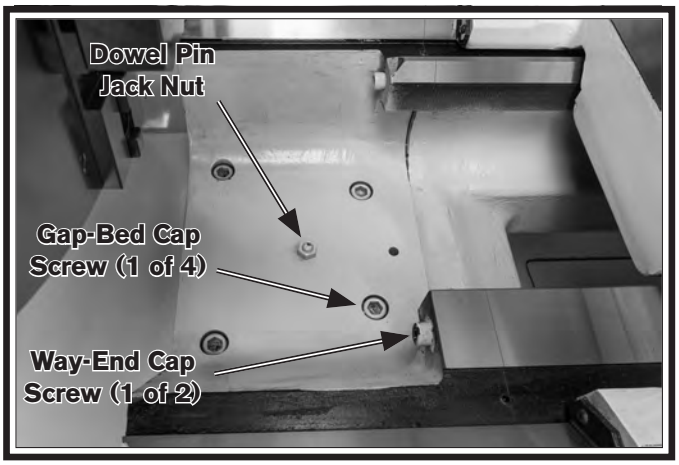


Figure 93. Fasteners holding gap in place.

2. Remove both way-end cap screws.

3. Tighten dowel-pin jack nut until pin is pulled free from gap insert.

4. Tap outside of gap insert with a dead blow hammer to loosen it, then remove it.

Installing Gap Insert

1. Use mineral spirits and a clean, lint-free rag to clean mating surfaces of gap, bed, and ways. If necessary, stone-dress mating surfaces to remove scratches, dings, or burs.

2. Wipe a thin layer of light machine oil on mating surfaces.

3. Place gap insert into gap and use a dead-blow hammer to align insert with lathe bed.

4. Back off dowel pin jack nut, and lightly tap dowel pin back into its hole until it is seated. This process will further help align gap insert and bed mating surfaces.

5. Install all fasteners and lightly snug them in place.

6. Mount a dial indicator with a magnetic base to top of saddle to indicate alignment.

7. On the machined surfaces where the gap meets the bedways shown in **Figure 94**, make sure the two surfaces are flush mating between the gap and bedways.

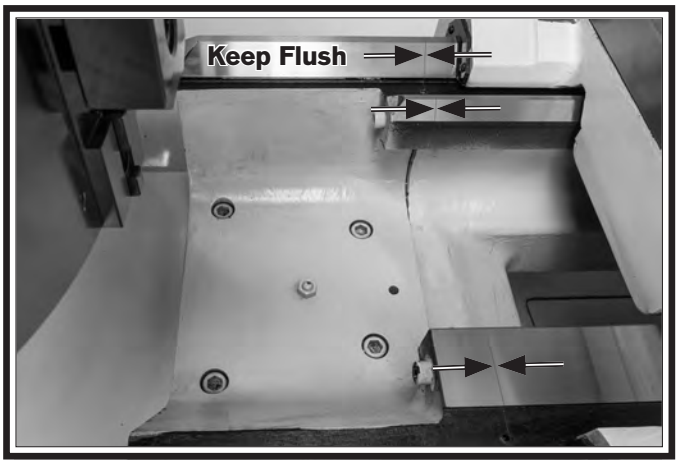


Figure 94. Locations for flush mating.

8. While making sure flushness is maintained, tighten gap bed cap screws in an alternating manner.

   Note: *While tightening gap fasteners, use a wooden mallet to tap gap insert into alignment if required.*

9. Inspect gap alignment 24 hours later to make sure gap is still aligned. If necessary, loosen gap bed cap screws and repeat **Steps 7–8** until insert is properly aligned.

If you need replacement parts, or if you are unsure how to do any of the solutions given here, feel free to call us at (360) 734-1540.

Symptom	Possible Cause	Possible Solution
Machine does not start or a circuit breaker trips.	**1.** (First time operation only) Lathe is wired out of phase.	**1.** Correct out-of-phase wiring (refer to Test Run **Page 22** for details).
	2. EMERGENCY STOP button is engaged or at fault.	**2.** Rotate button clockwise until it pops out to reset it for operation; replace if not working properly.
	3. Power supply is switched ***OFF*** at master power switch or breaker.	**3.** Make sure master power switch and circuit breaker are turned **ON**.
	4. Wall fuse/circuit breaker is blown/tripped; short in electrical system; start-up load too high for circuit.	**4.** Verify circuit is rated for machine amp load; troubleshoot and repair cause of overload; replace weak breaker; find/repair electrical short.
	5. Fuse has blown in machine electrical box.	**5.** Replace fuse; determine if overload is due to heavy operation; ensure power source has high enough voltage and power cord is correctly sized.
	6. One or more safety switches or brake switch are engaged.	**6.** Verify electrical box door, chuck guard, and motor access doors are fully closed or in safety position.
	7. Thermal overload relay has tripped.	**7.** Turn thermal relay cut-out dial to increase working amps and push reset pin. Replace if tripped multiple times (weak relay).
	8. Safety/brake switch(es) at fault.	**8.** Test all switches and replace as necessary.
	9. Contactor not getting energized/has burned contacts.	**9.** Test for power on all legs and contactor operation. Replace unit if faulty.
	10. Wiring is open/has high resistance.	**10.** Check for broken wires or disconnected/corroded connections, and repair/replace as necessary.
	11. Motor is at fault.	**11.** Test/repair/replace.
Loud, repetitious noise coming from lathe at or near the motor.	**1.** Pulley set screws or keys are missing or loose.	**1.** Inspect keys and set screws. Replace or tighten if necessary.
	2. Motor fan is hitting cover.	**2.** Tighten fan, shim cover, or replace items.
Motor overheats.	**1.** Motor overloaded.	**1.** Reduce load on motor.
Motor is loud when cutting, or bogs down under load.	**1.** Excessive depth of cut or feed rate.	**1.** Decrease depth of cut or feed rate.
	2. Spindle speed or feed rate wrong for cutting operation.	**2.** Refer to the feeds and speeds charts in **Machinery's Handbook** or a speeds and feeds calculator on the internet.
	3. Cutting tool is dull.	**3.** Sharpen or replace cutting tool.

