Grizzly Industrial, Inc.®

MODEL G0670
16" x 40" HIGH PRECISION EVS LATHE
OWNER'S MANUAL

#CR10520 PRINTED IN USA

⚠ WARNING!

This manual provides critical safety instructions on the proper setup, operation, maintenance and service of this machine/equipment.

Failure to read, understand and follow the instructions given in this manual may result in serious personal injury, including amputation, electrocution or death.

The owner of this machine/equipment is solely responsible for its safe use. This responsibility includes but is not limited to proper installation in a safe environment, personnel training and usage authorization, proper inspection and maintenance, manual availability and comprehension, application of safety devices, blade/cutter integrity, and the usage of personal protective equipment.

The manufacturer will not be held liable for injury or property damage from negligence, improper training, machine modifications or misuse.

⚠ WARNING!

Some dust created by power sanding, sawing, grinding, drilling, and other construction activities contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm. Some examples of these chemicals are:

- **Lead from lead-based paints.**
- **Crystalline silica from bricks, cement and other masonry products.**
- **Arsenic and chromium from chemically-treated lumber.**

Your risk from these exposures varies, depending on how often you do this type of work. To reduce your exposure to these chemicals: Work in a well ventilated area, and work with approved safety equipment, such as those dust masks that are specially designed to filter out microscopic particles.

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INTRODUCTION

Foreword

We are proud to offer the Model G0670 16" X 40" High Precision EVS Lathe. This machine is part of a growing Grizzly family of fine metalworking machinery. When used according to the guidelines set forth in this manual, you can expect years of trouble-free, enjoyable operation and proof of Grizzly's commitment to customer satisfaction.

The specifications, drawings, and photographs illustrated in this manual represent the Model G0670 when the manual was prepared. However, owing to Grizzly's policy of continuous improvement, changes may be made at any time with no obligation on the part of Grizzly. For your convenience, we always keep current Grizzly manuals available on our website at **www.grizzly.com**. Any updates to your machine will be reflected in these manuals as soon as they are complete. Visit our site often to check for the latest updates to this manual!

Contact Info

We stand behind our machines. If you have any service questions, parts requests or general questions about the machine, please call or write us at the location listed below.

Grizzly Industrial, Inc.
1203 Lycoming Mall Circle
Muncy, PA 17756
Phone: (570) 546-9663
Fax: (800) 438-5901
E-Mail: techsupport@grizzly.com

If you have any comments regarding this manual, please write to us at the address below:

Grizzly Industrial, Inc.
C/O Technical Documentation Manager
P.O. Box 2069
Bellingham, WA 98227-2069
Email: manuals@grizzly.com

Functional Overview

The Model G0670 is a 16" X 40" High Precision Electrical Variable Speed Lathe that has a pressurized headstock oiling system. The electrical and mechanical controls allow for complete spindle speed control from 20 to 2500 RPM. Merely shift one lever to high or low range, and then just turn the spindle speed dial to your needed RPM.

This lathe is also equipped with a CSS (Constant Surface Speed) system that gives consistent finishes between surfaces with different diameters. During facing operations, as the tool bit moves toward the center of the workpiece, the spindle speed increases to maintain a constant surface speed during cutting as diameter decreases.

Note: *If the CSS switch is in the OFF position, the cross slide position has no effect on spindle speed. The spindle speed is only adjusted with the spindle speed dial.*

The lathe gearbox has a selection of five levers that control the speed and direction of the leadscrew and feed rod. When when threading or power fed turning operations are selected, the carriage moves left or right, or the cross slide will move in or out.

A feed direction quick change knob on the apron allows for feed direction changes during power fed operations without having to shut the lathe down and shift the feed direction lever on the headstock. A hand-operated oil pump allows for easy carriage lubrication, and for speedy machine shutdown, a foot-pedal brake system is used.

When cutting fluid is required, the built-in coolant pump and delivery nozzle directs the coolant to the point of cut. As cuts are made, the chips fall into the chip catch drawer, which slides out for easy cleaning.

MACHINE DATA SHEET

Customer Service #: (570) 546-9663 · To Order Call: (800) 523-4777 · Fax #: (800) 438-5901

MODEL G0670 16" X 40" ELECTRONIC VARIABLE SPEED LATHE

Product Dimensions:

Weight..... 3080 lbs.
Width (side-to-side) x Depth (front-to-back) x Height..... 82 x 37-3/4 x 57-1/2 in.
Footprint (Length x Width)..... 82 x 20-1/2 in.

Shipping Dimensions:

Type..... Wood Slat Crate
Content..... Machine
Weight..... 3417 lbs.
Length x Width x Height..... 89-1/2 x 44-1/4 x 68-3/4 in.

Electrical:

Power Requirement..... 220V, 3-Phase, 60Hz
Minimum Circuit Size..... 20 amp
Inverter Type..... Yaskawa G7A23P7
Switch..... Magnetic with Thermal Protection
Switch Voltage..... 220V
Cord Length..... 5 ft.
Cord Gauge..... 12 guage
Plug Included..... No

Motors:

Main

Type..... TEFC Induction
Horsepower..... 5 Hp
Voltage..... 220V
Prewired..... 220V
Phase..... Three
Amps..... 14A
Speed..... 3450 RPM
Cycle..... 60 Hz
Number of Speeds..... 1
Power Transfer ..... V-Belt & Gear
Bearings..... Shielded and Permanently Sealed

Lubrication

Type..... TEFC Induction
Horsepower..... 1/4 HP
Voltage..... 220V
Prewired..... 220V
Phase..... Three
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
Prewired	220V
Phase	Three
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	16-1/8 in.
Distance Between Centers	40 in.
Swing Over Cross Slide	10-3/8 in.
Swing Over Saddle	15-3/8 in.
Swing Over Gap	22-15/16 in.
Maximum Tool Bit Size	5/8 in.
Compound Travel	5-1/8 in.
Carriage Travel	40 in.
Cross Slide Travel	8-3/16 in.

Headstock Info

Spindle Bore	2-1/16 in.
Spindle Taper	MT#6
Number of Spindle Speeds	Variable
Spindle Speeds	20 - 2500 RPM
Spindle Type	D1-6 Camlock
Spindle Bearings	Tapered Roller
Spindle Length	24-3/8 in.
Spindle Length with 3-Jaw Chuck	30-1/2 in.
Spindle Length with 4-Jaw Chuck	28-7/8 in.

Tailstock Info

Tailstock Quill Travel	6 in.
Tailstock Taper	MT#4
Tailstock Barrel Diameter	2.047 in.

Threading Info

Number of Longitudinal Feeds	17
Range of Longitudinal Feeds	0.002 - 0.067 in./rev.
Number of Cross Feeds	17
Range of Cross Feeds	Constant Surface Speed & 0.001 - 0.0034 in./rev.
Number of Inch Threads	45
Range of Inch Threads	2 - 72 TPI
Number of Metric Threads	39
Range of Metric Threads	0.2 - 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	10-1/4 in.
Leadscrew Diameter	1-1/8 in.
Leadscrew TPI	4
Leadscrew Length	61-1/2 in.
Steady Rest Capacity	5/16 - 4-5/16 in.
Follow Rest Capacity	5/8 - 3-1/8 in.
Faceplate Size	12 in.
Feed Rod Diameter	3/4 in.
Floor to Center Height	44-1/4 in.
Height With Leveling Jacks	46-3/4 in.

Construction

Base	Cast Iron
Headstock	Cast Iron
Headstock Gears	Flame Hardened Steel
Bed	Induction Hardened Cast Iron
Body	Cast Iron
Stand	Cast Iron
Paint	Urethane

Other Specifications:

Country Of Origin	Taiwan
Warranty	1 Year
Serial Number Location	ID Label on Front of Chip Tray
Assembly Time	2 hrs.

Features:

Dial Controlled, Variable Spindle Speeds w/Digital Read Out
Constant Surface Speed Function
Precision Hardened and Ground Bed V-Ways made of Meehanite Casting
Totally Enclosed Universal Gearbox for Cutting of Inch, Metric, Modular & Diametral Threads
Deep Pull-Out Chip Tray
Pressurized Lubrication System for Headstock Gears & Bearings
Powered Coolant System w/4-3/4 Gallon Tank
Full Length Splash Guard
Halogen Work Light

Accessories Included:

#4 to #6 Morse Taper Spindle Nose Sleeve
10" 4-Jaw Chuck
12" Face Plate
9" 3-Jaw Chuck
Centers, Center Sleeve, Service Tools, Manual, and Toolbox
Dual Inch/Metric Dials
Follow Rest
Jog Button & Emergency Stop
Steady Rest

Identification

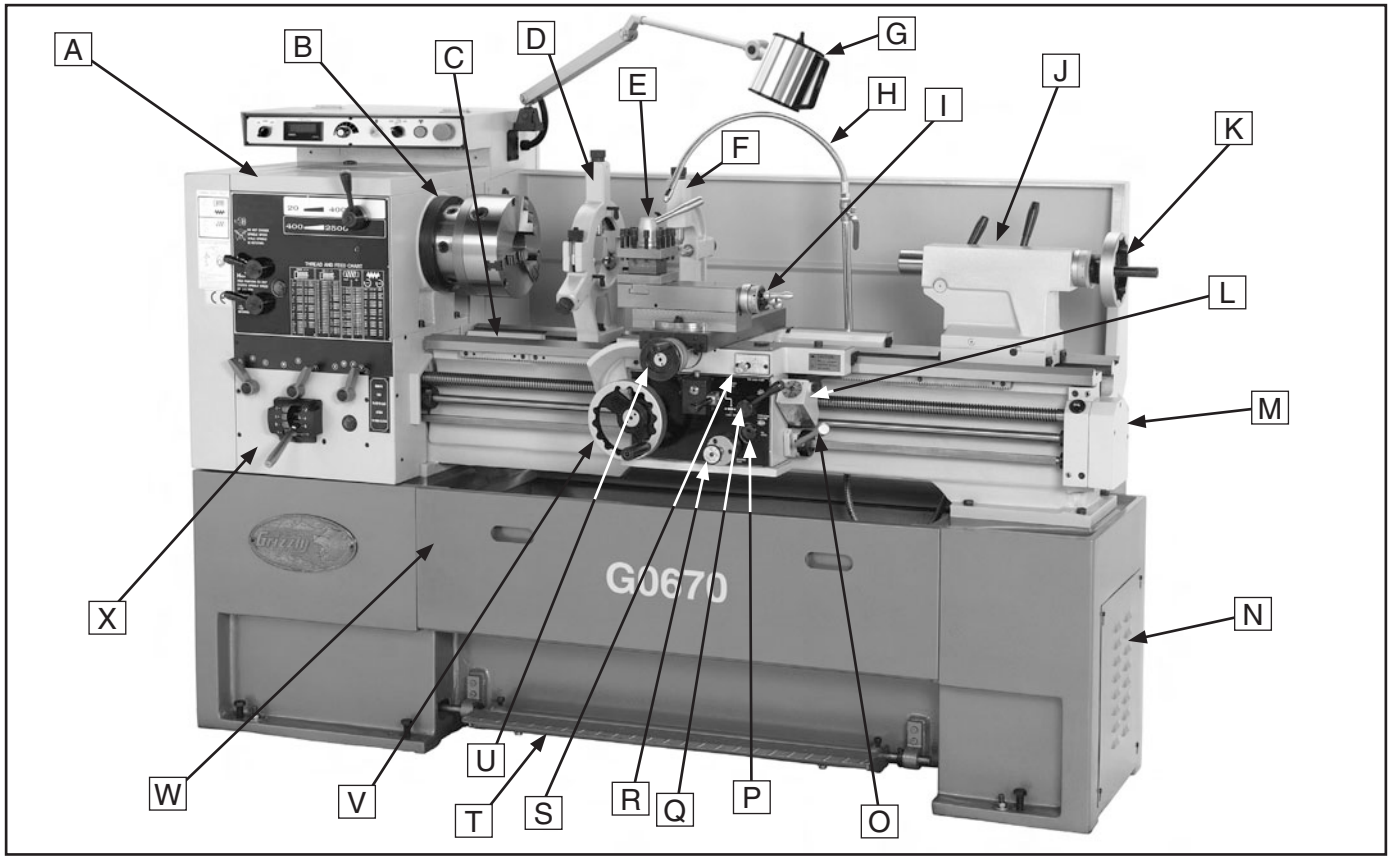


Figure 1. The Model G0670 16" x 40" High Precision EVS Lathe.

A. Headstock
B. D1-6 Camlock MT#6 Spindle
C. Gap Piece
D. Ball Bearing Style Steady Rest
E. 4-Position Tool Holder
F. Follow Rest
G. Work Lamp
H. Universal Cutting Fluid Tube w/Nozzle
I. Compound Handwheel
J. Tailstock
K. Tailstock Handwheel
L. Thread Dial
M. Leadscrew Bearing Housing
N. Cutting Fluid Pump/Reservoir Access Panel
O. Spindle Rotation ON/OFF Lever
P. Apron Oil Level Sight Glass
Q. Half nut Lever
R. Quick Change Apron Feed Direction Knob
S. Manual Oil Pump
T. Brake Pedal
U. Cross Slide Handwheel
V. Apron Handwheel
W. Removable Chip Drawer
X. Quick Change Gearbox

Headstock/Apron Controls

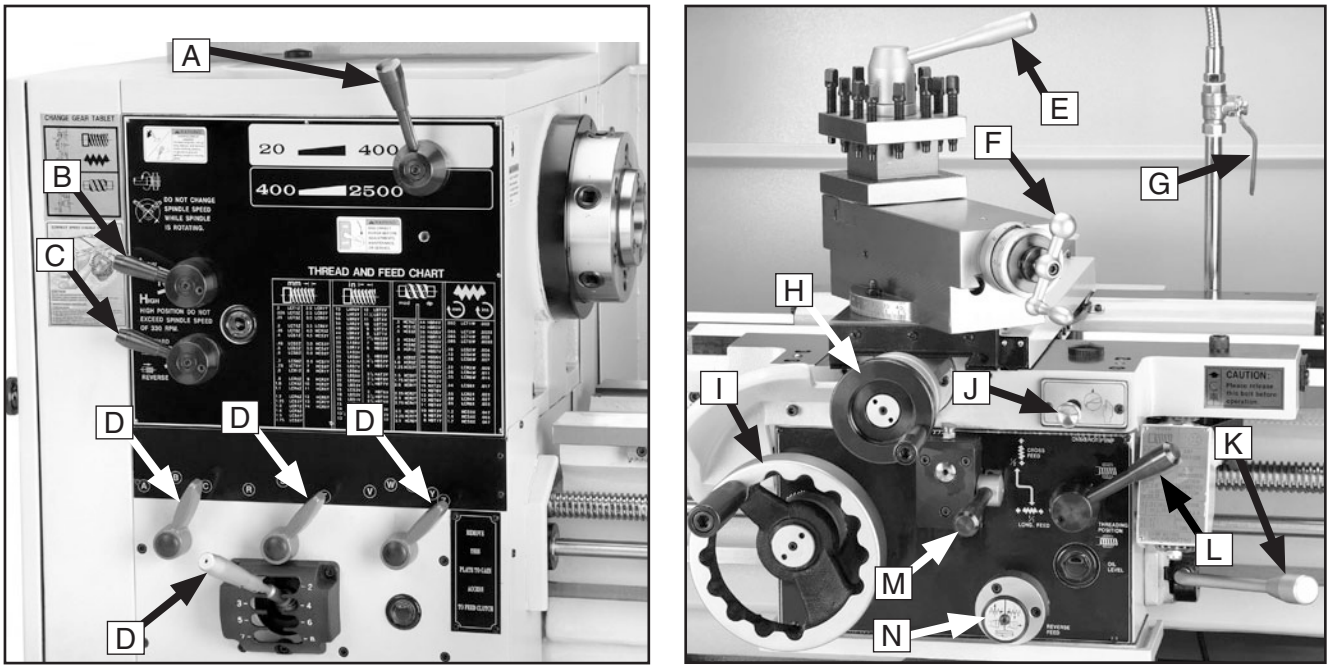


Figure 2. Headstock and gearbox controls.

A. Spindle Range Lever: Shifts the headstock into low or high range for spindle speeds between 20-400 RPM or 400-2500 RPM.

B. Gearbox Range Lever: This lever puts the gearbox in high or low range and has no effect on spindle RPM.

C. Feed Direction Lever: This lever changes the direction that the gearbox is turning at, and as a result the leadscrew and feed rod change direction.

D. Gearbox Levers: Moves the gearbox gears into particular ratios, which then turn the leadscrew and feedrod for threading and power feed operations.

E. 4-Position Tool Post Lever: Used for locking the rotary tool post in four possible detents.

F. Compound Hand Crank: Used to position the compound along the compound slide.

G. Cutting Fluid Flow Control Lever: Used to vary the flow of cutting fluid out of the nozzle.

H. Cross Slide Handwheel: Positions the cross slide in or out. In the CSS mode, the spindle speed is linked with the cross slide position.

I. Longitudinal Carriage Handwheel: Allows for manual movement of the carriage from left to right along the bed.

J. Manual Carriage Oil Pump: Draws oil from the apron case and lubricates the carriage and ways through various oil ports.

K. Spindle ON/OFF Lever: Used to start and stop the lathe during normal operation.

L. Halfnut Lever: Engages and disengages the apron with the leadscrew for threading operations.

M. Feed Control Lever: Engages and disengages the cross feed and longitudinal feed gearing.

N. Feed Direction Knob: Allows for feed direction changes without having to stop the lathe and move the feed direction lever on the headstock.

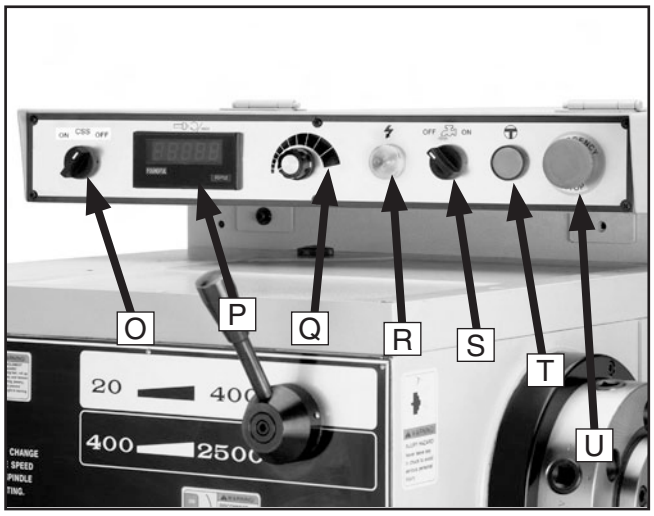


Figure 3. Control panel.

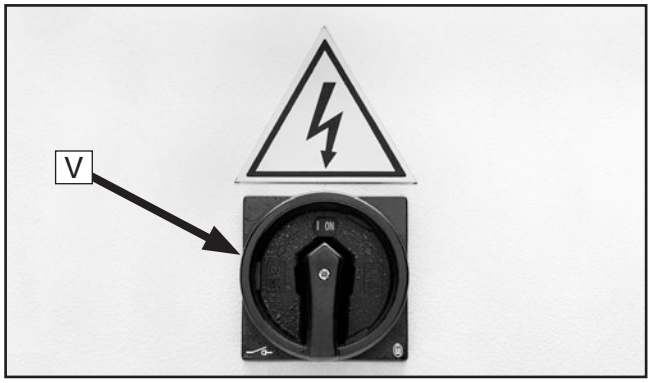


Figure 4. Master power switch.

O. CSS *ON/OFF* SWITCH: Turns the constant surface speed feature ***ON*** or ***OFF***.

P. Tachometer Display: Indicates what RPM the spindle is currently rotating at.

Q. Spindle Speed Dial: Changes the spindle speed to user-defined levels.

R. Power Light: Indicates the lathe is powered-up when illuminated.

S. Cutting Fluid Pump Switch: Turns cutting fluid delivery ***ON/OFF***.

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

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

V. Master Power Switch: Located at the rear of the lathe on the electrical box cover, this switch turns power ***ON/OFF*** to the lathe so lathe operations can begin.

SECTION 1: SAFETY

⚠WARNING

For Your Own Safety, Read Instruction Manual Before Operating this Machine

The purpose of safety symbols is to attract your attention to possible hazardous conditions. This manual uses a series of symbols and signal words intended to convey the level of importance of the safety messages. The progression of symbols is described below. Remember that safety messages by themselves do not eliminate danger and are not a substitute for proper accident prevention measures.

⚠DANGER **Indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.**

⚠WARNING **Indicates a potentially hazardous situation which, if not avoided, COULD result in death or serious injury.**

⚠CAUTION **Indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate injury. It may also be used to alert against unsafe practices.**

NOTICE **This symbol is used to alert the user to useful information about proper operation of the machine.**

⚠WARNING

Safety Instructions for Machinery

1. **READ THE ENTIRE MANUAL BEFORE STARTING MACHINERY.** Machinery presents serious injury hazards to untrained users.
2. **ALWAYS USE ANSI APPROVED SAFETY GLASSES WHEN OPERATING MACHINERY.** Everyday eyeglasses only have impact resistant lenses—they are NOT safety glasses.
3. **ALWAYS WEAR A NIOSH APPROVED RESPIRATOR WHEN OPERATING MACHINERY THAT PRODUCES DUST.** Most types of dust (wood, metal, etc.) can cause severe respiratory illnesses.
4. **ALWAYS USE HEARING PROTECTION WHEN OPERATING MACHINERY.** Machinery noise can cause permanent hearing loss.
5. **WEAR PROPER APPAREL.** DO NOT wear loose clothing, gloves, neckties, rings, or jewelry that can catch in moving parts. Wear protective hair covering to contain long hair and wear non-slip footwear.
6. **NEVER OPERATE MACHINERY WHEN TIRED OR UNDER THE INFLUENCE OF DRUGS OR ALCOHOL.** Be mentally alert at all times when running machinery.

⚠WARNING
Safety Instructions for Machinery

7. **ONLY ALLOW TRAINED AND PROPERLY SUPERVISED PERSONNEL TO OPERATE MACHINERY.** Make sure operation instructions are safe and clearly understood.

8. **KEEP CHILDREN AND VISITORS AWAY.** Keep all children and visitors a safe distance from the work area.

9. **MAKE WORKSHOP CHILDPROOF.** Use padlocks, master switches, and remove start switch keys.

10. **NEVER LEAVE WHEN MACHINE IS RUNNING.** Turn power ***OFF*** and allow all moving parts to come to a complete stop before leaving machine unattended.

11. **DO NOT USE IN DANGEROUS ENVIRONMENTS.** DO NOT use machinery in damp, wet locations, or where any flammable or noxious fumes may exist.

12. **KEEP WORK AREA CLEAN AND WELL LIGHTED.** Clutter and dark shadows may cause accidents.

13. **USE A GROUNDED EXTENSION CORD RATED FOR THE MACHINE AMPERAGE.** Grounded cords minimize shock hazards. Undersized cords create excessive heat. Always replace damaged extension cords.

14. **ALWAYS DISCONNECT FROM POWER SOURCE BEFORE SERVICING MACHINERY**. Make sure switch is in OFF position before reconnecting.

15. **MAINTAIN MACHINERY WITH CARE.** Keep blades sharp and clean for best and safest performance. Follow instructions for lubricating and changing accessories.

16. **MAKE SURE GUARDS ARE IN PLACE AND WORK CORRECTLY BEFORE USING MACHINERY.**

17. **REMOVE ADJUSTING KEYS AND WRENCHES.** Make a habit of checking for keys and adjusting wrenches before turning machinery ***ON***.

18. **CHECK FOR DAMAGED PARTS BEFORE USING MACHINERY.** Check for binding or misaligned parts, broken parts, loose bolts, and any other conditions that may impair machine operation. Repair or replace damaged parts before operation.

19. **USE RECOMMENDED ACCESSORIES.** Refer to the instruction manual for recommended accessories. Improper accessories increase risk of injury.

20. **DO NOT FORCE MACHINERY.** Work at the speed for which the machine or accessory was designed.

21. **SECURE WORKPIECE.** Use clamps or a vise to hold the workpiece when practical. A secured workpiece protects your hands and frees both hands to operate the machine.

22. **DO NOT OVERREACH.** Maintain stability and balance at all times.

23. **MANY MACHINES CAN EJECT WORKPIECES TOWARD OPERATOR.** Know and avoid conditions that cause the workpiece to "kickback."

24. **ALWAYS LOCK MOBILE BASES (IF USED) BEFORE OPERATING MACHINERY**.

25. **CERTAIN DUST MAY BE HAZARDOUS** to the respiratory systems of people and animals, especially fine dust. Be aware of the type of dust you are exposed to and always wear a respirator designed to filter that type of dust.

⚠WARNING
Additional Safety for Metal Lathes

1. **READ AND UNDERSTAND THIS MANUAL BEFORE OPERATING THIS MACHINE. YOUR SAFETY AND THE PROPER USE OF THIS MACHINE IS YOUR RESPONSIBILITY.**

2. **CLEARING CHIPS.** Do not clear chips by hand or while the lathe is operating.

3. **CHUCK KEY SAFETY.** Always remove chuck key. Never walk away from the lathe with the key in the chuck.

4. **TOOL SELECTION.** Always select the right cutter for the job, and make sure they are sharp. The right tool decreases strain on the lathe components and provides a better finish.

5. **SECURING THE WORKPIECE.** Make sure workpiece is properly held in the chuck before starting lathe. A workpiece thrown from the chuck may cause severe injury to yourself or others.

6. **CHANGING GEARS.** Turn the lathe ***OFF*** before changing speeds. The spindle must be brought to a complete stop before changing gears.

7. **SUPPORT LONG STOCK.** Stock extending beyond the headstock MUST be supported. Unsupported stock will begin to whip and cause serious injury to operator/bystanders and cause damage to the lathe. Always turn supported long stock at slow RPM's.

8. **PINCH HAZARDS.** Protect your hands and the ways by always using a chuck cradle or piece of plywood over the ways of the lathe when removing/installing chucks.

9. **LATHE MAINTENANCE.** Never operate the lathe with damaged or worn parts. Maintain your lathe in proper working condition. Perform routine inspections and maintenance promptly when needed. Put away adjustment tools after use.

10. **SAFETY CLEARANCES.** Make sure workpiece has adequate clearance before starting machine. Check tool and tool post clearance, chuck clearance, and saddle clearance before starting the lathe.

11. **RATES.** Always use the appropriate feed and speed rates, and select the turning speed appropriate for the type of work, material, and tool bit. Allow the lathe to gain full speed before beginning a cut.

12. **STOPPING LATHE.** Never attempt to slow or stop the lathe chuck by using your hand.

13. **ATTENDANCE.** Never walk away from the lathe while it is running. An unsupervised lathe that is running invites accidents.

14. **ENTANGLEMENT HAZARDS.** Tie back long hair, loose clothing, and remove jewelry and gloves to reduce the risk of entanglement with moving parts.

15. **AUTOMATIC FEEDS.** Release any automatic feeds after completing a job.

16. **MOTOR DIRECTION.** Never reverse motor direction while the lathe is in motion.

17. **GUARDS.** Make sure all guards are in place and working properly before starting the lathe.

18. **TOOL POST CLEARANCE.** Adjust tool post to provide proper support for the installed turning tool. Test tool post clearance by rotating workpiece by hand before turning lathe ***ON***.

19. **CRASHES.** Make sure no part of the tool, tool holder, compound, cross slide, or carriage will contact the chuck during operation.

Glossary of Terms

The following is a list of common definitions, terms and phrases used throughout this manual as they relate to this lathe and metalworking in general. Become familiar with these terms for assembling, adjusting or operating this machine. Your safety is VERY important to us at Grizzly!

Arbor: A machine shaft that supports a cutting tool.

Backlash: Space between threads in a leadscrew and half nut, or between gear teeth, that may result in excessive lever or handwheel free-play or loose or noisy gear train operation, and loss of tolerances.

Collet: A conical shaped split-sleeve bushing that holds round or rectangular tool or workpieces by their outside diameter.

CSS: Constant surface speed feature automatically increases spindle RPM to compensate for loss in workpiece diameter. As a result, a constant surface speed is maintained for an even finish and greater tool life.

Cross Slide: A fixture attached to the lathe carriage that holds the compound and can be moved in and out.

Cutting Speed: The distance a point on a cutter moves in one minute, expressed in meters or feet per minute.

Dial Indicator: An instrument used in setup and inspection work that shows on the amount of error in size or alignment of a part.

Facing: In lathe work, cutting across the end of a workpiece, usually to machine a flat surface.

Feed: The movement of a cutting tool into a workpiece.

EVS: Electronic Variable Speed. A set of electrical controls that allow the operator to select any spindle speed by using an electronic dial. Speeds are not changed by levers and gears.

Gib: A tapered wedge or piece of metal located along a sliding member that can be adjusted to remove excessive play resulting from wear.

Headstock: The major lathe component that houses the spindle and motor drive system.

Lathe Center: A lathe accessory with a 60° point which is inserted into the headstock or tailstock of the lathe and is used to support the workpiece.

Leadscrew: The long screw that is driven by the gearbox that moves the carriage for threading operations.

Spindle: The rotating shaft that holds and drives the workpiece or cutting tool.

Tailstock: A movable housing opposite from the chuck that is used to support the end of a workpiece.

Tool Post: The part of the compound that holds the tool holder.

Turret: A machine fixture that holds multiple tools and can be revolved and indexed to position.

Ways: The precision machined and flat tracks on a lathe on which the carriage and tailstock slide.

SECTION 2: CIRCUIT REQUIREMENTS

220V 3-Phase Operation

⚠WARNING

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

⚠WARNING

Electrocution or fire could result if machine is not grounded and installed in compliance with electrical codes. Compliance MUST be verified by a qualified electrician!

Full Load Amperage Draw

All Motors Combined..... 14 Amps

Power Supply Circuit Requirements

You MUST connect your machine to a grounded circuit that is rated for the amperage given below. Never replace a circuit breaker on an existing circuit with one of higher amperage without consulting a qualified electrician to ensure compliance with wiring codes. **If you are unsure about the wiring codes in your area or you plan to connect your machine to a shared circuit, consult a qualified electrician.**

Minimum Circuit.....20 Amp

Power Connection Device

The power connection device depends on the type of installed or planned service. We recommend using one of the devices shown in **Figure 5**, depending on the voltage being used.

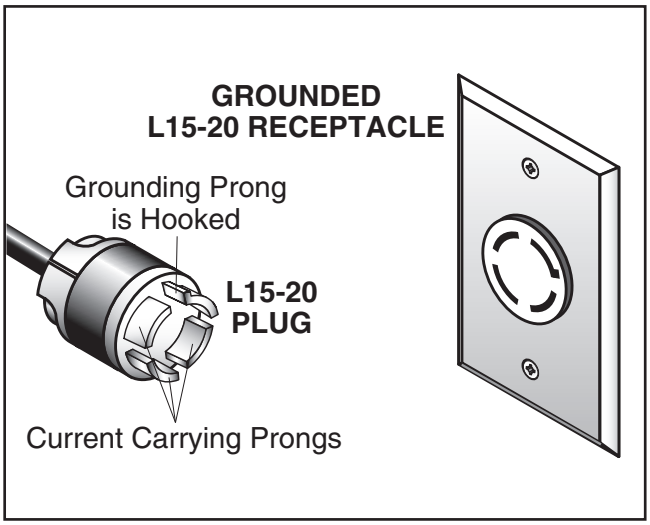


Figure 5. L15-20 Plug & Outlet for 220V, 3-Phase

Extension Cords (220V Only)

Using extension cords may reduce the life of the motor. Instead, place the machine near a power source. If you must use an extension cord:

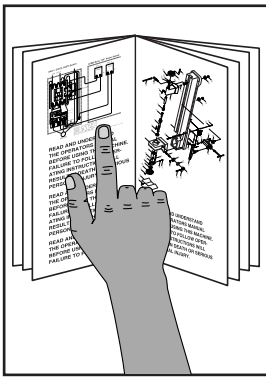
- Use at least a 12 gauge cord that does not exceed 50 feet in length, and ensure that the extension cord contains a ground wire and plug pin.

Phase Converter

If your lathe is connected to a phase converter for 3-phase power, the power from the manufactured power leg (sometimes called the wild wire or manufactured leg) can fluctuate. Connect the "Wild Wire" or the "Manufactured Leg" from the phase converter to the lathe input lead L2. Otherwise, your lathe may not start properly, and magnetic switch chatter and transformer damage will occur.

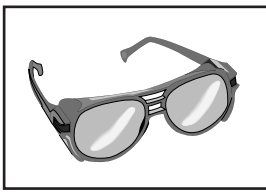
SECTION 3: SETUP

Setup Safety



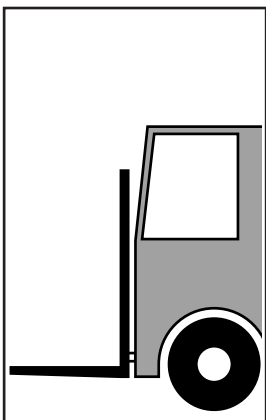
⚠WARNING

This machine presents serious injury hazards to untrained users. Read through this entire manual to become familiar with the controls and operations before starting the machine!



⚠WARNING

Wear safety glasses during the entire setup process!



⚠WARNING

The Model G0670 is an extremely heavy machine. Serious personal injury may occur if safe moving methods are not followed. To be safe, get assistance and use power equipment when disassembling the crate and moving the machine.

Items Needed for Setup

The following items may be needed to complete the setup process, but are not included with your machine:

Description	Qty
• Forklift or Crane (5000 lb capacity)	1
• Lifting Straps (5000 lb. capacity each)	2
• Safety Glasses (for each person)	1
• Helper for Moving	1
• Solvent for Cleaning	1
• Shop Rags for Cleaning	1

Unpacking

The Model G0670 was carefully packed when it left our warehouse. If you discover the machine is damaged after you have signed for delivery, *please immediately call Customer Service at (570) 546-9663 for advice.*

Save the containers and all packing materials for possible inspection by the carrier or its agent. *Otherwise, filing a freight claim can be difficult.*

When you are completely satisfied with the condition of your shipment, you should inventory the contents.

Inventory

In the event that any nonproprietary parts are missing (e.g. a nut or a washer), we would be glad to replace them, or for the sake of expediency, replacements can be obtained at your local hardware store.

After you have inspected your lathe and all the parts have been removed from the crate, you should have the following items:

Major Inventory 1: (Figure 6) **Qty**

A. Steady Rest Assembly 1
B. 12" Faceplate w/D1-6 Camlock Stud Set ... 1
C. Follow Rest Assembly 1
D. Four-Jaw Chuck Wrench 1
E. 10" Four-Jaw Chuck w/Combo Jaws..... 1
F. Four-Jaw Chuck D1-6 Camlock Stud Set... 1

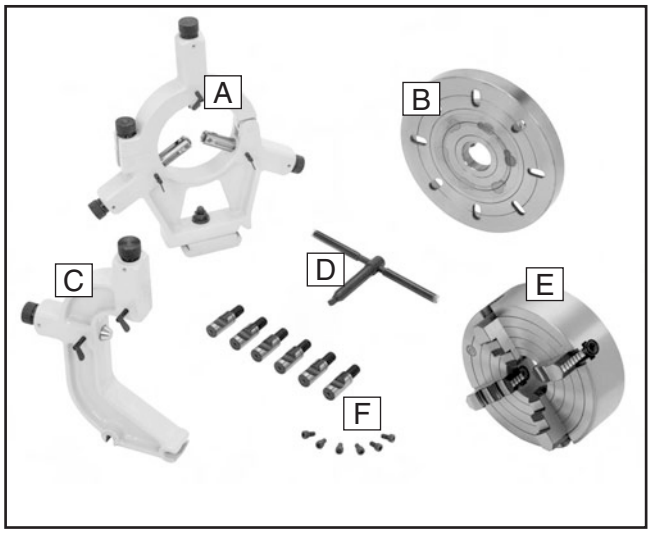


Figure 6. Pallet item inventory.

NOTICE

Some hardware/fasteners on the inventory list may arrive pre-installed on the machine. Check these locations before assuming that any items from the inventory list are missing.

Tool Box Inventory: (Figure 7) **Qty**

G. Tool Box..... 1
H. Three-Jaw Chuck Wrench..... 1
I. Tool Post T-Wrench 1
J. MT#6 to #4 Tapered Spindle Sleeve 1
K. Hex Wrench Set 1.5-10mm 1
L. Cast Iron Feet..... 6
M. MT#4 Standard Dead Center 1
N. MT#4 Carbide Tip Dead Center 1
O. #2 Standard Screw Driver 1
P. #2 Phillips Screw Driver 1
Q. Open End Wrench 10/12mm 1
R. Open End Wrench 14/17mm 1
S. Open End Wrench 22/24mm..... 1
T. 9" Chuck Jaws..... 3
Note: *Chuck jaws are shiped inside of main lathe electrical box.*

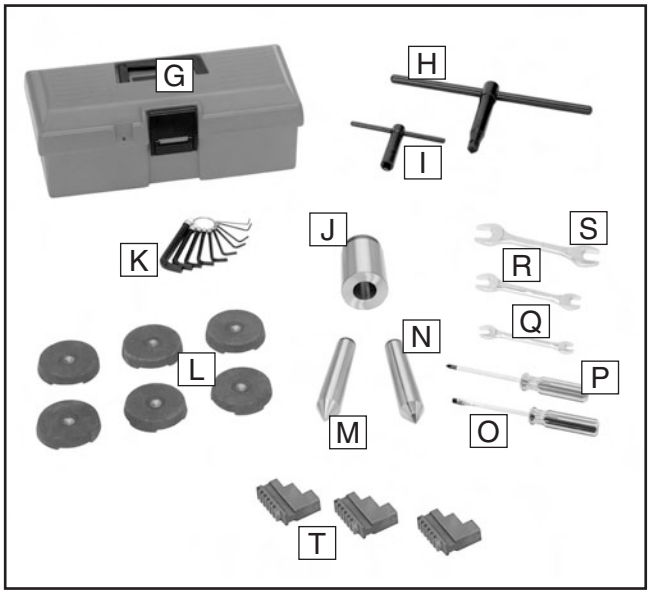


Figure 7. Tool Box Inventory.

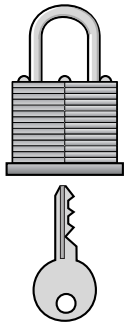
Site Considerations

Floor Load

Refer to the **Machine Data Sheet** for the weight and footprint specifications of your machine. Some floors may require additional reinforcement to support both the machine and operator.

Working Clearances

Consider existing and anticipated needs, size of material to be processed through each machine, and space for auxiliary stands, work tables or other machinery when establishing a location for your new machine. See **Figure 8** for the minimum working clearances.



⚠CAUTION

Children and visitors may be seriously injured if unsupervised around this machine. Lock entrances to the shop or disable start switch or power connection to prevent unsupervised use.

Clean Up

The unpainted surfaces are coated with a waxy oil to prevent corrosion during shipment. Remove this protective coating with a solvent cleaner or degreaser. Avoid chlorine-based solvents, such as acetone or brake parts cleaner that may damage painted surfaces. Follow the manufacturer's instructions when using any cleaning product.

⚠WARNING

Gasoline and petroleum products have low flash points and can explode or cause fire if used to clean machinery. DO NOT use these products to clean the machinery.

⚠CAUTION

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

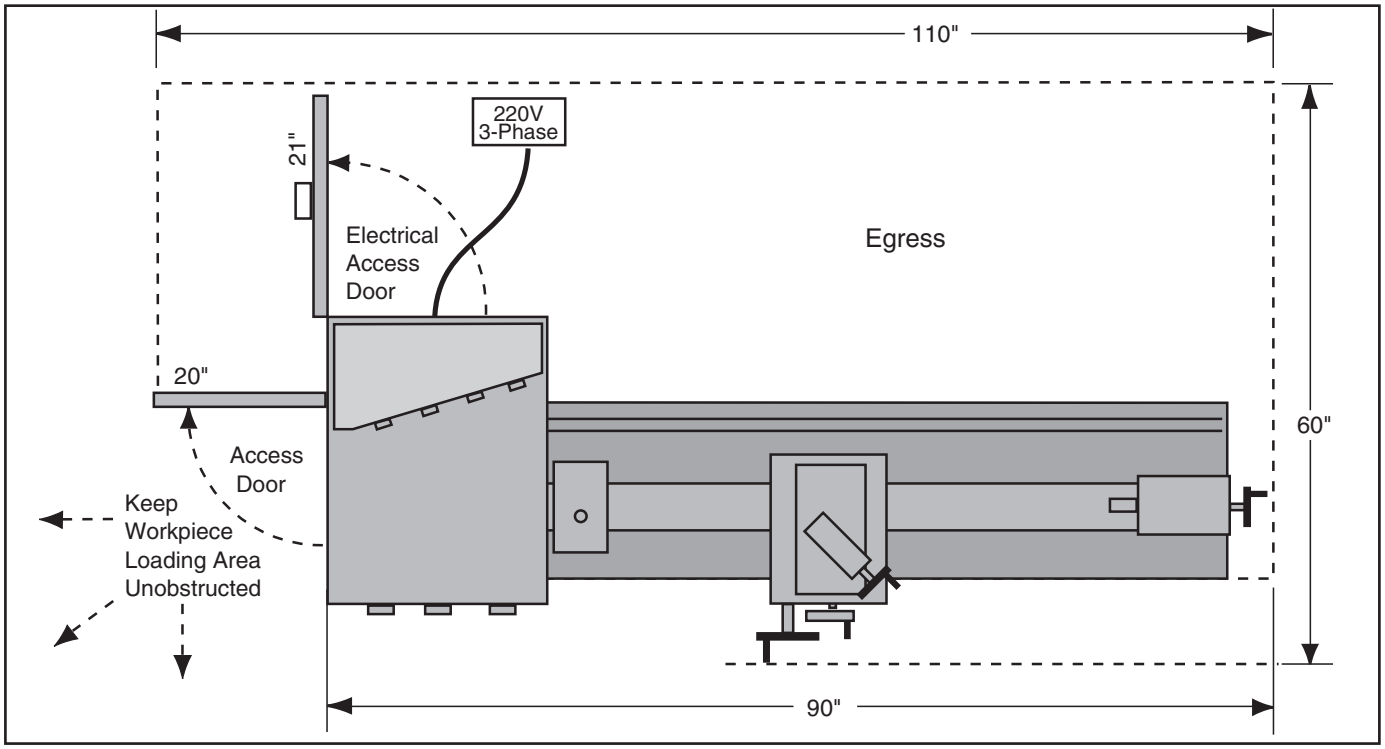
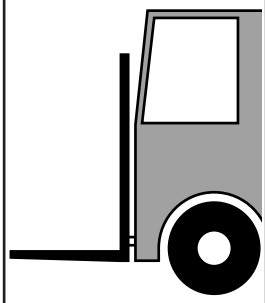


Figure 8. Minimum working clearances.

Lifting & Moving the Lathe



⚠WARNING

This lathe is an extremely heavy machine. Serious personal injury or death may occur if safe lifting and moving methods are not followed. Get assistance from a professional rigger if you are unsure about your abilities or maximum load ratings of your lifting equipment.

This lathe must be placed on the included leveling studs and cast-iron feet (**Figure 9**). Complete support at each of the six leveling stud locations is mandatory. The bed cannot be twisted or bent, and the ways must be perfectly level with the floor. If a misalignment condition arises, adjust the leveling studs, or shim the cast iron feet where they touch the floor until the bed and ways are in alignment. Wait 24 hours and then recheck the alignment, adjust or shim as required. Recheck the alignment again in one week.

