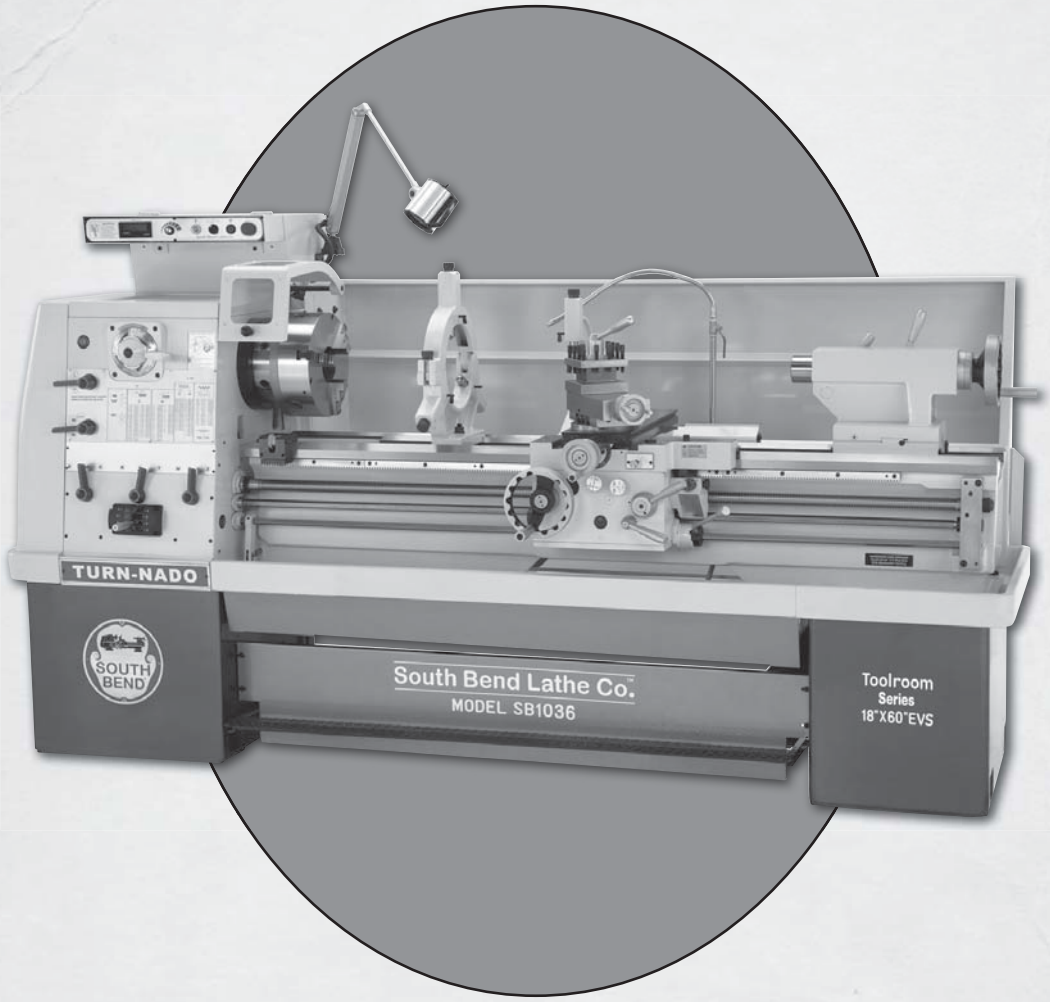
18" & 60" EVS TOOLROOM LATHES

MODEL SB1016 - 220V Three Phase

MODEL SB1036 - 440V Three Phase



OWNER'S MANUAL

South Bend Lathe Co.™

Hundreds of Thousands of Lathes Sold With a Tradition of Quality Since 1906!

For Machines Mfg. Since 7/09

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?

South Bend Lathe, Inc.
c/o Technical Documentation Manager
P.O. Box 2027
Bellingham, WA 98227
Email: manuals@southbendlathe.com

Updates

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

www.southbendlathe.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 These Machines

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 lathes represented in this manual are 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 EVS Toolroom Lathes are built for daily use in a busy industrial setting. Loaded with many nice features and high-precision parts, these lathes excel at making fine tools, dies, thread gauges, jigs, and precision test gauges—however, they are by no means delicate. Thick castings, heavy weight, and quality construction throughout provide the necessary brawn for demanding production and manufacturing tasks.

Features

As the name implies, these lathes feature EVS (Electronic Variable Speed) spindle control, which allows the operator to quickly adjust the spindle speed. First, within the 18–1800 RPM range, one of four headstock gear ranges is selected using the spindle speed range lever. Next, the EVS dial is used to dial in any available speed within that range. Lastly, a digital tachometer displays the current spindle speed.

The beds of these lathes are constructed with Meehanite castings that have been precision hardened and ground in the traditional 3-V prismatic design—long used on South Bend Lathes for its accuracy, durability, and rigidity.

The headstock features quick-change gear levers and an adjustable clutch mechanism for the feed rod that can be set to prevent damage in the event of a carriage or cross feed bind from too deep of a cut.

To further ensure a high degree of accuracy, these lathes are equipped with high-grade spindle bearings. The spindles are the D1-8 camlock type with an MT#7 taper and 3.125" bore. The tailstock quills have an MT#5 taper and offer 6.5" of travel.

Compared to conventional splash and spray oil systems that can leave upper bearings and gears starved for oil on initial start up and during low speed operations, the EVS lathes have a pressurized headstock oiling system. All bearings and gears are pre-lubricated before the spindle starts, so lubrication during high-load low-speed operations is guaranteed.

Finally, these EVS toolroom lathes are packed with a premium Yaskawa Inverter unit, Allen-Bradley contactors, thermal relays, and fuse system. A complete cutting fluid system is included with an easy-to-clean chip drawer, Way lubrication system, ball bearing steady rest and brass-tipped follow rest, adjustable work lamp, foot brake, and powered X and Y feed capabilities.

Identification

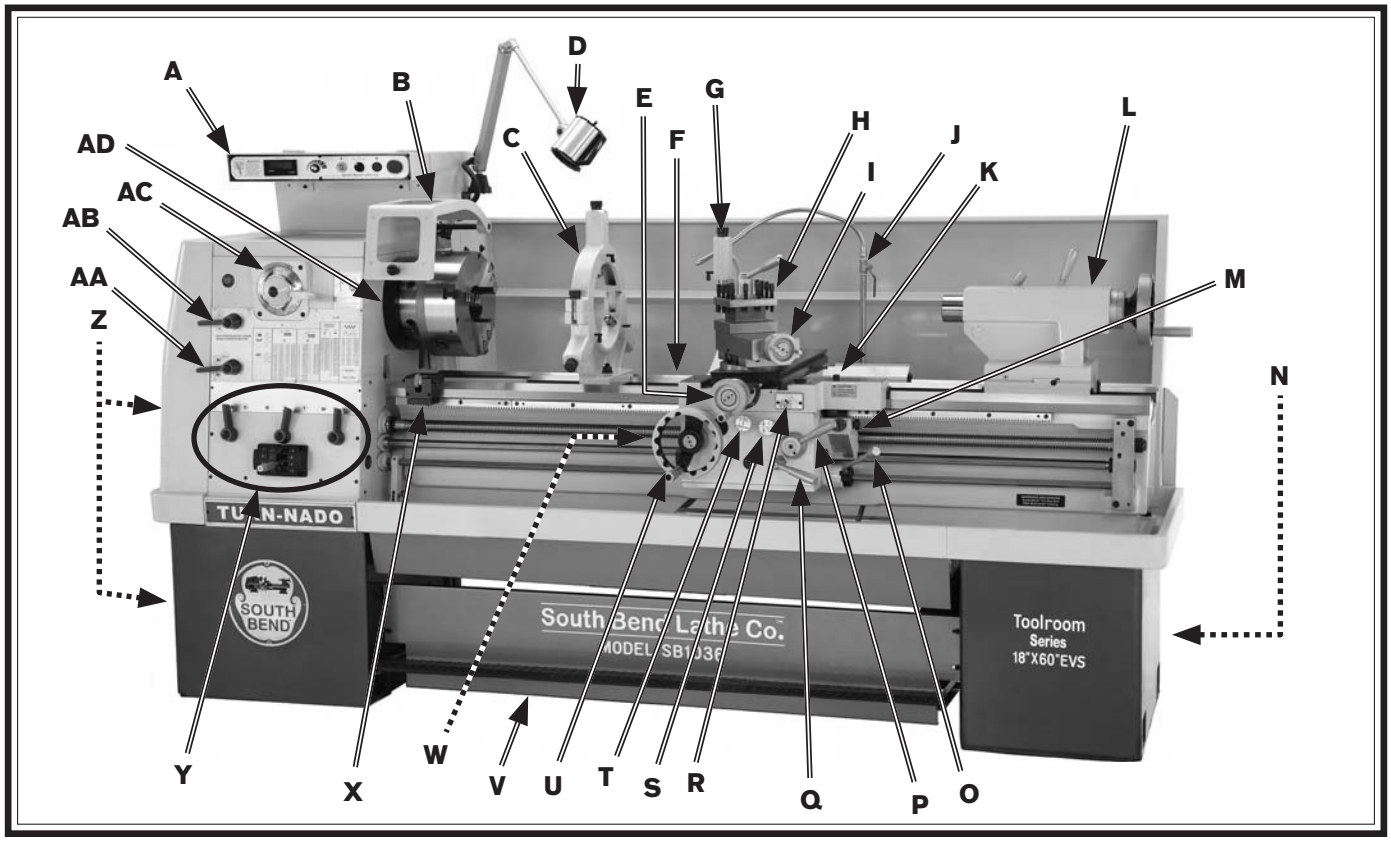

Figure 1. The 18" x 60" Variable Speed Toolroom Lathe (EVS).

A. Control Panel
B. Chuck Guard w/Safety Switch
C. Steady Rest w/Ball Bearing Fingers
D. Halogen Work Lamp
E. Cross Slide Handwheel
F. Three-Vee Bed and Way System
G. Follow Rest w/Brass Fingers
H. 4-Way Tool Post
I. Compound Rest Handwheel
J. Cutting Fluid Nozzle
K. Carriage Lock
L. Double-Clamping Tailstock
M. Thread Dial for Cutting Inch Threads
N. Cutting Fluid Pump/Tank
O. Spindle ON/OFF Lever
P. Half Nut Lever
Q. Feed ON/OFF Lever
R. Way Oil Pump
S. Apron Feed Direction Knob
T. Feed Selection Knob
U. Carriage Handwheel w/Safety Position
V. Brake Pedal
W. Adjustable Feed Clutch Knob
X. Micrometer Stop
Y. Quick Change Gearbox Levers
Z. Headstock Oil Pump & Reservoir Access
AA. Headstock Feed Direction Lever
AB. Quick Change Range Lever
AC. Spindle Speed and Range Lever
AD. D1-8 Camlock MT#7 Spindle

⚠WARNING

Serious personal injury could occur if you connect the machine to power before completing the setup process. DO NOT connect power until instructed to do so later in this manual.

⚠WARNING

Untrained users have an increased risk of seriously injuring themselves with this machine. Do not operate this machine until you have understood this entire manual and received proper training.

SOUTH BEND®

Product Specifications

P.O. Box 2027, Bellingham, WA 98227 U.S.A.
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www.southbendlathe.com

SOUTH BEND®

Model SB1016
South Bend 18" x 60" Lathe 220V

Product Dimensions

Weight..... 5170 lbs.
Width (side-to-side) x Depth (front-to-back) x Height..... 120 x 46 x 63-1/4 in.
Footprint (Length x Width)..... 110-1/4 x 27 in.

Shipping Dimensions

Type..... Wood Slat Crate
Content..... Machine
Weight..... 5522 lbs.
Length x Width x Height..... 121 x 44 x 73 in.

Electrical

Power Requirement..... 220V, 3-Phase, 60 Hz
Full-Load Current Rating..... 29.7A
Minimum Circuit Size..... 40 Amp
Inverter Type..... Yaskawa G7A4011
Switch..... Magnetic with Thermal Protection
Switch Voltage..... 220V
Plug Included..... No
Recommended Plug/Outlet Type..... Hardwire to Locking Disconnect Switch

Motors

Main

Type..... TEFC Induction
Horsepower..... 10 HP
Voltage..... 220V
Phase..... 3-Phase
Amps..... 28A
Speed..... 0 – 3000 RPM
Cycle..... 60 Hz
Number of Speeds..... Variable
Power Transfer ..... V-Belt & Gear
Bearings..... Shielded and Permanently Sealed

Lubrication

Type..... TEFC Induction
Horsepower..... 1/4 HP
Voltage..... 220V
Phase..... 3-Phase
Amps..... 1.4A
Speed..... 1725 RPM
Cycle..... 60 Hz
Number of Speeds..... 1
Power Transfer ..... Direct Drive
Bearings..... Shielded and Permanently Sealed

Coolant

Type..... TEFC Induction
Horsepower..... 1/8 HP
Voltage..... 220V
Phase..... 3-Phase
Amps..... 0.3A
Speed..... 3450 RPM
Cycle..... 60 Hz
Number of Speeds..... 1
Power Transfer ..... Direct Drive
Bearings..... Shielded and Permanently Sealed

Main Specifications

Operation Info

Swing Over Bed..... 18.11 in.
Distance Between Centers..... 60 in.
Swing Over Cross Slide..... 11.02 in.
Swing Over Saddle..... 18 in.
Swing Over Gap..... 27.95 in.
Maximum Tool Bit Size..... 1 in.
Compound Travel..... 5.39 in.
Carriage Travel..... 59 in.
Cross Slide Travel..... 11 in.

Headstock Info

Spindle Bore..... 3.125 in.
Spindle Taper..... MT#7
Spindle Speeds..... 18 – 1800 RPM
Spindle Type..... D1-8 Camlock
Spindle Bearings..... FAG or SKF Tapered Roller
Spindle Length..... 26.93 in.
Spindle Length with 3-Jaw Chuck..... 34.25 in.
Spindle Length with 4-Jaw Chuck..... 40.71 in.

Tailstock Info

Tailstock Quill Travel..... 6.5 in.
Tailstock Taper..... MT#5
Tailstock Barrel Diameter..... 3 in.

Threading Info

Number of Longitudinal Feeds	15
Range of Longitudinal Feeds	0.0015 – 0.04 in.
Number of Cross Feeds	15
Range of Cross Feeds	0.00075 – 0.02 in.
Number of Inch Threads	38
Range of Inch Threads	2 – 72 TPI
Number of Metric Threads	40
Range of Metric Threads	0.4 – 14 mm
Number of Modular Pitches	18
Range of Modular Pitches	0.3 – 3.5 MP
Number of Diametral Pitches	21
Range of Diametral Pitches	8-44 DP

Dimensions

Bed Width	13.58 in.
Leadscrew Diameter	1-3/8 in.
Leadscrew TPI	4
Leadscrew Length	85.5 in.
Steady Rest Capacity	5/8 – 7-1/16 in.
Follow Rest Capacity	5/8 – 5-1/8 in.
Faceplate Size	14 in.
Feed Rod Diameter	0.93 in.
Floor to Center Height	45 in.
Height With Leveling Jacks	46-1/4 in.

Construction

Base	Cast Iron
Headstock	Cast Iron
Headstock Gears	Flame Hardened Steel
Bed	Induction Hardened and Ground Meehanite Cast Iron
Stand	Cast Iron

Other

Country Of Origin	Taiwan (Some Components Made in USA and Germany)
Warranty	1 Year
Serial Number Location	ID Label on Rear Side of Left Stand
Assembly Time	Approximately 2 Hours
Sound Rating	82 dB

Features

Allen Bradley Electrical Components
Meehanite Casting, Signature South Bend 3 V-Way Bed
Safety Chuck Guard with Micro-Switch Shut-Off
Halogen Work Light
4-Way Tool Post
Complete Coolant System
Micrometer Carriage Stop
Threading Dial Indicator
FAG or SKF German Spindle Bearings
Full Length Splash Guard
Front Removable Sliding Chip Tray
Yaskawa G7A4011 Inverter
Completely Enclosed Universal Gearbox for Cutting Inch, Metric, Modular and Diametral Pitches
Pressurized Lubrication System for Headstock Gears and Bearings
Dial Controlled, Variable Spindle Speeds with Digital Read Out
Jog Button and Emergency Stop

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Model SB1036
South Bend 18" x 60" Lathe 440V

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Footprint (Length x Width)..... 110-1/4 x 27 in.

Shipping Dimensions

Type..... Wood Slat Crate
Content..... Not Available
Weight..... 5522 lbs.
Length x Width x Height..... 121 x 44 x 73 in.

Electrical

Power Requirement..... 440V, 3-Phase, 60 Hz
Full-Load Current Rating..... 14.75A
Minimum Circuit Size..... 20A
Inverter Type..... Yaskawa G7A4011
Switch..... Magnetic with Thermal Protection
Switch Voltage..... 440V
Plug Included..... No
Recommended Plug/Outlet Type..... Hardwire to Locking Disconnect Switch

Motors

Main

Type..... TEFC Induction
Horsepower..... 10 HP
Voltage..... 440V
Phase..... 3-Phase
Amps..... 14A
Speed..... 0 – 3000 RPM
Cycle..... 60 Hz
Number of Speeds..... Variable
Power Transfer ..... V-Belt & Gear
Bearings..... Shielded and Permanently Sealed

Lubrication

Type..... TEFC Induction
Horsepower..... 1/4 HP
Voltage..... 440V
Phase..... 3-Phase
Amps..... 0.6A
Speed..... 1725 RPM
Cycle..... 60 Hz
Number of Speeds..... 1
Power Transfer ..... Direct Drive
Bearings..... Shielded and Permanently Sealed

Coolant

Type..... TEFC Induction
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Other

Country Of Origin	Taiwan (Some Components Made in USA and Germany)
Warranty	1 Year
Serial Number Location	ID Label on Rear Side of Left Stand
Assembly Time	Approximately 2 Hours
Sound Rating	82 dB

Features

Allen Bradley Electrical Components
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Safety Chuck Guard with Micro-Switch Shut-Off
Halogen Work Light
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Pressurized Lubrication System for Headstock Gears and Bearings
Dial Controlled, Variable Spindle Speeds with Digital Read Out
Jog Button and Emergency Stop

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 defined 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

1. **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.

2. **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.

3. **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.

4. **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.

5. **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.

6. **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.

7. **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.

8. **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.

9. **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.

10. **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.

11. **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.

12. **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.

13. **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.

14. **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.

15. **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.

16. **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

1. **Clearing Chips:** Metal chips can easily cut bare skin—even through a piece of cloth. Avoid clearing chips by hand or with a rag. Use a brush or vacuum to clear metal chips.

2. **Chuck Key Safety:** A chuck key left in the chuck can become a deadly projectile when the spindle is started. Always remove the chuck key after using it. Develop a habit of not taking your hand off of a chuck key unless it is away from the machine.

3. **Tool Selection:** Cutting with an incorrect or dull tool increases the risk of accidental injury. Dull tools require extra force when cutting, which increases risk of breaking or dislodging components, which can cause small shards of metal to become dangerous projectiles. Always select the right cutter for the job and make sure it is sharp. A correct, sharp tool decreases strain and provides a better finish.

4. **Securing Workpiece:** An improperly secured workpiece can fly off of the lathe spindle with deadly force, which can result in a severe impact injury. Make sure the workpiece is properly secured in the chuck or faceplate before starting the lathe.

5. **Handling Chucks:** Chucks can be very heavy and difficult to grasp, which can lead to crushed fingers or hands if mishandled. Get assistance when installing or removing chucks to reduce this risk. Protect your hands and the precision-ground ways by using a chuck cradle or piece of plywood over the ways of the lathe when servicing chucks.

6. **Safe Clearances:** Workpieces that crash into other components on the lathe may throw dangerous projectiles in all directions, leading to impact injury and damaged equipment. Before starting the spindle, make sure the workpiece has adequate clearance by hand-rotating it through its entire range of motion. Also, check the tool and tool post clearance, chuck clearance, and saddle clearance.

7. **Speed Rates:** Operating the lathe at the wrong speed can cause nearby parts to break or the workpiece to come loose, which will result in dangerous projectiles that could cause severe impact injury. Large workpieces must be turned at slow speeds. Always use the appropriate feed and speed rates.

8. **Stopping Spindle by Hand:** Stopping the spindle by putting your hand on the workpiece or chuck creates an extreme risk of entanglement, impact, crushing, friction, or cutting hazards. Never attempt to slow or stop the lathe spindle with your hand. Allow the spindle to come to a stop on its own or use the brake.

9. **Crashes:** Driving the cutting tool or other lathe components into the chuck may cause an explosion of metal fragments, which can result in severe impact injuries and major damage to the lathe. Reduce this risk by releasing automatic feeds after use, not leaving lathe unattended, and checking clearances before starting the lathe. Make sure no part of the tool, tool holder, compound slide, cross slide, or carriage will contact the chuck during operation.

10. **Long Stock Safety:** Long stock can whip violently if not properly supported, causing serious impact injury and damage to the lathe. Reduce this risk by supporting any stock that extends from the chuck/headstock more than three times its own diameter. Always turn long stock at slow speeds.

11. **Cutting Fluid Safety:** Cutting fluid can be a poisonous biohazard that may cause personal injury from skin or eye contact. Incorrectly positioned cutting fluid nozzles can splash on the operator or the floor, resulting in an exposure or slipping hazard. To decrease your risk, wear the required personal protection gear, change cutting fluid regularly, and position the cutting fluid nozzle where it will not splash or end up on the floor.

Preparation Overview

The purpose of the preparation section is to help you prepare your machine for operation. The list below outlines the 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 the lathe and inventory the contents of the box/crate.
2. Clean the lathe and its components.
3. Identify an acceptable location for the lathe and move it to that location.
4. Level the lathe and either bolt it to the floor or place it on mounts.
5. Assemble the loose components, lubricate the lathe, and make any necessary adjustments or inspections to ensure the lathe is ready for operation.
6. Connect the lathe to the power source.
7. Test run the lathe to make sure it functions properly and is ready for operation.

Things You'll Need

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

For Lifting and Moving

- Two extra persons with guide rods to steady the lathe during lifting and moving.
- A Forklift or Other Power Lifting device rated for at least 10,000 lbs.
- Lifting Strap or Chain with Hook rated for at least 10,000 lbs.
- Various Hardwood Blocks and Planks as Needed

For Power Connection

- A power source that meets the minimum circuit requirements for this machine (refer to **Page 16** for details).
- A qualified electrician to ensure a safe and code-compliant connection to the power source.

For Assembly

- Precision Level
- Cotton Rags
- Mineral Spirits
- Quality Metal Protectant Oil
- Safety Glasses
- Wrench or Socket 21mm
- Wrench or Socket 19mm
- Floor Mounting Hardware as Needed
- Standard Screwdriver #2

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 a qualified electrician in accordance with all applicable codes and standards.

⚠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.

Model SB1016 Full-Load Rating 220V..... 30A
Model SB1036 Full-Load Rating 440V..... 15A

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.

⚠CAUTION

For your own safety and protection of property, consult a qualified electrician if you are unsure about wiring practices or electrical codes in your area.

Note: The circuit requirements listed in this manual apply to 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 that the circuit is properly sized for safe operation.

NOTICE

This machine is equipped with a frequency drive that contains sensitive electronics, which can be damaged by a phase converter. DO NOT use a phase converter to power this machine. Doing so will void the warranty.

Circuit Requirements for 440V (Model SB1036)

This machine is prewired to operate on a 440V power supply circuit that has a verified ground and meets the following requirements:

Nominal Voltage 440V/480V
Cycle ..... 60 Hz
Phase ..... Three-Phase
Circuit Rating..... 20 Amps
Connection Type.....Hardwire (Page 24)

Continued On Next Page

Circuit Requirements for 220V (Model SB1016)

This machine is prewired to operate on a 220V power supply circuit that has a verified ground and meets the following requirements:

Nominal Voltage 220V/240V
Cycle ..... 60 Hz
Phase ..... Three-Phase
Circuit Rating..... 40 Amps
Connection Type.....Hardwire (Page 24)

Grounding Requirements

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.

Power supply connections that are hardwired to the power source must be connected to a grounded metal permanent wiring system, or to a system having an equipment-grounding conductor.

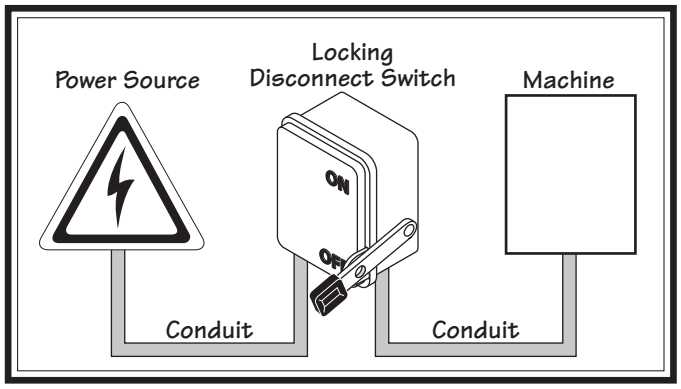


Figure 2. Typical hardwire setup with a locking disconnect switch.

Due to the complexity required for planning, bending, and installing the conduit necessary for a hardwire setup, this type of setup can only be performed by a qualified electrician.

⚠WARNING

Serious injury could occur if you connect the machine to power before completing the setup process. DO NOT connect to power until instructed later in this manual.

Correcting Phase Polarity (Yaskawa Drive)

This sub-section is only provided for troubleshooting by a qualified electrician. If you discover during the test run that the lathe will not operate, or that one or more motors run backwards, incorrect phase polarity may be at fault and will need to be corrected.

To establish the correct phase polarity:

1. Disconnect the machine from power, wait 15 minutes for the drive unit capacitors to discharge.

   — If the spindle motor rotates in the incorrect direction, swap any two of the output wires U, V, or W that are located at the variable frequency drive shown in **Figure 3**.

   Note: Swapping any two of the L1, L2, or L3 incoming power leads located at the input of the machine or frequency drive has no effect on spindle motor rotation.

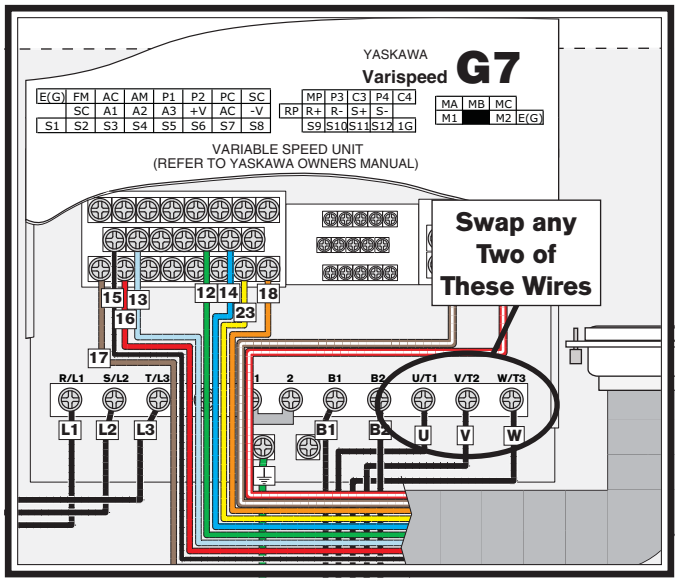


Figure 3. Spindle motor power supply wires at variable frequency drive unit.

— If one or more pump motors do not pump or rotate in the incorrect direction, locate the master power switch on the lathe, and swap any two of the L1, L2, or L3 incoming power leads shown in **Figure 4**.

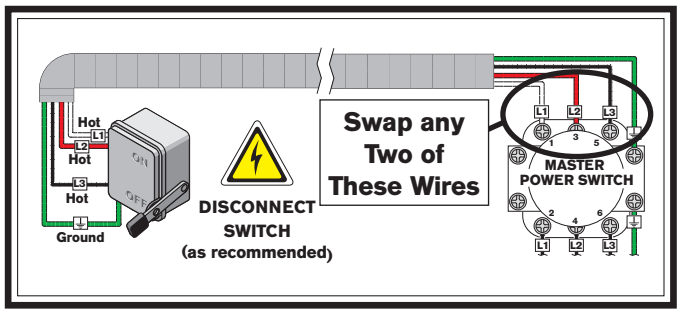


Figure 4. Machine incoming power supply wires.

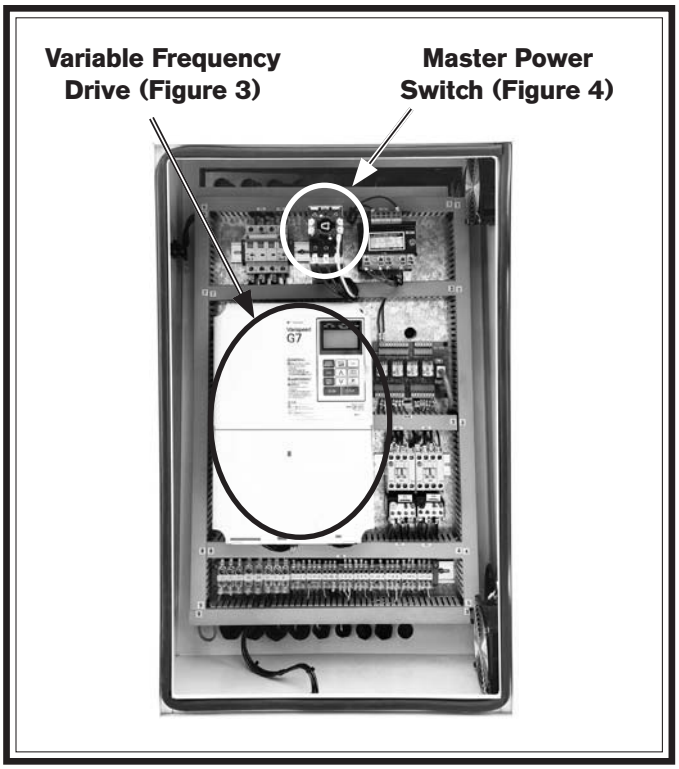


Figure 5. Component locations in lathe electrical cabinet.

2. Close the electrical cabinet door, reinstall motor covers and access panels, and test machine operation.

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

Main Inventory 1: (Figure 6)		Qty
A.	Steady Rest Assembly	1
B.	D1-8 Camlock Stud Set	1
C.	15" Faceplate w/D1-8 Camlock Stud Set	1
D.	12" 3-Jaw Chuck w/OD Clamping Jaws	1
E.	14" 4-Jaw Chuck w/Combo Jaws	1
F.	4-Jaw Chuck Key	1
G.	Follow Rest Assembly	1

Tool Box Inventory: (Figure 7)		Qty
H.	Tool Box	1
I.	3-Jaw Chuck Key	1
J.	Tool Post T-Wrench	1
K.	Hex Wrench Set 1.5-10mm	1
L.	Handwheel Handles	2
M.	Solid Dead Center MT#5	1
N.	Carbide-Tipped Dead Center MT#5	1
O.	Spindle Sleeve MT#7-MT#5	1
P.	Open End Wrench 10/12mm	1
Q.	Open End Wrench 14/17mm	1
R.	Open End Wrench 22/24mm	1
S.	Combo Wrench 27mm	1
T.	Phillips Screwdriver #2	1
U.	Standard Screwdriver #2	1
V.	ID Clamping Jaw Set (Three Jaw Chuck)	1
W.	Cast Iron Leveling Pads	8

Note: Some inventory components may be shipped inside of the lathe electrical box. These items MUST be removed before connecting the lathe to the power source.

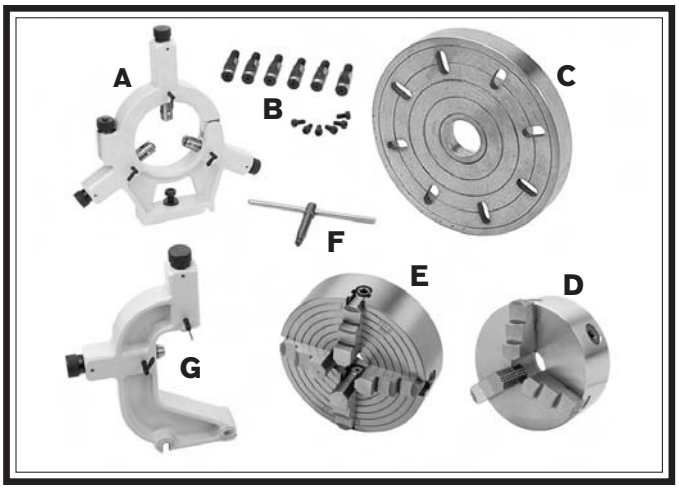


Figure 6. Main inventory.

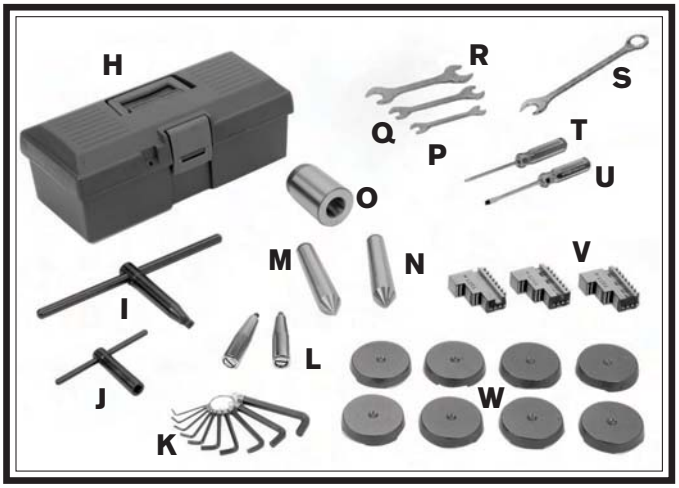


Figure 7. Toolbox inventory.

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, we have cleaned thousands of machines and found the following process to be the best balance between efficiency and minimized exposure to toxic fumes or chemicals.

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 area 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.

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

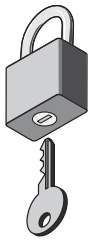
Lighting around the machine must be adequate enough that operations can be performed safely. Shadows, glare, or strobe effects that may distract or impede the operator must be eliminated.

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.

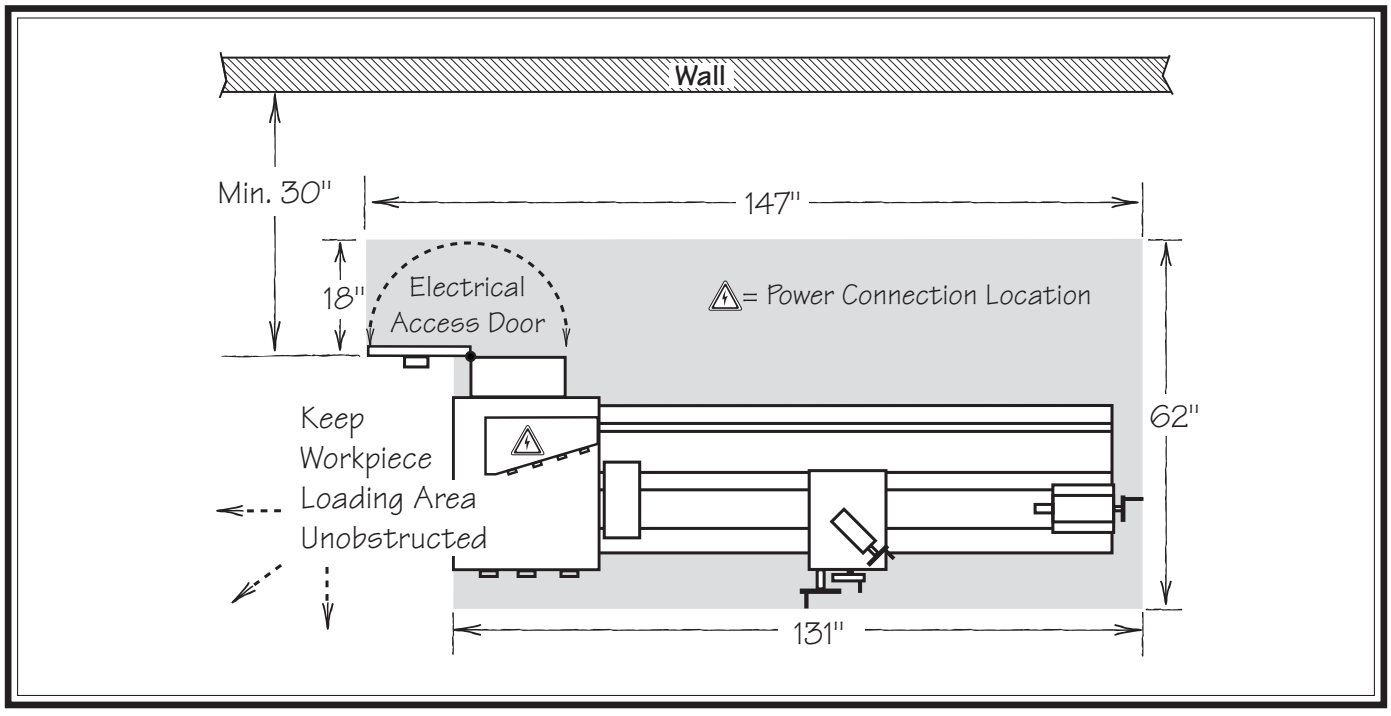
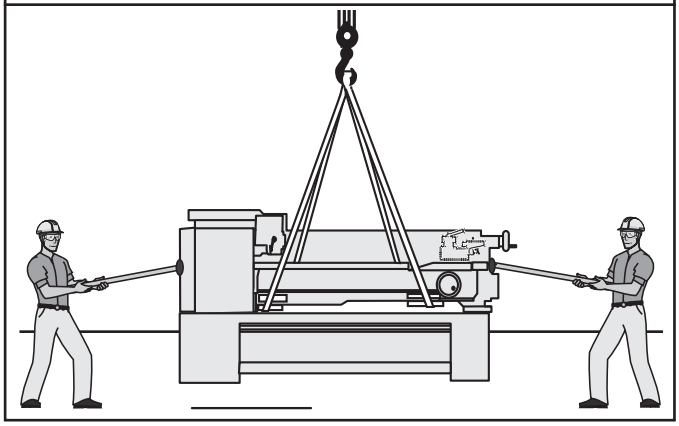


Figure 8. Space required for full range of movement.

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.



Do not attempt to lift or move this lathe if you do not have the proper equipment or the necessary assistance from other people. All lifting equipment must be rated for at least 10,000 lbs. to account for dynamic loads from bouncing or pulling that may be applied while lifting. Refer to the **Things You'll Need** section on **Page 14** for details.

To lift and move your lathe:

1. Prepare the permanent location for the lathe, and remove the top and sides of the shipping crate, then remove the small components from the shipping pallet.

2. To balance the lifting load, slide the tailstock and the carriage to the far right end of the lathe away from the headstock.

3. Position hardwood blocking under each end of the bed as shown in **Figure 9** to keep the lifting straps away from the leadscrew, feed rod, and control rod to prevent bending the rods.

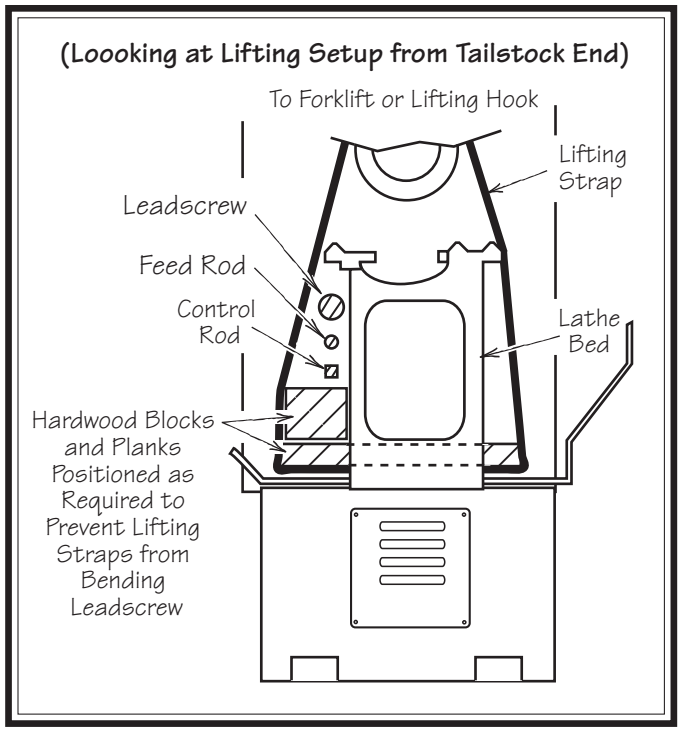


Figure 9. Lifting setup to keep straps from bending leadscrew or rods.

4. Attach the lifting straps to a forklift or an overhead crane, as shown in **Figure 10**, and unbolt the lathe from the pallet.

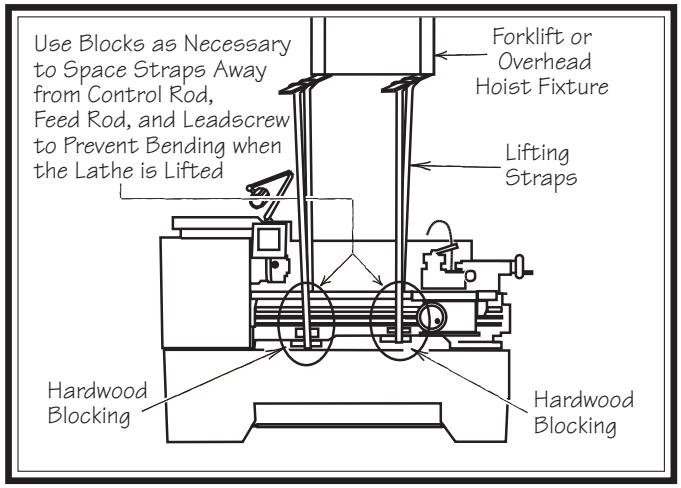


Figure 10. Lathe set up for typical lifting.

5. At each end of the lathe, have an assistant connect a guide rod to safely keep the lathe from swaying during lifting and transport.

6. Raise the lathe a couple of inches and place the lathe. If lathe balance is questionable however, or any other problem is suspected, lower the lathe and correct the problem.

Leveling & Mounting

You must level your machine and either use the included foot pads and leveling hardware or bolt your lathe to the floor. Because mounting your lathe to the floor with permanent hardware is an optional step and floor materials may vary, floor mounting hardware is not included.

Leveling

NOTICE

For accurate turning results and to prevent warping the cast iron bed and ways, the lathe bedways MUST be leveled from side-to-side and from front-to-back.

Re-check the 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 an un leveled machine may slowly twist due to the dynamic loads placed on the machine during operation.

For best results, use a precision level 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.

See the figure below for an example of a high precision level.

Figure 11. Example of a precision level.

To level the machine, use a precision level to make sure the bedways are level from side-to-side and from front-to-back. If using the included leveling pads (**Figure 12**), place them under the six leveling bolt locations, then use a 24mm wrench to adjust the bolts and level the lathe.

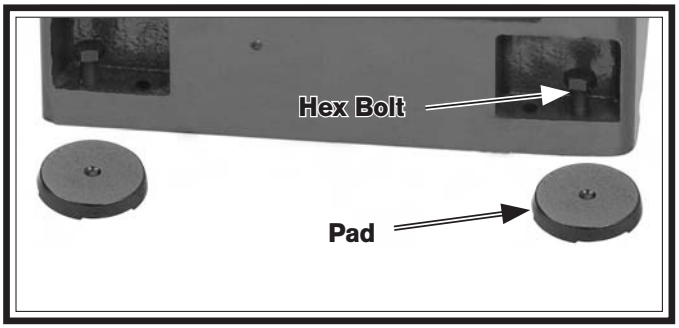


Figure 12. Leveling pads and hex bolts.

If using mounting hardware that does not allow for adjustment, level the lathe by placing metal shims between the lathe base and the floor before bolting down.

Bolting to Concrete Floors

Lag screws and anchors, or anchor studs (**below**), are two popular methods for securing machinery to a concrete floor. We suggest you research the many options and methods for securing your machine and choose the best one for your specific application.

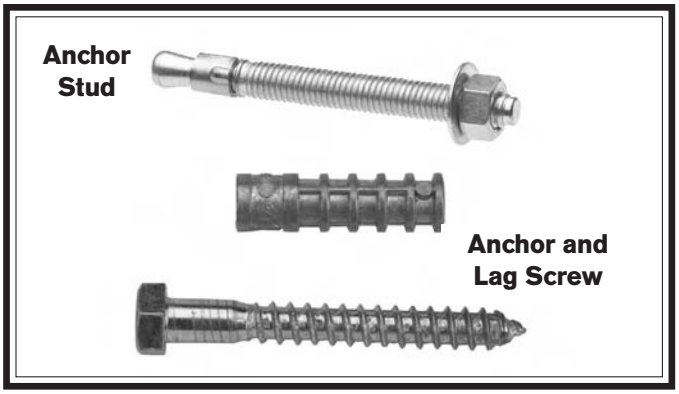


Figure 13. Common types of fasteners for bolting machinery to concrete floors.

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 the handwheel handles, thread the large handle into the carriage handwheel and the small handle into the cross slide handwheel, as shown in **Figure 14**.

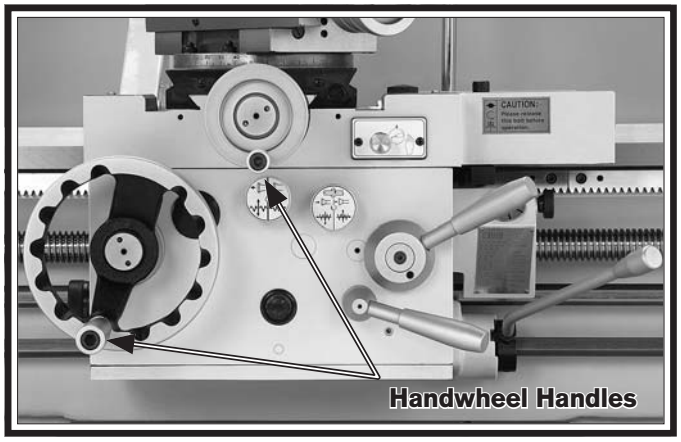


Figure 14. Handwheel handles installed.

Lubricating Lathe

The headstock oil pump tank, gearbox, and apron must have the proper amount and type of oil in them before the lathe can be operated for the first time.

Running the lathe without the required oil will void the warranty. Refer to the **Lubrication** section, beginning on **Page 66**, for details on how to check and add oil.

In addition to the gearboxes, we also recommend that you lubricate all other points on the machine at this time. This can be accomplished by following the maintenance schedule on **Page 64**.

Note: If your lathe was shipped with oil in the gearboxes, do not change that oil until after the break-in period.

Adding Cutting Fluid

Add the cutting fluid of your choice now. For detailed instructions on where the cutting fluid tank is located and how to add fluid, refer to **Cutting Fluid System** on **Page 73**.

Connecting to Power

Due to the complexity required for planning, bending, and installing the conduit necessary for a code-compliant hardwire setup, an electrician or other qualified person MUST perform this type of installation. Hardwire setups typically require power supply wires to be enclosed inside of a solid or flexible conduit, which is securely mounted at both ends with the appropriate conduit fittings. All work must adhere to the required electrical codes.

The hardwire setup for this machine must include a locking disconnect switch (see **Figure 15**) between the power source and the machine. This switch serves as the means to completely disconnect the machine from power to prevent electrocution accidental startup during adjustments, maintenance, or service to the machine.

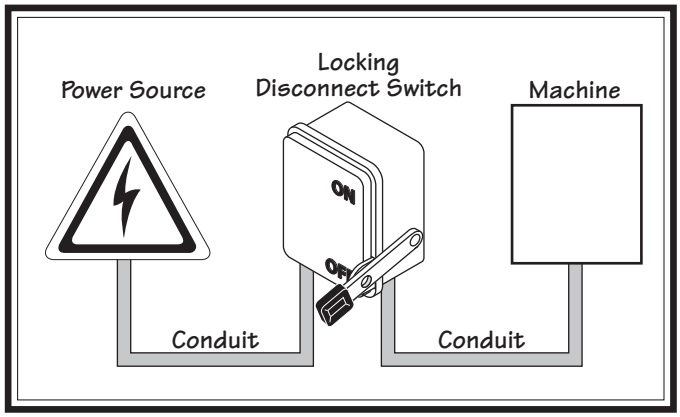


Figure 15. Typical hardwire setup with a locking disconnect switch.

⚠DANGER

Electrocution or death will occur if this procedure is attempted with live power supply wires. All wiring going to the machine must be disconnected from the power source, and the power supply shut OFF and locked out before performing this procedure.

The incoming power wires must be connected to the three terminals on the master power switch marked L1, L2, and L3, and the incoming ground wire must be connected the ground terminal shown in **Figure 16**. All wires must have adequate slack and be clear of sharp objects.

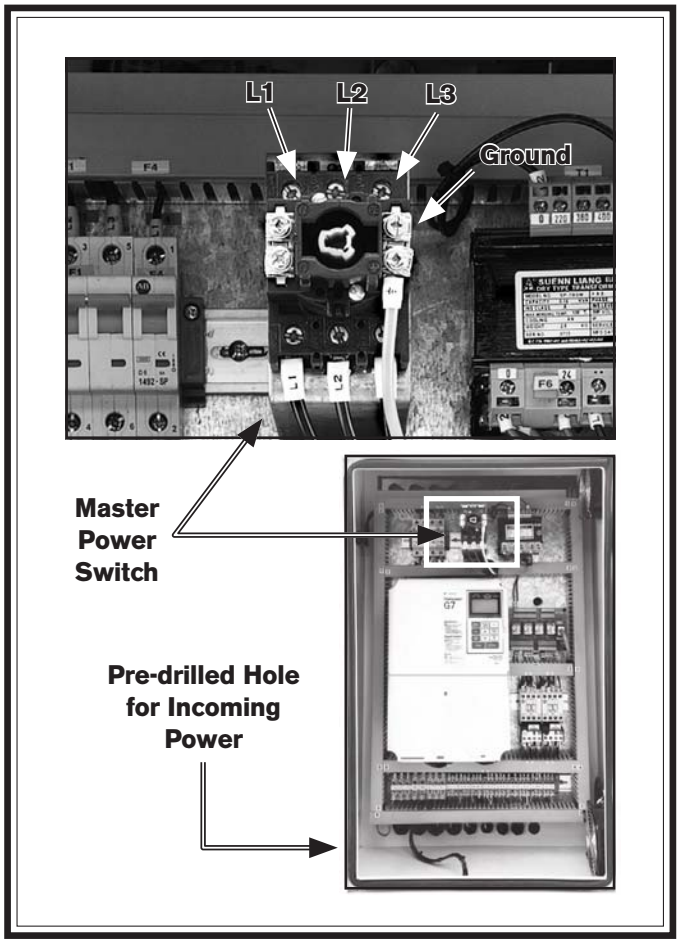


Figure 16. Machine power connection locations.

When the wiring job is complete, close and lock the main electrical box door, otherwise the machine control panel will be disabled.

Test Run

After all preparation steps have been completed, the machine and its safety features must be tested to ensure correct operation. If you discover a problem with the operation of the machine or its safety components, shut the machine down, disconnect it from power, and do not operate it again until you have resolved the problem.

Note: The variable speed on this machine is controlled by a frequency drive unit with sensitive electronics. These electronics can be damaged if power is disconnected during operation. Therefore, unless the stop button and brake lose functionality, always properly shut the machine down before, disconnecting it from the power source.

A **Troubleshooting** section is provided, starting on **Page 88**, to assist you with solutions if a problem occurs or if the lathe does not function as described in this section. If you need additional help after reviewing the troubleshooting section, or you are not confident troubleshooting the machine on your own, contact our tech support at (360) 734-1540.

To test run your machine:

1. Read and follow the safety instructions at the beginning of the manual, take required safety precautions, and complete all previous preparation steps including verifying that all oil levels are correct.

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

3. DISCONNECT LATHE FROM POWER!

4. Make sure that the chuck and jaws, if installed, are secure (refer to **Chuck and Faceplate Mounting** on **Page 35**).

Note: If a chuck is not installed on the lathe, you do not need to install one for this test.

5. Push the stop button in, turn the spindle speed dial to the minimum, and turn the cutting fluid pump switch (**Figure 17**) to the ***OFF*** position, and point the nozzle into the chip pan.

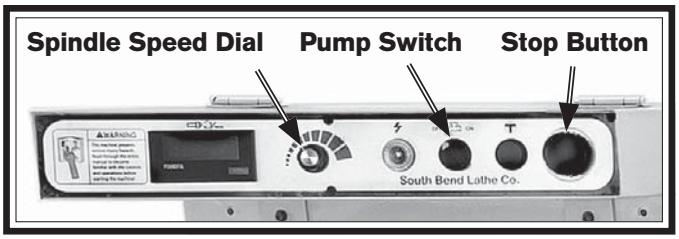


Figure 17. Control panel.

6. Move the spindle range lever (**Figure 18**) to low speed range 1 (18-55 RPM).

Note: You may need to slightly rotate the chuck by hand to engage the lever.

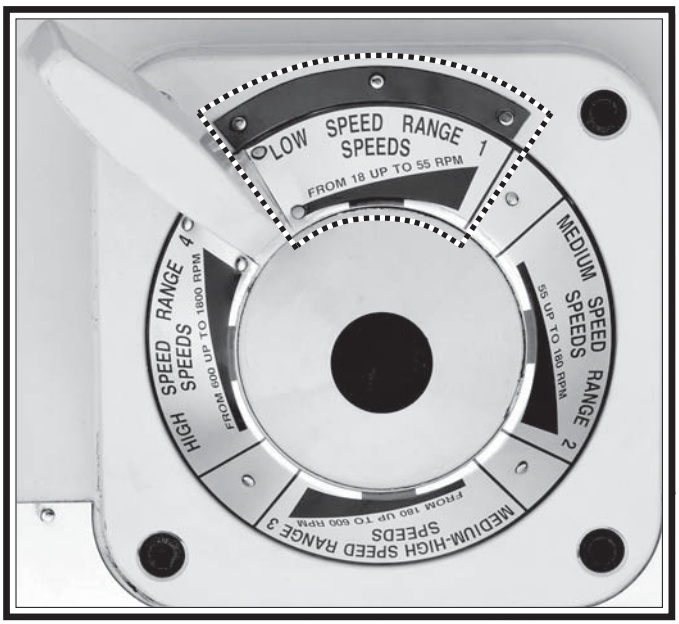


Figure 18. Spindle range lever.

7. Move the gearbox range lever to the middle (neutral) position, as shown in **Figure 19**.

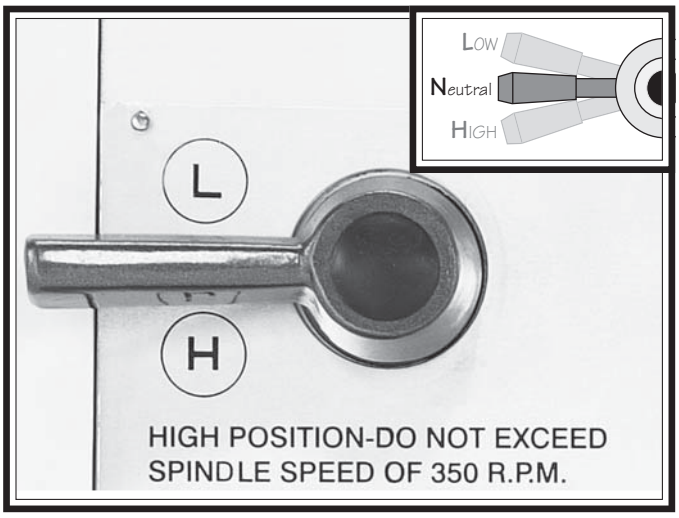


Figure 19. Gearbox range lever in neutral.

8. Move the headstock feed direction lever to the (neutral) position (see **Figure 20**).

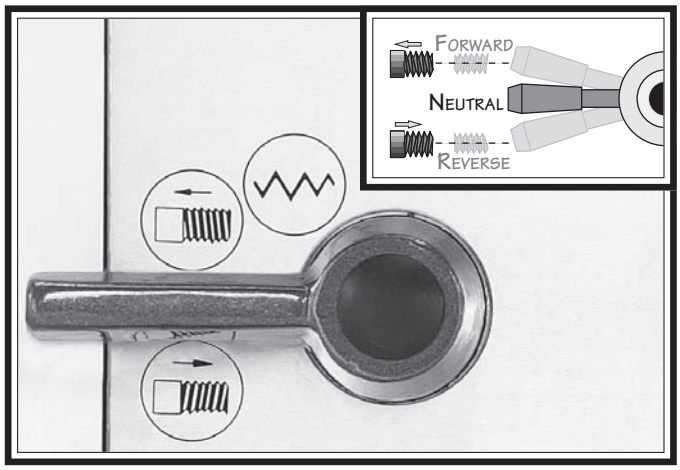


Figure 20. Feed direction lever in neutral.

9. Pull up on the half nut and the feed levers to disengage the carriage, as shown in **Figure 21**, and make sure the carriage lock is loose.

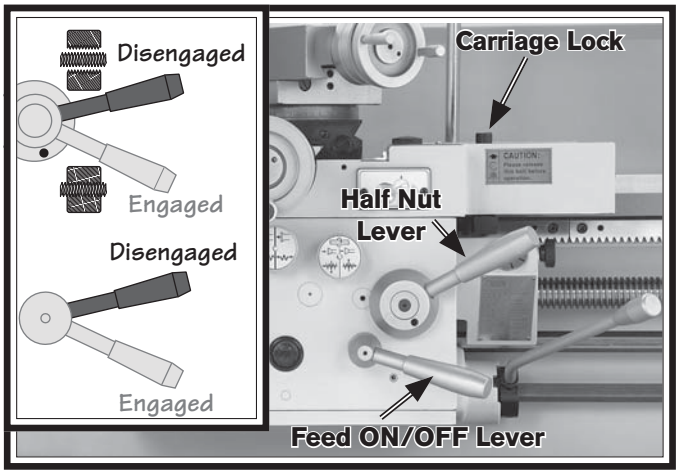


Figure 21. Halfnut and carriage feed levers moved to the disengaged positions.

10. Swing the spindle ON/OFF lever outward and move it to the ***OFF*** (center) position, as shown in **Figure 22**.

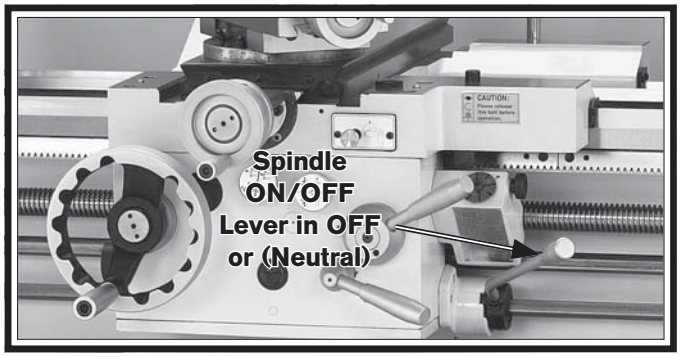


Figure 22. Spindle ON/OFF lever in OFF (Neutral).

11. Make sure that the master power switch is OFF, shown in **Figure 23**. Next, connect the lathe to the power source, and turn the master power switch **ON**.

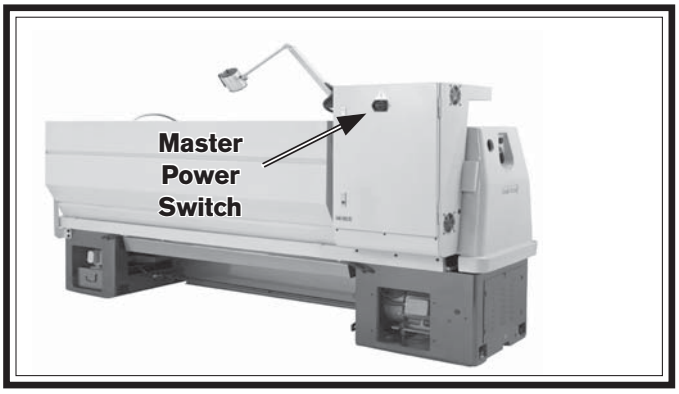


Figure 23. Master power switch in ON position.

12. Rotate the stop button shown in **Figure 24** clockwise until it pops out. The headstock oil pump will turn ***ON***.

Figure 24. Stop button.

13. Observe the oil pump tube through the sight glass (**Figure 25**). Verify that you see oil flowing.

Note: This headstock has a pressurized oil system that is equipped with an oil pressure safety switch. If oil stops flowing or does not flow to start with, the lathe will not operate until the oil is properly flowing. Refer to **Troubleshooting** to correct.

NOTICE

Never bypass the oil pressure safety switch! If you do, you will void the warranty, and headstock damage may occur.

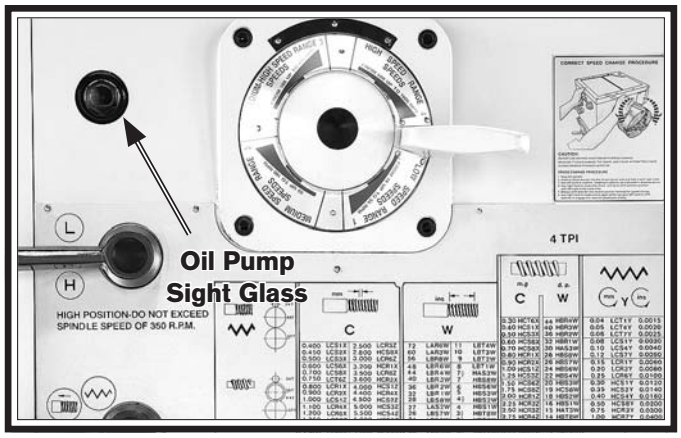


Figure 25. Oil pump sight glass.

14. Make sure that all bystanders are out of the way, tools are cleared away, and the chuck key is removed from the chuck.

15. Move the spindle ON/OFF lever (**Figure 26**) down and the chuck will rotate counter-clockwise (down and toward you, as you face the front of the lathe).

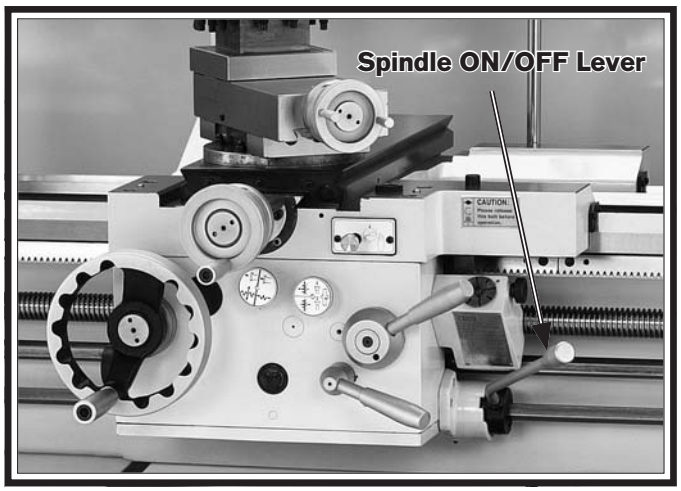


Figure 26. Starting the lathe.