Symptom	Possible Cause	Possible Solution
Entire machine vibrates upon startup and while running.	**1.** Workpiece is unbalanced.	**1.** Re-install workpiece as centered with spindle bore as possible.
	2. Workpiece is hitting stationary object.	**2.** Stop lathe immediately and correct interference problem.
	3. Loose or damaged V-belt(s).	**3.** Re-tension/replace the V-belt(s) as necessary (see **Page 55**).
	4. V-belt pulleys are not properly aligned.	**4.** Align V-belt pulleys.
	5. Chuck or faceplate is unbalanced.	**5.** Re-balance chuck or faceplate; contact a local machine shop for help.
	6. Gears not aligned in headstock or no backlash.	**6.** Adjust gears and establish backlash.
	7. Broken gear or bad bearing.	**7.** Replace broken gear or bearing.
	8. Spindle bearings at fault.	**8.** Reset spindle bearing preload or replace worn spindle bearings.
Bad surface finish.	**1.** Wrong spindle speed or feed rate.	**1.** Adjust for appropriate spindle speed and feed rate.
	2. Dull tooling or poor tool selection.	**2.** Sharpen tooling or select a better tool for intended operation.
	3. Tool height/tailstock alignment not at spindle centerline.	**3.** Adjust tool height to spindle centerline and or tailstock alignment (see **Page 28**).
	4. Too much play in gibs.	**4.** Tighten gibs (see **Page 51**).
Tapered tool difficult to remove from tailstock quill.	**1.** Quill is not fully retracted into tailstock.	**1.** Turn tailstock handwheel until it forces tapered tool out of quill.
	2. Contaminants not removed from taper before inserting into quill.	**2.** Clean taper and bore and re-install tapered tool.
Cross slide, compound, or carriage feed has sloppy operation.	**1.** Gibs are out of adjustment.	**1.** Adjust gib screw(s) (see **Page 51**).
	2. Handwheel is loose or backlash is high.	**2.** Tighten handwheel fasteners, adjust handwheel backlash to a minimum (see **Page 50**).
	3. Leadscrew mechanism worn or out of adjustment.	**3.** Adjust leadscrew to remove end play (see **Page 53**).
	4. Ways are loaded with grime or chips.	**4.** Clean ways and re-lubricate.
Cross slide, compound, or carriage feed handwheel is hard to move.	**1.** Dovetail slides loaded with shavings, dust, or grime.	**1.** Remove gibs, clean ways/dovetails, lubricate, and re-adjust gibs.
	2. Gib screws are too tight.	**2.** Loosen gib screw(s) slightly (see **Page 51**).
	3. Backlash setting too tight (cross slide only).	**3.** Slightly loosen backlash setting (see **Page 50**).
	4. Bedways are dry.	**4.** Lubricate bedways and handles.
Cutting tool or machine components vibrate excessively during cutting.	**1.** Tool holder not tight enough.	**1.** Check for debris, clean, and retighten.
	2. Cutting tool sticks too far out of tool holder; lack of support.	**2.** Re-install cutting tool so no more than ⅓ of the total length is sticking out of tool holder.
	3. Gibs are out of adjustment.	**3.** Adjust gib screws at affected component (see **Page 51**)
	4. Dull cutting tool.	**4.** Replace or resharpen cutting tool.
	5. Incorrect spindle speed or feed rate.	**5.** Use recommended spindle speed.

Symptom	Possible Cause	Possible Solution
Workpiece is tapered.	**1.** Spindle and tailstock centerlines are not properly aligned with each other.	**1.** Realign tailstock to headstock spindle bore centerline (see **Page 28**).
Chuck jaws will not move or do not move easily.	**1.** Chips lodged in jaws or scroll plate.	**1.** Remove jaws, clean and lubricate scroll plate, then replace jaws.
Carriage will not feed or is hard to move.	**1.** Gears are not all engaged. **2.** Carriage lock is tightened down. **3.** Loose screw on feed handle. **4.** Chips have loaded up on bedways. **5.** Bedways are dry and in need of lubrication. **6.** Four-position apron stop is interfering. **7.** Gibs are too tight. **8.** Gears or shear pin broken.	**1.** Adjust gear levers. **2.** Check to make sure carriage lock bolt is fully released. **3.** Tighten. **4.** Frequently clean away chips that load up during turning operations. **5.** Lubricate bedways and handles. **6.** Check four-position apron stop cam locations and adjust it as necessary (see **Page 38**). **7.** Loosen gib screw(s) slightly (see **Page 51**). **8.** Replace gears or shear pin (see **Page 56**).
Gear change levers will not shift into position.	**1.** Gears not aligned inside headstock.	**1.** Rotate spindle by hand with light pressure on lever until gear falls into place.

South Bend Tools®

Warranty

This quality product is warranted by South Bend Tools to the original buyer for **2 years** from the date of purchase. This warranty does not apply to consumable parts, or defects due to any kind of misuse, abuse, negligence, accidents, repairs, alterations or lack of maintenance. We do not reimburse for third party repairs. In no event shall we be liable for death, injuries to persons or property, or for incidental, contingent, special or consequential damages arising from the use of our products.

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WARRANTY

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