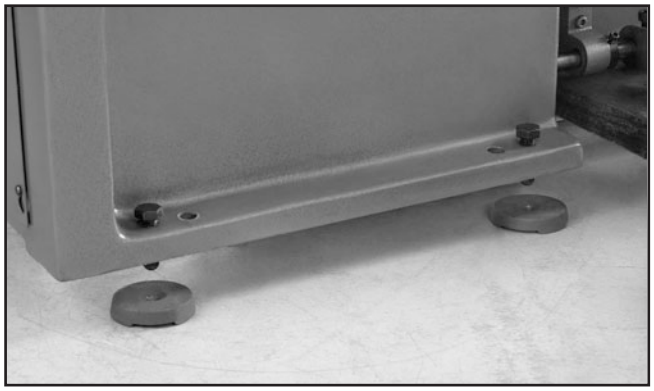


Figure 9. Leveling feet and screws.

Do not attempt to lift or move this lathe if you are unsure how to safely do so. Get assistance from a professional rigger if required. Before lifting, you must move the carriage and tailstock to the extreme right and lock into place to provide a counter-balance.

Double check weight ratings and connections of the lifting system, cables, chains pins, and clevis links before lifting and moving the lathe.

Make sure the forklift forks are positioned as shown in **Figure 10**. Since the lathe is top heavy, use additional straps or chains as required to prevent the lathe from rolling off of the forks if a bump is encountered during forklift operation.

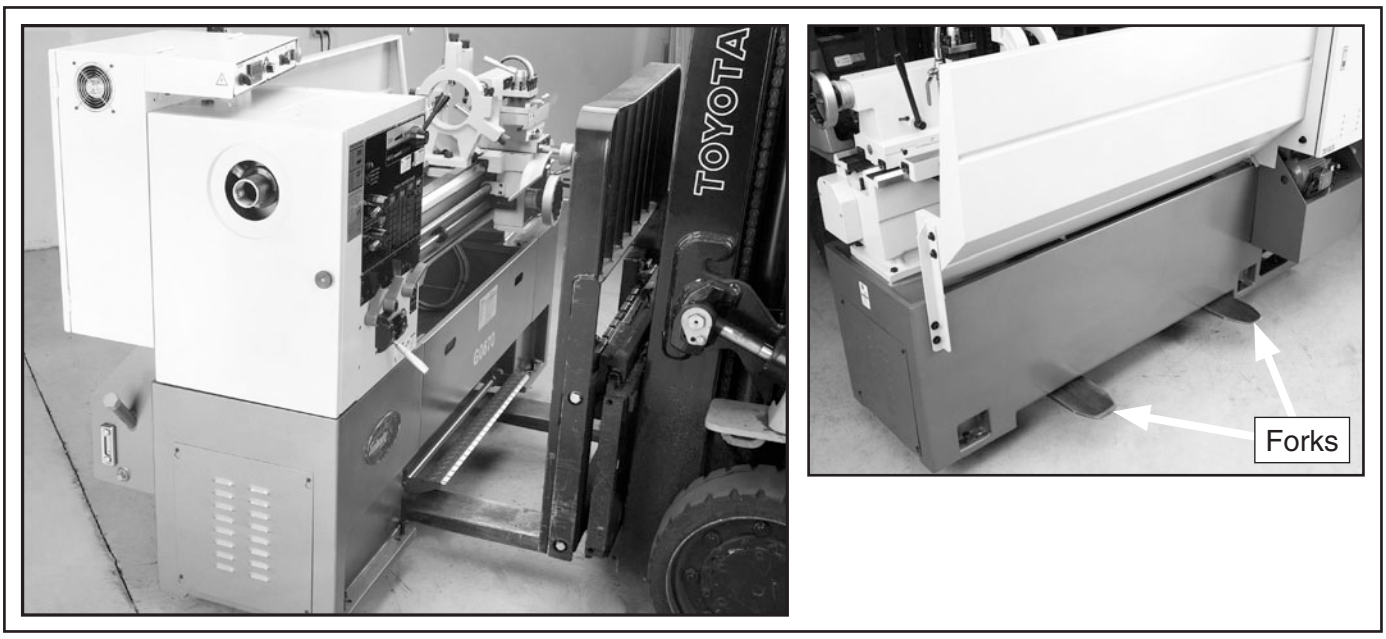


Figure 10. Lifting locations for the G0670 lathe.

Test Run

NOTICE

This lathe is shipped without oil. Fill all gearboxes to the correct level, and oil the ways and all lubrication points before starting lathe. Ignoring this notice will result in lathe damage and void warranty!

Once you have read this manual and taken all safety precautions, you are ready to complete this test run. If, during the test run, you cannot easily locate the source of an unusual noise or vibration, stop running the machine immediately, and refer **Troubleshooting** on **Page 59** for a solution.

If you still cannot remedy a problem, contact our Tech Support at (570) 546-9663 for assistance.

To test run the lathe:

1. DISCONNECT THE LATHE FROM POWER!

2. Make sure that the headstock oil tank, gearbox, apron, and lead screw reservoir oil levels are full. Refer to **Lubrication** in the **MAINTENANCE** section on **Page 53** of this manual for details.

3. Make sure that the chuck and jaws are secure (refer to **Chuck and Faceplate Mounting** on **Page 25**).

4. Turn the pump switch (**Figure 11**) to the ***OFF*** position, fill the cutting fluid reservoir (refer to **Cutting Fluid System** on **Page 58**), and point the fluid nozzle into the chip pan.

5. Turn the CSS ON/OFF switch to ***ON***, turn the spindle speed dial (**Figure 11**) to its minimum speed, and make sure the cross slide is backed out to avoid possibility of a high-speed start.

Note: *With the CSS switch in the ON position the spindle speed varies with the cross slide position. With the switch in the OFF position, the spindle speed is independent of the cross slide position. Do not switch between modes when the lathe is operating.*

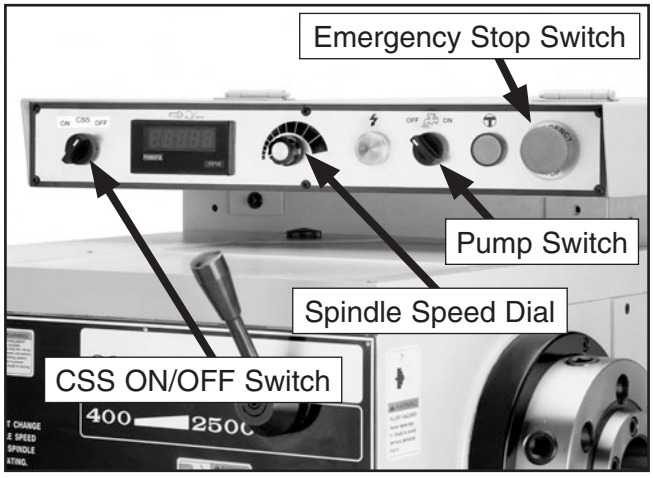


Figure 11. Control panel.

6. Rock the chuck back and forth by hand and move the headstock range lever (**Figure 12**) to the left so the headstock is in low range (20-400 RPM).

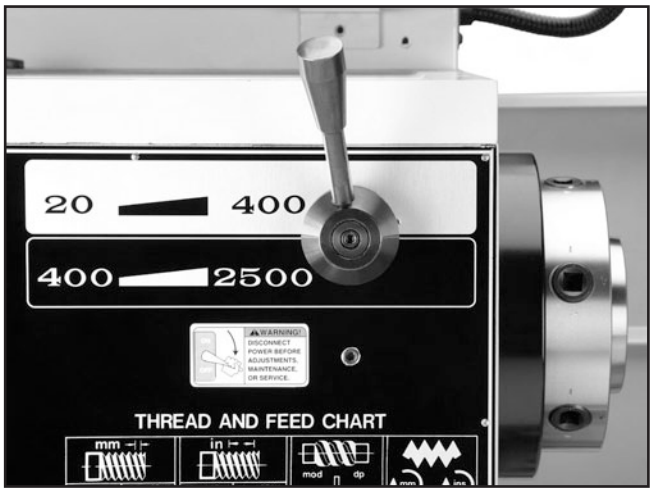


Figure 12. Headstock range lever.

7. Move the Gearbox range lever to neutral as shown in **Figure 13**.

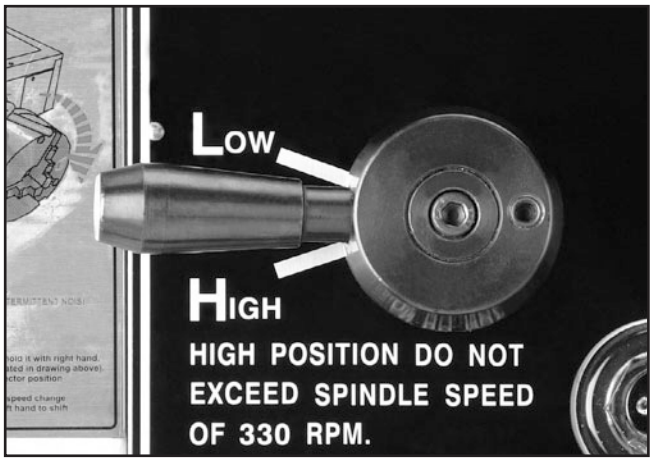


Figure 13. Gearbox range lever.

8. Move the feed direction forward/reverse lever to neutral as shown in **Figure 14**.

Figure 14. Feed forward/reverse lever.

9. To disengage the apron, position the half nut and the power feed levers as shown in **Figure 15**.

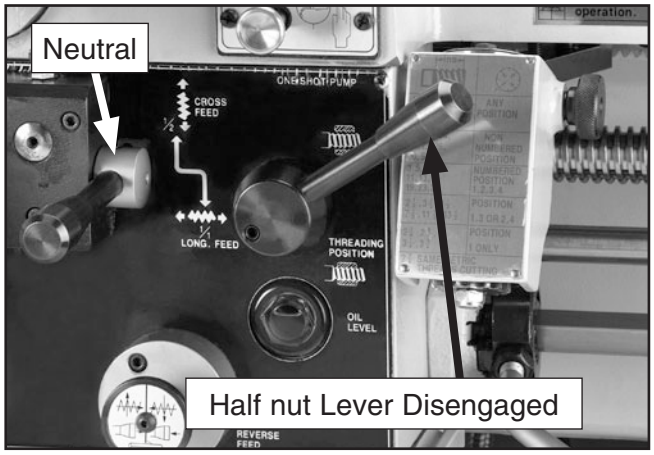


Figure 15. Apron disengaged.

10. Using a 10mm hex wrench, loosen the carriage lock (**Figure 16**) so the carriage is free to slide.

Figure 16. Carriage lock.

11. Move the spindle **ON/OFF** lever to the ***OFF*** position as shown in **Figure 17**.

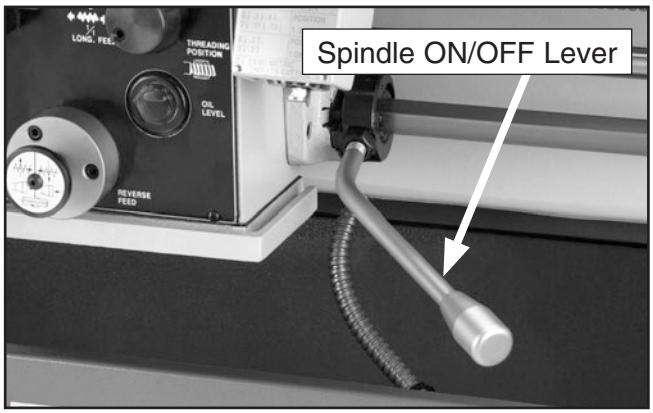


Figure 17. Spindle ON/OFF lever.

12. Connect the lathe to power, and at the rear of the headstock, turn the master power switch to the **ON** position (**Figure 18**).

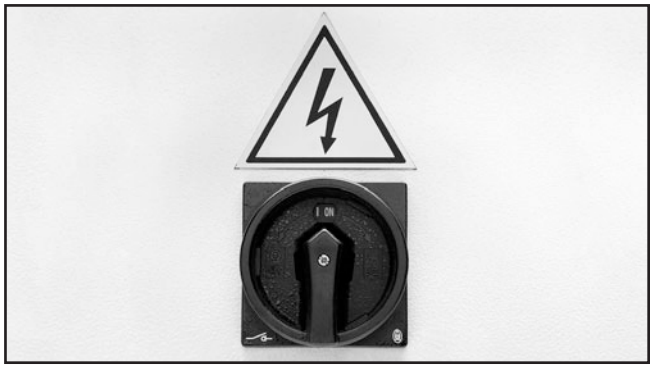


Figure 18. Master power switch in ON position.

13. Rotate the red EMERGENCY stop switch knob (**Figure 11**) clockwise until it pops out and the pump will turn on. Observe the oil pump tube sight glass (**Figure 19**). When oil flows out of the tube and against the sight glass, you can start the lathe.

—If oil is not flowing, disconnect the lathe from power and swap any two of the incoming power leads L1 or L2. Resume the test run after you see oil being pumped.

Note: *This headstock has a pressurized oil system that is equipped with an oil pressure safety switch. If oil stops flowing, the lathe will shut down automatically and not restart until the oil system failure is corrected. Never bypass this safety system or headstock damage may occur.*

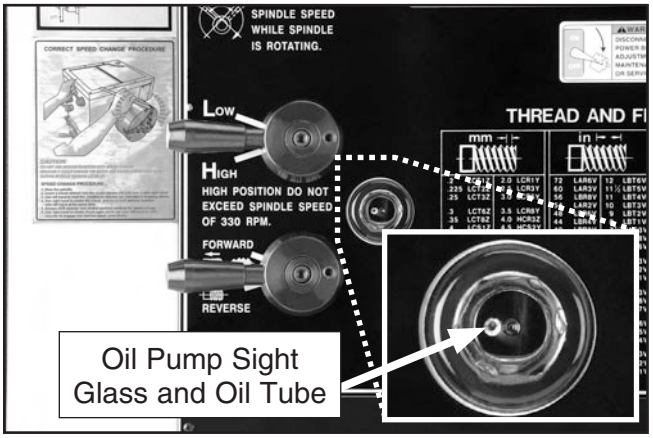


Figure 19. Oil pump sight glass and oil tube.

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 20**) down and the chuck will rotate.

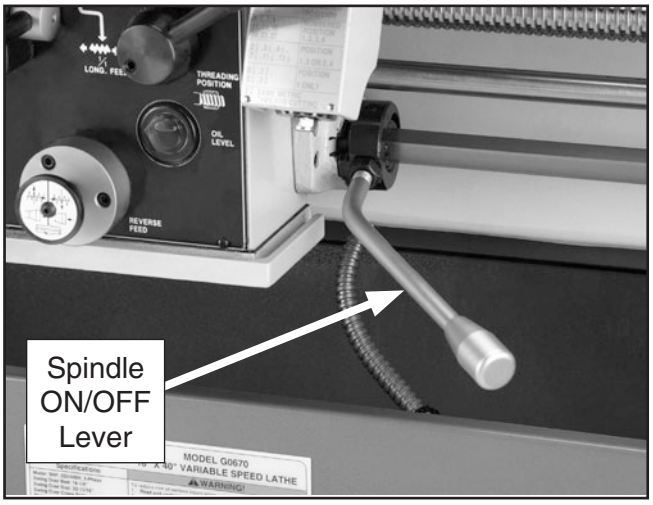


Figure 20. Spindle ON/OFF Lever.

16. Observe and listen for any abnormal noises or vibration. The lathe should run smoothly with little or no vibration or rubbing noises.

17. Push the foot brake, and the lathe should come to a quick stop.

—If the brake pedal has no effect on the lathe, shut the lathe down and refer **V-Belts** and **Brake and Switch** on **Page 66** and make the required adjustments.

18. Open the lathe headstock side cover approximately 1-inch so the door safety limit switch opens and disables the lathe from starting

19. Attempt to start the lathe. Should the lathe start, the safety limit switch is faulty and needs replacement.

20. Close the door and start the lathe again, and push the EMERGENCY STOP switch and the lathe should stop.

21. Turn the cutting fluid pump on, and fluid should flow from the nozzle.

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

Spindle Break-in

NOTICE

THIS LATHE IS SHIPPED WITHOUT OIL! Complete all Lubrication procedures outlined in the MAINTENANCE section on Page 53. Failure to follow all lubrication and beak-in procedures will cause rapid deterioration of bearings and other related parts and void your machine warranty.

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 break-in the spindle:

1. Complete the **Test Run** procedure beginning on **Page 19**.

2. Turn the CSS ON/OFF dial to ***OFF*** and the spindle speed dial to the minimum speed.

3. Move the gearbox range lever (**Figure 21**) to low range.

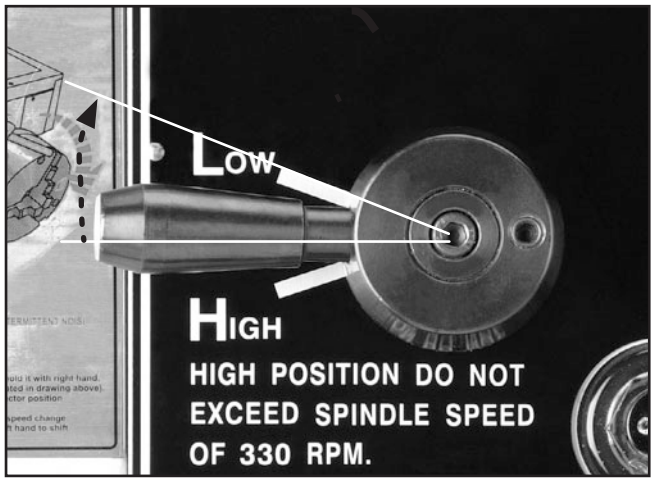


Figure 21. Gearbox range lever.

4. Move the headstock range lever (**Figure 12**) to low range.

5. Move the feed direction forward/reverse lever (**Figure 22**) to FORWARD.

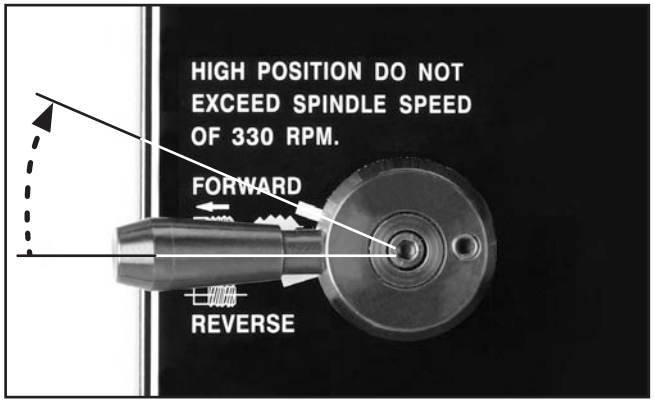


Figure 22. Feed forward/reverse lever.

NOTICE

Do not leave the lathe unattended during the break-in period. Make sure that you keep a close eye on the headstock oil thermometer (Figure 23) on the oil tank. If the headstock oil temperature reaches 160°F shut the lathe down and let the system cool before resuming break-in. Also, if for any reason the oil pump stops pumping, shut the lathe down immediately.

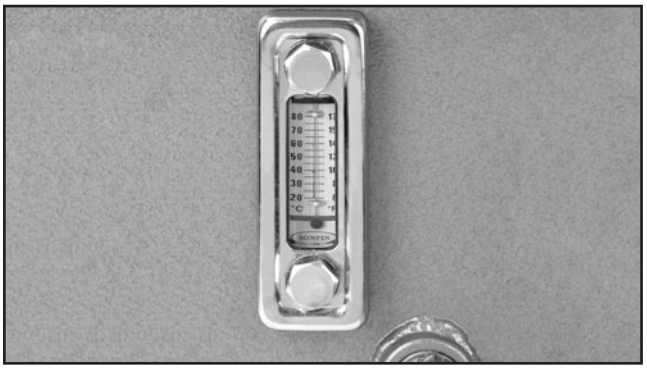


Figure 23. Oil temperature thermometer.

6. Disengage the half nut and the power feed levers shown in **Figure 24**.

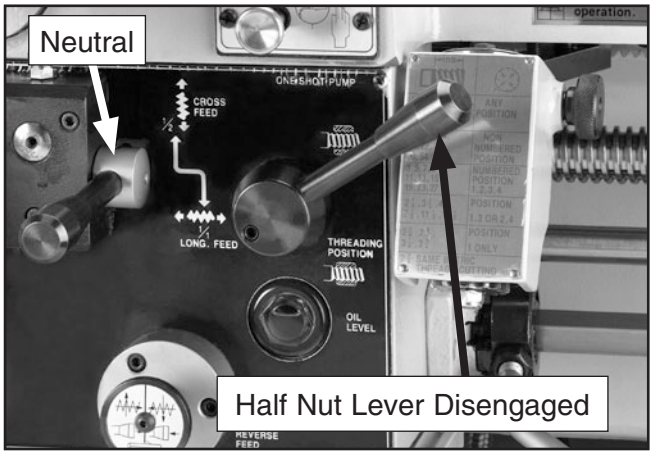


Figure 24. Power feed and half nut levers disengaged.

7. Turn the lathe ***ON,*** and let it run for ten minutes in each speed of 25, 200, and 400 RPM, using the dial to adjust the speed.

8. After completing **Step 7**, stop the lathe and move the gearbox range lever cto neutral, and move the headstock range lever (**Figure 12**) to high.

9. Turn the lathe ***ON*** and let it run at for ten minutes in each speed of 400, 1000, and 2500 RPM.

10. After completing **Step 9**, reduce the spindle speed to 400 RPM and let the lathe run for a final 15 minutes to allow the machine to cool and circulate the oil.

11. Shut the lathe down, replace the headstock and gearbox oil, and re-tension the v-belts.

SECTION 4: OPERATIONS

Operation Safety

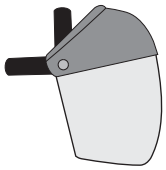
The Model G0670 will perform many types of operations that are beyond the scope of this manual. Many of these operations can be dangerous or deadly if performed incorrectly.

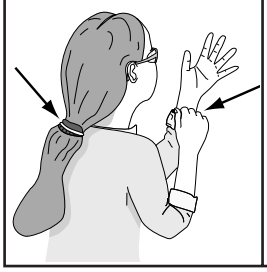
The instructions in this section are written with the understanding that the operator has the necessary knowledge and skills to operate this machine. **If at any time you are experiencing difficulties performing any operation, stop using the machine!**

If you are an inexperienced lathe operator, we strongly recommend that you read books, trade articles, or seek training from an experienced lathe operator before performing any unfamiliar operations. **Above all, your safety must come first!**

⚠WARNING

Damage to your eyes could result from using this machine without proper protective gear. Always wear safety glasses or a face shield when operating this machine.





⚠WARNING

Loose hair and clothing could get caught in machinery and cause serious personal injury. Keep loose clothing and long hair away from moving machinery.

CSS System

This lathe is equipped with a CSS (Constant Surface Speed) system (**Figure 25**) that gives consistent finishes between surfaces with different diameters.

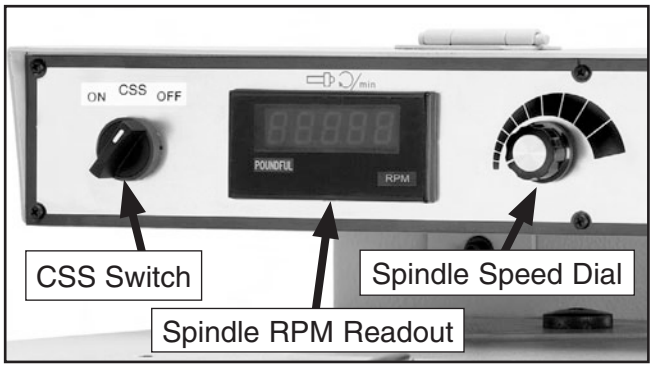


Figure 25. CSS system.

If the CSS switch is in the **ON** position, the spindle speed automatically changes with the position of the cross slide. For example, during facing operations, as the tool bit moves toward the center of the workpiece, the spindle speed increases to maintain a constant surface speed during cutting as diameter decreases. As a result of this automatic spindle speed control, surface finishes are consistent, tooling lasts longer, and fewer workpieces will be lost from mistakes.

Another benefit derived from the CSS feature is that from reduced machine shutdown and less lever shifting cycles, shorter machining time will be achieved which can mean increased productivity.

Note: When the CSS switch is in the **ON** position, the spindle RPM can be adjusted with the spindle speed dial (**Figure 25**).

When the CSS switch is in the **OFF** position, the cross slide position has no effect on spindle speed. The spindle speed is only adjusted with the spindle speed dial.

Camlock Stud Adjustment

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

In order to properly install or adjust one or more camlock studs, you must remove a stud locking cap screw, then thread the camlock stud in or out until the line on the side of the stud is flush with the top of the chuck casting (**Figure 26**). This is an initial adjustment.

When you place the chuck onto the lathe spindle, you may find that one or more camlocks do not fully point between the "**V**" marks on the chuck.

If this is the case, you will have to remove the chuck and fine-tune the camlock stud adjustment. See **Figure 26** for which direction to turn the camlock studs.

Once you have adjusted the camlock studs, install the chuck or faceplate as outlined in "To install chuck or faceplate" on **Page 26**.

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 never be able to be removed since the camlock studs will turn with the camlocks and never release.

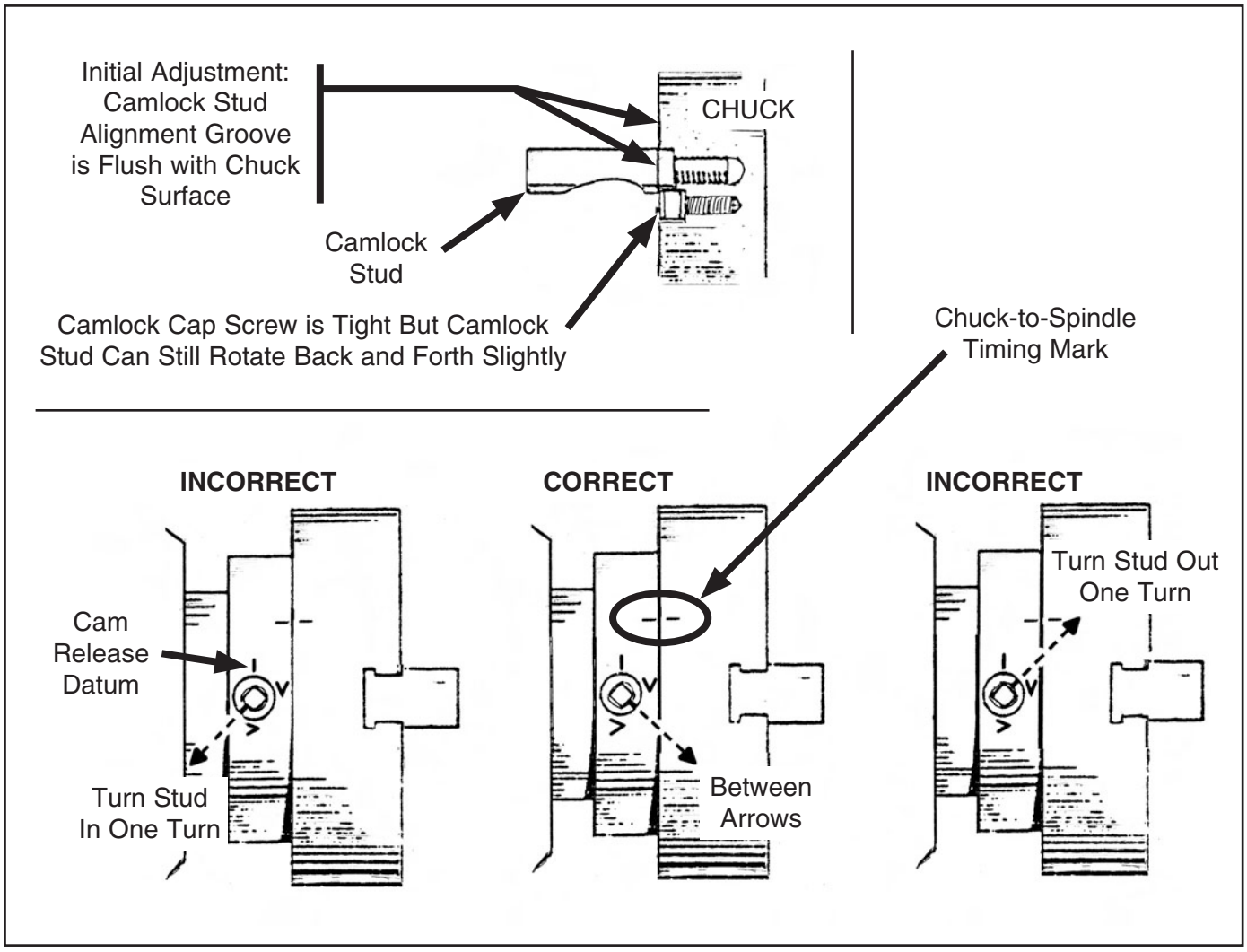


Figure 26. Camlock stud alignment.

Chuck and Faceplate Mounting

The Model G0670 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 4-jaw chuck, on the other hand, features independent jaws, which is used for square or unevenly-shaped stock.

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 such as castings.

The chucks and faceplate have a D-6 Camlock mount. Please note that there are lines stamped into the cam and on the chuck body. A chuck key is used to turn the locking cams (**Figure 28**) to secure/release the chuck/faceplate.

⚠WARNING

The chuck is heavy and is awkward to handle. Always protect the ways when removing or installing a chuck, and make sure that you make a support cradle (**Figure 27**)**, lifting hoist, or that you have an assistant when installing or removing chucks. Ignoring this warning may lead to a severe crushing or amputation injury!**

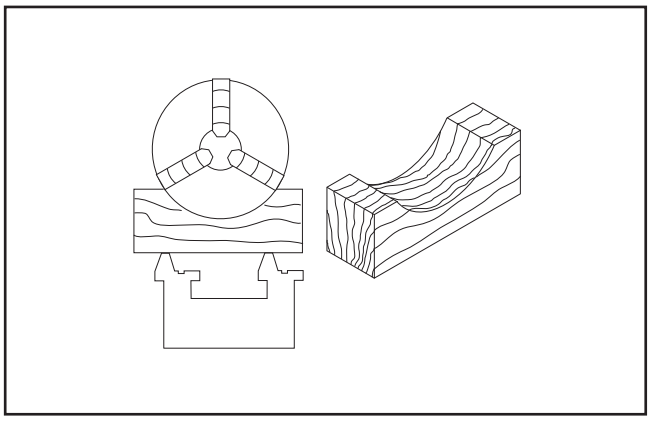


Figure 27. Wooden chuck support cradle.

To remove a chuck or faceplate:

1. DISCONNECT LATHE FROM POWER!

2. Place a piece of plywood across the lathe ways to protect the ways, or use a support cradle and position it just under the chuck.

3. Turn a cam with the chuck key until the cam line aligns with the cam release datum line shown in **Figure 28.**

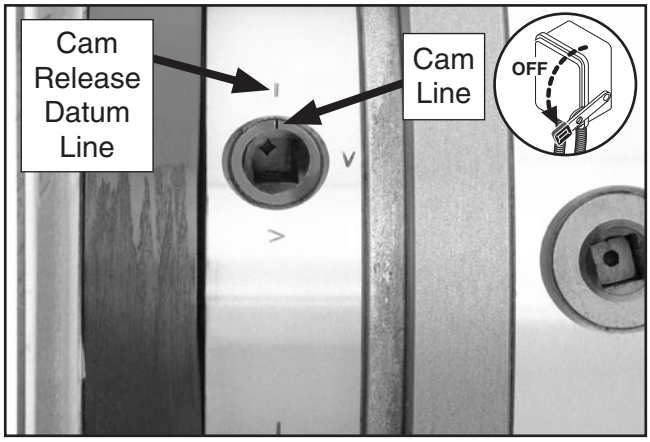


Figure 28. Cam and lines.

4. Unlock the other cams in the same manner. Make sure to support the chuck as you align the last cam. The chuck may come off at this point, so **it is important that the weight is supported by an adequate chuck cradle.**

5. Remove the chuck key.

   —If the chuck is still tight on the spindle, tap the back of the chuck with a rubber or wood mallet while supporting the bottom of the chuck.

   —If the chuck does not immediately come off, rotate the spindle approximately 60˚ and tap again. Make sure all the marks on the cams and spindle are in proper alignment.

To install a chuck or faceplate:

1. DISCONNECT LATHE FROM POWER!

2. Place a piece of plywood across the lathe ways and position it just under the chuck.

3. Place the chuck on the cradle.

4. Make sure the chuck taper and spindle taper mating surfaces are perfectly clean.

5. 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 never be able to be removed since the camlock studs will turn with the camlocks and never release.

6. If equipped, align the chuck-to-spindle timing marks (**Figure 29**), and slide the chuck onto the spindle.

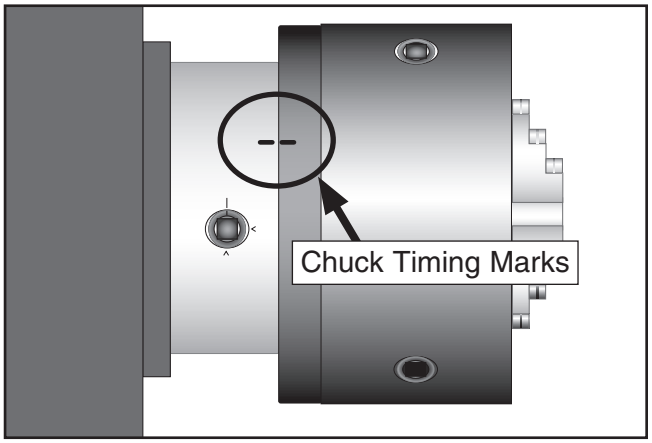


Figure 29. Chuck timing marks.

7. Turn a camlock with the chuck key until the cam line falls between the "**V**" marks shown in **Figure 30.**

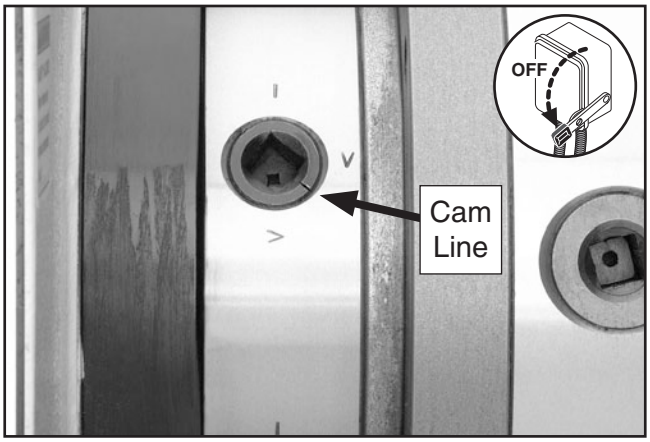


Figure 30. Cam and lines.

8. Lock the other cams in a crisscross or star pattern so the chuck is drawn up evenly on all sides without any chance of misalignment.

   Note: *If any of the cam lines (**Figure** **30**) do not fall between the "**V**" marks when the cam lock is tight, you must adjust the offending camlock stud as discussed in **Camlock Stud Adjustment** on **Page** **24.***

9. Remove the chuck key.

Using the 3-Jaw Chuck

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 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 31** for examples).

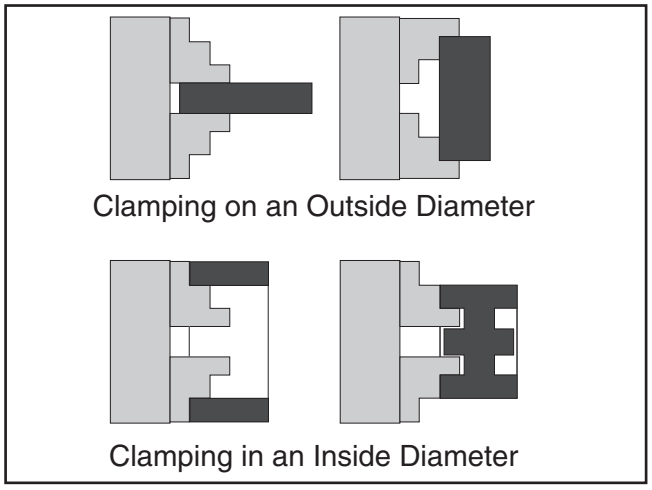


Figure 31. Example of using the 3-jaw chuck.

Tools Needed	**Qty**
Chuck Key	1

To mount a workpiece in the 3-jaw chuck:

1. DISCONNECT LATHE FROM POWER!
2. Use the chuck key to open the jaws until the workpiece sits flat against the chuck face and jaw step, or fits in the chuck hole.
3. Close the jaws until they just make contact with the workpiece.
4. Turn the chuck by hand to make sure the workpiece makes even contact with all three jaws and is centered.

   —If the workpiece is not centered, loosen the jaws and rotate the workpiece slightly and retighten the jaws.

   —If the workpiece is centered, fully tighten the jaws.

Using the 4-Jaw Chuck

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.

Tools Needed	**Qty**
Chuck Key	1

To mount a workpiece on the 4-jaw chuck:

1. DISCONNECT LATHE FROM POWER!
2. Use a piece of wood to protect the bedways.
3. Use the chuck key to open each jaw until the workpiece can lie flat against the chuck face.
4. With assistance to hold the workpiece in place, tighten each jaw in small increments. After adjusting the first jaw, continue tightening in opposing sequence, as shown in **Figure 32**, until the workpiece is firmly secure in the desired position.

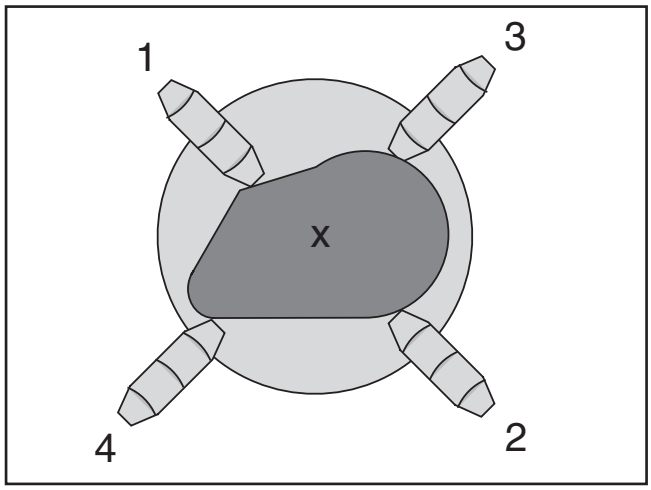


Figure 32. 4-jaw tightening sequence.

5. Make fine adjustments by using a test indicator and adjusting the jaws until the workpiece is precisely aligned.

Using the Faceplate

The faceplate can be used to turn non-cylindrical parts or for off-center turning by clamping the workpiece to it.

To mount a workpiece on the faceplate:

1. DISCONNECT LATHE FROM POWER!

2. Use a piece of wood to protect the bedways.

3. Secure the workpiece on the faceplate with a minimum of three independent clamping devices (see **Figure 33** for an example).

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

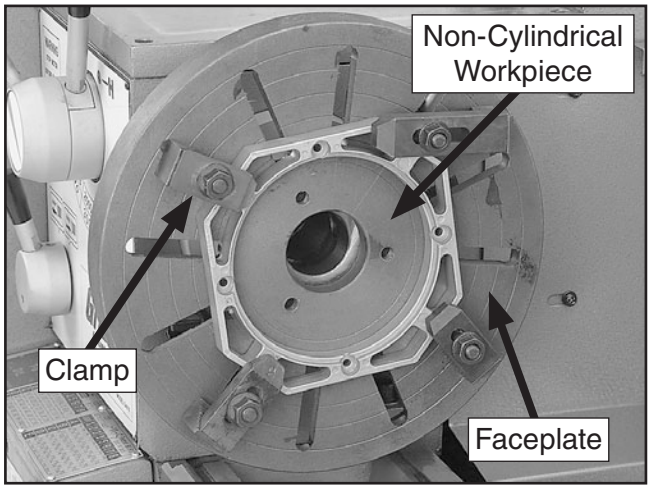


Figure 33. Example of a non-cylindrical workpiece mounted on a typical faceplate.

Reversing the Jaws

The three-jaw scroll chuck has removable hardened steel jaws (**Figure 34**). The outside of the jaws are used to hold the workpiece from the outer diameter.

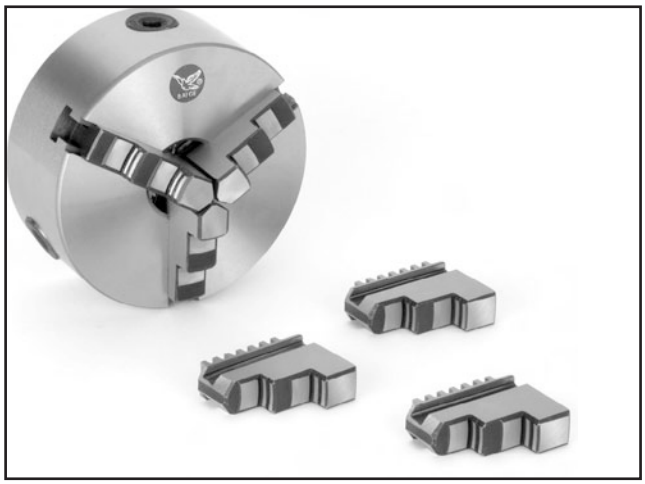


Figure 34. Chuck and jaw selection.

Numbered from 1–3, the jaws must be used in the matching numbered jaw guides, see **Figure 35**.

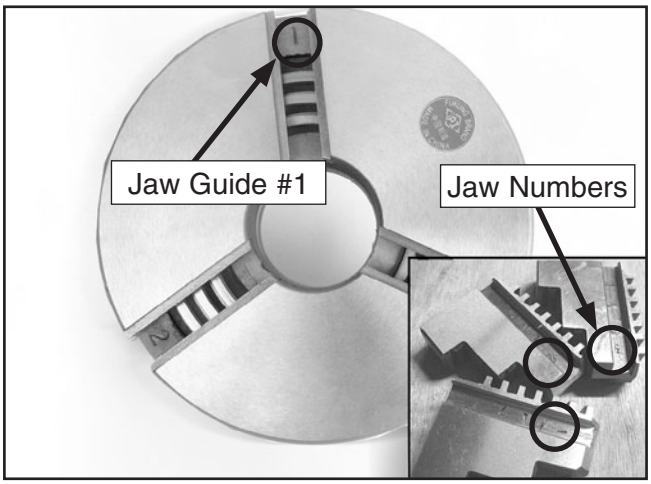


Figure 35. Jaw guide number.

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

To reverse a set of jaws:

1. DISCONNECT LATHE FROM POWER!

2. Place a piece of wood over the ways to protect them from potential damage.

3. Turn the chuck key counterclockwise and back the jaws out to remove them.

4. Clean the jaw mating surfaces and apply a thin film of white lithium grease to the mating surfaces.

5. Set the old jaws aside in a safe place free of moisture and abrasives.

6. Rotate the chuck key clockwise until you see the tip of the scroll-gear lead thread just begin to enter jaw guide #1 (see **Figure 36**).

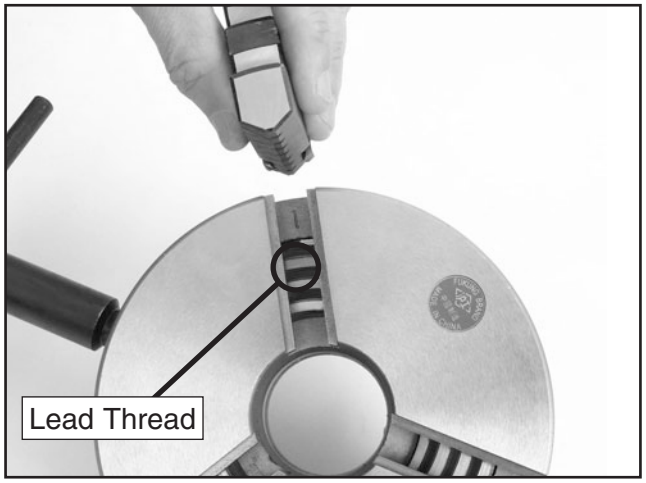


Figure 36. Lead thread on scroll gear.