16. Observe the lathe and listen for any abnormal noises or vibration. The lathe should run smoothly. If the spindle rotates in the incorrect direction, refer to **Correcting Phase Polarity** on **Page 16** to solve the problem.

17. Push the stop button. The lathe should stop.

18. Move the spindle ON/OFF lever up to the OFF position, reset the stop button by twisting it clockwise until it pops out, then restart the spindle with the lever.

19. Push the foot brake. The lathe should come to a quick stop.

— If the foot brake has no effect on the lathe, push the stop button, and refer to **V-Belts** and **Brake & Switch** on **Page 81** to make any required adjustments.

20. Remove the lathe headstock side cover. The kill switch shown in **Figure 27** should prevent the lathe from starting while this cover is removed.

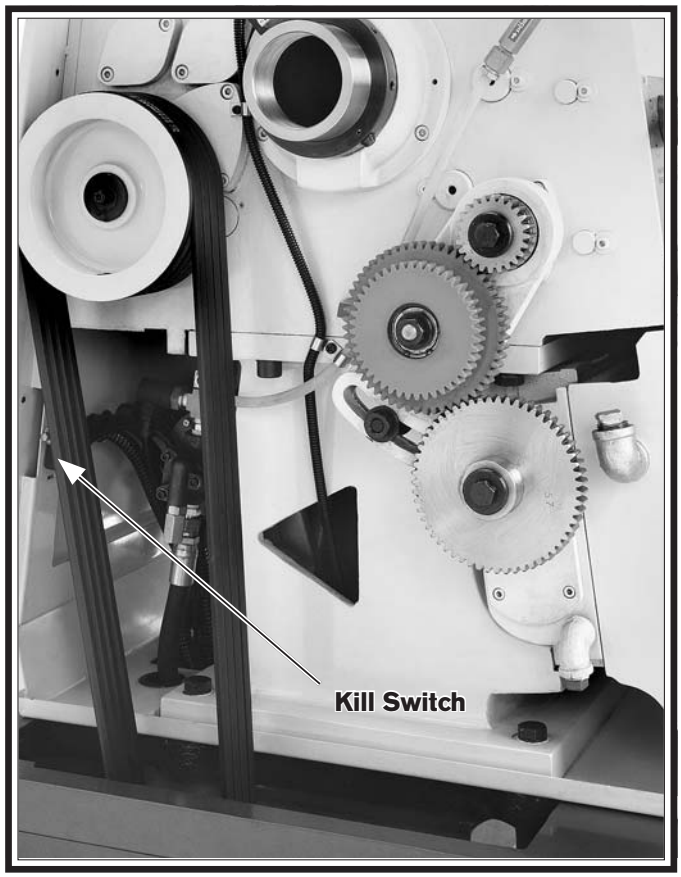


Figure 27. Headstock gear cover kill switch.

21. Stand away from all the exposed gears on the side of the headstock, and attempt to start the lathe.

— If the lathe starts, the safety switch is not functioning properly and may need to be replaced before the machine can be safely operated.

22. Reinstall the end gear cover, then start the lathe.

23. Lift the chuck guard shown in **Figure 28**, and try to start the lathe again. The cover kill switch should prevent the lathe from starting while the guard is open.

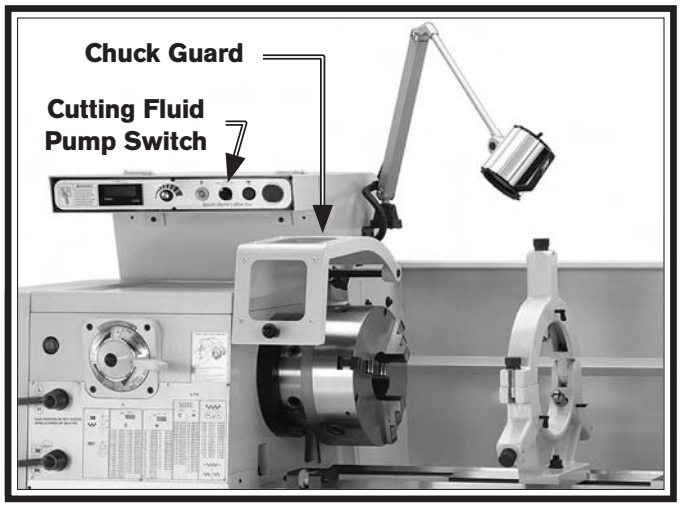


Figure 28. Chuck safety cover.

24. Close the chuck guard.

25. Open the cutting fluid valve, and using the pump switch shown in **Figure 28**, turn the cutting fluid pump ***ON***. Verify that fluid flows from the nozzle, then turn the cutting fluid pump OFF.

— If no fluid is pumped, but fluid level is full, no hose kinks exist, and the cutting fluid nozzle is open, the pump may be wired with incorrect phase polarity. Correct the pump phase polarity wiring as outlined on **Page 16**.

The test run is now finished. Shut the lathe down and begin the **Spindle Break-In** procedure.

Spindle Break-In

It is essential to closely follow the proper break-in procedures to ensure trouble-free performance. Complete this process once you have familiarized yourself with all instructions in this manual and completed the test run.

To complete the spindle break-in:

1. Make sure you have completed the **Test Run** procedure beginning on **Page 25**.

2. Turn the spindle speed dial (**Figure 29**) all the way counterclockwise to the minimum speed.

Figure 29. Spindle speed dial.

3. Move the spindle range lever (**Figure 30**) to low speed range 1 (18-55 RPM).

Note: You may need to slightly rotate the chuck by hand to engage the lever.

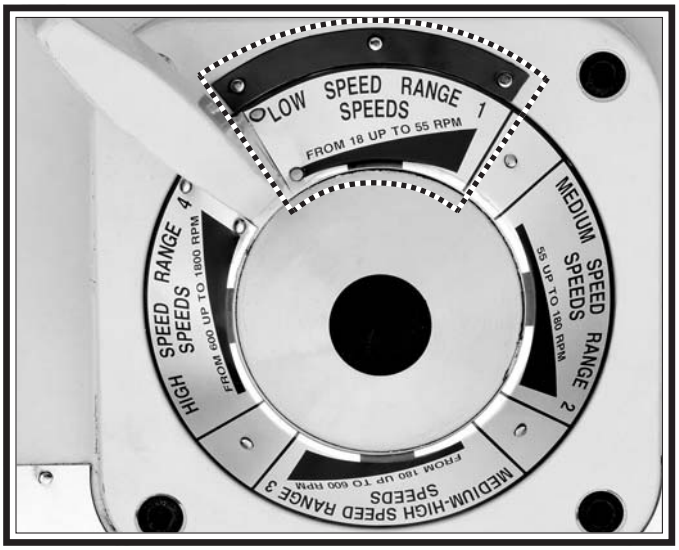


Figure 30. Spindle range lever in low 1.

4. Move the quick change range lever to the middle (neutral) position, as shown in **Figure 31**.

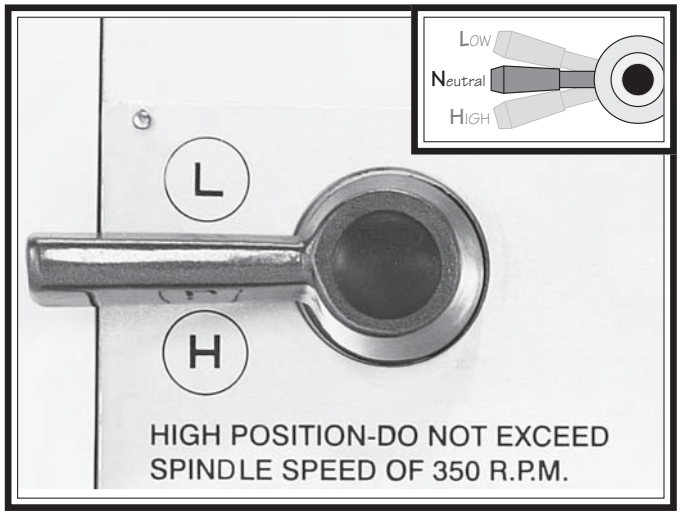


Figure 31. Quick change gearbox in neutral position.

5. If you have not already done so, move the headstock feed direction lever to the central or neutral position as shown in **Figure 32**

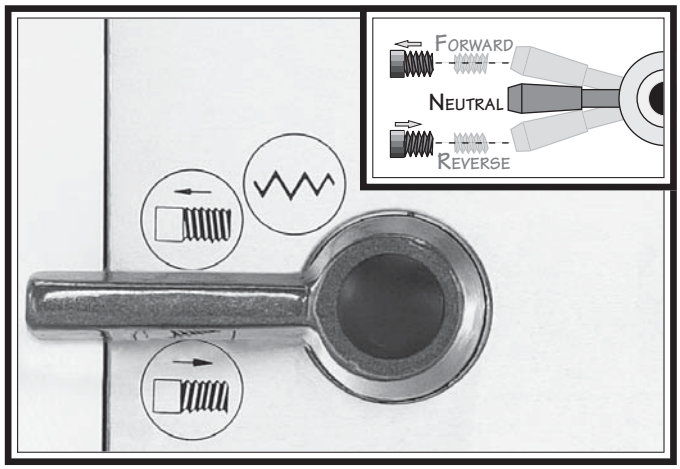


Figure 32. Feed direction lever in neutral position.

6. Pull up on the half nut and the feed levers to disengage the carriage, as shown in **Figure 33**, and make sure the carriage lock is loose.

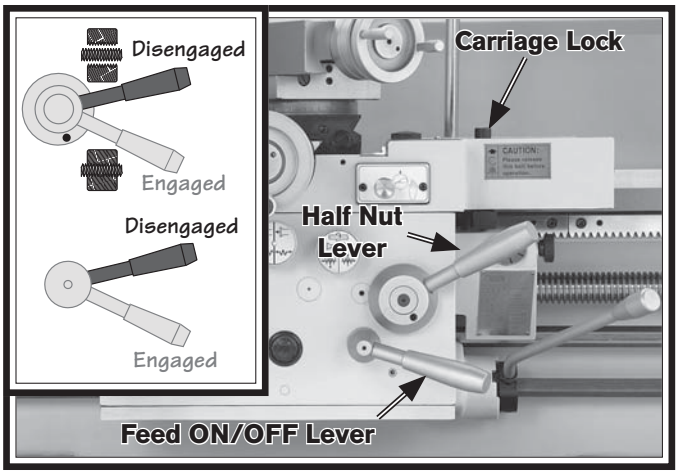


Figure 33. Halfnut and carriage feed levers shown in the disengaged positions.

7. Move the spindle ON/OFF lever to the ***OFF*** (center) position, as shown in **Figure 34**.

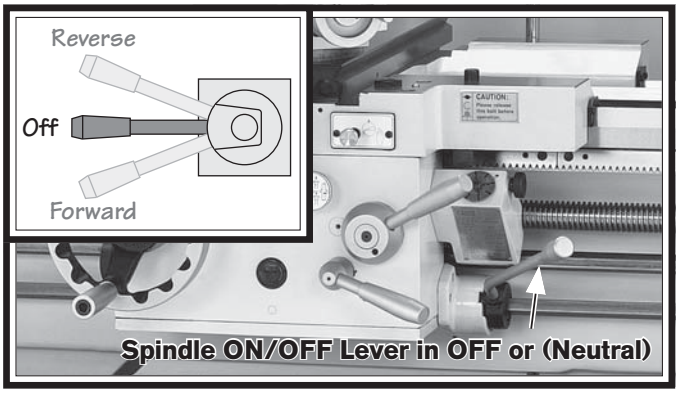


Figure 34. Spindle ON/OFF lever in OFF (Neutral).

⚠WARNING

Do not leave the lathe unattended during the break-in period. Should any problem arise, you must be able to immediately shut down the lathe to avoid damage. Curious bystanders can also be entangled with a lathe chuck if the machine is left running and unattended. Entanglement can lead to immediate amputation or death.

NOTICE

After the first 16 hours of use, the V-belts will stretch and seat into the pulley grooves. The V-belts must be properly re-tensioned after this period to avoid reducing their useful life. Refer to the V-Belts section on Page 81 for detailed instructions.

NOTICE

NEVER attempt to shift the headstock or quick change gearbox when the lathe is in operation. Gear clash causing tooth damage will result. Only use the gear shifting levers when the spindle id stopped.

8. Turn the lathe ***ON.***

9. Using the speed dial on the control panel, and the spindle range lever on the headstock, run the lathe spindle for ten minutes at 55, 180, 600, and 1800 RPM as indicated by the tachometer on the control panel.

10. When complete, reverse spindle rotation and run lathe in reverse at 1800 RPM for 10 minutes.

11. After completing **Step 10**, stop the lathe, set the spindle range lever to medium speed range 2 as shown in **Figure 35**.

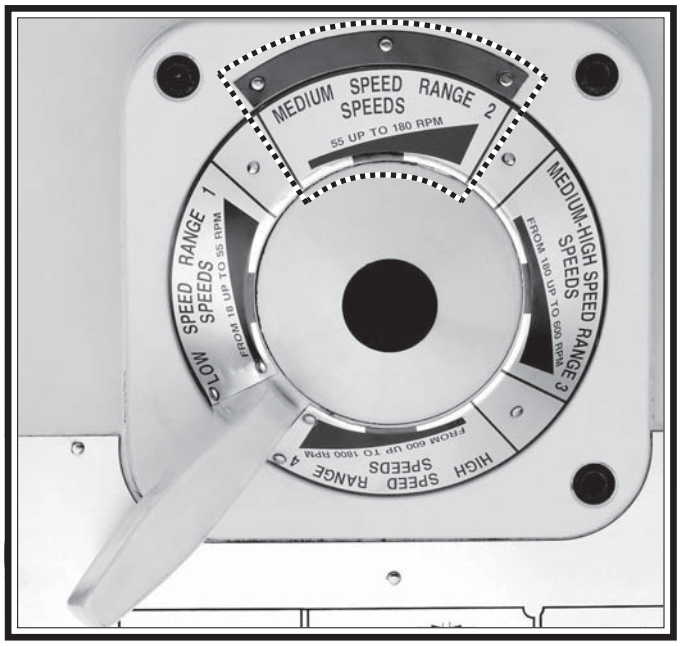


Figure 35. Spindle range lever in medium 2.

12. Move the quick change range lever shown in **Figure 36** to **L** or the low range position.

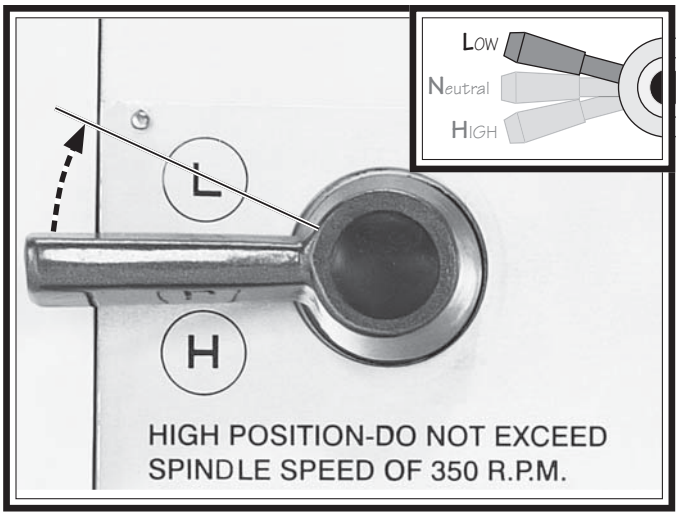


Figure 36. Quick change range lever.

13. Turn the lathe ***ON***, and run the lathe at 180 RPM for 10 minutes with the quick change gearbox in low, and then another 10 minutes with the quick change gearbox in high.

14. When complete, while the oil is still warm and any metal particles are still suspended in the oil, change the oil in the quick change gearbox and the headstock oil pump tank immediately.

15. Tighten the V-belts, and perform all other lubrication steps mentioned in the **Maintenance** section of this manual.

Recommended Adjustments

For your convenience, the adjustments listed below have been performed 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 your new machine. Step-by-step instructions for these adjustments can be found on the pages referenced below.

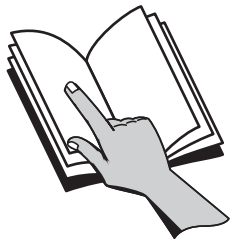
Factory adjustments that should be verified:

- Tailstock alignment (**Page 44**).
- Compound and cross slide backlash adjustment (**Page 77**).
- Gib adjustments (**Page 78**).

Operation Overview

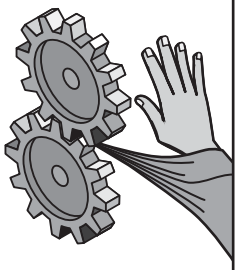
The purpose of this overview is to provide the novice machine operator with a basic understanding of how the machine is used during operation, so they can more easily understand the controls discussed later in this manual.

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

During operation, small metal chips may become airborne, leading to serious eye injury. Wear safety glasses to reduce this risk.

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

1. Puts on safety glasses, rolls up sleeves, removes jewelry, and secures any clothing, jewelry, or hair that could get entangled in moving parts.
2. Examines the workpiece to make sure it is suitable for turning, then mounts the workpiece in one of the chucks or on the faceplate, and removes the chuck key from the chuck.
3. Mounts the tooling, aligns it with the workpiece, then backs it away to establish a safe startup clearance.
4. Clears all tools from the lathe.
5. Sets the correct spindle speed range for the operation, and turns the spindle speed dial all the way counterclockwise (to the lowest speed) to avoid the possibility of damage from a high speed start.
6. Checks for safe clearances by rotating the workpiece by hand at least one full revolution.
7. Moves slides to where they will be used during operation.
8. If using power feed, selects the proper feed rate for the operation.
9. Turns the master power switch ***ON***, resets the stop button so it pops out, then moves the spindle ON/OFF lever down to start spindle rotation. The spindle will rotate forward (the top of the chuck rotates toward the operator).
10. Turns the spindle speed dial clockwise to the desired RPM.
11. Uses the carriage handwheels or power feed options to move the tooling into the workpiece for operations.
12. When finished cutting, moves the ON/OFF lever to the center position to turn the lathe ***OFF***, then removes the workpiece.

Description of Controls & Components

Refer to the following figures and descriptions to learn about the basic controls of this machine.

Main Power Control

A. Master Power Switch: The rotary switch shown in **Figure 37** toggles incoming power ***ON/OFF*** to the lathe. It also prevents the electrical box door from being opened when the switch is ***ON***. If switched to ***OFF***, this switch is not a safe alternative to completely disconnecting the machine from power when wiring, servicing, or making repairs.

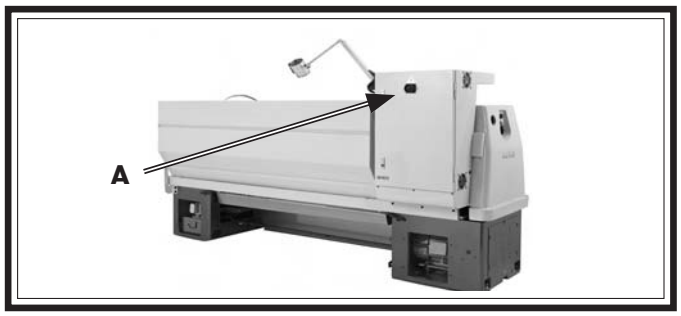


Figure 37. Master power switch.

Headstock Controls

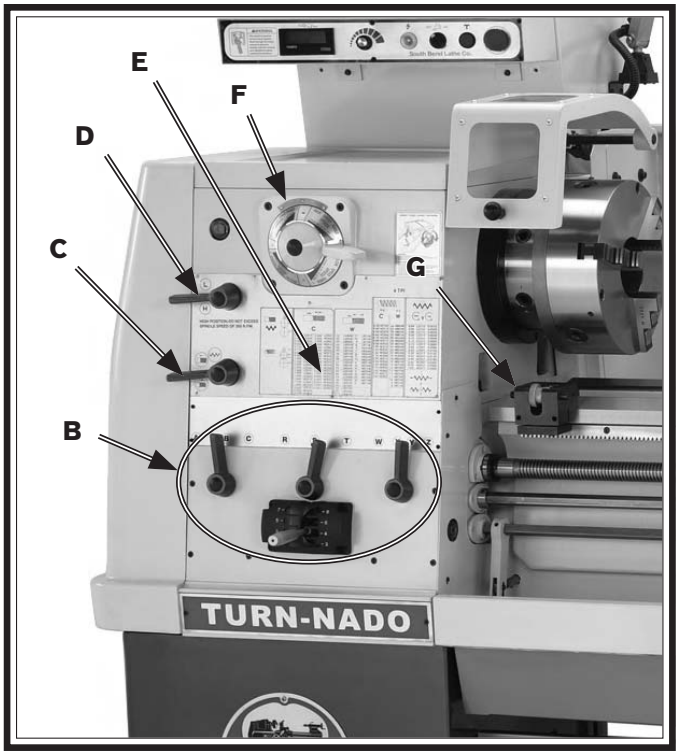


Figure 38. Headstock controls.

B. Quick Change Gearbox Levers: Controls the leadscrew and feedrod speed for threading and feed operations.

C. Headstock Feed Direction Lever: Controls the direction that the leadscrew and feed rod rotate.

D. Gearbox Range Lever: Shifts the quick change gearbox from neutral into high or low.

E. Threading and Feed Chart: Shows the configurations of the gearbox levers and displays the positions of the various gears for different threading or turning options.

F. Spindle Speed Range Lever: Controls the speed ranges available to the spindle.

G. Micrometer Stop: Clamps along the way, and serves as a stopping point indicator, so when cutting shoulders the tool tip can be stopped at exactly the same point every time.

Control Panel

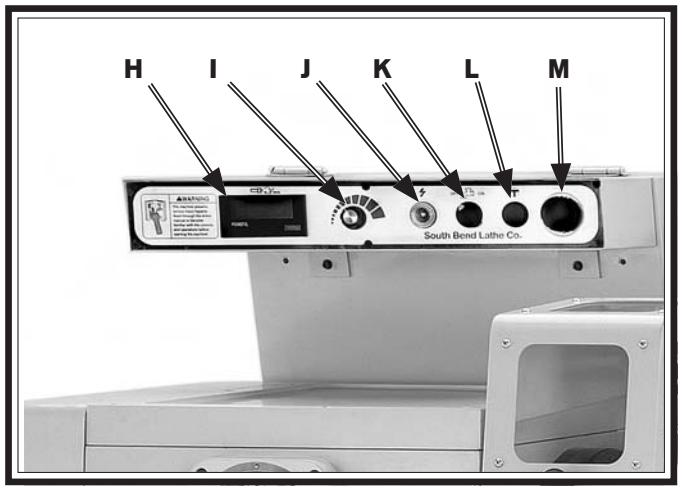


Figure 39. Control panel.

H. Tachometer Display: Displays the current spindle speed in RPM.

I. Spindle Speed Dial: When rotated, the EVS dial electronically varies the spindle speed within each of the four available spindle speed ranges.

J. Power Light: Illuminates when lathe is receiving power and the controls are LIVE.

K. Cutting Fluid Pump Switch: Start/stops the cutting fluid pump motor.

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

M. Stop Button: Stops all machine functions. Twist clockwise to reset.

Carriage Controls

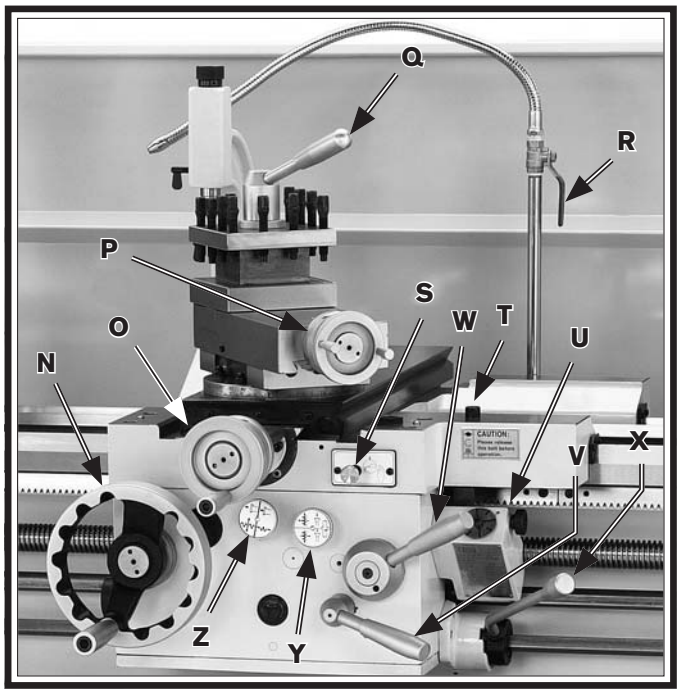


Figure 40. Carriage controls.

N. Carriage Handwheel: Moves the carriage parallel along the ways, and can be disengaged when power feed operations would make it an entanglement hazard.

O. Cross Slide Handwheel: Moves the cross slide perpendicular to the ways into the workpiece.

P. Compound Slide Handwheel: Moves the tool in fine increments at compound angles.

Q. 4-Position Tool Post Lever: Locks the rotary tool post in four possible detents.

R. Flow Control Lever: Controls the flow of cutting fluid from the nozzle.

S. Way Oil Oil Pump: Draws oil from the apron case and lubricates the carriage and ways through various oil ports.

T. Carriage Lock: Secures the carriage in place for greater rigidity and accuracy when using the cross or compound slide for the machining operation.

U. Thread Dial and Chart: Dial indicates when to engage the half nut during threading operations. Chart indicates on which thread dial reading to engage the half nut for specific inch or Whitworth thread pitches.

V. Feed ON/OFF Lever: Engages and disengages the longitudinal and cross feed system at the apron.

W. Half Nut Lever: Engages and disengages the half nut for threading operations.

X. Spindle ON/OFF Lever: Starts, stops and reverses direction of spindle rotation.

Y. Apron Feed Direction Knob: Changes direction of carriage feed or the cross slide feed without having to stop the lathe and move the headstock feed direction lever.

Z. Feed Selection Knob: Selects either the carriage feed or the cross slide feed.

AA. Feed Clutch: This adjustable clutch helps protect the feed system against broken gears and shafts caused by accidental overloads.

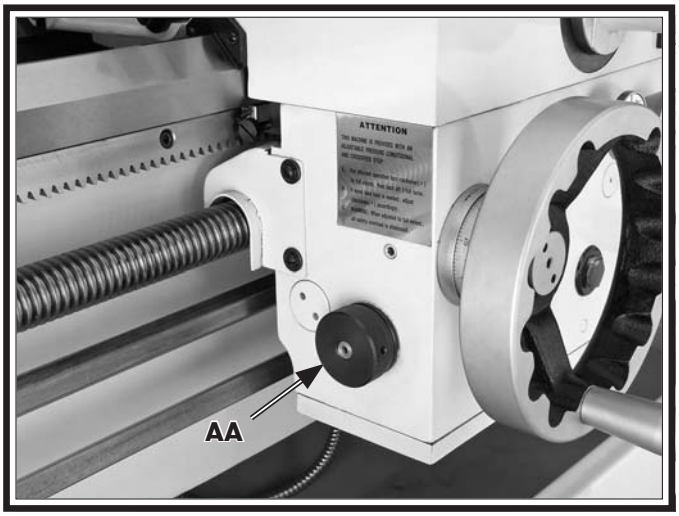


Figure 41. Adjustable feed clutch.

Tailstock Controls

AB. Quill: The quill has an MT#5 bore, metric and inch scale, and drift slot to remove tight-fitting tooling.

AC. Quill Lock Lever: Locks the quill in position.

AD. Tailstock Lock Lever: Secures the tailstock in place along the bedway.

AE. Handwheel: Moves the quill toward or away from the spindle, and is quipped with a graduated collar divided in increments of 0.001" where 360°= 0.200".

AF. Gib Screws: Adjust a tapered gib to control tailstock sliding accuracy.

AG. Tailstock Offset Screws: Adjusts the tailstock offset left or right from the spindle centerline.

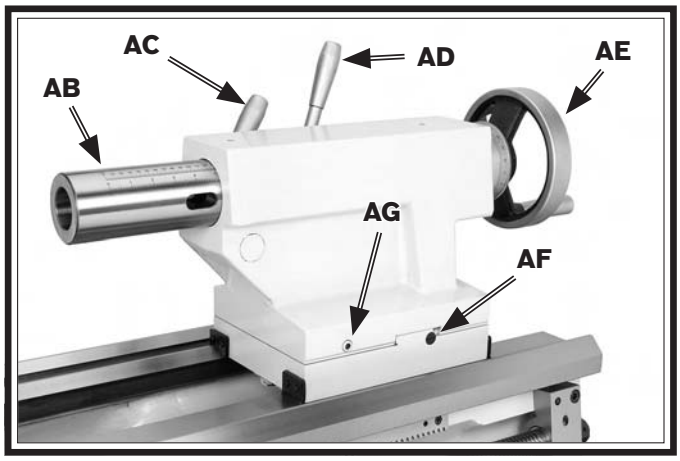


Figure 42. Tailstock controls.

AH. Tailstock Lock Bolt: Tightens a secondary tailstock clamp to assist the primary tailstock lock lever and clamp.

AI. Offset Scale: Indicates the distance of tailstock offset from the spindle centerline with arbitrary marks.

AJ. Tailstock Stop Pin: Prevents the tailstock from sliding off of the ways.

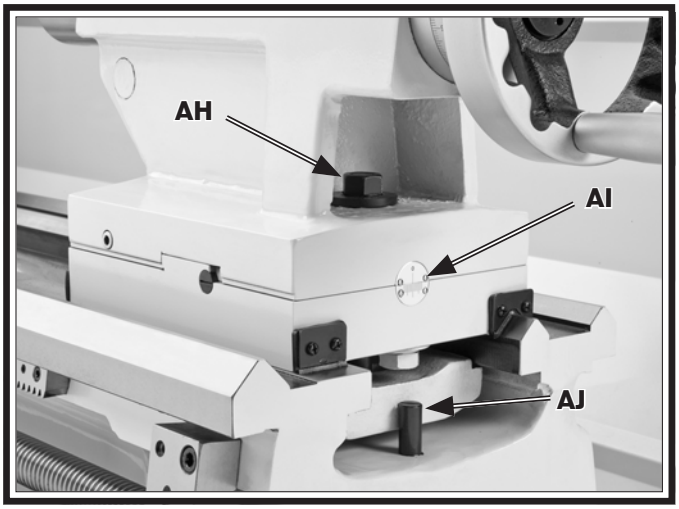


Figure 43. Tailstock controls.

Chip Drawer

The chip drawer shown in **Figure 44** catches cutting fluid and metal chips during the machining process. It slides open for easy cleaning.

Also, the chip drawer contains a screen that allows runoff cutting fluid to drain back into the cutting fluid tank.

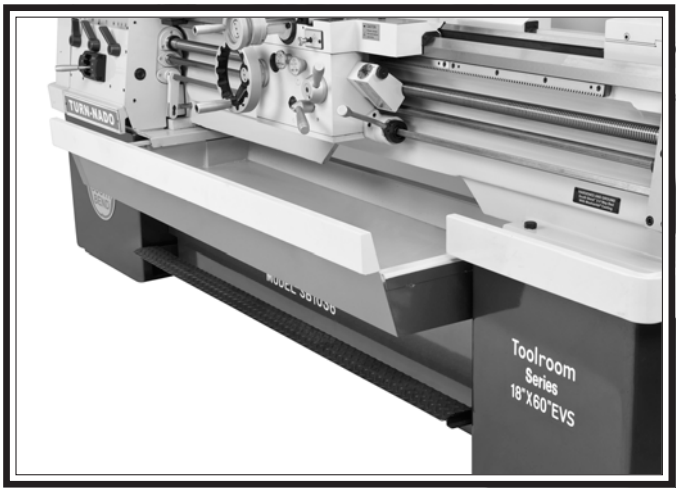


Figure 44. Chip drawer.

Foot Brake

This lathe is equipped with a foot brake (**Figure 45**) to quickly stop the spindle. Pushing the foot brake while the spindle is ***ON*** cuts power to the motor and stops the spindle. Once stopped, the spindle lever MUST be returned to the neutral position before the spindle can be restarted.

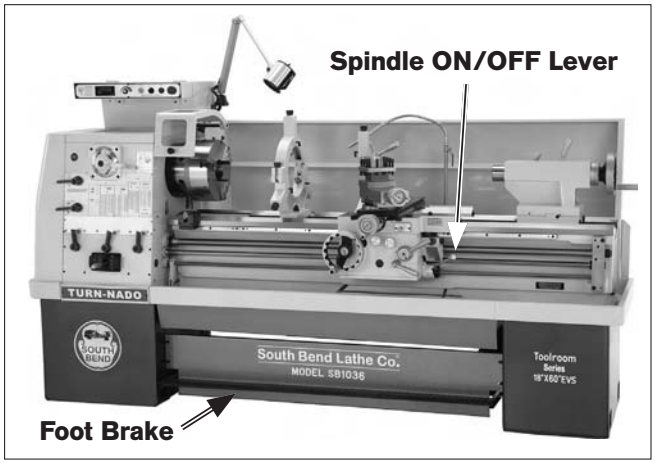


Figure 45. Foot brake and spindle ON/OFF lever.

⚠WARNING

Using the foot brake to stop the lathe reduces risk of an entanglement injury from allowing the lathe to coast to a stop. Use the foot brake to stop the lathe whenever possible.

Chuck & Faceplate Mounting

This lathe is shipped with the 3-jaw chuck installed. This is a scroll-type chuck, meaning that all three jaws move in unison when adjusted.

The included 4-jaw chuck features independent jaws, which are used for square or unevenly-shaped stock, and to mount work that needs to be adjusted to near "0" total indicated runout.

If neither chuck can hold your workpiece, the cast-iron faceplate has slots for T-bolts that hold standard or custom clamping hardware. With the correct clamping hardware, this faceplate will hold non-cylindrical parts.

The chucks and faceplate have a D1-8 camlock system. A chuck key is used to turn the locking cams to secure/release the chuck/faceplate.

Items Needed	**Qty**
Dead Blow Hammer	1
Chuck Cradle or Plywood ¾" (to protect bed)	1
Chuck Key	1

Removing Chuck or Faceplate

1. DISCONNECT LATHE FROM POWER!

2. Lay a chuck cradle (see **Figure 46**) or plywood under the chuck or faceplate and over the bedway to protect the precision ground surfaces from damage and reduce injury if fingers get pinched.

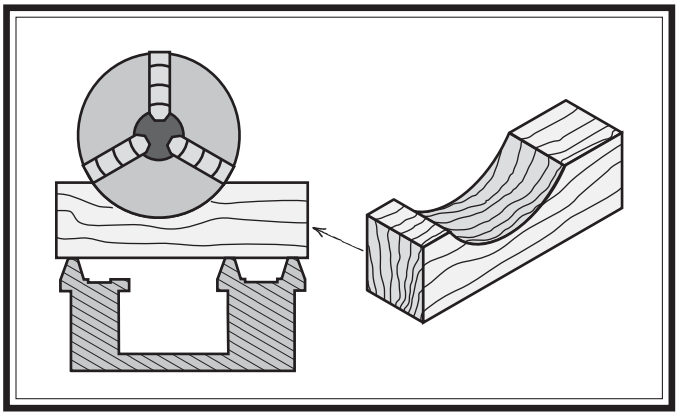


Figure 46. Wooden chuck support cradle.

3. One at a time, use the chuck key to turn each of the camlocks counterclockwise until the cam line aligns with the cam release datum line, as shown in **Figure 47**. As you turn the camlocks, they will rise up slightly from the spindle body.

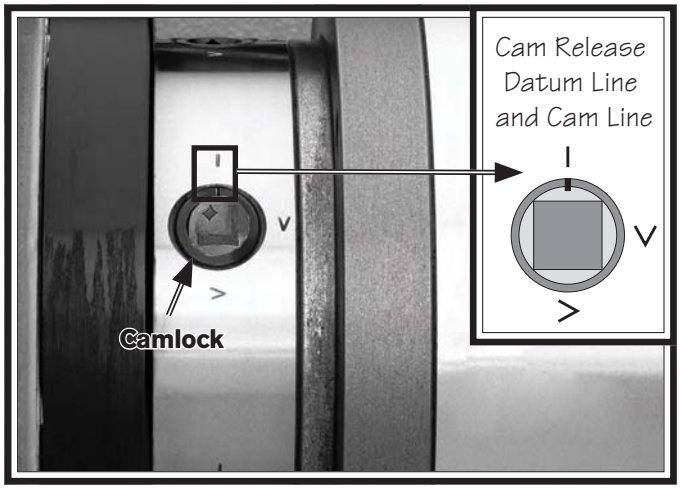


Figure 47. Camlock loosened with the cam line aligned with the datum line.

4. Remove the chuck key, then use a dead-blow hammer or a wood block to lightly tap around the circumference of the chuck or faceplate to break it free from the spindle taper and camlock sockets. Be sure to support the bottom of the chuck.

5. With a rocking motion, carefully remove the chuck or faceplate from the spindle nose, as shown in **Figure 48**, making sure to support the weight with an adequate chuck cradle.

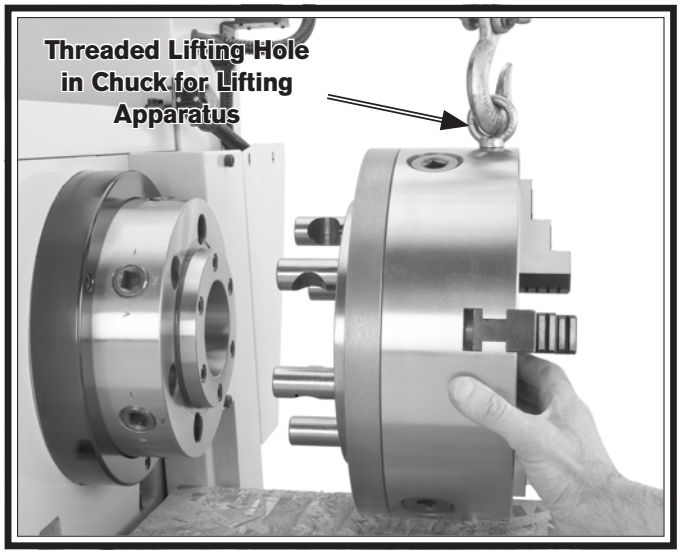


Figure 48. Removing the 3-jaw chuck from a spindle nose.

Mounting Chuck or Faceplate

The 4-jaw chuck is shipped with six camlock studs that may have to be installed before chuck mounting. If you have not yet installed the camlock studs, complete the instructions in "Installing and Adjusting Camlock Studs" on **Page 37**.

To mount a chuck or faceplate:

1. DISCONNECT LATHE FROM POWER!

2. Lay a chuck cradle (see **Figure 46**) or plywood under the chuck or faceplate and over the bedway to protect the precision ground surfaces from damage and reduce injury if fingers get pinched.

3. Clean away debris and oily substances from the mating surfaces of the spindle and chuck or faceplate.

4. Inspect and make sure that all camlock studs are undamaged, are clean and lightly oiled, and that the camlock stud cap screws are in place and snug.

NOTICE

Never install a chuck or faceplate without having the camlock cap screws in place or fully tightened. If you ignore this notice, the chuck may not be removable since the camlock studs may turn with the camlocks and never release.

5. Position the chuck/faceplate in front of the spindle nose, align the chuck timing marks, as shown in **Figure 49**, and align the camlock studs with the sockets, then carefully insert the chuck or faceplate onto the spindle.

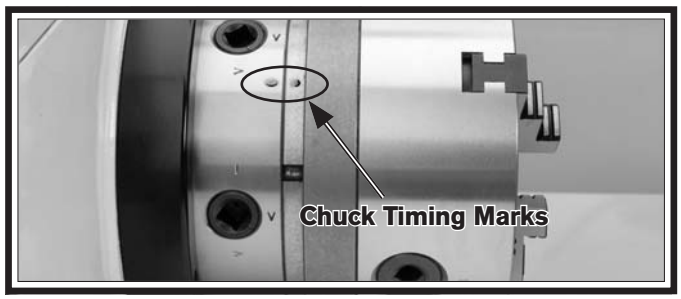


Figure 49. Chuck timing marks aligned.

6. Tighten camlocks in a star pattern to draw the chuck up evenly on all sides while reducing chance of misalignment, and make sure to tighten camlocks in an incremental manner to ensure that no camlock gets fully tightened all at once (i.e., snug the camlocks on the first pass, then moderately tighten on the next pass, then fully tighten on the third pass).

   As you tighten the camlocks, the chuck or faceplate will snug up onto the spindle nose. When fully tightened, the cam line will fall between the two "V" marks on the spindle nose, as shown in **Figure 50**.

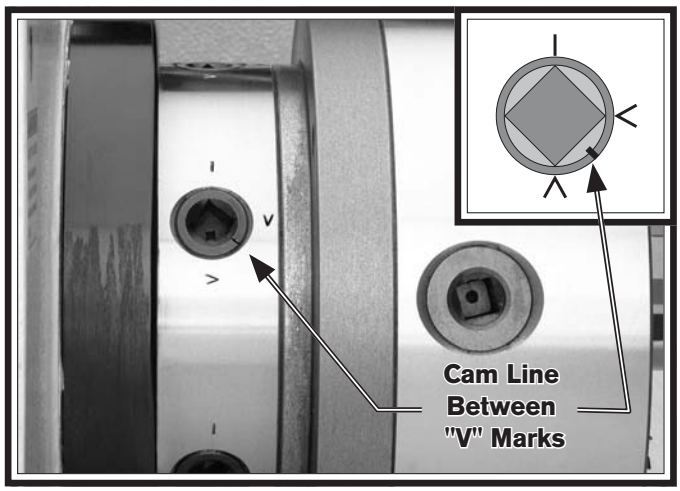


Figure 50. Camlock fully tightened with the line between the "V" marks.

Note: If any of the cam lines do not fall between the "V" marks when the camlock is tight, you must adjust the offending camlock stud as discussed in **Installing and Adjusting Camlock Studs** on **Page on this page**.

To make sure that the chuck centerline is aligned with the spindle centerline, clamp a test rod in the chuck and use a test indicator mounted on the bedways to check for workpiece runout.

Installing and Adjusting Camlock Studs

When fitting a chuck or faceplate with camlock studs, or when mounting a new chuck or faceplate, it may be necessary to install or adjust the camlock studs.

Tool Needed	Qty
Hex Wrench 6mm	1

To install or adjust camlock studs onto a chuck or faceplate:

1. Lay the chuck or faceplate upside down on a protective, flat surface.

2. If installed, remove the locking cap screw adjacent to each of the six cam-lock mounting holes (see **Figure 51**).

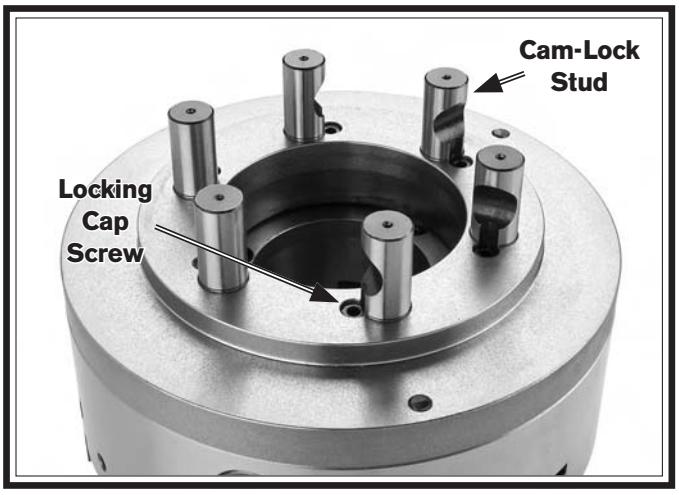


Figure 51. Identifying chuck camlock studs and locking cap screws.

3. Thread each cam-lock stud into the chuck or faceplate until the depth mark shown in **Figure 52** is even with the surface of the chuck or faceplate and the curved indent on the side of the stud faces the locking cap screw hole, as shown in **Figure 53**. This is an initial adjustment.

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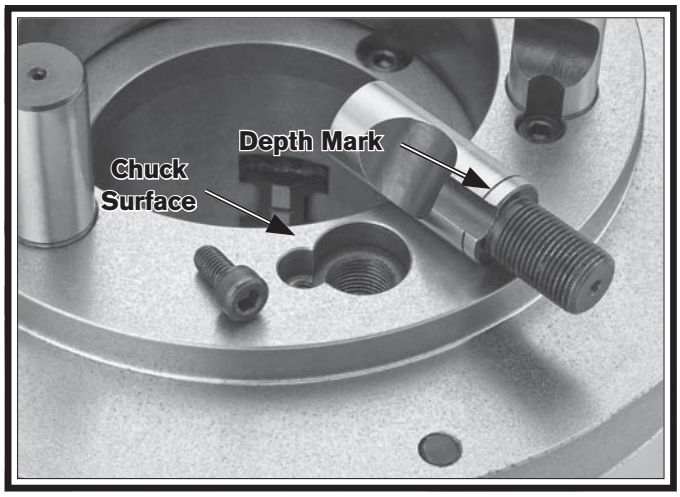


Figure 52. Example of camlock stud depth mark.

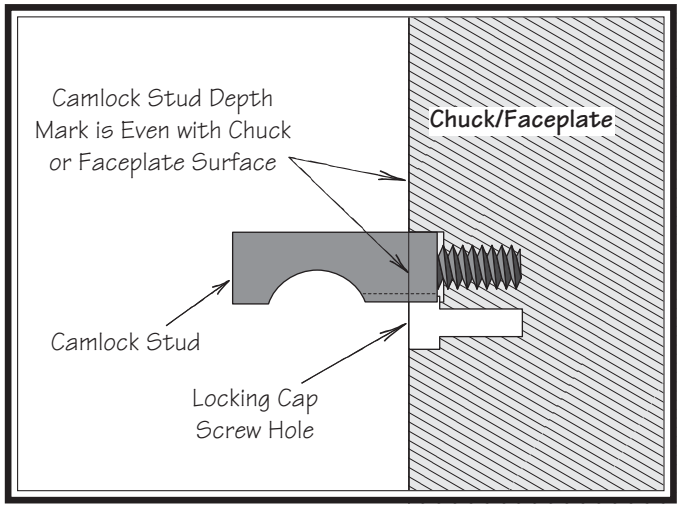


Figure 53. Initial adjustment of camlock stud.

4. Install and tighten the locking cap screws.

5. Make sure that the cam-lock studs can rotate back and forth against the head of the locking cap screw (see **Figure 54**).

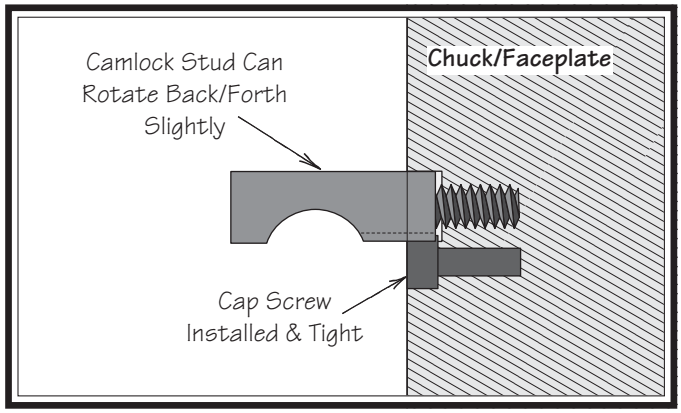


Figure 54. Camlock stud and cap screw correctly installed.

6. Insert the chuck onto the spindle, then check the position of each camlock, making sure the cam line points between the "V" marks.

— If one or more of the cams do not point between the "V" marks on the chuck, remove the chuck, and fine tune the camlock stud adjustment by adjusting the stud in or out and using **Figure 55** as a guide to correctly position the cam lines.

7. When the camlocks and chuck fit properly, find the existing mark on the spindle, and mark the chuck as shown in **Figure 49**.

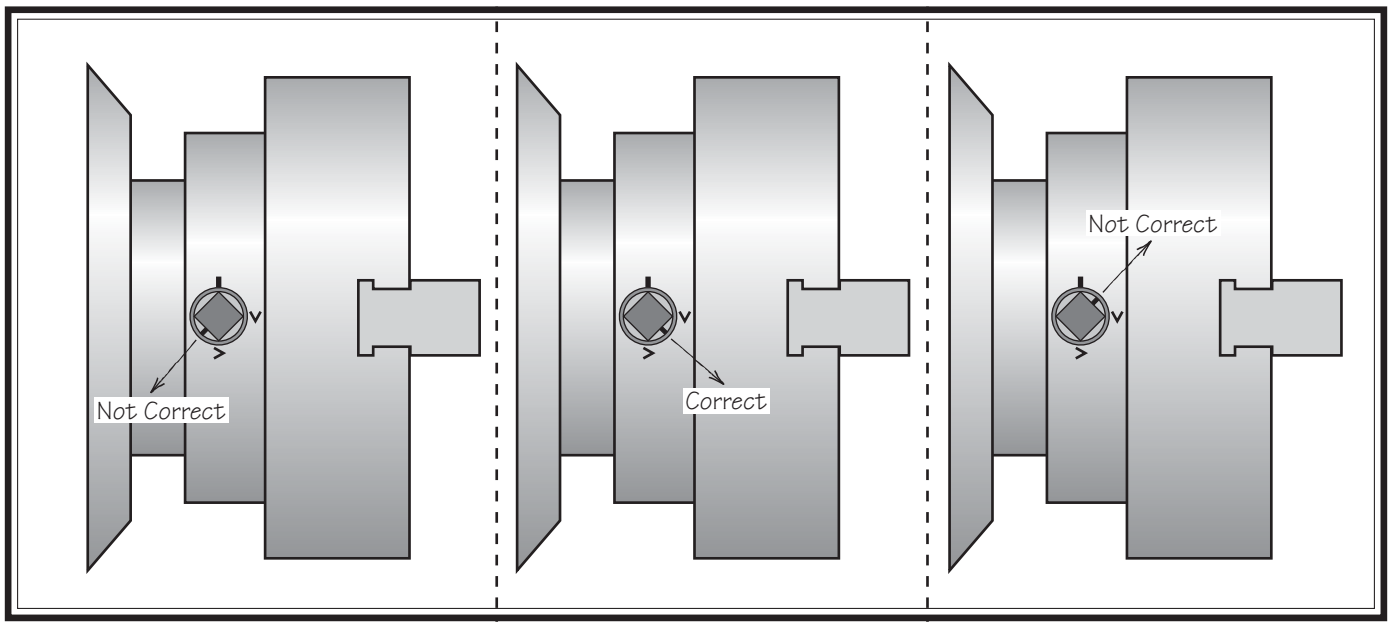


Figure 55. Correct camlock stud alignment.

3-Jaw Chuck

Refer to **Chuck & Faceplate Mounting** instructions on **Page 35** to mount the 3-jaw chuck to the spindle.

The 3-jaw scroll-type chuck included with this lathe features hardened steel jaws that center the workpiece. When the operator opens or closes the jaws with the chuck key, the jaws move in unison.

There are two sets of removable hardened steel jaws included with the 3-jaw chuck—inside and outside jaws. Use the correct jaws for the size and configuration of the workpiece to hold it firmly and securely on the chuck (see **Figure 56**). The outside of the jaws are used to hold the workpiece from the outer diameter.

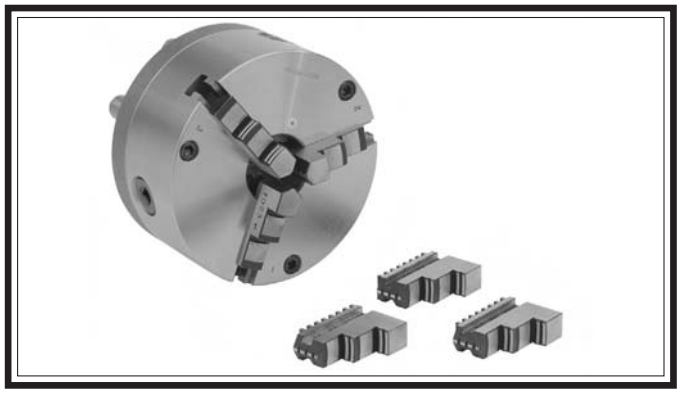


Figure 56. Chuck and jaw selection.

Numbered from 1–3, the jaws must be used in the matching numbered jaw guides, as shown in **Figure 57**.

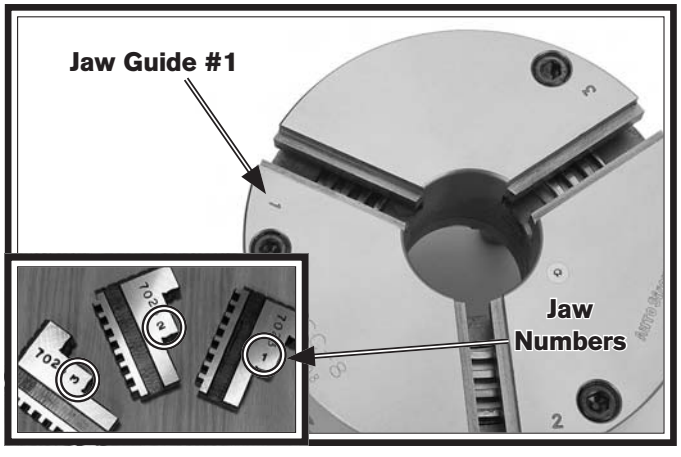


Figure 57 Jaw guides and jaw numbers.

Note: The chuck does not need to be removed from the spindle to swap the jaws.

Changing Jaws

Item Needed	Qty
Chuck Key	1
White Lithium Grease	As Needed
Chuck Cradle or Plywood ¾" (to protect bed)	1

To change the jaw:

1. DISCONNECT LATHE FROM POWER!
2. Place a piece of wood over the ways to protect them from potential damage.
3. Insert the chuck key and turn it counterclockwise to back the jaws out and remove them.
4. Clean the jaw mating surfaces and apply a thin film of white lithium grease to the mating surfaces.
5. Set the previously-mounted jaws aside in a safe place free of moisture and abrasives.
6. Rotate the chuck key clockwise until you see the initial thread of the scroll gear just begin to enter jaw guide #1 (see **Figure 58**).

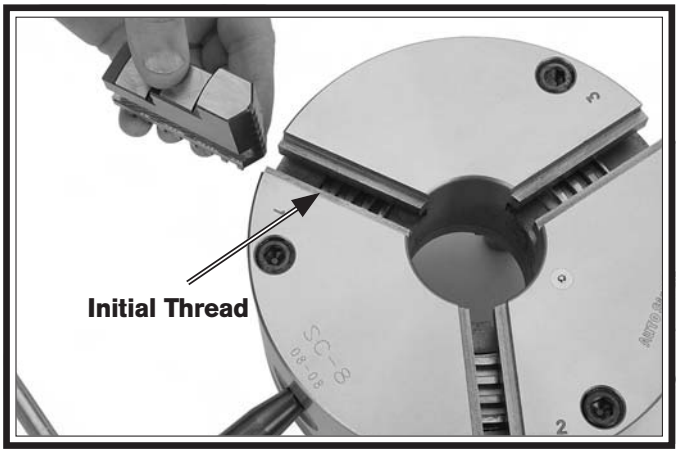


Figure 58. Inserting jaw guide #1.

7. Insert jaw #1 into jaw guide #1 and hold the jaw against the scroll gear lead thread.
8. Rotate the chuck key clockwise one turn to engage the tip of the scroll gear lead thread into the jaw. Pull on the jaw—now it should be locked into the jaw guide.
9. Repeat the **Steps 6–8** for jaws and guides #2 and #3.

— If installed correctly, the jaws converge together at the center of the chuck.

— If the jaws do not come together, the initial thread was missed on one of the jaws. Remove all the jaws and start again.

Mounting Workpiece

Items Needed	Qty
Chuck Key	1
Chuck Cradle or Plywood 3/4" (to protect bed)	1

To mount a workpiece in the 3-jaw chuck:

1. DISCONNECT LATHE FROM POWER!
2. If the workpiece is large and heavy, place a chuck cradle or plywood on the bedway below the chuck to protect it.
3. Use the chuck key to move the jaws and mount the workpiece into the chuck (refer to **Figure 59** for typical mounting methods).

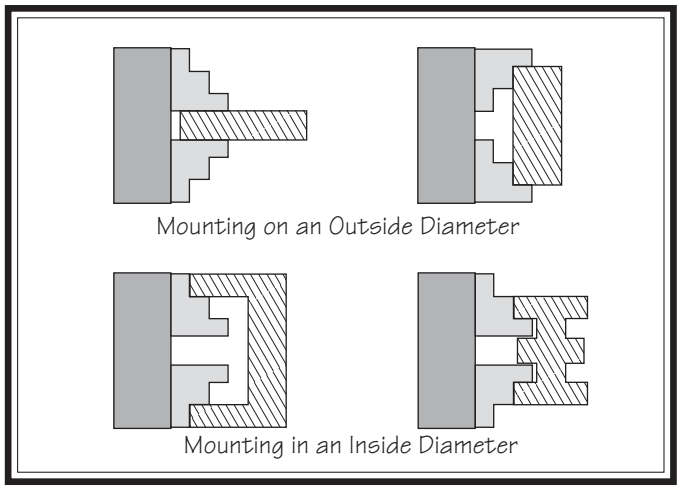


Figure 59. Typical of 3-jaw chuck mounting methods.

4. Rotate the chuck by hand to make sure the workpiece makes even contact with all three jaws and spins evenly without any visible wobble.

   — If the workpiece is not evenly held or is off-center, repeat **Steps 3–4**.

5. After verifying that the workpiece is properly centered, fully tighten the jaws to make sure the workpiece is held securely, so it will not come loose during operation.

4-Jaw Chuck

Refer to **Chuck & Faceplate Mounting** instructions on **Page 35** to mount the 4-jaw chuck to the spindle.

The 4-jaw chuck features independently adjustable hardened steel jaws to hold non-cylindrical or off-center workpieces. Each jaw can be removed from the chuck body and reversed for a wide range of work holding versatility.

Mounting Workpiece

Items Needed	Qty
Chuck Key	1
Chuck Cradle or Plywood 3/4" (to protect bed)	1

To mount a workpiece on the 4-jaw chuck:

1. DISCONNECT LATHE FROM POWER!
2. Place a chuck cradle or plywood on the bedway below the chuck to protect it.
3. Use the chuck key to open each jaw so the workpiece will lay flat against the chuck face or jaw steps.
4. With help from another person or a supporting device, mount the workpiece centered on the chuck, then turn each jaw until it makes contact with the workpiece.
5. Tighten each jaw in small increments. After you have adjusted the first jaw, continue tightening in an opposing sequence, as shown in **Figure 60**.

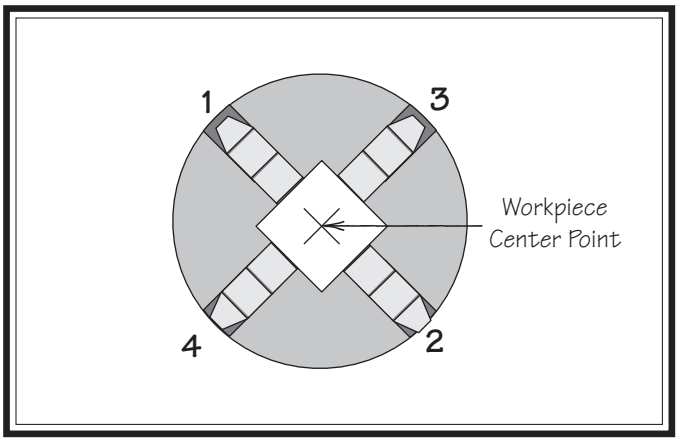


Figure 60. 4-jaw tightening sequence.

6. After the workpiece is held in place by the jaws, turn the chuck by hand and pay attention to the workpiece alignment.

— If the workpiece is not correctly aligned for your operation, turn the chuck and make fine adjustments by slightly loosening one jaw and tightening the opposing jaw until the workpiece is correctly aligned (see **Figure 61** for an example).

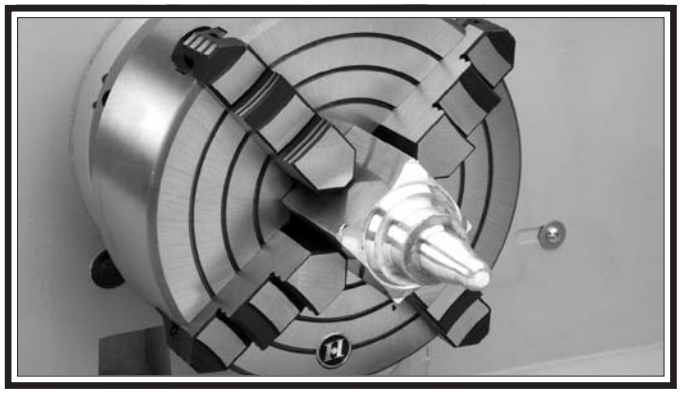


Figure 61. Example of non-concentric workpiece correctly mounted on the 4-jaw chuck.

Tailstock

The tailstock is typically used to support long workpieces by means of a live or dead center (refer to **Centers** on **Page 47**). It can also be used to hold a drill or chuck to bore holes in the center of a part. Custom arbors and tapers can also be cut on your lathe by using the off-set tailstock adjustment screws shown in (see **Figure 63**).

The tailstock quill is 3" diameter, has an MT#5 taper, and has 6½" of travel. If a tool ever becomes stuck in the bore where using the handwheel cannot extract the tool, the quill is also equipped with a slot for using a drift key (see **Figure 62**) to remove the stuck tool.

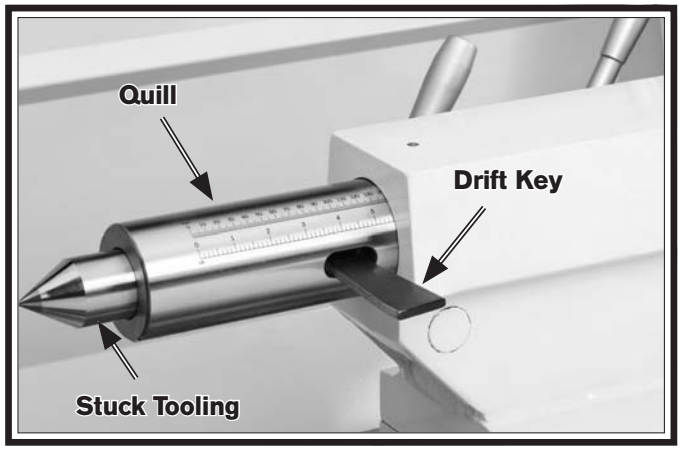


Figure 62. Tailstock controls.

Cut into the quill is a 6½" long inch-scale that is broken down into ⅛" increments, and a 16.8cm long metric scale that is and is broken down in millimeters. Inside of the quill at the end, an internal slot is present to accept drill and arbor lock tangs. This feature is especially useful when the tailstock is expected to hold large diameter drill bits where the torque loads would break most tooling free.