7. Insert jaw #1 into jaw guide #1 and hold the jaw against the scroll gear.

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 and it should be locked into the jaw guide.

9. Repeat the steps on the remaining jaws.

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

   — If the jaws do not come together, repeat this procedure until they do.

Centers

The dead center is used in the tailstock to support workpieces. When the dead center is used in the tailstock, make sure to keep the tip and workpiece lubricated.

This lathe is supplied with two MT#4 dead centers–one is HSS and one is carbide tipped. The supplied MT#6 to MT#4 sleeve fits into the spindle taper to hold the MT#4 center.

To install a dead or live center:

1. Feed the quill out about ⅝" from the casting so that the dead center can be inserted.

2. Insert the dead center into the quill opening, as shown in **Figure 37**.

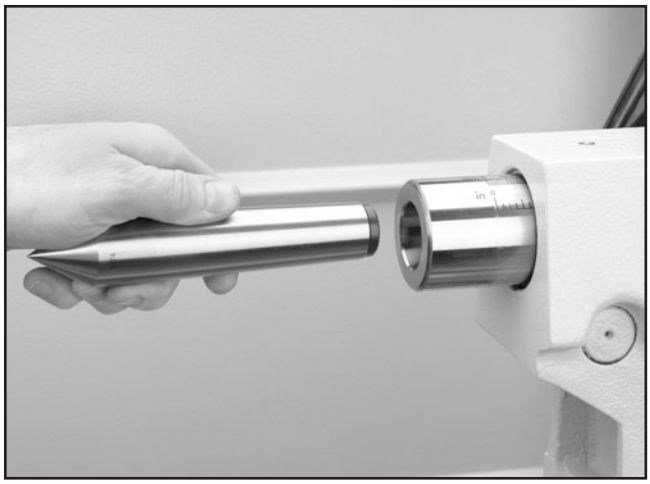


Figure 37. Inserting dead center.

3. Move the tailstock into position against the workpiece it will support, and lock in place with the tailstock lock lever.

   Note: *Make sure there is a center drilled hole in the end of workpiece that will fit the dead center tip.*

4. Feed the quill into the workpiece.

5. Lock the quill into place once the live center and the part rotate together. The quill may need to be adjusted during operation.

6. To remove the live center, retract the quill until the live center is pressed free.

Tailstock

The tailstock (**Figure 38**) of the Model G0670 lathe can be used to support workpieces with the use of a live or dead center. It can drill or bore holes in the center of a part, using a drill bit and chuck, or MT#4 tapered shank drill bit. The tailstock can also be used for cutting shallow tapers by using the offset adjustment.

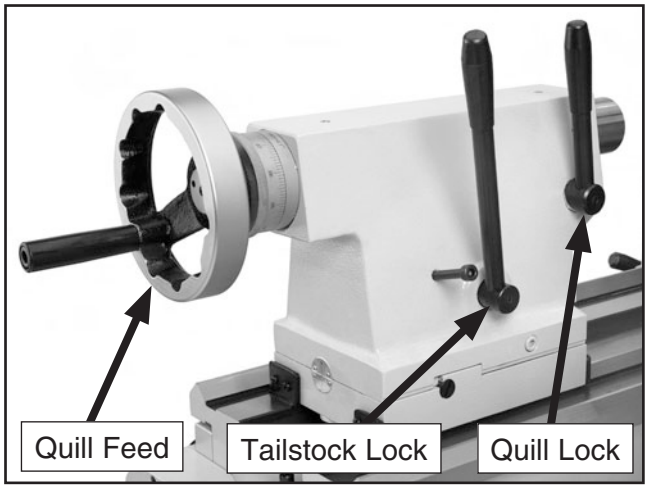


Figure 38. Tailstock and quill lock handles in locked position.

To move the tailstock:

1. Pull back on the lock lever.

2. Slide the tailstock to the desired position.

3. Push the tailstock lock lever forward to lock the tailstock to the lathe bed.

To use the tailstock quill:

1. With the tailstock locked to the bed, release the quill lock lever.

2. Turn the quill feed handwheel clockwise to feed/move the quill towards the spindle, or turn counterclockwise to move the quill away from the spindle.

3. Push the quill lock lever forward to lock the quill in place.

Aligning Tailstock

To align the tailstock:

1. Using a precision level, make sure the bedways are level side-to-side and front-to-back. If the lathe is not level, shim the lathe base as required before proceeding (refer to **Page 18** if required).

2. Get two pieces of steel round stock that are 2" diameter x 6" inches long.

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

4. Using the other piece of stock, make a dead center by turning a shoulder to make a shank. Flip the piece over in the chuck and turn a 60° point (**Figure 39**)**.**

   Note: *As long as the dead center remains in the chuck, the point of your center will remain true to the spindle axis. But remember the point will have to be refinished whenever it is removed and returned to the chuck.*

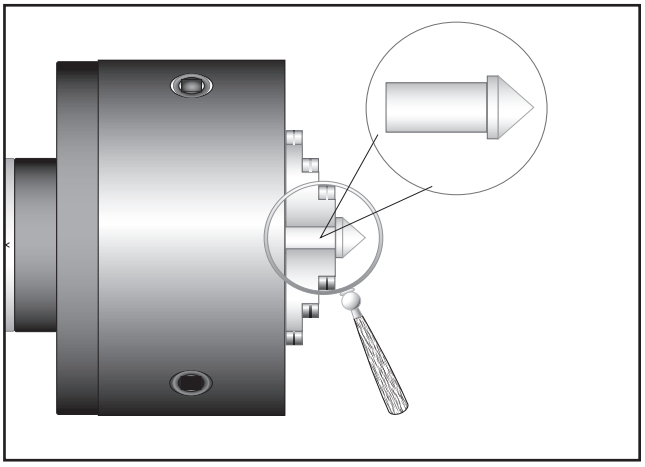


Figure 39. Chuck centering the dead center.

5. Place the live center in the tailstock.

6. Attach a lathe dog to the round stock and mount it between the centers**.**

7. Turn approximately 0.010" off the diameter.

8. Mount a dial indicator so the plunger is on the tailstock barrel before moving the tailstock.

9. Measure the stock diameter with a micrometer.

   —If the diameter is thicker at the tailstock end, move the tailstock toward you half of the diameter (**Figure 40**).

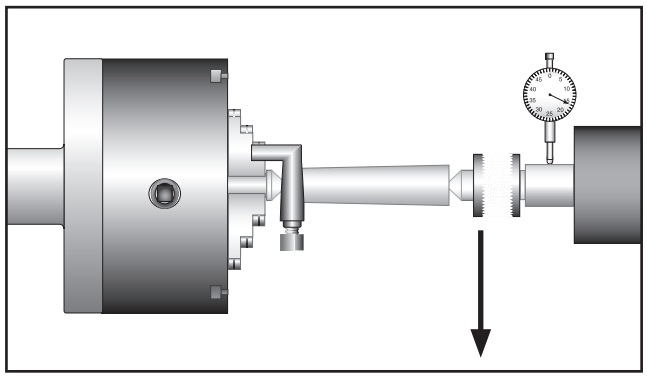


Figure 40. Tailstock adjustment option #1.

   —If the diameter is thinner at the tailstock end, move the tailstock away from you half the distance of the diameter (**Figure 41**).

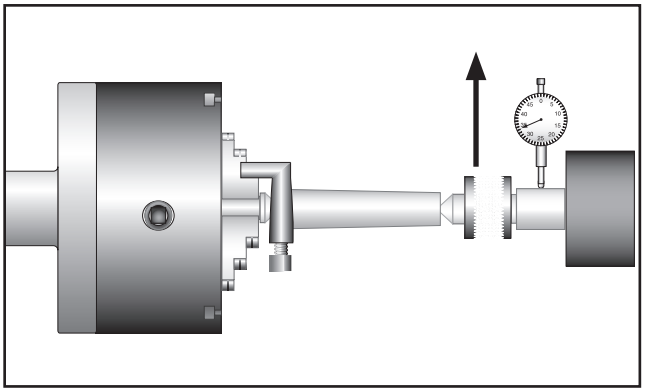


Figure 41. Tailstock adjustment option #2.

10. Turn another 0.010" off of the diameter and check for a taper. Repeat until the desired amount of accuracy is achieved.

Drilling with Tailstock

To use a tapered drill chuck:

1. With the tailstock locked, unlock the quill lock lever.

2. Turn the quill feed handle clockwise to extend the quill about 5/8" inch out of the casting.

3. Insert a tapered drill arbor (**Figure 42**), or a tapered drill bit (**Figure 43**), into the quill until the taper is firmly seated and the tang is locked into the quill slot.

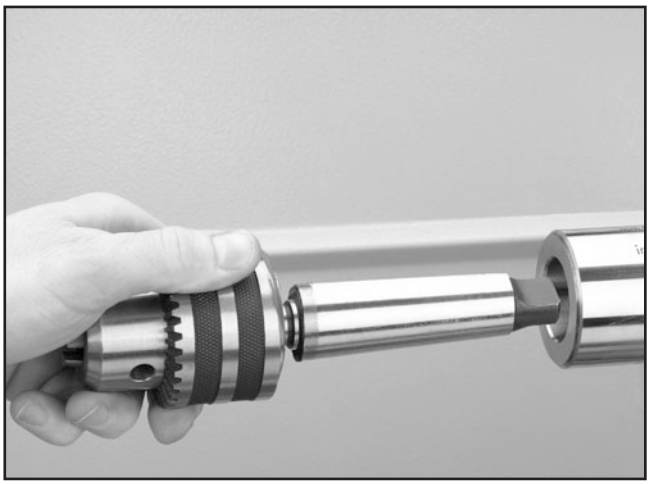


Figure 42. Typical tailstock chuck installation.

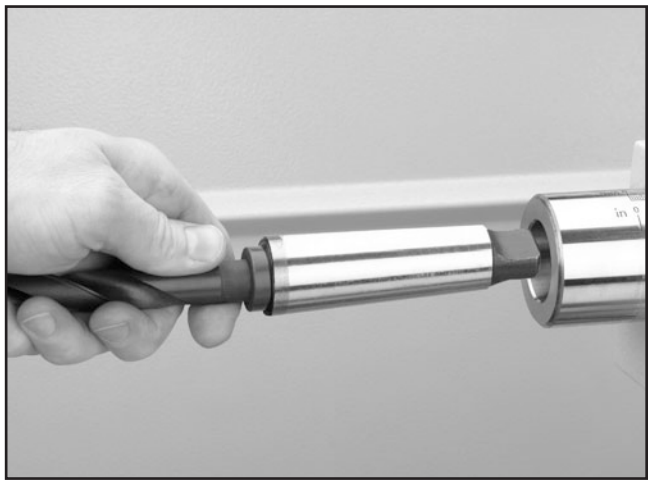


Figure 43. Typical tailstock tapered drill bit installation.

4. Turn the quill feed handwheel clockwise to feed the drill bit into the rotating workpiece.

5. To remove the tooling from the tailstock, turn the quill feed handwheel counterclockwise until the tooling is pushed out of the taper.

Cutting Tapers with Tailstock

The tailstock can be offset left or right to cut tapers.

To offset the tailstock:

1. Lock the tailstock in position, and adjust the left and right jack screws until the scale (**Figure 44**) indicates the offset you want. See **Figure 45** for adjustment direction.

2. When the offset is achieved, snug the jack screws so the tailstock position is locked.

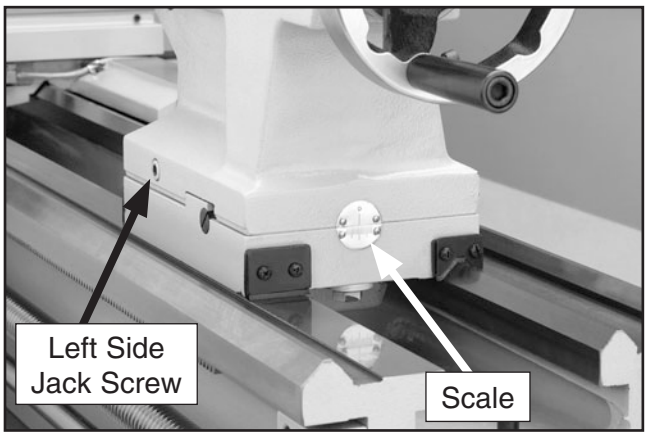


Figure 44. Tailstock offset adjustments.

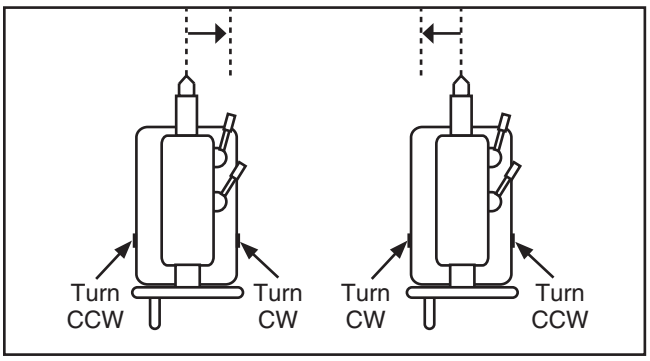


Figure 45. Jack screw adjustment verses tailstock movement.

Steady Rest

The steady rest serves as a support for long shafts (length to diameter ratio of 3:1 or greater). The steady rest can be placed anywhere along the length of the workpiece.

To install/use the steady rest:

1. Carefully place the steady rest on the lathe bedways so the triangular notch fits over the angled portion of the rear bedway.

2. Loosen the three wing bolts knobs so the finger positions can be adjusted (**Figure 46**).

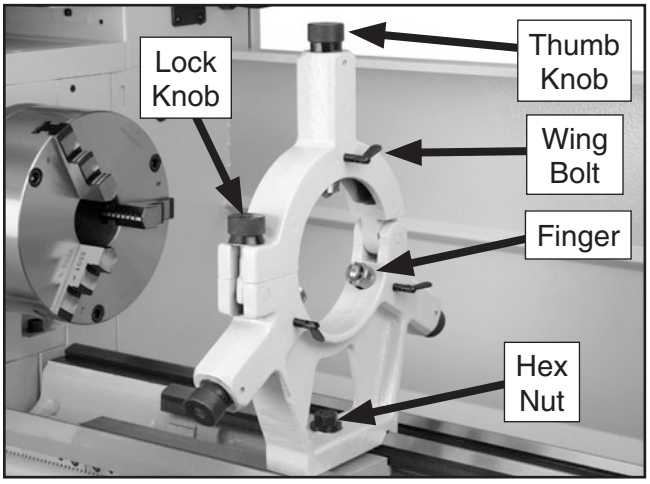


Figure 46. Steady rest adjustments.

3. Adjust the three thumb knobs (**Figure 46**) so the workpiece diameter can be accepted.

4. Loosen the lock knob and open the steady rest and fit the workpiece inside of the steady rest (**Figure 47**).

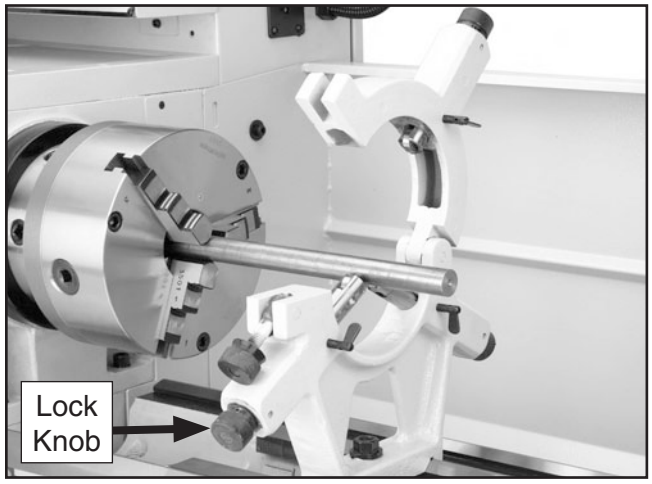


Figure 47. Lock knob.

5. Position the steady rest where desired. Tighten the hex nut at the base of the steady rest (**Figure 46**) to secure the rest in place.

6. Close the steady rest so that the workpiece is inside the fingers and tighten the lock knob.

7. Adjust the thumb knobs so the fingers are snug against the workpiece and secure the by tightening the three thumb knobs. Fingers should be snug and allow rotational movement of the workpiece. Lubricate the finger bearings with oil during operation.

8. Tighten the three wing bolts. The fingers should be snug and allow rotational movement of the workpiece. Lubricate the finger bearings with oil during operation.

Follow Rest

The follow rest in **Figure 48** is mounted on the saddle and follows the movement of the tool. The follow rest requires only two fingers as the cutting tool supports the workpiece in the front. The follow rest is used on long, slender parts to prevent flexing of the workpiece from the pressure of the cutting tool. It should be used when the workpiece length to diameter ratio is 3:1 or greater.

The sliding fingers are set similar to those of the steady rest—free of play but not binding. Always lubricate during operation. Remove the follow rest from the saddle when not in use. After prolonged use, mill or file the brass tips of the fingers so they are flat again.

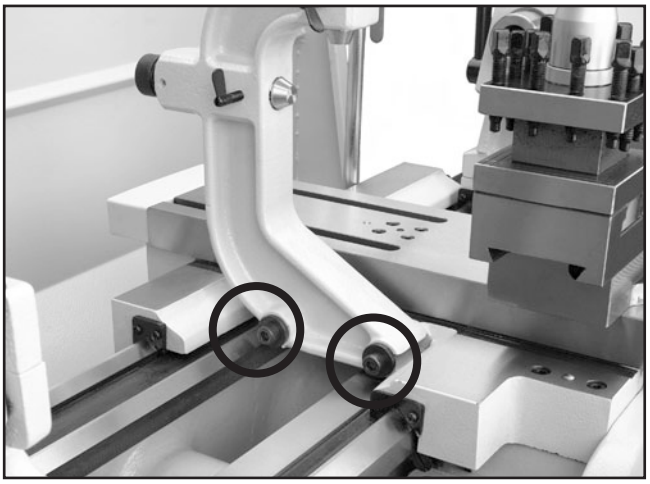


Figure 48. Follow rest attachment.

Setting the Compound

The compound is used to cut tapers on parts or to set the proper infeed angle when threading. It may also be used to cut specific lengths longitudinally when set parallel to the spindle axis.

The compound handcrank has a graduated dial for precise inch feed increments. The base of the compound slide has a graduated scale for angular setup.

To set the angular position:

1. Loosen the two hex nuts, one on each side of the compound (see **Figure 49**).

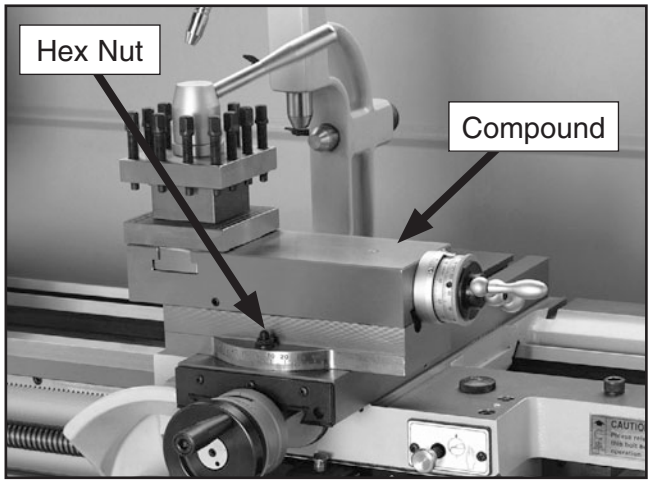


Figure 49. Compound slide set at an angle.

2. Observing the scale at the base of the slide, rotate the compound to the desired angle and retighten.

—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. Next 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 the process above but rotate the compound 29.5° clockwise and mark the cross slide accordingly.

4-Way Tool Post

The four-way tool post (**Figure 50**) is mounted on top of the compound and allows a maximum of four tools to be loaded simultaneously.

The four-way tool post allows for quick indexing to new tools. This is accomplished by loosening the top handle, then rotating the tool post to the desired position. Tighten the top handle to lock the tool into position.

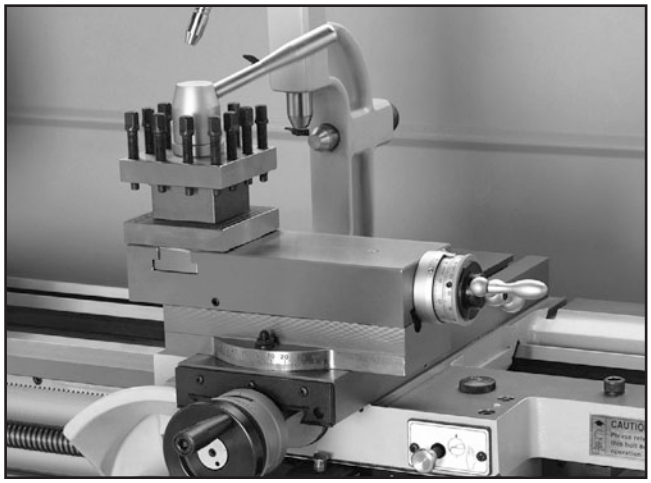


Figure 50. 4-way tool post.

Chip Drawer

This handy chip drawer allows for quick and easy chip removal and cutting fluid screen access. The lathe cabinet has two stop bolts (**Figure 51**) that allow for maximum drawer pullout without the worries of the drawer falling out onto the floor.

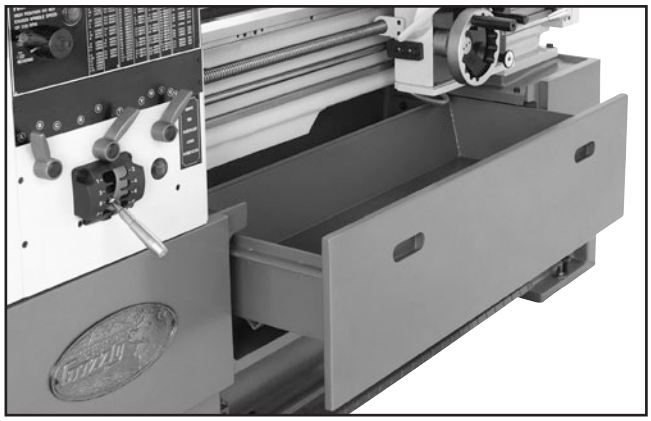


Figure 51. Chip drawer.

Foot Brake

This lathe is equipped with a foot brake (**Figure 52**), which is primarily intended to be used as a time saving tool. The best method for using the foot brake is turn the spindle lever ***OFF***, then partially step on the foot brake to stop the spindle.

Fully pushing the foot brake while the spindle is ***ON*** will cut power to the motor and bring the spindle to a stop. Stopping the spindle in this manner is harder on the lathe gearbox, brake pad, and belts. This type of brake application should be reserved for emergency situations. Once stopped, the spindle lever will then need to be returned to the neutral position.

Note: *Do not confuse this feature with the emergency stop button. The emergency stop button cuts power to the machine and does not apply the brake. This button must be reset to restore power to the lathe.*

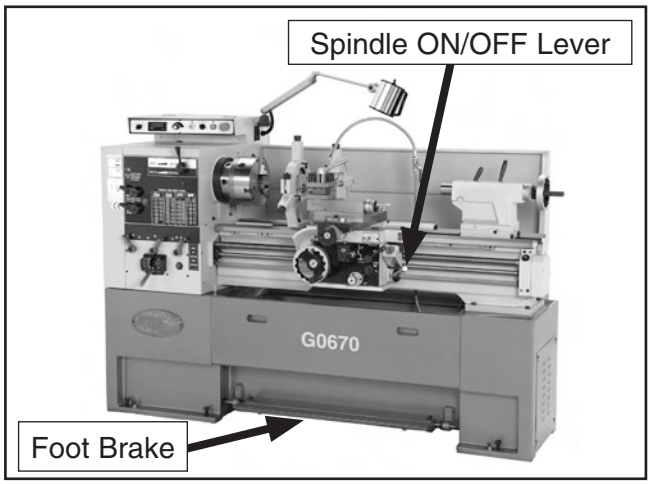


Figure 52. Foot brake and spindle *ON/OFF* lever.

Adjustable Carriage Stop System

Use the adjustable carriage stop (**Figure 53**) collar to set the location where the carriage will be disengaged by the feedrod friction clutch. When the adjustable carriage contacts the stop collar during a longitudinal feeding operation, the feedrod clutch disengages the feedrod from the apron and the carriage movement stops.

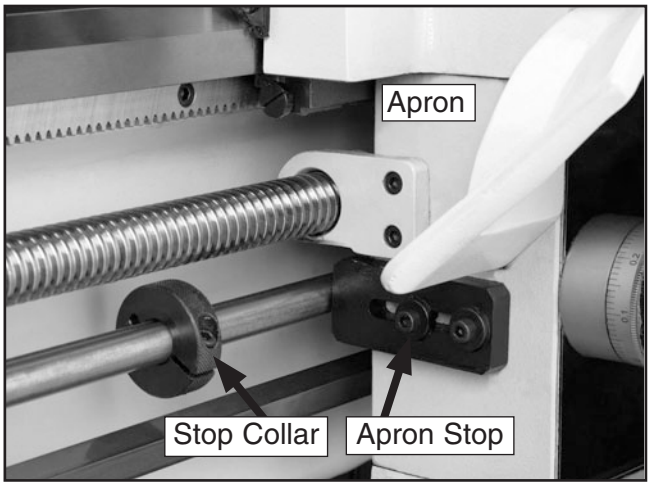


Figure 53. Adjustable carriage stop and collar.

NOTICE

The carriage stop system is designed to stop the longitudinal carriage movement at optional locations when the feedrod is engaged.

When the leadscrew is engaged for threading operations, the carriage stop system will not disengage the leadscrew—you must move the half nut lever instead. Otherwise the carriage can crash into the chuck, or if it contacts the stop, the leadscrew shear pin will break.

Before doing any threading operations, make sure to loosen the feedrod stop collar so it slides freely on the feedrod.

Manual Feed

You can manually move the cutting tool around the lathe with three methods. This section reviews the individual controls on the carriage and describes their uses (see **Figure 54**).

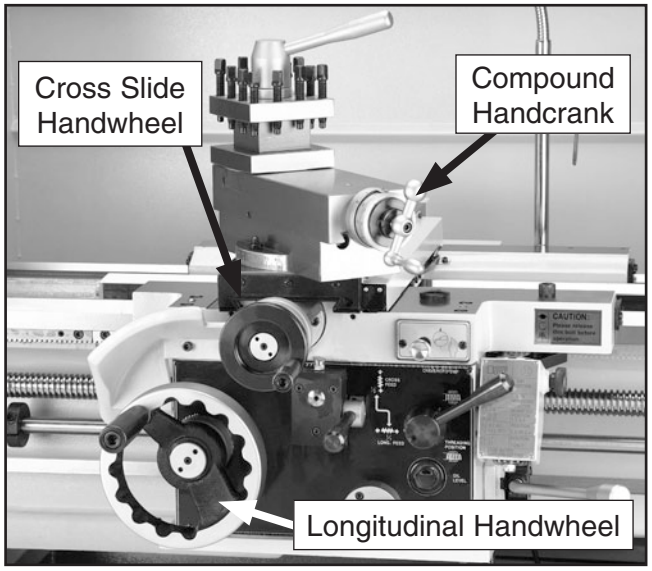


Figure 54. Carriage Controls.

Longitudinal Handwheel

The longitudinal handwheel moves the carriage left or right along the bed. Use this control when setting up the machine for turning or when manual movement is desired during turning operations.

Cross Slide Handwheel

The cross slide handwheel moves the top slide toward and away from the work. Turning the dial clockwise moves the slide toward the workpiece. Adjust the graduated dial by holding the handwheel with one hand and turning the dial with the other. To shift between inch and metric scales, rotate the scale barrel 180° until a new window exposes the alternate scale.

Compound Handcrank

The compound handcrank controls the position of the cutting tool relative to the workpiece. The compound is adjustable for any angle within its range. The combo inch/metric graduated dial is engraved into a rotatable barrel. Angle adjustment is secured by cap screws on the base of the compound.

Power Feed

NOTICE

Feed rate is based on spindle RPM. High feed rates combined with high spindle speeds result in a rapidly moving carriage or cross slide. Pay close attention to the feed rate you have chosen and keep your foot poised over the brake pedal. Failure to take this precaution can lead to carriage and chuck crash.

For either cross or longitudinal feed, move the power feed lever on the apron in the directions indicated by the placard (**Figure 55**), and then move the feed direction lever (**Figure 56**) to select feed direction. Remember, all directions reverse when spindle rotation is reversed. Refer to the **Using the Thread and Feed Chart** on **Page 43** to learn how to shift the lathe in order to get a specific feed rate.

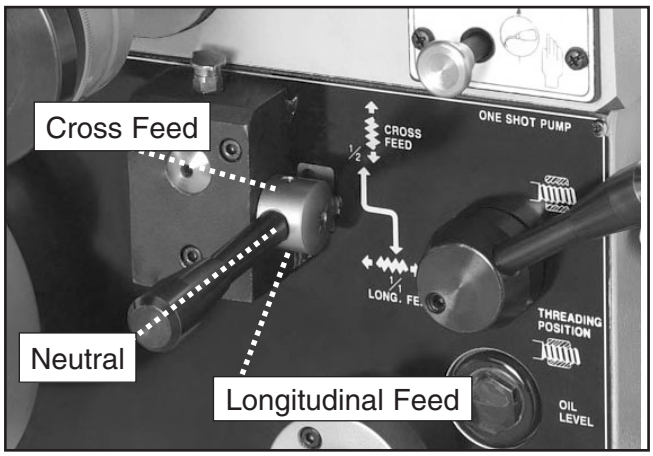


Figure 55. Power feed lever positions.

Figure 56. Feed direction lever.

Feed Direction Control Knob

With the use of this knob, the operator can avoid having to shut down the lathe and shift the feedrod forward/reverse lever on the gearbox to change the direction of feed. While the lathe is running, the operator can disengage the feed lever and then either pull or push this knob (**Figure 57**) to change the feed direction of carriage or cross slide. When the feed lever is re-engaged, the selected feed direction is reversed.

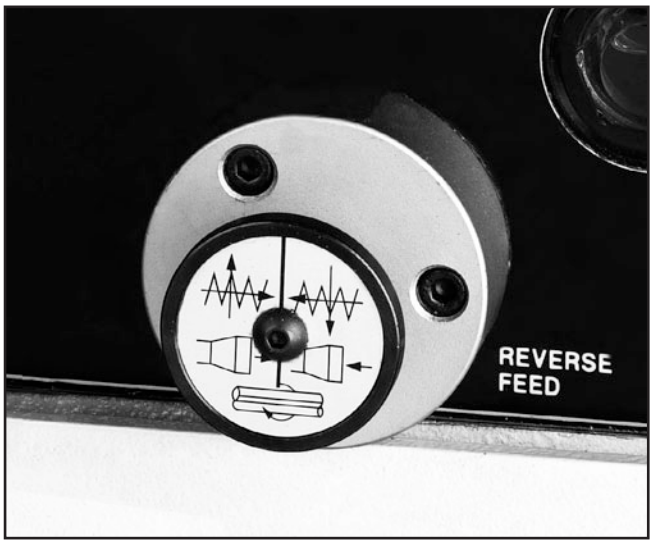


Figure 57. Feed direction knob.

However, with that said, if the feedrod forward/reverse lever (**Figure 58**) is moved to change the feedrod direction, whatever feed direction the feed control knob is currently in will be reversed.

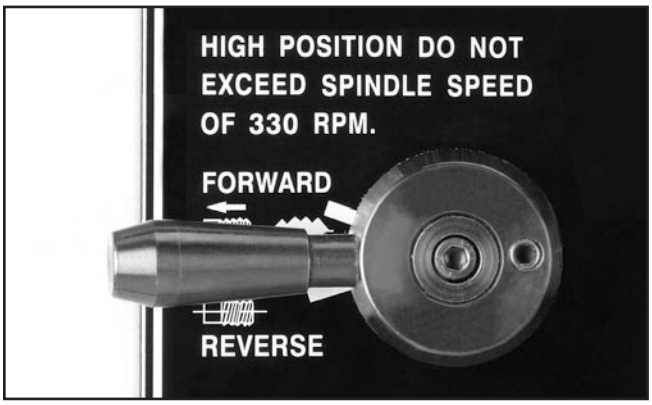


Figure 58. Feed rod forward/reverse lever.

Cutting Fluid System

While simple in concept and function, many issues must be taken into account and addressed to find and use the correct cutting fluid. Always follow all product warnings and contact the fluid manufacturer for unanswered questions.

The cutting fluid pump and reservoir (**Figure 59**) are located in the base behind the vented cover on the tailstock end of the lathe.

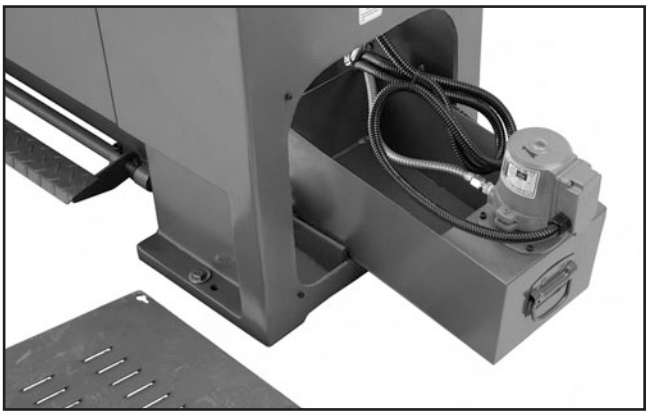


Figure 59. Cutting fluid pump and reservoir.

The quick reference table shown in **Figure 61** can help you select the appropriate cutting fluid.

To operate the cutting fluid pump, use the pump switch on the control panel (**Figure 60**) to turn on the pump, and the valve lever for flow control at the nozzle.

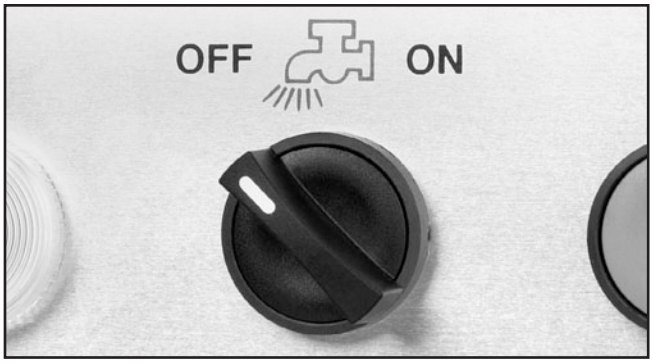


Figure 60. Cutting fluid pump switch.

⚠WARNING

BIOLOGICAL & POISON HAZARD! Use the correct personal protection equipment when handling cutting fluid and by follow federal, state, and fluid manufacturer requirements to properly dispose of cutting fluid.

Cutting Fluids for Lathe Operations

Workpiece	Dry	Water Soluble Oil	Synthetic Coolants	Sulfurized 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. Sulfurized oils often are used for threading. For small projects spot lubrication is done with an oil can or brush, or omitted completely.*

Figure 61. Cutting fluid selection table.

Calculating Spindle Speed

HSS Cutting Speed Table

	Low Carbon Steel	High Carbon Annealed Steel	Normalized Alloy Steel	Aluminum Alloys	Cast Iron	Bronze
Cutting Speed SFM (Roughing)	90	50	45	200	70	100
Feed Rate IPR (Roughing)	0.010" to 0.020"	0.010" to 0.020"	0.010" to 0.020"	0.015" to 0.030"	0.010" to 0.020"	0.010" to 0.020"
Cutting Speed SFM (Finishing)	120	65	60	300	80	130
Feed Rate IPR (Finishing)	0.003" to 0.005"	0.003" to 0.005"	0.003" to 0.005"	0.005" to 0.010"	0.003" to 0.010"	0.003" to 0.010"
SFM = Surface Feet per Minute						
IPR = Inches per Revolution						

Note: *For carbide cutting tools, double the cutting speed. These values still may need slight adjustment depending on cutting cutting tool rake and relief angles. Refer to the MACHINERY'S HANDBOOK for more detailed information.*

Determining the best spindle speed (**RPM**) to turn or face your workpiece requires you to enter the following information into the formula below:

$$RPM = \frac{CS \times 4}{D}$$

RPM: Spindle or workpiece revolutions per minute.
CS: Cutting speed in surface speed per minute or (**SFM**).
D: Diameter of the workpiece.

$$180 = \frac{90 \times 4}{2}$$

EXAMPLE: Lets say that you need to make the rough cut on a low carbon **2**" inch steel shaft. The chart above indicates that **90 SFM** is required for best results. Input a **CS** value of **90** and a **D** value of **2** and run the equation. The suggested spindle speed you need to set your lathe to run at is **180 RPM**.

⚠WARNING

Failure to follow RPM and feed rate guidelines may threaten operator safety from ejected parts or broken tools.

Figure 62. Cutting speed table for HSS and carbide cutting tools.

Gearbox Threading and Feed Setup

This lathe has many threading options, and is set up with two available positions for the gearbox drive gear.

In the normal position, the 56- and 57-tooth gears are meshed, allowing for inch and metric threading, including all general feed operations.

In the alternate position, the 44- and 57-tooth gears are meshed, allowing for module and diametrial pitch threading, and inch threading including all general feed operations. To convert the lathe between threading setups is very simple. Disconnect the lathe from power, remove the cap screw and swap the position of the gear and spacer shown in **Figure 63**. Use the diagram in **Figure 64** for gear locations if required.

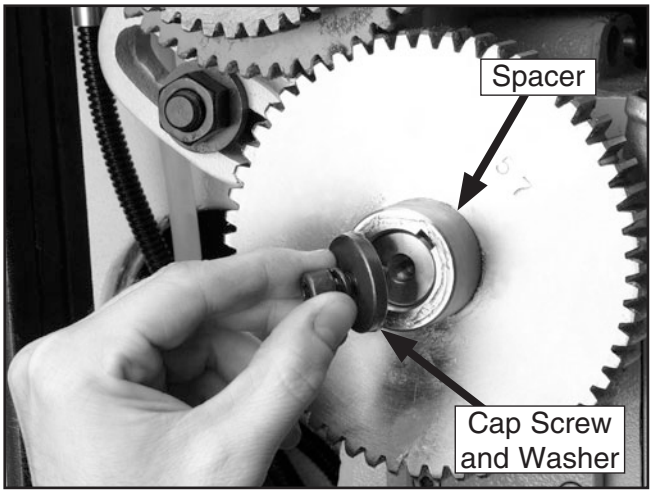


Figure 63. Removing the drive gear.

NOTICE

Always use the slowest speed possible for threading, and avoid deep cuts or you may not be able to disengage the half nut to prevent an apron crash!

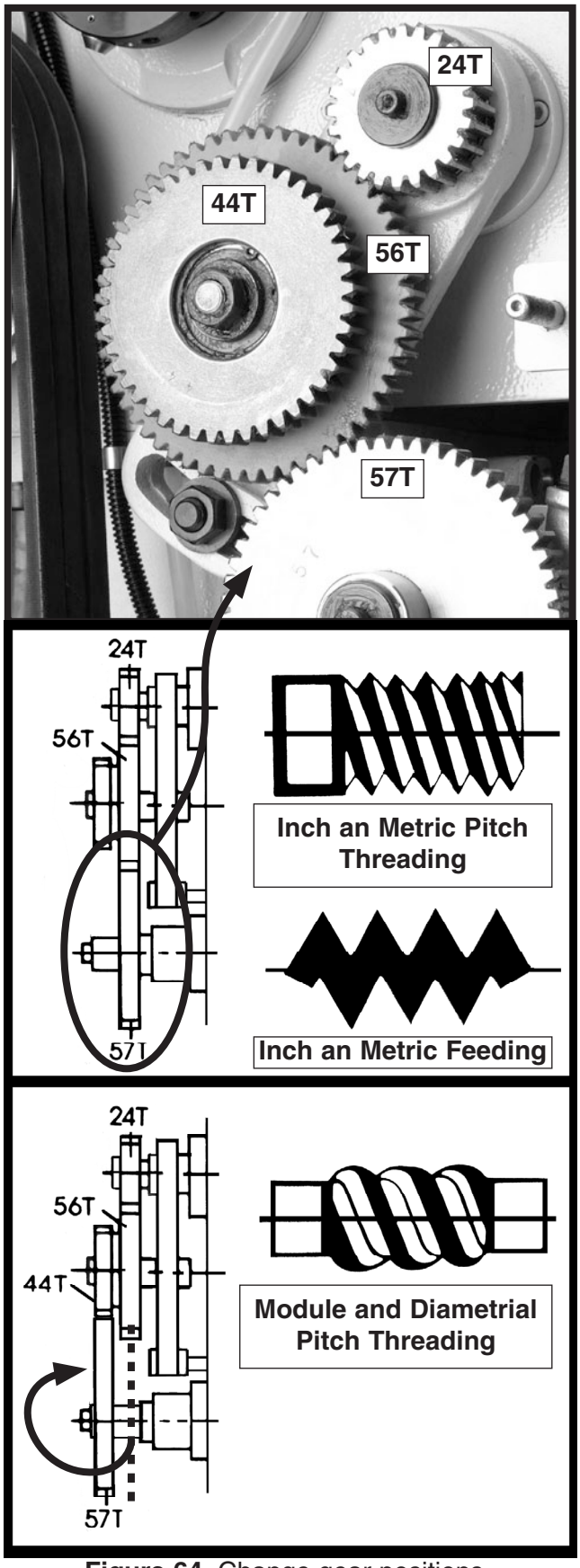


Figure 64. Change gear positions.

Thread Dial

This lathe is equipped with a thread dial that lets you know where on the leadscrew you can re-engage the half nut to resume inch or whitworth threading. However, since the leadscrew is 4 TPI, then the thread dial is not needed for any thread that is divisible by 4. For three examples, refer to the Indicator Table in **Figure 65** and see **Figure 66** for dial locations.

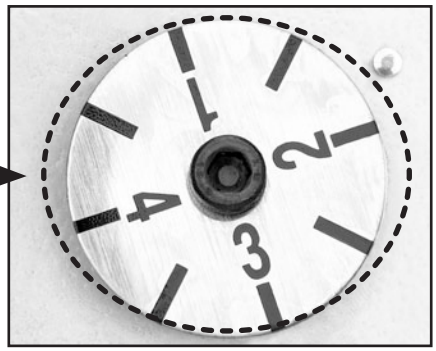
For metric, diametrial, and module threading, the thread dial is not used and you must leave the half nut lever engaged until the threading job is complete.

NOTICE

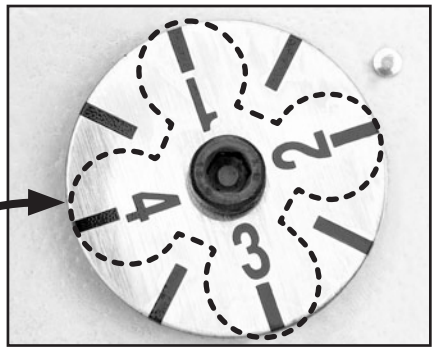
Always use the slowest speed possible for threading, and avoid deep cuts or you may not be able to disengage the half nut to prevent an apron crash!