When maximum rigidity is mandatory, the tailstock has a secondary lock bolt and clamp (see **Figure 64**) that adds additional clamping force to that of the standard tailstock lever.

The handwheel is quipped with a graduated collar that is broken down in increments of 0.001" where 360°= 0.200" of quill travel.

Offsetting

The tailstock can be offset from the spindle centerline for turning tapers. The offset movement is controlled by two opposing cap screws on the front and back sides of the tailstock (see **Figure 63**).

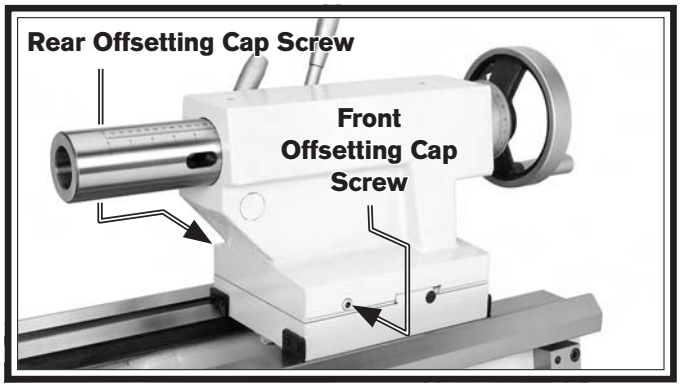


Figure 63. Offsetting cap screw.

The amount of movement is indicated by the offset scale on the back of the tailstock (see **Figure 64**). However, since the actual value of the scale is a function of workpiece length. The angle increments of the offset scale have been left as arbitrary lines only intended for use as a quick reference.

For actual calculations when returning the tailstock to the lathe centerline or defining actual angles, use a test indicator to check quill movement while adjusting screws.

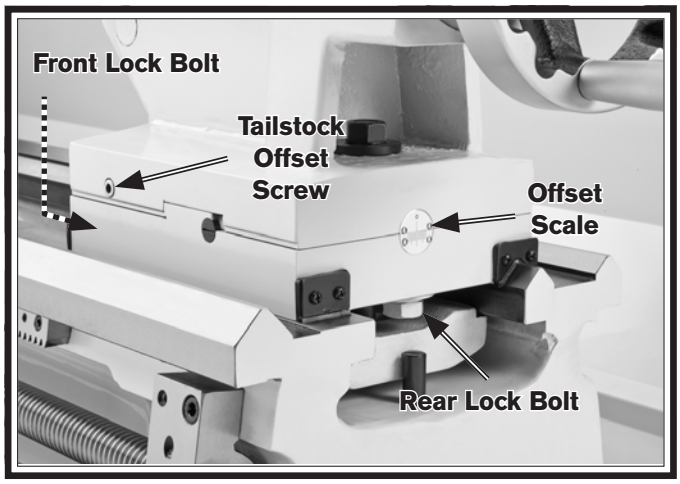


Figure 64. Tailstock offset scale.

Tool Needed	Qty
Hex Wrench 6mm	1
Wrench 28mm	1

To offset the tailstock from the spindle centerline, loosen the tailstock, and the front and rear lock bolts, then rotate the tailstock offset screws shown in **Figures 64–65**.

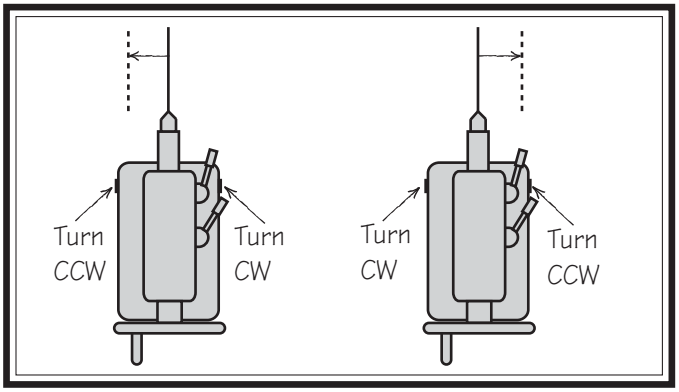


Figure 65. Tailstock offset screw adjustment.

Installing Tooling

This tailstock uses a quill with an MT#5 taper with a lock slot at the bottom to accept lock tang arbors and drill bits (see **Figure 66**).

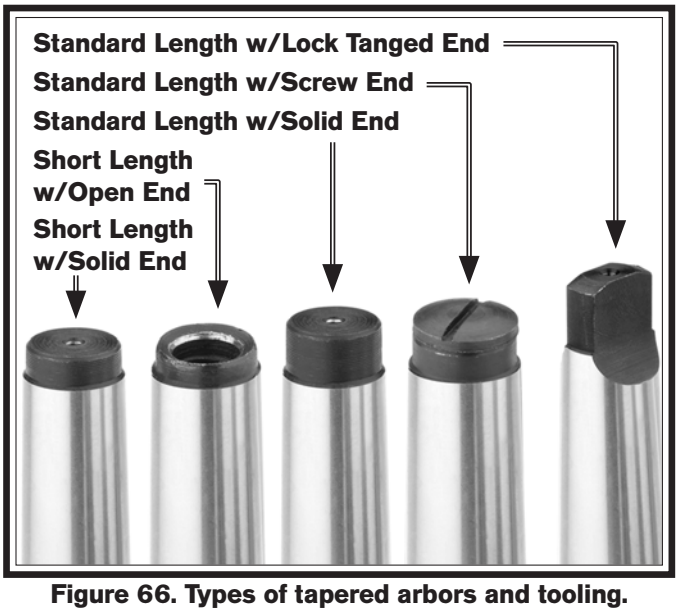


Figure 66. Types of tapered arbors and tooling.

The tang is essential to prevent an arbor or drill bit from breaking loose should the bit grab the workpiece suddenly, or if the drill bit is under heavy torque. If tooling spins inside the quill, it will gall the tapered mating surfaces. Repairing this type of damage can be time consuming or require outright quill replacement.

However, other tooling without lock tangs, such as the remaining four shown in **Figure 66**, can still be used if the following two conditions exist:

1. If the potential torque load from smaller drill chucks, drill bits, and centers will not override the strength of the MT#5 tapered fit, the tool can be used.

2. Usually the end of the arbor or tool that fits into the quill must be solid and a standard length.

If the center or tooling has an open hole in the end of the arbor but is too short to be exposed in the drift slot for removal, then a screw should be threaded into the end of the tool. Covering this hole will provide a solid surface for tailstock pin to push against when the handwheel is backed off for tool removal. Also, these short tools do not seat far enough into the quill to be exposed in the drift slot. As a result, the edge of the drift key cannot contact the tool to push it out of the quill.

Should a tool become stuck under these conditions, remove the quill or handwheel and drive the arbor or tool out with a long punch.

To install a tapered drill or chuck:

1. Lock the tailstock in position, then unlock the quill.

2. Use the tailstock handwheel to extend the quill about one inch out of the tailstock.

3. Insert a tapered drill arbor (**Figure 67**), or the tapered drill shank, into the quill until the taper is firmly seated. The matching tapers hold the arbor.

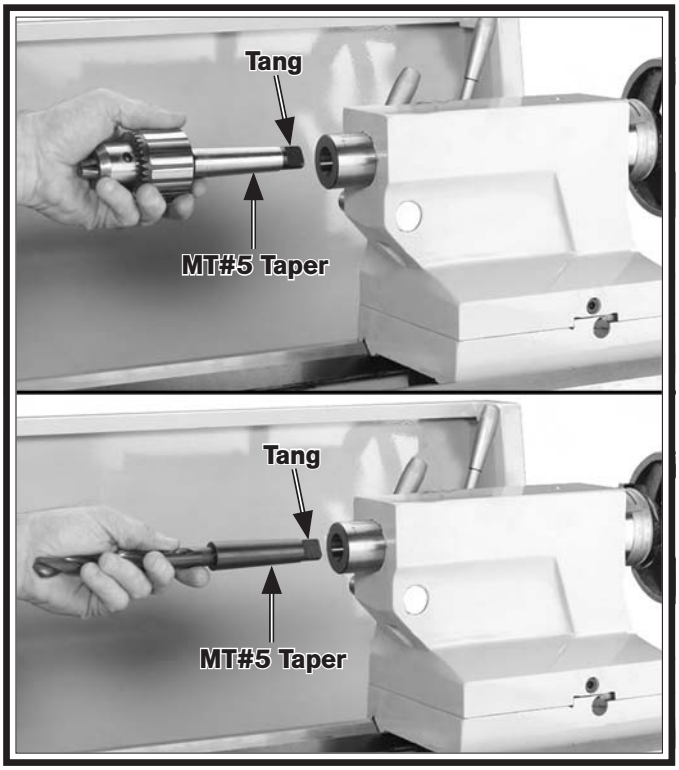


Figure 67. Inserting drill chuck arbor or tapered drill bit into tailstock.

To remove a tapered drill bit or chuck arbor:

Hold the arbor or drill bit with a rag, and turn the handwheel counterclockwise until the tooling is pushed out from the tailstock taper.

— If the arbor or drill bit is stuck in the bore and cannot be removed by using the handwheel with moderate force, do not apply extra leverage to the handwheel. Instead, extend the quill to expose the drift key slot in the quill, and use a drift key (see **Figure 62**) to remove the stuck tool.

Aligning

The offset of your lathe was aligned with the spindle centerline at the factory. We recommend that you take the time to ensure that the tailstock is aligned to your own desired tolerances, especially if you have changed the offset to cut shallow tapers.

To align the tailstock offset to the spindle centerline:

1. Use a precision level to make sure the bedway is level from side-to-side and from front-to-back.

   — If the bedway is not level, correct this condition before continuing with this procedure.

2. Obtain two pieces of steel round stock 2" in diameter and 6" long.

3. Center drill both ends of one piece of round stock, then set it aside for use in **Step 6**.

4. Use the other piece of round stock to make a dead center, and turn it to a 60° point, as shown in **Figure 68**.

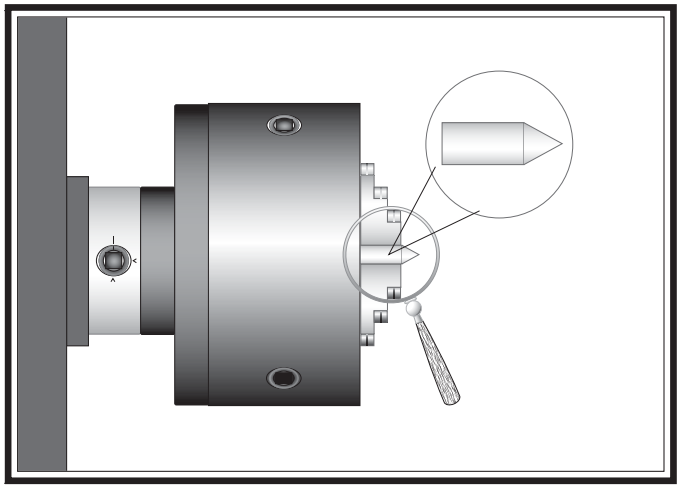


Figure 68. Non tapered dead center in the chuck.

Note: As long as this dead center remains in the chuck, the point of the center will remain true to the spindle centerline. The point will have to be refinished whenever the center is removed and then returned to the chuck.

5. Install a center in the tailstock.

6. Attach a lathe dog to the piece of stock from **Step 3**, then mount it between the centers, as shown in **Figure 69**.

Figure 69. Example of round stock mounted between the centers.

7. Turn 0.010" off the diameter of the stock.

8. Mount a test or dial indicator so that the plunger is on the tailstock quill.

Note: If necessary in the following step, refer to "To Set Up the Tailstock to Cut a Shallow Taper" on **Page 42** for adjusting the tailstock offset.

9. Use calipers to measure both ends of the workpiece.

— If the machined workpiece is *thicker* at the tailstock end, move the tailstock *toward* the operator ½ the distance of the amount of taper (see **Figure 70**).

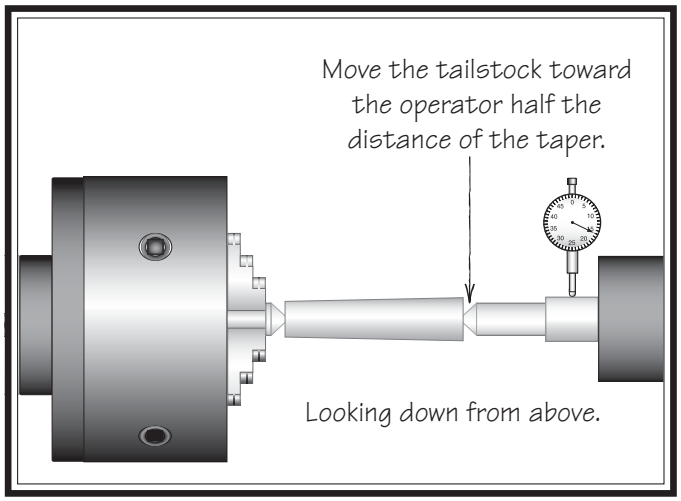


Figure 70. Adjust tailstock toward the operator.

— If the machined workpiece is *thinner* at the tailstock end, move the tailstock *away* from the operator ½ the distance of the amount of taper (see **Figure 71**).

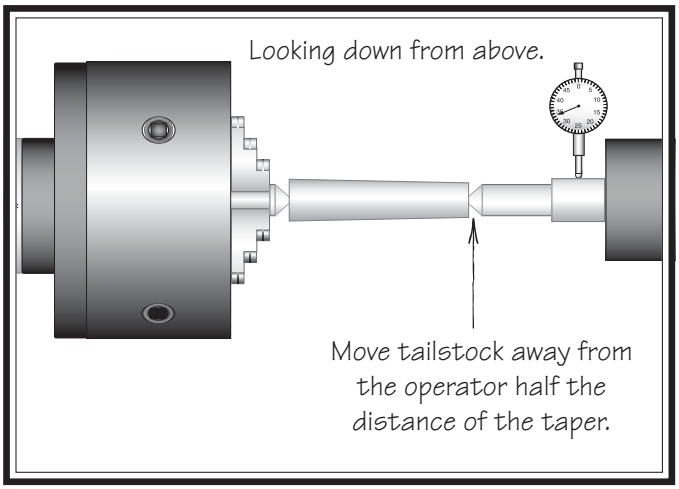


Figure 71. Adjust tailstock away from the operator.

10. Repeat **Steps 7–9** until the desired accuracy is achieved.

Faceplate

Refer to **Chuck & Faceplate Mounting** instructions on **Page 35** to mount the faceplate to the spindle.

The 15" faceplate included with your lathe offers a wide range of uses, including machining non-concentric workpieces, straight turning between centers, off-center turning, and boring.

The tools needed for mounting a workpiece will vary depending on the type of setup you have.

⚠WARNING

Failure to properly secure a workpiece to the faceplate could cause the workpiece to be thrown from the lathe with deadly force at the operator or bystanders. Use a minimum of three independent clamping devices to hold a non-concentric workpiece onto the faceplate.

⚠WARNING

Machining non-concentric workpieces at a high speed could cause the workpiece to be thrown from the spindle with deadly force at the operator or bystanders. To reduce this risk, only machine non-concentric workpieces at low speeds and clamp counter-weights to the faceplate to balance it.

Mounting Workpiece with Clamps

1. DISCONNECT LATHE FROM POWER!
2. Place a piece of ¾" plywood on the bedway below the spindle.
3. With help from another person, place the workpiece onto the faceplate and clamp it in place with a minimum of three independent clamping devices (see **Figure 72** for an example).

Note: Be sure to take into account the rotation and cutting forces that will be applied to the workpiece when clamping it to the faceplate.

4. Double check tool and slide motion clearances before turning the spindle ***ON***.

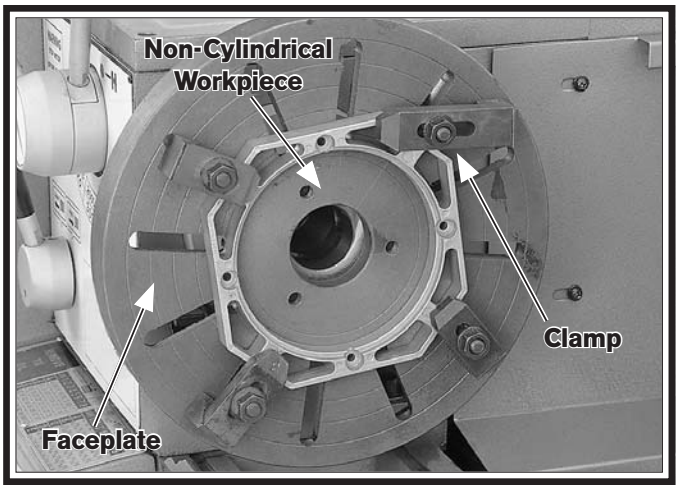


Figure 72. Example of workpiece clamped in a faceplate.

Mounting Workpiece Between Centers

1. DISCONNECT LATHE FROM POWER!
2. Drill center holes in both ends of the workpiece.
3. Install the dead center in the spindle and the live center or carbide-tipped dead center in the tailstock (refer to **Page 47**).
4. Secure a lathe dog on the spindle-end and place a drop of oil in the center hole on the tailstock-end of the workpiece.
5. Mount the workpiece between centers so the lathe dog tail fits freely in the faceplate slot without binding as shown in **Figure 73**.

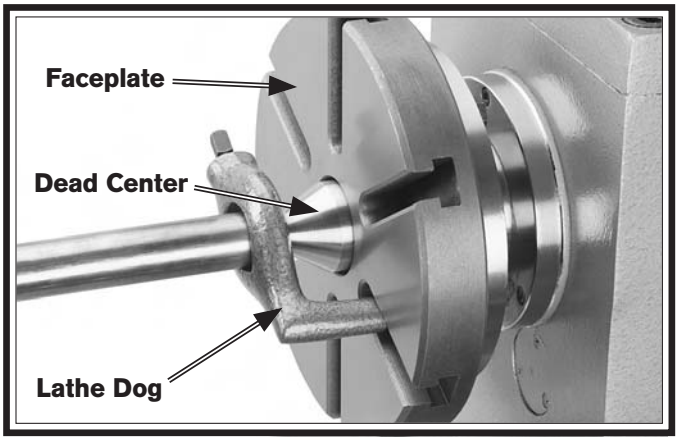


Figure 73. Example of using a typical faceplate to mount work between centers.

Centers

Figure 74 shows the dead centers included with the lathe. In addition, an MT#7–MT#5 tapered spindle sleeve is included for mounting centers in the spindle.

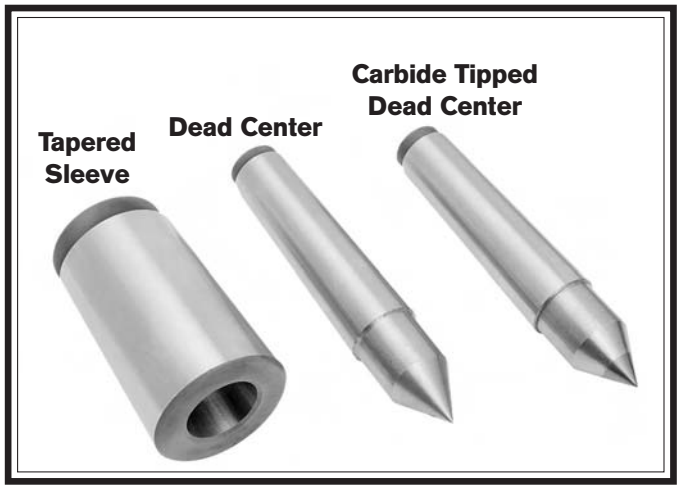


Figure 74. Tapered sleeve and dead centers.

Dead Centers

The dead center achieves more accurate results than a live center, but it requires low spindle speeds and a small amount of oil to reduce friction and wear that will damage the workpiece.

Use the dead center in the spindle, since the workpiece does not rotate on the tip and does not generate friction.

Use the carbide-tipped dead center in the tailstock where the workpiece will rotate against it and generate friction. The carbide-tipped dead center can better withstand the effects of friction; however, the tip of the center must be lubricated to avoid premature wear and maximize smooth operation. Also, using low spindle speeds will also reduce the heat and wear from friction.

Live Centers

A live center has bearings that allow the center tip and the workpiece to rotate together; it can be installed in the spindle and the tailstock quill for higher speeds. However, a live center typically does not provide the same level of rigidity as a dead center, and final workpiece accuracy can suffer as a result.

Mounting Center in Spindle

1. DISCONNECT LATHE FROM POWER!

2. Thoroughly clean and dry the tapered mating surfaces of the spindle bore, tapered sleeve, and the center, making sure that no lint or oil remains on the tapers.

3. Insert the center into the sleeve, then insert the sleeve into the spindle bore through the chuck or faceplate.

   Figure 75 shows an example of the dead center installed in the spindle, using a lathe dog and faceplate for turning between centers.

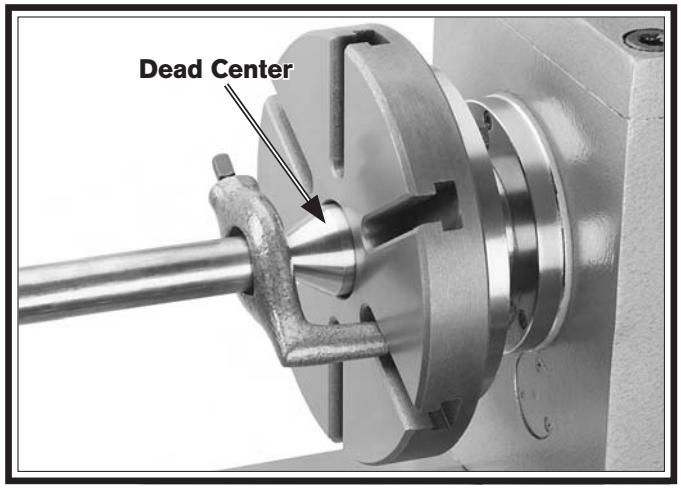


Figure 75. Example of using a dead center with a faceplate and lathe dog.

NOTICE

To avoid premature wear of the dead center or damage to the workpiece, use low spindle speeds and keep the tip of the dead center mounted in the tailstock well lubricated.

Removing Center from Spindle

To remove the sleeve and center from the spindle, insert a piece of round bar stock or similar tool through the outboard end (on the left side of the headstock), then while holding the sleeve, have a second person tap the sleeve loose.

Mounting Center in Tailstock

Either the carbide-tipped dead center or a live center can be mounted in the tailstock. Mounting instructions are the same for both.

To mount a center in the tailstock:

1. DISCONNECT LATHE FROM POWER!
2. Thoroughly clean and dry the tapered mating surfaces of the tailstock quill bore and the carbide-tipped dead center, making sure that no lint or oil remains on the tapers.
3. Use the tailstock quill handwheel to feed the quill out from the casting about 1". (Do not feed the quill out of the casting more than 2" or stability and accuracy will be reduced.)
4. Insert the center into the tailstock quill.
5. Seat the center firmly into the quill during workpiece installation by rotating the quill handwheel clockwise to apply pressure, with the center engaged in the center hole in the workpiece.

Note: Only apply enough pressure with the tailstock quill to securely mount the workpiece between centers. Avoid over-tightening the center against the workpiece, or it may become difficult to remove later, and it will result in excessive friction and heat, which may damage the workpiece and the center.

Removing Center from Tailstock

To remove the center from the quill, hold onto it with a rag in one hand, then rotate the tailstock handwheel counterclockwise to draw the quill back into the casting until the center releases. If the center does not come out, extend the quill, and use a drift key (see **Figure 62**) to drive the center out.

Steady Rest

The steady rest supports long shafts from ¾" to 8¾" in diameter and can be mounted anywhere along the length of the bed.

To install and use the steady rest:

1. DISCONNECT LATHE FROM POWER!
2. Thoroughly clean all mating surfaces, then place the steady rest base on the bedways so the triangular notch fits over the bedway prism.
3. Position the steady rest where required to properly support the workpiece, then tighten the hex nut shown in **Figure 76**.

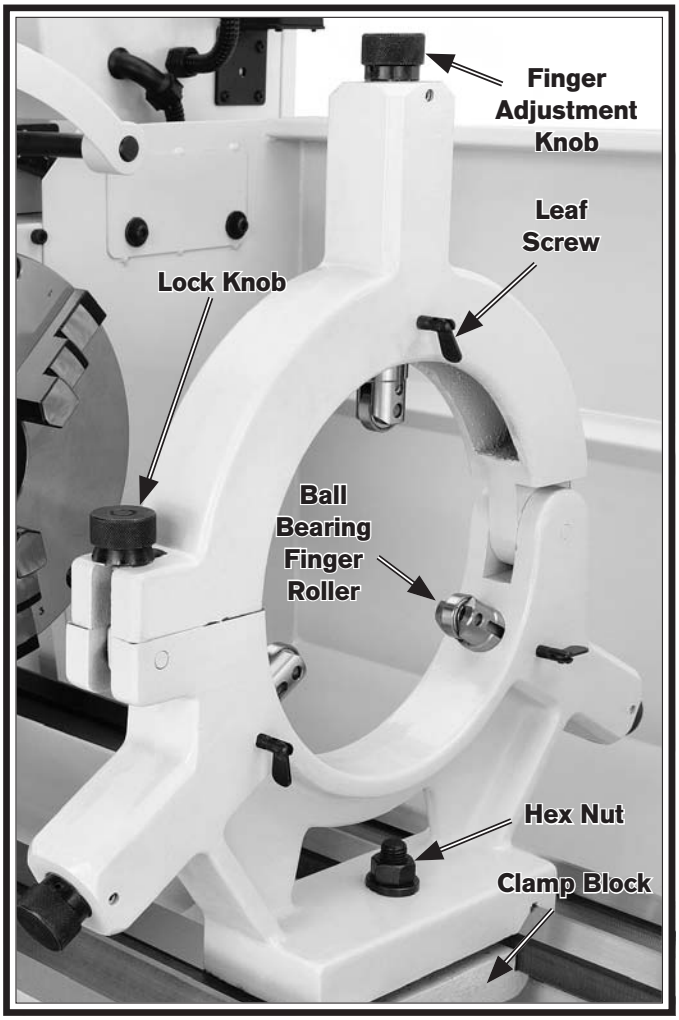


Figure 76. Steady rest components.

4. Loosen the lock knob (**Figure 76**), open the steady rest, and install the workpiece so it is supported at both ends.

5. Close the steady rest and tighten the lock knob.

6. Loosen the three leaf screws. Without causing any deflection in the workpiece, use the finger adjustment knobs to position the finger rollers against the workpiece.

7. Tighten the leaf screws.

Note: The finger rollers should properly support the workpiece but allow it to freely rotate.

Follow Rest

The follow rest mounts to the saddle with two cap screws (**Figure 77**). It is used on long, slender parts to prevent workpiece flexing from the pressure of the cutting tool during operation. Adjust the fingers on the follow rest in the same manner as those on the steady rest. To avoid marring, make sure to keep the contact surface well oiled during turning operations.

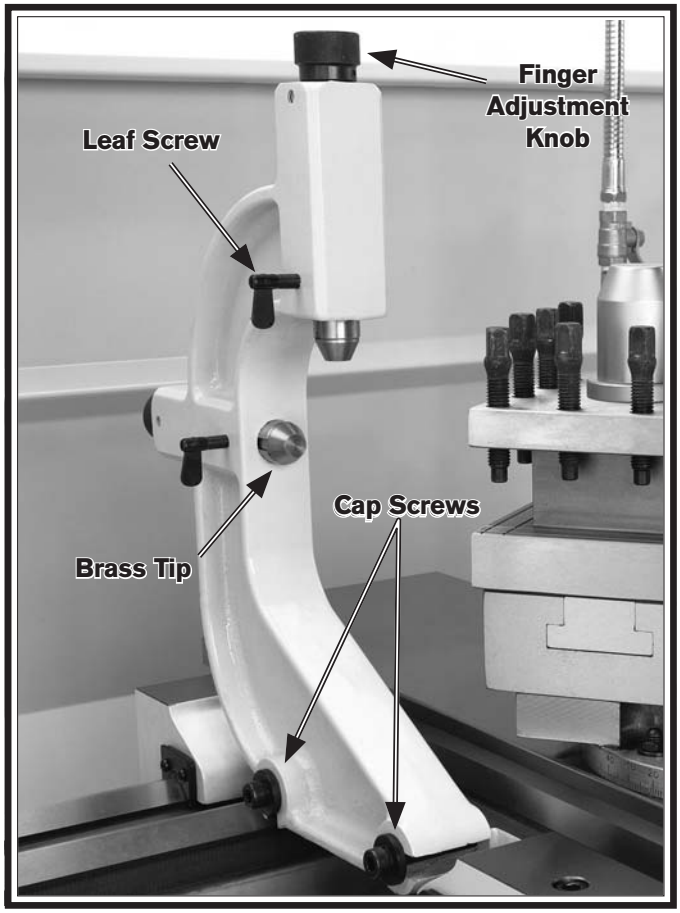


Figure 77. Follow rest attachment.

Compound Slide

The compound slide handwheel has an indirect-read graduated collar. This means that the distance shown on the scale represents the actual distance the tool moves, which will remove twice as much material from the diameter of the workpiece. The base of the compound slide has another graduated collar used for setting the tool to a specific angle.

To set the compound slide at a certain angle:

1. Loosen the two hex nuts at the base of the compound slide (1 of 2 shown in **Figure 78**).

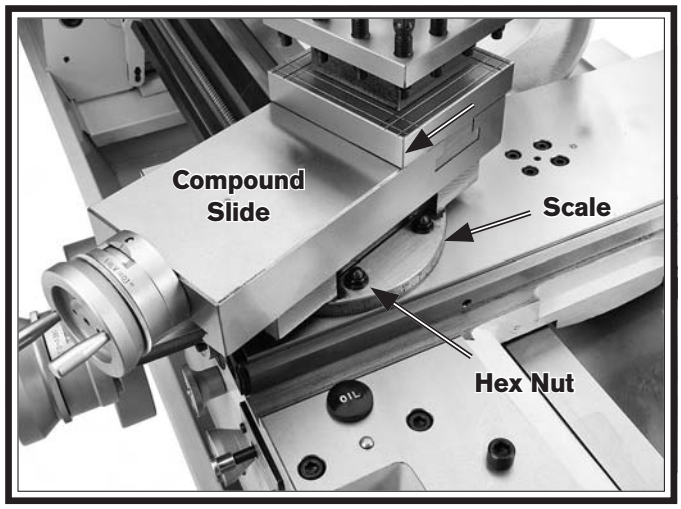


Figure 78. Compound slide set at an angle.

2. Rotate the compound slide to the desired angle, as indicated by the scale at the base, then retighten the two hex nuts.

Tip: If setting up to cut external right-hand inch or metric threads, or left-hand internal threads for the first time, set the compound so its travel is perfectly parallel with the cross slide. Using a protractor, rotate the compound 29.5° counterclockwise and mark the new location on the compound slide. This mark will be the quick reference point for setting the offset angle. To mark for internal right-hand threads, or left-hand external threads, repeat this process, but rotate the compound 29.5° clockwise and mark the cross slide accordingly.

4-Way Tool Post

The 4-way tool post is mounted on top of the compound slide, and allows a maximum of four tools to be loaded simultaneously. Quick indexing to different tools is accomplished by loosening the top handle, rotating the tool post to the desired position, then re-tightening the handle to lock the tool into position.

Tool Needed	**Qty**
Tool Post T-Wrench	1

To load the tool post:

1. Choose the desired cutting tool.

2. Loosen the tool post bolts so that the cutting tool can fit underneath them.

Note: If necessary, place one steel shim of the required thickness underneath the cutting tool, so the cutting tip is properly aligned with the workpiece. The shim should be as long and as wide as the cutting tool to properly support it, a set of standard automotive feeler gauges work well for this.

⚠WARNING

Over-extending a cutting tool from the tool post will increase the risk of it breaking during operation, which may cause metal pieces to be thrown at the operator or bystanders with great force. Only extend a cutting tool 2.5 times the width of its cross-section or less (i.e., 2.5 x 0.5" = 1.25").

3. Firmly secure the cutting tool with at least two tool post bolts shown in **Figure 79**.

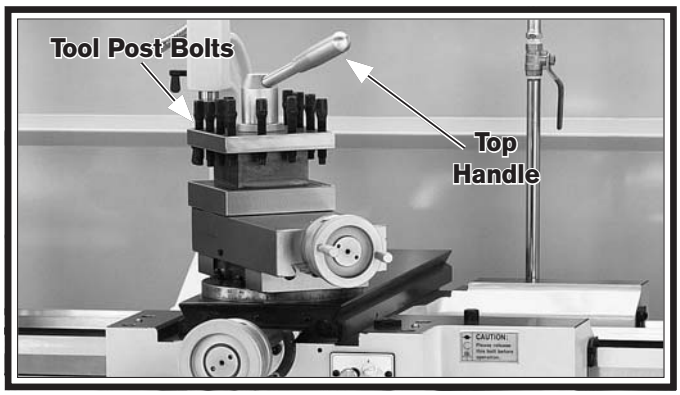


Figure 79. 4-Way tool post.

Aligning Cutting Tool with Spindle Centerline

For most operations, the cutting tool tip should be aligned with the spindle centerline, as illustrated in **Figure 80**.

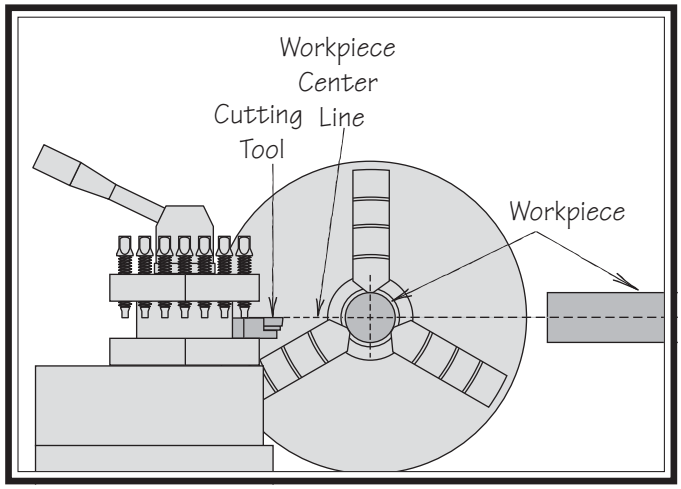


Figure 80. Cutting tool aligned with workpiece center (view from tailstock).

There are a number of ways to check and align the cutting tool to the spindle centerline. Below are two common methods:

- Align the tip of the cutting tool with a center installed in the tailstock (refer to instructions that follow). For this to work, the tailstock must be aligned to the spindle centerline (refer to **Aligning Tailstock** on **Page 44**).

- Make a facing cut on a piece of round bar stock. If the tool is above/below the spindle centerline, a nub will be left in the center of the workpiece. Adjust the height of the workpiece, then repeat the facing cut to check the adjustment. Repeat as necessary until the center of the workpiece is smoothly faced.

Tools Needed	Qty
Tool Post T-Wrench	1
Steel Shim	As Needed
Cutting Tool	1
Fine Ruler	1
Tailstock Center	1

To align the cutting tool with the tailstock center:

1. Mount the cutting tool in the tool post, then turn the tool post so the tooling faces the tailstock.

2. Install a center in the tailstock, and position the center tip near the tip of the cutting tool.

3. Lock the tailstock and quill in place.

4. Adjust the height of the cutting tool with a steel shim, so the tip just touches the end of the tailstock center, as shown in **Figure 81**.

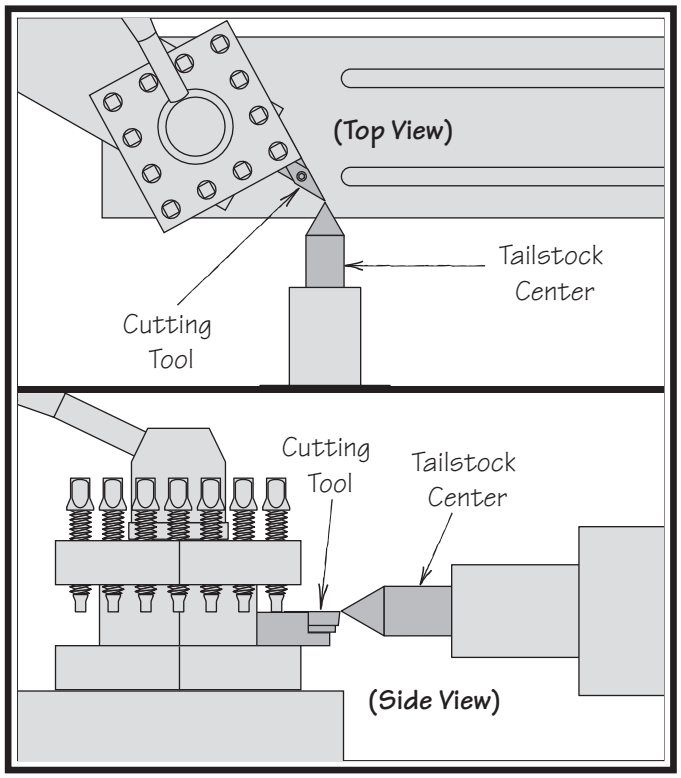


Figure 81. Cutting tool tip aligned with tailstock center.

Micrometer Stop

NOTICE

The micrometer stop on this lathe will NOT automatically stop the carriage or disengage the power feed! Failure to heed this notice could result in the carriage crashing and causing severe machine or property damage.

Use the micrometer stop as a guide to help judge when to stop the carriage movement. The scale increments are 0.001" where 360°=0.050".

Tools Needed	Qty
Hex Wrench 8mm	1

To adjust the micrometer stop:

1. DISCONNECT LATHE FROM POWER!

2. Loosen the cap screws shown in **Figure 82**.

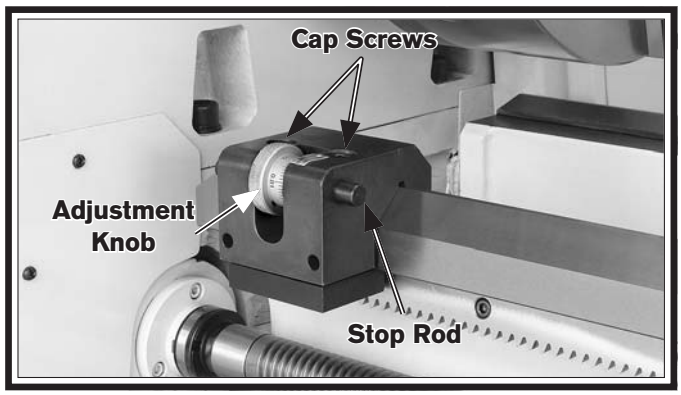


Figure 82. Micrometer stop.

3. Use the carriage handwheel to position the carriage/cutting tool at the stop point you want to set (typically the maximum distance the carriage can travel before there is a crash).

4. Position the micrometer stop so the stop rod is firmly against the carriage, retighten the cap screws loosened in **Step 2**, and use the adjustment knob to fine tune the position of the stop rod.

5. Move the carriage away from the stop rod, then move it back against the stop rod and verify that tooling will not make contact with chuck, jaws, or other components (rotate the chuck by hand to verify rotational clearance).

Manual Feed

These three handwheels (see **Figure 83**) manually position and control the cutting tool for lathe operations.

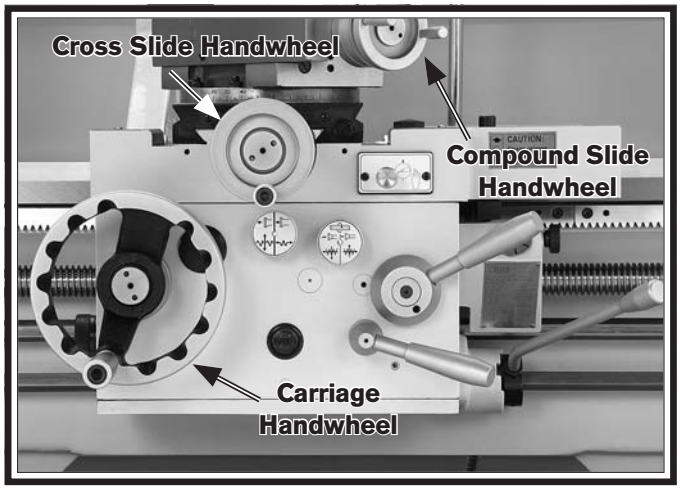


Figure 83. Carriage handwheels.

Carriage Handwheel

Moves the carriage parallel along the ways, and is equipped with a graduated collar in increments of 0.010" where 360°= 0.990". The handwheel can also be disengaged when power feed operations would make it an entanglement hazard by pushing it in.

Cross Slide Handwheel

Moves the cross slide perpendicular to the ways. For every revolution of the handwheel, the slide moves twice the distance or at a at a 1:2 ratio. The graduated collar indicates in increments of 0.001"where 360°= 0.200". When turning for example the scale directly reads the resulting workpiece diameter.

Compound Slide Handwheel

Moves the tool in fine increments into the workpiece. The handwheel has an "indirect reading" graduated collar that is broke down in 0.001" increments. When the tool path is perpendicular to the workpiece, the movement that is shown on the scale is only half of what has been removed from the workpiece. For example, if the handwheel is rotated 0.001" the compound slide and tool bit moves 0.001". This results in 0.002: being removed from the workpiece diameter.

Spindle Speed

Using the correct spindle speed is important for safe and satisfactory results, as well as maximizing tool life.

To set the spindle speed for your operation, you will need to: (1) Determine the best spindle speed for the cutting task, and (2) configure the lathe controls to produce the required spindle speed.

Determining Spindle Speed

Many variables affect the optimum spindle speed to use for any given operations, but the two most important are the recommended cutting speed for the workpiece material and the diameter of the workpiece, as noted in the formula shown in **Figure 84**:

$$\frac{{}^{*}\text{Recommended Cutting Speed (FPM)} \times 12}{\text{Dia. of Cut (in inches)} \times 3.14} = \text{SpindleSpeed (RPM)}$$

*Double if using carbide cutting tool

Figure 84. Spindle speed formula for lathes.

Cutting speed, typically defined in feet per minute (FPM), is the speed at which the edge of a tool moves across the material surface.

A recommended cutting speed is an ideal speed for cutting a type of material in order to produce the desired finish and optimize tool life.

The books **Machinery's Handbook** or **Machine Shop Practice**, and some internet sites, provide excellent recommendations for which cutting speeds to use when calculating the spindle speed. These sources also provide a wealth of additional information about the variables that affect cutting speed and they are a good educational resource.

Also, there are a large number of easy-to-use spindle speed calculators that can be found on the internet. All of these sources will help you take into account all the applicable variables in order to determine the best spindle speed for the operation.

Setting Spindle Speed

⚠WARNING

Make sure the variable speed dial is turned all the way to the left (counterclockwise) before turning the lathe ON, or the spindle may start up at a dangerously high rate of speed.

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

2. Use the chart in **Figure 85** to determine the available spindle speed range closest to your calculated spindle speed.

SPINDLE SPEED RANGES	RPM
Low Speed Range 1	18–55
Medium Speed Range 2	55–180
Medium-High Speed Range 3	180–600
High Speed Range 4	600–1800

Figure 85. Spindle speed range chart.

3. Turn the spindle speed dial shown in **Figure 86** all the way counterclockwise to the minimum.

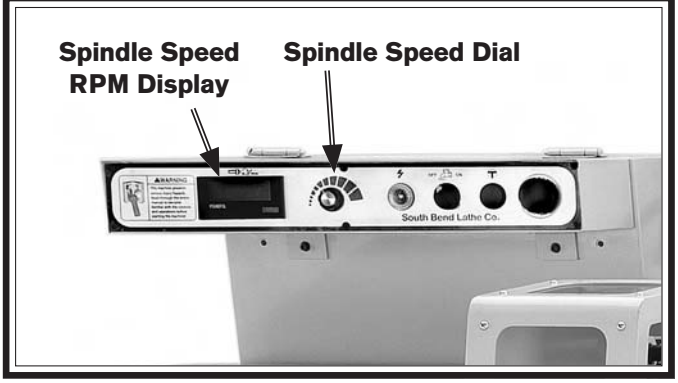


Figure 86. EVS spindle speed controls.

4. Move the spindle range lever shown in **Figure 87** to the range that covers your calculated spindle speed.

Note: To shift the spindle speed range lever, you may need to rock the chuck by hand to get the gears to align.

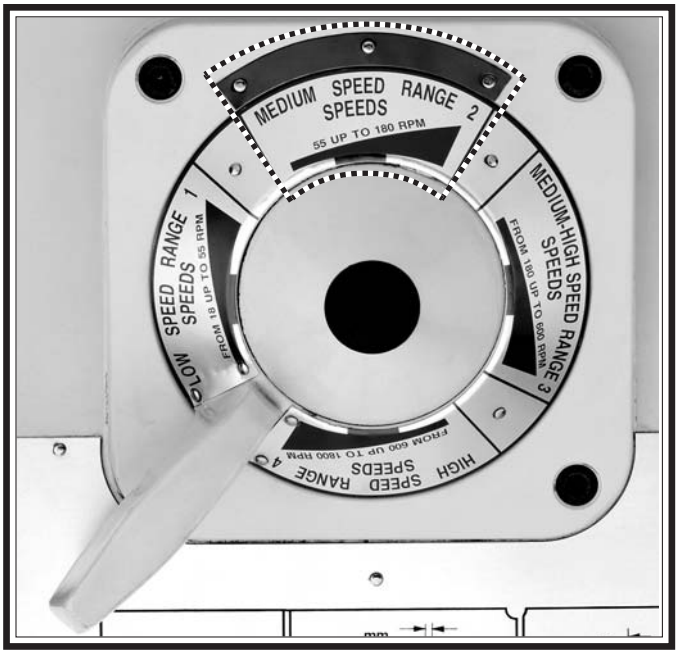


Figure 87. Spindle speed range lever.

5. Turn the spindle ***ON***, and slowly turn the spindle speed dial to your calculated spindle speed.

NOTICE

If using the quick change gearbox, and it is shifted into high, NEVER run the spindle at speeds greater than 350 RPM as listed on the label (Figure 88), or feed system damage will occur. DO NOT shift any levers on the headstock or quick change gearbox while the spindle is turning, or damage will occur to the gearing.

Figure 88. Quick change range lever.

Power Feed

On this lathe, both the carriage and cross slide have power feed capability. The power feed system is protected by an adjustable feed rod clutch located on the input side of the apron. The rate that these components move (feed rate) is controlled by how the quick change gearbox levers are configured.

Feed rate and spindle speed must be considered together. 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 also be driven by the leadscrew for threading operations. However, this section covers using the power feed option only for non-threading operations. To learn how to power the carriage for threading operations, refer to the **Threading Controls** section **Page 56**.

Power Feed Controls

The headstock feed direction lever shown in **Figure 89** controls the direction the carriage moves. However, it is important to understand that there is a direction change relationship between the headstock feed direction lever and the apron feed direction knob (see **Figure 90**). The apron feed direction knob and the headstock feed direction lever reverse the feed direction of each other. For example:

- When the apron feed direction knob is pushed-in, the direction of carriage travel shown on the headstock feed direction lever plate is applicable only when threading. For feeding, the directions shown will be opposite.

- When the apron feed direction knob is pulled-out, the direction of carriage travel shown on the headstock feed direction plate is accurate only when feeding. For threading, the directions shown will be opposite.

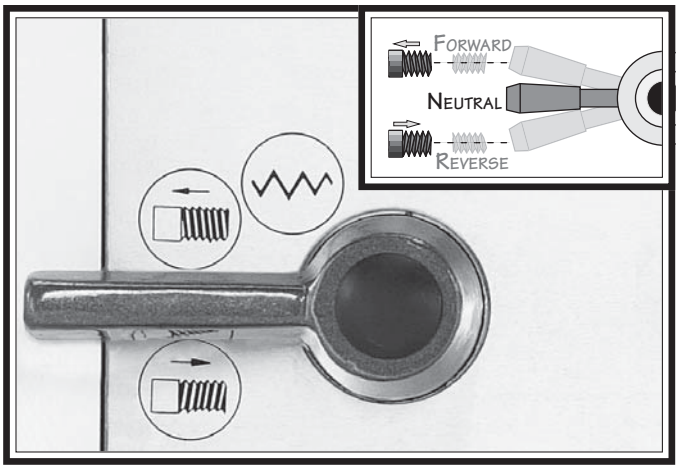


Figure 89. Headstock feed direction lever.

The main benefit of the apron feed direction knob shown in **Figure 90** is that it changes the direction of the selected feed without having to stop the lathe, and walk over and shift the headstock feed direction lever.

The feed selection knob shown in **Figure 90** engages either the carriage or cross slide feed.

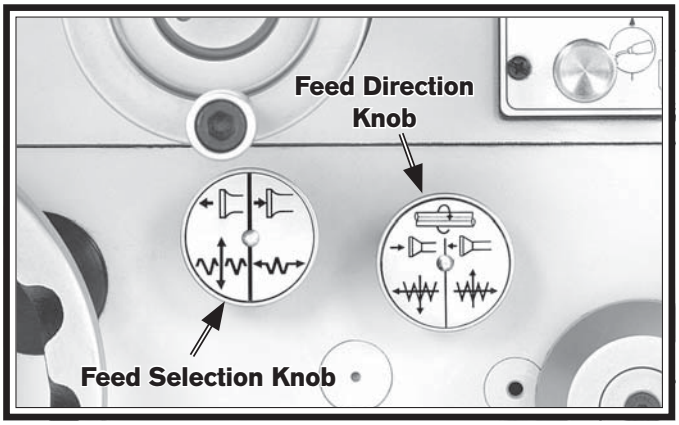


Figure 90. Apron feed knobs.

NOTICE

The apron feed direction knob and the headstock feed direction lever reverse the feed direction of each other. Before and after power feed operations, push-in the apron feed direction knob to the "normal position". Otherwise, if it is left pulled out, another lathe operator may move refer to the headstock plate and select a feed direction selection lever to his desired, only to suddenly realize when feeding begins, the feed movement is opposite what was shown causing possible carriage crash!

NOTICE

NEVER shift the headstock feed direction lever on the headstock while the spindle is turning, or damage will occur to the headstock gearing.

If the threading or general carriage feed is required, the carriage lock (see **Figure 91**) must be disengaged. If the cross feed will be used for facing, the carriage lock should be engaged and the cross feed gib lock screw (see **Figure 91**) should be loose. If it is tight, loosen the cross feed gib lock using a 3mm hex wrench.

To engage the power feed:

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

2. Shift the headstock feed direction lever to engage the leadscrew or feed rod. Sometimes you need to slightly rotate the handwheel of the component you are trying to engage, so that the gears can mesh.

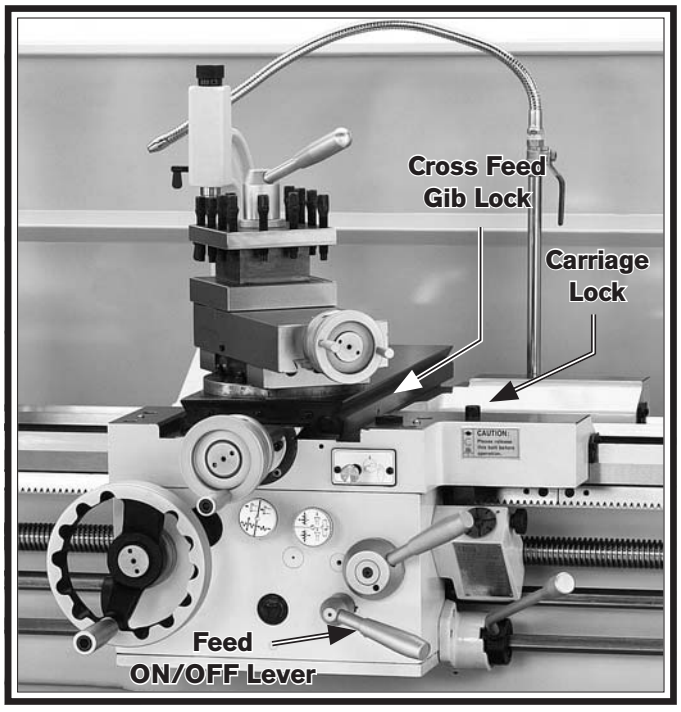


Figure 91. Carriage lock and gib lock.

3. Push down on the feed ON/OFF lever (see **Figure 91**) on the front of the apron to engage power feed for either the carriage or the cross slide.

4. Push the feed selection knob in to select carriage feed, or pull the feed selection knob out to select cross feed.

5. Adjust the feed clutch knob, shown in **Figure 92**, to set at which point the feed clutch will slip to avoid feed system overload.

   — Tighten the feed clutch knob completely to seat the clutch. Next, count how many turns it takes to back it off completely. Then tighten the knob ⅓ of the distance that was backed-off. If the clutch slips too easily at this conservative setting, the knob can be tightened further. But keep in mind that when the knob is completely tight, the feed clutch is overridden and will not slip in the event of a feed system overload, resulting in feed system damage.

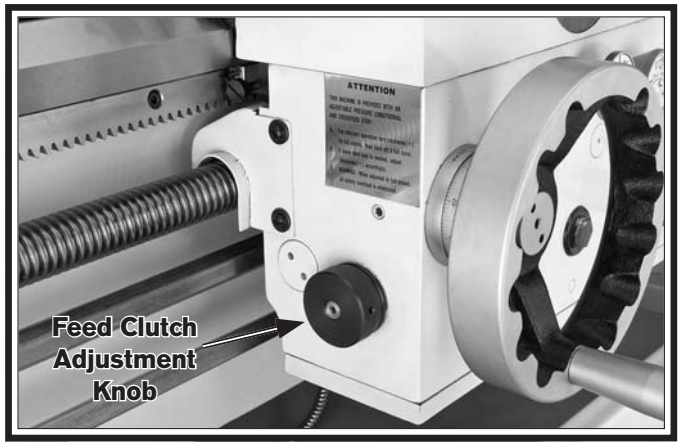


Figure 92. Feed clutch knob.

To use the apron feed direction knob during lathe operations:

1. Pull up on the feed ON/OFF lever to disengage the apron feed system.

2. Push in or pull out the apron feed direction knob to change the direction of the current feed selected.

3. Push down on the feed ON/OFF lever to resume the feed operation in the opposite direction.

Threading

If you are unfamiliar with how to cut threads on a lathe, we strongly recommend that you read books, review industry trade magazines, or get formal training before beginning any attempting any threading projects.

Power Feed Lever

The feed ON/OFF lever must be in the fully up disengaged position or the internal lockout will prevent the half nut lever from applying the half nut. Also to avoid shearing the leadscrew shear pin, the carriage lock (**Figures 93–94)** must be loosened before threading begins.

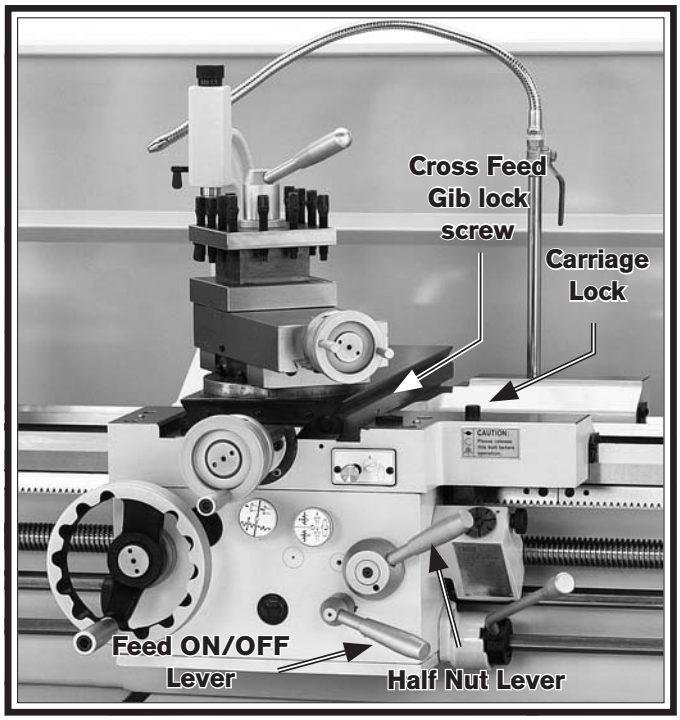


Figure 93. Carriage controls.

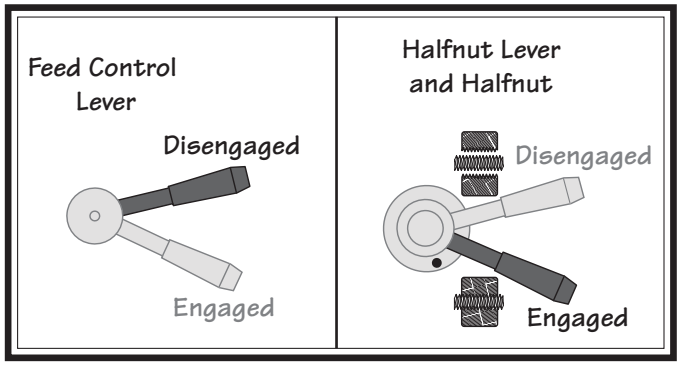


Figure 94. Feed ON/OFF lever and half nut positions for threading.

Half Nut Lever

The half nut lever locks the carriage to the leadscrew which moves the cutting tool along the length of the workpiece (**Figures 93–94)**.

NOTICE

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

Thread Dial & Chart Overview

The numbers on the thread dial are used with the thread dial chart to show when to engage the half nut during inch threading or threading Witworth threads. The thread dial gear must be engaged with the leadscrew for this to work. Loosen the knurled thumb knob on the thread dial, pivot the dial gear into mesh with the leadscrew, then tighten the hand knob (see **Figure 95**).

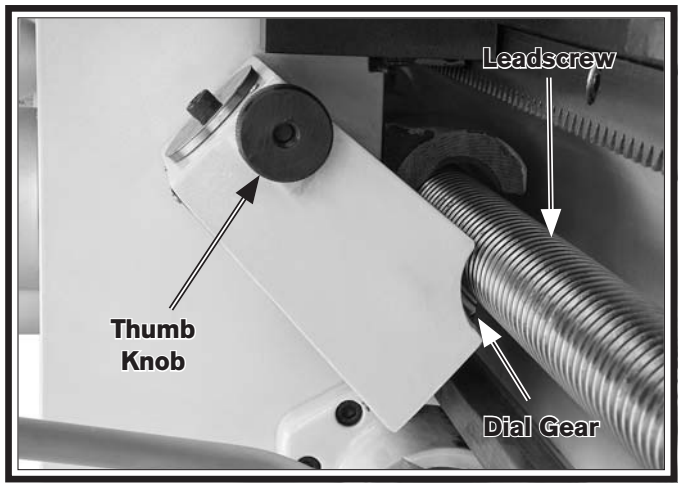
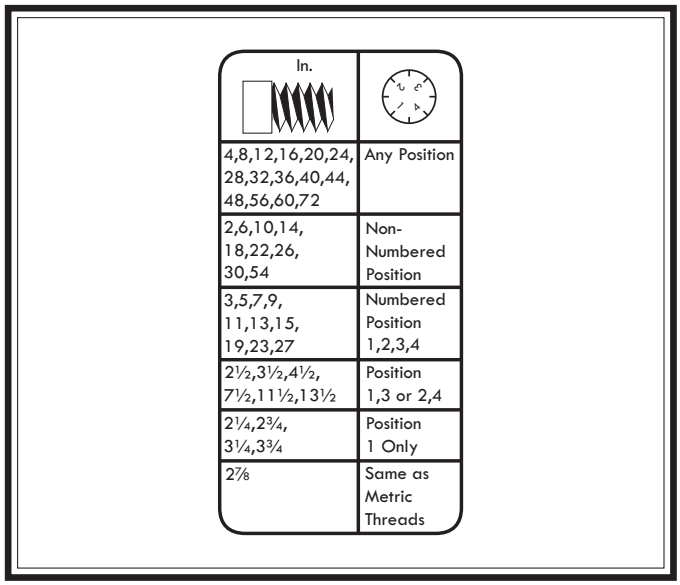


Figure 95. Thread dial gear engaged with the leadscrew.

Using Thread Dial and Chart

Find the TPI (threads per inch) that you want to cut in the left column (see **Figure 96**), then reference the dial number 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.



In.	
4,8,12,16,20,24, 28,32,36,40,44, 48,56,60,72	Any Position
2,6,10,14, 18,22,26, 30,54	Non-Numbered Position
3,5,7,9, 11,13,15, 19,23,27	Numbered Position 1,2,3,4
2½,3½,4½, 7½,11½,13½	Position 1,3 or 2,4
2¼,2¾, 3¼,3¾	Position 1 Only
2⅞	Same as Metric Threads

Figure 96. Thread dial chart.

The thread dial is not used for metric, diametral, or modular pitch threading. You must leave the half nut lever engaged from the beginning until the threads are complete for these types of operations.

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

TPI 4-72 Divisible By 4

Use any line (position) on the thread dial, shown in **Figure 97**, for threading TPI divisible by four.

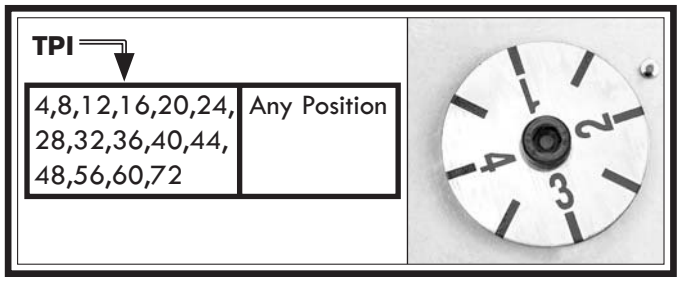


Figure 97. Any position marked on the dial can be used for threading 4-72 TPI.

TPI 2-54 Not Divisible By 4

Use any of the non-numbered lines on the thread dial for threading the TPI shown in **Figure 98**.

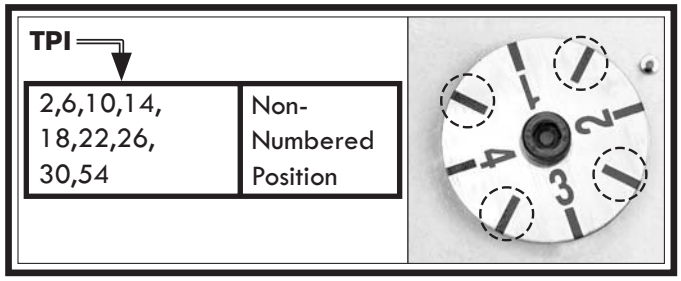


Figure 98. Marks are selected on the dial for threading 2-54 TPI.

Odd Numbered TPI

Use any of the numbered lines on the thread dial for threading the TPI shown in **Figure 99**.

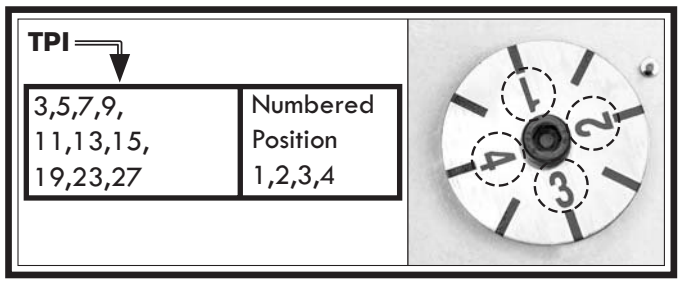


Figure 99. Numbers are selected on the dial for threading odd numbered TPI.