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
$2\frac{1}{2}, 3\frac{1}{2}, 4\frac{1}{2}$ $7\frac{1}{2}, 11\frac{1}{2}, 13\frac{1}{2}$	POSITION 1, 3 OR 2, 4
$2\frac{1}{4}, 2\frac{3}{4}$ $3\frac{1}{4}, 3\frac{3}{4}$	POSITION 1 ONLY
$2\frac{7}{8}$ SAME METRIC THREADS CUTTING	

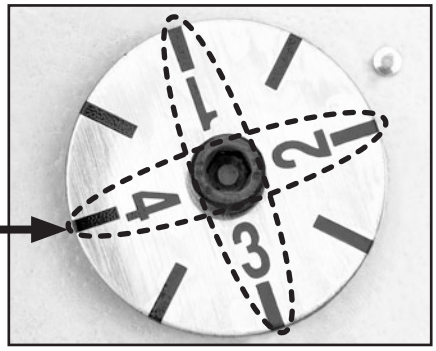
Figure 65. Indicator table.



For all other even numbered TPI: Any number or mark can be used. Note: Since the leadscrew is 4 TPI, then the thread dial is not needed for any thread that is divisible by 4.



For 3, 5, 7, 9, 11, 13, 15, 19, 23, 27 odd TPI: Any four grouped numbers or marks can be used.



For fractional TPI: Numbers 2 or 4, 1 or 3, or any two opposing marks can be used.

Figure 66. Thread dial use.

Positioning Gearbox Levers

To cut a particular thread or establish a particular feed rate, first swap the gearbox drive gear (if required) as explained in **Gearbox Threading and Feed Setup** on **Page 41**, then move the gearbox levers to the required positions. In the example below the chart shows **LCR8W** gives a feed rate of **0.35mm** or **0.014"**.

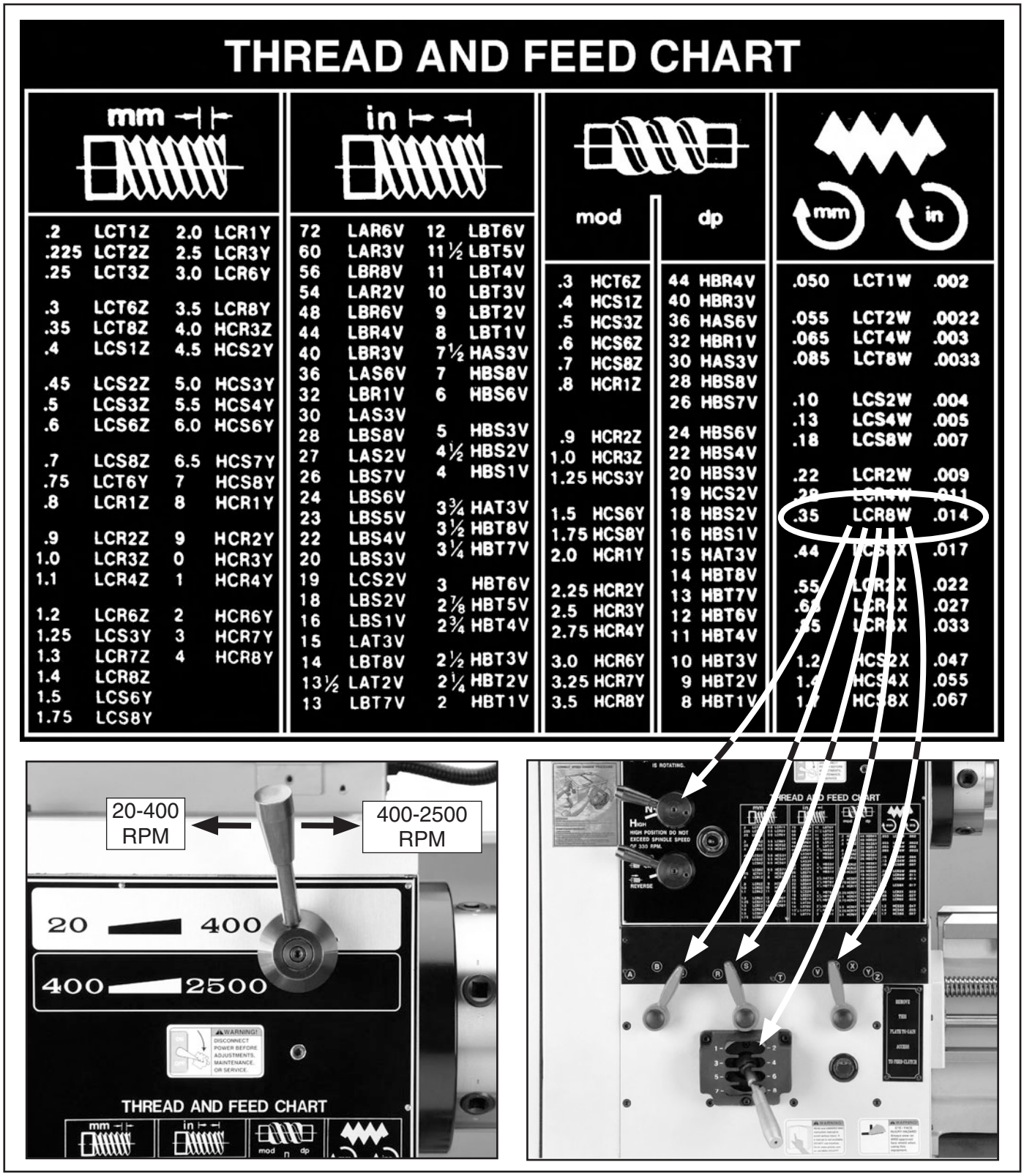


Figure 67. Using the thread and feed chart.

Starting Lathe

To start the lathe:

1. Before starting the lathe, make sure that you turn the CSS function switch (**Figure 68**) to **OFF**, turn the spindle speed dial to the minimum, and make sure the cross slide is backed out.

If the lathe is started with the CSS switch ***ON***, and the cross slide is positioned all the way inward, the spindle will immediately wind-up to the highest spindle RPM of the range that it is in. As a result, if the workpiece is long, heavy, or off-centered it could be thrown at a high velocity, causing severe injury or death.

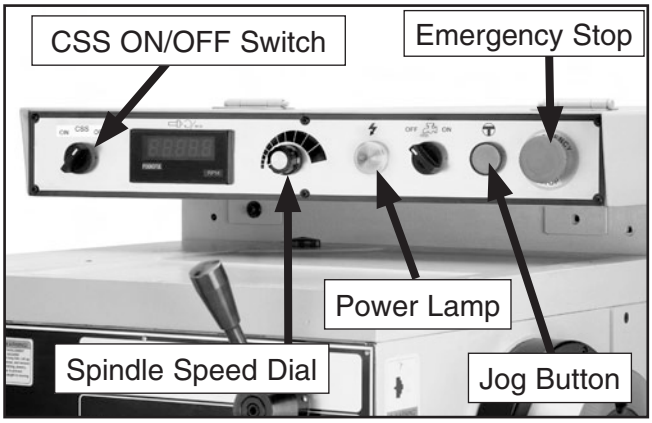


Figure 68. Control panel.

2. Find the master switch (**Figure 69**) on the back of the lathe, and turn it to the "**|**" or the "**ON**" position, and the power lamp (**Figure 68**) will light.

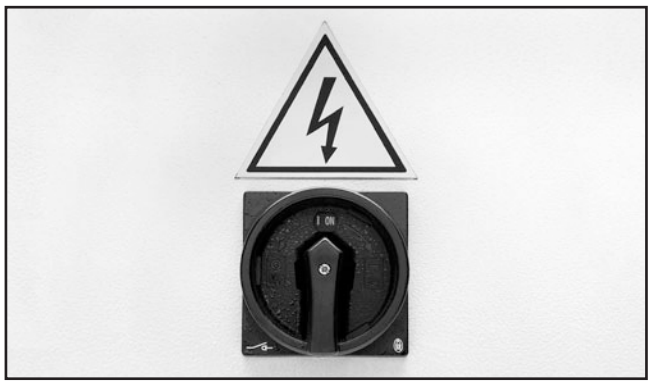


Figure 69. Master power switch.

3. Move the spindle ON/OFF lever (**Figure 70**) to start/stop spindle and chuck rotation.

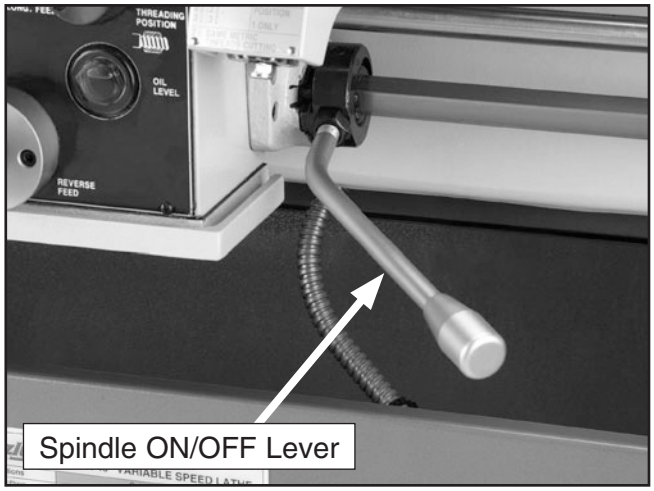


Figure 70. Spindle ON/OFF Lever.

4. To stop a free wheeling chuck and cut power to the motor, press down on the foot brake (**Figure 71**).

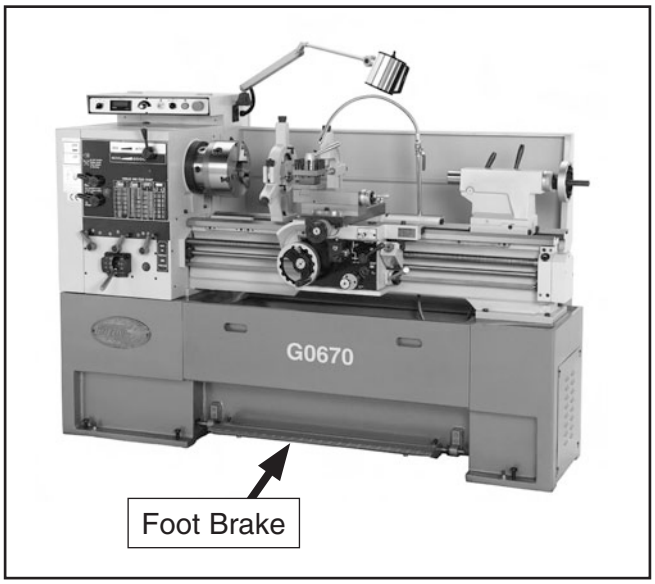


Figure 71. Foot brake.

Making Your First Cut

This procedure is an example of how to make your first cut on a 2" piece of low carbon steel. The steps will help you with how to use this lathe correctly and how to calculate the correct spindle speed and feed rate. You will also learn how to take advantage of the variable spindle speed control and the constant surface speed (CSS) feature.

⚠WARNING

Before starting the lathe, make sure that you turn the CSS function switch to OFF, turn the spindle speed dial to the minimum, and make sure the cross slide is backed out.

If the lathe is started with the CSS switch ON, and the cross slide is positioned all the way inward, the spindle will immediately wind-up to the highest spindle RPM of the range that it is in. As a result, if the workpiece is long, heavy, or off-centered it could be thrown at a high velocity causing severe injury or death.

NOTICE

If the headstock is in high range (400-2500 RPM), and if the spindle speed dial is turned completely to the left, the tachometer may show a speed lower than the 400 RPM listed on the headstock label.

This headstock range label indicates the allowable spindle speed for cutting operations while in a range. If in high range, do not turn or face any workpiece with a spindle speed lower than 400 RPM. If you must, then shift the headstock into low range to reach spindle RPMs lower than 400; otherwise, you may stall the motor.

To make your first cut:

1. Measure and record the diameter (**D**) of the workpiece to be turned or faced: ***D*** *= 2".*

2. Go to **Calculating Spindle Speed** on **Page 43,** and select the low carbon steel column.

3. Next, select the row that lists the roughing cut speed for low carbon steel. The table suggests the cutting speed (***CS***) of *90 SFM.*

   —If using HSS tooling, use the cutting speed value listed in the table.

   —If using carbide tooling, double the cutting speed listed in the table.

4. Input the **D** and **CS** values into the equation, and the required spindle speed calculates out to 180 RPM.

5. For a spindle speed of 180 RPM, move the headstock range lever (**Figure 72**) to the low position (20-400 RPM).

   Note: *To shift and get levers to completely engage, you may need to use the jog button, to move the gearbox range lever into neutral and then rotate the spindle by hand.*

Figure 72. Headstock range lever.

6. Shift the appropriate levers to the **LCR8W** positions. Referring to the **Calculating Spindle Speed** table you will see that the longitudinal roughing feed rate for low carbon steel is between 0.010-0.020" IPR (inches/per revolution), and the **Thread and Feed Chart** on **Page 43** indicates that the **LCR8W** lever positions give a feed rate compromise of 0.014" IPR.

7. Move the gearbox direction lever to ***FORWARD,*** and then push in the feed direction knob for left-hand carriage travel (**Figure 73**).

   Note: *To quickly change carriage or cross slide feed direction, disengage the feed lever, push-in or pull-out the feed direction knob, and the re-engage the feed lever. There is no need to shutdown and move the leadscrew/ feedrod direction lever on the gearbox. However be careful, changing the position of the gearbox direction lever will reverse any feed direction knob selection.*

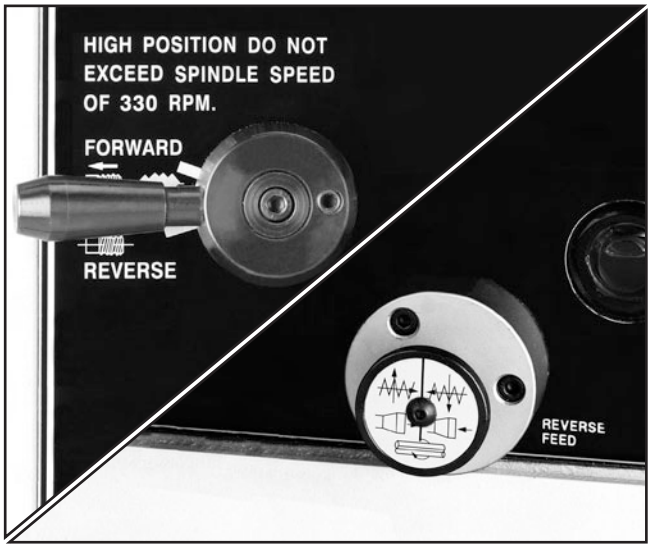


Figure 73. Gearbox direction lever and feed direction knob.

8. Put on your safety glasses and face shield.

9. Load your workpiece and tooling, and position the tip of the cutting tool right where you intend to begin the roughing cut. The tip must be within a few thousandths of an inch from touching the workpiece. When turned ***ON***, the CSS system will use this cross slide location as a starting point for increasing the spindle speed as the diameter of the workpiece is decreased.

   —If setup for facing, tighten the carriage lock at this time, but when finished facing, immediately loosen the carriage lock or the feedrod or the lead screw shear pin may snap the next time the longitudinal feed is used.

   —If setup for turning, use the longitudinal handwheel to move the carriage, and verify that the apron stop is set where you want, so the cutting tool will not crash into a workpiece shoulder or the chuck. Adjust the stop as required.

   —If setup for threading, make sure that the carriage lock (**Figure 16**) is released and the feedrod stop collar (**Figure 53**) is loose on the feedrod, or you will shear the leadscrew shear pin when the half nut is engaged.

10. Make sure the spindle speed dial is turned to its minimum, and make sure that the CSS switch (**Figure 74**) is in the ***OFF*** position.

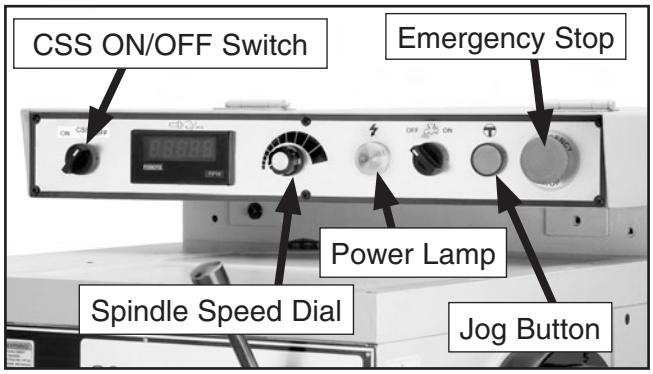


Figure 74. CSS switch, tachometer, and spindle speed dial.

11. Turn the master power switch to ***ON***. The power lamp will illuminate, and the tachometer will illuminate showing zeros.

12. Observe the oil pump sight glass on the headstock and verify that you see oil flowing out of the small tube.

    —If no oil is seen, do not attempt to start the lathe. Correct the problem first or immediate headstock gear and bearing damage will occur if the lathe is run.

13. Turn the CSS ON/OFF switch to ***ON.***

14. Disengage the carriage feed. Then move the spindle ON/OFF lever to start the lathe. The spindle will rotate.

15. Turn the spindle speed dial to 180 RPM.

16. Adjust the cutting fluid nozzle, and turn ***ON*** the pump.

17. Place your foot on the brake pedal and your hand on the feed lever, ready to disengage feeding and stop the lathe in an emergency.

18. Center and set the depth of your cutting tool to approximately 0.050".

19. Engage the apron feed lever for longitudinal feed. The tool will now begin the roughing cut as the carriage moves to the left. The feed rate for this cut is 0.014" per revolution with the spindle turning at 180 RPM.

20. When your rough cuts are complete and it is time make the finish cut, refer to the **Thread and Feed Chart** on **Page 43**, and move the gearbox levers to the positions that will provide the finishing feed rate shown in the **HSS Cutting Speed Table** on **Page 40**.

21. Position the tip of the cutting tool right where you intend to begin the finishing cut. The tip must be within a few thousandths an inch of touching the workpiece.

22. Refer to the **Calculating Spindle Speed** table and the **Thread and Feed Chart** on **Page** to determine the finishing-cut spindle speed and feed rate.

23. Reposition the appropriate levers, start the lathe, and make the finishing cut.

24. When complete, always first turn the spindle ***OFF***, and then second turn the CSS switch ***OFF***.

25. Back the cross slide out to prevent accidental high-speed lathe startup next time the late is started.

26. Push the emergency stop button in, and turn the master power switch ***OFF***.

SECTION 5: ACCESSORIES

This section includes the most common accessories available for this lathe through the Grizzly catalog, online at **www.grizzly.com**, or by calling 1-800-523-4777.

H2670—HSS Square Tool Bits ½" x ½" x 4
Our ground tool bits are M-2 HSS, making them some of the most durable tool bits around. Make your own specialized cutters in any shape using a silicon carbide grinding wheel (G8235-37) on your grinder.

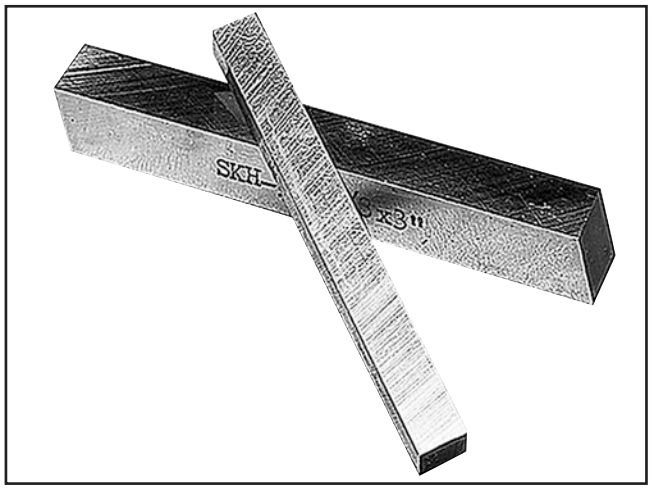


Figure 75. H2670 HSS Square Tool Bits.

H5687—8-Pc. Pre-Ground Tool Bit Set
Tired of grinding your blank high speed steel tool bits? We've done it for you! 8-pc set comes with these sharpened profiles: offset right and left hand tools with chip breaker, straight and chip breaker style threading tools, internal threading tool, parting tool, boring tool and turning tool. These tool bits are evenly hardened to better than 64C.

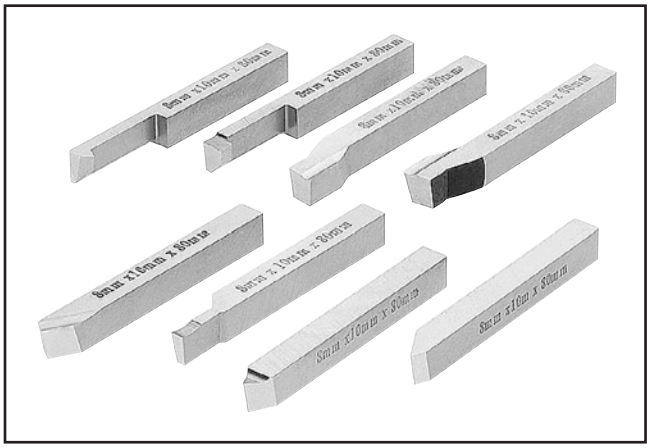


Figure 76. H5687 Pre-Ground Tool Bit Set.

G9777—20-Pc. Carbide Tipped Tool Bit Set
An exceptional value for carbide lathe tool bits! This twenty-piece set offers tremendous savings over bits sold individually, plus every type is duplicated and ready at hand when you need it. The carbide is C-6 grade for cutting steel and alloys.

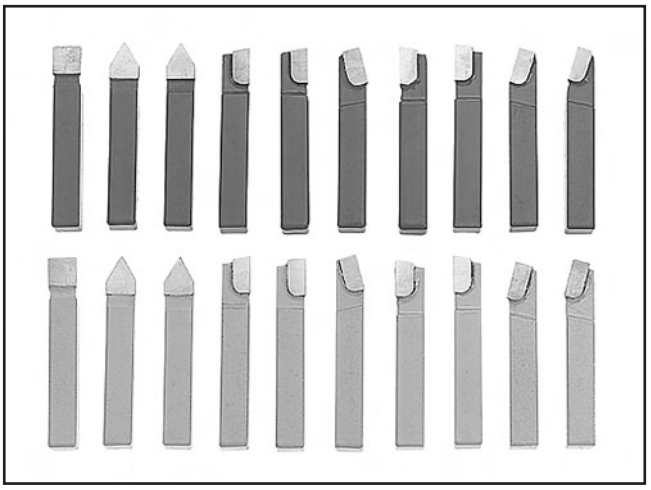


Figure 77. G9777 20 Pc. Carbide Tool Set.

G5640—5-Pc. Indexable Carbide Tool Set ½"
G6706—Replacement TiN Coated Carbide Indexable Insert
Five-piece turning tool set features indexable carbide inserts with "spline" type hold-down screw that allow indexing without removing the screw. Each set includes AR, AL, BR, BL, and E style tools with carbide inserts, hex wrench, extra hold-down screws and a wooden case.

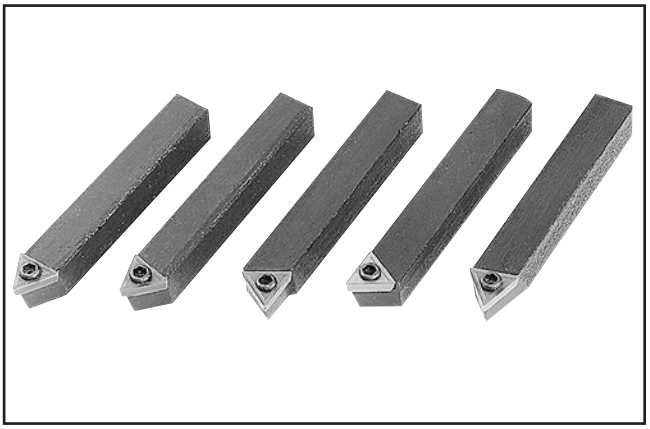


Figure 78. G5640 5 Pc. Indexable Tool Set.

H8257—Primrose Armor Plate with Moly-D Machine and Way Oil (For Lathe Beds)
Prevents stick slip and chatter due to superior anti friction capabilities, resulting in greater precision machining capabilities. This oil provides the thinnest film possible while effectively providing needed lubrication. Superior rust and corrosion protection, includes adhesive/cohesive additives for vertical slides, resists squeeze out, running, dripping and is non-gumming. Comes in 1 quart containers.

Figure 79. Lathe bed lubricant.

H9240—Rustlick™ WS5050 Heavy-Duty Soluble Machining Oil
Effective chlorinated E.P. additive provides excellent tool life, protects neoprene seals, suitable for most general purpose heavy-duty applications. This water-soluble machining oil can be used on all metals except titanium, and is compatible with CNC machining requirements.

Figure 80. Universal type cutting fluid.

T21168—EVS or CNC Rotary Phase Converter
Made especially for EVS or CNC machinery, these rotary phase converters allow you to operate 3-phase machinery from a single-phase power source at 100% power and 95% efficiency. For application assistance, please call our technical support group at (570) 546-9663.

Figure 81. Typical Rotary Phase Converter (Sizes will vary).

H5787—MT#4 x 5" Bull Nose Rolling Center
H5903—MT#4 x 5" Bull Nose Rolling Center
Built with precision sealed bearings, designed for heavy-duty use on hollow workpieces.

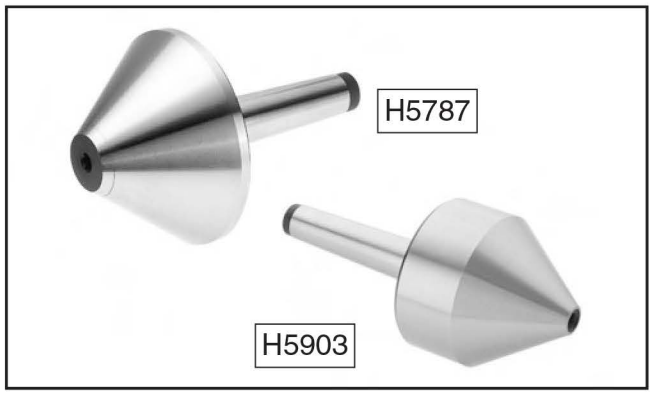


Figure 82. MT#4 bull nose rolling centers.

G7038Z—Boring Bar
G7040—Carbide Inserts for Steel (5 pk)
G7048—Carbide Inserts for Cast Iron (5 pk)

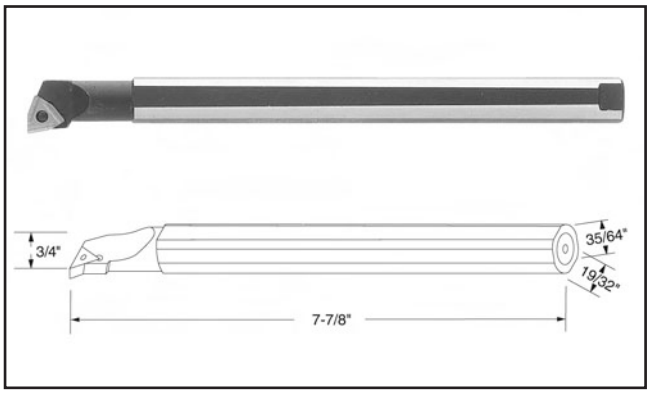


Figure 83. G7038Z Boring Bar.

G7030—Threading Tool Holder
G7041—Carbide Inserts for Steel (5 pk)
G7049—Carbide Inserts for Cast Iron (5 pk)

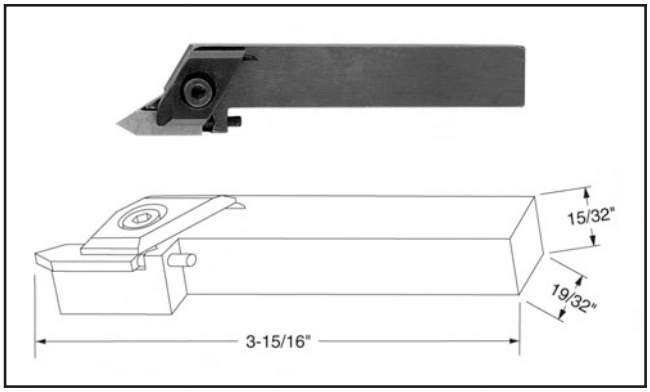


Figure 84. G7030 Threading Tool Holder.

G7033—Internal Threading Tool Holder
G7042—Carbide Inserts for Steel (5 pk)
G7050—Carbide Inserts for Cast Iron (5 pk)

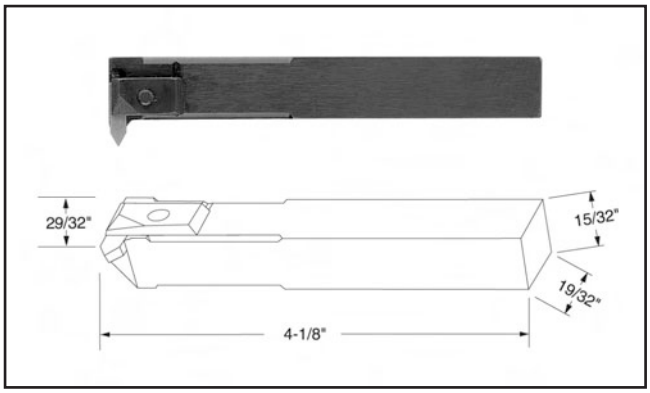


Figure 85. G7033 Int. Threading Tool Holder.

H5930—HSS Center Drill Set 60°
H5931—HSS Center Drill Set 82°
Double ended HSS center drills, are precision ground for unsurpassed accuracy. Each set includes sizes 1-4.

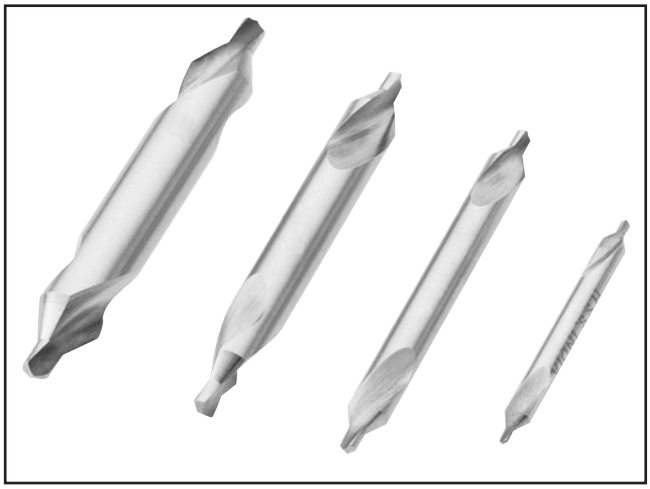


Figure 86. HSS Center Drills.

G9245—MT4 Live Center Set
A super blend of quality and convenience, this live center set offers seven interchangeable tips. High-quality needle bearings prolong tool life and special tool steel body and tips are precision ground. Supplied in wooden box.

Figure 87. G9245 Live Center Set.

H2987—½" Bent Lathe Dog
H2988—1" Bent Lathe Dog
H2989—1½" Bent Lathe Dog
H2990—2" Bent Lathe Dog
H2991—3" Bent Lathe Dog
Just the thing for precision machining between centers! These bent tail Lathe Dogs are made of durable cast iron and feature square head bolts.

Figure 88. H2987-91 Lathe Dogs.

G9256—6" Dial Caliper
G9257—8" Dial Caliper
G9258—12" Dial Caliper
These traditional dial calipers are accurate to 0.001" and can measure outside surfaces, inside surfaces, and heights/depths. Features stainless steel, shock resistant construction and a dust proof display. An absolute treat for the perfectionist!

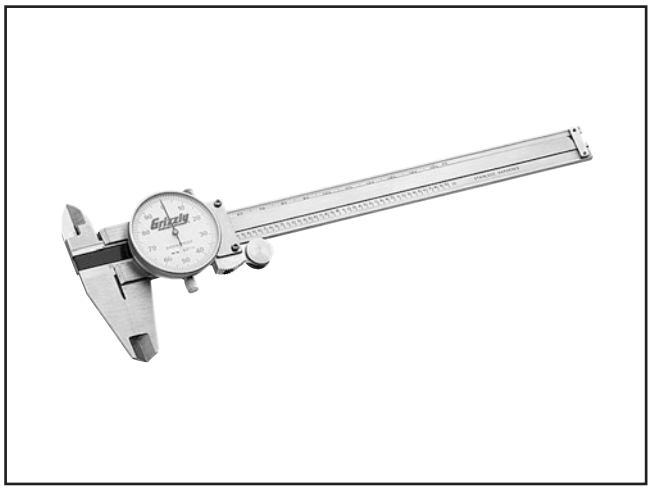


Figure 89. Grizzly® Dial Calipers.

G9849—Magnetic Base/Dial Indicator Combo
Precision measurements and setups have never been so easy. Magnetic base engages with just the turn of a switch and allows pinpoint adjustment. The dial indicator features 0–1" travel and has a resolution of 0.001". This fine set includes a molded case for protection and convenience.

Figure 90. G9849 Magnetic Base/Dial Indicator Combo.

H6879—Lathe Operation & Maintenance Book
This detailed metal lathe book provides extensive coverage of a wide variety of metalworking operations. Special emphasis is placed on lathe components, accessories, and operating procedures, including basic machine setup and routine maintenance. A "must have" reference for all metal lathe owners. 260 pages.

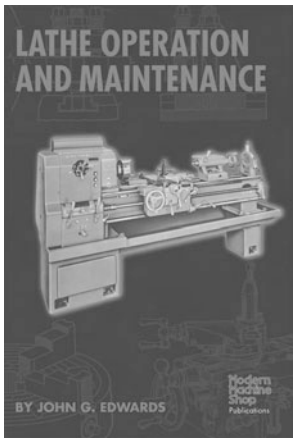
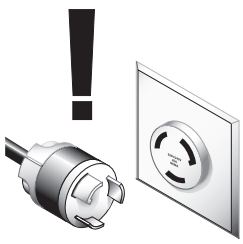


Figure 91. H6879 Lathe Operation & Maintenance Book.

SECTION 6: MAINTENANCE



⚠WARNING

Always disconnect power to the machine before performing maintenance. Failure to do this may result in serious personal injury.

Schedule

For optimum performance from your machine, follow this maintenance schedule and refer to any specific instructions given in this section.

Daily:
- Loose mounting bolts.
- Emergency stop and brake operation.
- Worn or damaged wires.
- Cutting fluid level.
- Oil levels.
- Remove chips.
- Apron oil level.
- Verify oil pump operation.
- Verify cooling fan operation.
- Any other unsafe condition.

Monthly:
- Service cutting fluid as needed.
- Remove electrical box air filter and blow out or vacuum out dust.

Annually:
- Change all oils.
- Clean the oil pump system.

Cleaning

Cleaning the Model G0670 is relatively easy. Make sure to disconnect the lathe from power before cleaning it. Disconnect the machine from power, remove electrical box air filter (**Figure 92**), and blow out or vacuum out dust. Remove chips daily as they accumulate on your lathe, or more often as needed. Wet chips left on the machine will eventually oxidize and create a gummy residue that will rust and bind moving parts. Regular cleaning keeps your lathe running smoothly.

Figure 92. Electrical box filter.

Lubrication

General Lubrication

Keep machined metal surfaces like the chuck, ways, bores, controls, change gears, rollers, and unpainted cast iron rust-free with applications of products like Primrose Armor Plate with Moly-D Machine and Way Oil, G96® Gun Treatment, SLIPIT®, or Boeshield® T-9 (refer to **SECTION 5: ACCESSORIES** on **Page 48** for more details).

Headstock

Use 7.5 liters of ISO 32 machine oil or an equivalent general machine gearbox oil. Keep the oil level full as seen in the sight glass shown in (**Figure 93**).

Figure 93. Headstock oil tank.

After the break-in period, drain the oil (**Figure 93**), and refill the tank. Change this oil yearly, or more frequently if required by heavy machine use or if the oil has been overheated.

When the lathe is running, periodically make sure that you see oil flowing out of the oil tube against the sight glass in the headstock (**Figure 94**). If oil is not flowing, shut down the lathe immediately and contact Technical Support.

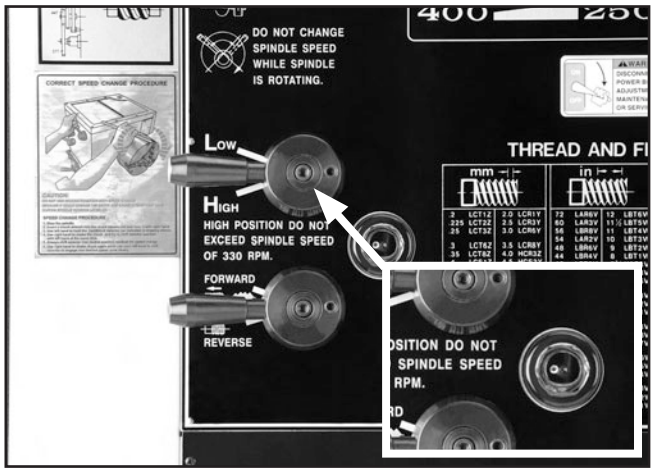


Figure 94. Oil pump sight glass.

Gearbox

Use 1 liter of ISO 68 or a high grade non-detergent SAE 30W motor oil. Keep the oil level full as seen in the sight glass (**Figure 95)**.

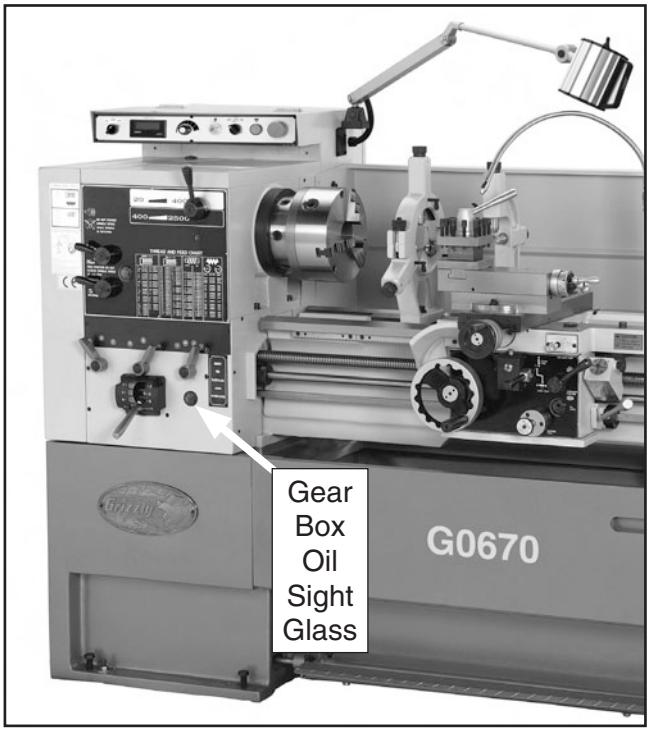


Figure 95. Oil sight glass locations.

After the first month of daily operation, drain and refill the gear box. See **Figure 96** for plug locations. Change the gearbox oil yearly, or more frequently if heavy machine use requires it.

Figure 96. Gearbox fill and drain plugs.

Lead Screw and Feedrod

To lubricate the lead screw, clean with mineral spirits, and relubricate with a very light machine oil so rust will not form on the threads. DO NOT use grease, as grease will pickup metal chips and abrasives and carry them into the half nut, causing premature wear.

Fill the lead screw bearing housing through the oil plug (**Figure 97**) until the housing is full. Use the same oil as used in the apron.

Figure 97. Leadscrew lubrication.

Apron

Use 1.1 liter of an ISO 68 or a high grade non-detergent SAE 30W motor oil in the apron. Daily check the oil level in the sight glass. The apron oil pump uses this oil to lubricate the ways.

After the first month of daily operation, drain the apron oil (**Figure 98**), and refill the apron through the fill plug labeled OIL (**Figure 99**). At a minimum, change the apron oil yearly or more frequently if heavy machine use requires it.

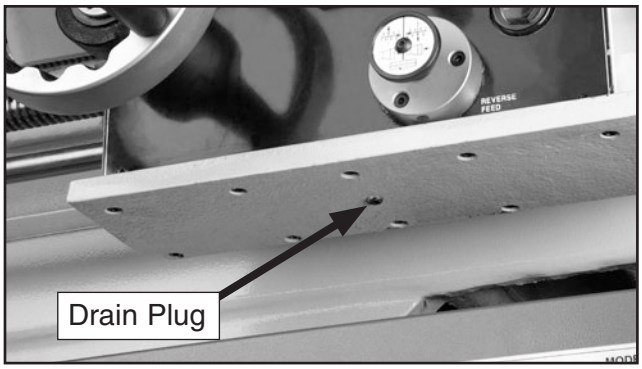


Figure 98. Apron drain plug.

Apron Oil Pump

To lubricate the saddle slide and the cross slide way guides, pull the apron oil pump knob (**Figure 99**) out and hold it for two or three seconds, and then push the knob in once. The pump draws oil from the apron reservoir and then is pumped through drilled passages to the way guides. Repeat this process until the way guides are lubricated. Lubricate the guides once before and once after using the lathe. If the lathe is in an environment that has high moisture or is very dirty, increase the lubrication interval and make sure to keep the apron oil level full.

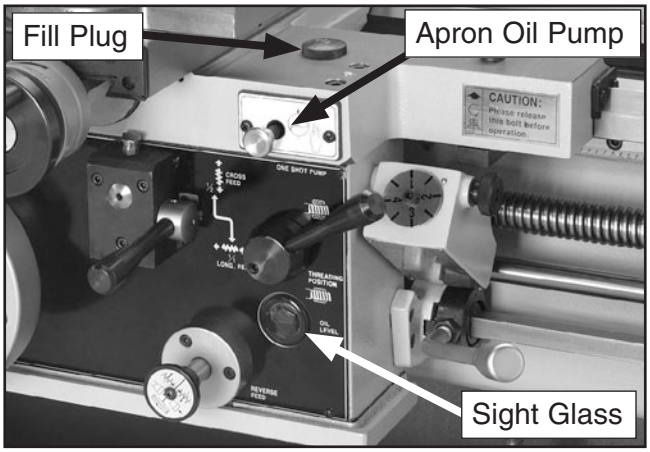


Figure 99. Apron lubrication.

Ball Oilers

This lathe has 5 ball oiler locations. You can use an ISO 68 or a high grade non-detergent SAE 30W motor oil for all general surface and ball oiler lubrication. To lubricate ball oilers, clean the outside of the ball oiler, push the ball with the tip of the oil can nozzle, and squirt one or two drops of oil inside the oiler before and after using the lathe. If the shop environment has high moisture or is very dirty, increase the oiling interval. Use the same oil as you are using for the headstock. See **Figures 100** to **101** for the ball oiler locations.

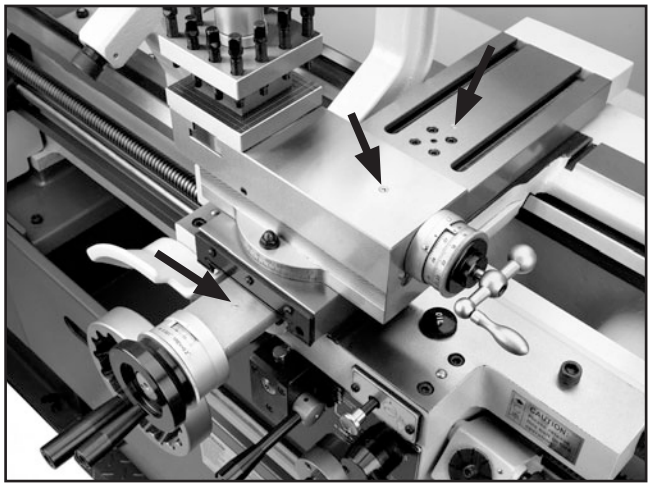


Figure 100. Ball oiler locations.

Figure 101. Tailstock ball oiler locations.