½ Fractional TPI

Use any opposing number pairs: 1 & 3 or 2 & 4 or on the thread dial for ½ fractional TPI (**Figure 100**). For example, to cut a 3½ thread, select 1 on the dial, then start threading, using 1 or 3 as your reference points.

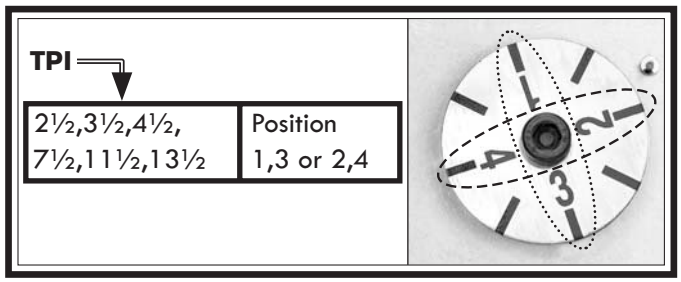


Figure 100. Opposing number group are selected on dial for cutting ½ thread TPI.

Other Fractional TPI

Select one position and always return to that single position on the thread dial for cutting the TPI shown in **Figure 101**. Typically 1 on the thread dial is selected for ease of memory.

2¼,2¾, 3¼,3¾	Position 1 Only

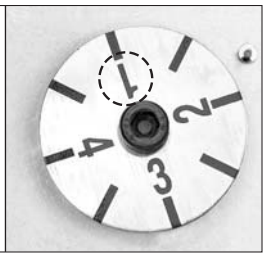


Figure 101. Number 1 on the dial is selected for other fractional TPI.

2⅞ TPI

You cannot use the thread dial when cutting this thread. The chart indicates that in order to cut this thread, the process is the same as for cutting metric threads where the halfnut must stay engaged until all threading pass are complete.

2⅞	Same as Metric Threads	**Do Not Use the Thread Dial for This Thread. Must Keep the Halfnut Engaged Untill this Thread is Complete**

Figure 102. Cannot use the thread dial for 2⅞ TPI.

Understanding Thread & Feed Rate Chart

A complete threading and feed rate chart is located on the face of the headstock that shows all available threading and feed configurations for your lathe. Chart use is described below.

Positioning Gearbox Levers

To cut a thread or establish a particular feed rate, you may need to first reposition the transposing gears located behind the end gear cover.

Once you have confirmed that the change gears are positioned according to what the thread and feed rate charts require, you then can move the quick change gearbox levers to the required positions, which are indicated by an alpha-numeric code on the thread and feed rate chart. For this example, an inch thread of 7 TPI is desired. The alpha-numeric code displayed on the chart shown in **Figure 103** is **HBS8W**.

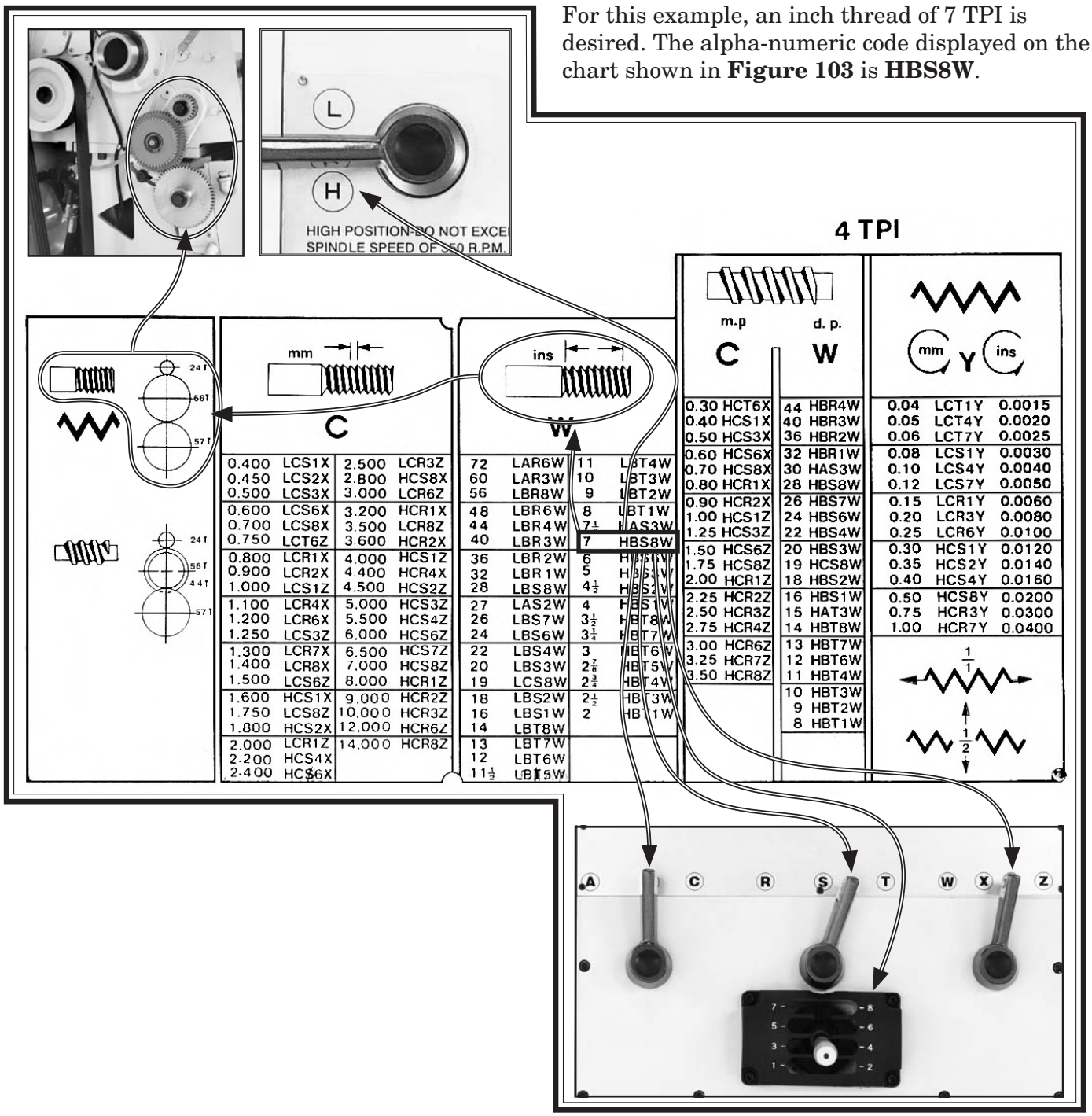


Figure 103. Using feed chart with lathe controls.

Repositioning Change Gears

The factory has arranged the change gears in the "normal position" so all inch and metric threading and feed selections are available by shifting levers. However, if modular or diametral pitch threading is required, the "alternate position" must be used. When the gears are changed they must be cleaned and re-coated with grease and the gear tooth backlash must reset for smooth operation.

Normal Position

The 24T change gear is installed in the top position, the 44T/56T change gears in the middle position, and the 57T change gear in the bottom position, as shown in **Figure 104**. In the normal position, the 56T and 57T gears are meshed, which allows for inch and metric threading and all general feed operations.

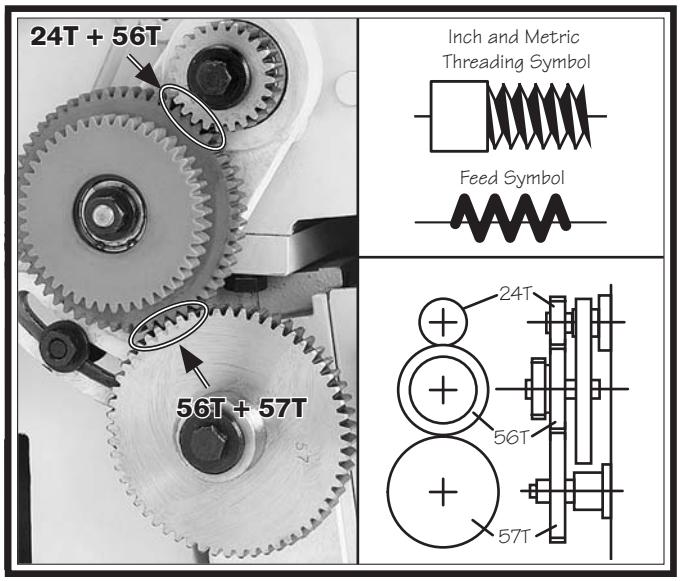


Figure 104. Normal change gear position for inch and metric threading and feeds.

Alternate Position

When the 44- and 57-tooth change gears are meshed (see **Figure 105**), the lathe is setup for modular and diametral pitch turning.

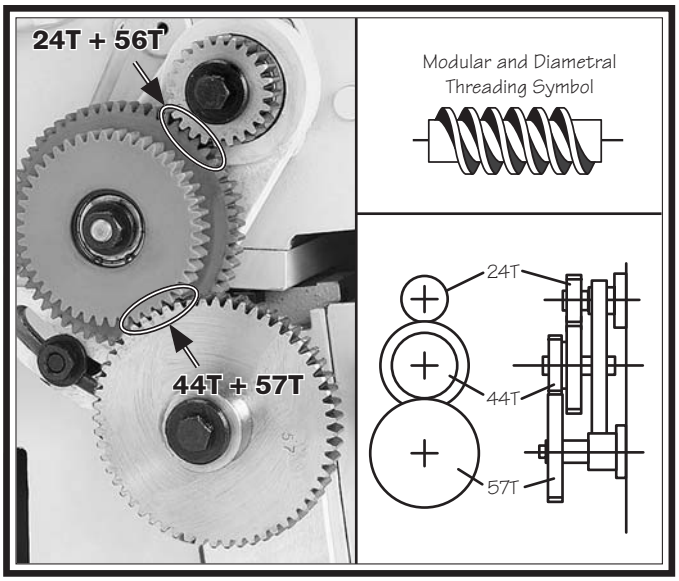


Figure 105. Alternate change gear position for modular and diametral pitch threading.

Configuring Change Gears

1. DISCONNECT LATHE FROM POWER!

2. Shift the gearbox range lever to "Low" so that the gears will not rotate when the hex bolt is loosened and retightened.

3. Remove the gear cover, the hex bolt, and the flat washer shown in **Figure 106**.

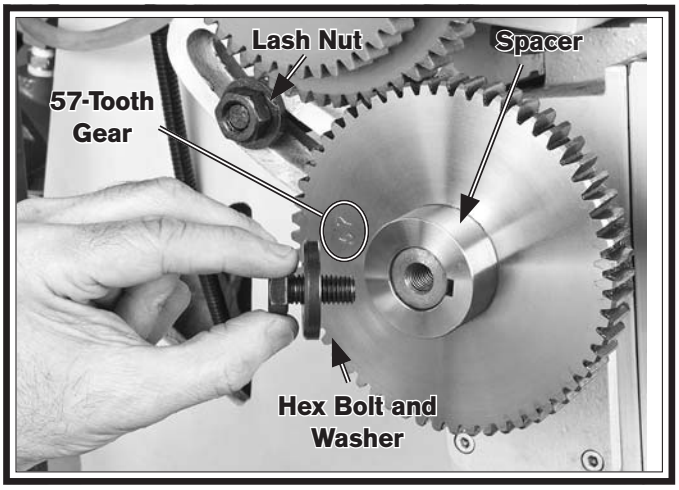


Figure 106. Removing the change gear.

4. Swap the position of the 57-tooth gear and spacer, and reinstall the bolt and washer.

5. Use a 23mm wrench to loosen the lash nut, set the tooth backlash to 0.003"-0.005", and reinstall the nut and gear cover.

Cutting Fluid System

A pump delivers cutting fluid through a flex tube and nozzle. The pump is turned ON/OFF by the cutting fluid pump switch on the control panel. Flow is controlled by the valve lever on the flex tube (see **Figure 107**).

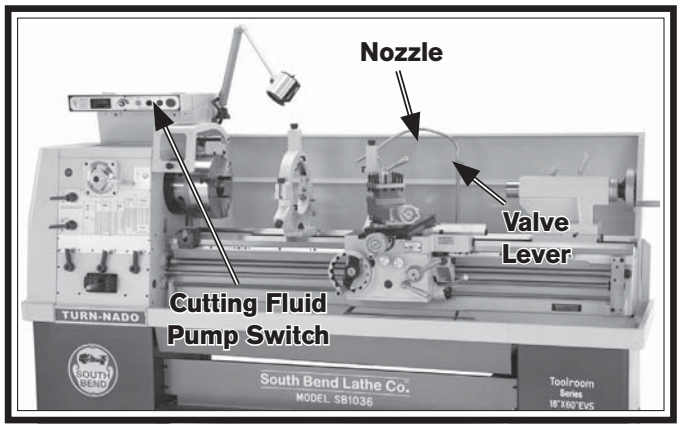
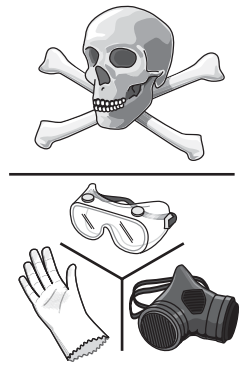


Figure 107. Cutting Fluid system controls and components.

Always use high quality cutting fluid in this lathe and follow the manufacturer's instructions for diluting. The quick reference table shown in **Figure 108** can help you select the appropriate cutting fluid.

Refer to **Cutting Fluid System** on **Page 73** for detailed instructions on how to add or change cutting fluid. Check the cutting fluid regularly and promptly change it when it becomes overly dirty or rancid, or as recommended by fluid manufacturer.



⚠WARNING

BIOLOGICAL & POISON HAZARD!

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

NOTICE

Running the pump without adequate fluid in the tank may permanently damage it. This is abuse and is not covered by the warranty.

To use the cutting fluid system on your lathe:

1. Make sure the tank is properly serviced and filled with cutting fluid, and that you wear the necessary personal protection equipment.
2. Position the cutting fluid nozzle for your operation.
3. Use the control panel cutting fluid pump switch to turn the cutting fluid pump ***ON***.
4. Adjust the flow of cutting fluid by using the valve lever near the base of the nozzle hose.

Note: Promptly clean any splashed cutting fluid from the floor to avoid a slipping hazard.

Workpiece	Dry	Water Soluble Oil	Synthetic Coolants	Sulferized Oil	Mineral Oil
Aluminum		X	X		
Brass	X	X	X		
Bronze	X	X	X		X
Cast iron	X				
Low Carbon Steel		X	X		
Alloy Metals		X	X	X	X
Stainless Steel		X	X	X	X

General Note: Cutting fluids are used for heavy-duty lathe operations and production turning. Oil-water emulsions and synthetic cutting fluids are the most common for typical lathe operations. Sulferized oils often are used for threading. For small projects, spot lubrications can be done with an oil can or brush, or omitted completely.

Figure 108. Cutting Fluid selection table.

Accessories

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

SB1271—Taper Attachment for SB1016 & SB1036 Lathes

SB1272—Collet Attachment 5–C for SB1016 & SB1036 Lathes

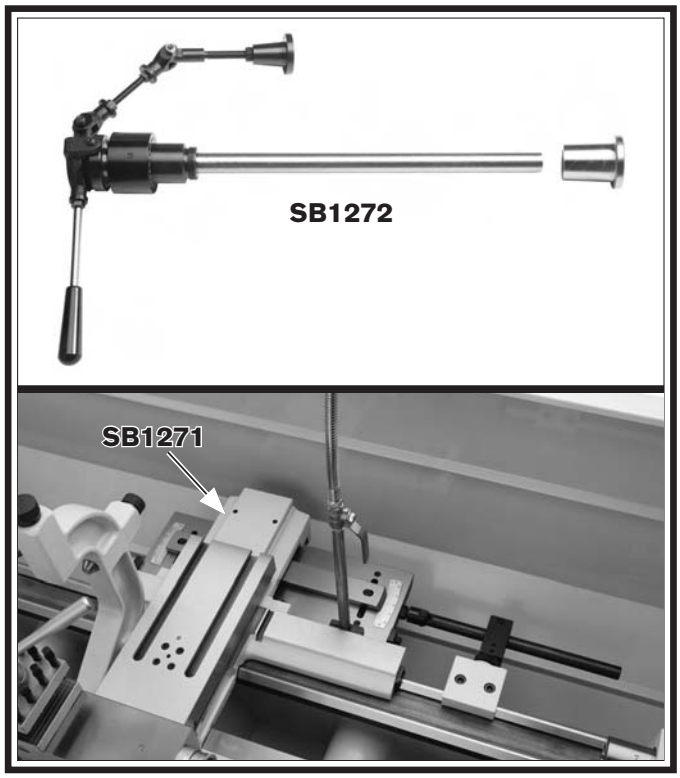


Figure 109. Collet and taper attachments accessories.

SB1240—MT#5 High Performance Live Center

South Bend® brand live centers are the best centers in the industry made with pride and uncompromising quality.

- Shafts are made of alloy steel and vacuum heat treated to HRC60 ± 1 for high rigidity and durability.
- Centers use a combination of roller bearings, thrust ball bearings and ball bearings.
- Applicable for CNC lathes and high speed turning.
- Waterproof design.
- 60° centers.

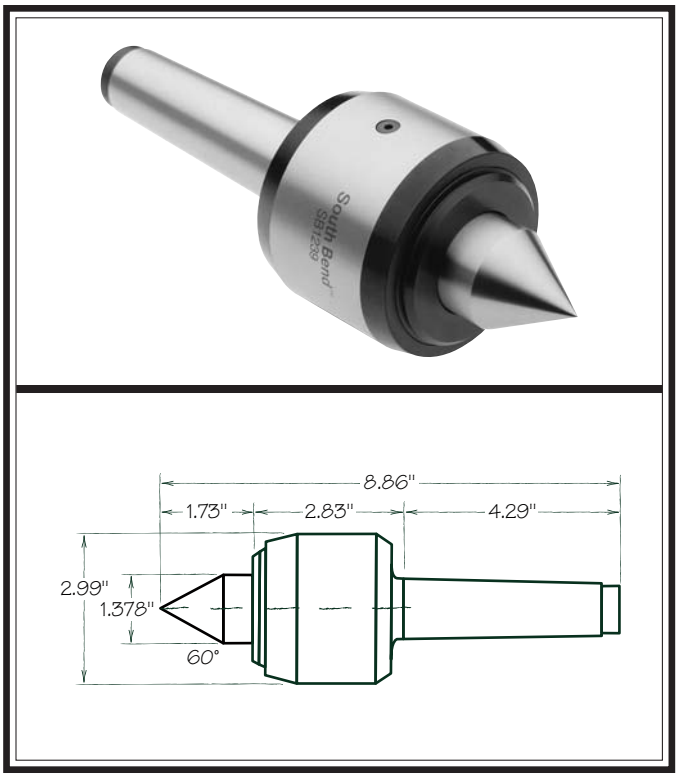


Figure 110. Model SB1239 High Performance Live Center.

SB1279—10 Pc. Precision 5—C Collet Set
Set of 10 collets sized from ⅛" - ¾". Same quality as the individual collets, only packaged in one convenient set.

Figure 111. Model SB1279 10 Pc. 5-C Collet Set.

SB1298—SBL Bench Lathe Shop Clock
SB1299—SBL Toolroom Lathe Shop Clock
SB1300—SBL Lathe with Man
These fine traditional shop clocks are constructed with a metal antique-finished frame. They are easy to read from a distance and measure 14" in diameter. Pictures just don't do them justice. They are very nice quality clocks and perfect for the South Bend Lathe aficionado.

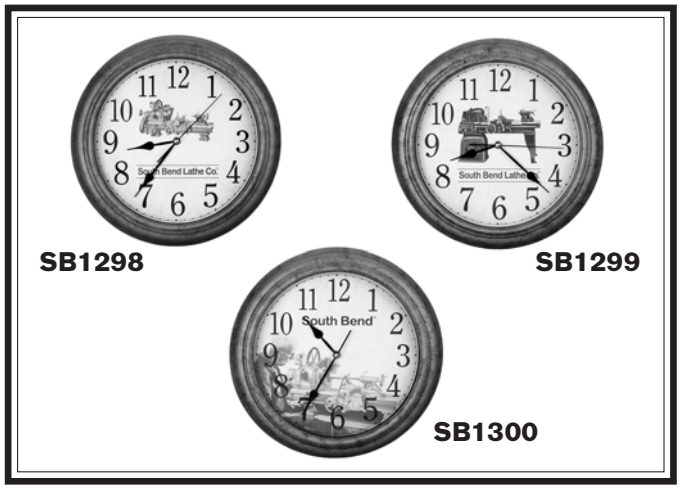
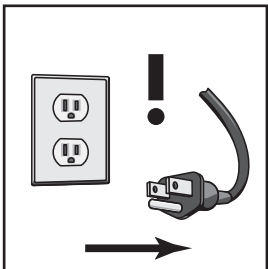


Figure 112. Antique-finished South Bend shop clocks.

SBL Gearhead T-Shirt
SBL One Good Turn T-Shirt
100% Cotton, preshrunk T-shirts, available in sizes S, M, L, XL, 2XL, 3XL.

Figure 113. Official South Bend Lathe T-Shirts.

Maintenance Schedule



⚠WARNING

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

Typically, each operator is responsible for ensuring proper care of the equipment. We strongly recommend all operators make a habit of following the daily maintenance procedures.

For optimum performance from this machine, this maintenance schedule must be strictly followed. Use the chart provided on **Page 65** to ensure this is done.

Ongoing

To maintain a low risk of injury and proper machine operation, if you ever observe any of the items below, shut down the machine immediately and fix the problem before continuing operations:

- Loose mounting bolts or fasteners.
- Worn, frayed, cracked, or damaged wires.
- Guards removed.
- Stop button not working correctly or not requiring you to reset it before starting the machine again.
- A reduction in braking speed or efficiency.
- Headstock oil not flowing against sight glass.
- Cutting Fluid not flowing out from nozzle.
- Any other unsafe condition.

Daily, Before Operations

- Check/add gearbox oil (**Page 69**).
- Check/add apron oil (**Page 70**).
- Check cutting fluid level (**Page 73**).
- Lubricate the ways (**Page 70**).
- Put oil in the ball oilers (**Page 71**).
- Clean/lubricate the leadscrew (**Page 70**).
- Turn spindle speed dial all the way down.
- Move the power feed lever on the apron to neutral (to prevent crashes upon startup).
- Ensure carriage lock is loose.

Daily, During Operations

- Verify headstock oil flows when power is turned ***ON*** (**Page 66**).

Daily, After Operations

- Vacuum/clean all chips and swarf from bed, slides, and chip drawer.
- Wipe down all unpainted or machined surfaces with an oiled rag (**Page 71**).
- Push the stop button and shut ***OFF*** the master power switch (to prevent accidental startup).

Monthly

- Drain and clean the cutting fluid tank, then add new cutting fluid.

Annually (or Semi-Annually with Hard Use)

- Drain and clean the headstock oil reservoir, then add new oil.
- Change the apron oil.
- Change the gearbox oil.
- Disconnect machine from power, open electrical box, and clean with compressed air or a vacuum.

Cleaning

Regular cleaning is one of the most important steps in taking care of this lathe. We recommend that each operator be responsible for cleaning the machine immediately after using it or at the end of the day. We also recommend that the cleaning routine be planned into the 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 only. The small chips leftover after vacuuming can be wiped up 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.

All visible swarf should be removed from the lathe during cleaning.

South Bend Lathe Co.® Monthly Maintenance Chart for EVS Toolroom Series Lathes

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																															
Cutting Fluid Level																															
Electrical Box Fans																															

Use this chart to keep track of the maintenance performed on your South Bend 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 South Bend 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 Cutting Fluid	

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

SOUTH BEND®

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Lubrication

Headstock

The headstock has a pressurized lubrication system that consists of an oil pump, a low oil pressure kill switch, a supply tank, oil hoses, and a manifold with oil distribution lines. The headstock has a series of oil lines that direct oil to key locations, such as the spindle bearings and upper headstock gearing, to ensure that they always remain well lubricated, (especially when low-speed high-load lathe operations could potentially starve the upper headstock of oil).

The oil pump automatically turns ***ON*** and begins oiling the headstock components when the master power switch is turned ***ON*** and the stop button is reset. The oil is pumped before the spindle is started to protect the spindle bearings against potential damage from dry starts.

Review the lubrication system diagram shown in **Figure 114** to familiarize yourself with the function and relationship of the components.

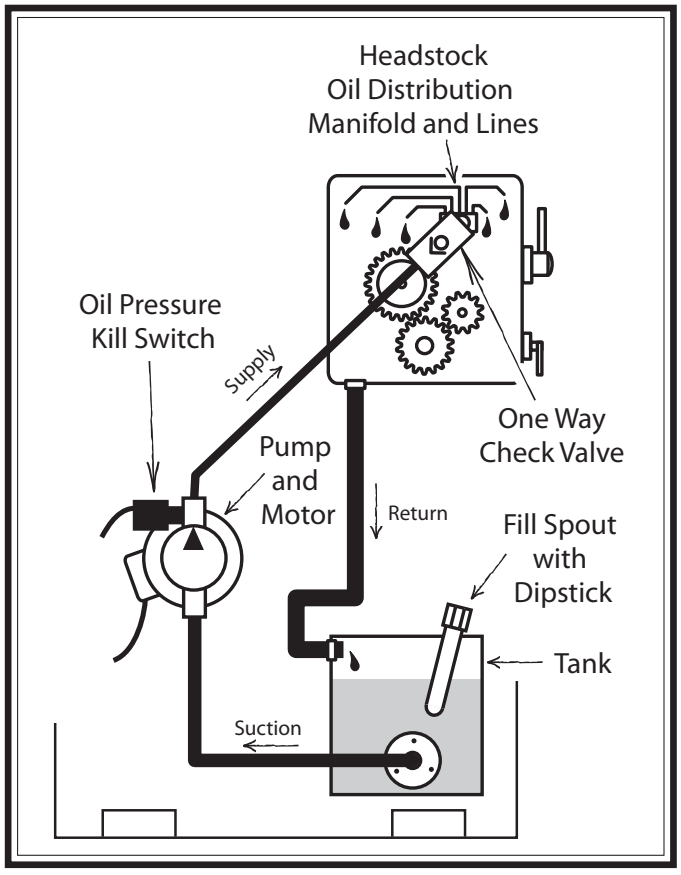


Figure 114. Lubrication system overview.

Oil Pressure Safety Switch

To prevent costly damage to the headstock gears and bearings, an oil pressure kill switch shown in **Figure 115** is installed on the output side of the pump and will shut the lathe down if oil pressure is lost for any reason. Verify that the pump works by looking into the sight glass shown in **Figure 116**, and observing the oil flow.

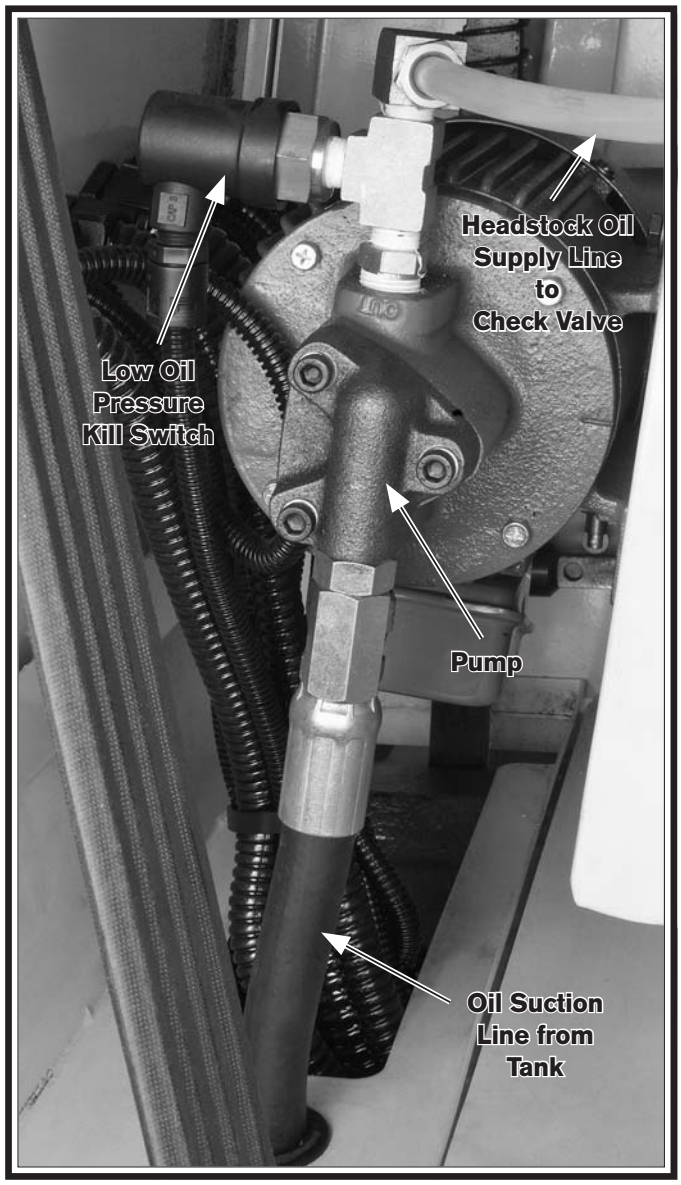


Figure 115. Oil pump and oil pressure safety switch.

NOTICE

Never bypass this switch to force the lathe to run. If you do, headstock gear and bearing damage will occur if headstock components operate without lubrication.

Checking & Adding Oil

Oil Type...Mobil DTE Light or ISO 32 Equivalent
Oil Amount ..... 4 Gallons
Check/Add Frequency ..... Daily
Change Frequency .....Annually

The oil sight glass shown in **Figure 116** is to verify that oil is being pumped into the headstock during operation. When the lathe is disconnected from power, no oil will be seen in the sight glass. Adding oil is done at the oil tank filler cap shown in **Figure 119**.

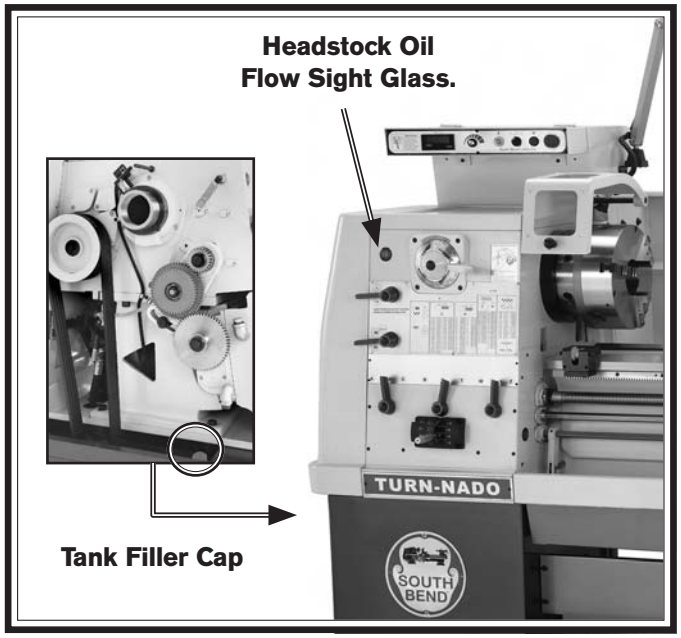


Figure 116. Headstock oil flow sight glass location.

The oil tank filler cap is fitted with a dip stick for checking the headstock oil level as shown in **Figure 117**.

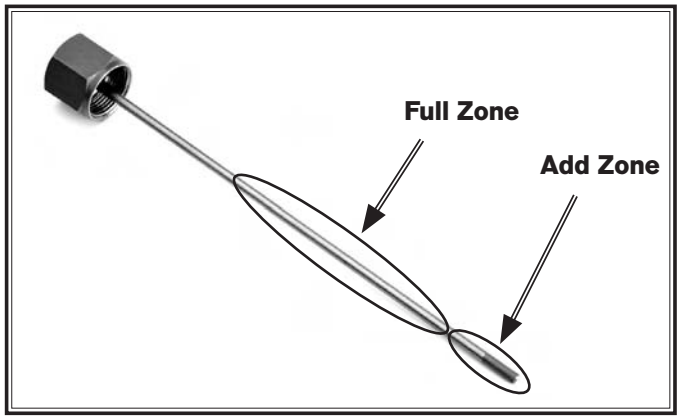


Figure 117. Headstock oil level dip stick.

Changing Headstock Oil

The headstock oil pump system must be cleaned and the oil changed after the break-in period and then annually (or every six months with hard service or extreme working conditions).

Since this lathe uses a base-mounted oil tank, removing a drain plug and using a drain pan is not an option when draining the oil. We recommend using a remote oil pump with a suction hose that can be inserted through the filler spout to the bottom of the oil tank instead. If a remote oil pump system is not available, use the headstock oil pump for this purpose, as outlined below.

Items Needed:	**Qty**
5-Gallon Waste Oil Bucket with Lid	1
Phillips Screwdriver #2	1
Standard Screwdriver #2	1
Funnel 8"	1
Hex Wrench 4mm	1
Wrench 17mm	1
Wrench 25mm	1
Wrench 1½"	1
Mineral Spirits	As Required
Rags	As Required
Gasket or Automotive Silicone Sealant	1
Hose Clamp	½" Dia.
Rubber Drain Hose	⅜" ID x 4' Long
Magnets	Optional

To to change the headstock oil:

1. DISCONNECT LATHE FROM POWER!

2. Remove the end gear cover, the tank cover (see **Figure 118**), and remove the oil tank filler cap (see **Figure 119**).

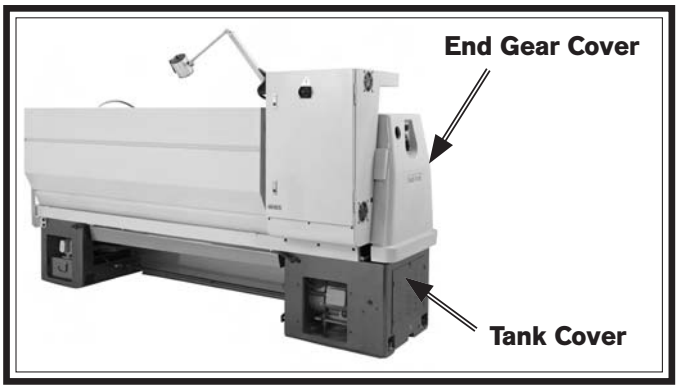


Figure 118. Tank cover plate removed.

3. Remove the headstock oil supply line from the check valve, as shown in **Figure 121**.

4. Push the rubber drain hose onto the headstock oil supply line, as shown in **Figure 119**. Use a hose clamp if required to ensure a tight connection.

Figure 119. Changing headstock oil.

5. Hold the other end of the drain tube in the bucket, and turn ***ON*** the master power switch located on the electrical box door. The old headstock oil will be pumped from the tank and into the bucket.

6. As soon as you hear a sucking sound from the tank, or when the oil slows or stops flowing out, turn the master power switch ***OFF*** to stop the pump.

7. Remove the rubber drain hose and reconnect the headstock oil supply line to the check valve.

8. Place a series of rags under the tank access cover to catch the residual oil in the tank when the tank access cover shown in **Figure 120** is removed.

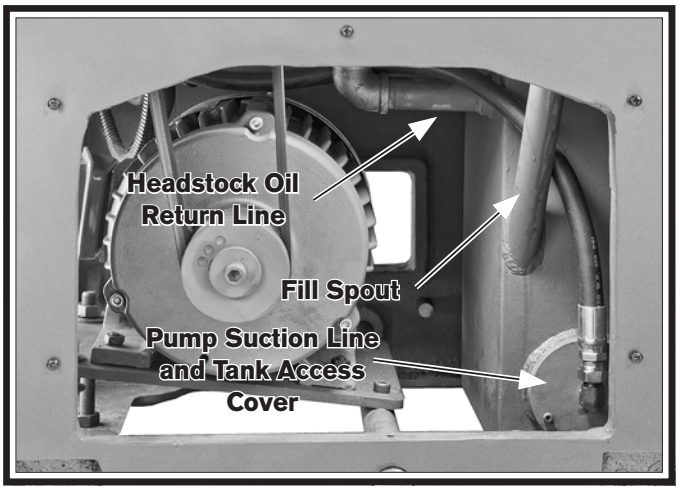


Figure 120. Location of tank.

9. Remove the pump suction line from the tank.

10. Remove the three access cover cap screws, and carefully remove the cover.

11. Using mineral spirits and rags, wipe down the inside of the tank including any baffles and screens until all are clean. Make sure to soak up any excess mineral spirits with dry rags, so it does not stay in the tank and contaminate the oil.

Tip: Consider placing one or two magnets at the bottom of the tank to collect any fine metal particles generated by the headstock drive train. This will make cleaning easier the next time around and ensure that more metal particles are kept out of the headstock oil.

12. Reinstall the access plate with a new gasket or silicone sealant.

13. Place the funnel in the fill spout and add the new oil. Refer to **Page 66** for the recommended type and amount of oil to use.

14. Test pump operation, recheck the oil level, and reinstall the covers.

Priming the Oil Pump

The lubrication system is also equipped with a check valve that is shown in **Figure 121**. This valve allows oil to flow to the headstock during pump operation, but prevents the oil from draining back into the tank and the pump from losing its prime when not in operation. However, if after long-term storage, or if the machine is being started for the first time in test run, we recommend that the pump and line be primed with oil to prevent a dry run.

Items Needed:	**Qty**
Pump-Type Oil Can Filled with Headstock Oil	1
Wrench 17mm	1

To prime the oil pump:

1. DISCONNECT LATHE FROM POWER!
2. Remove the end gear cover.
3. Remove the headstock oil supply line from the check valve, as shown in **Figure 121**.

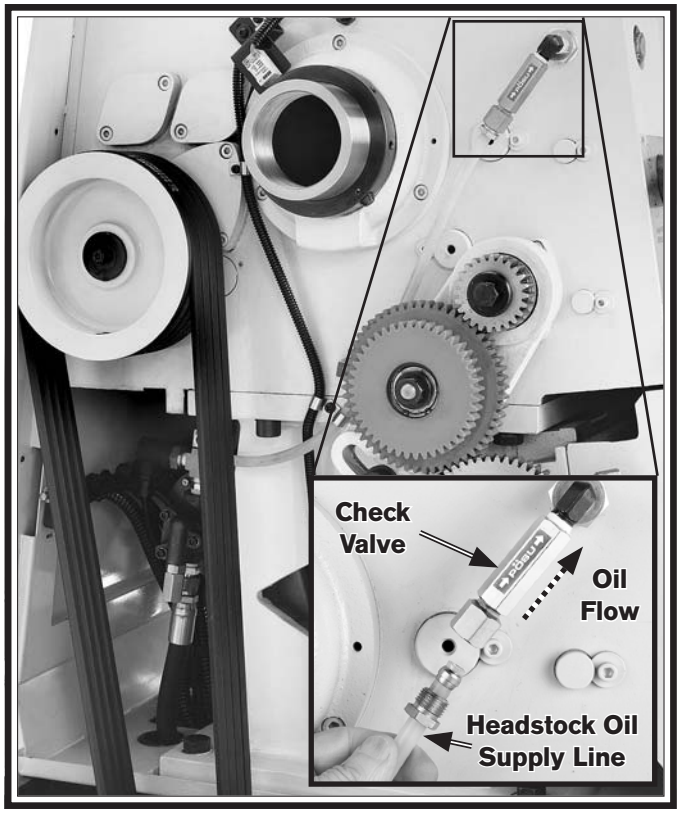


Figure 121. Priming location and check valve.

4. Fill the supply line with oil, reinstall, and test pump operation and verify oil flow.

Quick Change Gearbox

Oil Type	Mobil Vactra 2 or ISO 68 Equivalent
Oil Amount	As Needed
Check/Add Frequency	Daily
Change Frequency	Annually

Checking & Adding Oil

The sight glass shown in **Figure 122** shows the oil level in the gearbox. At the full level, the oil fills approximately ¾ of the sight glass. At the add level, the oil fills ¼ of the sight glass or less. Check the oil level daily.

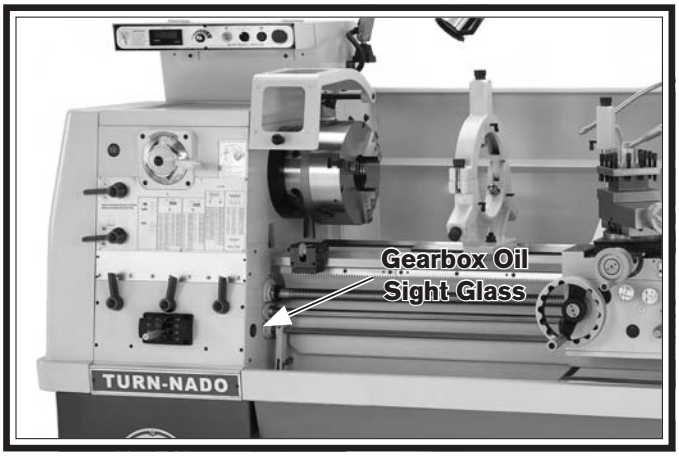


Figure 122. Gearbox sight glass location.

Changing Oil

The gearbox oil must be changed after the break-in period and then annually (or every six months with hard service or extreme working conditions). **Figure 123** shows fill and drain plugs used when changing the gearbox oil. The fill plug is removed with a 20mm wrench, and the drain plug is removed with a 16mm wrench.

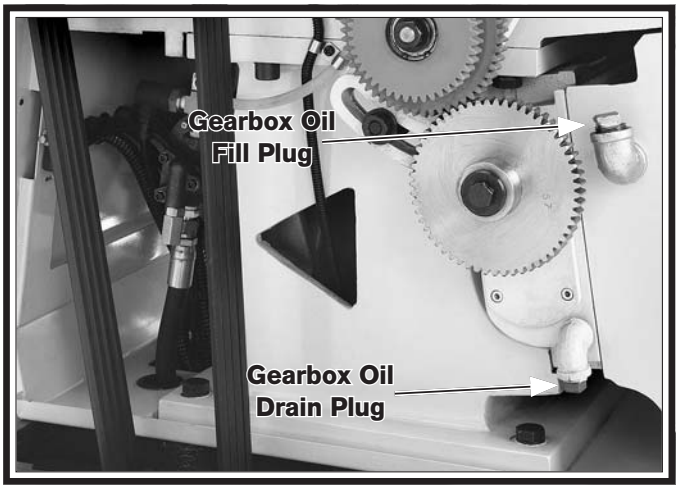


Figure 123. Location of gearbox fill and drain plugs.

Apron

Oil Type ..... Mobil Vactra 2 or ISO 68 Equivalent
Oil Amount ..... As Needed
Check/Add Frequency ..... Daily
Change Frequency ..... Annually

Checking & Adding Oil

The sight glass shown in **Figure 124** shows the oil level in the apron. At the full level, the oil fills approximately ¾ of the sight glass. At the add level, the oil fills ¼ of the sight glass or less. Check the oil level daily and after using the apron oil pump.

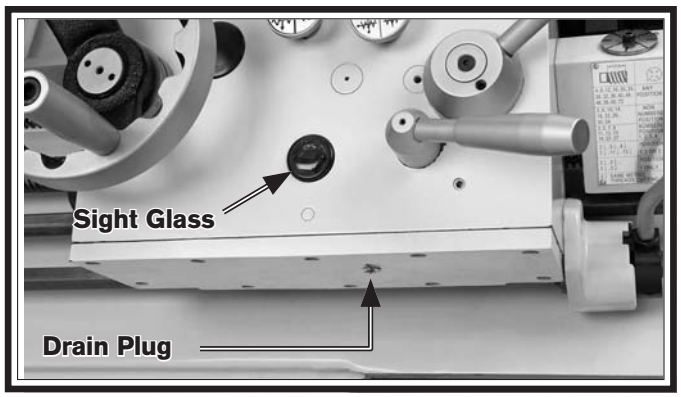


Figure 124. Location of apron drain plug & sight glass.

Changing Oil

The oil in the apron reservoir must be changed after the break-in period and then annually (or every six months with hard service or extreme working conditions). The drain plug is shown in **Figure 124** is removed with a 6mm hex wrench, and the knurled fill plug is shown in **Figure 125** is removed by hand.

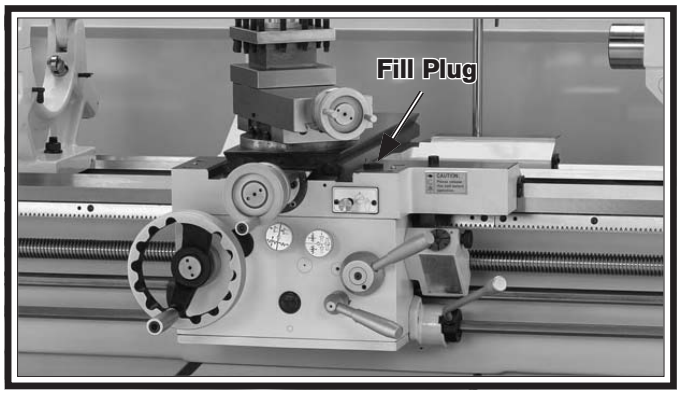


Figure 125. Location of fill plug for apron oil reservoir.

Lead Screw

Oil Type ..... Mobil Vactra 2 or ISO 68 Equivalent
Oil Amount ..... As Needed
Lubrication Frequency ..... Daily

Before lubricating the leadscrew, clean it first with mineral spirits. A paint brush works well to help clean out the threads. Make sure to move the carriage out of the way, so you can clean the entire length of the leadscrew.

Apply a thin coat of oil along the length of the leadscrew. Use a paint brush to make sure the oil is evenly applied and down in the threads.

Ways & Slides

The way pump shown in **Figure 126** lubricates the saddle and cross slide way guides with the oil from the apron reservoir.

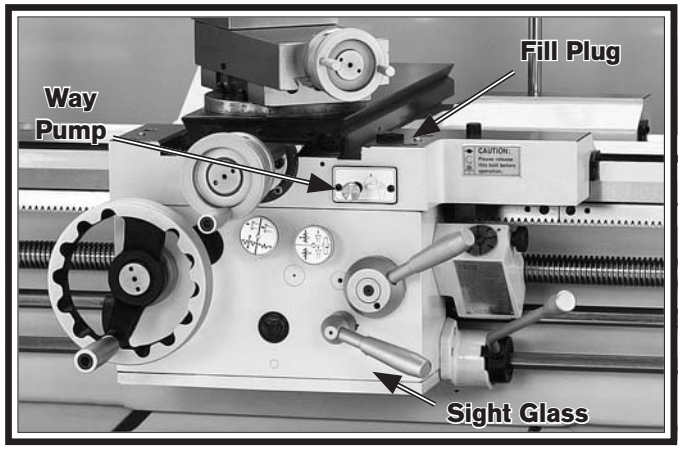


Figure 126. Location of way pump and sight glass.

To use the way pump to lubricate the ways, pull the pump knob out for two or three seconds and then push it in. The pump draws oil from the apron reservoir and then forces it through drilled passages to the way guides.

Repeat this process and move the carriage left/right and the cross slide forward/backward to distribute oil along the way guides.

Lubricate the guides once before and once after operating the lathe. If the lathe is in a moist or dirty environment, increase the lubrication interval and make sure to keep the oil level full.

Unpainted & Machined Surfaces

Besides the ways and leadscrew, all other unpainted and machined surfaces should be wiped down daily to keep them rust-free and in top condition. This includes the top of the saddle, the cross slide, compound slide, tool post, chuck, feedrod, and any other surface you can find that could be vulnerable to rust if left unprotected (this especially includes any parts that may be exposed to water soluble cutting fluids). Typically with these parts, a thin film of oil is all that is necessary for protection. Any quality metal protectant can be used to protect machined surfaces, including either of the oils you use elsewhere in the lathe.

Ball Oilers

Oil Type ..... Mobil Vactra 2 or ISO 68 Equivalent
Oil Amount ..... As required
Pump Oil Can w/Plastic or Rubber Cone Tip 1
Lubrication Frequency..... Before and After Use

Proper lubrication of ball oilers is done with a pump-type oil gun that has a plastic or rubberized cone tip. Metal needle or lance tips are not recommended as they do not create a good seal. These tips usually push the ball too far into the oiler, break the spring seat, and sometimes cause the ball to fall into the oil galley.

Lubricate the ball oilers before and after use machine use, and more frequently under heavy use. When lubricating ball oilers, clean the outside surface to remove any dust or grime. Push the rubber or plastic tip of the oil can nozzle against the ball oiler to create a hydraulic seal, and pump the oil can once or twice. If sludge and contaminants are seen being pushed out of the lubrication area, keep pumping the oil gun until clean oil is seen. When finished, wipe away the contaminants and oil.

Never blow out ball oilers or oil galleys with an air gun to purge the system of contaminants. Air pressure can force contaminants into unreachable areas and dislodge seals and blow-out gaskets.

This lathe has five ball oiler locations (see **Figures 127–129**).

Figure 127. Four ball oiler locations.

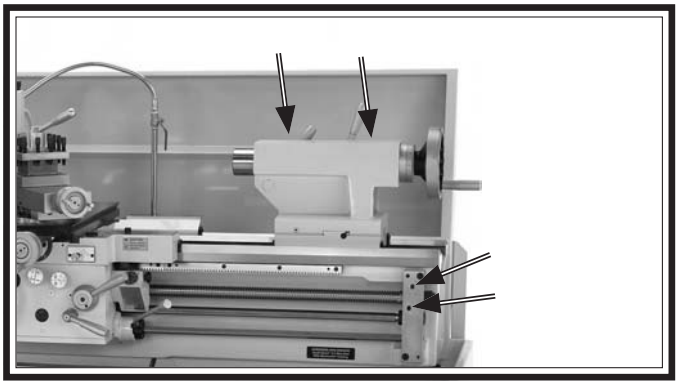


Figure 128. Four ball oiler locations.

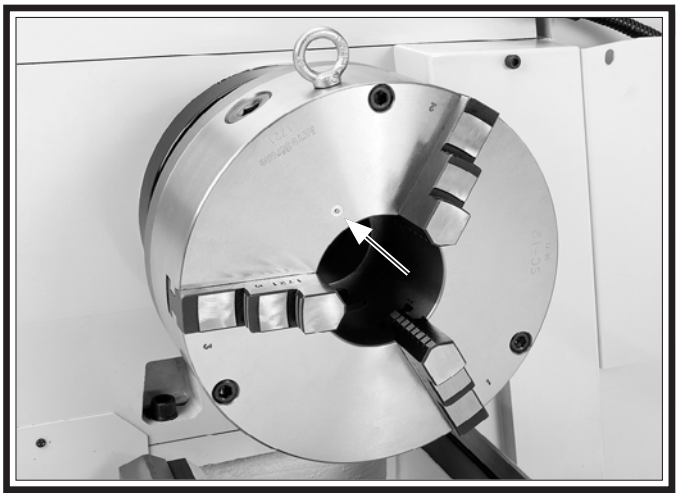


Figure 129. Ball oiler location for 3-Jaw chuck.

Change Gears

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

The change gears, shown in **Figure 130**, should always have a thin coat of heavy grease to minimize corrosion, noise, and wear. Care must be taken to avoid over-greasing because excess grease will be flung onto the V-belts, which will cause the belts to slip and the lathe to lose power.

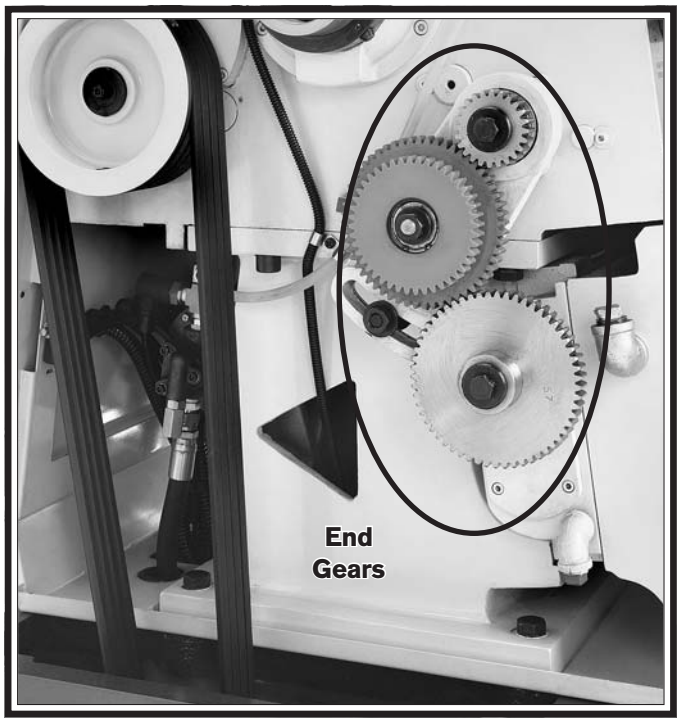


Figure 130. Location of change gears that require grease.

Handling & Care

Make sure to clean and lubricate any gears you install or swap. Unless you are very careful during handling and storage, the coating of grease on the gears will easily pickup dirt or debris, which can then spread to the other gears and increase the rate of wear.

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

Lubricating

1. DISCONNECT LATHE FROM POWER!
2. Remove the end gear cover.
3. Clean the change gears thoroughly with mineral spirits to remove all the old grease. Use a small brush if necessary to clean between the teeth.
4. Clean the shafts from which the end gears were removed, and wipe up any old grease splatters in the vicinity and on the inside of the headstock cover.
5. With clean hands, apply a thin layer of grease on the gears. Make sure to get grease between the gear teeth, but not so much that it fills the voids between the teeth.
6. Install the end gears and mesh them together with an approximate backlash of 0.005". Once the gears are meshed together, apply a small dab of grease in the crux of where the gears mesh together—this grease will spread around when the gears start moving and re-coat any areas scraped off during installation.

Annual Maintenance

Once a year, remove all the change gears, clean them thoroughly, and apply a new coating of grease. Even if the end gear cover has been kept in place throughout the year, it is still possible for dust from the V-belts to build-up in the grease, and the grease may also start to break down with extended or heavy use.

Cutting Fluid System

The cutting fluid system holds 6½ gallons. A pump pulls fluid from the tank and sends it to the valve, which controls the flow of cutting fluid through a universal hose and nozzle. When the valve is opened or closed, the fluid flows from the nozzle and drains into the chip drawer and into a catch tray that directs it back into the tank. **Figure 131** shows many of these components and their locations.

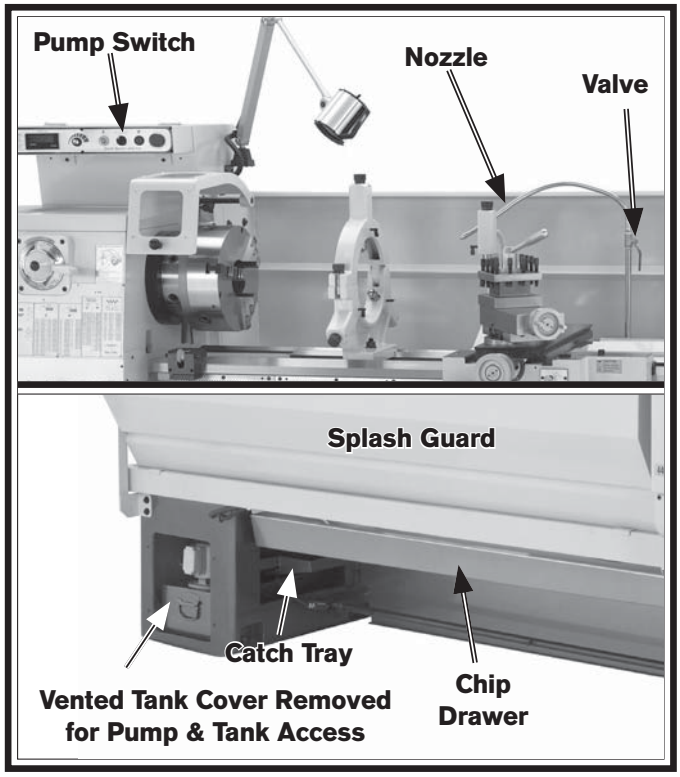


Figure 131. Cutting Fluid system components and locations.

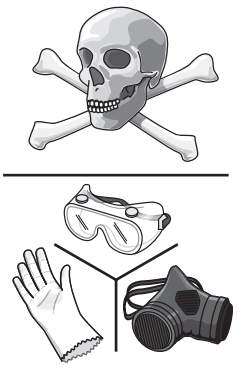
When swarf from machining operations falls into the chip drawer, most of it will stay there. However, some fine metal particles and chips are suspended by the cutting fluid and will wash into the tank via the catch tray. Once in the tank, these fine metal particles and shavings will settle, and cleaner cutting fluid will be drawn in by the pump.

Keep in mind that the metal particles from many types of metal sit at the bottom of the tank and the fluid can become very toxic and poisonous. To maintain safety and pump life, cleaning the system on a regular basis is mandatory.

Hazards

As some cutting fluid ages, dangerous microbes can proliferate and create a biological hazard. The risk of exposure to this hazard can be greatly reduced by replacing the old cutting fluid as indicated by the fluid manufacturer.

The important thing to keep in mind when working with cutting fluid is to minimize exposure to your skin, eyes, and respiratory system by wearing the proper PPE (personal protection equipment), such as splash-resistant safety glasses, long-sleeve gloves, protective clothing, and a NIOSH approved respirator.



⚠WARNING

BIOLOGICAL & POISON HAZARD!

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

Adding Fluid

1. DISCONNECT LATHE FROM POWER!

2. Remove the vented tank cover to access the cutting fluid tank (see **Figure 131)** and observe the fluid level in the tank when adding fluid.

3. Pour your pre-mixed cutting fluid in the chip drawer until the tank is nearly full and reinstall the vented cover.

Changing Cutting Fluid

When you replace the old cutting fluid, take the time to thoroughly clean out the chip drawer, catch tray, and chip drawer. Make sure to dispose of all old fluid according to local regulations. Cutting fluid is considered hazardous waste by the EPA. Follow all disposal and storage guidelines when changing and disposing of cutting fluid.

Tip: Maintaining the specific gravity of cutting fluid with a basic hydrometer or economical refractometer can greatly extend the life of cutting fluid, to maintain cutting fluid properties for cutting and reduce operating costs through longer tool life.

Items Needed:	**Qty**
Safety Wear .....See **Hazards** section on **Page 73**	
New Cutting Fluid	6½ Gallons
Five Gallon Drain Buckets w/Lids	2
Phillips Screwdriver #2	1
Wrench ¾"	1
Shop Rags	As Required
Rubber Hose ½" ID x 60" Long	Optional
Magnets	Optional

To change the cutting fluid:

1. Clean out the chip drawer.

2. Remove the vented tank cover. Lift and slide the pump and tank out of the cabinet as shown in **Figure 13130**.

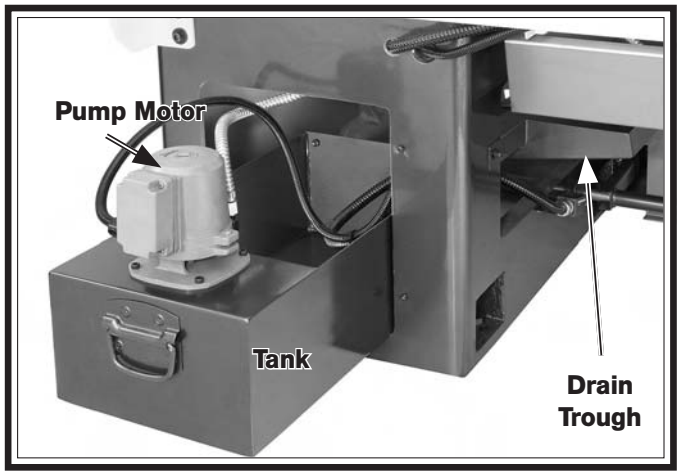


Figure 132. Tank location for cleaning.

3. Connect the rubber hose to the end of the cutting fluid nozzle as shown in **Figure 131**. If the connection is questionable, use a hose clamp to ensure it does not leak.

Figure 133. Cutting Fluid drain hose connection.

4. Insert the other end of the hose into the bucket and secure it from falling out with a piece of wire when the pump is turned on.

5. Open the flow lever all the way, and turn the cutting fluid pump ***ON***. Do not leave the area as you will need transfer the hose to the other bucket to prevent over-filling and spillage.

> ***NOTICE***
>
> **Leaving the pump running with and empty cutting fluid tank can damage the pump. Shut the pump OFF immediately when the fluid slows or stops coming from the drain hose. Otherwise, any pump damage is not covered under warranty.**

6. When the fluid stops flowing, immediately turn OFF the pump, and disconnect the drain hose.

8. Pour out the remaining cutting fluid from the tank into the 5-gallon bucket and seal the bucket with its lid.

9. Lift and slide the tank out far enough for cleaning.

10. Using mineral spirits and rags, clean and dry the tank. If a water soluble cutting fluid was used, use soap and hot water instead of mineral spirits.

Tip: Leave one or more strong magnets at the bottom of the tank to collect fine metal particles from the cutting fluid.

11. Reinstall the tank and cover.

12. Mix the new cutting fluid to the required specific gravity as specified by the cutting fluid manufacturer.

13. Pour 6½ gallons of cutting fluid into the chip drawer.

14. CONNECT LATHE TO POWER.

15. Point the cutting fluid nozzle into the chip drawer and open the valve.

16. Turn the cutting fluid pump ***ON*** to verify that fluid cycles properly, then turn it ***OFF***.

Cleaning Electrical Box

The electrical box has two cooling fans (**Figure 134**) for the electrical box. The lower fan draws in cool air and the upper fan exhausts warm air. Frequently verify that the cooling fans work and the blades are free of debris and dust that can cause the fans to run out of balance. An overheated electrical box could result in damage to the electrical components inside of the box.

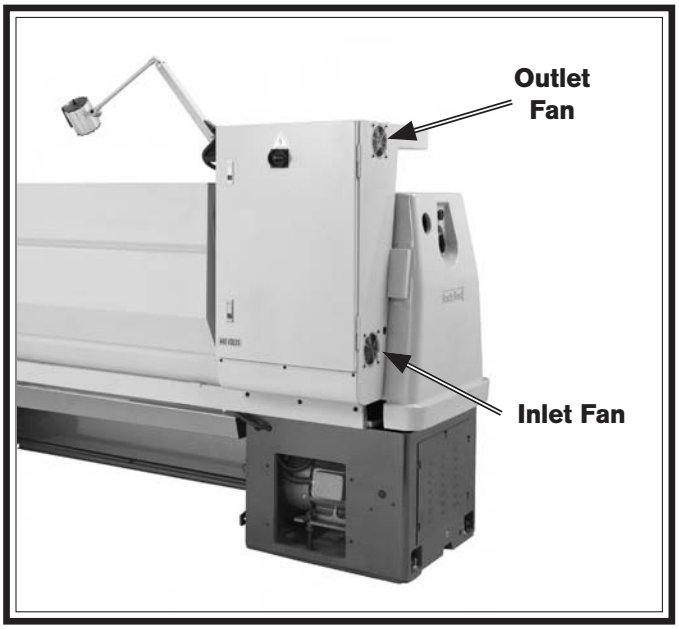


Figure 134. Electrical box cooling fans.