Oil Pump System

Use Shell Tellus 68 or ISO 68. The headstock oil system (**Figure 102**) consists of a pump, driven by an electric motor, a low oil pressure cutout switch, tank, lines, and a distribution manifold. The headstock has a series of oil lines that originate from an oil distribution manifold, which is supplied oil from the pump. The lines from the manifold direct oil to key locations, such as the spindle bearings, for superior lubrication (**Figure 107**). Never run the lathe without the oil system operating.

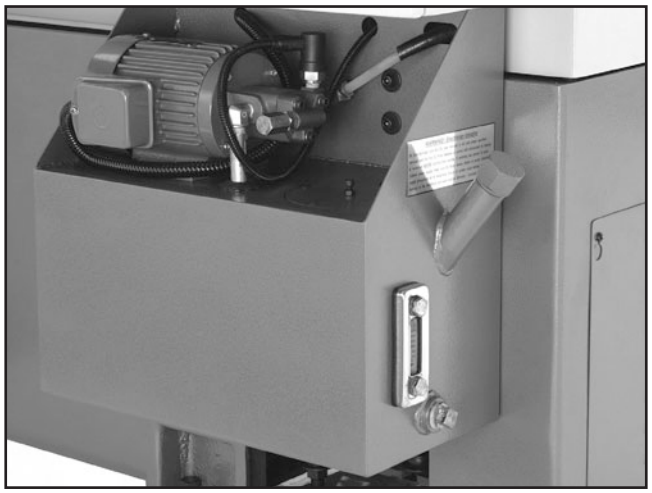


Figure 102. Headstock tank and oil pump system.

The oil system must be cleaned annually. Under heavy use, this interval may be increased accordingly.

If the oil temperature shown on the thermometer (**Figure 103**) ever exceeds 170° degrees Fahrenheit, the oil will get overheated and begin to break down. Change the oil immediately if this is the case. Investigate why the temperature exceeded the maximum. Possibilities may be poor ventilation, excessive work loads, or extreme work site temperatures. Correct the overheating problem to prevent this from happening again.

Tools Needed:	**Qty**
Phillips Screwdriver #2	1
Open End Wrench 40mm	1
Open End Wrench 18mm	1
Blowgun and Safety Glasses	1
Hex Wrench 4mm	1

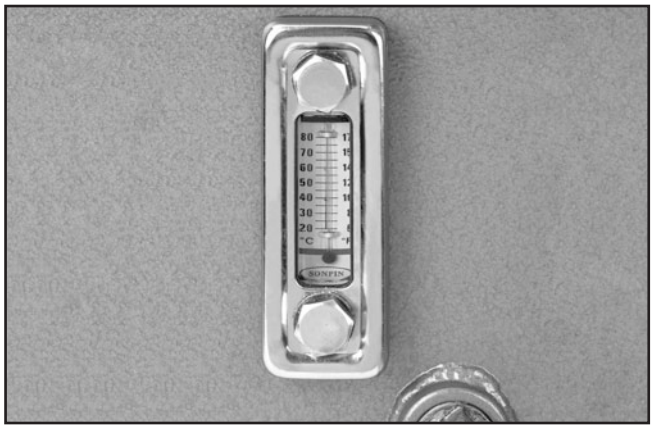


Figure 103. Tank thermometer.

To clean the oil pump system:

1. Remove the drain plug (**Figure 103**), and drain the oil from the tank into at least a 3-gallon drain pan.

2. Using a 4mm hex wrench, remove the four access cover cap screws (**Figure 104**), and then the cover.

   Note: *The cap screw in the center of the cover acts as a handle to lift the plate and does not need to be removed.*

3. Put on safety glasses. Using mineral spirits and rags, clean out the tank, and use the blow gun to dry the inside of the tank.

   Note: *Do not remove the suction screen at this time.*

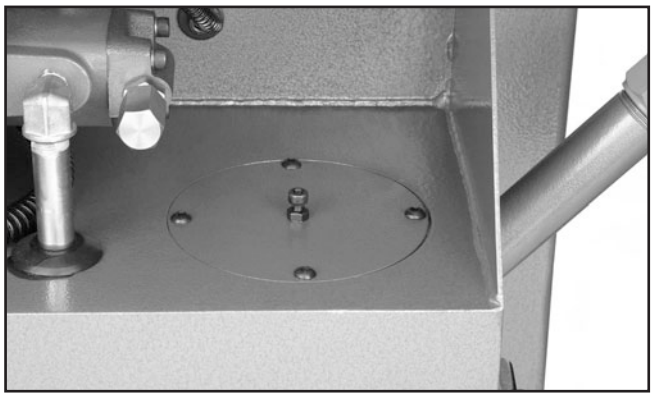


Figure 104. Tank access plate.

4. When the tank is completely cleaned out, unthread the suction screen (**Figure 105**), from the suction pipe, and remove the suction screen assembly.

   TIP: *While the tank is accessible, you can place a magnet at the bottom-center of the tank, or install a magnetic drain plug to collect any fine metal particles generated by the headstock drivetrain.*

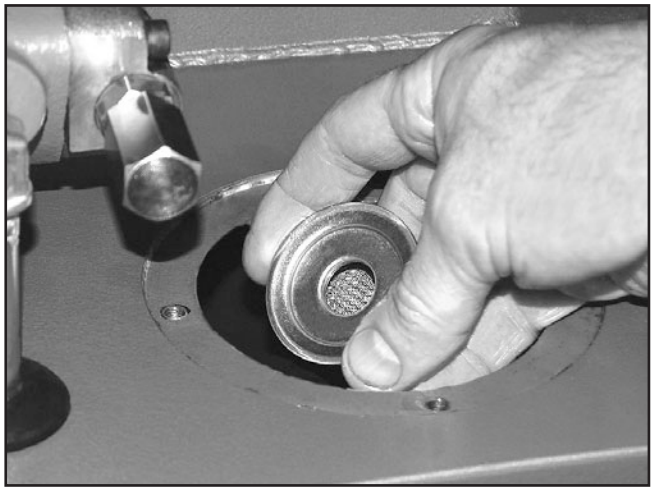


Figure 105. Suction screen removal.

5. Using mineral spirits and a blow gun, clean all contaminants from the screen (**Figure 105**) and blow dry.

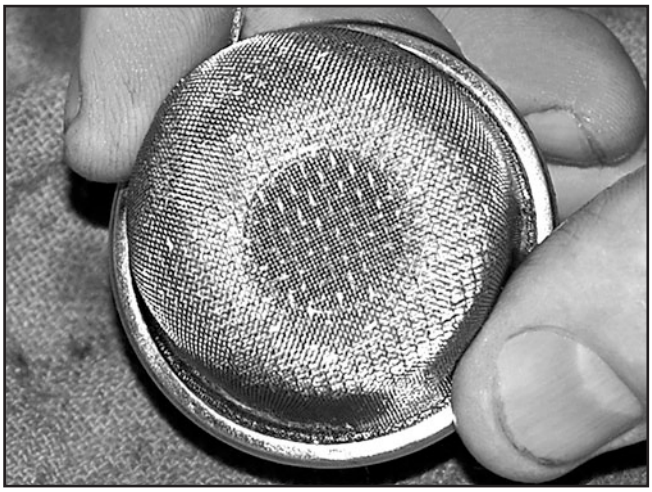


Figure 106. Suction screen.

6. Reinstall the screen assembly, access plate gasket, and plate.

7. Refill the tank with an ISO 32 or an equivalent general machine gearbox oil.

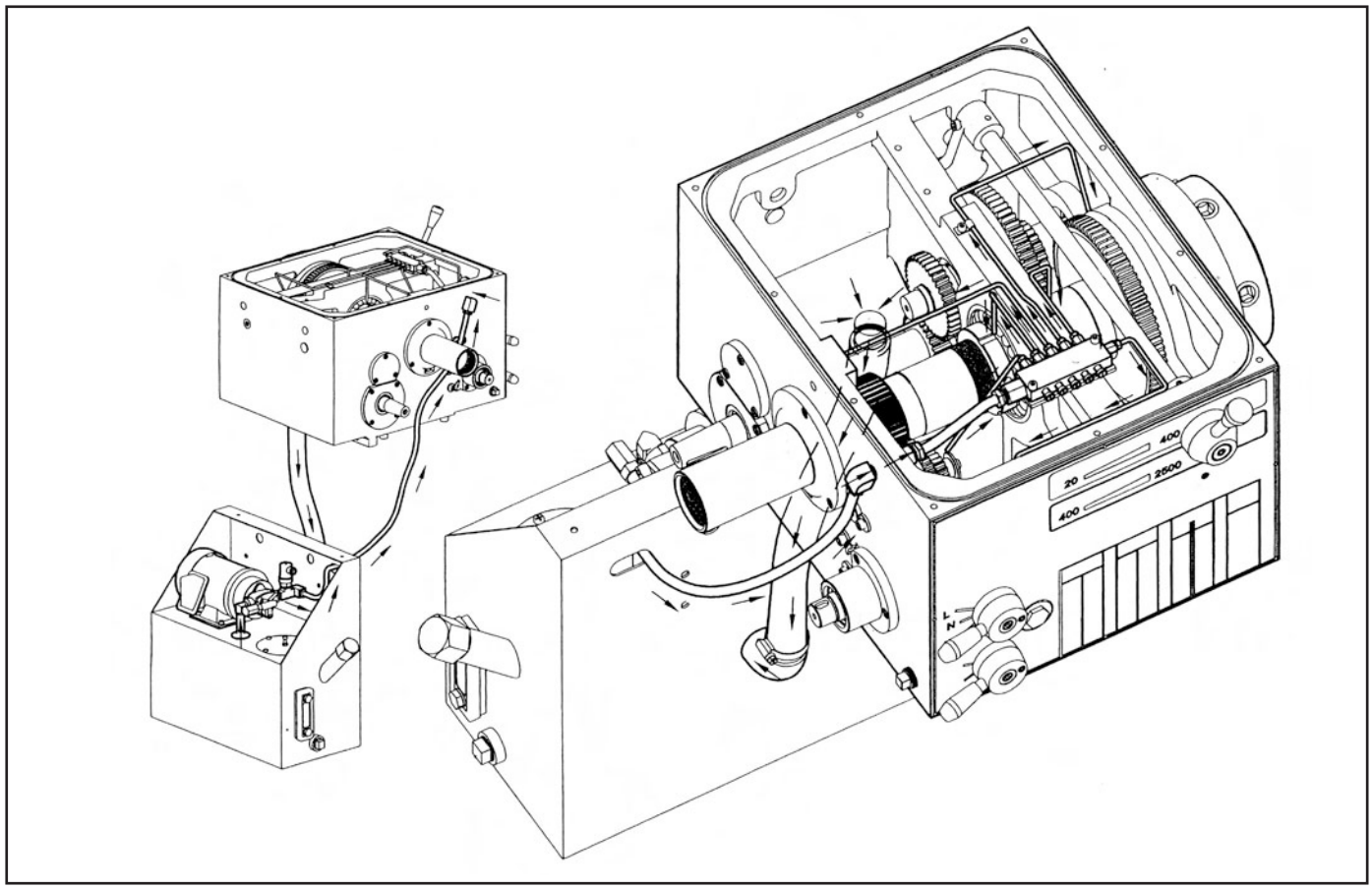


Figure 107. Headstock lubrication system oil flow diagram.

Cutting Fluid System

⚠WARNING

POISON AND BIOLOGICAL HAZARD! Use the correct personal protection equipment when handling cutting fluid and by follow federal, state, and fluid manufacturer requirements to properly dispose of cutting fluid.

The cutting fluid pump and reservoir are located in the base behind the vented cover on the tailstock end of the lathe.

To perform regular maintenance on the cutting fluid system:

1. Remove the access cover on the right end of the lathe (**Figure 108**).

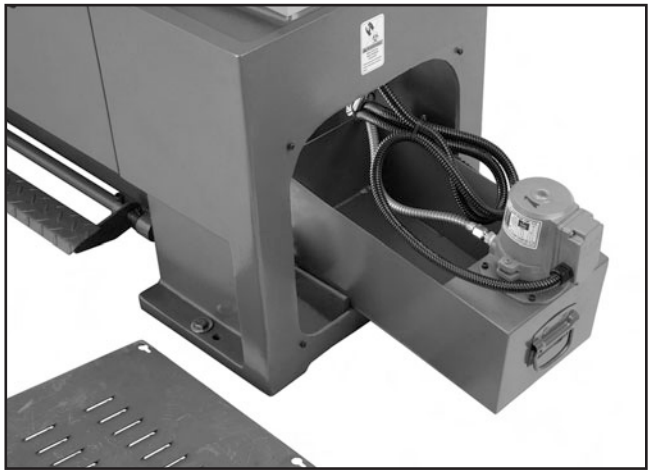


Figure 108. Cutting fluid pump and reservoir.

2. Pour the old cutting fluid out of the reservoir and dispose of according to State and Federal Environmental Laws.

3. Using a magnet, brush, and rags, clean out metal chips from the bottom of the reservoir. Flush with hot soapy water if needed.

4. Refill the reservoir with applicable cutting fluid. Closely follow the fluid manufacturer's instructions for mixing.

5. Open the valve on the cutting fluid nozzle.

6. Turn the cutting fluid pump ***ON*** (**Figure 109**) to prime the cutting fluid system and to see if the cutting fluid is cycling properly.

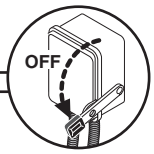
7. Replace the access cover.

Figure 109. Cutting fluid pump switch.

SECTION 7: SERVICE

Review the troubleshooting and procedures in this section to fix your machine if a problem develops. If you need replacement parts or you are unsure of your repair skills, then feel free to call our Technical Support at (570) 546-9663.

Troubleshooting



Motor & Electrical

Symptom	Possible Cause	Possible Solution
Machine does not start or a circuit breaker trips.	1. Emergency stop push-button is at fault. 2. Power supply is at fault/switched OFF. 3. Fuse has blown. 4. Plug/receptacle is at fault or wired incorrectly. 5. Oil pump motor inoperative. 6. Oil pump motor operating, but no oil is seen pumping in sight glass. 7. Low oil pressure switch is at fault. 8. Motor connection wired incorrectly. 9. Thermal overload relay has tripped. 10. Contactor not getting energized/has burnt contacts. 11. Wall fuse/circuit breaker is blown/tripped. 13. Wiring is open/has high resistance. 14. Spindle ON/OFF switch is at fault. 15. Motor is at fault. 16. Foot brake safety switch is faulty. 17. Frequency drive unit is at fault.	1. Rotate clockwise slightly until it pops out/replace it. 2. Correct power supply problem and turn ***ON***. 3. Correct short/replace fuse in main electrical box. 4. Test for good contacts; correct the wiring. 5. First time connection only: swap positions of power supply L1 and L2 wires at the lathe. Oil pump motor will start and oil pressure will close safety switch and allow lathe to run. Otherwise, repair pump motor, pump, or the electrical system. 6. Clean clogged tank suction screen (**Page 56**), fill headstock oil tank to full, or replace oil pump. 7. Oil is seen pumping, replace oil pressure switch. 8. Correct motor wiring connections. 9. Turn the thermal relay cut-out dial to increase working amps and push the reset pin. Replace if tripped multiple times (weak relay). 10. Test for power on all legs and contactor operation. Replace unit if faulty. 11. Ensure correct size for machine load; replace weak breaker. 13. Check for broken wires or disconnected/corroded connections, and repair/replace as necessary. 14. Move the spindle ON/OFF lever to ***ON***; replace bad switch. 15. Test/repair/replace. 16. Test, replace if needed. 17. 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 setscrews or keys are missing or loose. 2. Motor fan is hitting the cover.	1. Inspect keys and setscrews. Replace or tighten if necessary. 2. Tighten fan, shim cover, or replace items.
Motor overheats.	1. Motor overloaded. 2. Frequency drive unit is at fault.	1. Reduce load on motor. 2. Contact frequency drive manufacturer for list of authorized service providers in your area.
Motor is loud when cutting, or bogs down in the cut.	1. Excessive depth of cut or feed rate. 2. RPM or feed rate wrong for cutting operation. 3. Cutting tool is dull.	1. Decrease depth of cut or feed rate. 2. Refer to Cutting Speed Table for appropriate rates (**Page 40**). 3. Sharpen or replace the cutting tool.

Operation and Work Results

Symptom	Possible Cause	Possible Solution
Entire machine vibrates upon startup and while running.	1. Workpiece is unbalanced. 2. Loose or damaged belt(s). 3. V-belt pulleys are not properly aligned. 4. Worn or broken gear present. 5. Chuck or faceplate has become unbalanced. 6. Spindle bearings badly worn.	1. Reinstall workpiece as centered with the spindle bore as possible (**Page 27**). 2. Tighten/replace the belt as necessary (**Page 66**). 3. Align the V-belt pulleys. 4. Inspect gears and replace if necessary. 5. Rebalance chuck or faceplate (**Page 24**); contact a local machine shop for help. 6. Replace spindle bearings.
Bad surface finish.	1. Wrong spindle speed or feed rate. 2. Dull tooling or poor tool selection. 3. Too much play in gibs. 4. Tool too high.	1. Adjust for appropriate spindle speed and feed rate. 2. Sharpen tooling or select a better tool for the intended operation. 3. Tighten gibs (**Page 64**). 4. Lower the tool position.
Can't remove tapered tool from tailstock quill.	1. Quill is not retracted all the way back into the tailstock. 2. Contaminants were not removed from taper before inserting into quill.	1. Turn the quill handwheel until it forces taper out of quill. 2. Clean the taper and bore and reinstall tapered tool.
Cross slide, compound, or carriage feed has sloppy operation.	1. Gibs are out of adjustment. 2. Handwheel is loose. 3. Lead screw mechanism worn or out of adjustment.	1. Tighten gib screw(s) (**Page 64**). 2. Tighten handwheel fasteners. 3. Adjust leadscrew to remove endplay (**Page 63**).
Cross slide, compound, or carriage feed handwheel is hard to move.	1. Gibs are loaded up with shavings, dust, or grime. 2. Gib screws are too tight. 3. Backlash setting too tight (cross slide only). 4. Bedways are dry.	1. Remove gibs, clean ways/dovetails, lubricate, and readjust gibs (**Page 64**). 2. Loosen gib screw(s) slightly (**Page 64**), and lubricate bedways. 3. Slightly loosen backlash setting (**Page 62**). 4. Lubricate bedways and handles.
Cutting tool or machine components vibrate excessively during cutting.	1. Tool holder not tight enough. 2. Cutting tool sticks too far out of tool holder; lack of support. 3. Gibs are out of adjustment. 4. Dull cutting tool. 5. Incorrect spindle speed or feed rate.	1. Check for debris, clean, and retighten. 2. Reinstall cutting tool so no more than 1/3 of the total length is sticking out of tool holder. 3. Tighten gib screws at affected component (**Page 64**). 4. Replace or resharpen cutting tool. 5. Use the recommended spindle speed.
Inaccurate turning results from one end of the workpiece to the other.	1. Headstock and tailstock are not properly aligned with each other.	1. Realign the tailstock to the headstock spindle bore center line (**Page 31**).
Chuck jaws won't move or don't move easily.	1. Chips lodged in the jaws.	1. Remove jaws, clean and lubricate chuck threads, and replace jaws (**Page 29**).
Carriage won't feed.	1. Gears are not all engaged. 2. Loose screw on the feed handle. 3. Gears or shear pin broken.	1. Adjust gear levers. 2. Tighten. 3. Replace gears or shear pin.

Operation and Work Results

Symptom	Possible Cause	Possible Solution
Carriage hard to move.	1. Carriage lock is tightened down. 2. Chips have loaded up on bedways. 3. Bedways are dry and in need of lubrication. 4. Longitudinal stops are interfering. 5. Gibs are too tight.	1. Check to make sure the carriage lock bolt is fully released. 2. Frequently clean away chips that load up during turning operations. 3. Lubricate bedways and handles. 4. Check to make sure that stops are floating and not hitting the center stop. 5. Loosen gib screw(s) slightly (**Page 64**).
Gear change levers will not shift into position.	1. Gears not aligned in headstock.	1. Rotate spindle by hand until gear falls into place.
Loud, repetitious noise coming from machine (Non-motor related).	1. Gears not aligned in headstock or no backlash. 2. Broken gear or bad bearing. 3. Workpiece is hitting stationary object.	1. Adjust gears and establish backlash. 2. Replace broken gear or bearing. 3. Stop lathe immediately and correct interference problem.

Slide Leadscrew Adjustment

NOTICE

Avoid the temptation to overtighten the backlash set screw. Overtightening will cause excessive wear to the wedge, half nut, and lead screw. Reducing backlash to less than 0.001" is impractical and reduces cross slide and compound slide life.

Compound

Backlash is adjusted by tightening the set screws shown in **Figure 110**. These screws when push against the leadscrew nut taking up lash between the half nut and leadscrew. If you get the half 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 the it turns freely. To readjust the backlash, rock the handle back-and-forth, and tighten the screw slowly until the backlash is at approximately 0.001" as indicated on the handwheel dial.

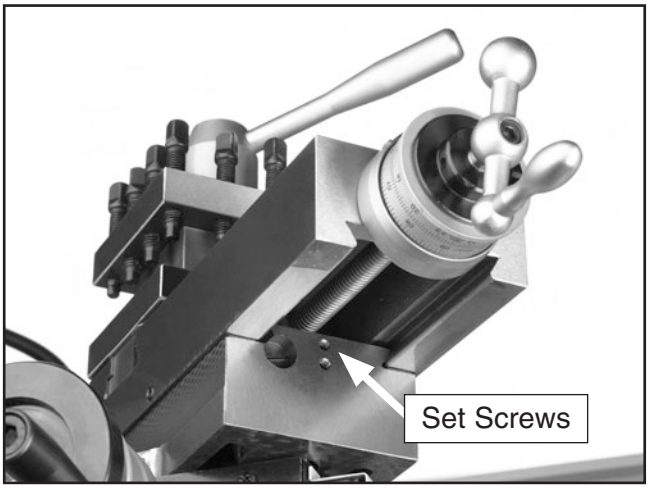


Figure 110. Compound backlash adjustment.

Cross Slide

Backlash can be found by turning the cross slide handwheel in one direction, then turning the handwheel the other direction. When the cross slide begins to move, the backlash has been taken up.

Backlash is adjusted by loosening all four cap screws shown in **Figure 111**, and then tightening the center set screw, which in turn pushes down on a wedge that forces the half nut apart, taking up lash in the half nut and leadscrew. If you get the half 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 readjust the backlash, rock the handle back and forth and tighten the screw set screw slowly until the backlash is at approximately 0.001" as indicated on the handwheel dial.

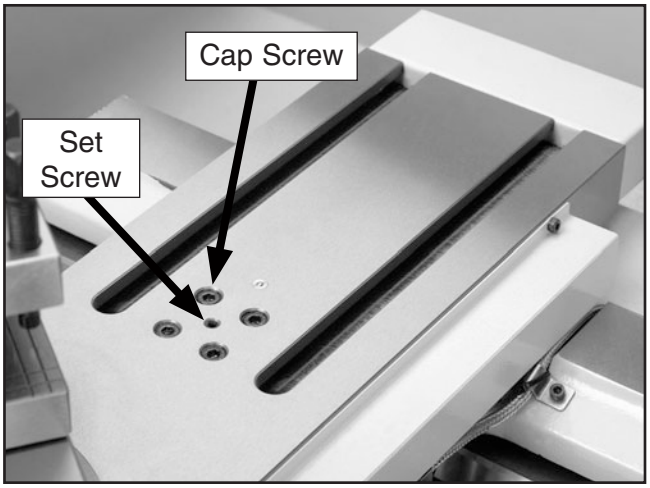


Figure 111. Cross slide backlash adjustment.

Leadscrew End Play Adjustment

After a long period of time, you may find that the lead screw has developed some end play. This lathe is designed so that leadscrew end play can be easily removed.

Tools Needed: **Qty**
Open End Wrench 1" 1
Hex Wrench 3mm 1
Hex Wrench 5mm 1

To remove leadscrew end play:

1. DISCONNECT LATHE FROM POWER.

2. Using a 5mm hex wrench, remove the three cap screws and the end cover.

3. Using a 3mm hex wrench, loosen both retaining nut set screws (**Figure 112**).

4. Engage the half nut lever and manually rotate the carriage feed handwheel back-and-forth slightly to test for end play. While you are doing this, tighten the retaining nut until all leadscrew end play is removed.

5. Tighten both set screws, reinstall the cover, and top-off the housing with oil.

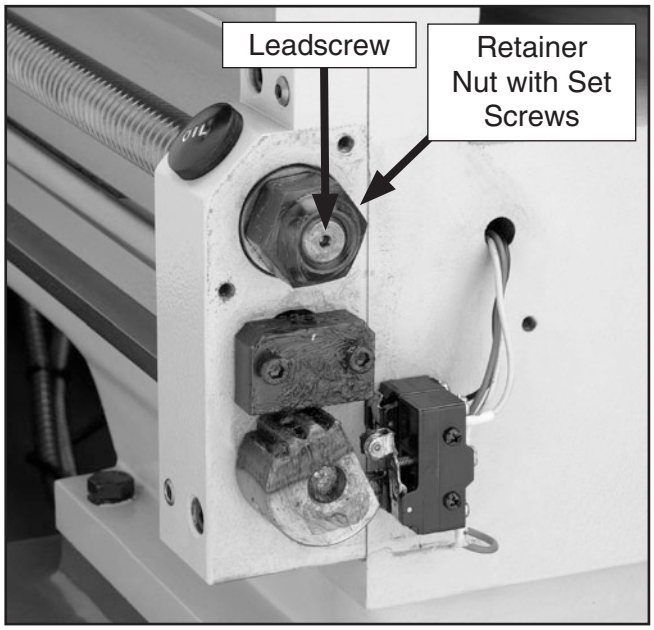


Figure 112. Leadscrew end play adjustment.

Half Nut Adjustment

When adjusting the half nut gibs, remove the thread dial to expose the two gib screws. The goal is to remove sloppiness in the ways without binding the half nut.

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

Use a 3mm hex wrench to turn the two set screws (**Figure 113**) clockwise until the half nuts are slightly pre-loaded against the leadscrew. When finished the halfnut lever must still clamp without binding.

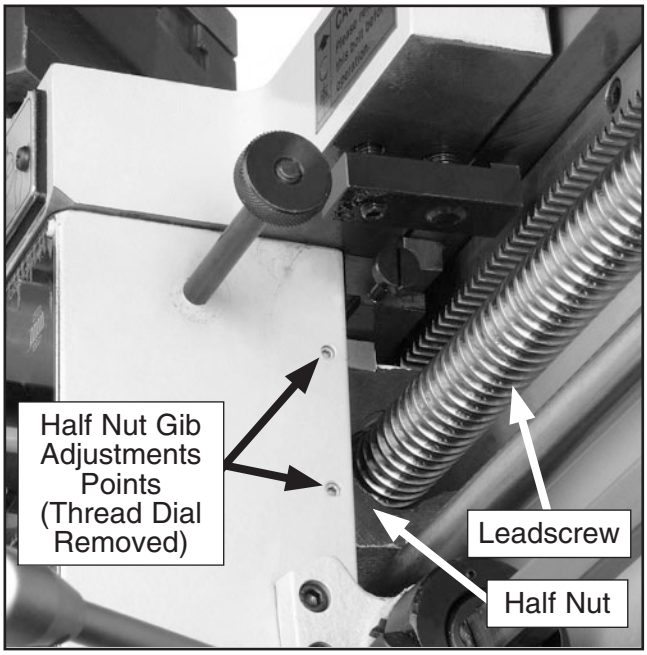


Figure 113. Half nut gib adjustment.

Gib Adjustment

When adjusting the cross slide, tailstock, saddle, and compound gib screws (**Figures 114-116**), the goal is to remove sloppiness in the ways without binding. Loose gibs will cause a poor finish on the workpiece and tool chatter. Over-tightening may cause premature wear on the slide, lead screw, and half nut.

The cross slide, tailstock, saddle, and compound gibs use a tapered piece of iron which is held in position by two gib screws at opposing ends of the gib. When these opposing front and rear gib adjustment screws are turned in opposite directions from each other, (one screw clockwise and the other counterclockwise, or vise-versa) the single gib will be pushed to fill the loose void in the way. Thus, the play in the slide is removed. If more play is needed, adjust the screws so the gib is moved and held in the opposite direction.

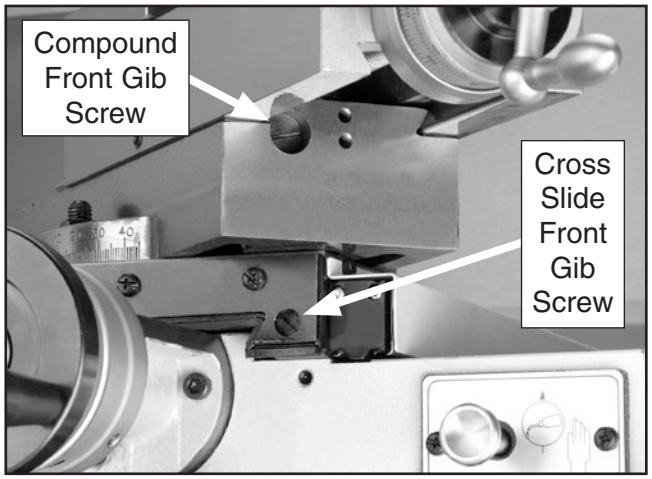


Figure 114. One of two cross slide and compound gib screws.

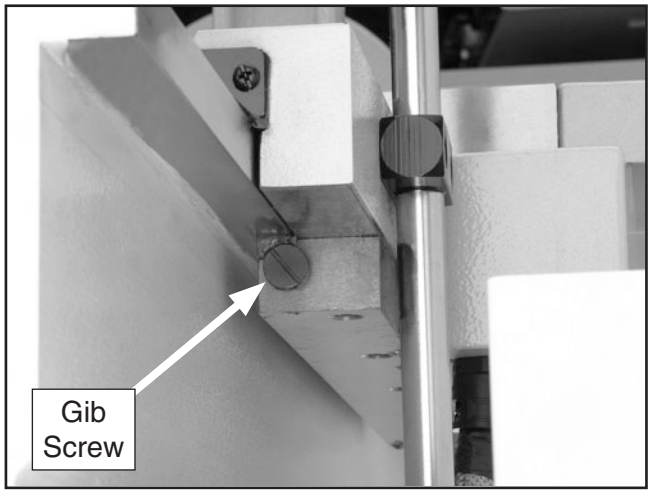


Figure 115. One of two rear saddle gib screws.

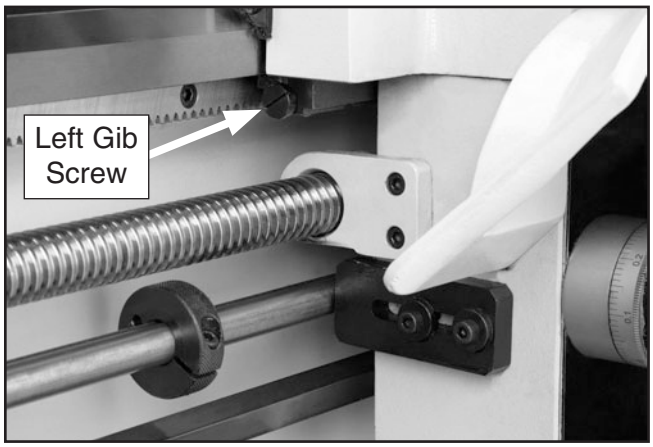


Figure 116. One of two front saddle gib screws.

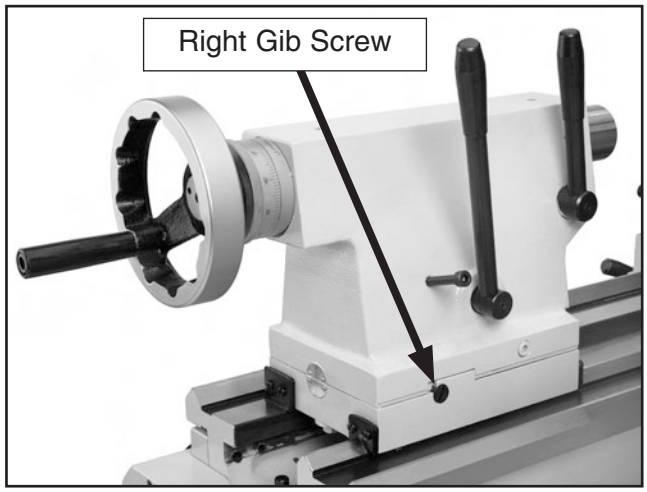


Figure 117. One of two tailstock gib screws.

Feedrod Clutch Adjustment

This lathe has an adjustable feed clutch that helps protect the drivetrain from overload. The feed clutch release point is adjusted at the factory. However, depending on the type of cutting that you do, you may need to readjust the release point.

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

To adjust the clutch release point:

1. DISCONNECT LATHE FROM POWER!

2. Remove the phillips head screws and the front/side feed access covers (**Figure 118**).

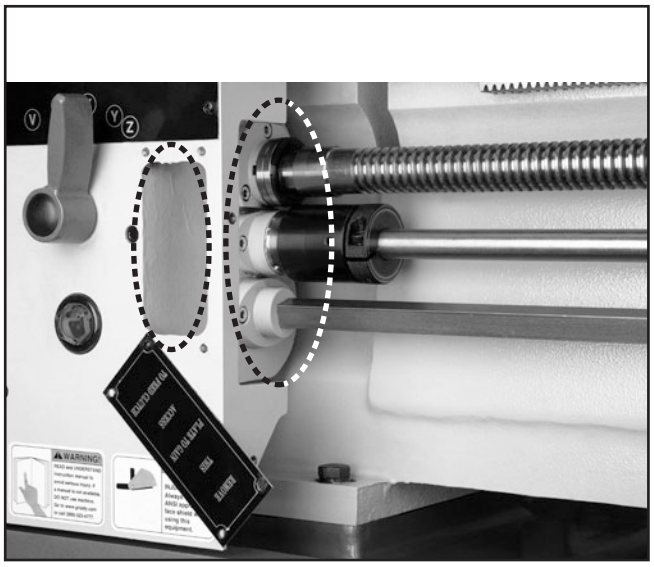


Figure 118. Feed access cover locations.

3. Using the hex wrench, remove the clutch collar set screw (**Figure 119**).

4. Insert the hex wrench into the collar adjustment holes (**Figure 120**), and use the wrench as a spanner to rotate the clutch collar.

   —If you need to increase the release point, rotate the clutch collar upward.

   —If you need to decrease the release point, rotate the clutch collar downward.

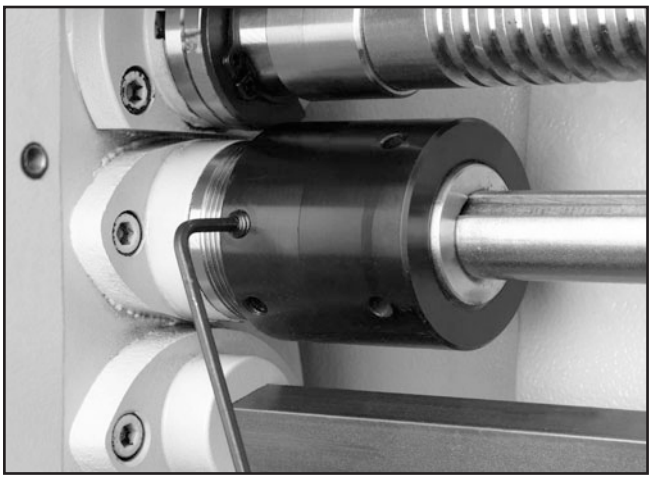


Figure 119. Feed clutch assembly.

5. Line up the set screw hole in the clutch collar with the closest slot (**Figure 120**) that is cut into the feedrod.

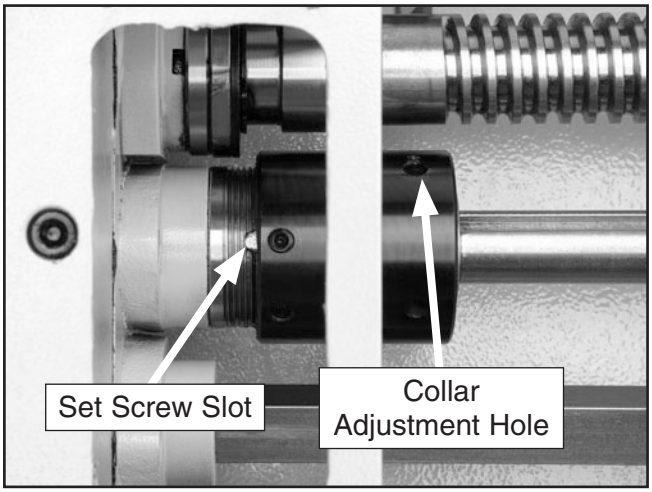


Figure 120. Feed clutch set screw alignment.

6. Install and tighten the set screw so it is fully seated in the slot.

7. Reinstall both access covers.

V-Belts

V-belts wear with use. Check and adjust V-belts on a monthly basis to ensure optimum brake and lathe performance.

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

To adjust or replace the V-belts on the lathe:

1. DISCONNECT LATHE FROM POWER!

2. Use the screwdriver to remove the four motor cover retaining screws.

3. Use the wrench to adjust the belt tension hex nuts (see **Figure 121**). There is approximately ¾" belt deflection on each belt when pressed firmly in the center between the pulleys.

   Note: *Replace all three belts as a matched set even if only one shows cracking, glazing, or fraying.*

4. Reinstall the motor cover.

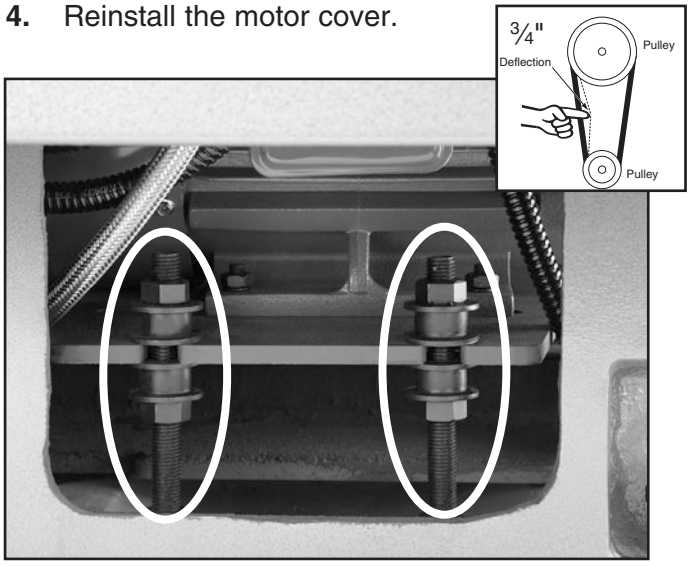


Figure 121. V-belt adjustment.

Brake and Switch

As the brake lining wears, the foot pedal develops more travel. If the brake band is not adjusted to compensate for normal wear, the limit switch will still turn the lathe off, but the spindle will not stop as quickly. It is especially important that the brake is kept in adjustment so you can stop the spindle quickly in an emergency.

Tools Needed: **Qty**
#2 Phillips Screwdriver 1
6mm Hex Wrench 1

To adjust the brake and brake switch:

1. DISCONNECT LATHE FROM POWER!

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

3. Remove the motor cover.

4. Measure the remaining brake band lining at the thinnest point, usually at the 8 O'clock position (**Figure 122**).

   When the brake band is new, the lining is approximately 6mm thick. If the lining thickness wears to 3mm or less, the brake band must be replaced, or the rivets that secure the lining to the band will wear grooves into the brake hub.

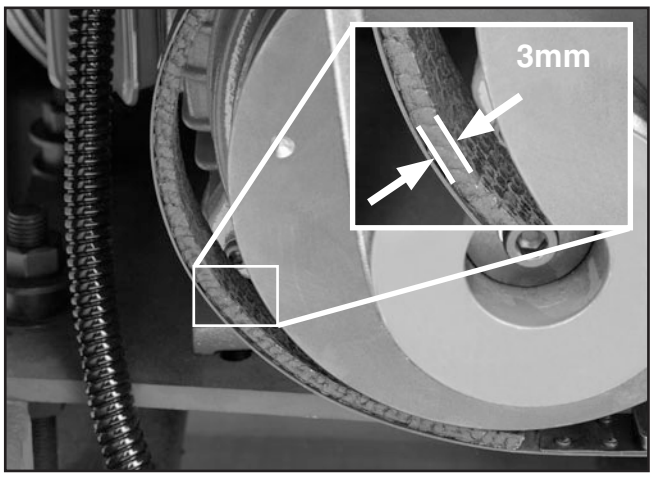


Figure 122. Minimum brake band lining thickness.

5. Use a 6mm hex wrench to remove the cap screw, lock washers, and the pedal stop (**Figure 123**).

6. Move the brake band to the right one hole and reinstall the pedal stop, washers, and cap screw lock so the pedal stop is just snug.

   —If you are installing a new brake band, install the cap screw so there is one hole to the left for future brake adjustment.

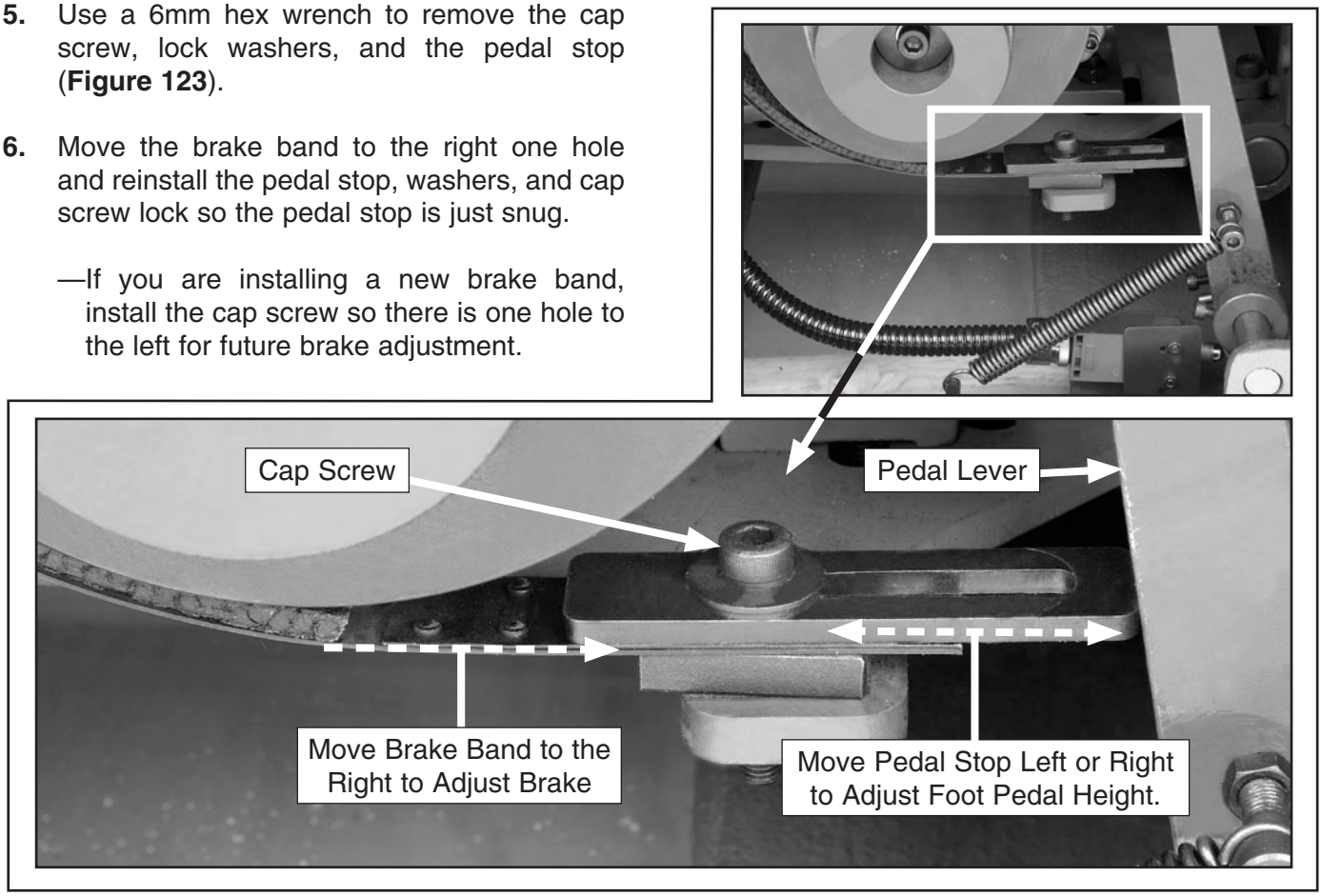


Figure 123. Brake linkage adjustments.

7. Firmly push the pedal lever to the right (**Figure 124**) until it stops and the brake band is fully clamped around the brake hub.

8. Tap the pedal stop into position so there is approximately a 25mm gap between the pedal lever and the stop (**Figure 124**).

9. Tighten the cap screw lock.

10. Push the pedal lever to the right again to the end of its stroke, and verify that the cam lobe pushes the limit switch plunger (**Figure 124**) in so you can hear the switch click.

    —If no click is heard, loosen the switch mounting screws, and move it to the right so that the switch clicks at the end of the pedal stroke. When the pedal is in its released position, there should be approximately 3mm of clearance between the plunger roller and the cam lobe.

11. Reinstall the cover and test the brake operation.

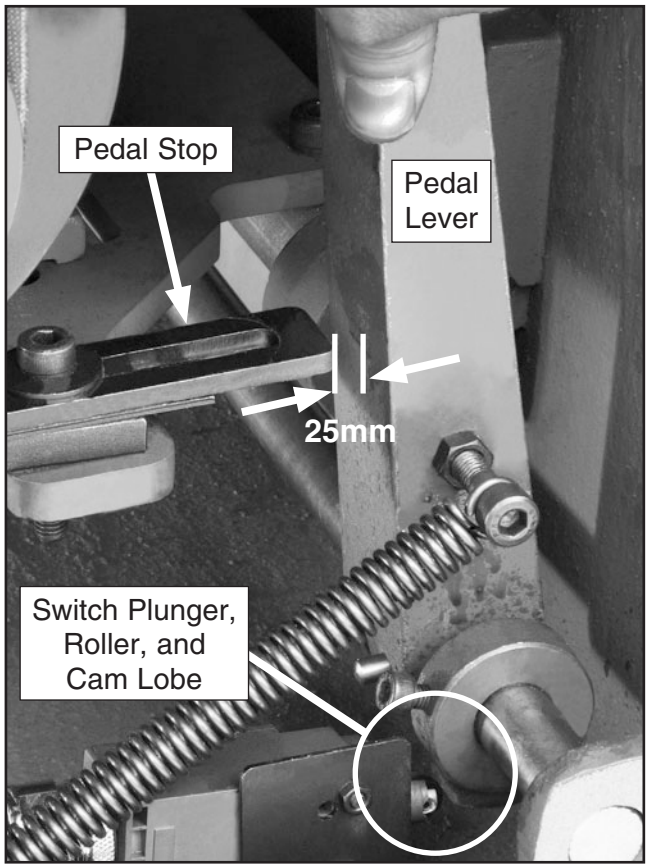


Figure 124. Pedal travel adjustment.

Leadscrew Shear Pin Replacement

If you break the leadscrew shear pin during a threading operation, replacement is quick and easy. If you do not have an extra shear pin on hand, you can turn one on your lathe if you follow the specifications in **Figure 125**.

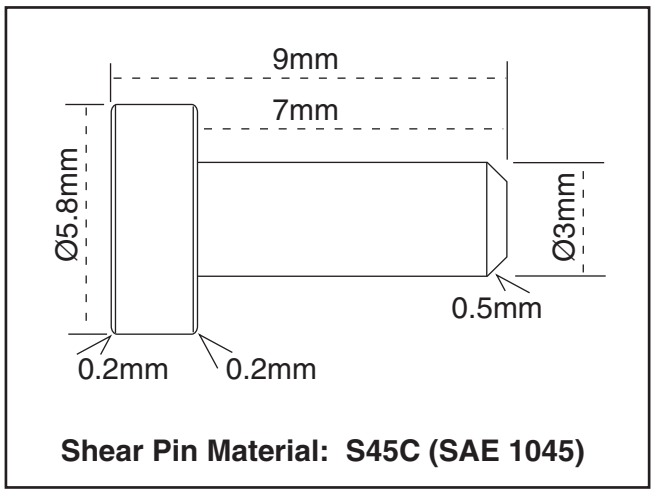


Figure 125. Shear pin specifications.

Tools Needed: **Qty**
Phillips Screwdriver #2 1
External Retaining Ring Pliers #1 1
Magnet and Safety Goggles..... 1

To replace the shear pin:

1. DISCONNECT LATHE FROM POWER!

2. Remove the Phillips head screws and the front and side access covers (**Figure 126**).

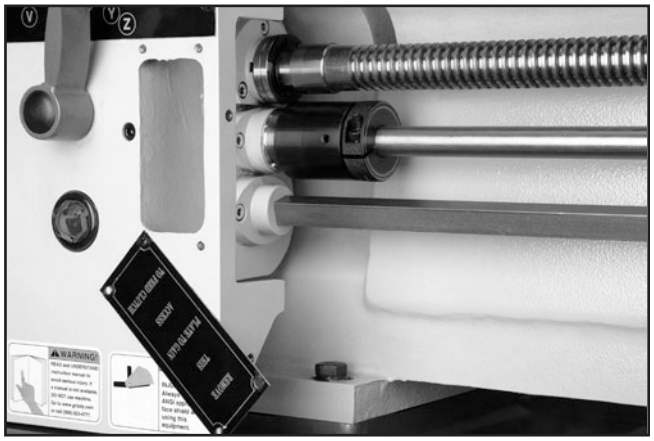


Figure 126. Feed clutch access covers removed.

3. Rotate the shroud washer so the cutout lines up with the shear pin head (**Figure 127**).

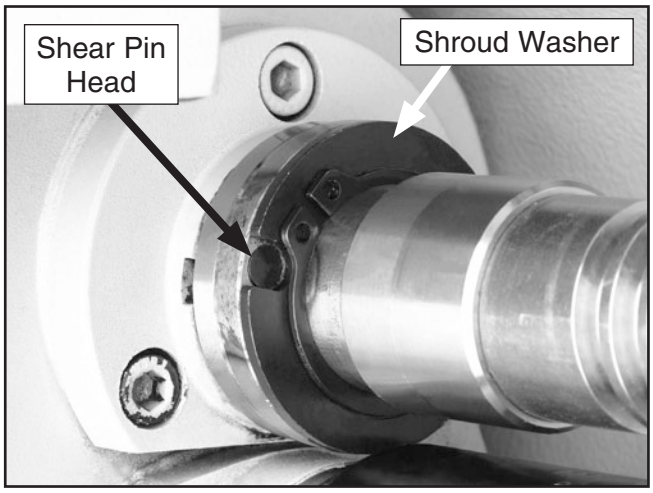


Figure 127. Shroud washer/pin alignment.

4. Put on your safety goggles.

5. Using retaining ring pliers remove the retaining ring from its groove and place it in the rear most position away from the shroud washer (**Figure 128**).

6. Move the shroud washer away from the shear pin to the rear position so there is a gap to remove the shear pin (**Figure 128**).

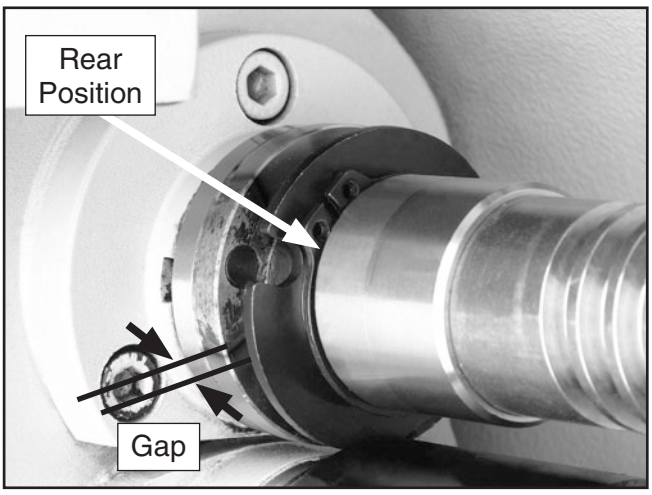


Figure 128. Shear pin access.

7. Using a magnet, remove the shear pin head, then rotate the lathe spindle to line up the bore that has the rest of the shear pin inside, and use the magnet to remove the other half of the broken shear pin (**Figure 129**).

8. Using a blow gun tip inserted into the shear pin hole, blow out the hole with compressed air and apply a drop of oil in the hole.

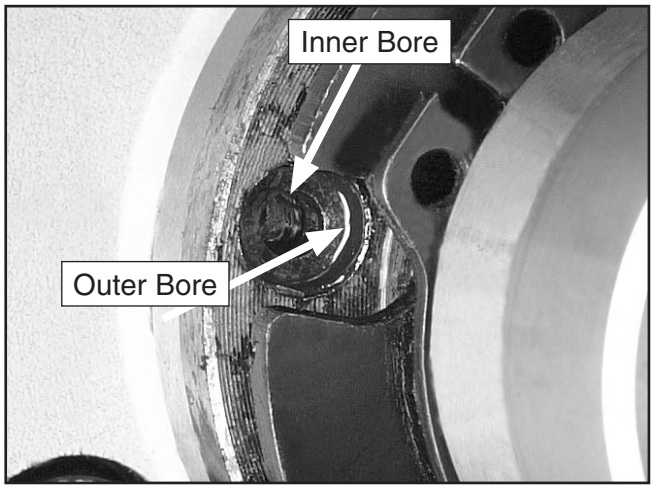


Figure 129. Aligned shear pin bores.

9. Insert the new shear pin into the bore (**Figure 130**).

   —If the pin does not freely slide into the bore, DO NOT hammer on the pin or you may permanently damage the shear mechanism and bore making it next to impossible to remove and install a new shear pin.

   Instead, take the time and carefully line up the two bores. You may file a slight chamfer on the end of the pin to assist in pin insertion.

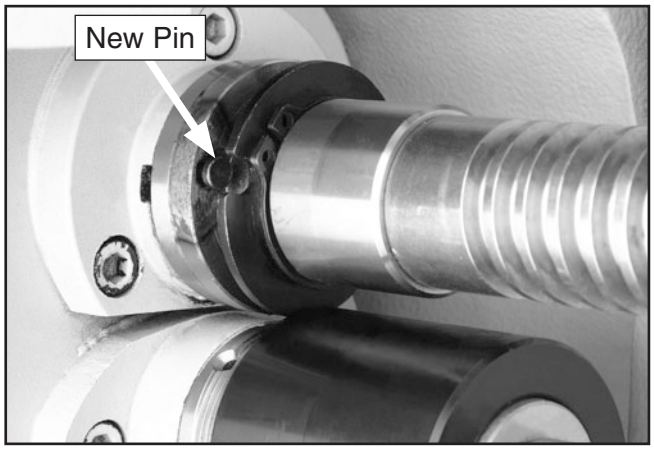


Figure 130. Pin installation.

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 the washer 180° so the washer covers the head of the shear pin (**Figure 131**).

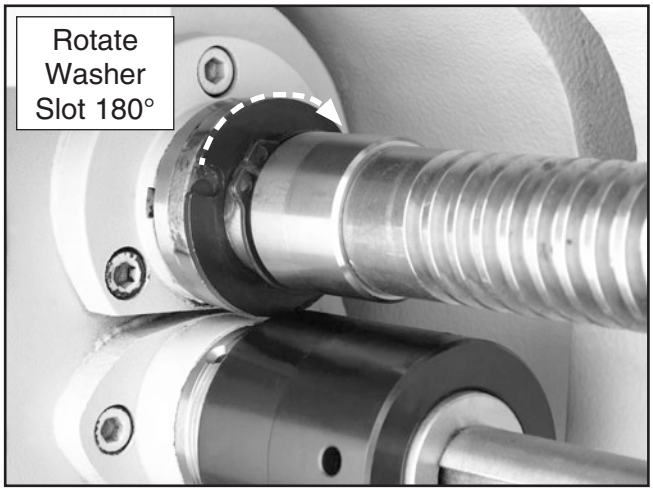


Figure 131. Shroud washer positioning.

11. Using retaining ring pliers, return the retaining ring to its groove, and position the retaining ring ears over the shear pin head.

    If the shroud washer rotates and the pin access groove lines up with the pin, the snap ring ears will still prevent the shear pin from falling out (**Figure 132**).

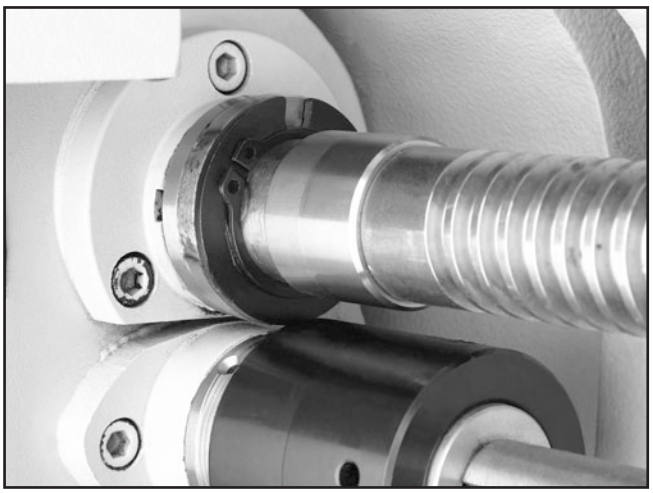


Figure 132. Retaining ring final installation.

12. Reinstall the access covers.

Gap Removal & Installation

Your lathe has a gap section below the spindle that can be removed for turning large diameter parts. This gap was installed, then ground at the factory during lathe assembly for precise fit and alignment. Factors during the remaining assembly apply additional forces to the gap; therefore, replacing the gap to the original position will be very difficult.

NOTICE

We don't recommend removing the gap. Reinstallation to exact factory alignment is nearly impossible. The only option is to then leave the gap out.

To remove the gap:

1. Using an 8mm hex wrench, remove the four cap screws (**Figure 133**) from the bottom of the gap.

2. Using a 6mm hex wrench, remove the two capscrews from the ends of the ways, and then with the 4mm hex wrench, remove the two bed set screws (**Figure 133**).

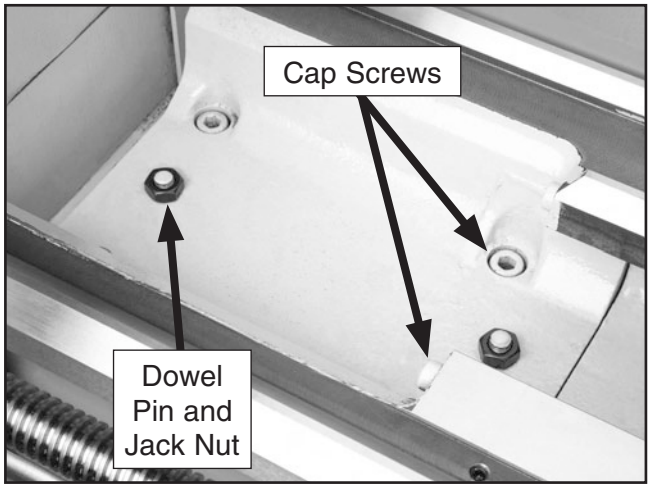


Figure 133. Lathe gap.

3. Using a 17mm wrench, tighten the two dowel pin jack nuts (**Figure 133**) until the pins are pulled free from the gap.

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

To reinstall the gap:

1. Using mineral spirits and a clean lint-free rag, clean the mating surfaces of the gap, bed, and ways.

2. Wipe a layer of light machine oil on all freshly cleaned surfaces.

3. Using a block of wood or dead-blow hammer, fully seat the gap in the lathe bed with the best possible alignment.

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

5. Install all fasteners into position, and lightly snug them in place.

6. Study the shape of the gap and the orientation of the fasteners to determine which fasteners need to be tightened first, and in which sequence, so the gap will realign with the ways.

7. Using the hex wrenches and a dead-blow hammer or block of wood, alternately tighten the fasteners and tap the gap into alignment.

8. Inspect the gap position 24-hours later to make sure the gap is still aligned.

   — If it has shifted slightly, use the hex-wrenches and dead-blow hammer or a block of wood again. Alternately loosen and tighten the fasteners at the shifted location, and adjust the gap into final alignment.

SECTION 8: WIRING

These pages are current at the time of printing. However, in the spirit of improvement, we may make changes to the electrical systems of future machines. Study this diagram carefully. If you notice differences between your machine and these wiring diagrams, call Technical Support at (570) 546-9663 for assistance.

⚠WARNING
Electrical Safety Instructions

1. **PRINTED INFORMATION.** The electrical information included in this section is current at the time of printing. However, in the spirit of improvement, we may make changes to the electrical system of future machines. Study the photos and diagrams in this section carefully. If you notice differences between your machine and these diagrams, call Technical Support at (570) 546-9663 for assistance.

2. **FREQUENCY DRIVE.** The frequency drive inside the electrical cabinet was configured for your machine at the factory. It should not need any adjustment. Making changes to the frequency drive may cause damage to the machine and void the warranty.

3. **SHOCK HAZARD.** Disconnect the power from the machine before servicing electrical components. Touching electrified parts will result in personal injury including but not limited to severe burns, electrocution, or death.

4. **CIRCUIT REQUIREMENTS.** You MUST follow circuit requirements given on **Page 14**. **If you are unsure about the wiring codes in your area or you plan to connect your machine to a shared circuit, consult a qualified electrician.**

5. **220V SINGLE-PHASE POWER.** This machine uses a frequency drive to convert incoming single-phase power to 3-phase for greater spindle motor performance. Attempting to change this design may result in serious personal injury, damage to the machine, and may void the warranty.

6. **GROUNDED CIRCUIT.** Electrocution or fire could result if the machine is not grounded and installed in compliance with electrical codes. Compliance MUST be verified by a qualified electrician.

7. **MOTOR WIRING.** The motor wiring shown in these diagrams are current at the time of printing, but it may not match your machine. Always use the wiring diagram inside the motor junction box.

8. **EXPERIENCING DIFFICULTIES.** If at any time you are experiencing difficulties understanding the information included in this section, contact our Technical Support at (570) 546-9663.

NOTICE

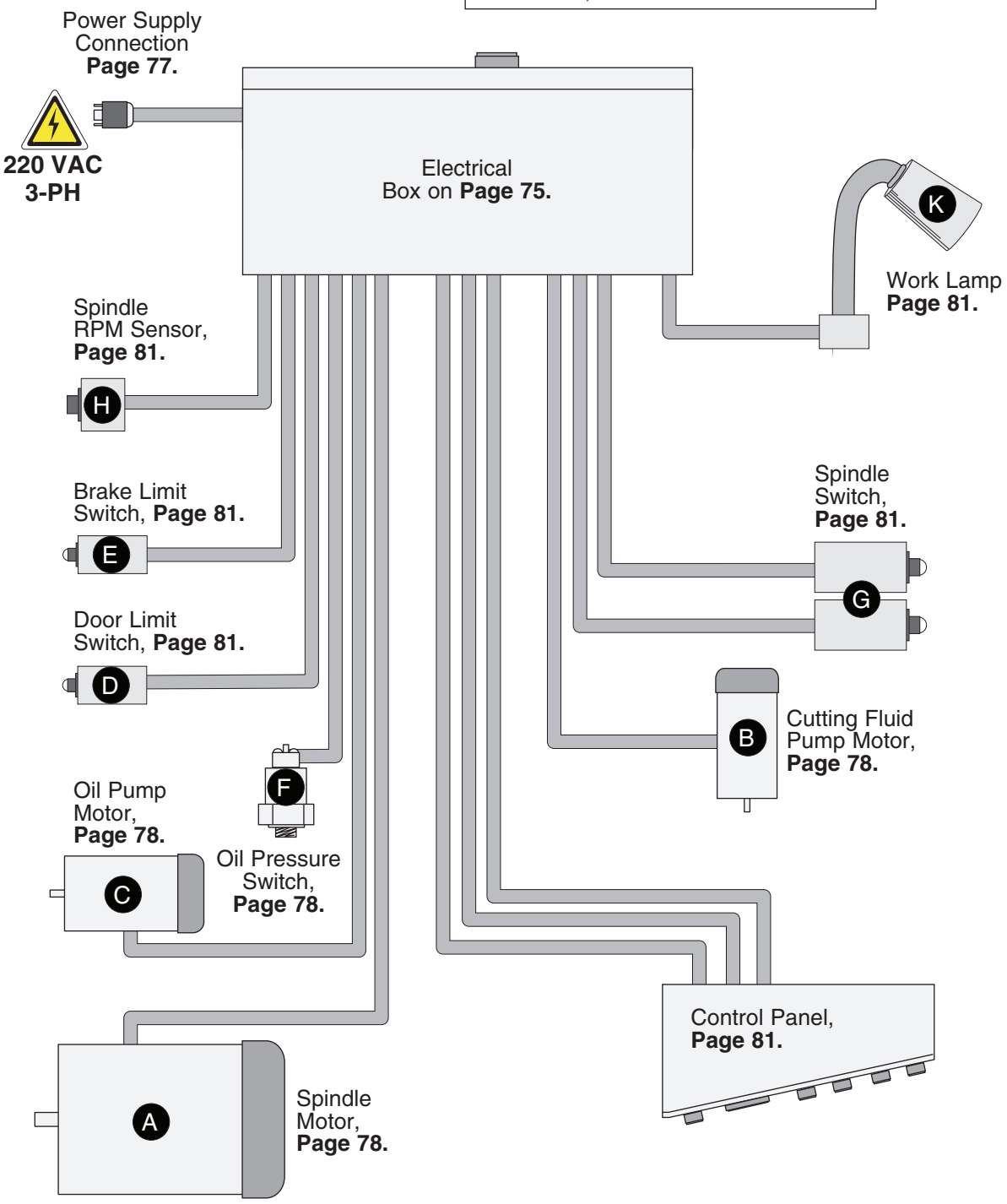
The photos and diagrams included in this section are best viewed in color. You can view these pages in color at *www.grizzly.com.*

General Wiring Diagram Index

DANGER

SHOCK HAZARD!

Disconnect power and wait five minutes to allow Varispeed unit capacitors to discharge before servicing electrical parts. Touching electrified parts will result in severe burns, electrocution, or death.



Electrical Box Wiring Diagram Index

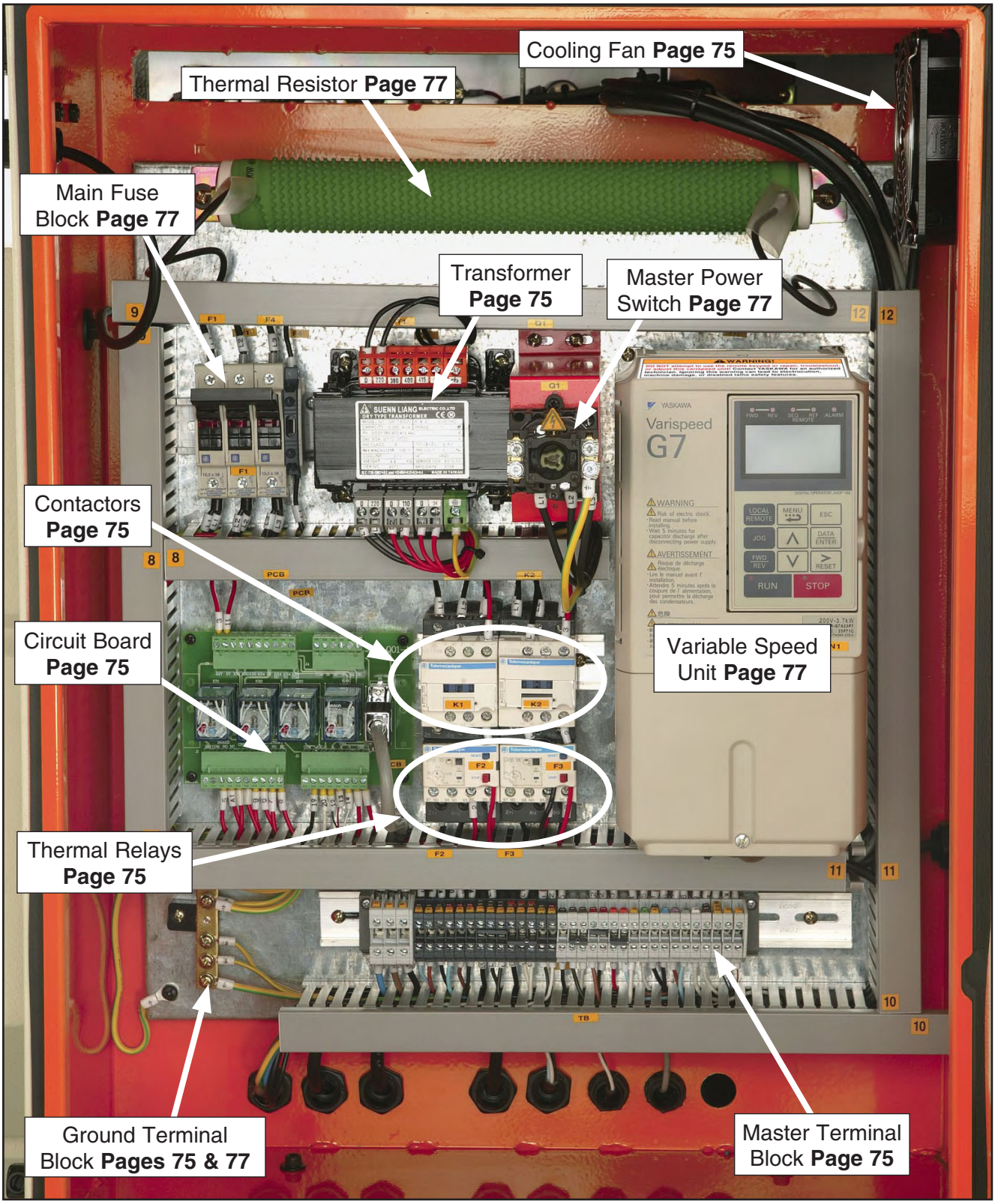


Figure 134. Electrical box.

Electrical Component Index

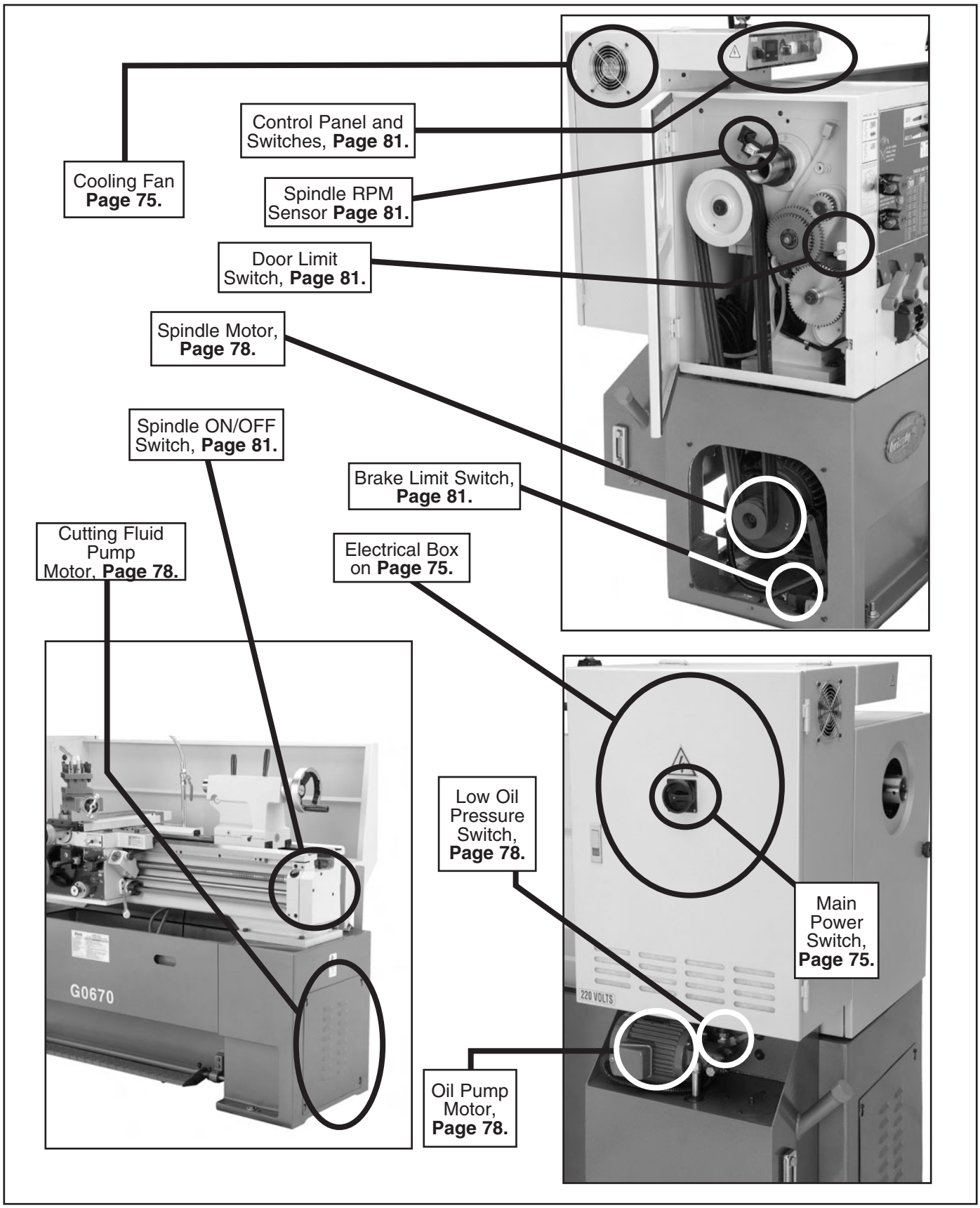
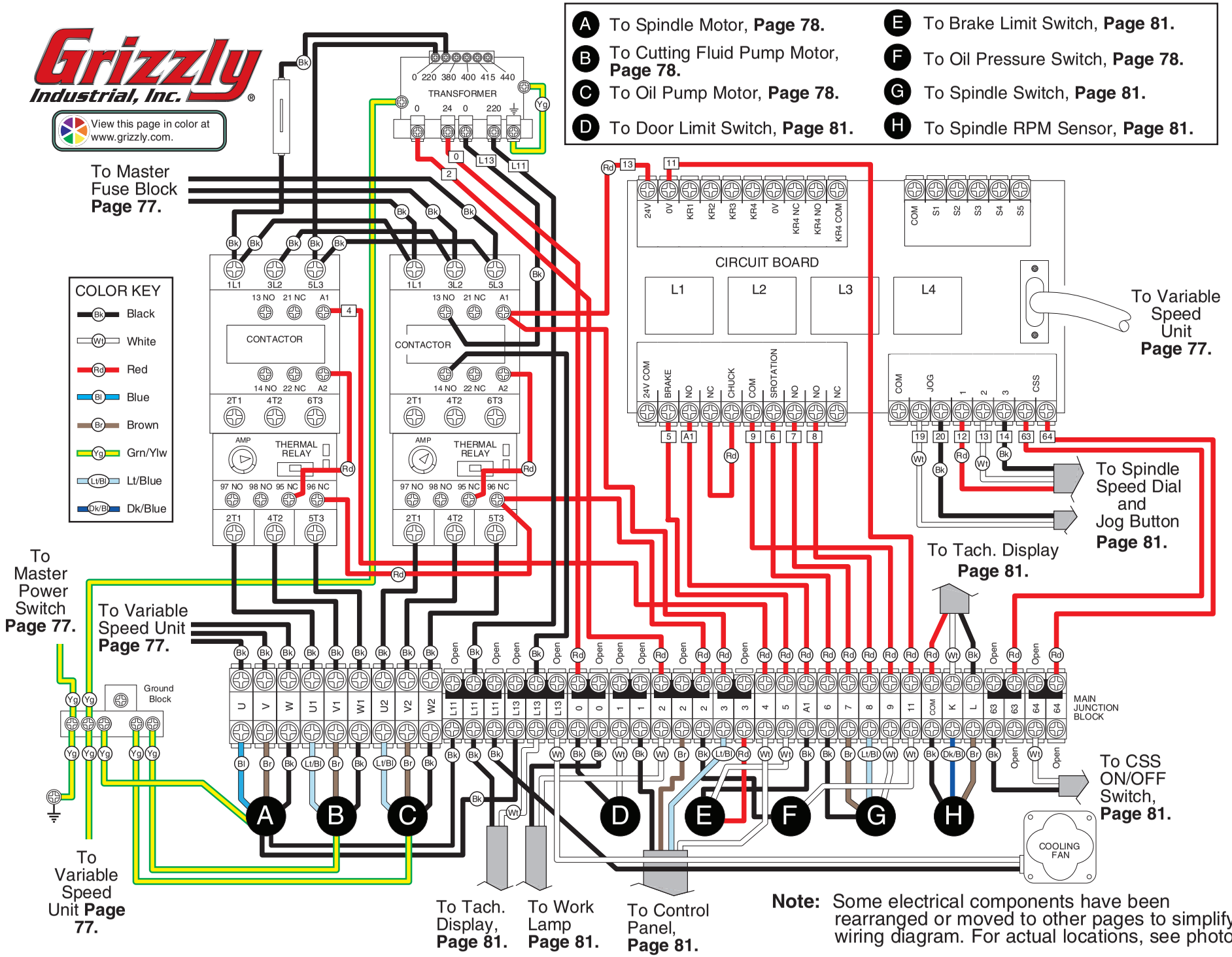


Figure 135. Component locations.



Note: Some electrical components have been rearranged or moved to other pages to simplify wiring diagram. For actual locations, see photos.

Variable Speed Drive Unit

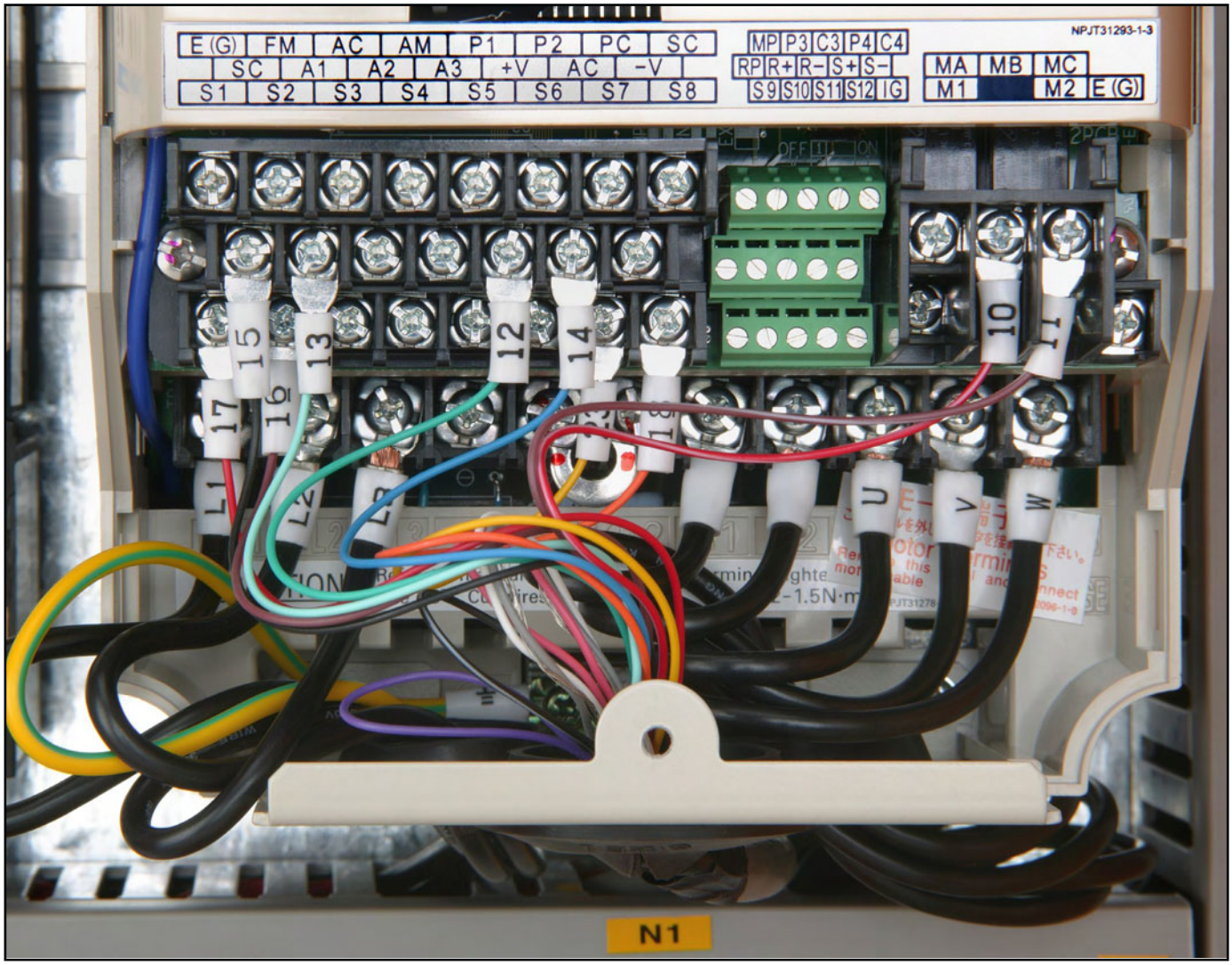
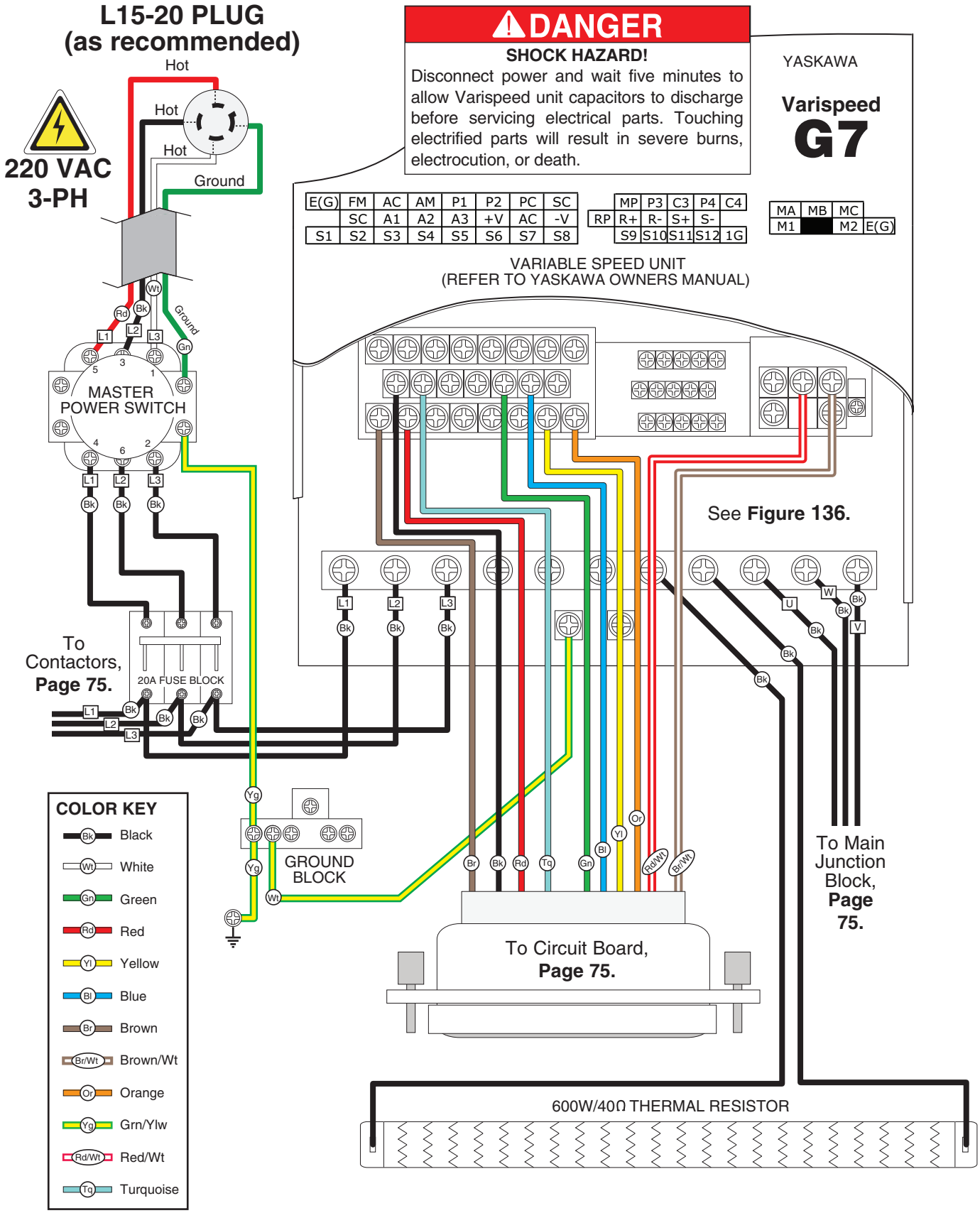


Figure 136. Variable speed drive unit connection.


L15-20 PLUG
(as recommended)
Hot
Hot
Hot
Ground
220 VAC
3-PH
DANGER
SHOCK HAZARD!
Disconnect power and wait five minutes to allow Varispeed unit capacitors to discharge before servicing electrical parts. Touching electrified parts will result in severe burns, electrocution, or death.
YASKAWA
Varispeed
G7
E(G) FM AC AM P1 P2 PC SC
SC A1 A2 A3 +V AC -V
S1 S2 S3 S4 S5 S6 S7 S8
MP P3 C3 P4 C4
RP R+ R- S+ S-
S9 S10 S11 S12 1G
MA MB MC
M1 M2 E(G)
VARIABLE SPEED UNIT
(REFER TO YASKAWA OWNERS MANUAL)
MASTER
POWER SWITCH
See Figure 136.
To
Contactors,
Page 75.
20A FUSE BLOCK
GROUND
BLOCK
To Main
Junction
Block,
Page
75.
To Circuit Board,
Page 75.
600W/40Ω THERMAL RESISTOR
COLOR KEY
Black
White
Green
Red
Yellow
Blue
Brown
Brown/Wt
Orange
Grn/Ylw
Red/Wt
Turquoise

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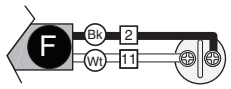
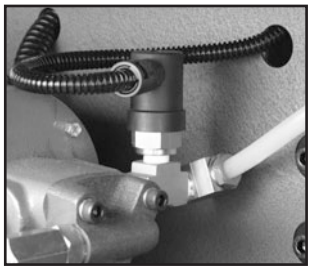
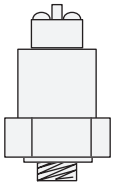
COLOR KEY

- Bk — Black
- Wt — White
- Rd — Red
- Bl — Blue
- Br — Brown
- Yg — Yellow
- Lt/Bl — Lt/Blue
- Or — Orange

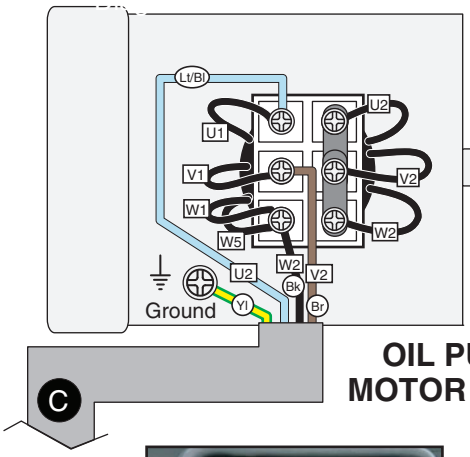
To Main Junction Block on **Page 75.**





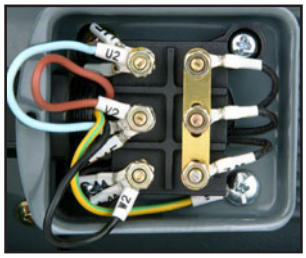


Low Oil Pressure Switch.