To clean the fans and electrical box:

1. DISCONNECT LATHE FROM POWER!

2. Put on a dust mask and safety goggles.

3. Open the electrical box door.

4. Holding an air gun nozzle 24" away from the electrical components, blow dust off of the components and out of the box.

5. Close electrical box door and verify fan operation.

Machine Storage

If the machine is not properly prepared for storage, it may develop rust or corrosion. If decommissioning this machine, use the steps in this section to ensure that it remains in good condition for later use.

To prepare your machine for short-term storage (up to a year):

1. Pump out the old cutting fluid, and remove and blow out lines with compressed air and a few drops of way oil.

2. DISCONNECT LATHE FROM POWER!

3. Thoroughly clean all unpainted, bare metal surfaces, then apply a liberal coat of way oil.

4. Lubricate the machine as outlined in the lubrication section. Be sure to use the oil gun to purge all ball oilers and the oil passages with fresh oil.

5. Cover and place the machine 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 plastic guards cloudy.

6. Once or twice a month, depending on the ambient humidity levels in the storage environment, wipe down the machine as outlined in **Step 3**. Slide the carriage, micrometer stop, tailstock, and steady rest down the lathe bed to make sure that way spotting is not beginning to occur.

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

To prepare your machine for long-term storage (a year or more):

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

2. Pump out the old cutting fluid, and remove and blow out lines with compressed air and a few drops of way oil.

3. DISCONNECT LATHE FROM POWER!

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

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

6. Loosen or remove machine belts so they do not become stretched during the storage period. (Be sure to also affix a maintenance note near the power button as a reminder that the belts have been loosened or removed.)

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

8. Cover and place the machine 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 plastic guards cloudy.

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

Backlash Adjustment

Backlash is the amount of free play felt while switching rotation directions with the handwheel. This can be adjusted on the compound and cross slide leadscrews. Before beginning any adjustment, make sure that all associated components have been cleaned and re-lubricated.

NOTICE

Reducing backlash to less than 0.001" is impractical. Avoid the temptation to overtighten the backlash set screw while adjusting. Overtightening leads to accelerated wear of the wedge, nut, and leadscrew.

Compound Leadscrew

Tools Needed: **Qty**
Hex Wrench 4mm 1

Backlash is adjusted by tightening the set screws shown in **Figure 135**. When these screws are-adjusted against the leadscrew nut, they offset part of the nut to remove play between the nut and leadscrew.

If you end up adjusting the nut too tight, loosen the set screws, tap the compound a few times with a rubber or wooden mallet, and turn the handle slowly back and forth until it moves freely.

To readjust the backlash, rock the handle back and forth, and tighten the screws slowly until the backlash is at approximately 0.001" as indicated on the handwheel dial.

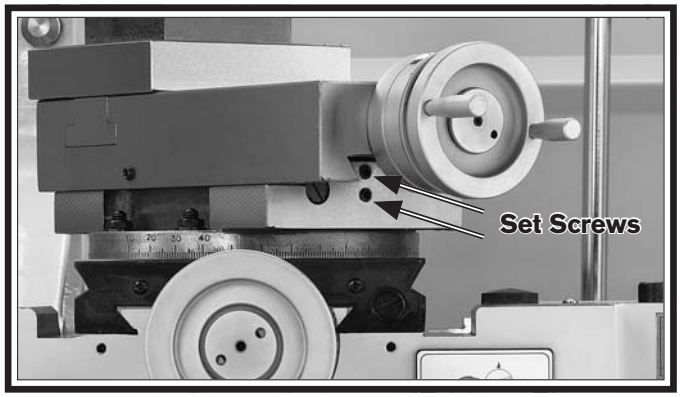


Figure 135. Compound slide backlash adjustment screws.

Cross Slide Leadscrew

Tools Needed: **Qty**
Hex Wrench 3mm 1
Hex Wrench 6mm 1

Backlash is adjusted by loosening all four cap screws shown in **Figure 136**, and then tightening the center set screw, which pushes down on a wedge and forces the nut apart, taking up lash in the nut and leadscrew.

If you end up adjusting the nut too tight, loosen the set screw, tap the cross slide a few times with a rubber or wooden mallet, and turn the handle slowly back-and-forth, until the handle turns freely.

To re-adjust the backlash, rock the handle back and forth and tighten the set screw slowly until the backlash is at approximately 0.001" as indicated on the handwheel dial.

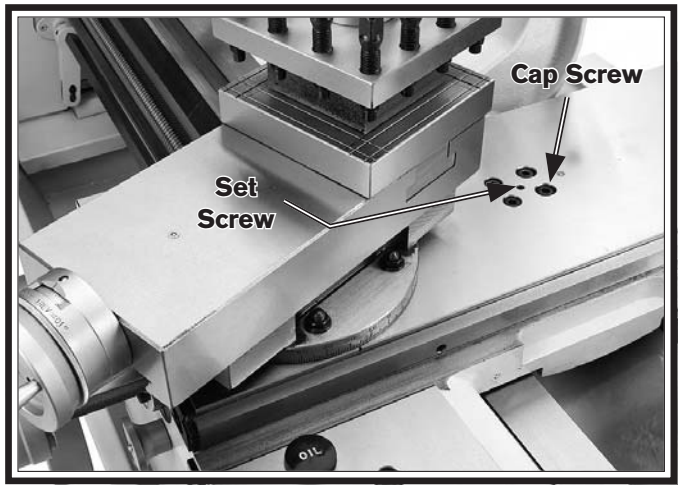


Figure 136. Cross slide backlash adjustment screws.

Leadscrew End Play Adjustment

After a long period of time, you may find that the leadscrew develops a small amount of end play. This lathe is designed so that leadscrew end play can be easily removed with adjustment.

Tools Needed:	Qty
Open End Wrench 36mm or 1 7/16"	1
Hex Wrench 3mm	1

To remove leadscrew end play:

1. DISCONNECT LATHE FROM POWER!
2. Remove the three cap screws and end cover.
3. Loosen both retaining nut set screws shown in **Figure 137**.

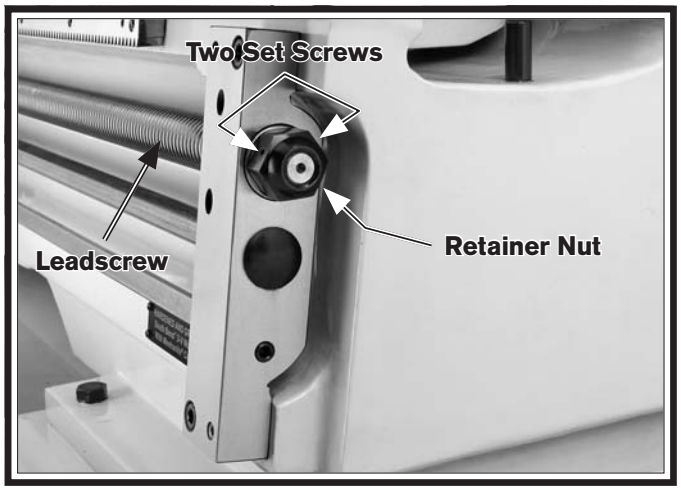


Figure 137. Leadscrew end play adjustment.

4. Engage the half nut lever.
5. Rotate the carriage feed handwheel back slightly and tighten the retaining nut at the same until the end play is removed.
6. Tighten both set screws and re-install the cover.

Gib Adjustment

Before beginning any adjustment, make sure that the slides and ways have been cleaned and re-lubricated, or adjustments may be inaccurate. The goal of adjusting gibs is to set the play between two sliding dovetailed surfaces so various cutting tasks can be accomplished with accuracy and the least amount of wear on the related components. In general, loose gibs cause poor finishes and tool chatter; and over-tightened gibs cause premature wear and are difficult to operate.

Compound & Cross Slide Gibs

Tools Needed:	Qty
Phillips Screwdriver #2	1
Standard Screwdriver #3	1
Hex Wrench 4mm	1

To adjust the compound and cross slide gibs:

1. Loosen the gib lock for each gib (see **Figure 137)**.
2. Remove the front cross slide wiper and plate shown in **Figure 137**.
3. To tighten the compound slide or the cross slide and move the gib toward the splash guard, loosen the rear gib screw ¼-turn, and then tighten the front gib screw ¼-turn. Test with handwheels, and repeat as necessary for your desired adjustment.

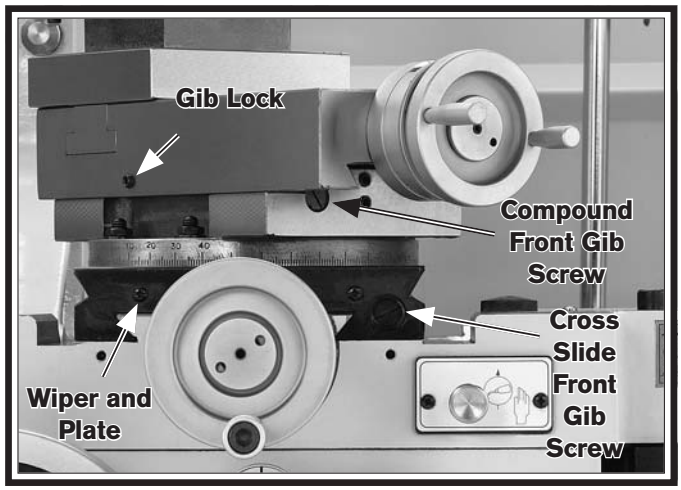


Figure 138. Compound and cross slide gib screws.

Saddle Gibs

The saddle on this lathe is equipped with opposing gibs that lie parallel with one another on either side of the saddle. To tighten the saddle and remove play, the front gib must move toward the tailstock, and the rear gib must move toward the headstock.

Tools Needed:	**Qty**
Hex Wrench 6mm	1
Standard Screwdriver #3	1

To adjust the saddle gibs:

1. DISCONNECT LATHE FROM POWER!

2. Remove the thread dial shown in **Figure 137** by removing the lock knob.

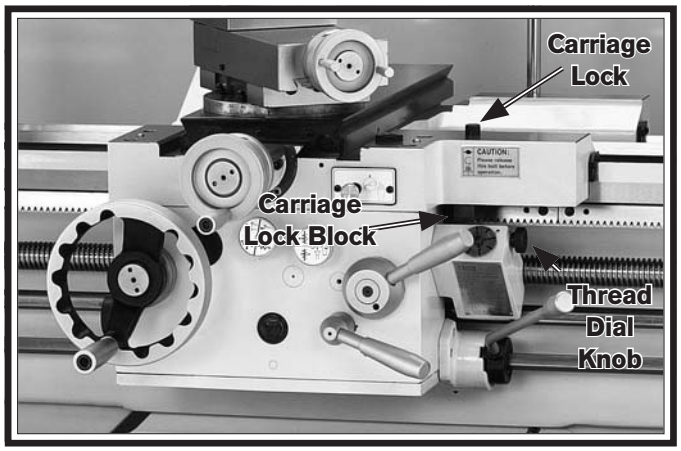


Figure 139. Location of carriage lock and half nut for removal.

3. Remove the carriage lock and the carriage lock-block shown in **Figures 137–140**.

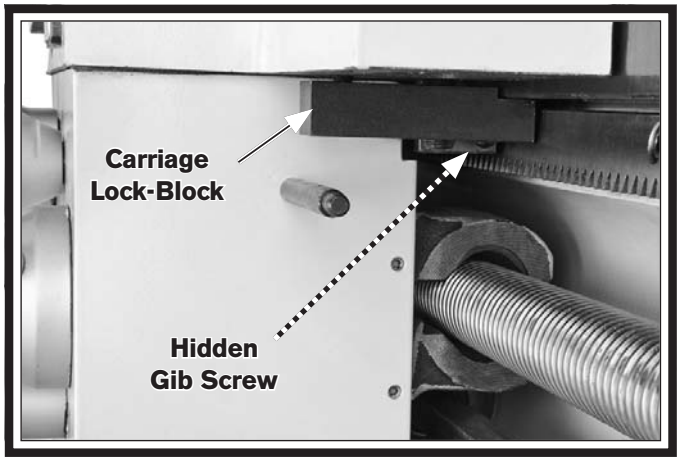


Figure 140. Gib screw access.

4. To tighten the front saddle gib (**Figure 141**) and move it toward the tailstock, loosen the tailstock-facing gib screw ¼-turn, and tighten the headstock-facing gib screw ¼-turn.

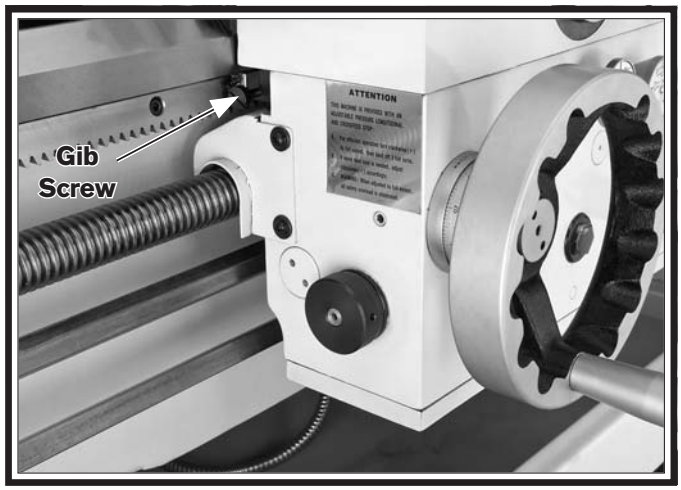


Figure 141. Front saddle gib screw.

5. To tighten the rear saddle gib (**Figure 142**) and move it toward the headstock, loosen the headstock-facing gib screw ¼-turn, and tighten the tailstock-facing gib screw ¼-turn.

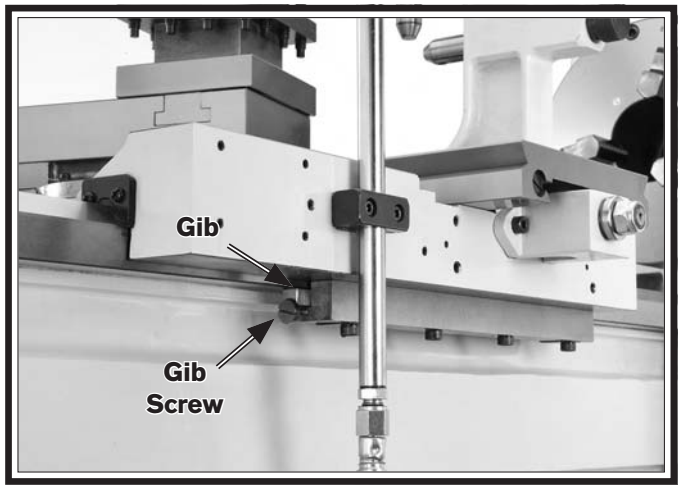


Figure 142. Rear saddle gib and screw.

6. Test the feel of the carriage by turning the handwheel. Re-adjust the gib screws in the same manner to tighten or loosen the gibs. Most machinists find that the ideal gib adjustment is one where a small amount of drag or resistance is present yet the handwheels are still easy to move.

7. Reinstall carriage lock and the thread dial.

Tailstock Gib

When the tailstock is offset, it slides along a dovetailed way that has a gib installed between the upper and lower tailstock halves. To maintain alignment and prevent the upper portion of the tailstock from tilting off-center when the tailstock is clamped to the ways, the gib must be fairly snug.

Tools Needed:	Qty
Standard Screwdriver #3	1
Wrench 28mm	1

To adjust the tailstock gib:

1. Loosen the front and rear lock bolts (see **Figure 143**), and unlock the tailstock from the bed.

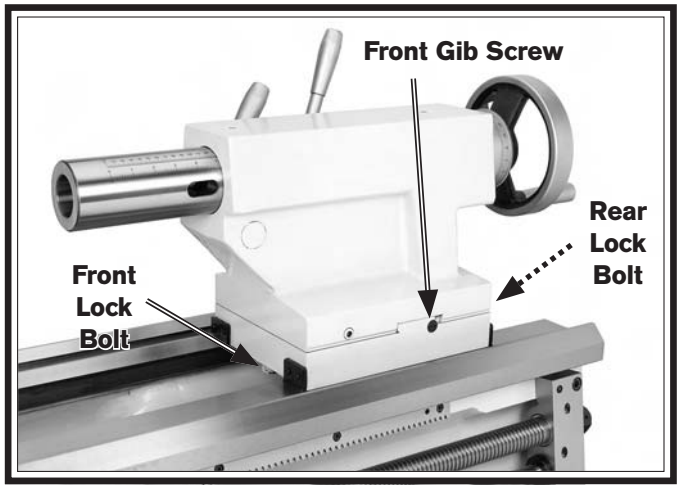


Figure 143. One of two tailstock gib screws.

2. To tighten the tailstock gib and move it toward the splash guard, loosen the splash guard-facing gib screw ¼-turn, and tighten the front gib screw shown in **Figure 143** ¼-turn.

3. When finished, retighten the lock bolts.

Half Nut Adjustment

The half nut mechanism can be tightened if it becomes loose from wear. The pressure exerted by the half nut is controlled by a gib. The half nut gib is adjusted with two set screws.

Tool Needed:	Qty
Hex Wrench 3mm	1

To adjust the half nut gib:

1. Disengage the half nut.

2. Remove the thread dial.

3. Turn the half-nut adjustment set screws, shown in **Figure 144**, clockwise approximately an ⅛-turn.

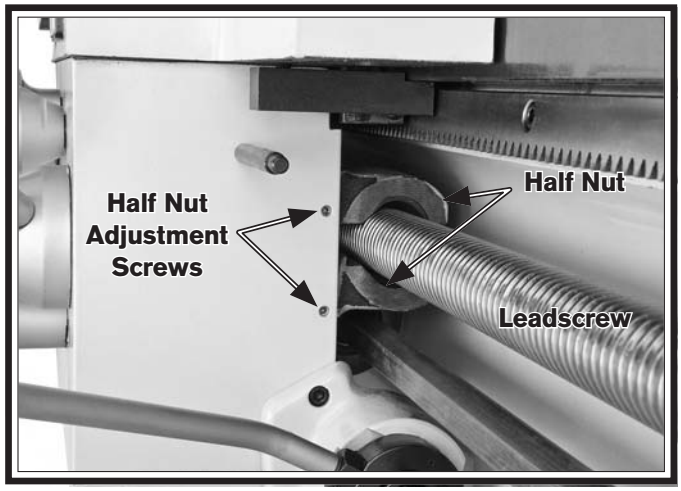


Figure 144. Half nut gib adjustment.

4. Engage/disengage the half nut several times and notice how it feels (you may need to move the carriage handwheel slightly to get the half nut to close).

   The half nut is correctly adjusted when it has a slight drag while opening and closing. The movement should not be too stiff or too sloppy.

5. Repeat **Steps 3–4**, if necessary, until you are satisfied with the half nut adjustment. (If the half nut becomes too stiff, turn the set screws counterclockwise to loosen it.)

6. Re-install the thread dial.

V-Belts

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

Tools Needed:	**Qty**
Phillips Screwdriver #2	1
Open End Wrench 24mm	1

To adjust the V-belts:

1. DISCONNECT LATHE FROM POWER!

2. Remove the cover shown in **Figure 145**.

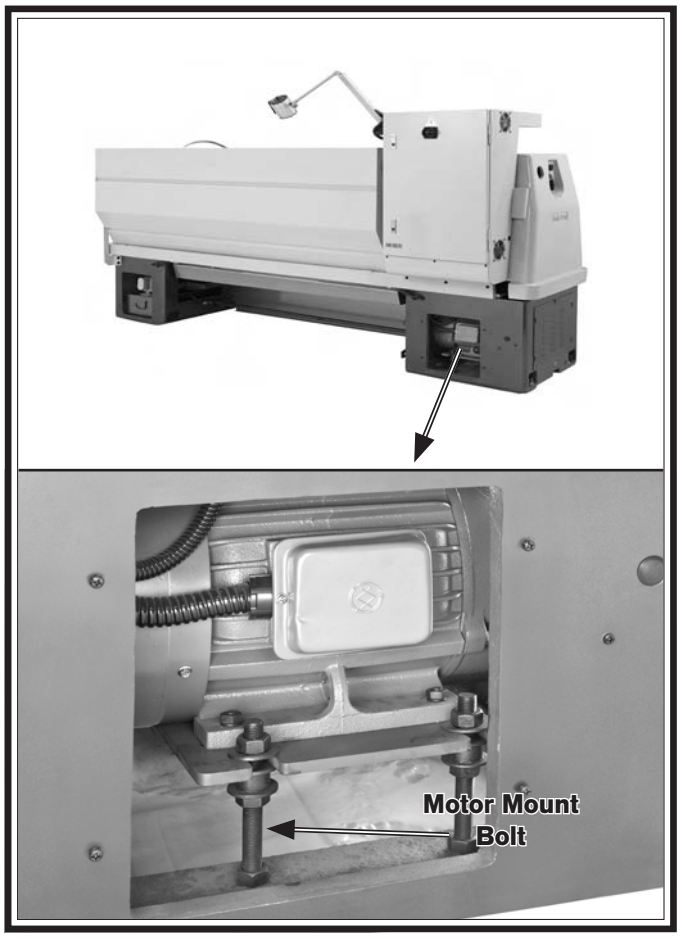


Figure 145. Location of belt tension adjustment.

3. Turn the hex nuts on the motor mount bolts shown in **Figure 146** to move the motor mount plate up or down and adjust the V-belt tension. When correctly tensioned, each belt should have about ¾" deflection when pressed firmly (see **Figure 146**).

   To ensure that the belts do an equal part in transmitting power, always replace all of them at the same time. If one belt is larger or has more deflection than the others, the other belts will absorb the additional load and wear faster.

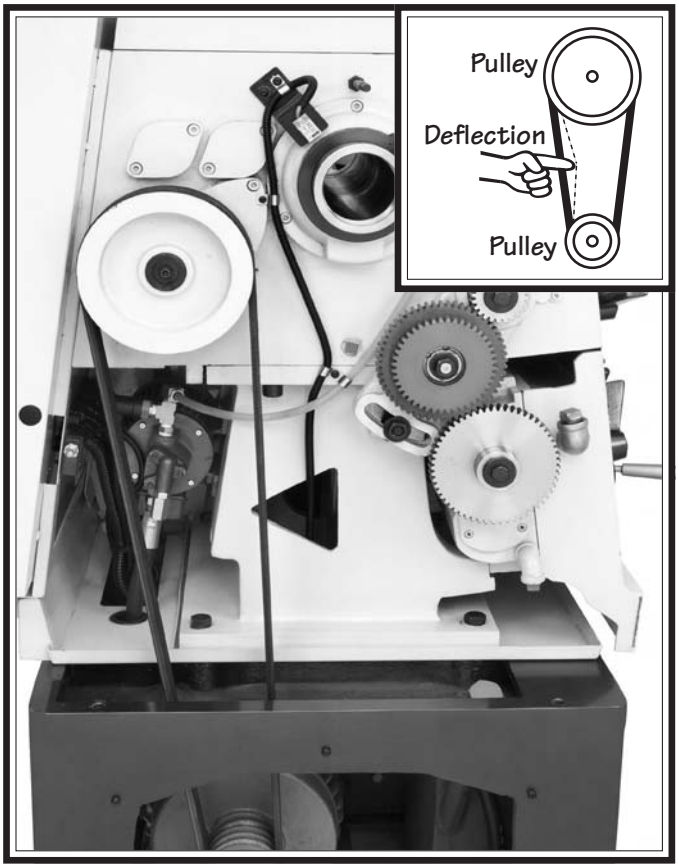


Figure 146. V-belt adjustment.

4. Firmly tighten the hex nuts (loosened in the previous step) against the motor mount plate to prevent it from moving out of adjustment during operation, then re-install the motor cover.

Brake Inspection & Replacement

The linkage geometry on this lathe is non adjustable. Before replacing the brake shoes, verify that all fasteners are tight, and all clevis pins and yokes have minimal wear. As pivot points wear, the increased slop in the linkage absorbs the usable stroke that is required for full brake application. If the brake does not stop the lathe as fast as it should, before replacing the brake shoes, verify that the linkage is not worn and is the cause of the problem.

Tools Needed:	**Qty**
Another Person	1
Hex Wrench 6mm	1
Hex Wrench 8mm	1
Needle-Nose Pliers	1
Basic Caliper	1
Safety Glasses	1
Respirator Rated for Brake Dust	1

To replace the brake shoes:

1. DISCONNECT LATHE FROM POWER!

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

3. With the help of another person, remove the splash guard, which is attached with the five capscrews shown in **Figure 147**.

4. Once the splash guard is removed, remove the two chuck guard mount cap screws (**Figure 147**) and the chuck guard from the headstock cover.

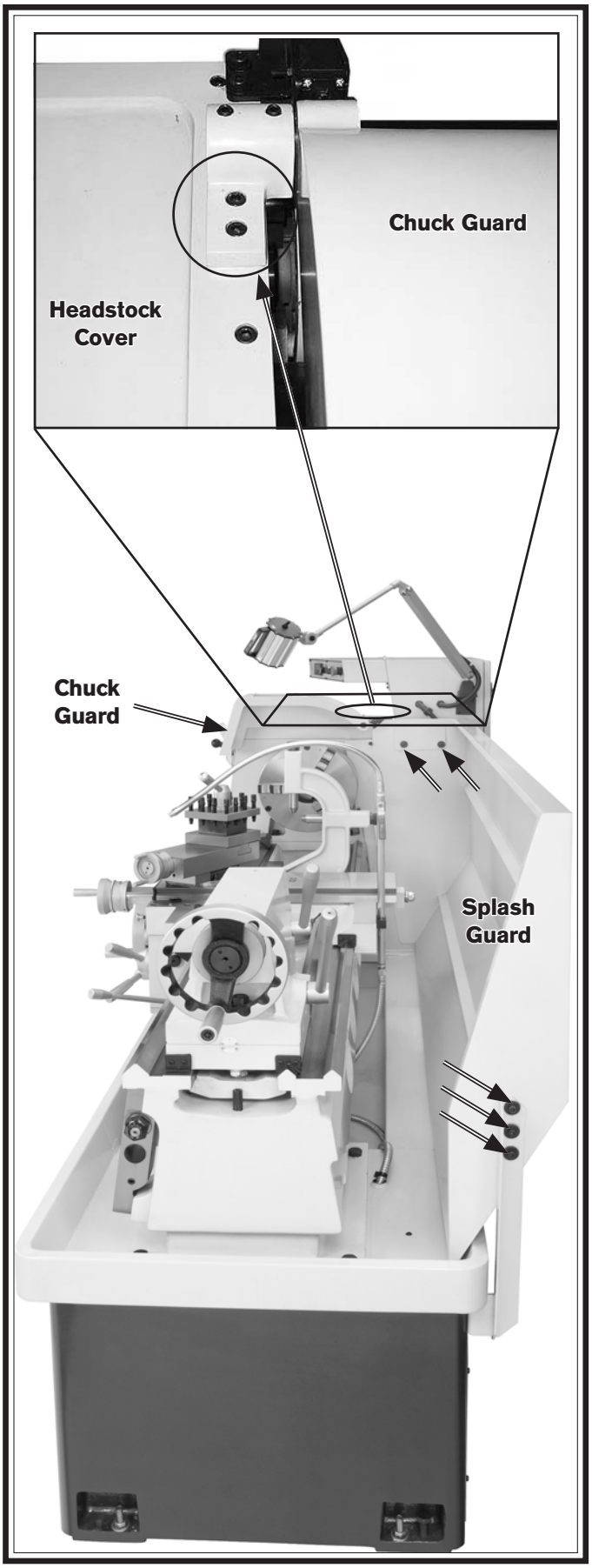


Figure 147. Tailstock end splash guard fasteners.

5. Place sheet of wood on the ways to protect them when the chuck is removed.

6. Using the appropriate lifting apparatus, remove the chuck as shown in **Figure 148.**

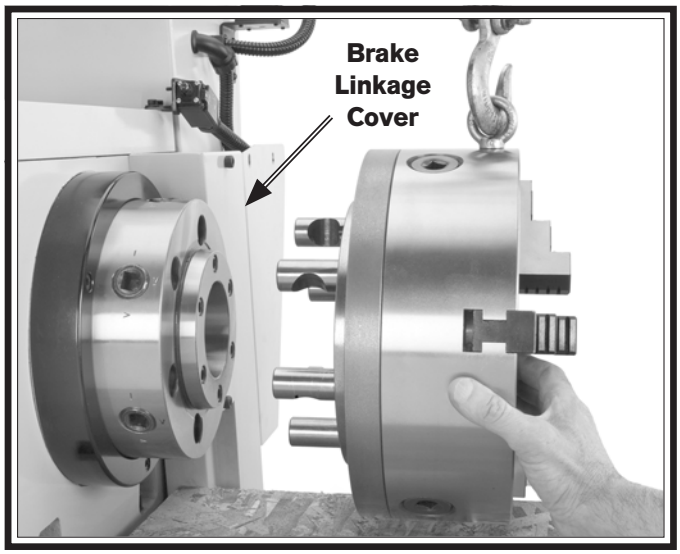


Figure 148. Removing the 3-jaw chuck from a spindle nose.

7. Remove the cap screws that fasten the brake linkage cover shown in **Figure 149** to the headstock.

8. Remove the brake linkage cover.

9. Have your assistant step on the brake pedal while you verify that the cam lobe shown in **Figure 149** makes the kill switch plunger click when pushed.

— If the switch does not click, loosen the switch mounting screws, push the pedal all the way down, and move the switch closer to the lobe until it clicks. Secure the switch in place at this location.

— With the foot pedal released, the switch plunger should be approximately 3mm from the lobe.

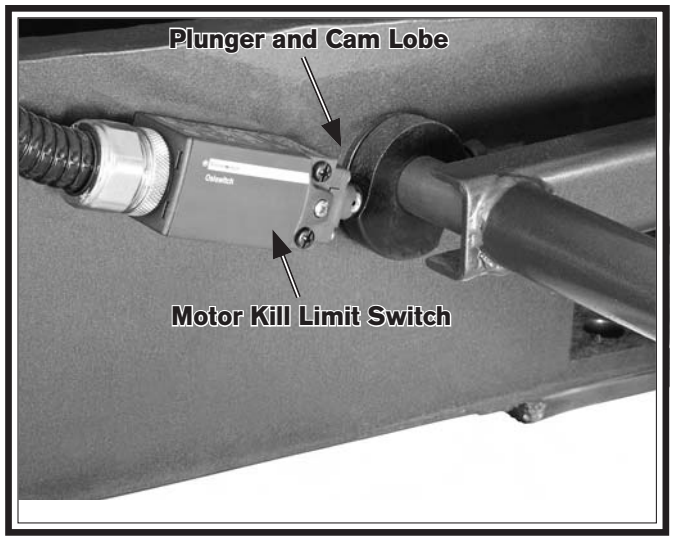


Figure 149. Brake pedal motor kill switch.

10. While the lathe is disconnected from power have your assistant move the spindle ON/OFF lever up to forward, neutral, and reverse, while you verify the lobe rod shown in **Figure 150** operates the switches without any loose switch mounts, cap screws, or interference.

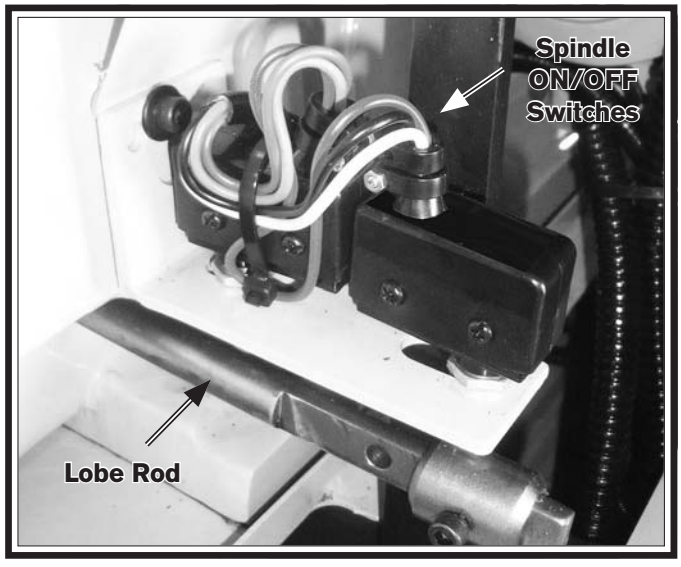


Figure 150. Lobe rod and spindle ON/OFF switch.

11. Have your assistant press on the brake pedal a few times while you watch all of the brake linkage for any loose fasteners or worn pivot points and pins. Tighten or replace parts as required.

12. Have your assistant step on and hold the brake pedal to lock the drum in place.

13. Remove the drum retaining cap screw shown in **Figure 151**.

14. Remove the brake drum, E-Clip, and shoes shown in **Figure 151**, and the brake shoes.

15. Use mineral spirits to clean the drum. Then inspect it. If the drum is bell-mouthd, cracked, or shows deep grooves, replace it. For minor scoring, the drum can be dressed with sandpaper or turned on a lathe.

16. Clean the brake shoes with hot soapy water and inspect. When evaluating the brake shoes, replace the shoes as a set if the lining thickness discussed below is 3/16" or less, or if the linings are loose on the rivets, or if the bonded linings are separating from the shoe.

— If riveted linings are present, measure the lining thickness by determining how much lining is left before the tops of the rivet heads will begin to score the drum.

— If bonded linings are present, view the brake shoe from the side, and measure the thickness of the remaining lining before the metal brake shoe begins to score the drum.

17. Re-install the guards and covers, and test for brake operation.

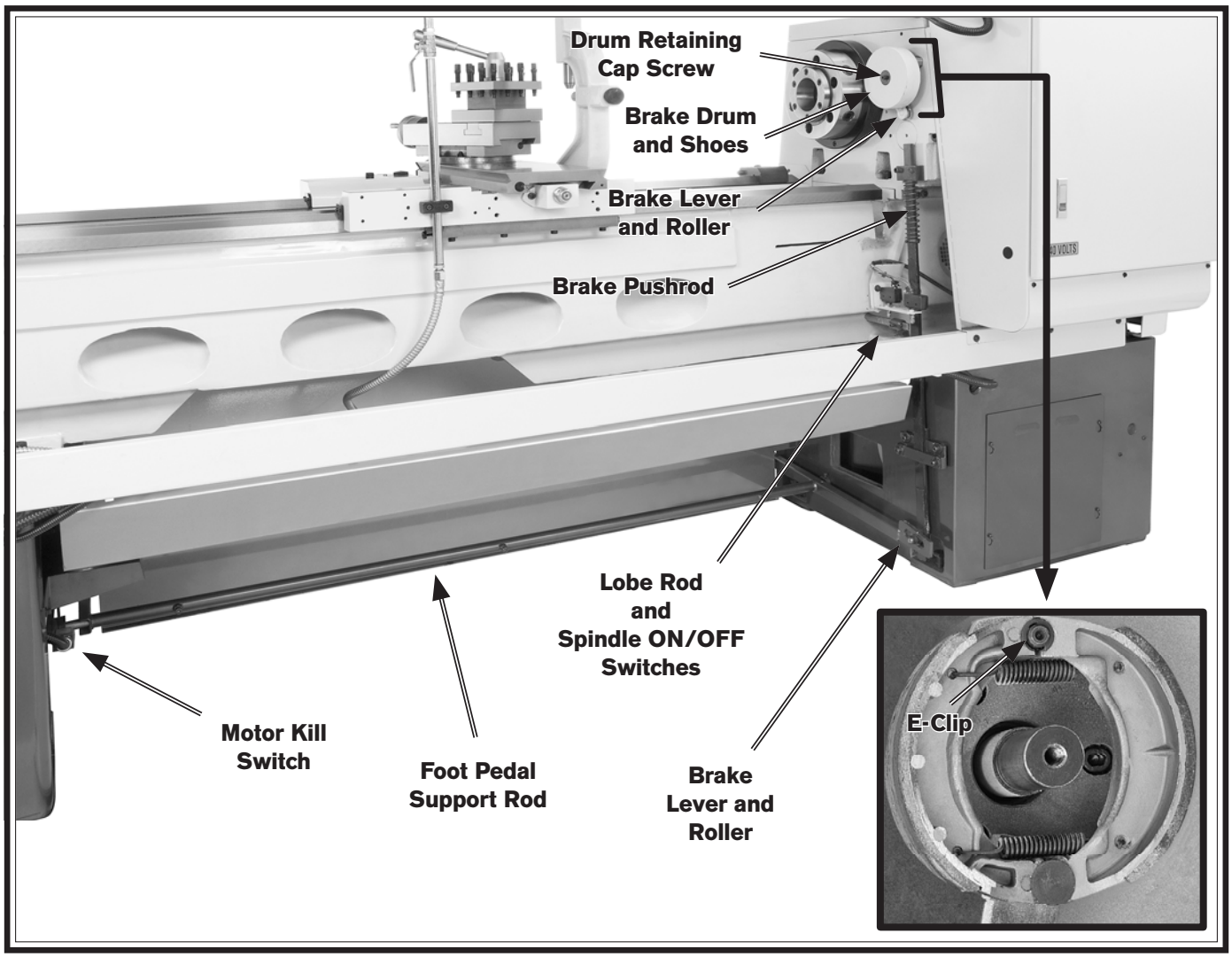


Figure 151. Complete brake system.

Leadscrew Shear Pin Replacement

If the shear pin has broken, do not improvise by inserting a roll pin, cotter pin, steel dowel, or nail. Should the pin need to shear again, catastrophic gearbox damage may result. Order extras or make your own set of shear pins using the specifications shown in **Figure 152**.

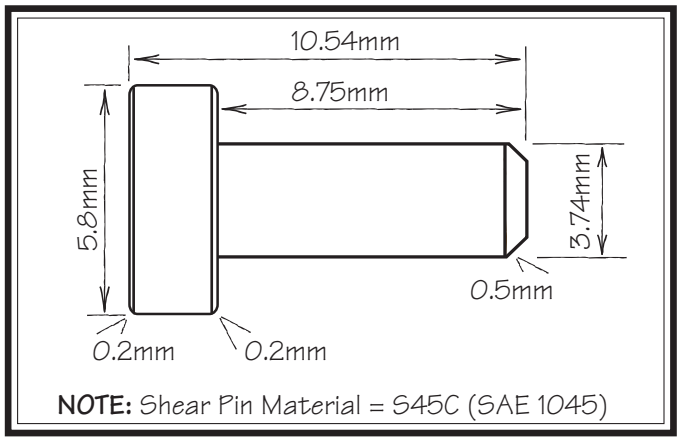


Figure 152. Shear pin specifications.

Tools Needed:	**Qty**
Phillips Screwdriver #2	1
External Retaining Ring Pliers 90° #2	1
Magnet	1
Safety Glasses	1

To replace the shear pin:

1. DISCONNECT LATHE FROM POWER!

2. Clean shear pin area shown in **Figure 153** with mineral spirits, then dry with a rag.

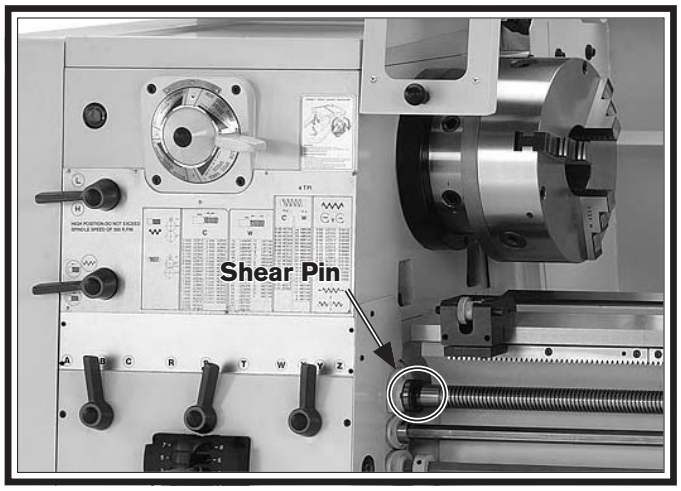


Figure 153. Shear pin location.

3. Rotate the shroud washer so the cutout in the washer aligns with the shear pin head, as shown in **Figure 154**.

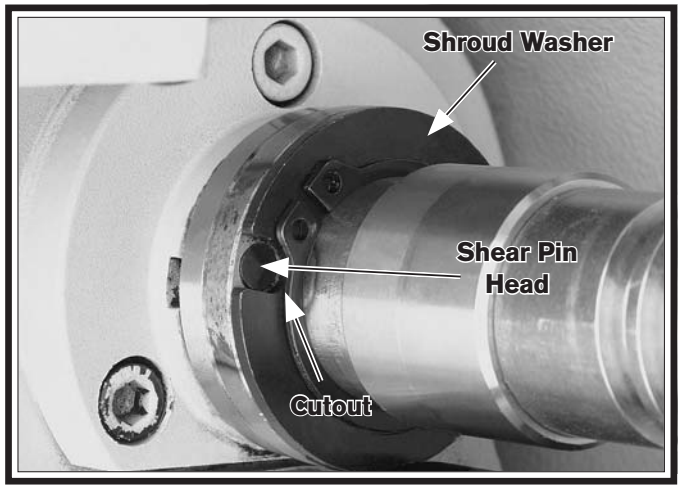


Figure 154. Shroud washer/pin alignment.

4. Put on safety glasses.

5. Slide the retaining ring away from the shroud washer so it rests against the spring-loaded sleeve as shown in **Figure 155**.

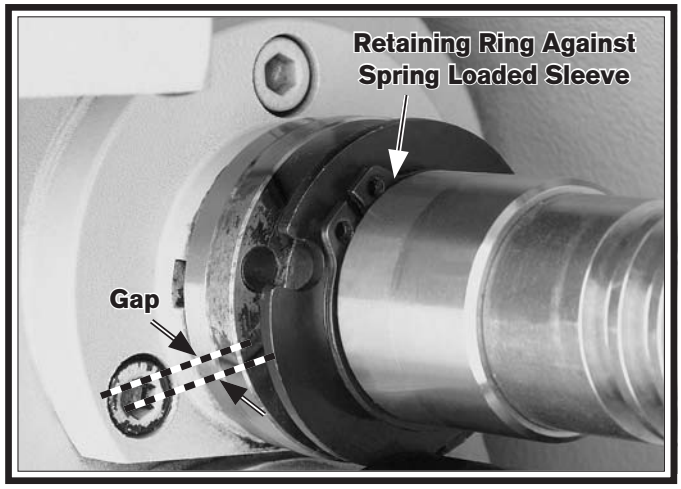


Figure 155. Shear pin access.

6. Slide the shroud washer against the retaining ring, as shown in **Figure 155**. There must be enough of a gap to remove the shear pin.

7. Use the magnet to remove the shear pin head, then rotate the lathe spindle by hand to line up the inner and outer bores, as shown in **Figure 156**. Next, use the magnet to remove the other half of the broken shear pin when it becomes visible.

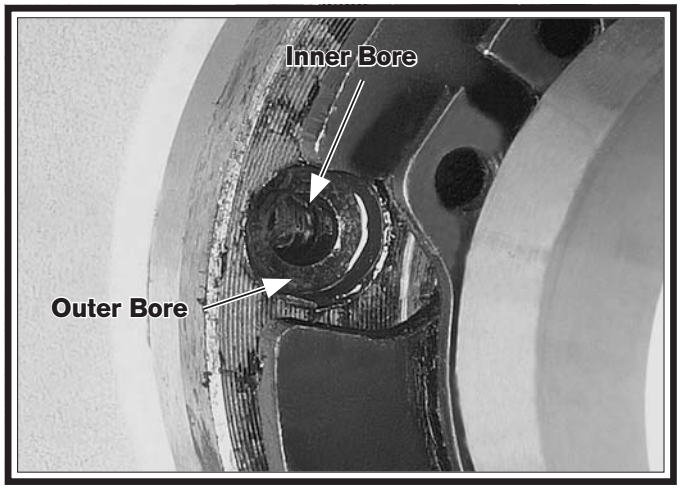


Figure 156. Aligned shear pin bores.

8. Blow out the shear pin hole with compressed air, and put a drop of oil in the hole.

9. Insert the new shear pin into the bore, as shown in **Figure 157**. If the pin does not freely slide into the bore, DO NOT hammer on the pin or you will mushroom the shear pin head, preventing installation. Instead, file a slight chamfer on the end of the pin to make it easier to align and insert.

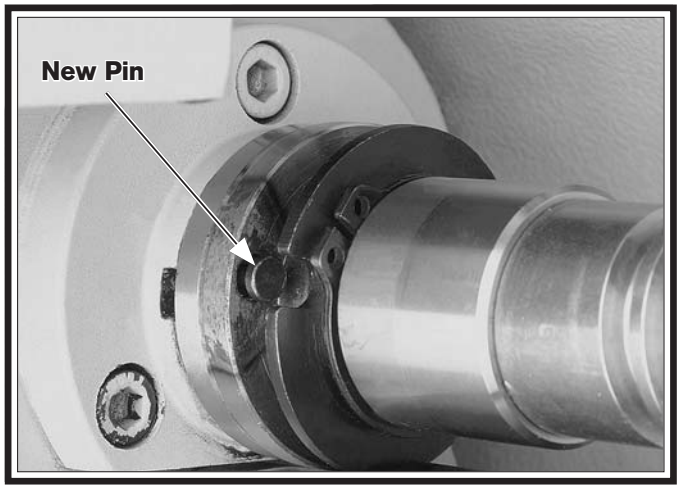


Figure 157. New shear pin installed in bore.

10. With the pin completely seated in the bore and the head flush with the leadscrew shoulder, slide the shroud washer against the shoulder, and rotate it 180° (see **Figure 158**) to cover the shear pin.

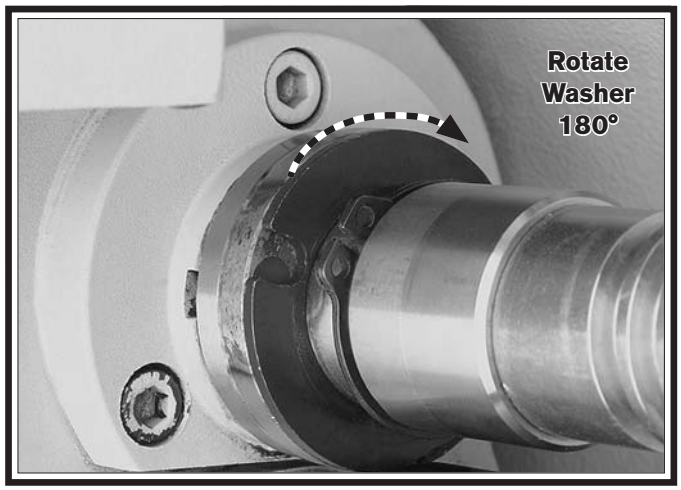


Figure 158. Rotating washer to cover shear pin.

11. Slide the retaining ring against the shroud washer, so the retaining-ring ears are offset from the hole in the shroud washer, as shown in **Figure 159**.

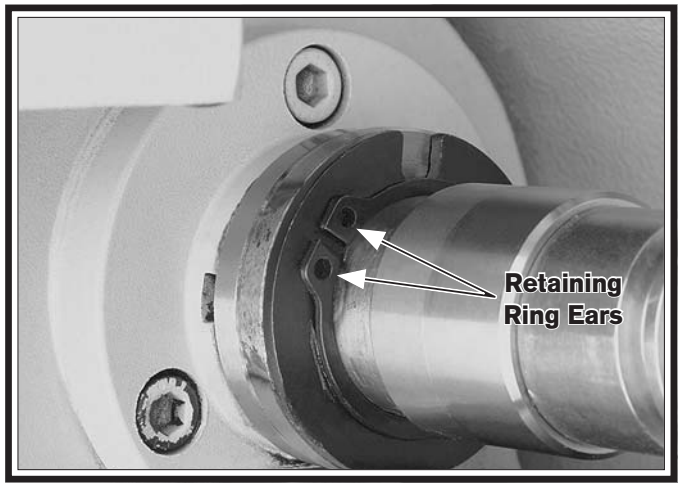


Figure 159. Offset positioning of retaining ring ears and hole in shroud washer.

Gap Removal & Installation

The gap insert (**Figure 160**), is a portion of the lathe bed directly under the spindle that can be removed to create additional space for turning large diameter parts.

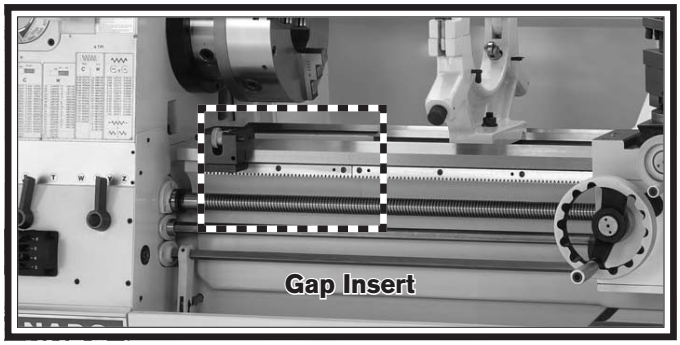


Figure 160. Gap insert that can be removed from bed.

The gap insert was installed, then ground flush with the bed at the factory to ensure precise fit and alignment. Therefore, if removed, it may be difficult to re-install with the same degree of alignment and mating when installed at the factory.

Tools Needed:	**Qty**
Hex Wrenches 6, 14mm	1 Each
Wrench 19mm	1
Box Cutter or Razor Blade	1

To remove the gap insert:

1. Remove the four gap bed cap screws, shown in **Figure 161**, that secure the gap insert to the bed.

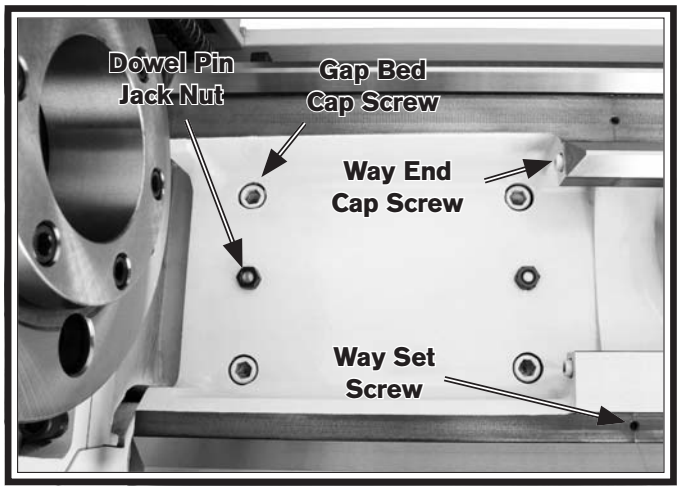


Figure 161. Fasteners holding gap in place.

2. Remove the two way-end cap screws, and way set screws shown in **Figure 161**.

3. Tighten the two dowel pin jack nuts (**Figure 161**) until the pins are pulled free from the gap insert.

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

To re-install the gap insert:

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

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

3. Place the gap insert into the bed and use a block of wood or dead-blow hammer to align it with the lathe bed.

4. Back off the dowel pin jack nuts, and tap the dowel pins back into their respective holes until seated. This will further help align the gap insert and bed mating surfaces.

5. Install all fasteners (except the way set screws) and lightly snug them in place.

6. Mount a base-mounted dial indicator to the top of the saddle to indicate alignment. First test the peak of the two prisms the saddle rides on, then test the flanks of the prisms. Jack the insert up or down by tightening or loosening the gap bed cap screws.

7. Alternately tighten the fasteners and tap the side of the gap insert into alignment.

8. Inspect the gap position 24 hours later to make sure the gap is still aligned. Adjust if necessary, then install the two way set screws.

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 may be wired with the incorrect phase polarity.	**1.** Correct phase polarity (refer to **Page 16** for details).
	2. Emergency stop push-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. Spindle ON/OFF switch is at fault.	**3.** Move the spindle ON/OFF lever to ON; replace bad switch.
	4. Power supply is switched OFF at master power switch or breaker.	**4.** Make sure master power switch and circuit breaker are turned ON.
	5. Wall fuse/circuit breaker is blown/ tripped; short in electrical system; start-up load too high for circuit.	**5.** Verify circuit is rated for machine amp load; troubleshoot and repair cause of overload; replace weak breaker; find/repair electrical short.
	6. Fuse has blown in machine electrical box due to thermal overload.	**6.** Replace fuse; determine if overload is due to heavy operation; ensure power source has high enough voltage and cord is correctly sized.
	7. One or more kill switches are engaged.	**7.** Verify electrical box door, chuck guard, gear cover, spindle, and brake switches are not engaged. Headstock oil pump is not pumping, or is wired with the incorrect phase polarity. Correct pump phase polarity, refer to **Page 16**.
	8. Motor connection wired incorrectly.	**8.** Correct motor wiring connections.
	9. Oil pump motor operating, but oil is not seen pumping past sight glass.	**9.** Prime pump, fill headstock oil tank to full, or replace oil pump.
	10. Limit/kill switch at fault.	**10.** Test all limit/kill switches and replace as necessary.
	11. Contactor not getting energized/has burnt contacts.	**11.** Test for power on all legs and contactor operation. Replace unit if faulty.
	12. Wiring is open/has high resistance.	**12.** Check for broken wires or disconnected/corroded connections, and repair/replace as necessary.
	13. Motor is at fault.	**13.** Test/repair/replace.
	14. Frequency drive unit is at fault.	**14.** Contact frequency drive manufacturer for list of authorized service providers in your area.
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 the cover.	**2.** Tighten fan, shim cover, or replace items.
Motor overheats.	**1.** Motor overloaded.	**1.** Reduce load on motor.
	2. Frequency drive unit is at fault.	**2.** Contact frequency drive manufacturer for list of authorized service providers in your area.
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 the 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 the spindle bore as possible.
	2. Loose or damaged belt(s).	**2.** Tighten/replace the belt as necessary (**Page 81**).
	3. V-belt pulleys are not properly aligned.	**3.** Align the V-belt pulleys.
	4. Worn or broken gear present.	**4.** Inspect gears and replace if necessary.
	5. Chuck or faceplate has become unbalanced.	**5.** Rebalance chuck or faceplate; contact a local machine shop for help.
	6. Gears not aligned in headstock or no backlash.	**6.** Adjust gears and establish the correct amount of backlash.
	7. Broken gear or bad bearing.	**7.** Replace broken gear or bearing.
	8. Workpiece is hitting stationary object.	**8.** Stop lathe immediately and correct interference problem.
	9. Spindle bearings at fault.	**9.** Rest 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 the intended operation.
	3. Tool height not at centerline.	**3.** Adjust tool height to centerline.
	4. Too much play in gibs.	**4.** Tighten gibs (**Page 78**).
Tapered tool difficult to remove from tailstock quill.	**1.** Quill is not retracted all the way back into the tailstock.	**1.** Turn the quill handwheel until it forces taper out of quill.
	2. Contaminants not removed from taper before inserting into quill.	**2.** Clean the taper and bore and re-install tapered tool.
Cross slide, compound, or carriage feed has sloppy operation.	**1.** Gibs are out of adjustment.	**1.** Tighten gib screw(s) (**Page 78**).
	2. Handwheel is loose or backlash is high.	**2.** Tighten handwheel fasteners, adjust handwheel backlash to a minimum.
	3. Lead screw mechanism worn or out of adjustment.	**3.** Adjust leadscrew to remove endplay (**Page 78**).
Cross slide, compound, or carriage feed handwheel is hard to move.	**1.** Dovetail slides loaded up with shavings, dust, or grime.	**1.** Remove gibs, clean ways/dovetails, lubricate, and readjust gibs.
	2. Gib screws are too tight.	**2.** Loosen gib screw(s) slightly, and lubricate bedways.
	3. Backlash setting too tight (cross slide only).	**3.** Slightly loosen backlash setting (**Page 78**).
	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.** Tighten gib screws at affected component.
	4. Dull cutting tool.	**4.** Replace or resharpen cutting tool.
	5. Incorrect spindle speed or feed rate.	**5.** Use the recommended spindle speed.

Symptom	Possible Cause	Possible Solution
Workpiece is tapered.	**1.** Headstock and tailstock are not properly aligned with each other.	**1.** Realign the tailstock to the headstock spindle bore centerline (**Page 44**).
Chuck jaws will not move or do not move easily.	**1.** Chips lodged in the 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.** Loose screw on the feed handle. **3.** Carriage lock is tightened down. **4.** Chips have loaded up on bedways. **5.** Bedways are dry and in need of lubrication. **6.** Micrometer stop is interfering. **7.** Gibs are too tight. **8.** Gears or shear pin broken.	**1.** Adjust gear levers. **2.** Tighten. **3.** Check to make sure the Carriage Lock is fully released. **4.** Frequently clean away chips that load up during turning operations. **5.** Lubricate bedways and handles. **6.** Check micrometer stop position, and adjust it as necessary (**Page 51**). **7.** Loosen gib screw(s) slightly (**Page 78**). **8.** Replace gears or shear pin (**Page 85**).
Gear change levers will not shift into position.	**1.** Gears not aligned inside headstock.	**1.** Rotate spindle by hand with light pressure on the lever until gear falls into place.
Headstock oil does not flow or circulate properly.	**1.** (For first time operation only) The oil pump phase polarity is wired incorrectly. **2.** Emergency stop push-button is engaged or at fault. **3.** Power supply is switched OFF at master power switch or breaker. **4.** Insufficient oil level in headstock oil tank or incorrect oil used in headstock oil tank. **5.** Suction screen clogged. **6.** Pinched/damaged oil line. **7.** Suction side of pump drawing air. **8.** Leak in distribution manifold located inside headstock. **9.** Pump motor at fault.	**1.** Correct oil pump phase polarity (refer to **Page 16** for details). **2.** Rotate button clockwise until it pops out to reset it for operation; replace if not working properly. **3.** Make sure master power switch and circuit breaker are turned ON. **4.** Add oil to the headstock oil tank (refer to **Headstock** "Checking & Adding Oil" on **Page 66** for details). Make sure to use the correct type of oil. **5.** Clean suction screen (**Page 69**). **6.** Trace oil lines to inspect and replace pinched/damaged line. **7.** Locate leak and reseal/replace affected components. **8.** Locate leak and reseal/replace affected components. **9.** Replace/repair pump motor.

Electrical Safety Instructions

These pages are accurate at the time of printing. In the constant effort to improve, however, we may make changes to the electrical systems of future machines. Study this section carefully. If you see differences between your machine and what is shown in this section, call Technical Support at (360) 734-1540 for assistance BEFORE making any changes to the wiring on your machine.

1. **Shock Hazard:** It is extremely dangerous to perform electrical or wiring tasks while the machine is connected to the power source. Touching electrified parts will result in personal injury including but not limited to severe burns, electrocution, or death. For your own safety, disconnect machine from the power source before servicing electrical components or performing any wiring tasks!

2. **Wire Connections:** All connections must be tight to prevent wires from loosening during machine operation. Double-check all wires disconnected or connected during any wiring task to ensure tight connections.

3. **Modifications:** Using aftermarket parts or modifying the wiring beyond what is shown in the diagram may lead to unpredictable results, including serious injury or fire.

4. **Motor Wiring:** The motor wiring shown in these diagrams is current at the time of printing, but it may not match your machine. Always use the wiring diagram inside the

5. **Circuit Requirements:** Connecting the machine to an improperly sized circuit will greatly increase the risk of fire. To minimize this risk, only connect the machine to a power circuit that meets the minimum requirements given in this manual.

6. **Capacitors/Inverters:** Some capacitors and power inverters store an electrical charge for up to 10 minutes after being disconnected from the power source. To reduce the risk of being shocked, wait at least this long before working on capacitors.

7. **Wire/Component Damage:** Damaged wires or components increase the risk of serious personal injury, fire, or machine damage. If you notice that any wires or components are damaged while performing a wiring task, replace those wires or components before completing the task.