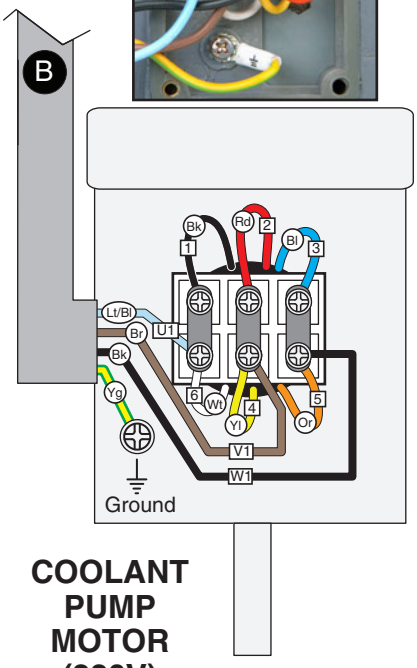


OIL PUMP MOTOR (220V)

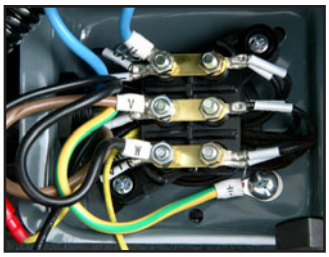
To Main Junction Block on **Page 75.**



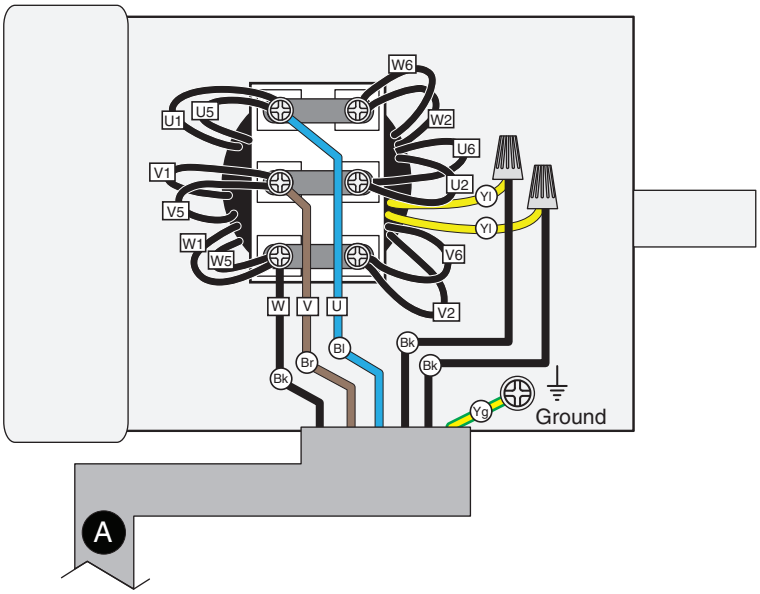
To Main Junction Block on **Page 75.**



COOLANT PUMP MOTOR (220V)



SPINDLE MOTOR (220V)



To Main Junction Block on **Page 75.**

Control Panel Switch Electrical

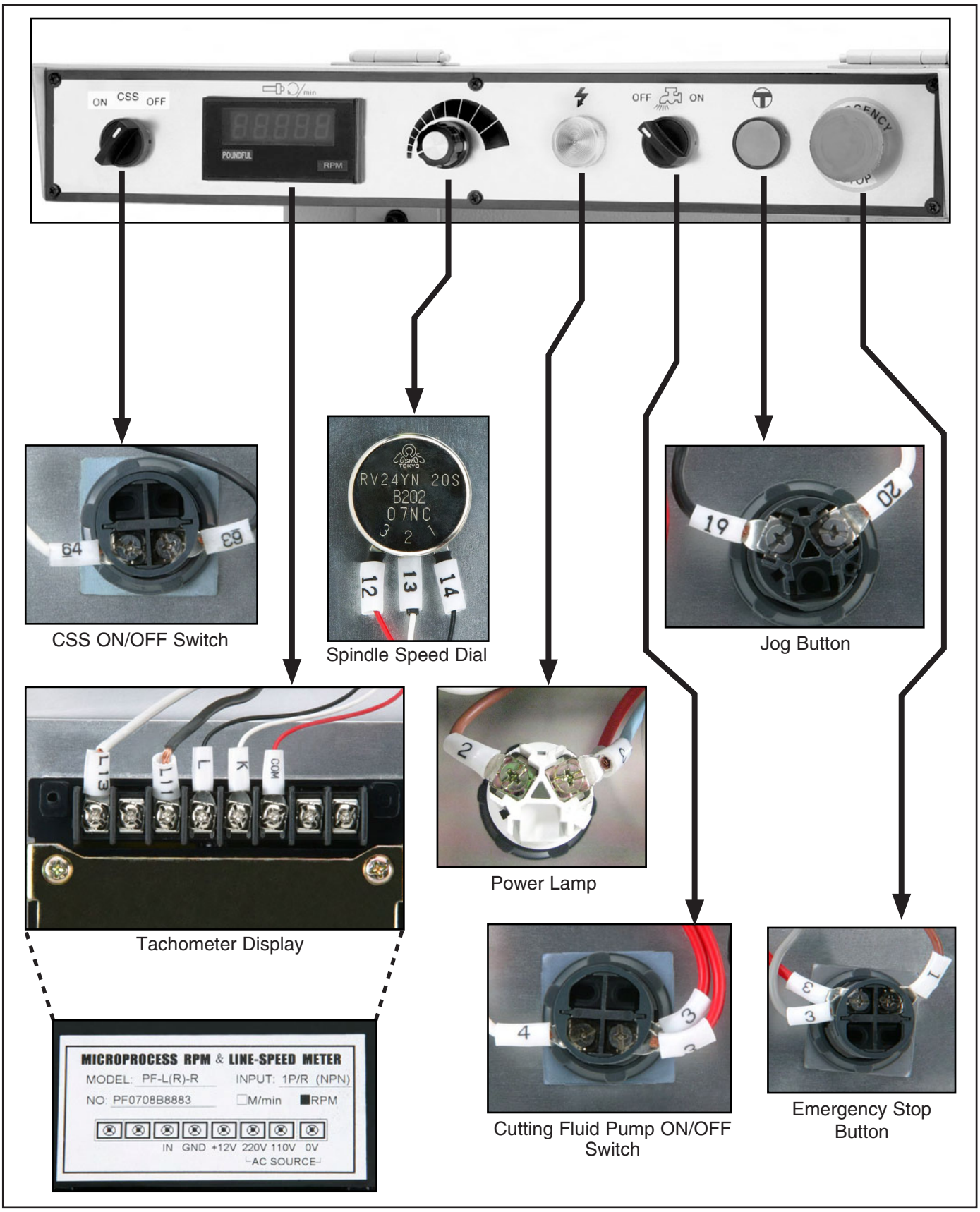


Figure 137. Control panel switches.

Sensor and Limit Switch Electrical

Figure 138. Spindle RPM sensor.

Figure 140. Brake limit switch.

Figure 139. Door limit switch.

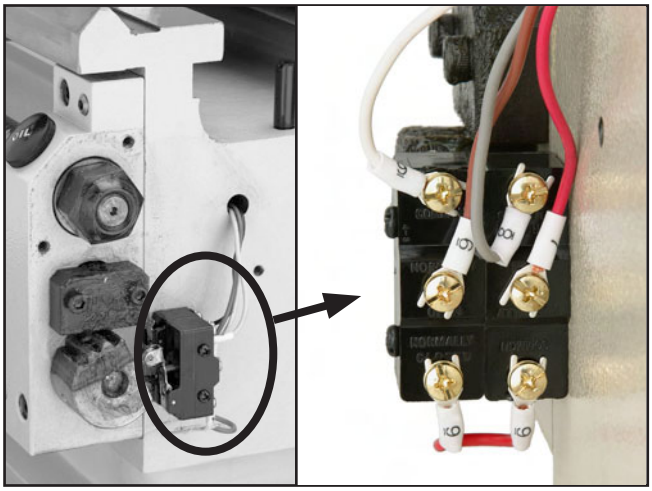


Figure 141. Spindle rotation switch.

View this page in color at *www.grizzly.com.*

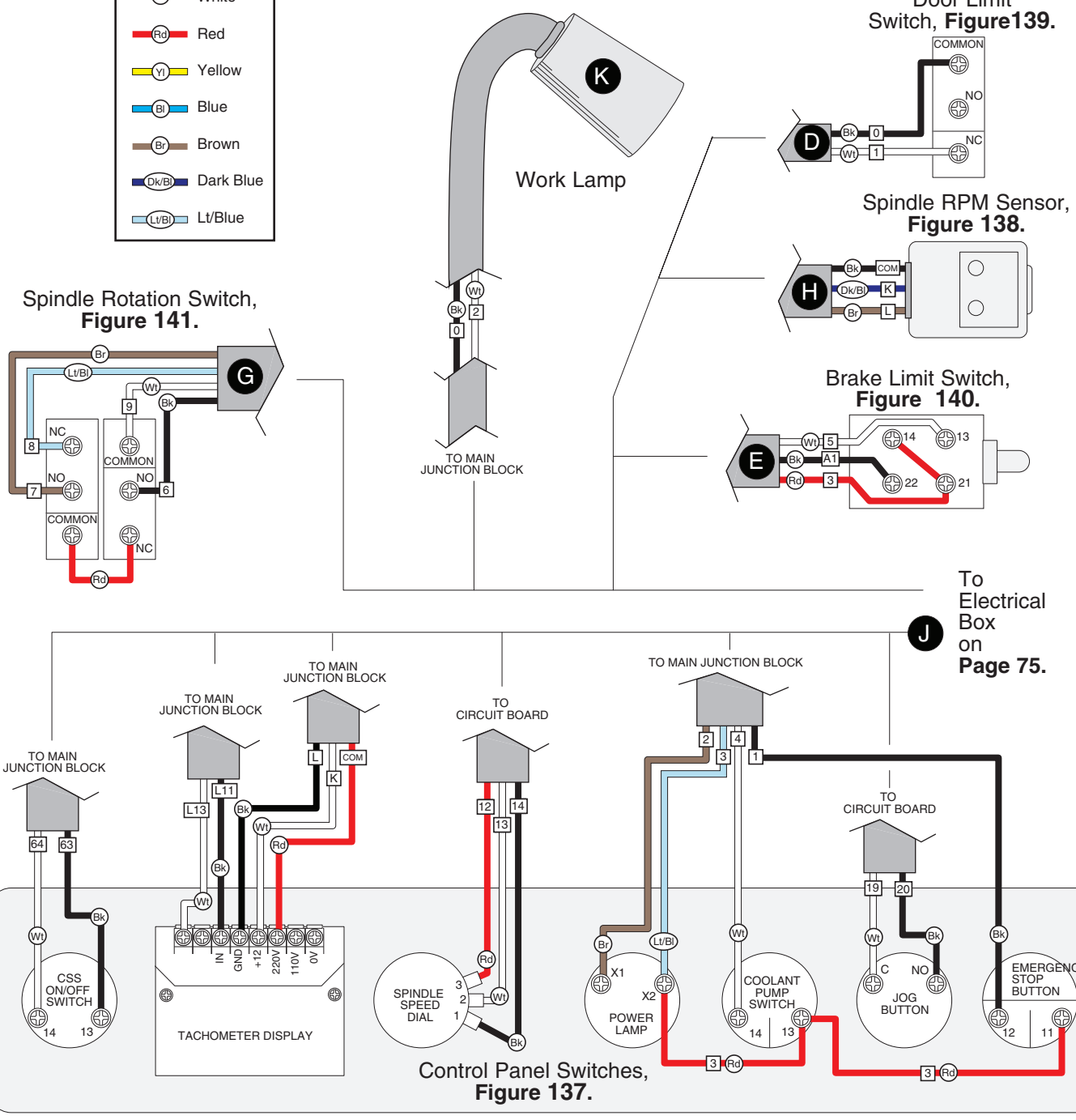
DANGER

SHOCK HAZARD!

Disconnect power and wait five minutes to allow Varispeed unit capacitors to discharge before servicing electrical parts. Touching electrified parts will result in severe burns, electrocution, or death.

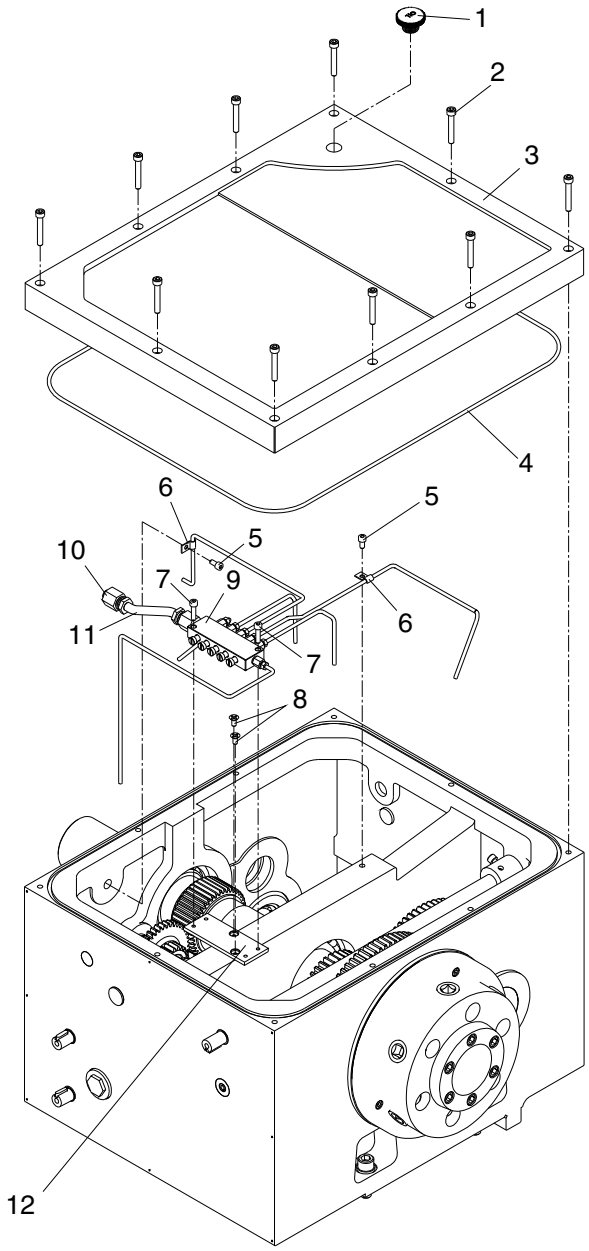
COLOR KEY

- Bk — Black
- Wt — White
- Rd — Red
- Yl — Yellow
- Bl — Blue
- Br — Brown
- Dk/Bl — Dark Blue
- Lt/Bl — Lt/Blue



Control Panel Switches, **Figure 137.**

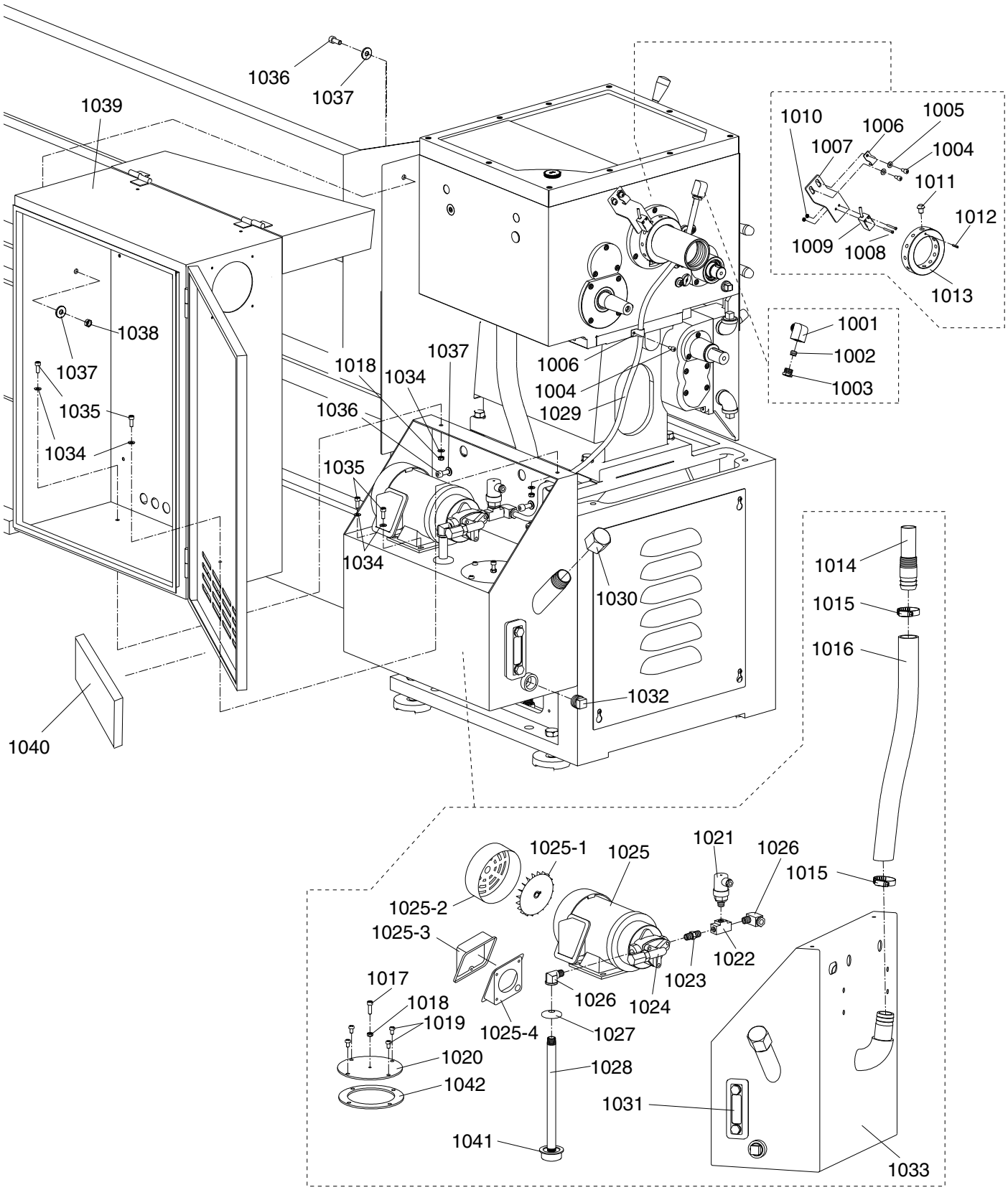
Headstock (Oil Distribution System)



REF	PART #	DESCRIPTION
1	P06700001	OIL PLUG
2	PSB29M	CAP SCREW M6-1 X 40
3	P06700003	HEADSTOCK COVER
4	P06700004	COVER SEAL
5	PSB50M	CAP SCREW M5-.8 X 10
6	P06700006	STAND-OFF CLAMP

REF	PART #	DESCRIPTION
7	PSB15M	CAP SCREW M5-.8 X 20
8	PFH30M	FLAT HD SCR M5-.8 X 8
9	P06700009	MANIFOLD AND TUBE ASSEMBLY
10	P06700010	QUARTER JOINT
11	P06700011	TUBE 10 X 120
12	P06700012	BASE PLATE

Headstock (Lubrication System)

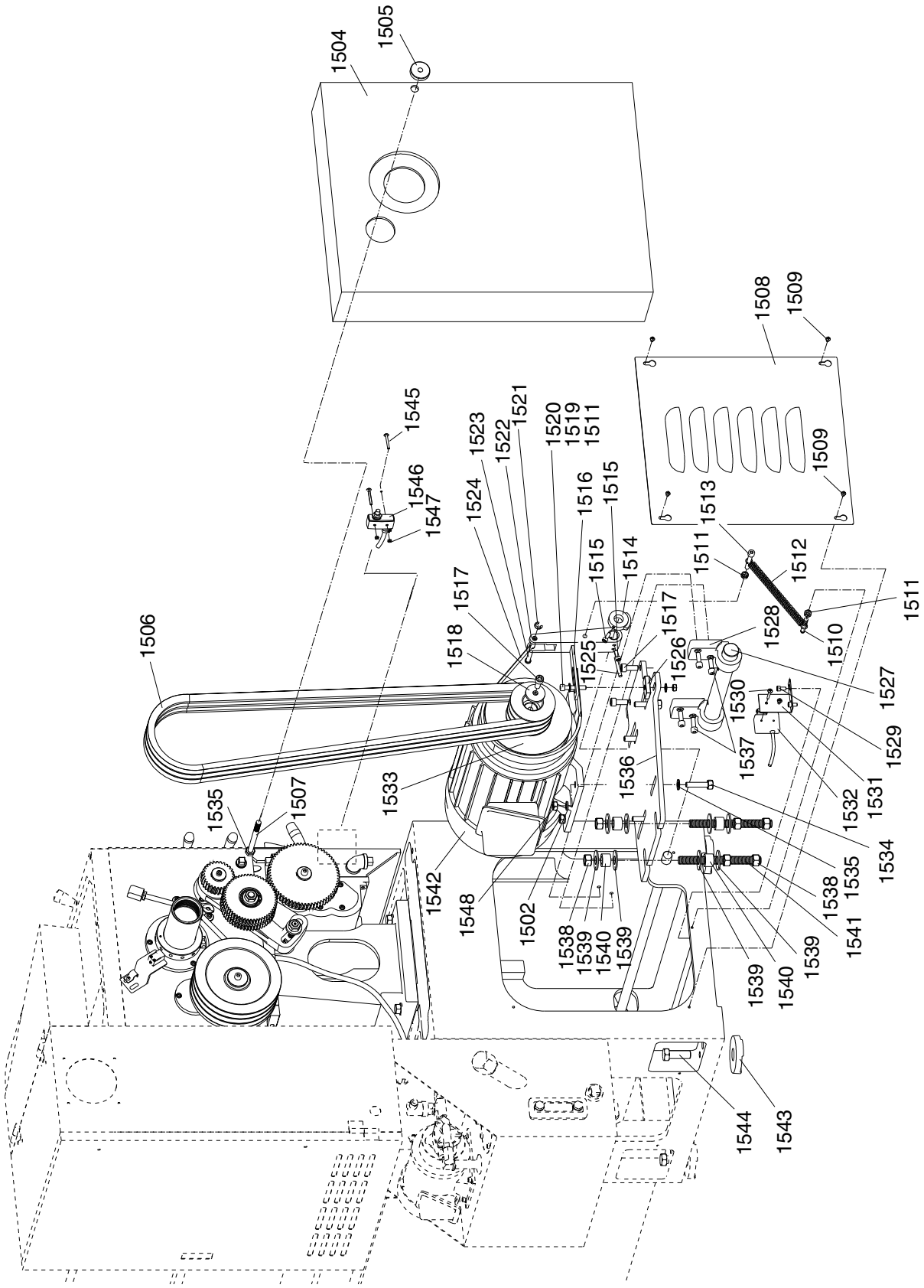


Headstock (Lubrication) Parts List

REF	PART #	DESCRIPTION
1001	P06701001	ELBOW FITTING
1002	P06701002	FERRULE
1003	P06701003	FERRULE NUT
1004	PSB50M	CAP SCREW M5-.8 X 10
1005	PW02M	FLAT WASHER 5MM
1006	P06701006	PIPE CLIP
1007	P06701007	BRACKET
1008	PS34	PHLP HD SCR M3-.5 X 25
1009	P06701009	TACHOMETER SENSOR
1010	PN07M	HEX NUT M3-.5
1011	P06701011	SENSOR PIN
1012	PRP104M	ROLL PIN 3 X 15
1013	P06701013	BALANCE RING
1014	P06701014	PIPE
1015	P06701015	HOSE CLAMP 1.5-2"
1016	P06701016	HOSE
1017	PSB02M	CAP SCREW M6-1 X 20
1018	PN01M	HEX NUT M6-1
1019	PSB04M	CAP SCREW M6-1 X 10
1020	P06701020	ROUND COVER
1021	P06701021	PRESSURE SWITCH
1022	P06701022	T-JOINT
1023	P06701023	NIPPLE

REF	PART #	DESCRIPTION
1024	P06701024	LUBRICATION PUMP
1025	P06701025	MOTOR 1/4 HP 220V
1025-1	P06701025-1	FAN
1025-2	P06701025-2	FAN COVER
1025-3	P06701025-3	JUNCTION BOX COVER
1025-4	P06701025-4	JUNCTION BOX BASE
1026	P06701026	ELBOW FITTING
1027	P06701027	GROMMET
1028	P06701028	STAND PIPE
1029	P06701029	TUBE 10 X 100
1030	P06701030	CAP
1031	P06701031	OIL SIGHT
1032	P06701032	DRAIN PLUG
1033	P06701033	OIL TANK
1034	PW03M	FLAT WASHER 6MM
1035	PSB01M	CAP SCREW M6-1 X 16
1036	PSB14M	CAP SCREW M8-1.25 X 20
1037	PW01M	FLAT WASHER 8MM
1038	PN03M	HEX NUT M8-1.25
1039	P06701039	ELECTRICAL BOX
1040	P06701040	FILTER ELEMENT
1041	P06701041	SUCTION SCREEN
1042	P06701042	GASKET

Headstock (Spindle Motor)

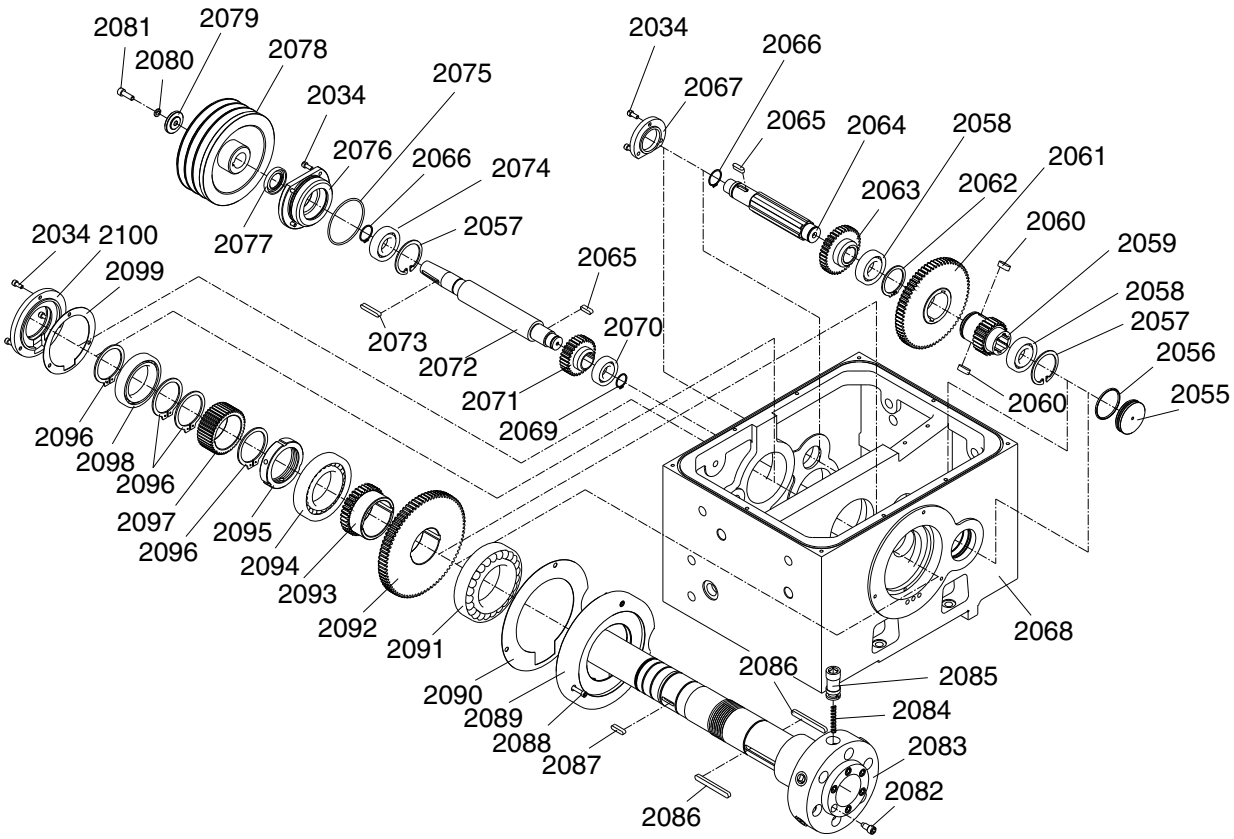


Headstock (Spindle Motor) Parts List

REF	PART #	DESCRIPTION
1502	PW04M	FLAT WASHER 10MM
1504	P06701504	COVER
1505	P06701505	THUMB KNOB M10-1.5
1506	PVB69	V-BELT 5L690
1507	PB116M	HEX BOLT M10-1.5 X 45
1508	P06701508	COVER
1509	PS68M	PHLP HD SCR M6-1 X 10
1510	P06701510	ANCHOR PIN
1511	PN03M	HEX NUT M8-1.25
1512	P06701512	TENSION SPRING 15 X 135
1513	PSB60M	CAP SCREW M8-1.25 X 55
1514	P06701514	CAM
1515	PSB01M	CAP SCREW M6-1 X 16
1516	P06701516	PLATE
1517	PSB64M	CAP SCREW M10-1.5 X 25
1518	P06701518	SPECIAL WASHER
1519	PW01M	FLAT WASHER 8MM
1520	PSB45M	CAP SCREW M8-1.25 X 45
1521	PEC015M	E-CLIP 8MM
1522	P06701522	LEVER
1523	P06701523	CLEVIS PIN
1524	P06701524	BRAKE BAND
1525	P06701525	TAPER PIN

REF	PART #	DESCRIPTION
1526	P06701526	PLATFORM
1527	P06701527	SHAFT
1528	P06701528	SUPPORT
1529	PSB26M	CAP SCREW M6-1 X 12
1530	PS51M	PHLP HD SCR M4-.7 X 30
1531	P06701531	BRACKET
1532	P06701532	LIMIT SWITCH
1533	P06701533	MOTOR PULLEY
1534	PSB70M	CAP SCREW M10-1.5 X 45
1535	PW04M	FLAT WASHER 10MM
1536	P06701536	BASE PLATE
1537	PSB31M	CAP SCREW M8-1.25 X 25
1538	PN13M	HEX NUT M16-2
1539	PW08M	FLAT WASHER 16MM
1540	P06701540	RUBBER BUSHING
1541	P06701541	MOUNT STUD M16-2 X 170
1542	P06701542	MOTOR 5HP 220V 3-PH
1543	P06701543	FOOT PAD
1544	PB51M	HEX BOLT M16-2 X 50
1545	PS65M	PHLP HD SCR M4-.7 X 40
1546	P06701546	LIMIT SWITCH
1547	PN04M	HEX NUT M4-.7
1548	PN02M	HEX NUT M10-1.5

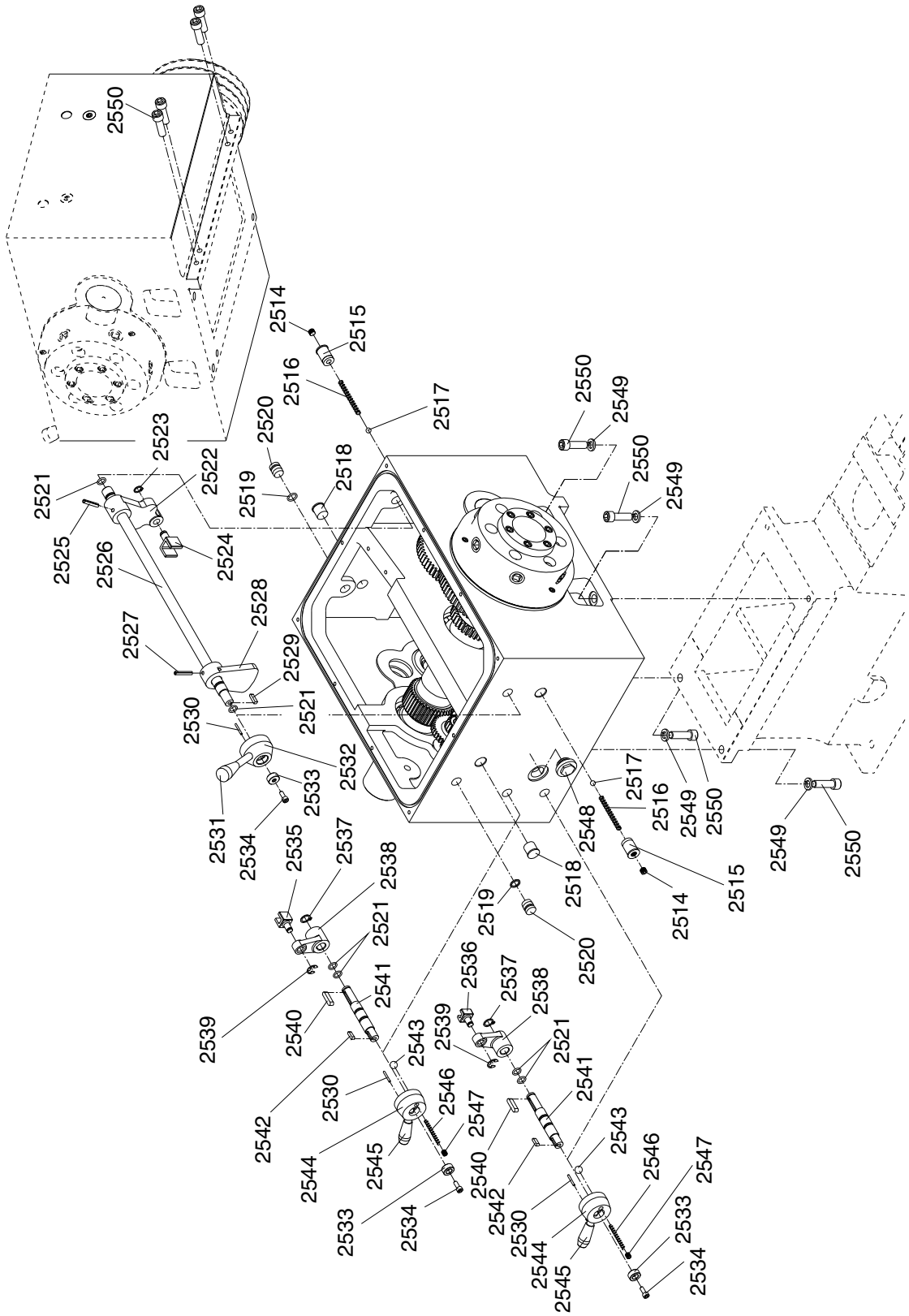
Headstock (Spindle Drive System)



REF	PART #	DESCRIPTION
2034	PSB01M	CAP SCREW M6-1 X 16
2055	P06702055	PLUG
2056	PORG055	O-RING 54.4 X 3.1 G55
2057	PR38M	INT RETAINING RING 62MM
2058	P6206Z	BALL BEARING 6206Z
2059	P06702059	GEAR 24T
2060	P06702060	SPECIAL KEY 10 X 8 X 25
2061	P06702061	GEAR 67T
2062	PR76M	EXT RETAINING RING 52MM
2063	P06702063	GEAR 38T
2064	P06702064	INTERMEDIATE SHAFT
2065	PK27M	KEY 7 X 7 X 25
2066	PR15M	EXT RETAINING RING 30MM
2067	P06702067	COVER
2068	P06702068	HEADSTOCK CASTING
2069	PR11M	EXT RETAINING RING 25MM
2070	P6205Z	BALL BEARING 6205Z
2071	P06702071	GEAR 30T
2072	P06702072	INPUT SHAFT
2073	PK62M	KEY 7 X 7 X 45
2074	P6206Z	BALL BEARING 6206Z
2075	POR0085	O-RING 84.4 X 3.1 G85
2076	P06702076	FLANGED BEARING RL-10024A
2077	P06702077	OIL SEAL

REF	PART #	DESCRIPTION
2078	P06702078	PULLEY
2079	P06702079	SHOULDER WASHER
2080	PLW04M	LOCK WASHER 8MM
2081	PSB31M	CAP SCREW M8-1.25 X 25
2082	P06702082	SPECIAL CAP SCREW
2083	P06702083	SPINDLE
2084	P06702084	SPECIAL COMPRESSION SPRING
2085	P06702085	CAM
2086	P06702086	SPECIAL KEY 10 X 6 X 85
2087	PK61M	KEY 7 X 7 X 30
2088	PSB48M	CAP SCREW M6-1 X 35
2089	P06702089	FRONT BEARING COVER
2090	P06702090	GASKET
2091	P06702091	TAPER ROLLER BEARING 32019
2092	P06702092	GEAR 79T
2093	P06702093	GEAR 36T
2094	P06702094	TAPER ROLLER BEARING 30214A
2095	P06702095	SPANNER NUT
2096	PR13M	EXT RETAINING RING 65MM
2097	P06702097	GEAR 42T
2098	P6013	BALL BEARING 6013
2099	P06702099	GASKET
2100	P06702100	BEARING COVER

Headstock (Shifting System)

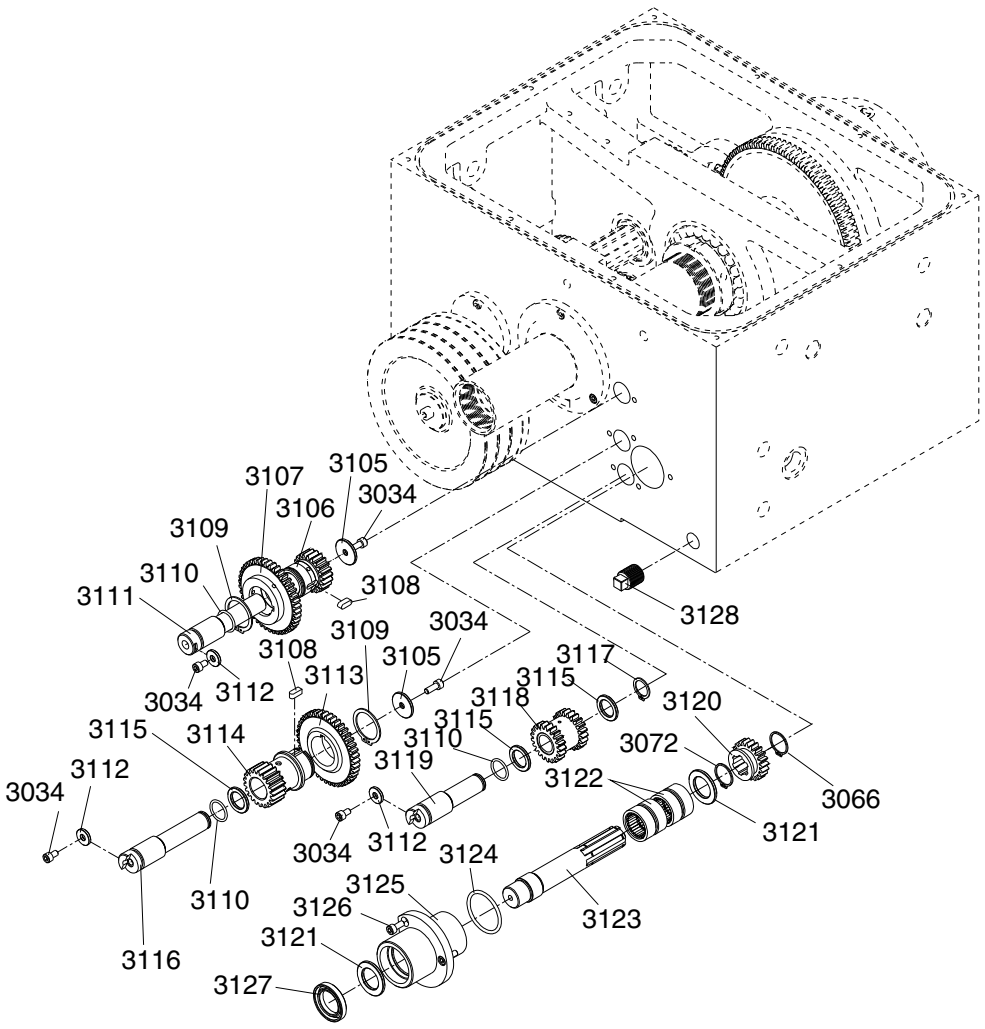


Headstock (Shifting System) Parts List

REF	PART #	DESCRIPTION
2514	PSS30M	SET SCREW M10-1.5 X 10
2515	P06702515	BUSHING
2516	P06702516	COMPRESSION SPRING 8 X 37
2517	P06702517	STEEL BALL 1/4"
2518	P06702518	PLUG
2519	PORP014	O-RING 13.8 X 2.4 P14
2520	P06702520	PLUG
2521	PORP016	O-RING 15.8 X 2.4 P16
2522	P06702522	LEVER
2523	PR03M	EXT RETAINING RING 12MM
2524	P06702524	FORK
2525	PRP31M	ROLL PIN 6 X 36
2526	P06702526	ROD
2527	PRP32M	ROLL PIN 6 X 40
2528	P06702528	LEVER
2529	PK01M	KEY 5 X 5 X 22
2530	PRP106M	ROLL PIN 3 X 24
2531	P06702531	LEVER
2532	P06702532	HUB

REF	PART #	DESCRIPTION
2533	P06702533	SPACER
2534	PSB01M	CAP SCREW M6-1 X 16
2535	P06702535	FORK
2536	P06702536	FORK
2537	PR05M	EXT RETAINING RING 15MM
2538	P06702538	LEVER
2539	PEC015M	E-CLIP 8MM
2540	PK12M	KEY 5 X 5 X 30
2541	P06702541	SHAFT
2542	PK14M	KEY 5 X 5 X 18
2543	P06702543	STEEL BALL 1/4"
2544	P06702544	HUB
2545	P06702545	HANDLE
2546	P06702546	COMPRESSION SPRING 8 X 27
2547	PSS20M	SET SCREW M8-1.25 X 8
2548	P06702548	SIGHT GLASS
2549	PLW05M	LOCK WASHER 12MM
2550	PSB92M	CAP SCREW M12-1.75 X 40