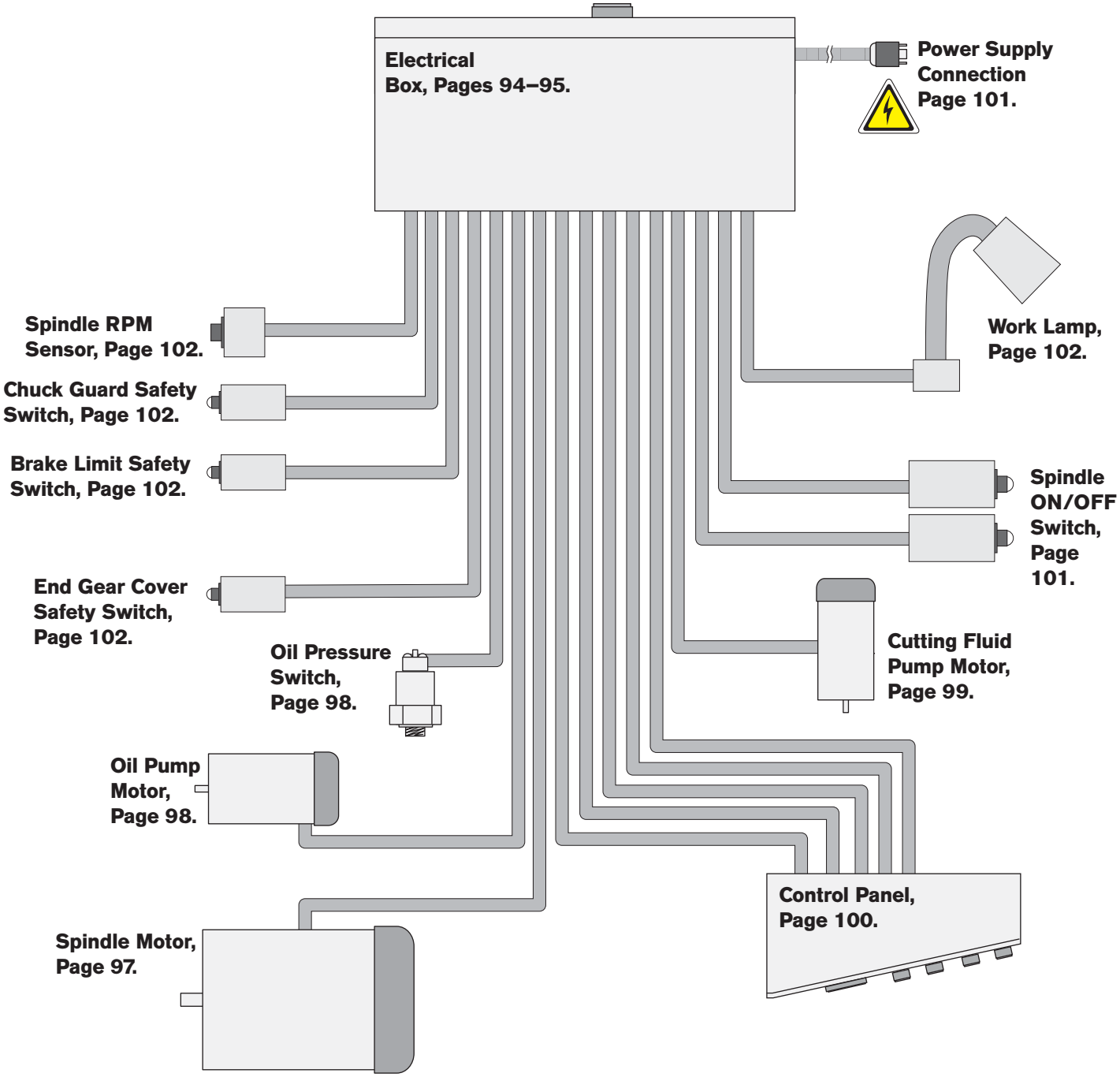
8. **Experiencing Difficulties:** If you are experiencing difficulties understanding the information included in this section, contact

WIRING DIAGRAM COLOR KEY

BLACK (Bk)	BLUE WHITE (Bw)	RED (Rd)	PINK (Pk)	WHITE (Wt)
BLUE (Bl)	GREEN (Gn)	LIGHT BLUE (Lb)	PURPLE (Pu)	YELLOW GREEN (Yg)
BROWN (Br)	GRAY (Gy)	ORANGE (Or)	TURQUIOSE (Tu)	YELLOW (Yl)

NOTICE: **The photos and diagrams included in this section are best viewed in color. You can see them in color at www.southbendlathe.com.**

Wiring Overview



SB1016/36 Component Location Index

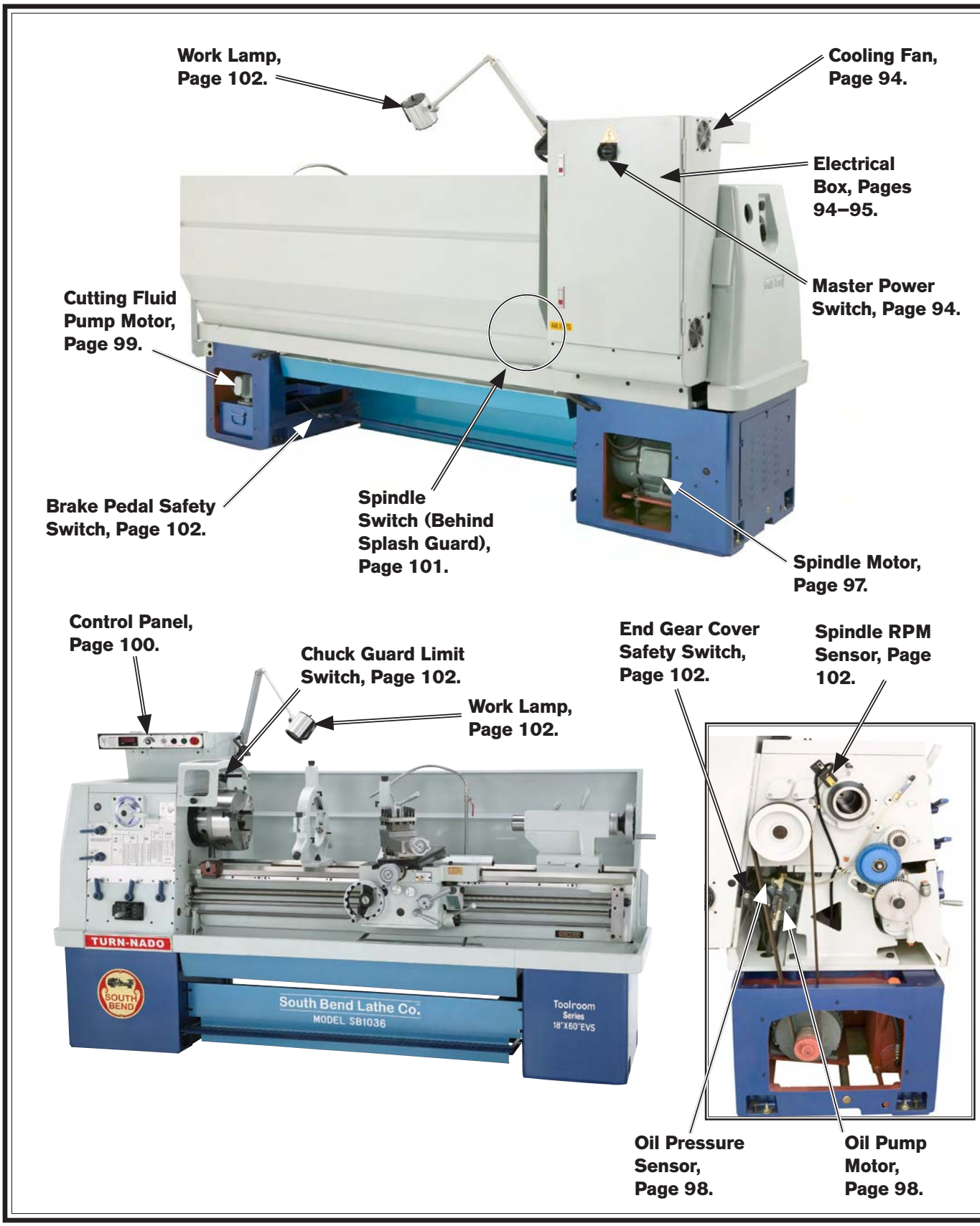
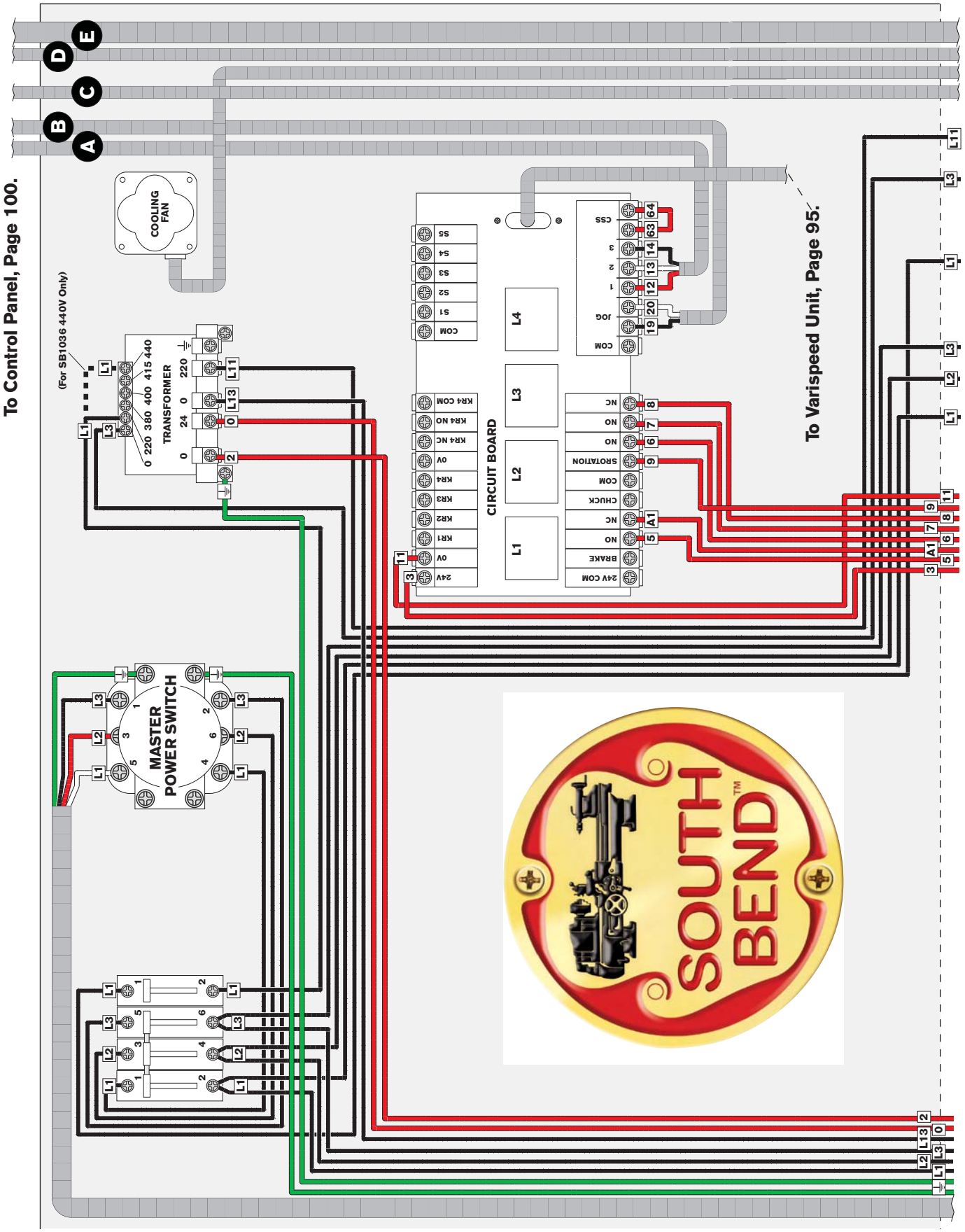
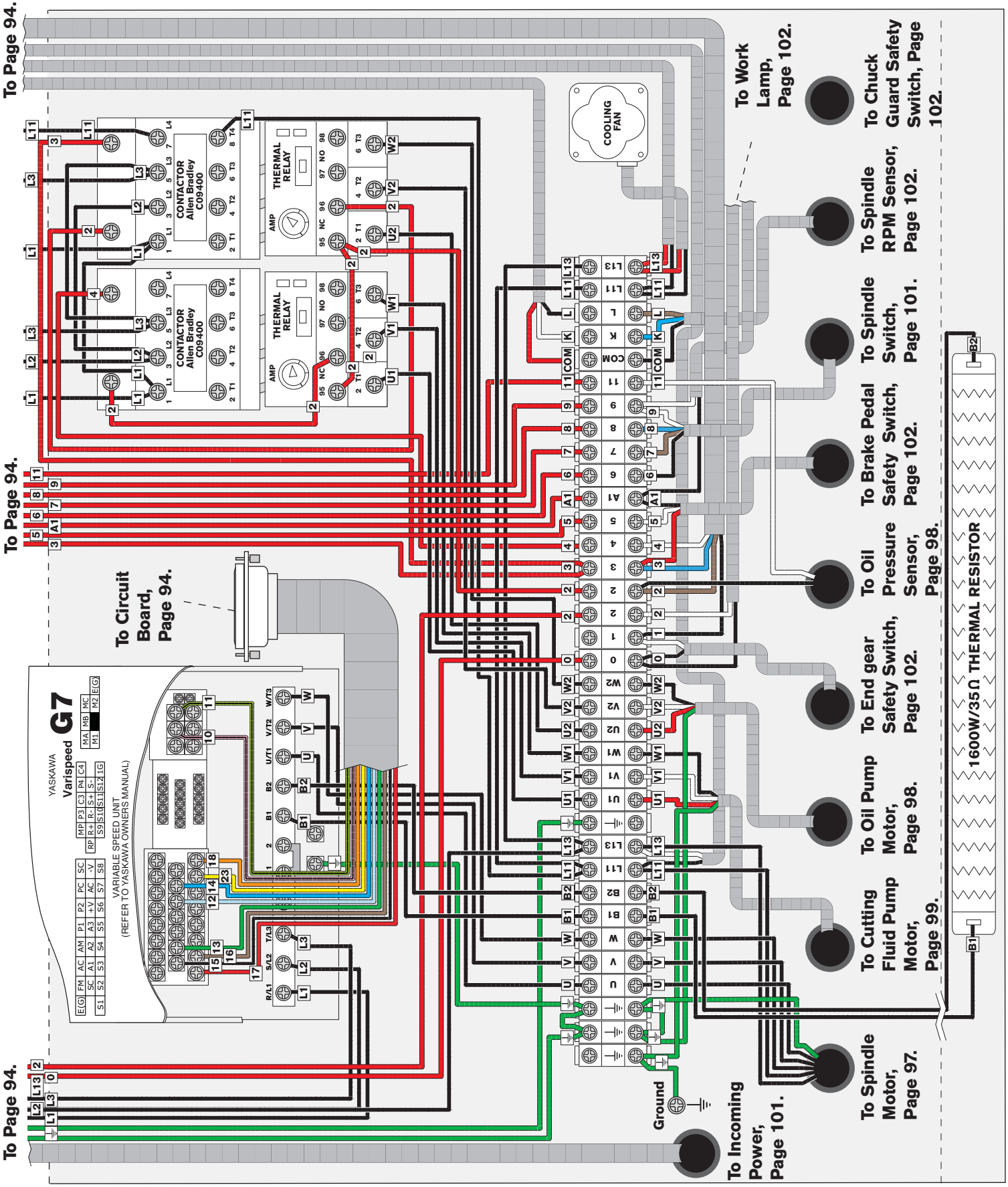


Figure 162. Component location index.

SB1016/36 Electrical Box Wiring



SB1016/36 Electrical Box Wiring



SB1016/36 Electrical Box

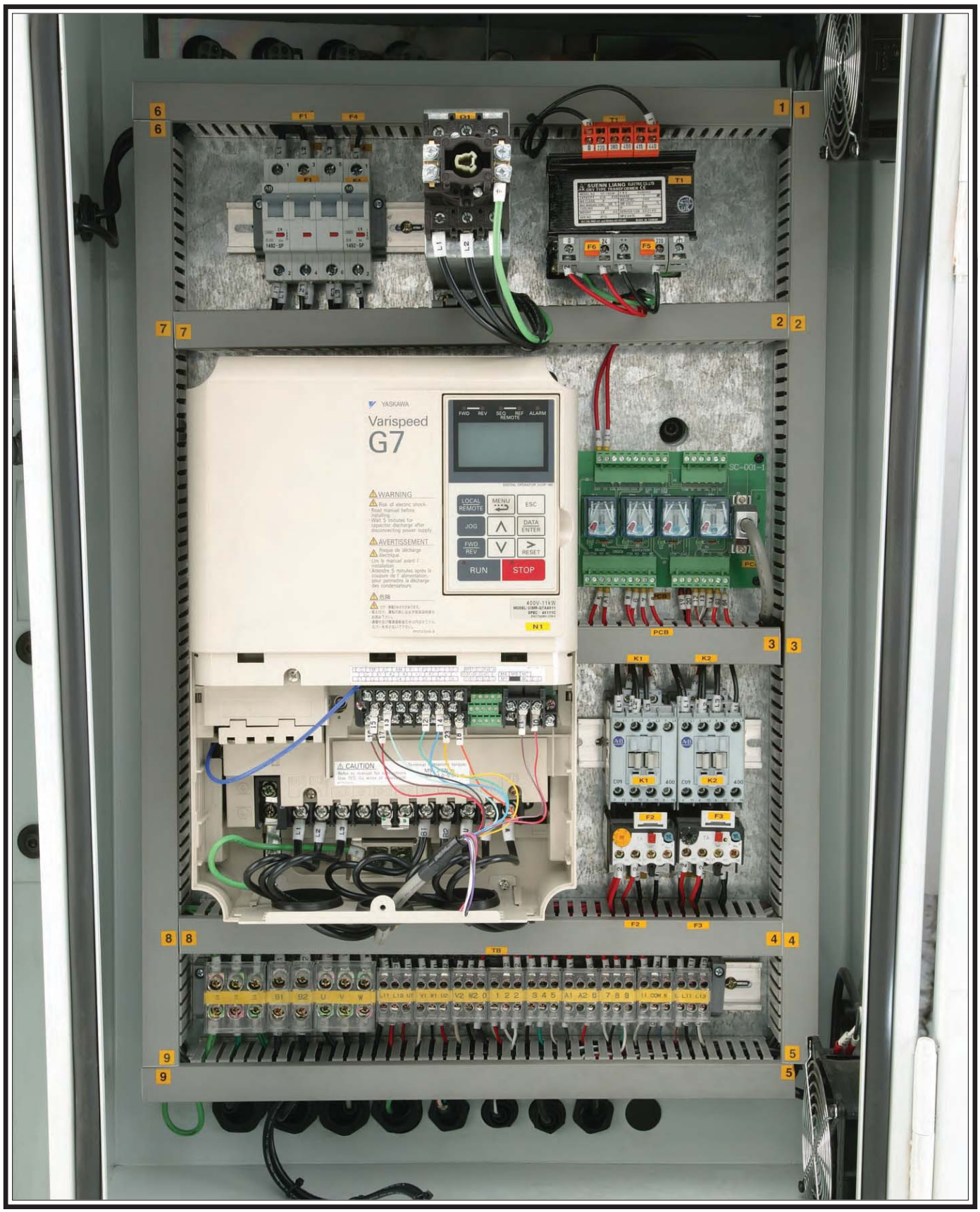
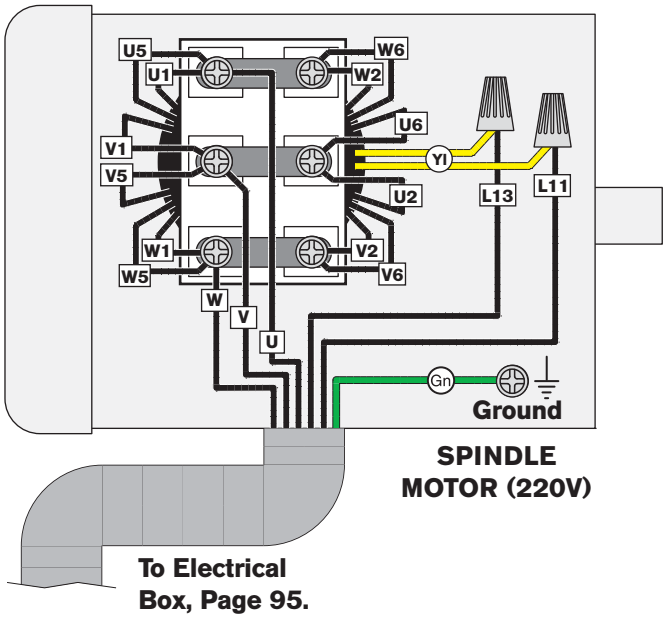


Fig. 163. Electrical box.

SB1016 220V Spindle Motor



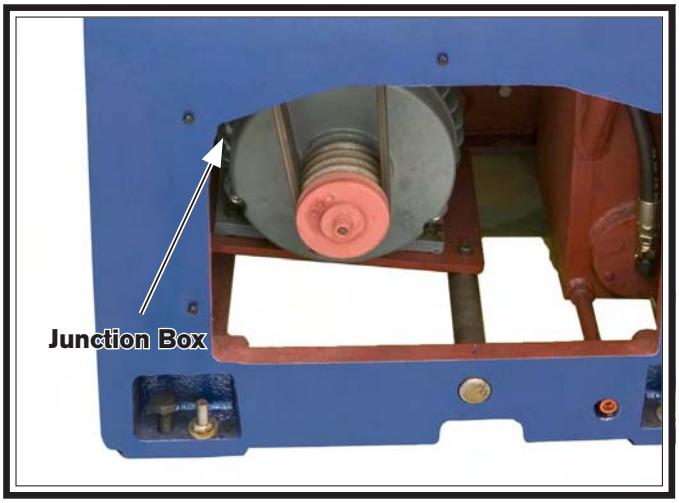
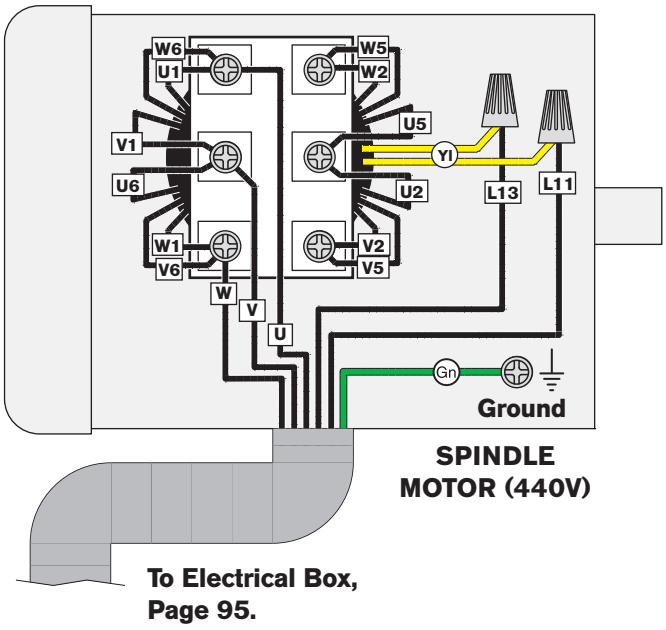


Figure 164. SB1016 Spindle motor location.

SB1036 440V Spindle Motor



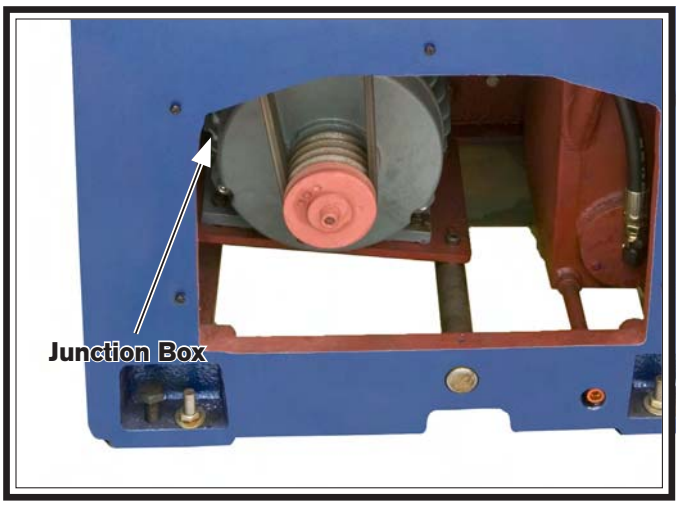
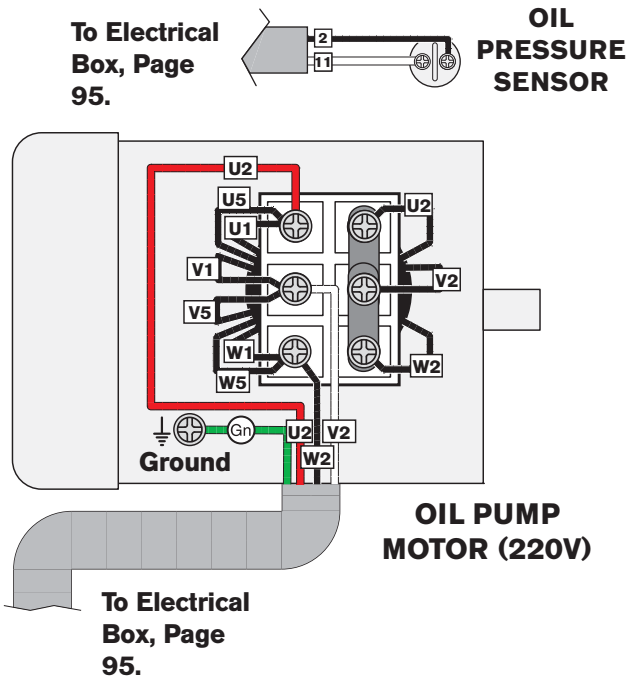


Figure 165. SB1036 Spindle motor location.

SB1016 220V
Oil Pump Motor & Pressure Sensor



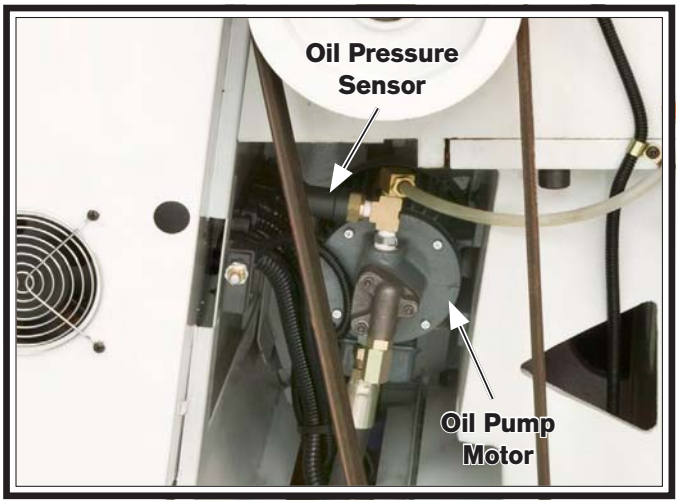
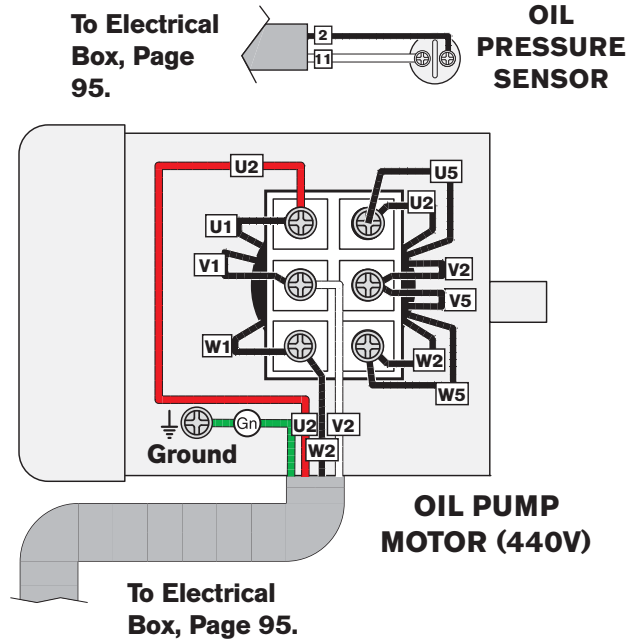


Figure 166. SB1016 Oil pump motor & pressure sensor location.

SB1036 440V
Oil Pump Motor & Pressure Sensor



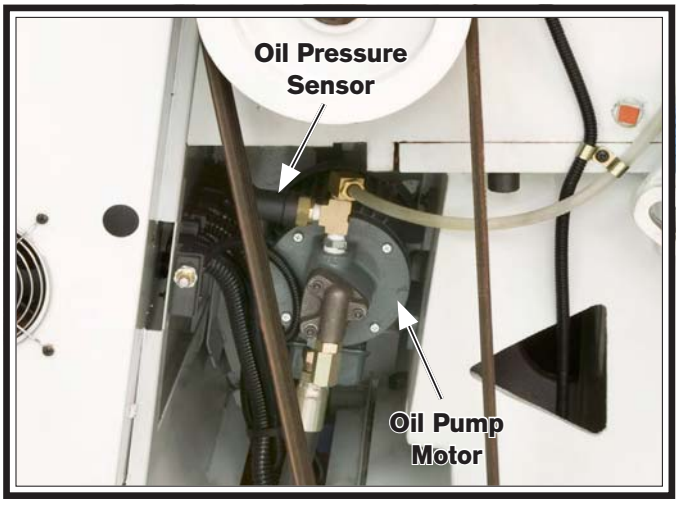
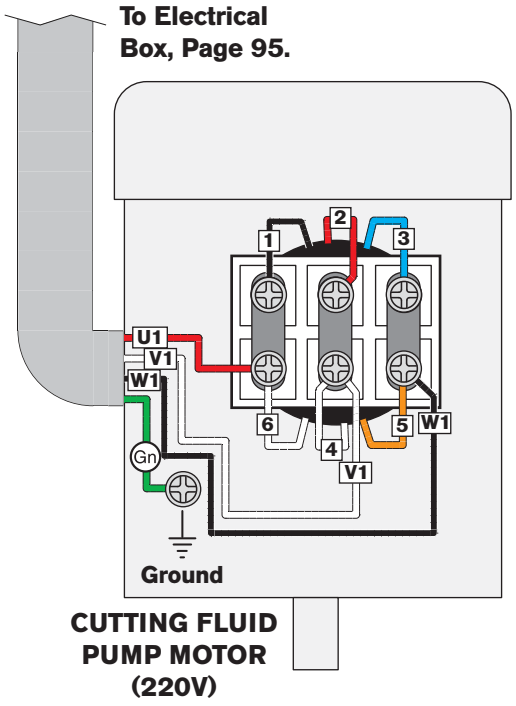


Figure 167. SB1036 Oil pump motor & pressure sensor location.

SB1016 220V Cutting Fluid Pump Wiring



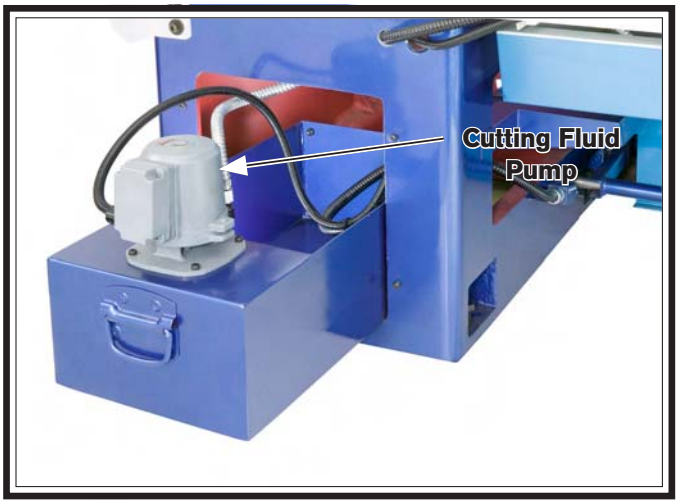
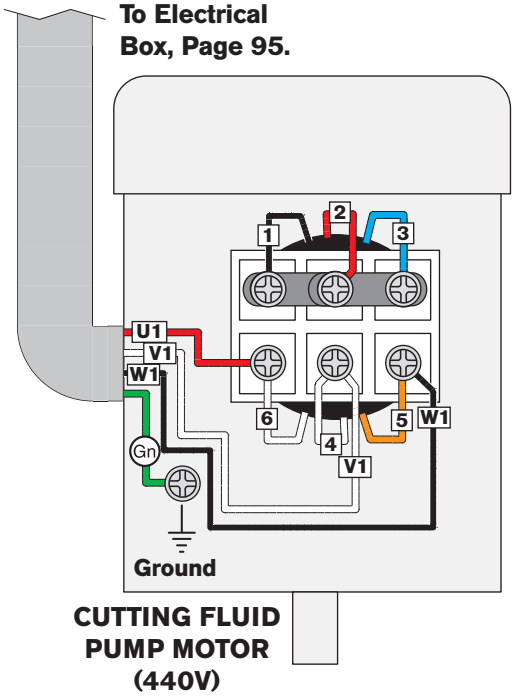


Figure 168. SB1016 Cutting fluid pump location.

SB1036 440V Cutting Fluid Pump Wiring



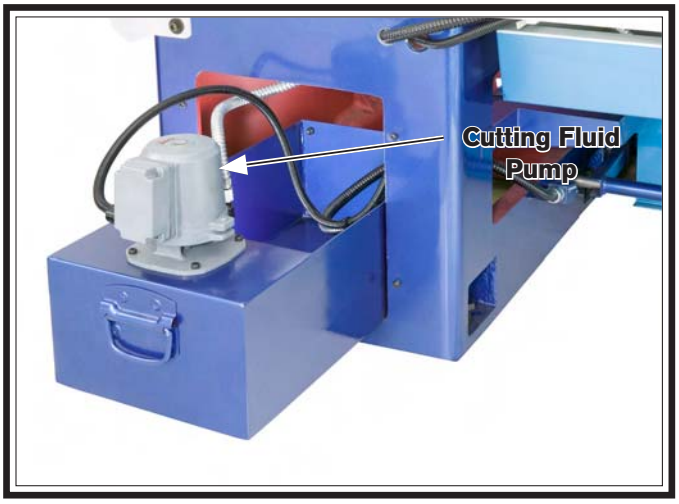
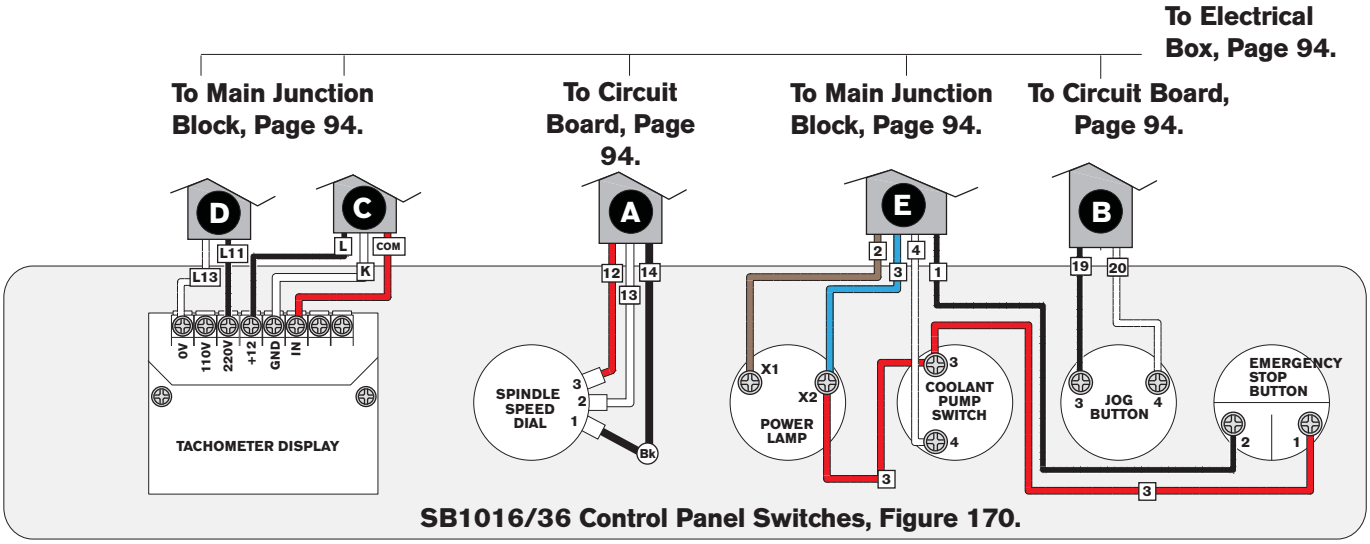


Figure 169. SB1036 Cutting fluid pump location.

SB1016/36 Control Panel Wiring

Figure 170. Control panel location.



SB1016/36 Control Panel Switches, Figure 170.

SB1016/36 Spindle ON/OFF Switch

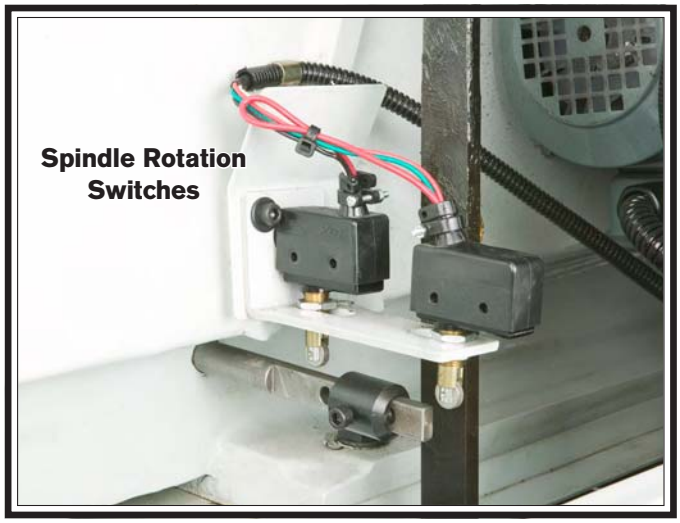
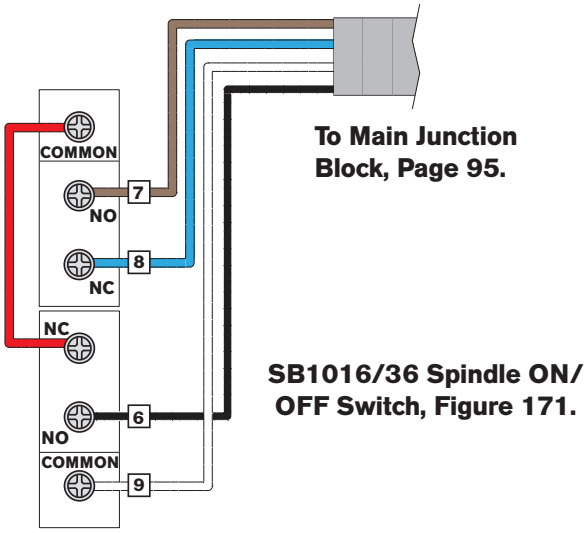
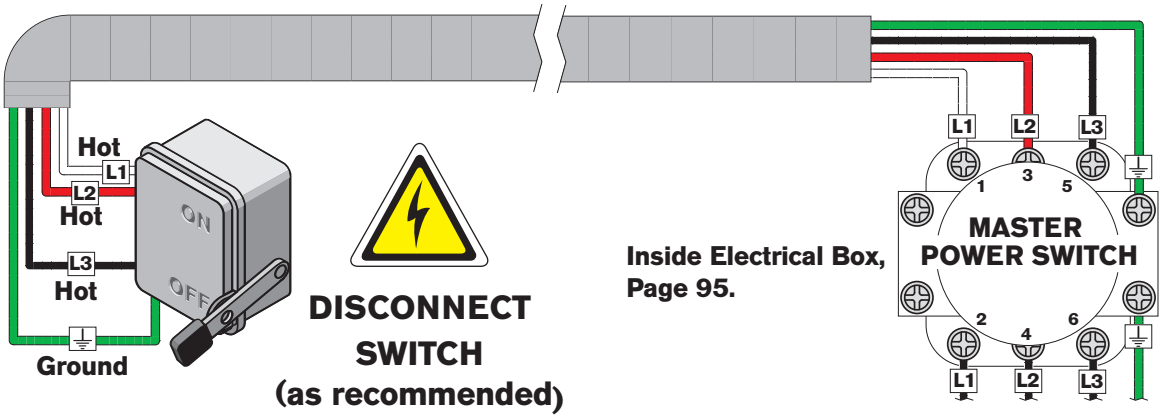


Figure 171. Spindle rotation switch location.



SB1016/36 Power Connection



SB1016/36 Additional Component Wiring

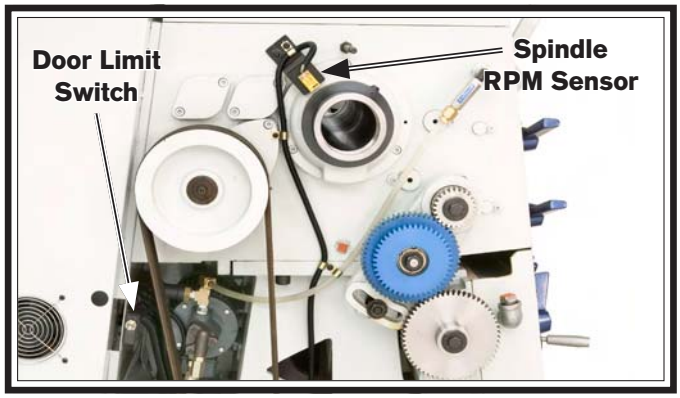


Figure 172. RPM sensor and end gear cover safety switch location.

Figure 173. Brake pedal safety switch location.

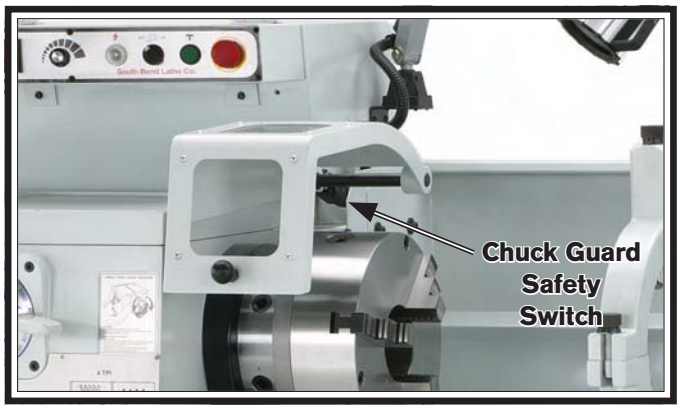
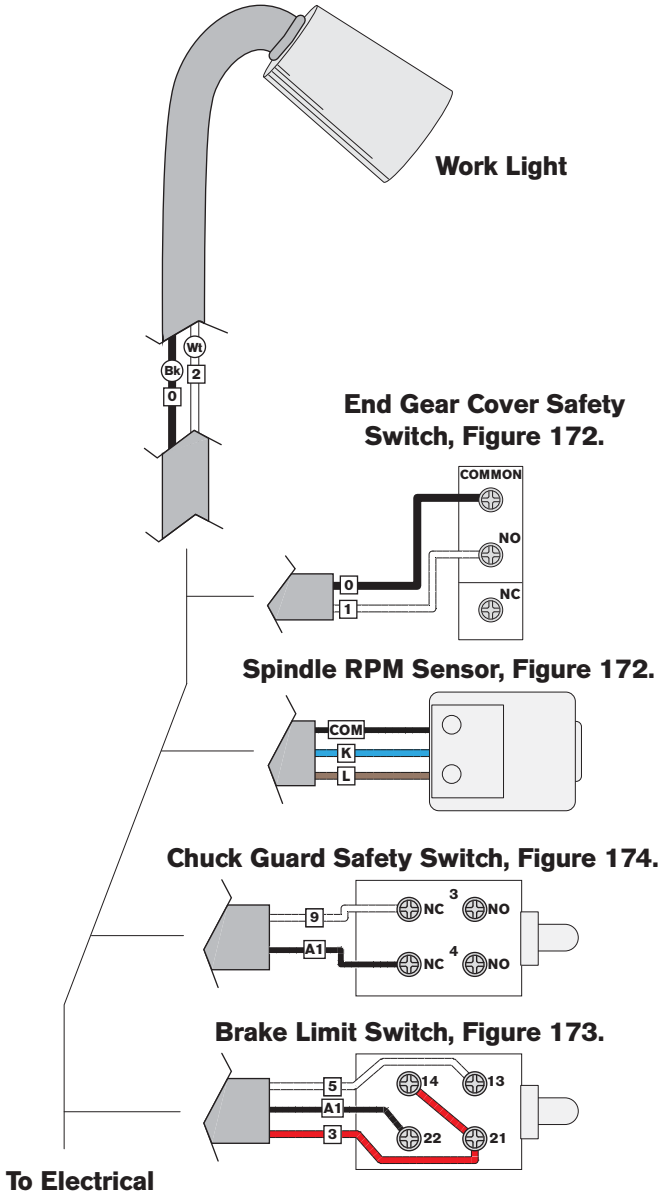
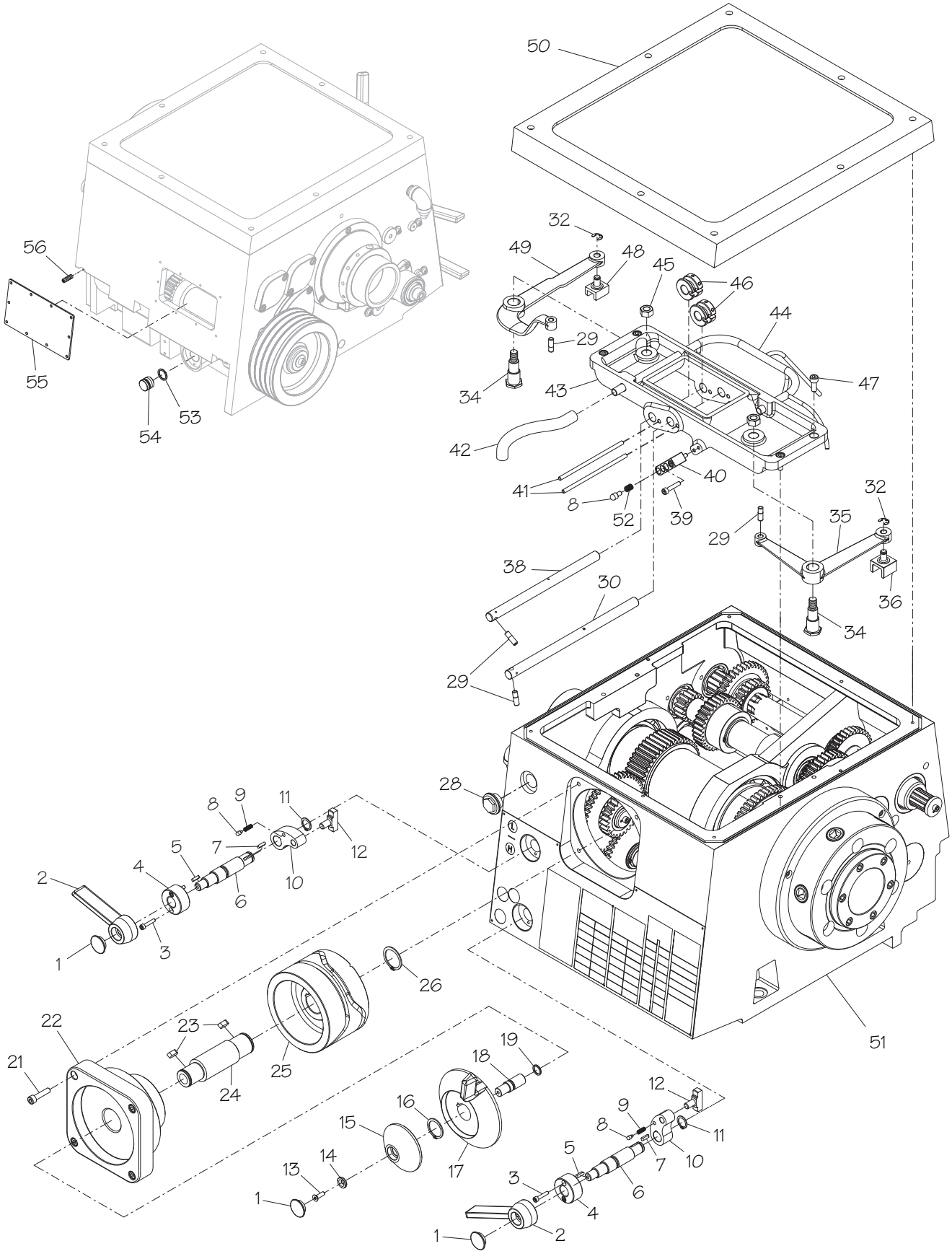


Figure 174. Chuck guard limit switch.



Headstock Controls

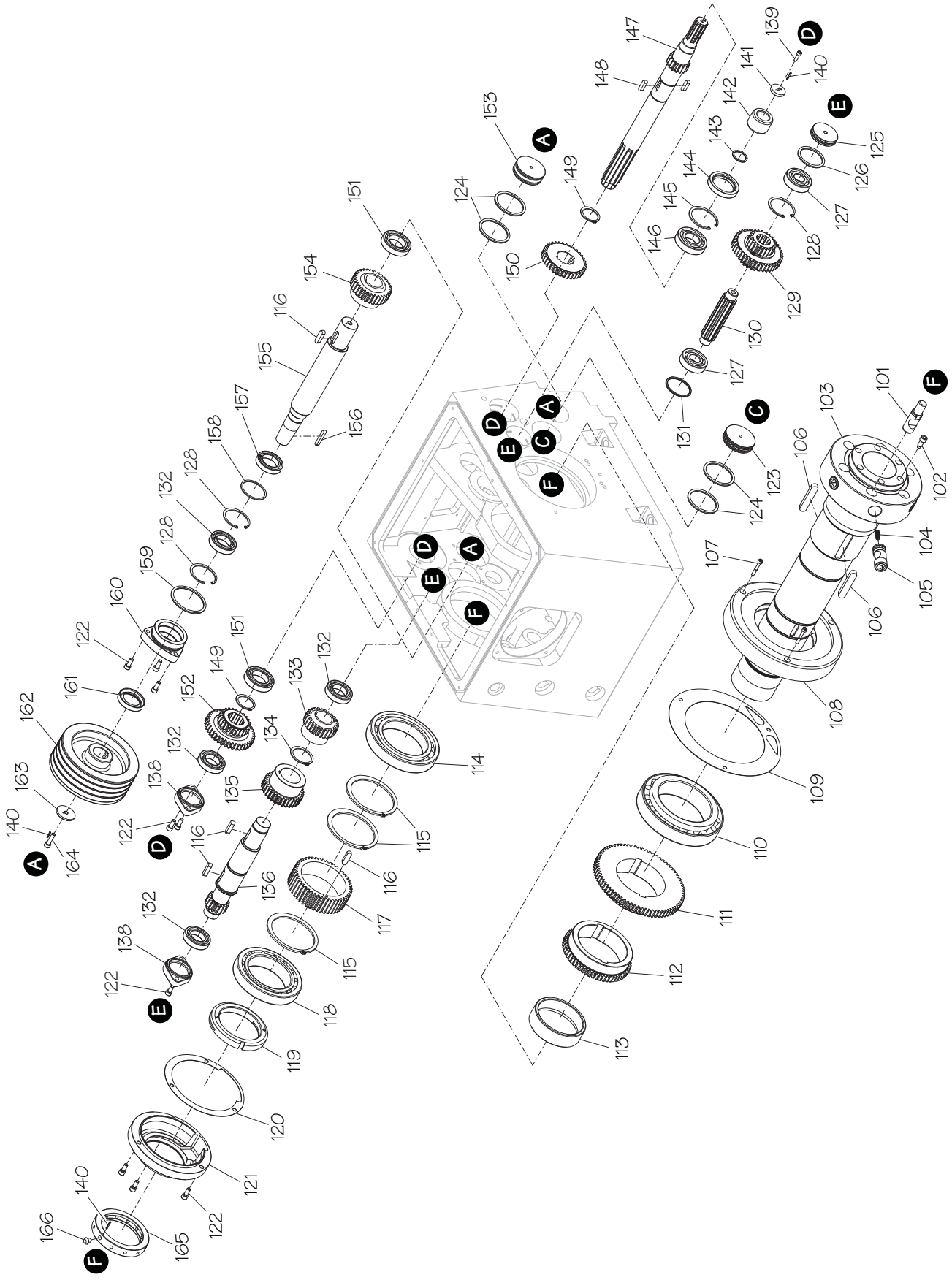


Headstock Controls Parts List

REF	PART #	DESCRIPTION
1	PSB10160001	SHIFTING SHAFT END CAP
2	PSB10160002	SHIFTING LEVER
3	PCAP38M	CAP SCREW M5-.8 X 25
4	PSB10160004	SHIFTING SHAFT LOCK COLLAR
5	PK47M	KEY 4 X 4 X 15
6	PSB10160006	SHIFTING SHAFT
7	PK48M	KEY 4 X 4 X 20
8	PSB10160008	STEP PIN
9	PSB10160009	COMPRESSION SPRING
10	PSB10160010	SHIFTING ARM
11	PR07M	EXT RETAINING RING 18MM
12	PSB10160012	SHIFTING CAM
13	PFH06M	FLAT HD SCR M6-1 X 20
14	PSB10160014	END CAP BEVELED WASHER
15	PSB10160015	SPEED SELECTOR END CAP
16	PR15M	EXT RETAINING RING 30MM
17	PSB10160017	SPEED SELECTOR HUB
18	PSB10160018	CAM SHAFT
19	PSB10160019	O-RING G14
21	PCAP175M	CAP SCREW M8-1.25 X 35 BLK C12.9
22	PSB10160022	SPEED SELECTOR CAM END CAP
23	PK82M	KEY 7 X 7 X 18
24	PSB10160024	CAM SHAFT
25	PSB10160025	SPEED SELECTOR CAM
26	PR12M	EXT RETAINING RING 35MM
28	PSB10160028	HEADSTOCK OIL SIGHT GLASS

REF	PART #	DESCRIPTION
29	PSB10160029	STEP PIN
30	PSB10160030	LONG SHIFTING ROD
32	PEC03M	E-CLIP 10MM
34	PSB10160034	SHIFTING PIVOT ARM BOLT
35	PSB10160035	RIGHT SHIFTING PIVOT ARM
36	PSB10160036	RIGHT SHIFTING FORK
38	PSB10160038	SHORT SHIFTING ROD
39	PCAP176M	CAP SCREW M6-1 X 30 BLK C12.9
40	PSB10160040	INDENT BLOCK
41	PSB10160041	SHIFTING PIN
42	PSB10160042	NYLON OIL TUBE
43	PSB10160043	SHIFTING SUPPORT FRAME
44	PSB10160044	OIL PIPE
45	PSB10160045	PIVOT ARM BOLT HEX NUT
46	PSB10160046	SHIFTING ROD LOCK COLLAR
47	PCAP14M	CAP SCREW M8-1.25 X 20
48	PSB10160048	LEFT SHIFTING FORK
49	PSB10160049	LEFT SHIFTING PIVOT ARM
50	PSB10160050	HEADSTOCK TOP COVER
51	PSB10160051	HEADSTOCK CASTING
52	PSB10160052	COMPRESSION SPRING
53	PORG035	O-RING 3.1 X 34.4 G35
54	PSB10160054	HEADSTOCK OIL DRAIN PLUG
55	PSB10160055	HEADSTOCK SIDE COVER
56	PSS21M	SET SCREW M8-1.25 X 25

Headstock Internal Gears

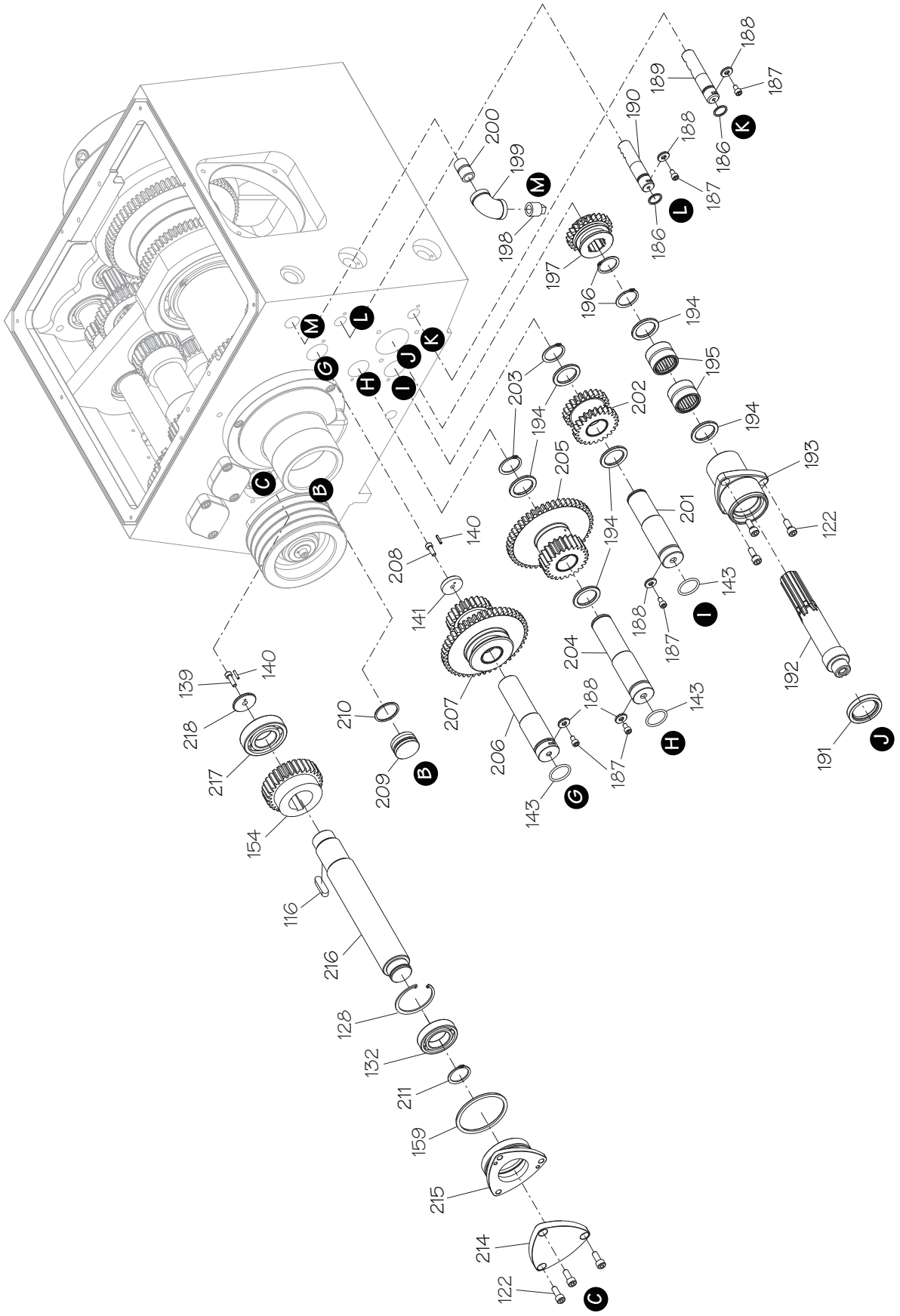


Headstock Internal Gears Parts List

REF	PART #	DESCRIPTION
101	PSB10160101	CAM LOCK STUD D1-8
102	PSB10160102	SPINDLE NOSE CAP SCREW
103	PSB10160103	SPINDLE
104	PSB10160104	COMPRESSION SPRING
105	PSB10160105	CAM LOCK D1-8
106	PSB10160106	KEY 15 X 10 X 78
107	PCAP29M	CAP SCREW M6-1 X 40
108	PSB10160108	INBOARD SPINDLE END CAP
109	PSB10160109	BEARING SEAT GASKET
110	P32026-N	TAPERED ROLLER BEARING 32026 NTN
111	PSB10160111	GEAR 75T
112	PSB10160112	GEAR 56T
113	PSB10160113	BEARING SPACER
114	P6022-OPEN-N	BALL BEARING 6022-OPEN NTN
115	PR90M	EXT RETAINING RING 110MM
116	PSB10160116	KEY 10 X 8 X 36
117	PSB10160117	GEAR 48T
118	P32026-N	TAPERED ROLLER BEARING 32026 NTN
119	PSB10160119	OUTBOARD SPINDLE SPANNER NUT
120	PSB10160120	OUTBOARD SPINDLE END CAP GASKET
121	PSB10160121	OUTBOARD SPINDLE END CAP
122	PCAP14M	CAP SCREW M8-1.25 X 20
123	PSB10160123	BEARING END CAP
124	PORG065	O-RING 64.4 X 3.1 G65
125	PSB10160125	BEARING END CAP
126	PORG050	O-RING 54.4 X 3.1 G50
127	P6305-OPEN	BALL BEARING 6305-OPEN
128	PR38M	INT RETAINING RING 62MM
129	PSB10160129	COMBO GEAR 21T/40T
130	PSB10160130	SPLINE SHAFT
131	PSB10160131	THRUST WASHER
132	P6007-OPEN	BALL BEARING 6007-OPEN
133	PSB10160133	GEAR 26T

REF	PART #	DESCRIPTION
134	PR32M	EXT RETAINING RING 48MM
135	PSB10160135	GEAR 32T
136	PSB10160136	GEAR SHAFT E 16T
138	PSB10160138	BEARING RETAINER
139	PCAP02M	CAP SCREW M6-1 X 20
140	PRP02M	ROLL PIN 3 X 16
141	PSB10160141	GEAR FLAT WASHER
142	PSB10160142	SPLINE SHAFT BUSHING
143	PORP030	O-RING 29.7 X 3.5 P30
144	PSB10160144	OIL SEAL
145	PR64M	INT RETAINING RING 72MM
146	P6207-2RS	BALL BEARING 6207-2RS
147	PSB10160147	GEAR SHAFT D 16T
148	PK136M	KEY 8 X 8 X 30
149	PR68M	EXT RETAINING RING 40MM
150	PSB10160150	GEAR 35T
151	P6008-OPEN	BALL BEARING 6008-OPEN
152	PSB10160152	COMBO GEAR 25T/40T
153	PSB10160153	BEARING END CAP
154	PSB10160154	GEAR 31T
155	PSB10160155	GEAR SHAFT A
156	PK62M	KEY 7 X 7 X 45
157	P6908-OPEN	BALL BEARING 6908-OPEN
158	PSB10160158	THRUST WASHER
159	PORG075	O-RING 74.4 X 3.1 G75
160	PSB10160160	BEARING RETAINER
161	PSB10160161	OIL SEAL
162	PSB10160162	SPINDLE PULLEY
163	PSB10160163	SPINDLE PULLEY FLAT WASHER
164	PCAP13M	CAP SCREW M8-1.25 X 30
165	PSB10160165	EXCITER RING
166	PSB10160166	SENSOR EXCITER PIN

Headstock Transfer Gears

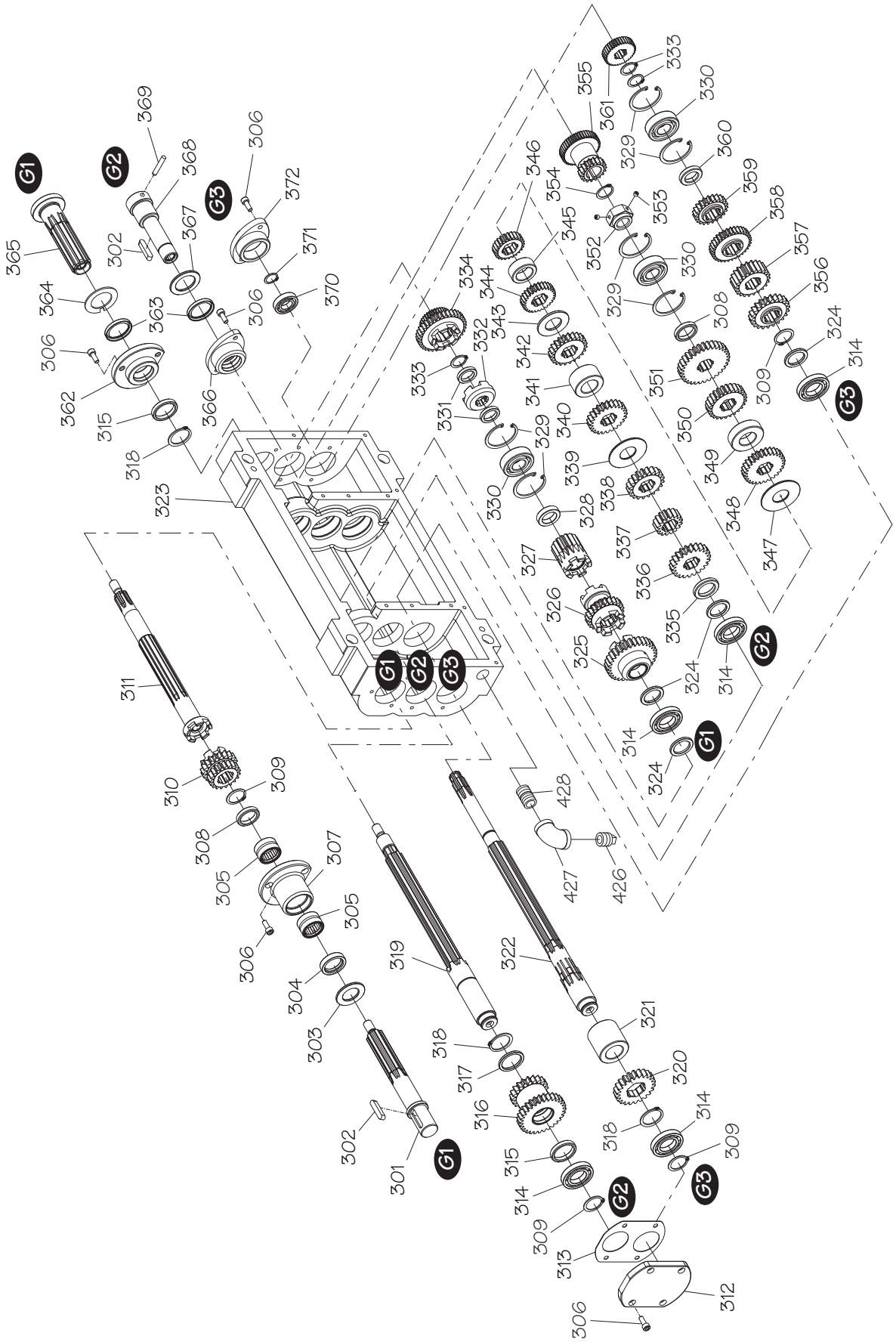


Headstock Transfer Gears Parts List

REF	PART #	DESCRIPTION
116	PSB10160116	KEY 10 X 8 X 36
122	PCAP14M	CAP SCREW M8-1.25 X 20
128	PR38M	INT RETAINING RING 62MM
132	P6007-0PEN	BALL BEARING 6007-0PEN
139	PCAP02M	CAP SCREW M6-1 X 20
140	PRP02M	ROLL PIN 3 X 16
141	PSB10160141	GEAR FLAT WASHER
143	P0RP030	0-RING 29.7 X 3.5 P30
154	PSB10160154	GEAR 31T
159	P0RG075	0-RING 74.4 X 3.1 G75
186	PSB10160186	0-RING G16
187	PCAP26M	CAP SCREW M6-1 X 12
188	PSB10160188	GEAR SHAFT FLAT WASHER
189	PSB10160189	0UTB0UND SHAFT K
190	PSB10160190	0UTB0UND SHAFT L
191	PSB10160191	0IL SEAL
192	PSB10160192	SPLINED SHAFT J
193	PSB10160193	BEARING RETAINER
194	PSB10160194	THRUST WASHER
195	PSB10160195	NEEDLE BEARING W/0 INNER RACE 3230
196	PR15M	EXT RETAINING RING 30MM

REF	PART #	DESCRIPTION
197	PSB10160197	GEAR 24T
198	PSB10160198	SQUARE HD 0IL DRAIN PLUG 1/2 PT
199	PSB10160199	PIPE ELB0W 90DEG 3/4 X 1/2 PT
200	PSB10160200	PIPE NIPPLE 3/4 PT X 1-1/4"
201	PSB10160201	GEAR SHAFT I
202	PSB10160202	C0MB0 GEAR 24T
203	PR37M	EXT RETAINING RING 32MM
204	PSB10160204	GEAR SHAFT H
205	PSB10160205	C0MB0 GEAR 24T/48T
206	PSB10160206	GEAR SHAFT G
207	PSB10160207	D0UBLE GEAR 48T/24T
208	PCAP01M	CAP SCREW M6-1 X 16
209	PSB10160209	HEADSTOCK CASTING PLUG
210	P0RG035	0-RING 3.1 X 34.4 G35
211	PR12M	EXT RETAINING RING 35MM
214	PSB10160214	SHAFT END CAP
215	PSB10160215	BEARING RETAINER
216	PSB10160216	SHAFT C
217	P6207-0PEN	BALL BEARING 6207-0PEN
218	PSB10160218	BEARING FLAT WASHER

Gearbox Gears

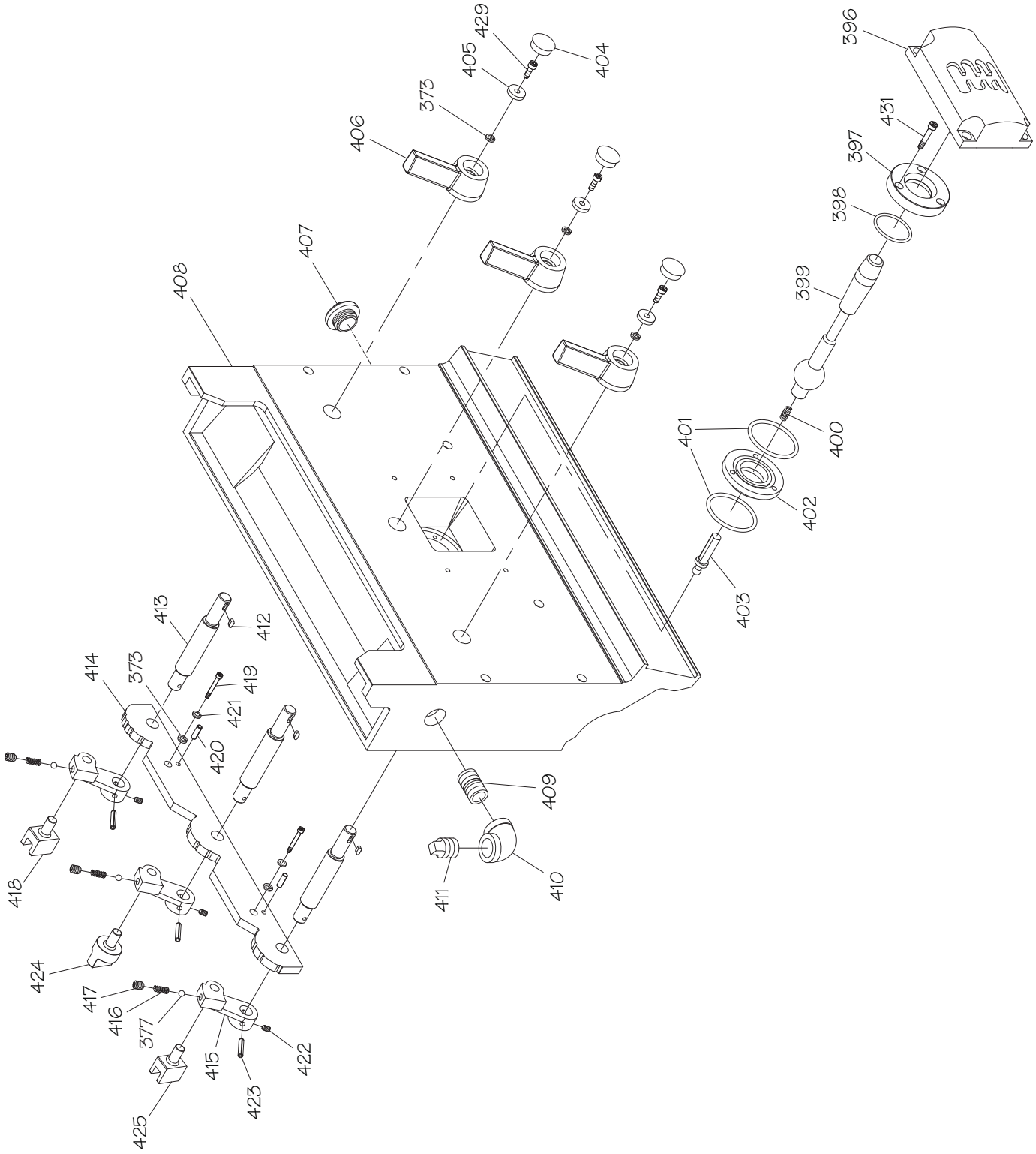


Gearbox Gears Parts List

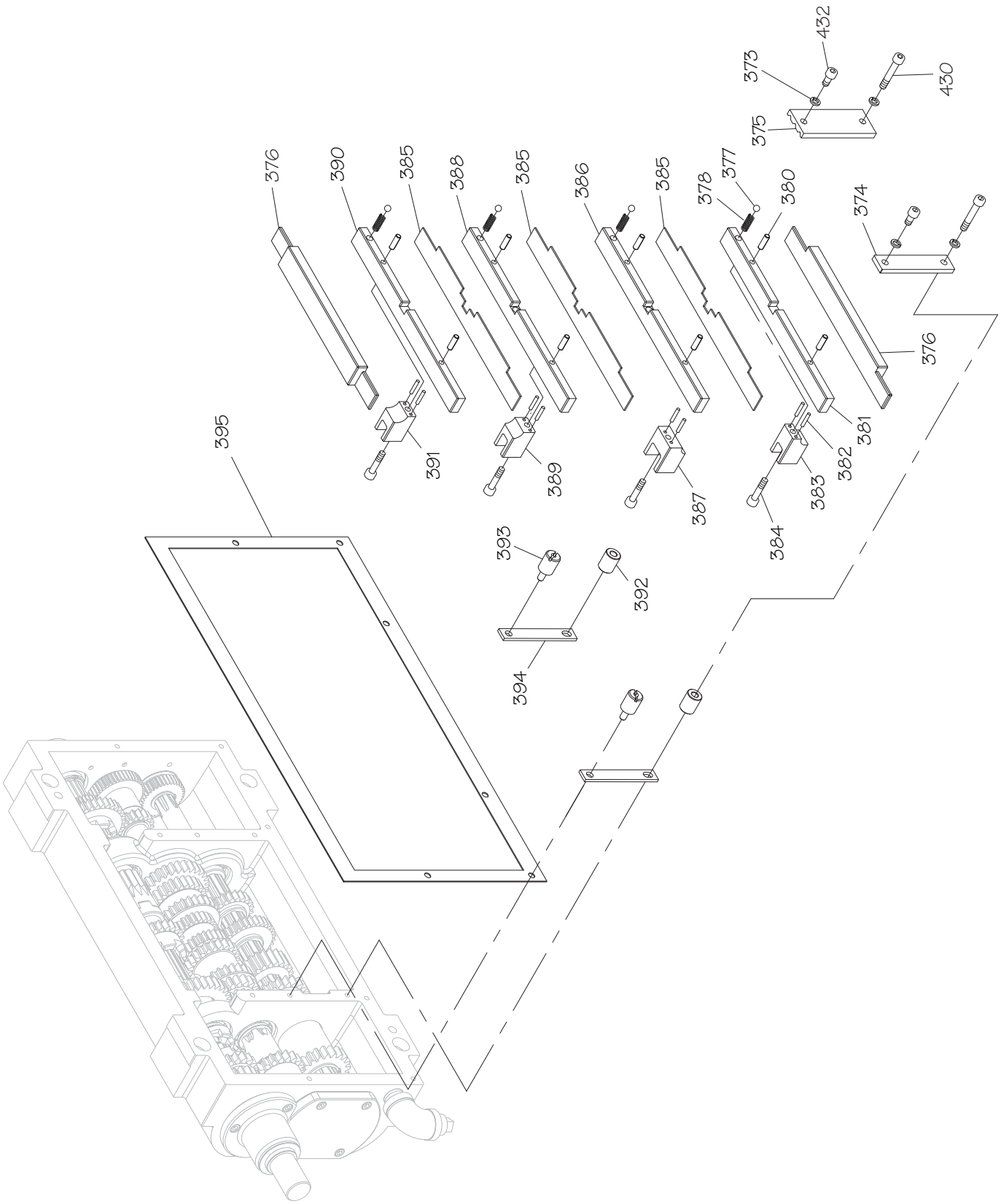
REF	PART #	DESCRIPTION
301	PSB10160301	OUTBOARD GEAR SHAFT G1
302	PK109M	KEY 7 X 7 X 35
303	PSB10160303	THRUST WASHER
304	PSB10160304	OIL SEAL
305	PSB10160305	GEAR SHAFT NEEDLE BEARING
306	PCAP177M	CAP SCREW M6-1 X 16 BLK C12.9
307	PSB10160307	BEARING RETAINER
308	PSB10160308	SPACER
309	PR11M	EXT RETAINING RING 25MM
310	PSB10160310	DOUBLE CLUTCH GEAR 19T/19T
311	PSB10160311	CLUTCH SPLINE SHAFT G1
312	PSB10160312	BEARING RETAINER
313	PSB10160313	SPLINE SHAFT COVER GASKET
314	P16005-OPEN	BALL BEARING 16005-OPEN
315	PSB10160315	THRUST WASHER
316	PSB10160316	DOUBLE GEAR 20T/30T
317	PSB10160317	GEAR WASHER
318	PR15M	EXT RETAINING RING 30MM
319	PSB10160319	SPLINE SHAFT G2
320	PSB10160320	GEAR 22T
321	PSB10160321	SPLINE SHAFT BUSHING
322	PSB10160322	SPLINE SHAFT G3
323	PSB10160323	GEARBOX CASTING
324	PSB10160324	THRUST WASHER
325	PSB10160325	GEAR 32T
326	PSB10160326	CLUTCH GEAR 23T
327	PSB10160327	CLUTCH SPLINE 16T
328	PSB10160328	SPACER
329	PR25M	INT RETAINING RING 47MM
330	P6204-OPEN	BALL BEARING 6204-OPEN
331	PSB10160331	SPACER
332	PSB10160332	LEADSCREW CLUTCH
333	PR09M	EXT RETAINING RING 20MM
334	PSB10160334	DOUBLE CLUTCH GEAR 35T/35T
335	PSB10160335	SPACER
336	PSB10160336	GEAR 22T
337	PSB10160337	GEAR 16T
338	PSB10160338	GEAR 20T

REF	PART #	DESCRIPTION
339	PSB10160339	THRUST WASHER
340	PSB10160340	GEAR 24T
341	PSB10160341	GEAR BUSHING
342	PSB10160342	GEAR 23T
343	PSB10160343	THRUST WASHER
344	PSB10160344	GEAR 27T
345	PSB10160345	GEAR BUSHING
346	PSB10160346	GEAR 24T
347	PSB10160347	THRUST WASHER
348	PSB10160348	GEAR 28T
349	PSB10160349	GEAR BUSHING
350	PSB10160350	GEAR 26T
351	PSB10160351	GEAR 32T
352	PSB10160352	LOCK COLLAR
353	PSS02M	SET SCREW M6-1 X 6
354	PR10M	EXT RETAINING RING 22MM
355	PSB10160355	DOUBLE GEAR 45T/18T
356	PSB10160356	GEAR 22T
357	PSB10160357	GEAR 22T
358	PSB10160358	GEAR 33T
359	PSB10160359	GEAR 22T
360	PSB10160360	SPACER
361	PSB10160361	GEAR 36T
362	PSB10160362	INBOARD SHAFT SEAL RETAINER
363	PSB10160363	OIL SEAL
364	PSB10160364	KEYED SHAFT WASHER
365	PSB10160365	INBOARD SPLINE SHAFT G1
366	PSB10160366	CONNECTION SHAFT SEAL RETAINER
367	PSB10160367	THRUST WASHER
368	PSB10160368	FEED ROD CONNECTION SHAFT
369	PSB10160369	DOWEL PIN 6 X 36
370	P16003-OPEN	BALL BEARING 16003-OPEN
371	PR18M	EXT RETAINING RING 17MM
372	PSB10160372	BEARING RETAINER
426	PSB10160426	SQUARE HD OIL DRAIN PLUG 1/2 PT
427	PSB10160427	PIPE ELBOW 90DEG 1/2 PT
428	PSB10160428	PIPE NIPPLE 1/2 PT

Gearbox Controls A



Gearbox Controls B

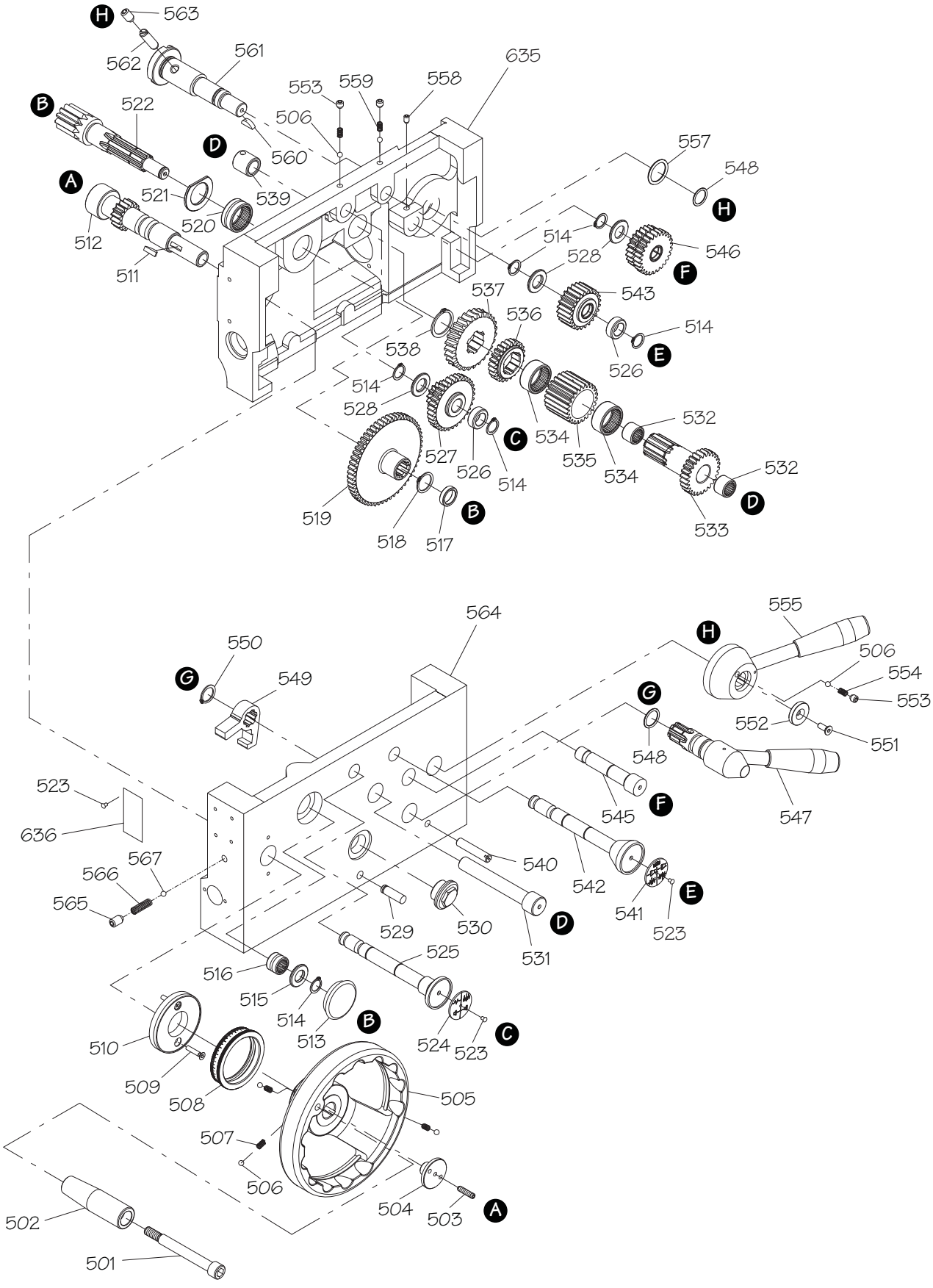


Gearbox Controls Parts List

REF	PART #	DESCRIPTION
373	PSB10160373	STEP PIN LOCK WASHER
374	PSB10160374	SHOULDER PLATE
375	PSB10160375	REVERSE STOP
376	PSB10160376	OUTER PLATE
377	PSTB001	STEEL BALL 1/4
378	PSB10160378	COMPRESSION SPRING
380	PRP24M	ROLL PIN 5 X 16
381	PSB10160381	BOTTOM FORK SUPPORT
382	PRP24M	ROLL PIN 5 X 16
383	PSB10160383	BOTTOM SHIFT FORK
384	PCAP15M	CAP SCREW M5-.8 X 20
385	PSB10160385	FORK SUPPORT PARTITION
386	PSB10160386	LOWER MIDDLE FORK SUPPORT
387	PSB10160387	LOWER MIDDLE SHIFT FORK
388	PSB10160388	UPPER MIDDLE FORK SUPPORT
389	PSB10160389	UPPER MIDDLE SHIFT FORK
390	PSB10160390	TOP FORK SUPPORT
391	PSB10160391	TOP SHIFTING FORK
392	PSB10160392	PLATE SPACER
393	PSB10160393	SLOTTED STEP SCREW
394	PSB10160394	SUPPORT PLATE
395	PSB10160395	GEARBOX COVER GASKET
396	PSB10160396	SHIFT SELECTOR BRACKET
397	PSB10160397	SHIFT SELECTOR LOCK COLLAR
398	PORG035	O-RING 3.1 X 34.4 G35
399	PSB10160399	SHIFT LEVER
400	PSB10160400	COMPRESSION SPRING
401	PORG040	O-RING 39.4 X 3.1 G40

REF	PART #	DESCRIPTION
402	PSB10160402	SHIFT SELECTOR SUPPORT
403	PSB10160403	SHIFT SELECTOR PLUNGER
404	PSB10160404	SHIFT LEVER END CAP
405	PSB10160405	SHIFT LEVER FLAT WASHER
406	PSB10160406	SHIFT LEVER
407	PSB10160407	OIL SIGHT GLASS
408	PSB10160408	GEARBOX COVER
409	PSB10160409	PIPE NIPPLE 3/4 PT
410	PSB10160410	PIPE ELBOW 90DEG 3/4 PT
411	PSB10160411	SQUARE HD OIL FILL PLUG 3/4 PT
412	PK05M	KEY 4 X 4 X 10
413	PSB10160413	SHIFT CONNECTION SHAFT
414	PSB10160414	SHIFT SELECTOR BAR
415	PSB10160415	SHIFT ARM
416	PSB10160416	COMPRESSION SPRING
417	PSS20M	SET SCREW M8-1.25 X 8
418	PSB10160418	RIGHT SHIFT FORK
419	PCAP02M	CAP SCREW M6-1 X 20
420	PRP24M	ROLL PIN 5 X 16
421	PW03M	FLAT WASHER 6MM
422	PSS02M	SET SCREW M6-1 X 6
423	PRP04M	ROLL PIN 4 X 24
424	PSB10160424	MIDDLE SHIFT FORK
425	PSB10160425	LEFT SHIFT FORK
429	PCAP26M	CAP SCREW M6-1 X 12
430	PCAP29M	CAP SCREW M6-1 X 40
431	PCAP38M	CAP SCREW M5-.8 X 25
432	PCAP01M	CAP SCREW M6-1 X 16

Apron Front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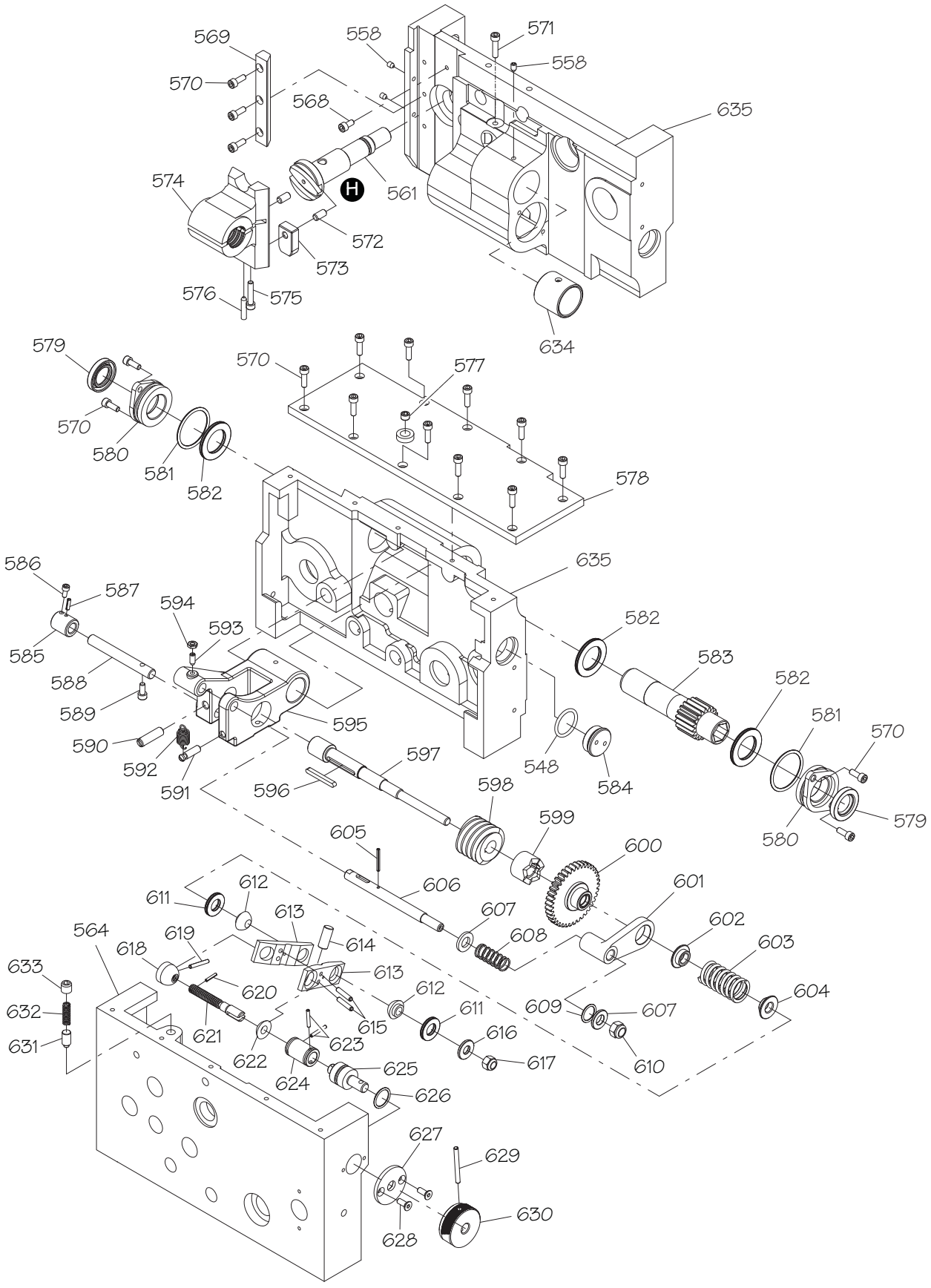
Apron Rear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Apron Parts List

REF	PART #	DESCRIPTION
501	PSB10160501	HANDWHEEL HANDLE BOLT
502	PSB10160502	HANDWHEEL HANDLE
503	PSS12M	SET SCREW M6-1 X 25
504	PSB10160504	HANDWHEEL END CAP
505	PSB10160505	HANDWHEEL
506	PSTB001	STEEL BALL 1/4
507	PSB10160507	COMPRESSION SPRING
508	PSB10160508	INDEX RING
509	PFH72M	FLAT HD CAP SCR M5-.8 X 12
510	PSB10160510	GEAR SHAFT END CAP
511	PSB10160511	WOODRUFF KEY 19 X 5
512	PSB10160512	GEARED SHAFT A 16T
513	PSB10160513	SHAFT END CAP
514	PR07M	EXT RETAINING RING 18MM
515	PSB10160515	THRUST WASHER
516	PSB10160516	NEEDLE BEARING 18/20
517	PSB10160517	THRUST WASHER
518	PR11M	EXT RETAINING RING 25MM
519	PSB10160519	GEAR 56T
520	PSB10160520	NEEDLE BEARING 28/20
521	PSB10160521	BEARING D-WASHER
522	PSB10160522	GEARED SHAFT B 11T
523	PSB10160523	SOLID STEEL RIVET 2.8 X 10
524	PSB10160524	INDICATOR PLATE
525	PSB10160525	SHIFT SHAFT C
526	PSB10160526	GEAR BUSHING
527	PSB10160527	COMBO GEAR 15T/33T
528	PSB10160528	GEAR WASHER
529	PSB10160529	DOWEL PIN
530	PSB10160530	OIL SIGHT GLASS
531	PSB10160531	SHAFT D
532	PSB10160532	NEEDLE BEARING W/O INNER RACE 1616
533	PSB10160533	GEARED SHAFT D 26T
534	PSB10160534	NEEDLE BEARING W/O INNER RACE 3016
535	PSB10160535	GEAR 24T
536	PSB10160536	GEAR 24T
537	PSB10160537	WORM GEAR
538	PR15M	EXT RETAINING RING 30MM
539	PSB10160539	SHAFT LOCK COLLAR
540	PSB10160540	SLOTTED DOWEL PIN
541	PSB10160541	INDICATOR PLATE
542	PSB10160542	SHIFT SHAFT (E)
543	PSB10160543	GEAR 24T
545	PSB10160545	GEAR SHAFT (F)
546	PSB10160546	COMBO GEAR 24T/26T

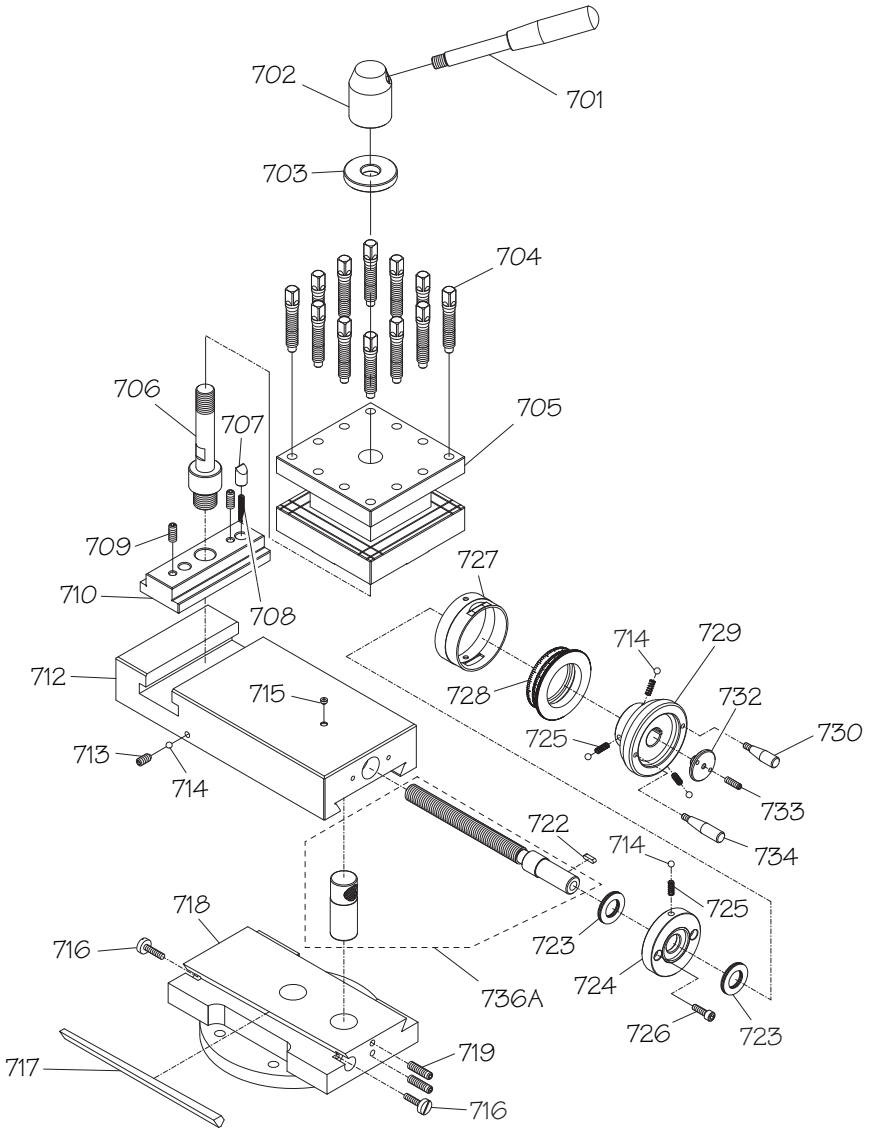
REF	PART #	DESCRIPTION
547	PSB10160547	LEVER ASSEMBLY
548	PORP021	O-RING 20.8 X 2.4 P21
549	PSB10160549	SHIFT FORK
550	PR81M	EXT RETAINING RING 21MM
551	PFH73M	FLAT HD CAP SCR M6-1 X 16
552	PSB10160552	LEVER HUB FLAT WASHER
553	PSS20M	SET SCREW M8-1.25 X 8
554	PSB10160554	COMPRESSION SPRING
555	PSB10160555	HALF-NUT LEVER ASSEMBLY
557	PSB10160557	O-RING G25
558	PSS03M	SET SCREW M6-1 X 8
559	PSB10160559	COMPRESSION SPRING
560	PSB10160560	WOODRUFF KEY 16 X 5
561	PSB10160561	CAM SHAFT H
562	PSS84M	SET SCREW M10-1.5 X 35
563	PSS30M	SET SCREW M10-1.5 X 10
564	PSB10160564	FRONT APRON CASTING
565	PSS75M	SET SCREW M10-1.5 X 16
566	PSB10160566	COMPRESSION SPRING
567	PSTB003	STEEL BALL 3/8
568	PCAP26M	CAP SCREW M6-1 X 12
569	PSB10160569	HALF-NUT GIB
570	PCAP177M	CAP SCREW M6-1 X 16 BLK C12.9
571	PCAP176M	CAP SCREW M6-1 X 30 BLK C12.9
572	PSB10160572	DOWEL PIN
573	PSB10160573	HALF-NUT PLATE
574	PSB10160574	HALF-NUT ASSEMBLY
575	PCAP176M	CAP SCREW M6-1 X 30 BLK C12.9
576	PSS28M	SET SCREW M6-1 X 30
577	PSB10160577	OIL FILL PLUG 1/4 PT
578	PSB10160578	APRON TOP PLATE
579	PSB10160579	OIL SEAL 30 X 40 X 5
580	PSB10160580	PINION SHAFT SEAL RETAINER
581	PORG045	O-RING 44.4 X 3.1 G45
582	PSB10160582	THRUST BEARING 3047-NTB/AS2
583	PSB10160583	GEARED PINION SHAFT 18T
584	PSB10160584	CASTING PLUG
585	PSB10160585	SHAFT LOCK COLLAR
586	PCAP26M	CAP SCREW M6-1 X 12
587	PRP76M	ROLL PIN 4 X 16
588	PSB10160588	BRACKET SHAFT
589	PCAP38M	CAP SCREW M5-.8 X 25
590	PSB10160590	SLOTTED DOWEL PIN
591	PSB10160591	CAPTIVE PIN
592	PSB10160592	TENSION SPRING

Apron Parts List

REF	PART #	DESCRIPTION
593	PSS91M	SET SCREW M6-1 X 14
594	PLN03M	LOCK HEX NUT M6-1
595	PSB10160595	WORM SHAFT BRACKET
596	PK33M	KEY 5 X 5 X 45
597	PSB10160597	WORM SHAFT
598	PSB10160598	WORM GEAR
599	PSB10160599	CLUTCH
600	PSB10160600	CLUTCH GEAR 36T
601	PSB10160601	PIVOT ARM
602	PSB10160602	SPRING CAP
603	PSB10160603	COMPRESSION SPRING
604	PSB10160604	SPRING CAP
605	PRP04M	ROLL PIN 4 X 24
606	PSB10160606	TRIP ROD
607	PW06M	FLAT WASHER 12MM
608	PSB10160608	COMPRESSION SPRING
609	PSB10160609	PIVOT ARM WASHER
610	PLN09M	LOCK NUT M12-1.75
611	PSB10160611	THRUST BEARING 1528-NTB/AS2
612	PSB10160612	CUPPED BEARING
613	PSB10160613	COMPRESSION PLATE
614	PSB10160614	DOWEL PIN

REF	PART #	DESCRIPTION
615	PRP05M	ROLL PIN 5 X 30
616	PW04M	FLAT WASHER 10MM
617	PLN05M	LOCK NUT M10-1.5
618	PSB10160618	CUPPED BEARING
619	PRP04M	ROLL PIN 4 X 24
620	PRP02M	ROLL PIN 3 X 16
621	PSB10160621	THREADED SHAFT
622	PSB10160622	COMPRESSION PLATE WASHER
623	PRP105M	ROLL PIN 3 X 24
624	PSB10160624	COUPLING
625	PSB10160625	STEP SHAFT
626	P0RP018	O-RING 17.8 X 2.4 P18
627	PW03M	SHAFT END CAP
628	PFH74M	FLAT HD CAP SCR M5-.8 X 16
629	PRP10M	ROLL PIN 5 X 36
630	PSB10160630	KNURLED KNOB
631	PSB10160631	PLUNGER
632	PSB10160632	COMPRESSION SPRING
633	PSS15M	SET SCREW M12-1.75 X 12
634	PSB10160634	SHAFT SLEEVE
635	PSB10160635	REAR APRON CASTING
636	PSB10160636	FEED CLUTCH INSTRUCTION PLATE

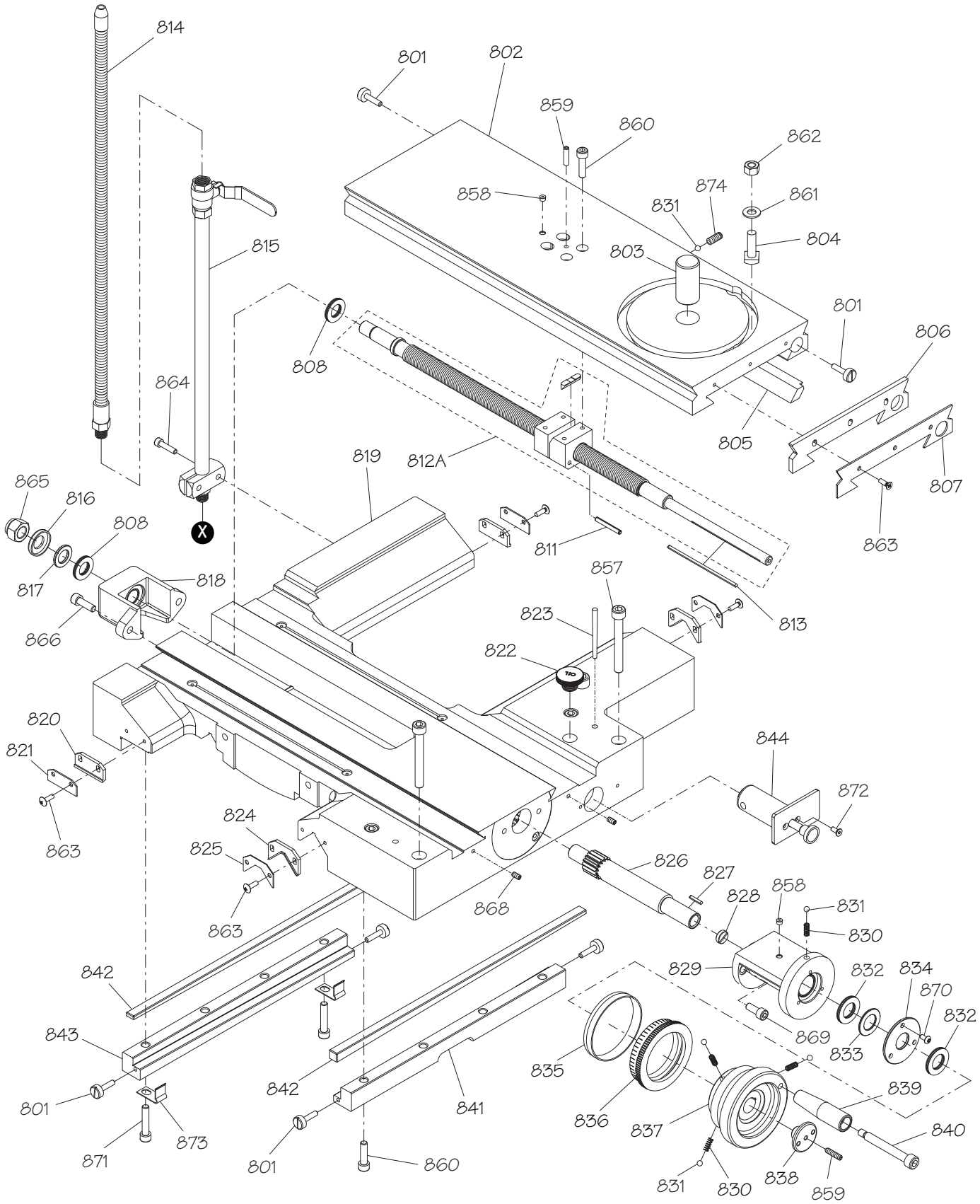
Compound Slide & Tool Post



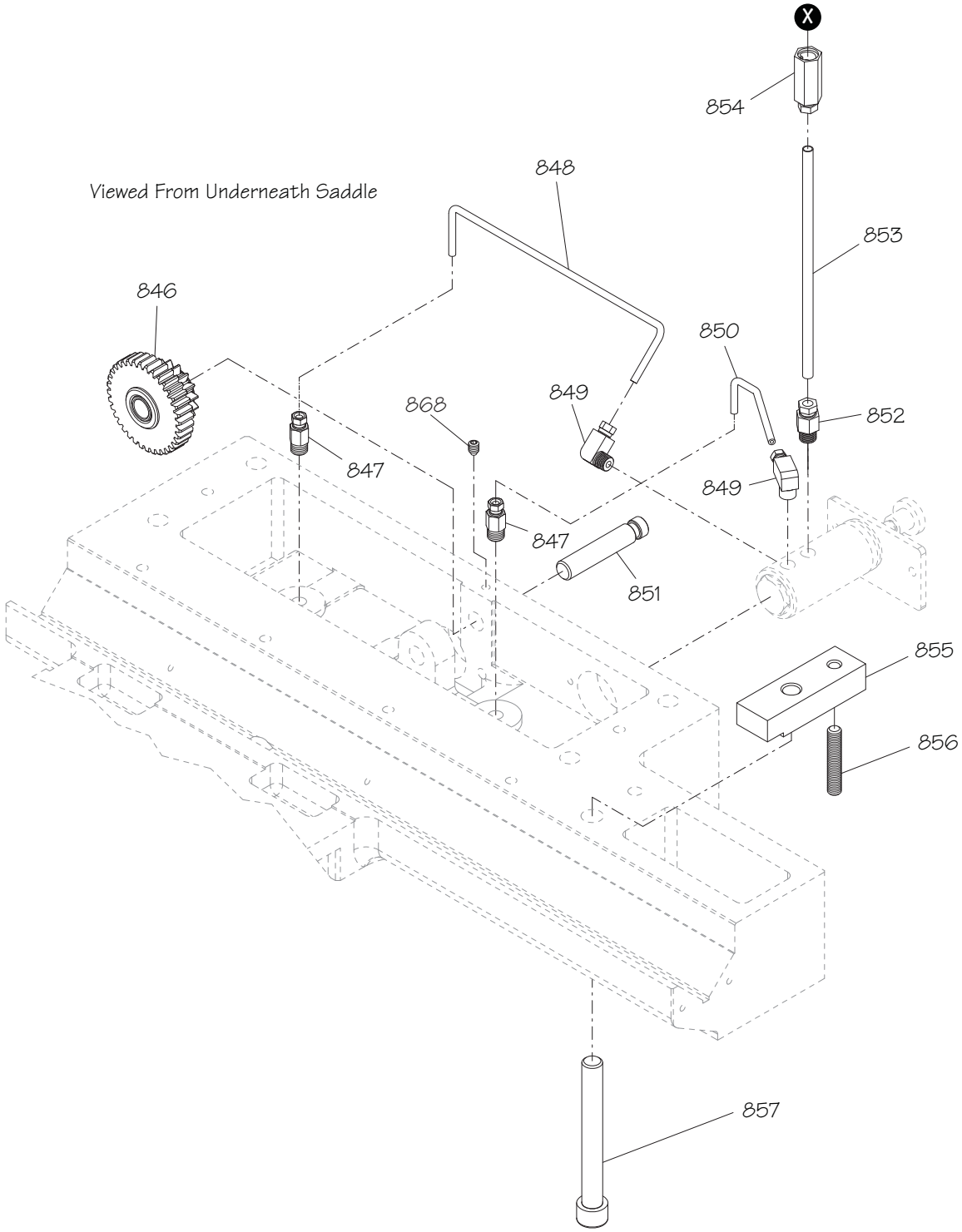
REF	PART #	DESCRIPTION
701	PSB10160701	POST HANDLE
702	PSB10160702	POST HANDLE HUB
703	PSB10160703	POST FLAT WASHER
704	PSB10160704	TOOL POST SQUARE HD BOLT
705	PSB10160705	POST TURRET
706	PSB10160706	POST TURRET SHAFT
707	PSB10160707	INDENT PLUNGER
708	PSB10160708	COMPRESSION SPRING
709	PSS09M	SET SCREW M8-1.25 X 20
710	PSB10160710	POST T-SLIDE
712	PSB10160712	COMPOUND SLIDE
713	PSS06M	SET SCREW M8-1.25 X 16
714	PSTB001	STEEL BALL 1/4
715	PLUBE001M	TAP-IN BALL OILER 6MM
716	PSB10160716	GIB ADJUSTMENT SCREW
717	PSB10160717	COMPOUND SLIDE GIB

REF	PART #	DESCRIPTION
718	PSB10160718	COMPOUND SWIVEL BASE
719	PSS19M	SET SCREW M8-1.25 X 30
722	PK47M	KEY 4 X 4 X 15
723	PSB10160723	THRUST BEARING 2035-NTB/AS2
724	PSB10160724	LEADSCREW END CAP
725	PSB10160725	COMPRESSION SPRING
726	PCAP179M	CAP SCREW M6-1 X 20 BLK C12.9
727	PSB10160727	INDEX COLLAR
728	PSB10160728	INDEX RING
729	PSB10160729	COMPOUND HANDWHEEL
730	PSB10160730	SHORT HANDWHEEL HANDLE
732	PSB10160732	HANDWHEEL END CAP
733	PSS25M	SET SCREW M6-1 X 20
734	PSB10160734	LONG HANDWHEEL HANDLE
736A	PSB10160736A	COMPOUND LEADSCREW W/NUT

Cross Slide & Saddle A



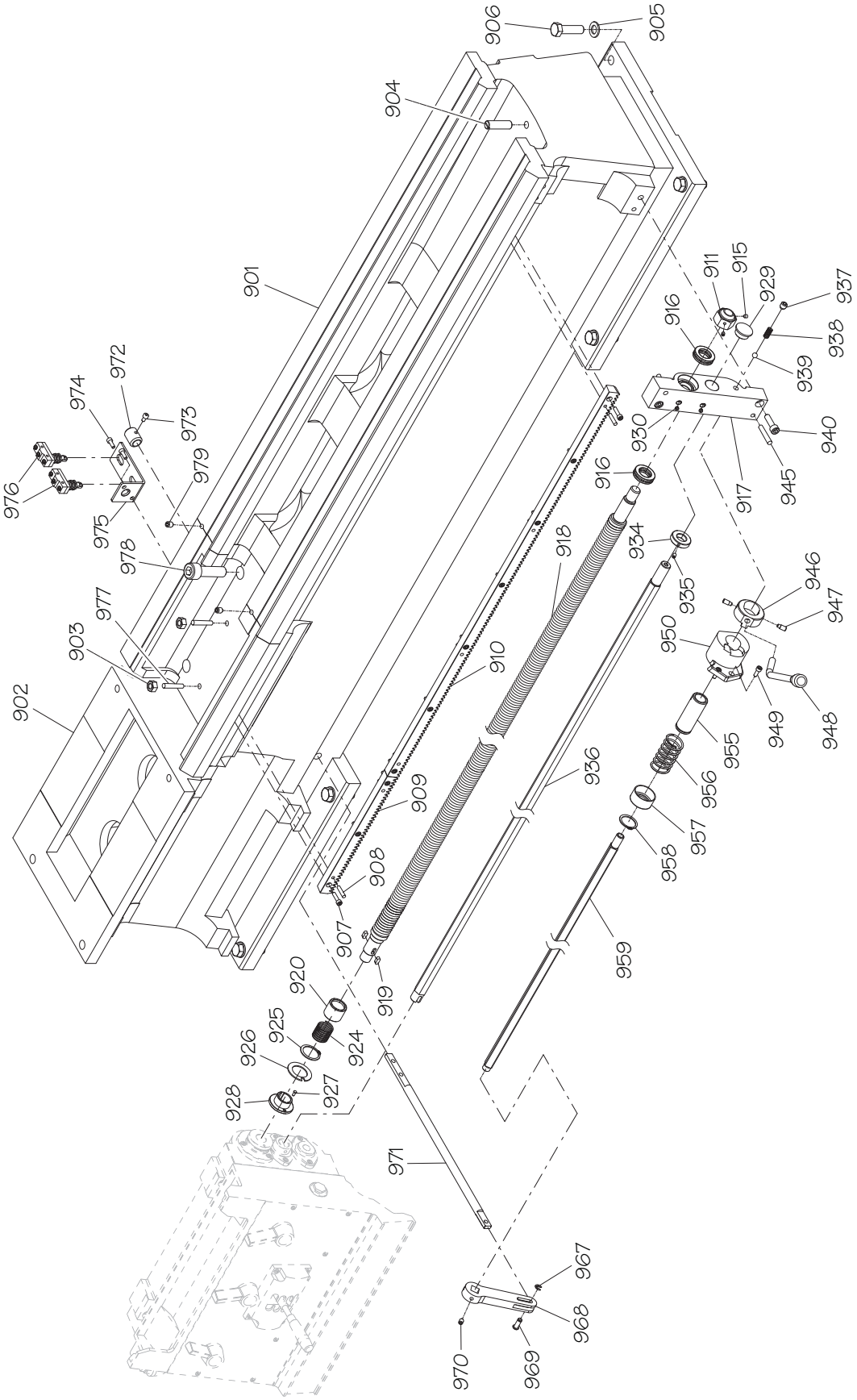
Cross Slide & Saddle B



Cross Slide & Saddle Parts List

REF	PART #	DESCRIPTION
801	PSB10160801	GIB ADJUSTMENT SCREW
802	PSB10160802	CROSS SLIDE
803	PSB10160803	COMPOUND PIVOT PIN 25 X 40
804	PSB10160804	COMPOUND PIVOT T-BOLT
805	PSB10160805	CROSS SLIDE GIB
806	PSB10160806	CROSS SLIDE WAY WIPER
807	PSB10160807	CROSS SLIDE WAY WIPER PLATE
808	PSB10160808	THRUST BEARING 1730-NTB/AS2
811	PRP28M	ROLL PIN 5 X 40
812A	PSB10160812A	CROSS SLIDE LEADSCREW W/NUT & KEY
813	PSB10160813	KEY 3 X 3 X 115
814	PSB10160814	COOLANT NOZZLE 3/8 PT X 24"
815	PSB10160815	COOLANT STAND PIPE ASSY 3/8 PT
816	PSB10160816	BEARING COLLAR
817	PSB10160817	THRUST WASHER
818	PSB10160818	CROSS LEADSCREW END BRACKET
819	PSB10160819	SADDLE CASTING
820	PSB10160820	SADDLE STRAIGHT WAY WIPER
821	PSB10160821	SADDLE STRAIGHT WAY WIPER PLATE
822	PSB10160822	OIL FILL PLUG 3/4 NF
823	PSB10160823	TAPER PIN #6 X 90MM
824	PSB10160824	SADDLE V-WAY WIPER
825	PSB10160825	SADDLE V-WAY WIPER PLATE
826	PSB10160826	CROSS SLIDE PINION 16T
827	PK96M	KEY 3 X 3 X 20
828	PSB10160828	PINION END PLUG
829	PSB10160829	PINION BRACKET
830	PSB10160830	COMPRESSION SPRING
831	PSTB001	STEEL BALL 1/4
832	PSB10160832	THRUST BEARING 2035-NTB/AS2
833	PSB10160833	THRUST WASHER
834	PSB10160834	PINION BRACKET END PLATE
835	PSB10160835	INDEX COLLAR
836	PSB10160836	INDEX RING
837	PSB10160837	CROSS SLIDE HANDWHEEL
838	PSB10160838	HANDWHEEL END CAP
839	PSB10160839	HANDWHEEL HANDLE
840	PSB10160840	HANDWHEEL HANDLE BOLT
841	PSB10160841	FRONT SADDLE GIB BRACKET
842	PSB10160842	SADDLE GIB
843	PSB10160843	REAR SADDLE GIB BRACKET
844	PSB10160844	SADDLE OIL PUMP ASSEMBLY
846	PSB10160846	COMBO GEAR 16T/36T
847	PSB10160847	STRAIGHT PIPE ADAPTER 1/8 PT X 4MM
848	PSB10160848	ALUMINUM OIL TUBE 4 X 258MM
849	PSB10160849	ELBOW PIPE ADAPTER 18 PT X 4MM
850	PSB10160850	ALUMINUM OIL TUBE 4 X 121MM
851	PSB10160851	GEAR SHAFT
852	PSB10160852	STRAIGHT PIPE ADAPTER 1/8 PT X 6MM
853	PSB10160853	ALUMINUM OIL TUBE 6 X 175MM
854	PSB10160854	OIL FILTER 6MM
855	PSB10160855	CARRIAGE LOCK BLOCK
856	PSS44M	SET SCREW M8-1.25 X 40
857	PCAP180M	CAP SCREW M12-1.75 X 85 BLK C12.9
858	PLUBE001M	TAP-IN BALL OILER 6MM
859	PSS12M	SET SCREW M6-1 X 25
860	PCAP178M	CAP SCREW M8-1.25 X 30 BLK C12.9
861	PW04M	FLAT WASHER 10MM
862	PN02M	HEX NUT M10-1.5
863	PS08M	PHLP HD SCR M5-.8 X 12
864	PCAP181M	CAP SCREW M6-1 X 25 BLK C12.9
865	PLN07M	LOCK NUT M16-2
866	PCAP182M	CAP SCREW M5-.8 X 25 BLK C12.9
868	PSS03M	SET SCREW M6-1 X 8
869	PCAP14M	CAP SCREW M8-1.25 X 20
870	PS09M	PHLP HD SCR M5-.8 X 10
871	PCAP183M	CAP SCREW M8-1.25 X 40 BLK C12.9
872	PFH05M	FLAT HD SCR M5-.8 X 12
873	PSB10160873	GIB SUPPORT PLATE
874	PSS09M	SET SCREW M8-1.25 X 20

Bed & Shafts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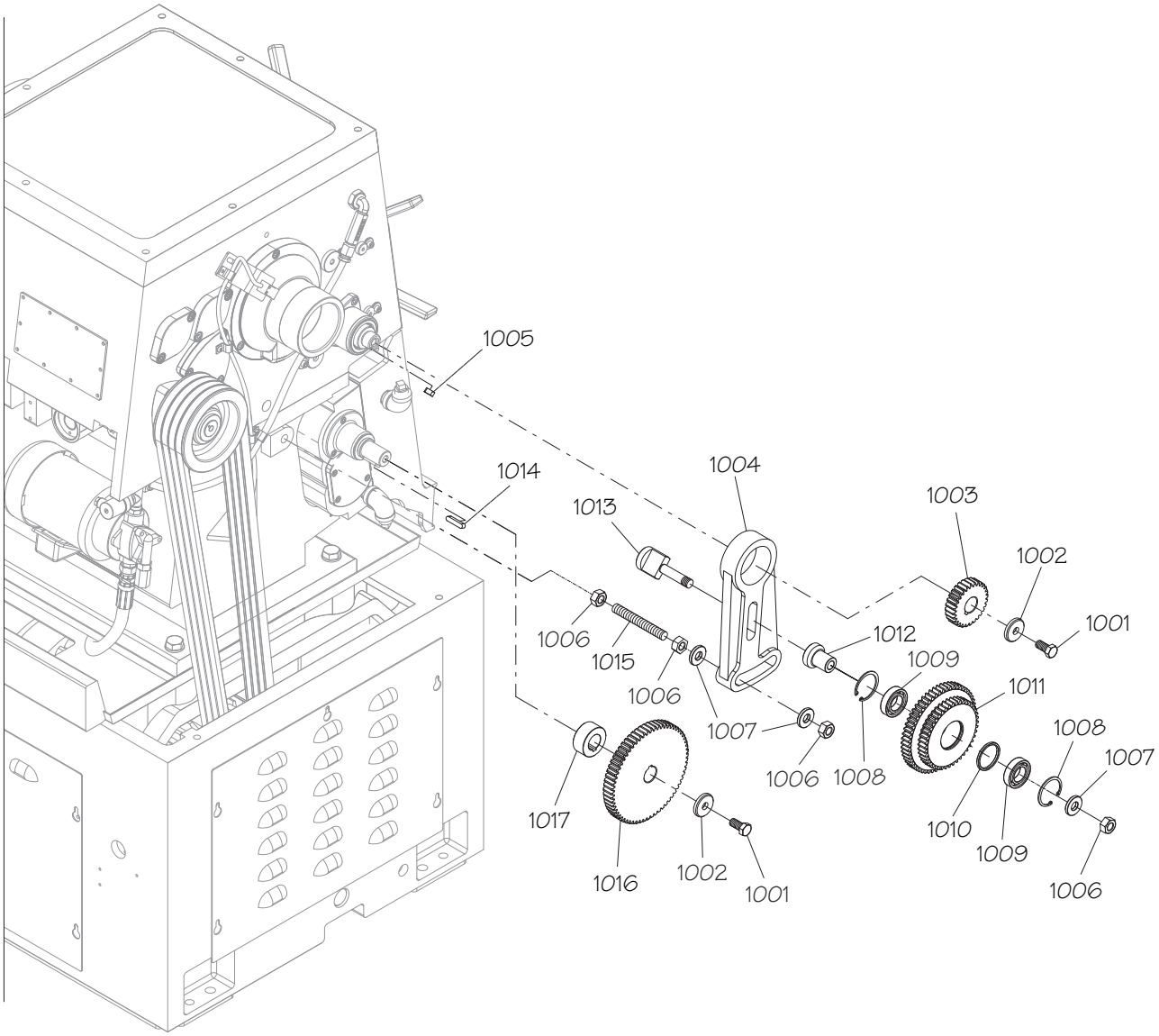
Bed & Shafts Parts List

REF	PART #	DESCRIPTION
901	PSB10160901	BED
902	PSB10160902	GAP INSERT
903	PN09M	HEX NUT M12-1.75
904	PSB10160904	TAILSTOCK STOP STUD
905	PW08M	FLAT WASHER M16-2
906	PB80M	HEX BOLT M16-2 X 55
907	PCAP06M	CAP SCREW M6-1 X 25
908	PRP08M	ROLL PIN 6 X 30
909	PSB10160909	GAP RACK
910	PSB10160910	BED RACK
911	PSB10160911	LEADSCREW LOCK NUT
915	PSS03M	SET SCREW M6-1 X 8
916	P51105	THRUST BEARING 51105
917	PSB10160917	SHAFT END BRACKET
918	PSB10160918	LONGITUDINAL LEADSCREW
919	PK99M	KEY 6 X 6 X 15
920	PSB10160920	SPRING HOUSING
924	PSB10160924	COMPRESSION SPRING
925	PR37M	EXT RETAINING RING 32MM
926	PSB10160926	KEYED SHEAR PIN WASHER
927	PSB10160927	SHEAR PIN
928	PSB10160928	LEADSCREW COLLAR
929	PSB10160929	FEED ROD END CAP
930	PLUBE001M	TAP-IN BALL OILER 6MM
934	PSB10160934	FEED ROD LOCK COLLAR
935	PSS01M	SET SCREW M6-1 X 10
936	PSB10160936	FEED ROD
937	PSS15M	SET SCREW M12-1.75 X 12

REF	PART #	DESCRIPTION
938	PSB10160938	COMPRESSION SPRING
939	PSTB003	STEEL BALL 3/8
940	PCAP84M	CAP SCREW M10-1.5 X 35
945	PSB10160945	TAPER PIN #7 X 50MM
946	PSB10160946	SPINDLE LEVER HUB
947	PSB10160947	HUB STEP PIN
948	PSB10160948	SPINDLE LEVER ASSEMBLY
949	PCAP01M	CAP SCREW M6-1 X 16
950	PSB10160950	SPINDLE ROD SELECTOR HUB
955	PSB10160955	SPINDLE ROD SLEEVE
956	PSB10160956	SPINDLE ROD COMPRESSION SPRING
957	PSB10160957	SPRING CAP
958	PR37M	EXT RETAINING RING 32MM
959	PSB10160959	SPINDLE ROD
967	PEC015M	E-CLIP 8MM
968	PSB10160968	CONNECTING PIVOT ARM
969	PSB10160969	CAPTIVE PIN
970	PSS14M	SET SCREW M8-1.25 X 12
971	PSB10160971	CONNECTING ROD
972	PSB10160972	LOCK COLLAR
973	PCAP04M	CAP SCREW M6-1 X 10
974	PCAP01M	CAP SCREW M6-1 X 16
975	PSB10160975	SPINDLE SWITCH BRACKET
976	PSB10160976	SPINDLE SWITCH SET 2PC
977	PSB10160977	THREADED TAPERED PIN M8-1.25 X 90
978	PCAP186M	CAP SCREW M16-2 X 50 BLK C12.9
979	PSS20M	SET SCREW M8-1.25 X 8

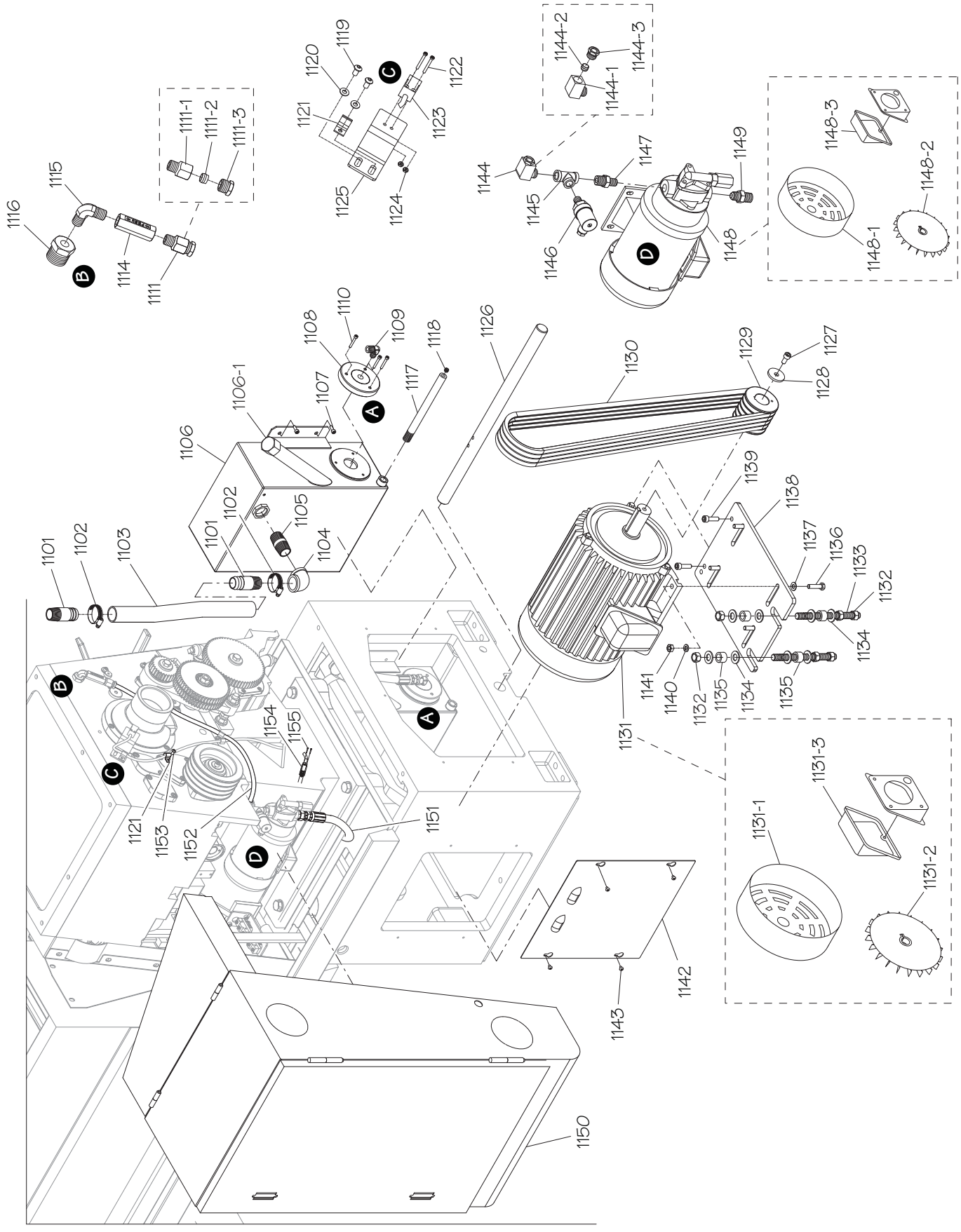
End Gears



REF	PART #	DESCRIPTION
1001	PB176MM	HEX BOLT M12-1.75 X 25 BLK C12.9
1002	PSB10161002	GEAR FLAT WASHER
1003	PSB10161003	GEAR 24T
1004	PSB10161004	PIVOT ARM
1005	PK166M	KEY 7 X 7 X 15
1006	PN32M	HEX NUT M14-2
1007	PW10M	FLAT WASHER 14MM
1008	PR25M	INT RETAINING RING 47MM
1009	P6005ZZ	BALL BEARING 6005ZZ

REF	PART #	DESCRIPTION
1010	PSB10161010	THRUST WASHER
1011	PSB10161011	DOUBLE GEAR 44T/56T
1012	PSB10161012	GEAR SHAFT
1013	PSB10161013	GEAR SHAFT T-PIN
1014	PK109M	KEY 7 X 7 X 35
1015	PSB10161015	ALL-THREAD STUD M14-2 X 110
1016	PSB10161016	GEAR 57T
1017	PSB10161017	GEAR SPACER

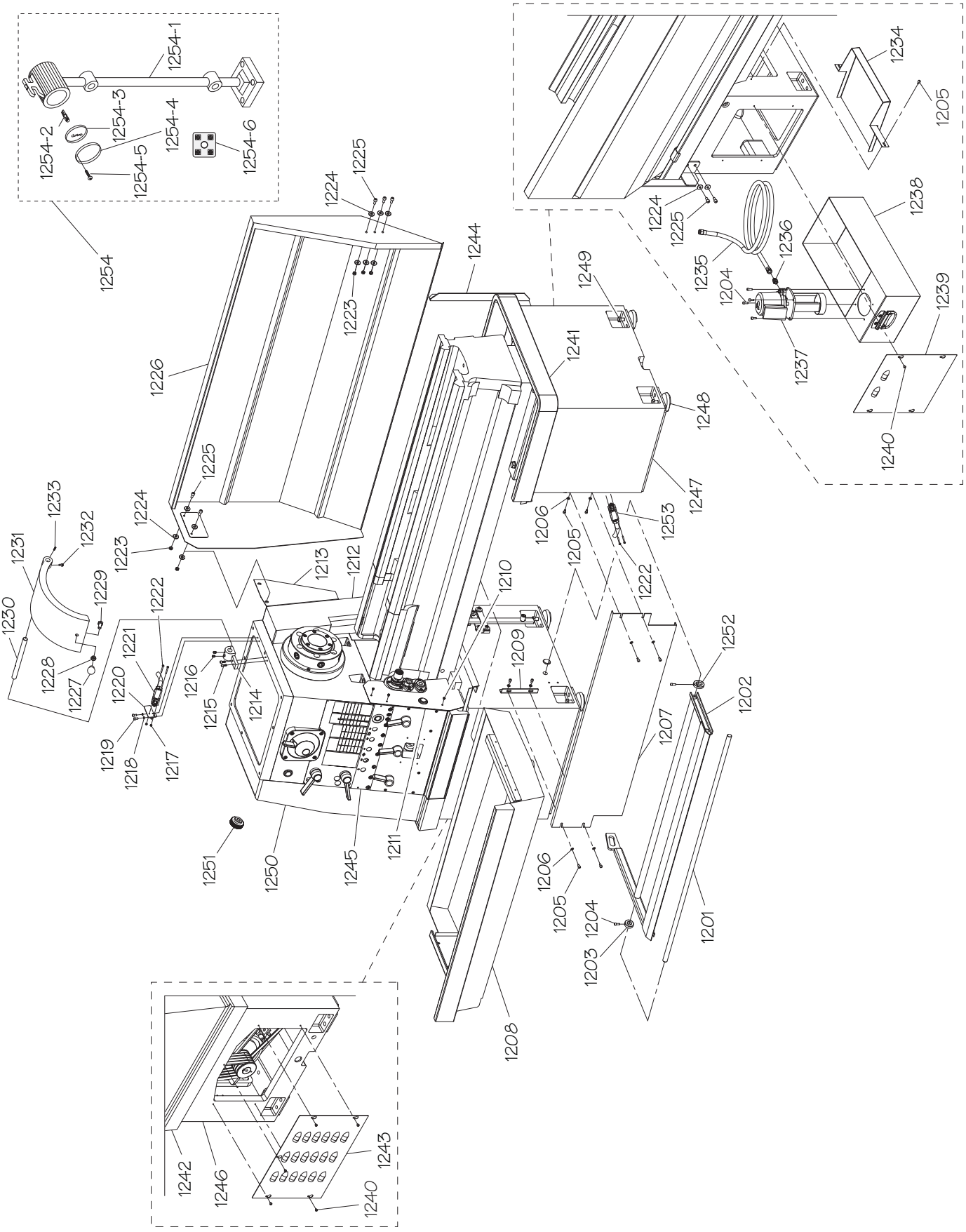
Motor & Lubrication



Motor & Lubrication Parts List

REF	PART #	DESCRIPTION
1101	PSB10161101	STRAIGHT PIPE ADAPTER 1 PT X 3/4"
1102	PSB10161102	HOSE CLAMP 1"
1103	PSB10161103	REINFORCED OIL HOSE 1" X 90"
1104	PSB10161104	FEMALE 90 DEG PIPE ELBOW 1 PT
1105	PSB10161105	PIPE NIPPLE 1 PT X 2-1/2"
1106	PSB10161106	OIL TANK
1106-1	PSB10161106-1	OIL FILL CAP
1107	PCAP11M	CAP SCREW M8-1.25 X 16
1108	PSB10161108	OIL TANK SIDE COVER
1109	PSB10161109	FEMALE 90 DEG PIPE ELBOW 5/8 X 1/2 PT
1110	PB151M	HEX BOLT M5-.8 X 35
1111	PSB10161111	OIL HOSE STRAIGHT CONNECTOR ASSY
1111-1	PSB10161111-1	STRAIGHT HOSE CONNECTOR
1111-2	PSB10161111-2	CONNECTOR THIMBLE
1111-3	PSB10161111-3	THIMBLE NUT
1114	PSB10161114	CHECK VALVE
1115	PSB10161115	FEMALE 90 DEG PIPE ELBOW 1/4 X 1/4 PT
1116	PSB10161116	PIPE ADAPTER 3/4 X 1/4 PT
1117	PSB10161117	OIL DRAIN PIPE
1118	PSB10161118	OIL DRAIN PLUG 1/4 PT
1119	PS68M	PHLP HD SCR M6-1 X 10
1120	PW02M	FLAT WASHER 5MM
1121	PSB10161121	WIRE CLIP 10MM
1122	PS98M	PHLP HD SCR M3-.5 X 15
1123	PSB10161123	SPINDLE SPEED SENSOR
1124	PN07M	HEX NUT M3-.5
1125	PSB10161125	SENSOR BRACKET
1126	PSB10161126	MOTOR MOUNT SHAFT
1127	PCAP64M	CAP SCREW M10-1.5 X 25
1128	PSB10161128	PULLEY WASHER 12 X 45 X 5MM
1129	PSB10161129	MOTOR PULLEY
1130	PVA75	V-BELT A75
1131	PSB10161131	MOTOR 10HP 220/440V 3PH
1131-1	PSB10161131-1	MOTOR FAN COVER
1131-2	PSB10161131-2	MOTOR FAN
1131-3	PSB10161131-3	MOTOR JUNCTION BOX
1132	PN13M	HEX NUT M16-2
1133	PSB10161133	MOTOR MOUNT ALL-THREAD STUD
1134	PSB10161134	MOTOR MOUNT FLAT WASHER 16.5 X 40MM
1135	PSB10161135	MOTOR MOUNT RUBBER CUSHION
1136	PB31M	HEX BOLT M10-1.5 X 40
1137	PW04M	FLAT WASHER 10MM
1138	PSB10161138	MOTOR MOUNT PLATE
1139	PCAP64M	CAP SCREW M10-1.5 X 25
1140	PLW06M	LOCK WASHER 10MM
1141	PN02M	HEX NUT M10-1.5
1142	PSB10161142	MOTOR ACCESS COVER
1143	PS14M	PHLP HD SCR M6-1 X 12
1144	PSB10161144	OIL HOSE 90 DEG CONNECTOR ASSY
1144-1	PSB10161144-1	ELBOW CONNECTOR 3/8 PT X 16MM
1144-2	PSB10161144-2	CONNECTOR THIMBLE
1144-3	PSB10161144-3	THIMBLE NUT
1145	PSB10161145	PIPE T-JOINT 3/8 PT
1146	PSB10161146	OIL PRESSURE SWITCH
1147	PSB10161147	PIPE ADAPTER 3/8 X 1/4 PT
1148	PSB10161148	OIL PUMP 1/4HP 220/440V 3PH
1148-1	PSB10161148-1	MOTOR FAN COVER
1148-2	PSB10161148-2	MOTOR FAN
1148-3	PSB10161148-3	MOTOR JUNCTION BOX
1149	PSB10161149	PIPE ADAPTER 3/8 X 1/2 PT
1150	PSB10161150	ELECTRICAL/CONTROL PANEL CABINET
1151	PSB10161151	OIL HOSE 1/2"
1152	PSB10161152	OIL HOSE 10MM
1153	PS05M	PHLP HD SCR M5-.8 X 8
1154	PSB10161154	END GEAR COVER SAFETY SWITCH
1155	PS65M	PHLP HD SCR M4-.7 X 40

Cabinets & Panels

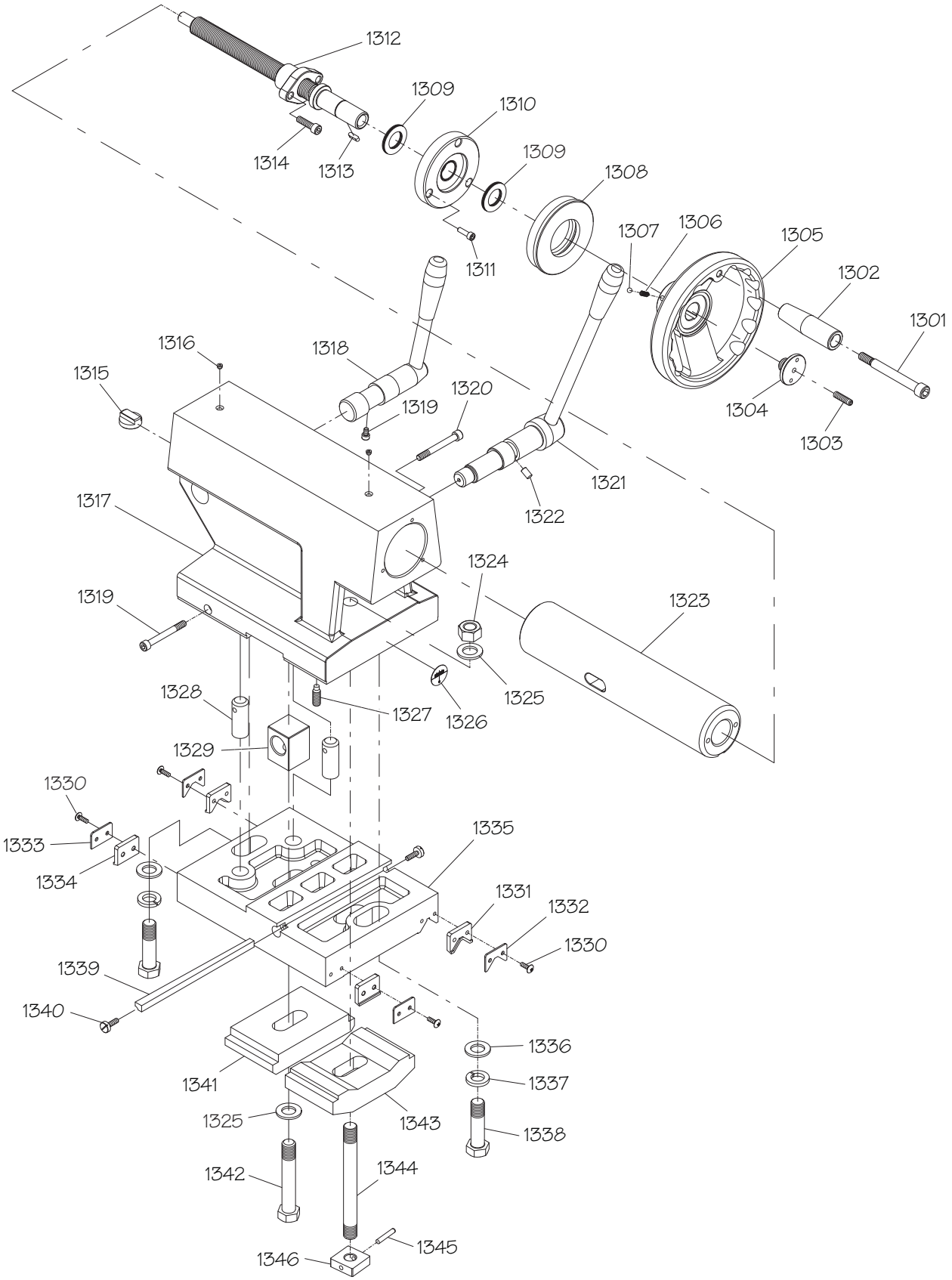


Cabinets & Panels Parts List

REF	PART #	DESCRIPTION
1201	PSB10161201	BRAKE PEDAL SHAFT
1202	PSB10161202	BRAKE PEDAL
1203	PSB10161203	LOCK COLLAR
1204	PCAP01M	CAP SCREW M6-1 X 16
1205	PCAP04M	CAP SCREW M6-1 X 10
1206	PW03M	FLAT WASHER 6MM
1207	PSB10161207	CENTER PANEL
1208	PSB10161208	CHIP DRAWER
1209	PSB10161209	CENTER PANEL BRACKET
1210	PS05M	PHLP HD SCR M5-.8 X 8
1211	PSB10161211	ACCESS PANEL
1212	PSB10161212	SPINDLE SWITCH ACCESS PANEL
1213	PSB10161213	SPLASH GUARD MOUNTING PLATE
1214	PSB10161214	CHUCK GUARD MOUNTING BRACKET
1215	PB56M	CAP SCREW M10-1.5 X 20
1216	PSS14M	SET SCREW M8-1.25 X 12
1217	PN04M	HEX NUT M4-.7
1218	PLW03M	LOCK WASHER 6MM
1219	PCAP26M	CAP SCREW M6-1 X 12
1220	PSB10161220	SWITCH BRACKET
1221	PSB10161221	CHUCK GUARD SAFETY SWITCH
1222	PS65M	PHLP HD SCR M4-.7 X 40
1223	PN03M	HEX NUT M8-1.25
1224	PW01M	FLAT WASHER 8MM
1225	PCAP14M	CAP SCREW M8-1.25 X 20
1226	PSB10161226	SPLASH GUARD
1227	PSB10161227	CHUCK GUARD KNOB
1228	PN06	HEX NUT 1/2-13
1229	PB52	HEX BOLT 1/2-13 X 1
1230	PSB10161230	PIVOT ROD

REF	PART #	DESCRIPTION
1231	PSB10161231	CHUCK GUARD
1232	PCAP26M	CAP SCREW M6-1 X 12
1233	PSS34M	SET SCREW M5-.8 X 16
1234	PSB10161234	COOLANT RETURN CHUTE
1235	PSB10161235	COOLANT HOSE 3/8" X 78"
1236	PSB10161236	STRAIGHT PIPE NIPPLE 3/8 PT X 3/8 PH
1237	PSB10161237	COOLANT PUMP 1/8HP 220/440V 3PH
1238	PSB10161238	COOLANT TANK
1239	PSB10161239	COOLANT TANK ACCESS PANEL
1240	PS68M	PHLP HD SCR M6-1 X 10
1241	PSB10161241	RIGHT CABINET CHIP TRAY
1242	PSB10161242	LEFT CABINET CHIP TRAY
1243	PSB10161243	LEFT CABINET SIDE ACCESS PANEL
1244	PSB10161244	SPLASH GUARD MOUNTING BRACKET
1245	PSB10161245	HEADSTOCK INFORMATION PANEL
1246	PSB10161246	LEFT CABINET
1247	PSB10161247	RIGHT CABINET
1248	PSB10161248	CAST IRON FOOT PAD
1249	PB80M	HEX BOLT M16-2 X 55
1250	PSB10161250	END GEAR COVER
1251	PSB10161251	COVER RETAINING KNOB
1252	PSB10161252	BRAKE SWITCH CAM
1253	PSB10161253	BRAKE SWITCH
1254	PSB10161254	HALOGEN LAMP ASSEMBLY
1254-1	PSB10161254-1	LAMP BODY
1254-2	PSB10161254-2	HALOGEN BULB 24V
1254-3	PSB10161254-3	LENS
1254-4	PSB10161254-4	LENS RETAINER
1254-5	PS55M	PHLP HD SCR M3-.5 X 10
1254-6	PSB10161254-6	LAMP TERMINAL BLOCK 2P

Tailstock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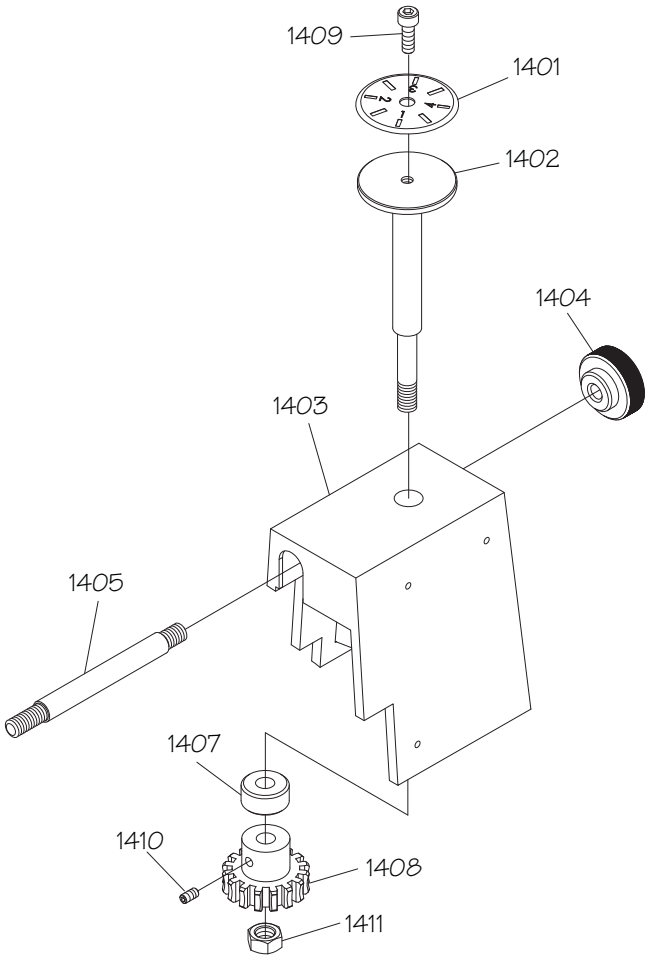
Tailstock Parts List

REF	PART #	DESCRIPTION
1301	PSB10161301	HANDWHEEL HANDLE SCREW
1302	PSB10161302	HANDWHEEL HANDLE
1303	PSS19M	SET SCREW M8-1.25 X 30
1304	PSB10161304	HANDWHEEL END CAP
1305	PSB10161305	HANDWHEEL
1306	PSB10161306	COMPRESSION SPRING
1307	PSTB001	STEEL BALL 1/4
1308	PSB10161308	INDEX RING
1309	PSB10161309	THRUST BEARING 3542-AS2
1310	PSB10161310	TAILSTOCK LEADSCREW FLANGE CAP
1311	PCAP02M	CAP SCREW M6-1 X 20
1312	PSB10161312	TAILSTOCK LEADSCREW ASSEMBLY
1313	PK10M	KEY 5 X 5 X 12
1314	PCAP178M	CAP SCREW M8-1.25 X 30 BLK C12.9
1315	PSB10161315	QUILL ALIGNMENT KEY
1316	PLUBE001M	TAP-IN BALL OILER 6MM
1317	PSB10161317	TAILSTOCK CASTING
1318	PSB10161318	QUILL LOCK LEVER ASSEMBLY
1319	PSB10161319	FULL THREAD CAP SCREW M6-1 X 10
1320	PSB10161320	FULL THREAD CAP SCREW M8-1.25 X 70
1321	PSB10161321	TAILSTOCK LOCK LEVER ASSEMBLY
1322	PSB10161322	DOWEL PIN
1323	PSB10161323	QUILL MT#5

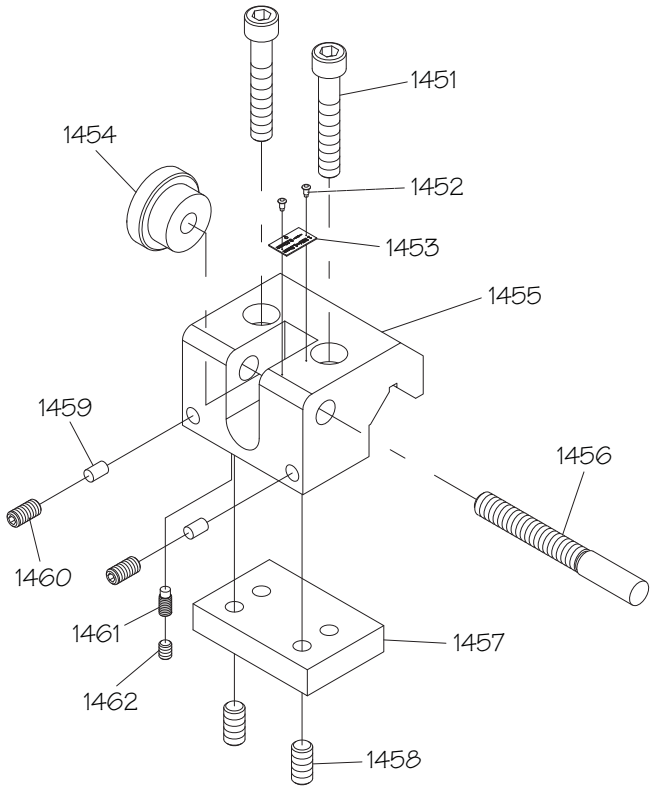
REF	PART #	DESCRIPTION
1324	PN29M	HEX NUT M18-2.5
1325	PW18M	FLAT WASHER 18MM
1326	PSB10161326	OFFSET INDICATOR PLATE
1327	PSB10161327	DOG POINT SET SCREW M10-1.5 X 30
1328	PSB10161328	ALIGNMENT STUD
1329	PSB10161329	PIVOT BLOCK
1330	PS40M	PHLP HD SCR M5-.8 X 16
1331	PSB10161331	V-WAY WIPER
1332	PSB10161332	V-WAY WIPER PLATE
1333	PSB10161333	STRAIGHT WAY WIPER PLATE
1334	PSB10161334	STRAIGHT WAY WIPER
1335	PSB10161335	TAILSTOCK BASE
1336	PW18M	FLAT WASHER 18MM
1337	PLW12M	LOCK WASHER 18MM
1338	PSB10161338	TAILSTOCK MOUNTING BOLT
1339	PSB10161339	TAILSTOCK GIB
1340	PSB10161340	GIB ADJUSTMENT SCREW
1341	PSB10161341	TAILSTOCK TOP CLAMP PLATE
1342	PSB10161342	BASE MOUNTING HEX BOLT
1343	PSB10161343	TAILSTOCK BOTTOM CLAMP PLATE
1344	PSB10161344	TAILSTOCK CLAMP STUD
1345	PRP31M	ROLL PIN 6 X 36
1346	PSB10161346	TAILSTOCK CLAMP BLOCK SQUARE NUT

Thread Dial



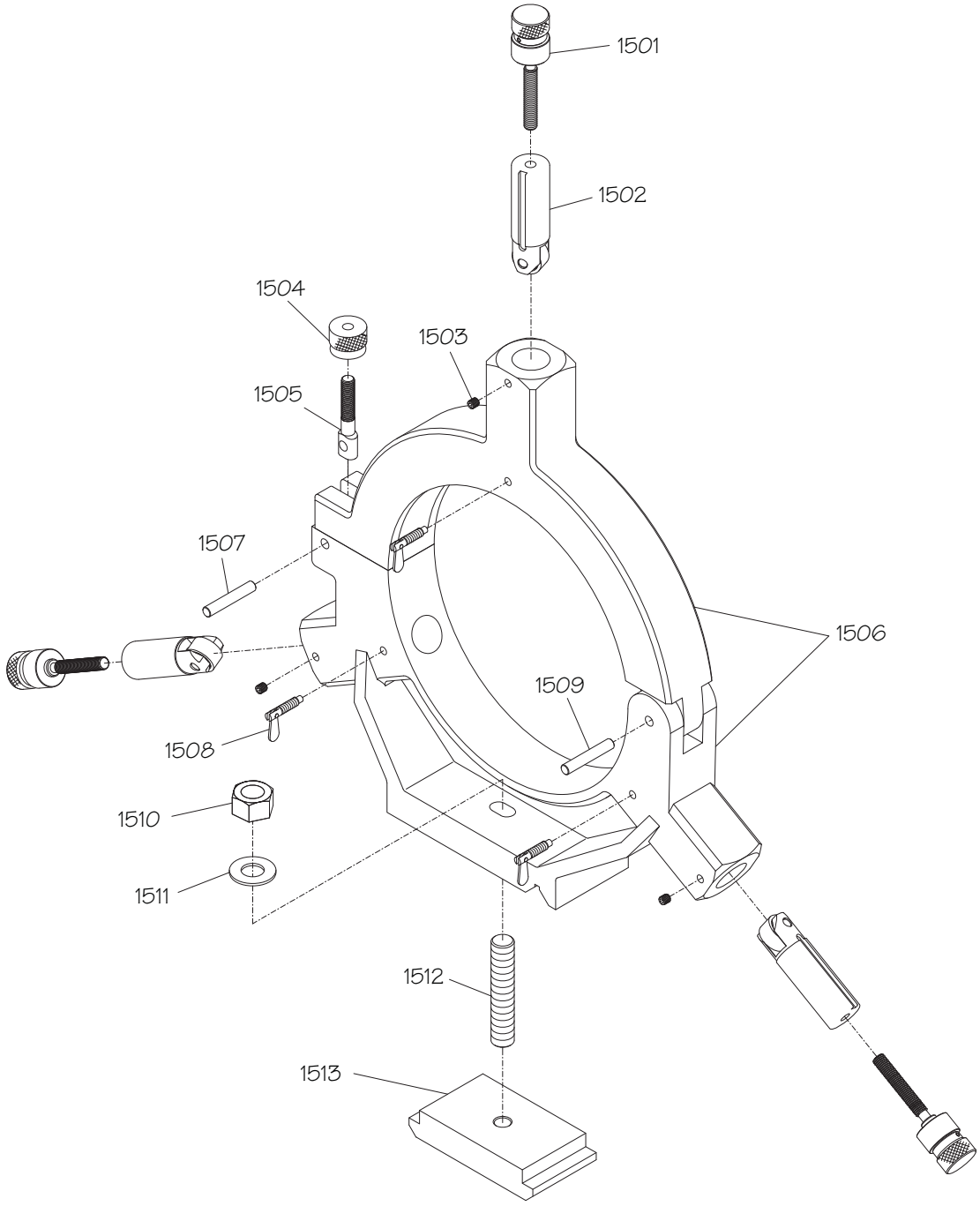
REF	PART #	DESCRIPTION
1401	PSB10161401	INDICATOR PLATE
1402	PSB10161402	GEAR SHAFT
1403	PSB10161403	DIAL INDICATOR CASTING
1404	PSB10161404	KNURLED KNOB
1405	PSB10161405	PIVOT STUD
1407	PSB10161407	GEAR SPACER
1408	PSB10161408	DIAL GEAR 16T BRASS
1409	PSB10161409	INDICATOR PLATE CAP SCREW
1410	PSS02M	SET SCREW M6-1 X 6
1411	PSB10161411	GEAR SHAFT HEX NUT

Micrometer Stop



REF	PART #	DESCRIPTION
1451	PCAP185M	CAP SCREW M10-1.5 X 60 BLK C12.9
1452	PSB10161452	SOLID STEEL RIVET 2.8 X 10
1453	PSB10161453	INDICATOR PLATE
1454	PSB10161454	KNURLED KNOB
1455	PSB10161455	BED STOP CASTING
1456	PSB10161456	BED STOP ADJUSTMENT STUD
1457	PSB10161457	CLAMP PLATE
1458	PSS10M	SET SCREW M10-1.5 X 20
1459	PSB10161459	COPPER CUSHION
1460	PSS06M	SET SCREW M8-1.25 X 16
1461	PSB10161461	DOG POINT SET SCREW M8-1.25 X 12
1462	PSS14M	SET SCREW M8-1.25 X 12

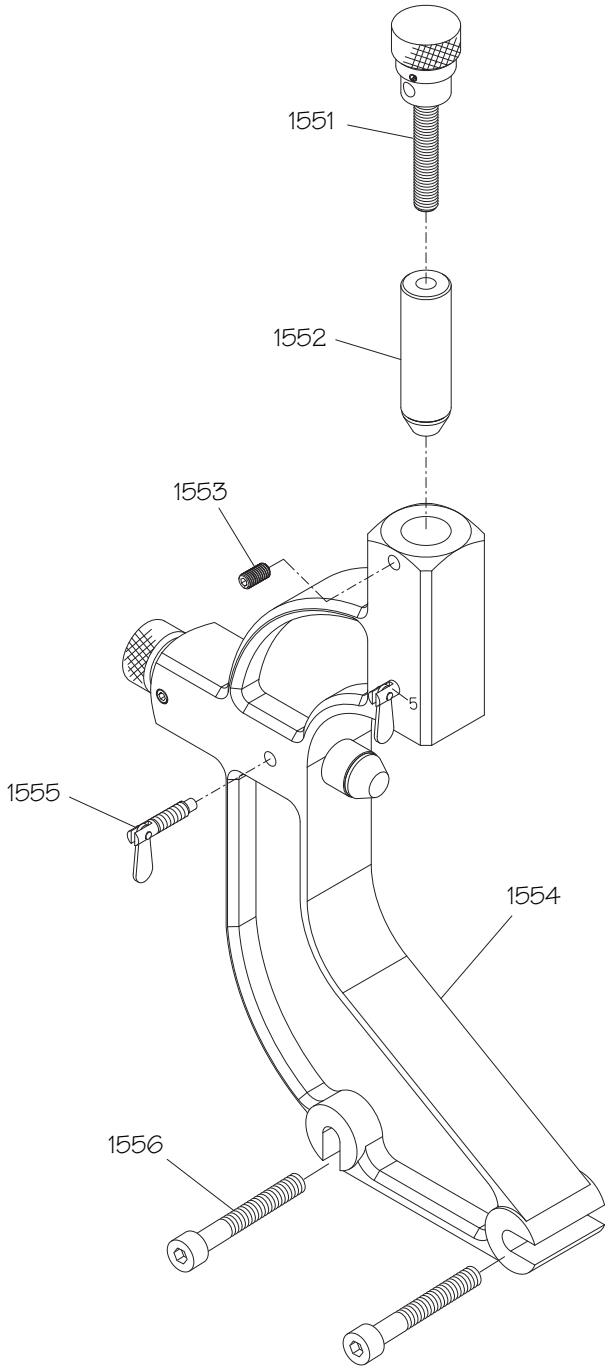
Steady Rest



REF	PART #	DESCRIPTION
1501	PSB10161501	FINGER ADJUSTMENT KNOB SCREW ASSY
1502	PSB10161502	STEADY REST FINGER ASSEMBLY
1503	PSS20M	SET SCREW M8-1.25 X 8
1504	PSB10161504	KNURLED KNOB
1505	PSB10161505	CLAMP STUD
1506	PSB10161506	STEADY REST CASTING ASSEMBLY
1507	PSB10161507	DOWEL PIN 10 X 53

REF	PART #	DESCRIPTION
1508	PSB10161508	LEAF SCREW
1509	PSB10161509	DOWEL PIN 10 X 53
1510	PN29M	HEX NUT M18-2.5
1511	PLW12M	LOCK WASHER 18MM
1512	PSB10161512	ALL-THREAD CLAMP STUD M18-2.5 X 100
1513	PSB10161513	CLAMP PLATE

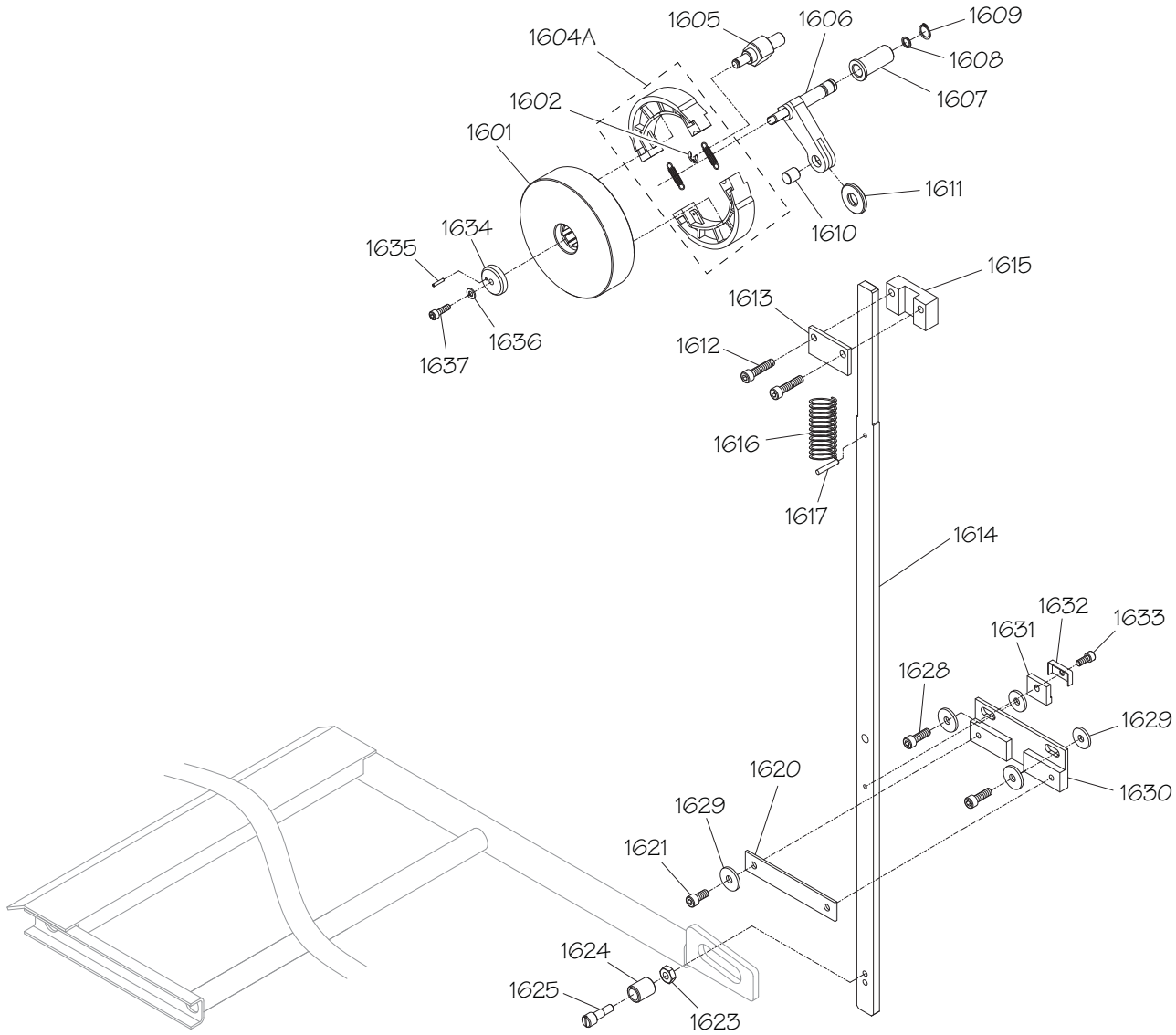
Follow Rest



REF	PART #	DESCRIPTION
1551	PSB10161551	FINGER ADJUSTMENT KNOB BOLT ASSY
1552	PSB10161552	FOLLOW REST FINGER ASSEMBLY
1553	PSS06M	SET SCREW M8-1.25 X 16

REF	PART #	DESCRIPTION
1554	PSB10161554	FOLLOW REST CASTING
1555	PSB10161555	LEAF SCREW
1556	PCAP65M	CAP SCREW M10-1.5 X 70

Brake System

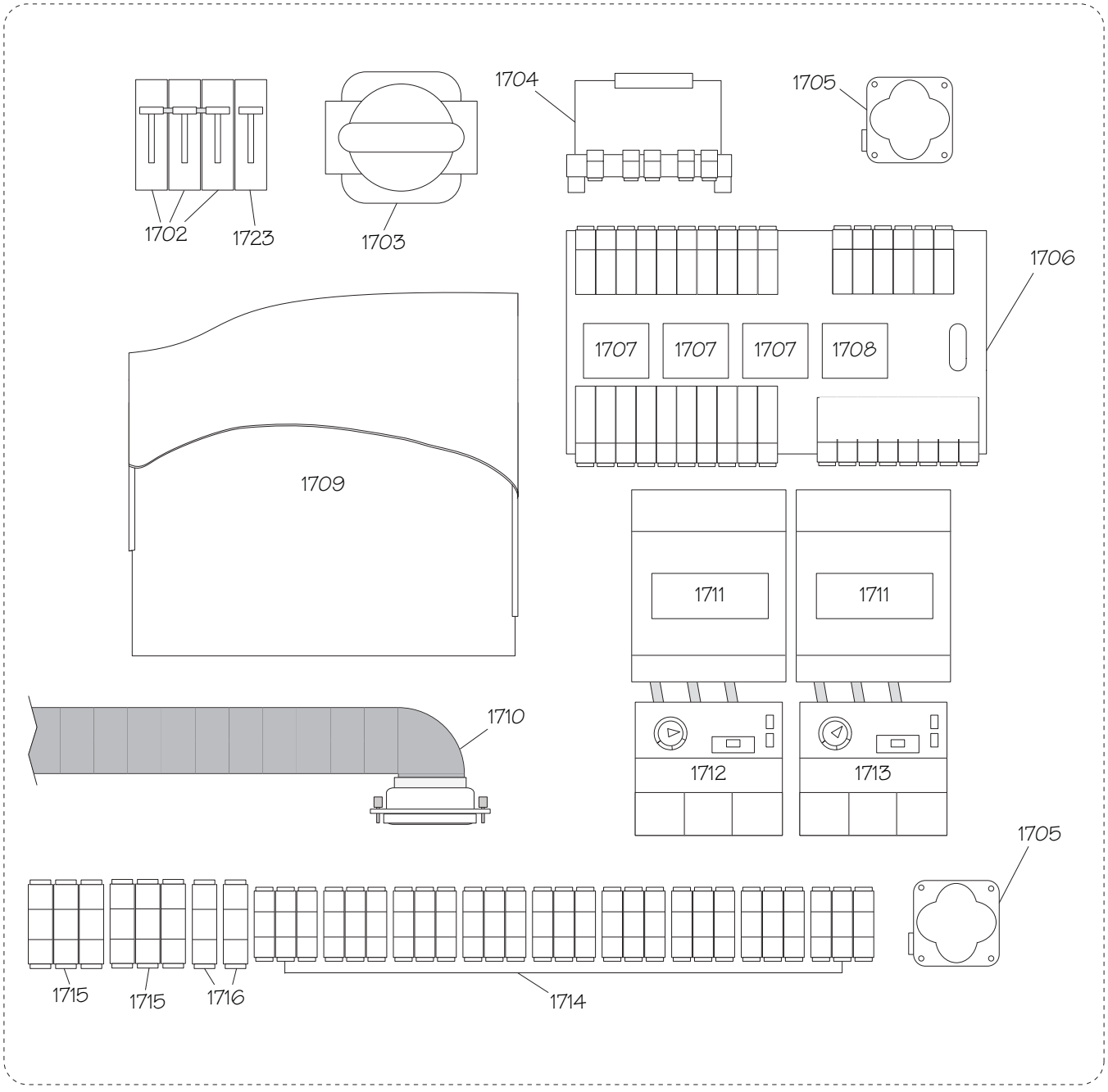


REF	PART #	DESCRIPTION
1601	PSB10161601	BRAKE DRUM
1602	PEC015M	E-CLIP 8MM
1604A	PSB10161604A	BRAKE SHOE SET W/SPRING
1605	PSB10161605	BRAKE SHOE ANCHOR PIN
1606	PSB10161606	PIVOT ARM
1607	PSB10161607	PIVOT ARM BUSHING
1608	PORP010	O-RING 9.8 X 1.9 P10
1609	PR02M	EXT RETAINING RING 14MM
1610	PSB10161610	PIVOT ARM AXLE
1611	PSB10161611	PIVOT ARM ROLLER
1612	PCAP40M	CAP SCREW M8-1.25 X 35
1613	PSB10161613	TOP LINKAGE BRACKET PLATE
1614	PSB10161614	BRAKE LINKAGE
1615	PSB10161615	TOP LINKAGE BRACKET
1616	PSB10161616	COMPRESSION SPRING
1617	PSB10161617	DOWEL PIN 5 X 30

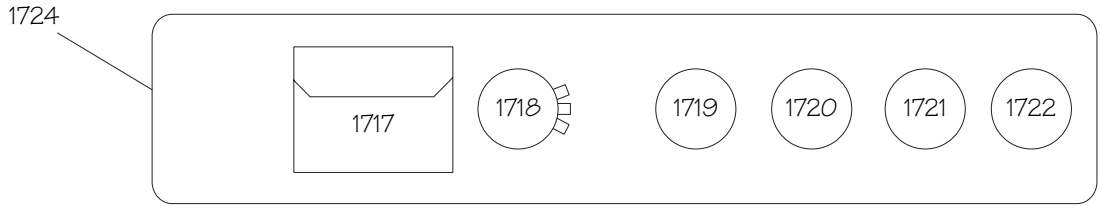
REF	PART #	DESCRIPTION
1620	PSB10161620	BOTTOM LINKAGE BRACKET PLATE
1621	PCAP11M	CAP SCREW M8-1.25 X 16
1623	PSB10161623	PIVOT SCREW HEX NUT
1624	PSB10161624	AXLE ROLLER
1625	PSB10161625	AXLE
1628	PCAP31M	CAP SCREW M8-1.25 X 25
1629	PW01M	FLAT WASHER 8MM
1630	PSB10161630	BOTTOM LINKAGE BRACKET
1631	PSB10161631	PIVOT STOP
1632	PSB10161632	PIVOT STOP COVER
1633	PCAP04M	CAP SCREW M6-1 X 10
1634	PSB10161634	BRAKE DRUM WASHER
1635	PRP02M	ROLL PIN 3 X 16
1636	PLW03M	LOCK WASHER 6MM
1637	PCAP121M	CAP SCREW M6-1 X 20 LH

Electrical Cabinet & Control Panel

Electrical Cabinet



Control Panel

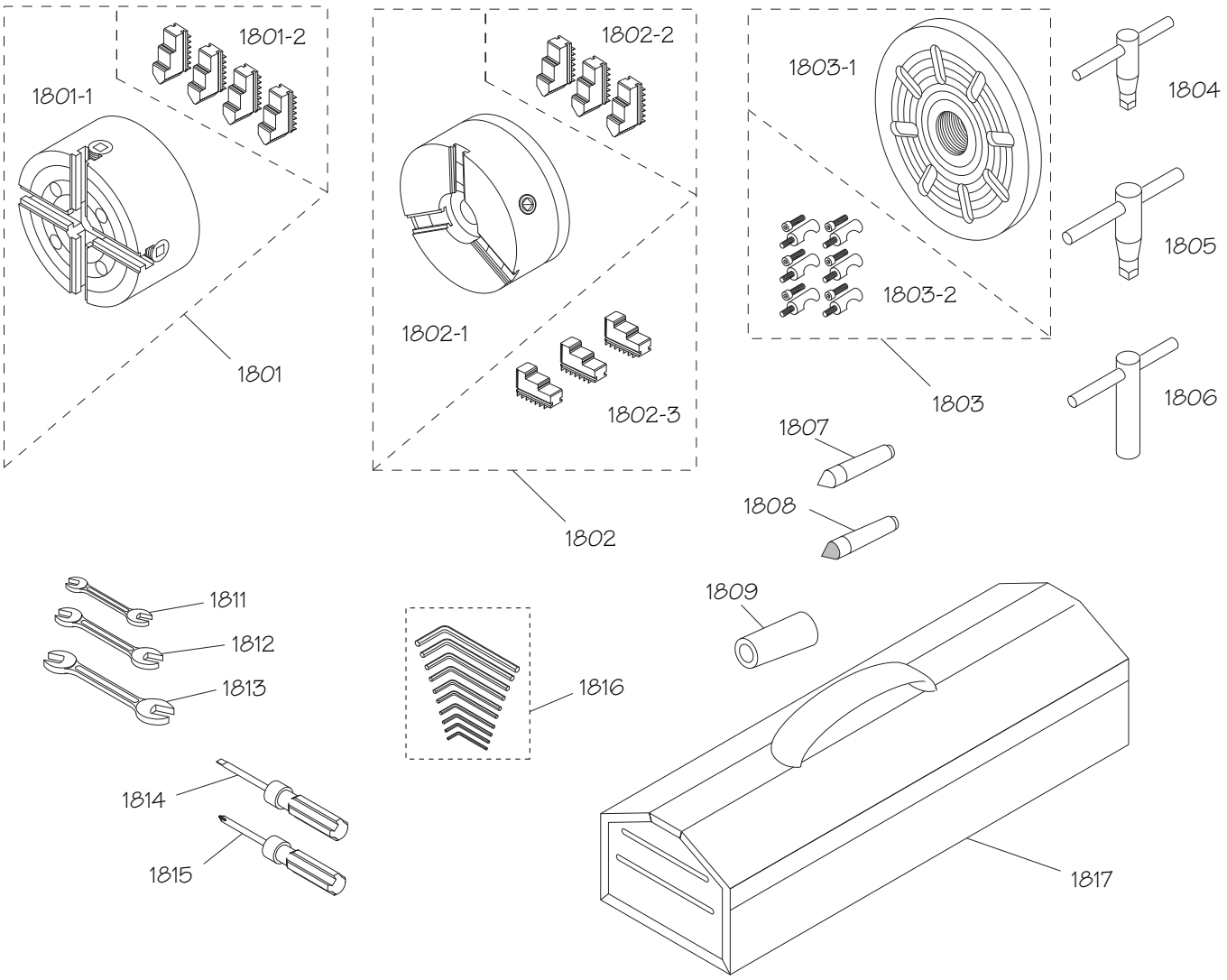


Electrical Cabinet & Control Panel Parts List

REF	PART #	DESCRIPTION
1702	PSB10161702	CIRCUIT BREAKER AB SP3D320 20A
1703	PSB10161703	MAIN POWER SWITCH P1-32 (SB1016)
1703	PSB10361703	MAIN POWER SWITCH P1-25 (SB1036)
1704	PSB10161704	TRANSFORMER SUEN LIANG 0-440V
1705	PSB10161705	CABINET COOLING FAN
1706	PSB10161706	CIRCUIT BOARD
1707	PSB10161707	RELAY OMRON MY4NJ 24V
1708	PSB10161708	RELAY OMRON MY2NJ 24V
1709	PSB10161709	POWER INVERTER YASKAWA CMIR-G7A4011
1710	PSB10161710	INVERTER/CIRCUIT BOARD CABLE
1711	PSB10161711	CONTACTOR AB C09400 24V
1712	PSB10161712	OL RELAY AB 193-TAA40 0.24-0.4A
1713	PSB10122209	OL RELAY AB 193TAB24 1.6-2.5A (SB1016)

REF	PART #	DESCRIPTION
1713	PSB10132209	OL RELAY AB 193TAB10 0.6-1.0A (SB1036)
1714	PSB10161714	TERMINAL BOARD 3P SMALL
1715	PSB10161715	TERMINAL BOARD 3P LARGE
1716	PSB10161716	TERMINAL BOARD 1P LARGE
1717	PSB10161717	TACHOMETER DISPLAY
1718	PSB10161718	SPINDLE SPEED DIAL
1719	PSB10161719	POWER LAMP ASSEMBLY
1720	PSB10161720	COOLANT PUMP SWITCH
1721	PSB10161721	SPINDLE JOG BUTTON
1722	PSB10161722	EMERGENCY STOP BUTTON
1723	PSB10161723	CIRCUIT BREAKER AB SP1D060 6A
1724	PSB10161724	CONTROL PANEL PLATE

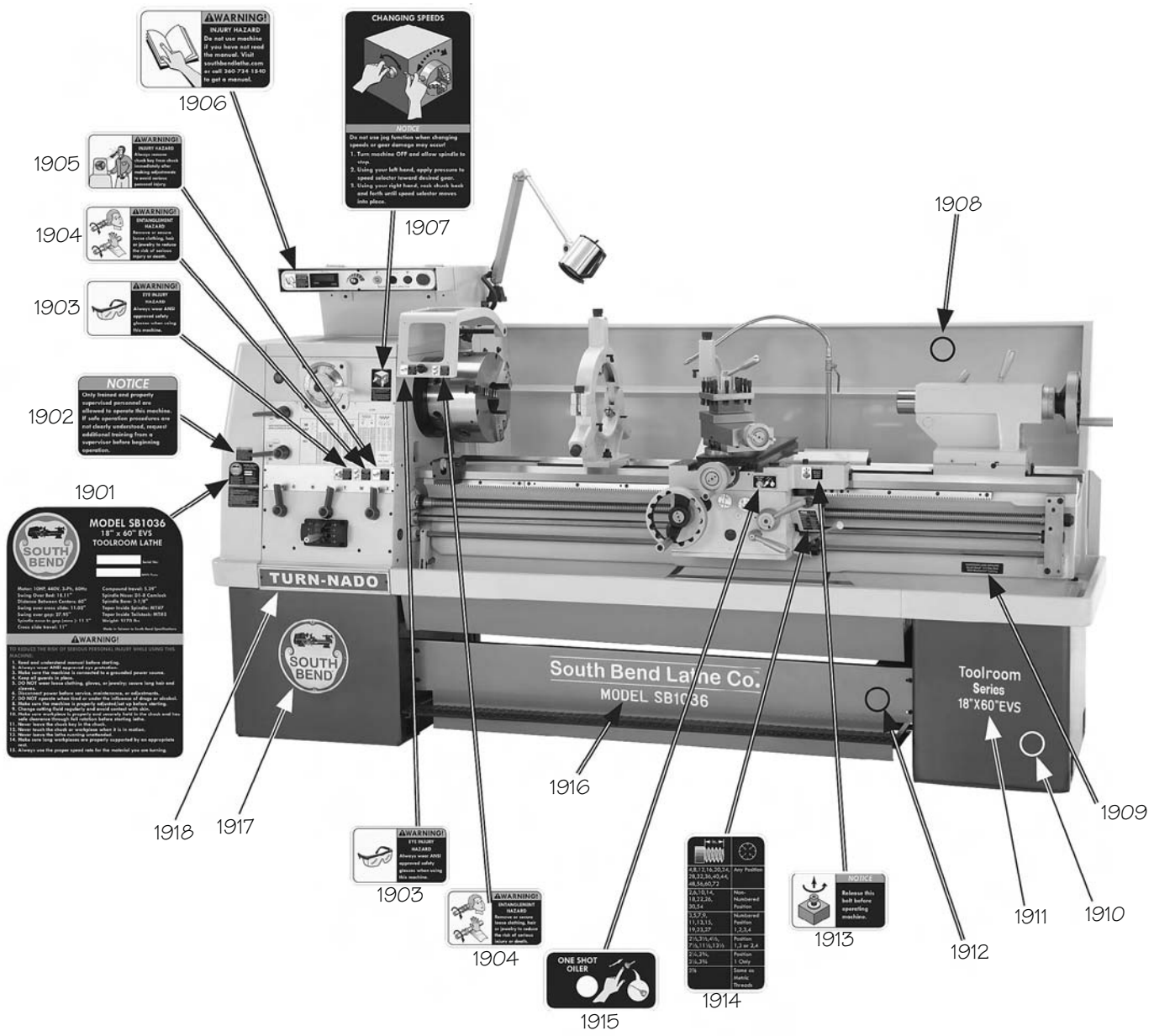
Accessories



REF	PART #	DESCRIPTION
1801	PSB10161801	4-JAW CHUCK 14" ASSEMBLY
1801-1	PSB10161801-1	4-JAW CHUCK 14"
1801-2	PSB10161801-2	4-JAW CHUCK JAW SET
1802	PSB10161802	3-JAW CHUCK 12" ASSEMBLY
1802-1	PSB10161802-1	3-JAW CHUCK 12"
1802-2	PSB10161802-2	3-JAW CHUCK STANDARD JAW SET
1802-3	PSB10161802-3	3-JAW CHUCK REVERSIBLE JAW SET
1803	PSB10161803	FACEPLATE ASSEMBLY 15"
1803-1	PSB10161803-1	FACEPLATE 15"
1803-2	PSB10161803-2	FACEPLATE CAMLOCK STUD SET
1804	PSB10161804	3-JAW CHUCK KEY
1805	PSB10161805	4-JAW CHUCK KEY

REF	PART #	DESCRIPTION
1806	PSB10161806	TOOL POST T-WRENCH
1807	PSB10161807	STANDARD DEAD CENTER MT#5
1808	PSB10161808	CARBIDE TIP DEAD CENTER MT#5
1809	PSB10161809	SPINDLE SLEEVE MT#5-MT#7
1811	PWR1012	WRENCH 10/12MM
1812	PWR1417	WRENCH 14/17MM
1813	PWR2224	WRENCH 22/24MM
1814	PSDF2	SCREWDRIVER FLAT #2
1815	PSDP2	SCREWDRIVER PHILLIPS #2
1816	PAW1510M	HEX WRENCH SET 10PC 1.5-10MM
1817	PSB10161817	TOOLBOX

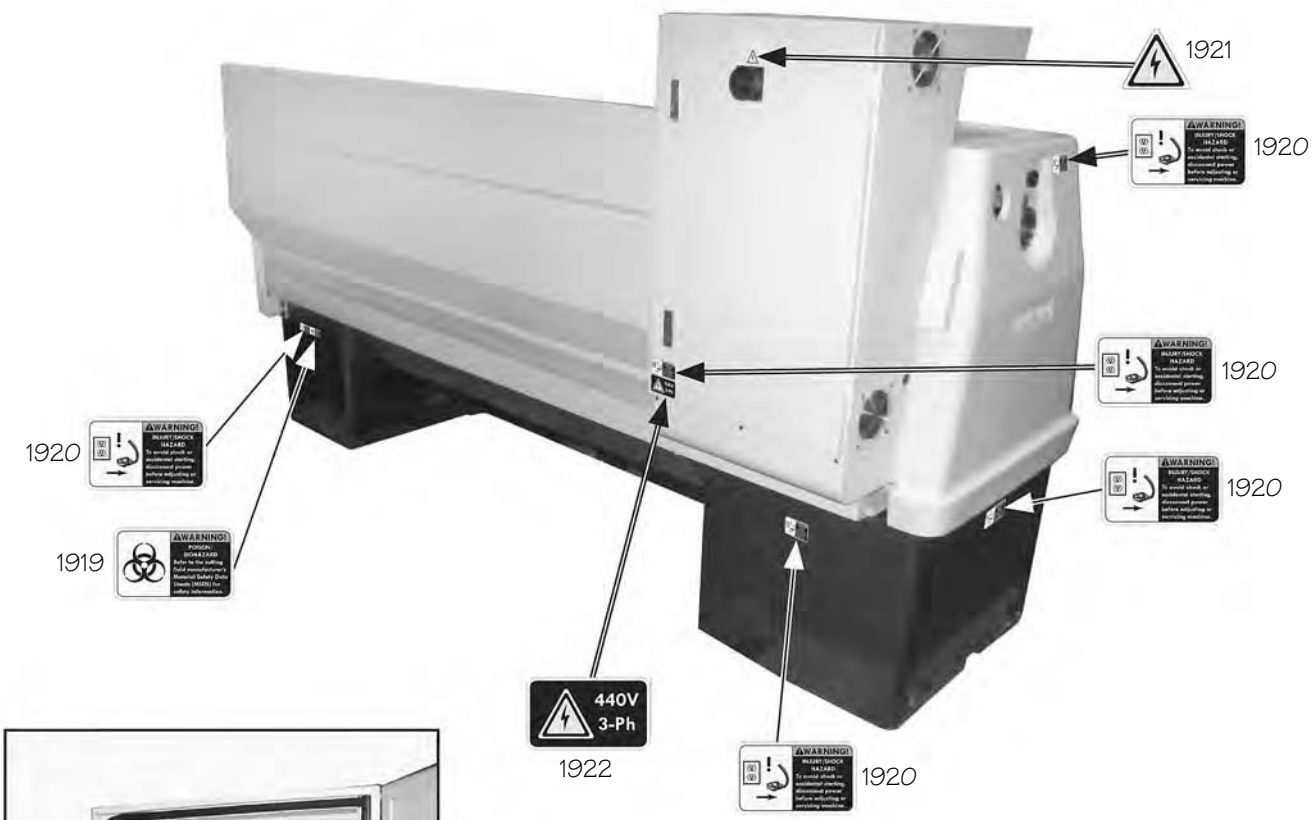
Front Machine Labels

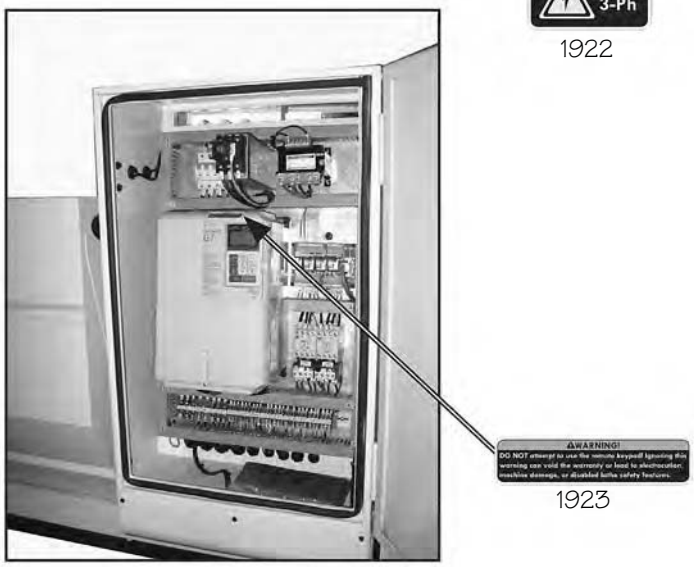


REF	PART #	DESCRIPTION
1901	PSB10161901	MACHINE ID LABEL (SB1016)
1901	PSB10361901	MACHINE ID LABEL (SB1036)
1902	PSB10161902	TRAINED PERSONNEL NOTICE LABEL
1903	PSBLABEL04HS	EYE INJURY LABEL
1904	PSBLABEL08HS	ENTANGLEMENT HAZARD LABEL
1905	PSB10161905	CHUCK KEY HAZARD LABEL
1906	PSBLABEL01HL	READ MANUAL LABEL
1907	PSB10161907	CHANGING SPEEDS LABEL
1908	PSBPAINT01	SB GRAY TOUCH-UP PAINT
1909	PSB10161909	BED CONSTRUCTION LABEL
1910	PSBPAINT03	SB DARK BLUE TOUCH-UP PAINT
1911	PSB10161911	TOOLROOM SERIES LABEL
1912	PSBPAINT02	SB LIGHT BLUE TOUCH-UP PAINT

REF	PART #	DESCRIPTION
1913	PSB10161913	SADDLE LOCK BOLT NOTICE LABEL
1914	PSB10161914	DIAL INDICATOR LABEL
1915	PSB10161915	ONE-SHOT OILER LABEL
1916	PSB10161916	SB1016 MODEL NUMBER LABEL
1916	PSB10361916	SB1036 MODEL NUMBER LABEL
1917	SB1322	SOUTH BEND NAMEPLATE
1918	PSB10161918	TURN-NADO LABEL
1919	PSBLABEL06VS	BIOHAZARD LABEL
1920	PSBLABEL02HS	INJURY/SHOCK HAZARD LABEL
1921	PSBLABEL15L	ELECTRICITY LABEL
1922	PSB10161922	220V 3PH LABEL (SB1016)
1922	PSB10361922	440V 3PH LABEL (SB1036)
1923	PSB10161923	INVERTER WARNING LABEL

Rear Machine Labels





⚠WARNING

The safety labels provided with your machine are used to make the operator aware of the machine hazards and ways to prevent injury. The owner of this machine MUST maintain the original location and readability of these safety labels. If any label is removed or becomes unreadable, REPLACE that label before using the machine again. Contact South Bend Lathe Co. at (360) 734-1540 or www.southbendlathe.com to order new labels.

Warranty

This quality product is warranted by South Bend Lathe Company to the original buyer for one year 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.

We do not warrant or represent that this machine complies with the provisions of any law, act, code, regulation, or standard of any domestic or foreign government, industry, or authority. In no event shall South Bend's liability under this warranty exceed the original purchase price paid for this machine. Any legal actions brought against South Bend Lathe Company shall be tried in the State of Washington, County of Whatcom.

This is the sole written warranty for this machine. Any and all warranties that may be implied by law, including any merchantability or fitness, for any purpose, are hereby limited to the duration of this warranty. To take advantage of this warranty, contact us by mail or phone to give us the details of the problem you are having.

Thank you for your business and continued support.

South Bend Lathe Co.
P.O. Box 2027
Bellingham, WA 98227

PHONE: (360) 734-1540 (Administrative Offices)
FAX: (360) 676-1075 (International)
FAX: (360) 734-1639 (USA only)

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