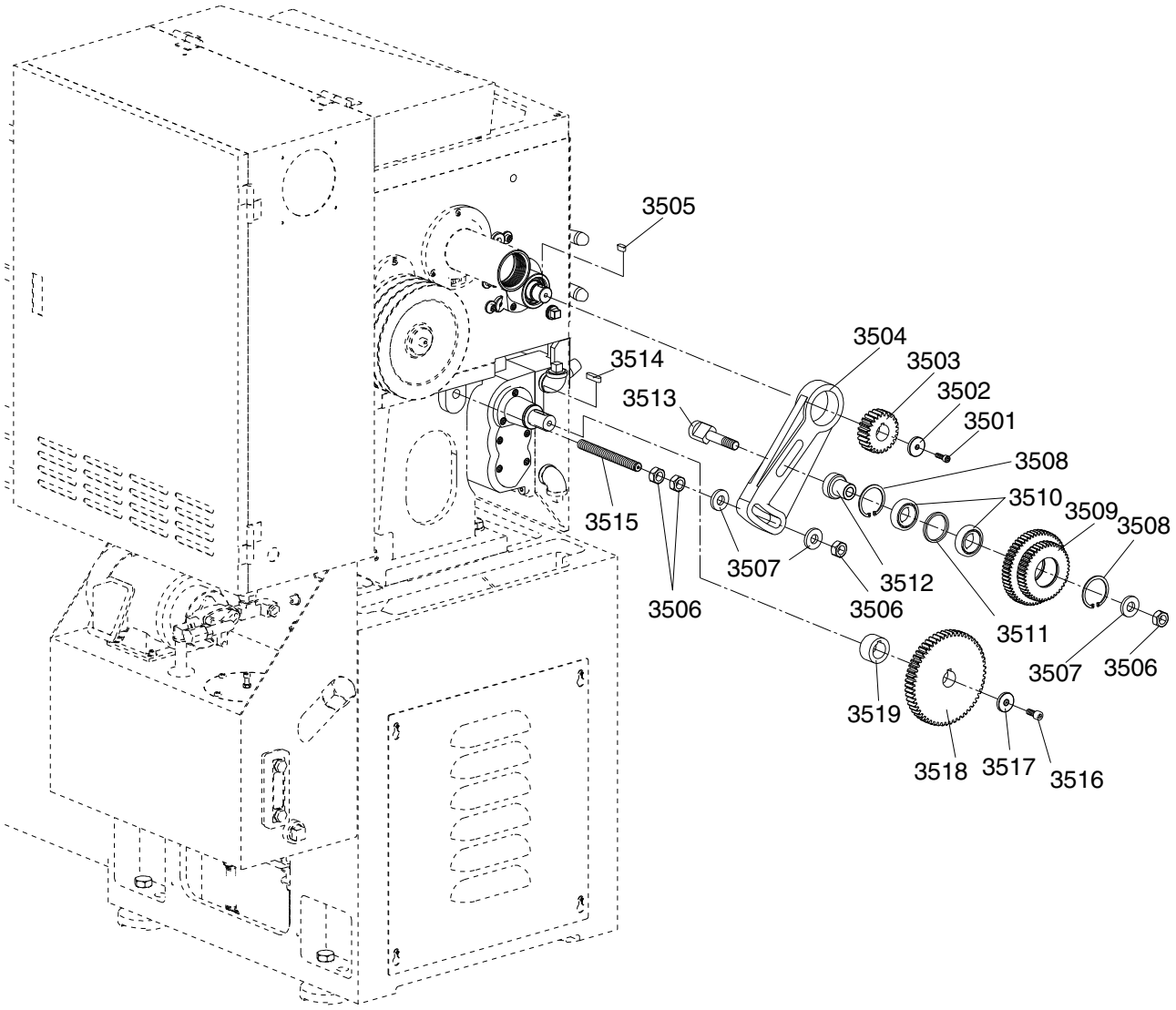
Headstock (Gearbox Drive System)



REF	PART #	DESCRIPTION
3034	PSB01M	CAP SCREW M6-1 X 16
3066	PR15M	EXT RETAINING RING 30MM
3072	PR15M	EXT RETAINING RING 30MM
3105	P06703105	SPECIAL WASHER 6MM
3106	P06703106	GEAR 21T
3107	P06703107	GEAR 42T
3108	PK99M	KEY 6 X 6 X 15
3109	PR12M	EXT RETAINING RING 35MM
3110	PORP021	O-RING 20.8 X 2.4 P21
3111	P06703111	SHAFT
3112	P06703112	SPECIAL WASHER 6MM
3113	P06703113	GEAR 42T
3114	P06703114	GEAR 21T
3115	P06703115	CONTACT WASHER

REF	PART #	DESCRIPTION
3116	P06703116	SHAFT
3117	PR09M	EXT RETAINING RING 20MM
3118	P06703118	GEAR 21T
3119	P06703119	SHAFT
3120	P06703120	GEAR 21T
3121	P06703121	CONTACT WASHER
3122	P06703122	NEEDLE BEARING
3123	P06703123	SHAFT
3124	PORP044	O-RING 43.7 X 3.5 P44
3125	P06703125	FLANGE BEARING
3126	PSB26M	CAP SCREW M6-1 X 12
3127	P06703127	OIL SEAL
3128	P06703128	PLUG

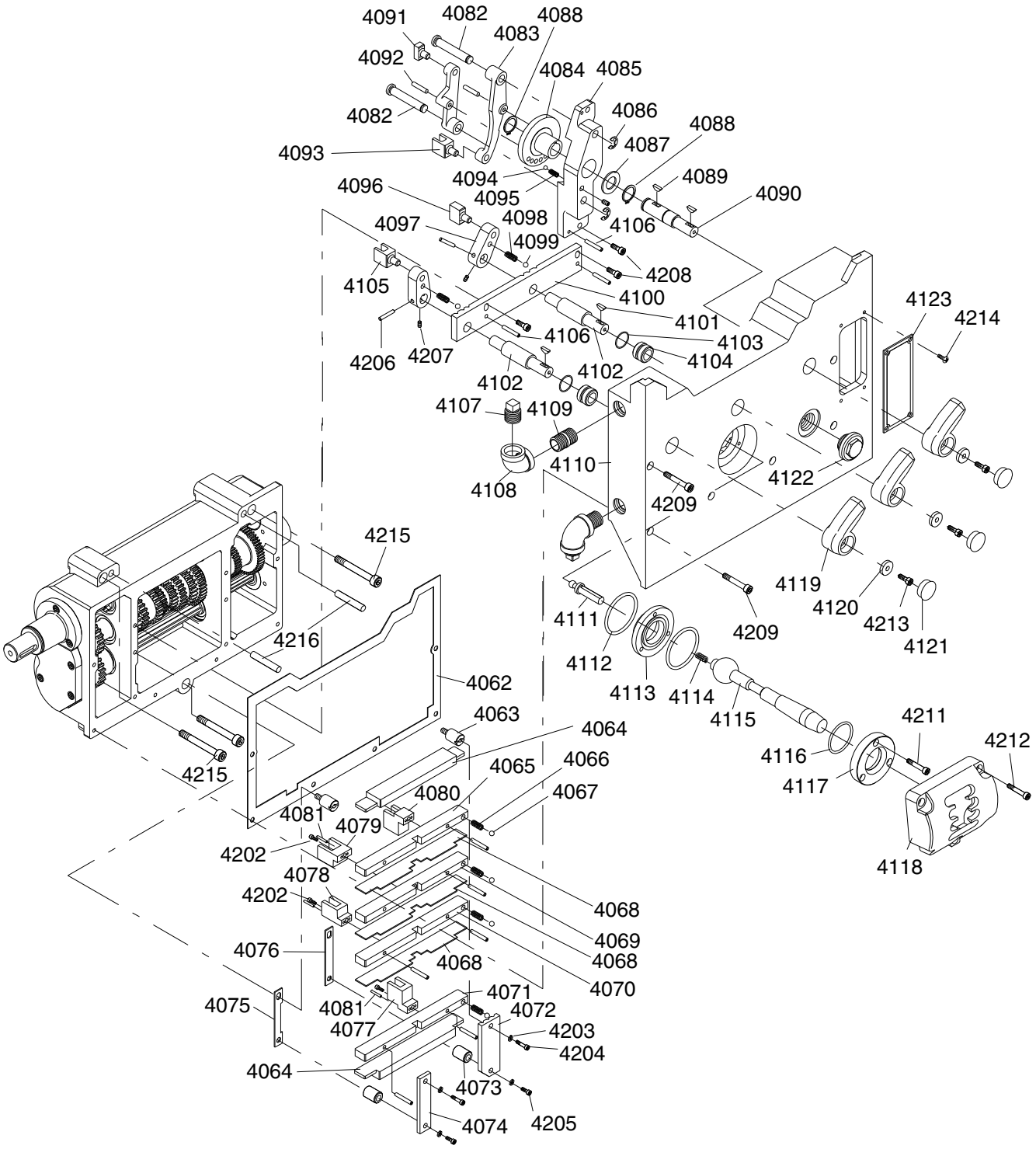
Gearbox (Change Gear System)



REF	PART #	DESCRIPTION
3501	PSB02M	CAP SCREW M6-1 X 20
3502	P06703502	SPECIAL 6MM WASHER
3503	P06703503	GEAR 24T
3504	P06703504	SWING FRAME
3505	PK82M	KEY 7 X 7 X 18
3506	PN32M	HEX NUT M14-2
3507	P06703507	SPECIAL 14MM WASHER
3508	PR25M	INT RETAINING RING 47MM
3509	P06703509	CLUSTER GEAR 44T/56T
3510	P6005	BALL BEARING 6005ZZ

REF	PART #	DESCRIPTION
3511	P06703511	SPACER
3512	P06703512	SHAFT COLLAR
3513	P06703513	SPINDLE
3514	PK61M	KEY 7 X 7 X 30
3515	P06703515	STUD
3516	PSB14M	CAP SCREW M8-1.25 X 20
3517	P06703517	SPECIAL 8MM WASHER
3518	P06703518	PLASTIC SAFETY GEAR 57T
3519	P06703519	COLLAR/SPACER

Gearbox (Shift System)

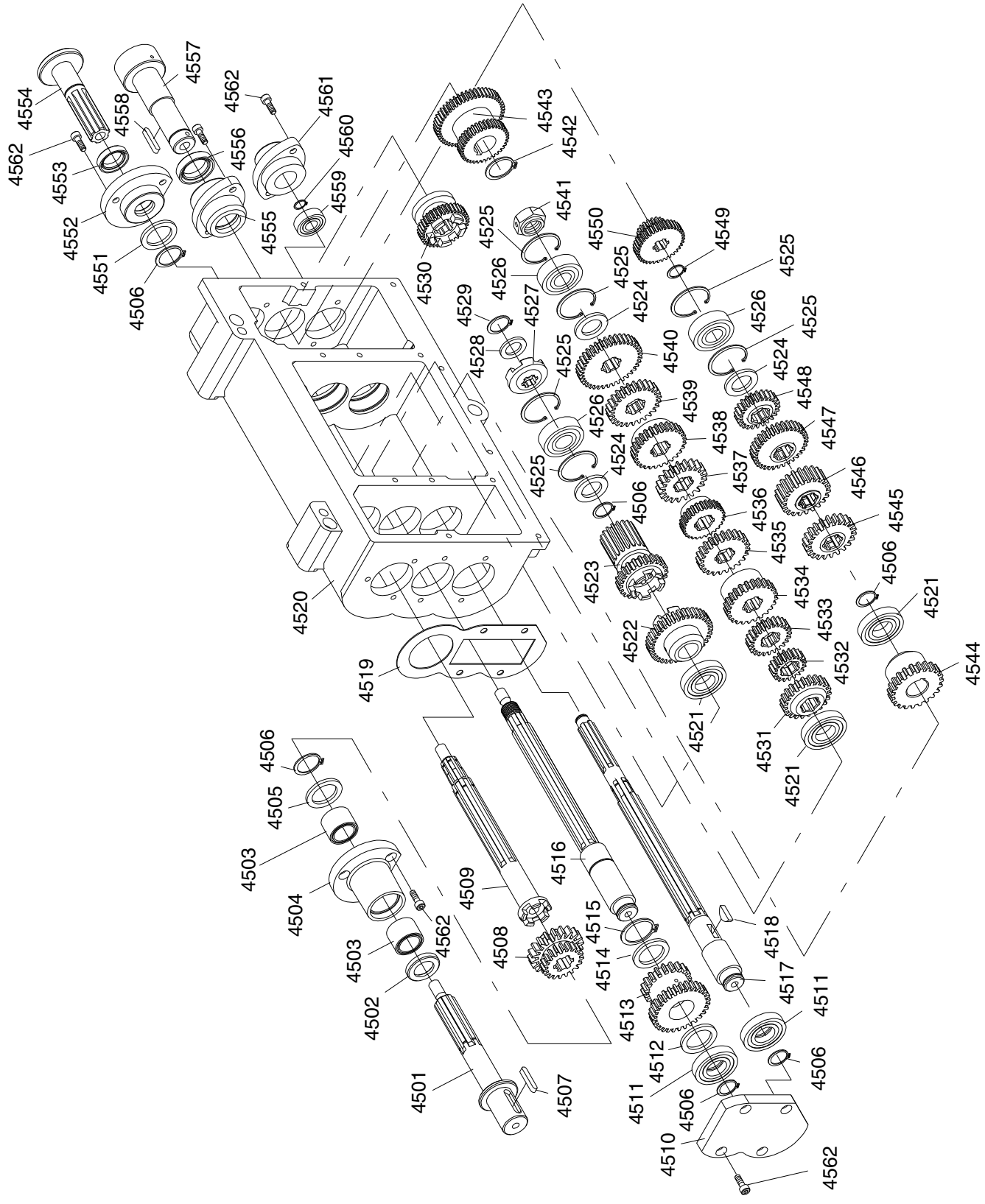


Gearbox (Shift System) Parts List

REF	PART #	DESCRIPTION
4062	P06704062	GASKET
4063	P06704063	PARTITION NUT
4064	P06704064	UPPER PLATE
4065	P06704065	FORK SUPPORT
4066	P06704066	COMPRESSION SPRING 4 X 19
4067	P06704067	STEEL BALL 1/4"
4068	P06704068	PARTITION
4069	P06704069	FORK SUPPORT
4070	P06704070	FORT SUPPORT
4071	P06704071	FORK SUPPORT
4072	P06704072	REVERSE-STOP
4073	P06704073	SPACER
4074	P06704074	SHOULDER PLATE
4075	P06704075	PLATE
4076	P06704076	PLATE
4077	P06704077	FORK
4078	P06704078	FORK
4079	P06704079	FORK
4080	P06704080	FORK
4081	PRP02M	ROLL PIN 3 X 16
4082	P06704082	SHAFT
4083	P06704083	ARM
4084	P06704084	CAM
4085	P06704085	SUPPORT SEAT
4086	PEC015M	E-CLIP 8MM
4087	P06704087	SPACER
4088	PR18M	EXT RETAINING RING 17MM
4089	P06704089	WOODRUFF KEY
4090	P06704090	SHAFT
4091	P06704091	DOG
4092	P06704092	DOWEL PIN
4093	P06704093	FORK
4094	P06704094	STEEL BALL 1/8"
4095	P06704095	COMPRESSION SPRING 4 X 19
4096	P06704096	DOG
4097	P06704097	LEVER
4098	P06704098	COMPRESSION SPRING 6 X 13
4099	P06704099	STEEL BALL 1/4"

REF	PART #	DESCRIPTION
4100	P06704100	SELECTOR BAR
4101	P06704101	WOODRUFF KEY
4102	P06704102	SHAFT
4103	PORP018	O-RING 17.8 X 2.4 P18
4104	P06704104	BUSHING
4105	P06704105	FORK
4106	PRP24M	ROLL PIN 5 X 16
4107	P06704107	PLUG
4108	P06704108	ELBOW
4109	P06704109	NIPPLE
4110	P06704110	GEARBOX COVER
4111	P06704111	SELECTOR LEVER
4112	PORG040	O-RING 39.4 X 3.1 G40
4113	P06704113	SELECTOR LEVER SUPPORT
4114	P06704114	COMPRESSION SPRING 9 X 38
4115	P06704115	LEVER
4116	PORG030	O-RING 29.4 X 3.1 G30
4117	P06704117	SELECTOR LEVER COVER
4118	P06704118	SHIFT DETENT COVER
4119	P06704119	HANDLE
4120	P06704120	SPECIAL 5MM WASHER
4121	P06704121	PLUG
4122	P06704122	SIGHT GLASS
4123	P06704123	COVER
4202	PSB15M	CAP SCREW M5-.8 X 20
4203	PLW03M	LOCK WASHER 6MM
4204	PSB26M	CAP SCREW M6-1 X 12
4205	PSB48M	CAP SCREW M6-1 X 35
4206	PRP04M	ROLL PIN 4 X 24
4207	PSS03M	SET SCREW M6-1 X 8
4208	PSB02M	CAP SCREW M6-1 X 20
4209	PSB167M	CAP SCREW M6-1 X 70
4211	PSB38M	CAP SCREW M5-.8 X 25
4212	PSB26M	CAP SCREW M6-1 X 12
4213	PSB33M	CAP SCREW M5-.8 X 12
4215	PSB66M	CAP SCREW M8-1.25 X 65
4216	P06704216	TAPER PIN

Gearbox (Leadscrew and Feedrod Drive)

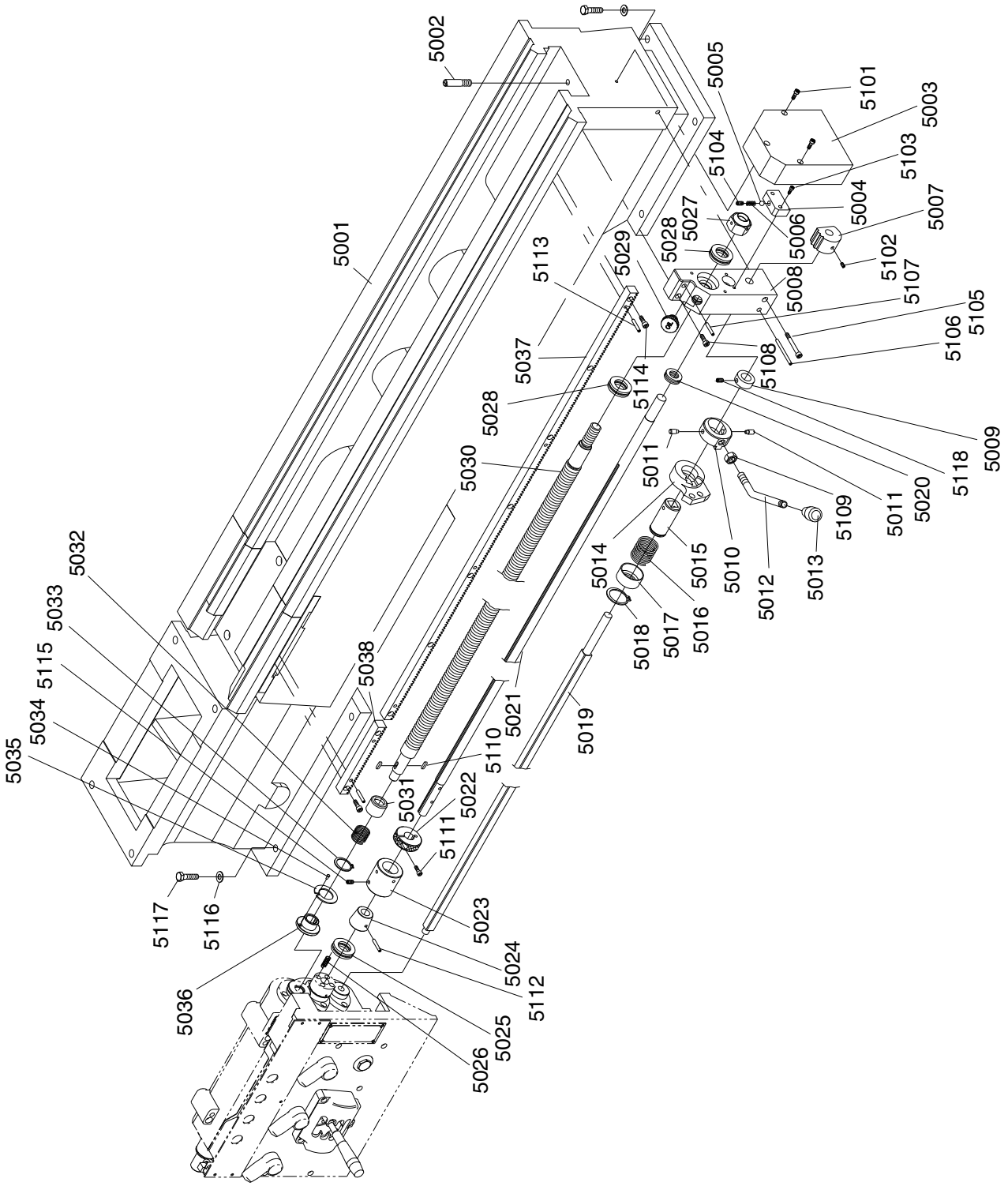


Gearbox (Leadscrew and Feedrod Drive) Parts List

REF	PART #	DESCRIPTION
4501	P06704501	SHAFT
4502	P06704502	OIL SEAL
4503	P06704503	ROLLER BEARING TAF202820
4504	P06704504	FLANGE BEARING
4505	P06704505	SPACER
4506	PR09M	EXT RETAINING RING 20MM
4507	PK109M	KEY 7 X 7 X 35
4508	P06704508	GEAR 19T/20T
4509	P06704509	SHAFT
4510	P06704510	COVER
4511	P16004	BALL BEARING 16004
4512	P06704512	SPACER
4513	P06704513	GEAR 19T/30T
4514	P06704514	SPACER
4515	PR11M	EXT RETAINING RING 25MM
4516	P06704516	SHAFT
4517	P06704517	SHAFT
4518	P06704518	WOODRUFF KEY
4519	P06704519	GASKET
4520	P06704520	GEARBOX CASE
4521	P16004	BALL BEARING 16004
4522	P06704522	GEAR 38T
4523	P06704523	GEAR 23T/19T
4524	P06704524	SPACER
4525	PR23M	INT RETAINING RING 40MM
4526	P6203	BALL BEARING 6203ZZ
4527	P06704527	CLUTCH
4528	P06704528	SPACER
4529	PR06M	EXT RETAINING RING 16MM
4530	P06704530	CLUTCH GEAR 35T
4531	P06704531	GEAR 22T

REF	PART #	DESCRIPTION
4532	P06704532	GEAR 19T
4533	P06704533	GEAR 20T
4534	P06704534	GEAR 24T
4535	P06704535	GEAR 23T
4536	P06704536	GEAR 27T
4537	P06704537	GEAR 24T
4538	P06704538	GEAR 28T
4539	P06704539	GEAR 26T
4540	P06704540	GEAR 38T
4541	P06704541	LOCKING SHAFT NUT
4542	PR10M	EXT RETAINING RING 22MM
4543	P06704543	GEAR 36T/50T
4544	P06704544	GEAR 22T
4545	P06704545	GEAR 22T
4546	P06704546	GEAR 22T
4547	P06704547	GEAR 33T
4548	P06704548	GEAR 22T
4549	PR18M	EXT RETAINING RING 17MM
4550	P06704550	GEAR 20T/36T
4551	P06704551	SPACER
4552	P06704552	FLANGE BEARING
4553	P06704553	OIL SEAL
4554	P06704554	SHAFT
4555	P06704555	FLANGE BEARING
4556	P06704556	OIL SEAL
4557	P06704557	SHAFT
4558	PK15M	KEY 5 X 5 X 35
4559	P6001	BALL BEARING 6001ZZ
4560	PR03M	EXT RETAINING RING 12MM
4561	P06704561	FLANGE BEARING
4562	PSB26M	CAP SCREW M6-1 X 12

Carriage (Controlrod, Feedrod, Leadscrew)

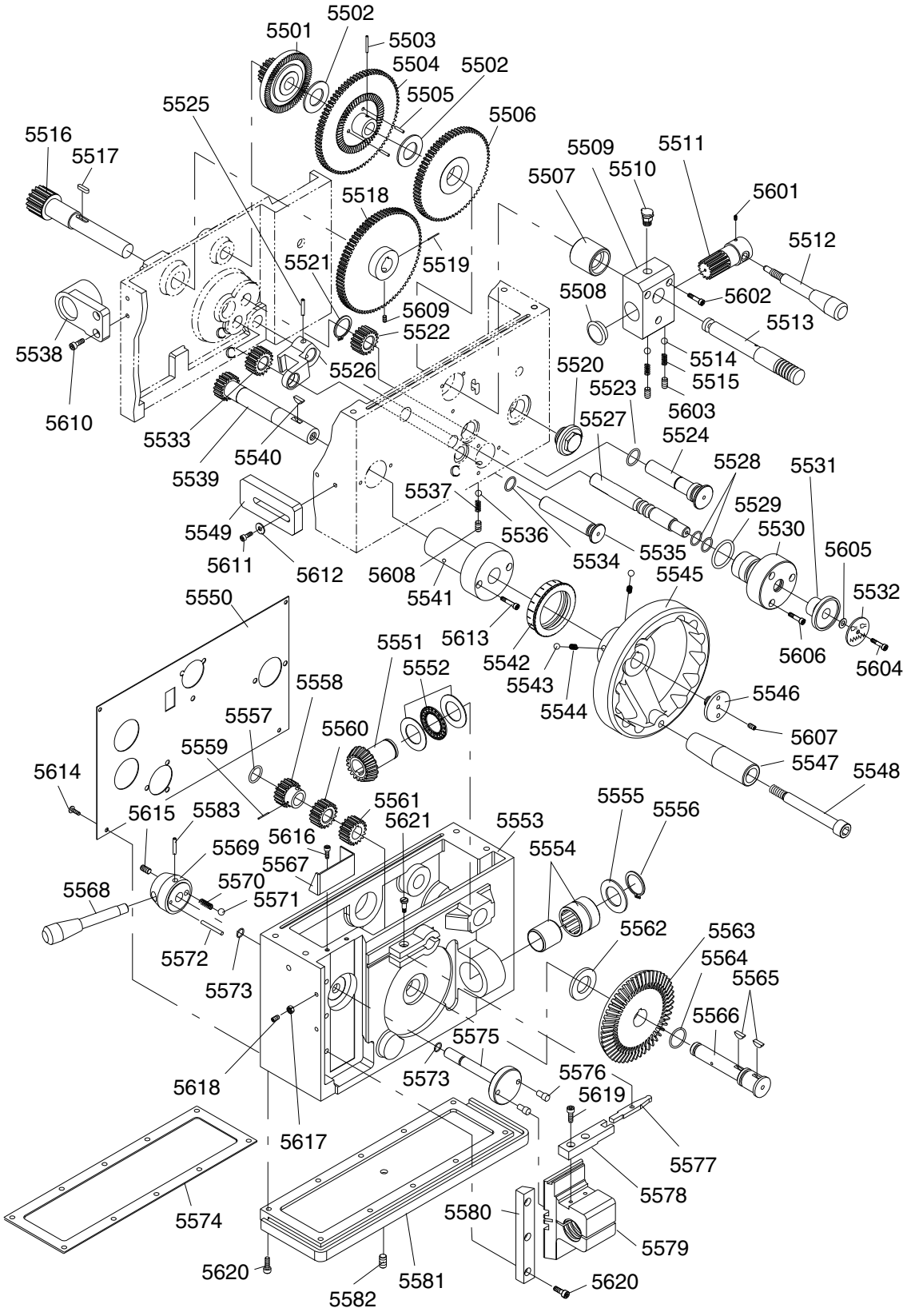


Carriage (Control Rod, Feedrod, Leadscrew) Parts List

REF	PART #	DESCRIPTION
5001	P06705001	BED
5002	P06705002	STOP STUD
5003	P06705003	COVER
5004	P06705004	BLOCK
5005	P06705005	STEEL BALL 1/4"
5006	P06705006	COMPRESSION SPRING 8 X 27
5007	P06705007	DETENT CAM
5008	P06705008	HOUSING
5009	P06705009	COLLAR
5010	P06705010	HUB
5011	P06705011	DOWEL PIN
5012	P06705012	LEVER
5013	P06705013	KNOB
5014	P06705014	ROD BRACKET
5015	P06705015	SLEEVE
5016	P06705016	COMPRESSION SPRING 38 X 75
5017	P06705017	COVER
5018	PR37M	EXT RETAINING RING 32MM
5019	P06705019	CONTROL ROD
5020	P06705020	THRUST BEARING NTB/AS2
5021	P06705021	FEED ROD
5022	P06705022	STOP
5023	P06705023	CLUTCH COLLAR
5024	P06705024	TAPERED BUSHING
5025	P51203	THRUST BEARING 51203
5026	P06705026	COMPRESSION SPRING 9 X 32
5027	P06705027	LEADSCREW NUT
5028	P51105	THRUST BEARING 51105

REF	PART #	DESCRIPTION
5029	P06705029	OIL CAP
5030	P06705030	LEADSCREW 4 TPI
5031	P06705031	SPRING COVER
5032	P06705032	COMPRESSION SPRING 27 X 55
5033	PR37M	EXT RETAINING RING 32MM
5034	P06705034	SHEAR PIN
5035	P06705035	SHROUD WASHER
5036	P06705036	COLLAR
5037	P06705037	BED RACK
5038	P06705038	GAP RACK
5101	PSB83M	CAP SCREW M6-1 X 55
5102	PSS11M	SET SCREW M6-1 X 16
5103	PSB06M	CAP SCREW M6-1 X 25
5104	PSS30M	SET SCREW M10-1.5 X 10
5105	PSB128M	CAP SCREW M8-1.25 X 70
5106	P06705106	TAPER PIN
5107	P06705107	TAPER PIN
5108	PSB40M	CAP SCREW M8-1.25 X 35
5109	PN09M	HEX NUT M12-1.75
5110	PK20M	KEY 5 X 5 X 15
5111	PSB02M	CAP SCREW M6-1 X 20
5112	P06705112	TAPER PIN
5113	PRP93M	ROLL PIN 6 X 25
5114	PSB02M	CAP SCREW M6-1 X 20
5115	PSS02M	SET SCREW M6-1 X 6
5116	PW06M	FLAT WASHER 12MM
5117	PB24M	HEX BOLT M12-1.75 X 45
5118	PSS03M	SET SCREW M6-1 X 8

Carriage (Apron Drive and Shift System)

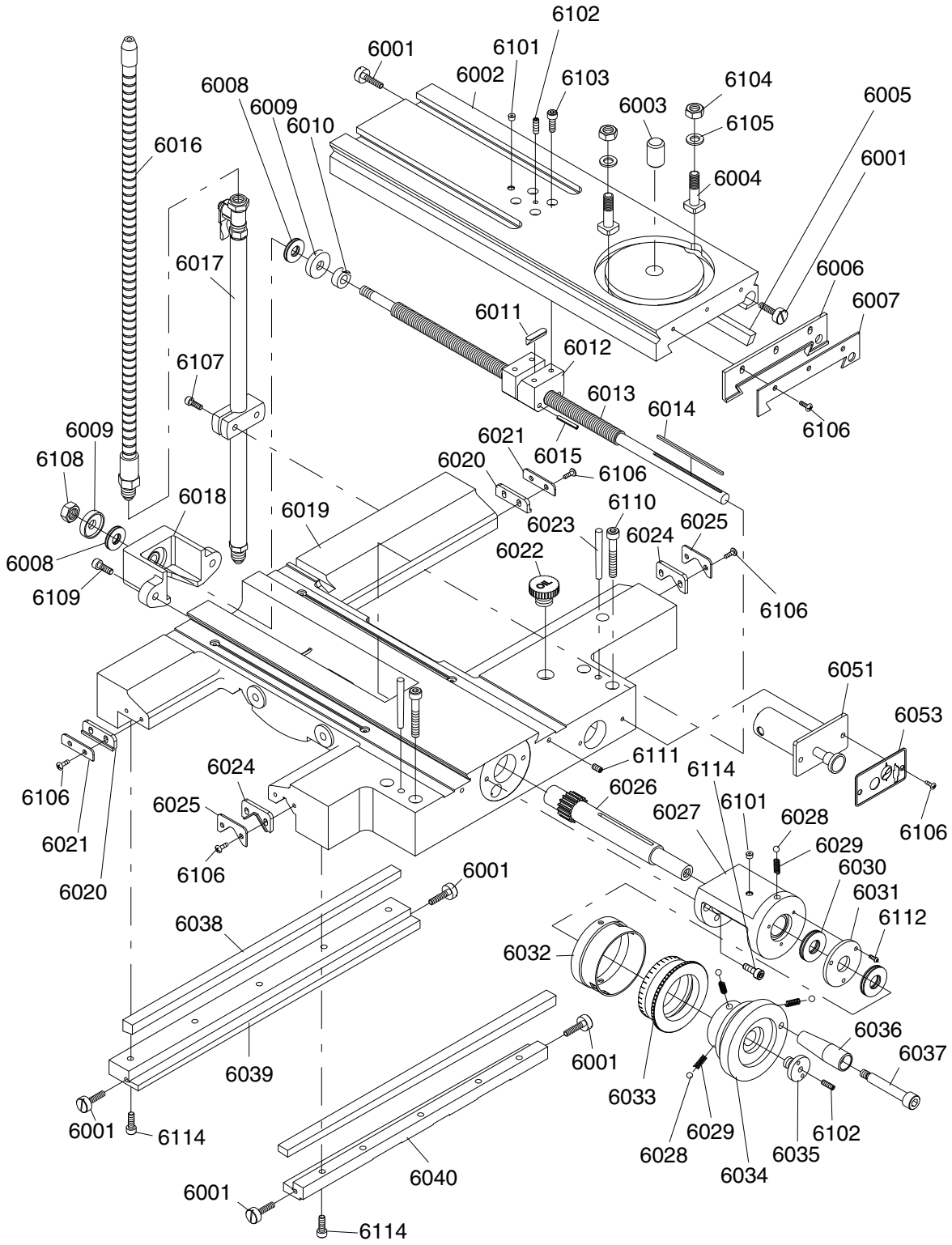


Carriage (Apron Drive and Shift System) Parts List

REF	PART #	DESCRIPTION
5501	P06705501	GEAR 18T/60T
5502	P06705502	SPECIAL WASHER
5503	PRP04M	ROLL PIN 4 X 24
5504	P06705504	GEAR 81T/60T
5505	P06705505	DOWEL PIN 4 X 17MM
5506	P06705506	GEAR 72T/60T
5507	P06705507	COLLAR
5508	P06705508	PLUG
5509	P06705509	GEAR BRACKET
5510	P06705510	OIL CAP
5511	P06705511	CAM SHAFT
5512	P06705512	LEVER
5513	P06705513	SHAFT
5514	P06705514	STEEL BALL 1/4"
5515	P06705515	COMPRESSION SPRING 6 X 16
5516	P06705516	GEAR SHAFT
5517	PK14M	KEY 5 X 5 X 18
5518	P06705518	GEAR
5519	PRP10M	ROLL PIN 5 X 36
5520	P06705520	SIGHT GLASS
5521	PR06M	EXT RETAINING RING 16MM
5522	P06705522	GEAR 18T
5523	PORP018	O-RING 17.8 X 2.4 P18
5524	P06705524	SHAFT
5525	PRP04M	ROLL PIN 4 X 24
5526	P06705526	FORK
5527	P06705527	SHAFT
5528	PORP016	O-RING 15.8 X 2.4 P16
5529	PORP026	O-RING 25.7 X 3.5 P26
5530	P06705530	SHAFT HUB
5531	P06705531	KNOB
5532	P06705532	INDICATOR PLATE
5533	P06705533	GEAR 18T
5534	PORP012	O-RING 11.8 X 2.4 P12
5535	P06705535	SHAFT
5536	P06705536	STEEL BALL 1/4"
5537	P06705537	COMPRESSION SPRING 4 X 19
5538	P06705538	BRACKET
5539	P06705539	GEAR SHAFT 18-SPLINE
5540	P06705540	WOODRUFF KEY
5541	P06705541	SHAFT HUB
5542	P06705542	INDEX RING
5543	P06705543	STEEL BALL 1/4"
5544	P06705544	COMPRESSION SPRING 6 X 15
5545	P06705545	HANDWHEEL
5546	P06705546	RETAINER HUB
5547	P06705547	HANDLE
5548	P06705548	SHOULDER CAP SCREW
5549	P06705549	SAFETY PLATE
5550	P06705550	APRON FACE PLATE
5551	P06705551	GEAR 23T
5552	P06705552	THRUST BEARING NTB/AS-254240012-I

REF	PART #	DESCRIPTION
5553	P06705553	APRON CASTING
5554	P06705554	BEARING NK29/30
5555	P06705555	SPACER
5556	PR11M	EXT RETAINING RING 25MM
5557	PORP012	O-RING 11.8 X 2.4 P12
5558	P06705558	GEAR 18T
5559	PRP88M	ROLL PIN 5 X 22
5560	P06705560	GEAR 18T
5561	P06705561	GEAR 18T
5562	P06705562	SPACER
5563	P06705563	GEAR 64T
5564	PORP018	O-RING 17.8 X 2.4 P18
5565	P06705565	WOODRUFF KEY
5566	P06705566	SHAFT
5567	P06705567	OIL SHIELD
5568	P06705568	LEVER
5569	P06705569	HUB
5570	P06705570	COMPRESSION SPRING 6 X 27
5571	P06705571	STEEL BALL 1/4"
5572	PRP04M	ROLL PIN 4 X 24
5573	PORP009	O-RING 8.8 X 1.9 P9
5575	P06705575	CAM SHAFT
5576	P06705576	SHOULDER PIN
5577	P06705577	LEVER
5574	P067055574	GASKET
5578	P06705578	STOP
5579	P06705579	HALF NUT
5580	P06705580	GIB
5581	P06705581	BASE PLATE
5582	P06705582	PLUG
5583	PRP105M	ROLL PIN 4 X 36
5601	PSS26M	SET SCREW M5-.8 X 6
5602	PSB79M	CAP SCREW M5-.8 X 35
5603	PSS20M	SET SCREW M8-1.25 X 8
5604	PSB33M	CAP SCREW M5-.8 X 12
5605	PW03M	FLAT WASHER 6MM
5606	PSB38M	CAP SCREW M5-.8 X 25
5607	PSS12M	SET SCREW M6-1 X 25
5608	PSS20M	SET SCREW M8-1.25 X 8
5609	PSS11M	SET SCREW M6-1 X 16
5610	PSB26M	CAP SCREW M6-1 X 12
5611	PSB06M	CAP SCREW M6-1 X 25
5612	PW03M	FLAT WASHER 6MM
5613	PSB38M	CAP SCREW M5-.8 X 25
5614	PS17M	PHLP HD SCR M4-.7 X 6
5615	PSS20M	SET SCREW M8-1.25 X 8
5616	PSB24M	CAP SCREW M5-.8 X 16
5617	PN01M	HEX NUT M6-1
5618	PSS03M	SET SCREW M6-1 X 8
5619	PSB24M	CAP SCREW M5-.8 X 16
5620	PSB24M	CAP SCREW M5-.8 X 16
5621	P06705621	SPECIAL SHOULDER SCREW

Carriage (Saddle and Slide)

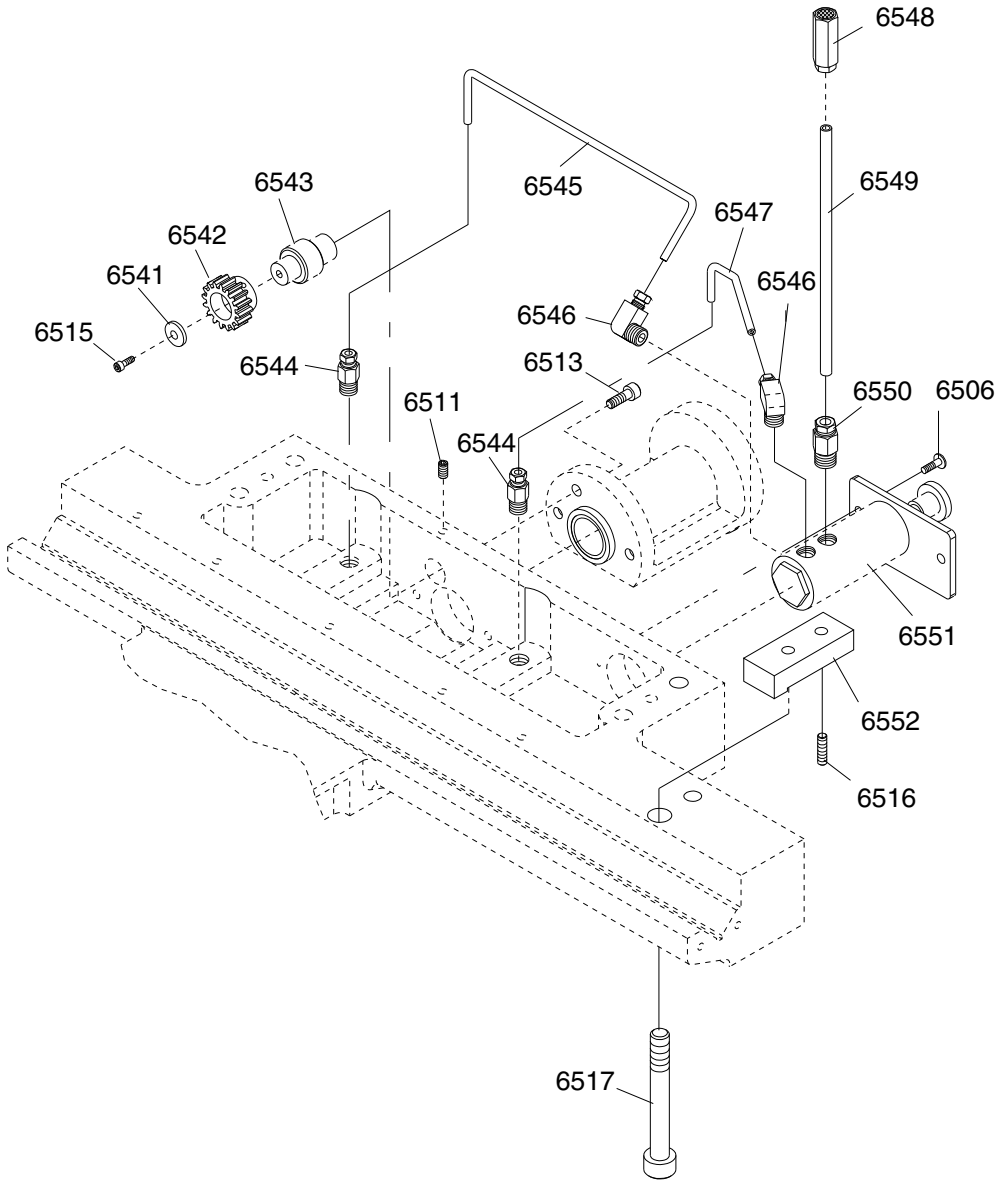


Carriage (Saddle and Slide) Parts List

REF	PART #	DESCRIPTION
6001	P06706001	GIB SCREW
6002	P06706002	CROSS SLIDE
6003	P06706003	PIVOT
6004	P06706004	T-BOLT
6005	P06706005	GIB
6006	P06706006	WIPER
6007	P06706007	PLATE
6008	P06706008	THRUST BEARING NTB/AS2
6009	P06706009	CAP COLLAR
6010	P06706010	SPACER
6011	P06706011	WEDGE
6012	P06706012	HALF NUT
6013	P06706013	LEAD SCREW
6014	P06706014	KEY 3 X 3 X 100
6015	PRP28M	ROLL PIN 5 X 40
6016	P06706016	COOLANT PIPE ASSEMBLY
6017	P06706017	VALVE & JUNCTION
6018	P06706018	BRACKET
6019	P06706019	SADDLE
6020	P06706020	WIPER
6021	P06706021	PLATE
6022	P06706022	FILL PLUG
6023	P06706023	TAPER PIN
6024	P06706024	WIPER
6025	P06706025	PLATE
6026	P06706026	PINION
6027	P06706027	PINION HOUSING
6028	P06706028	STEEL BALL 1/4"

REF	PART #	DESCRIPTION
6029	P06706029	COMPRESSION SPRING 6 X 15
6030	P06706030	THRUST BEARING NTB/AS2 2035
6031	P06706031	END PLATE
6032	P06706032	DIAL RING
6033	P06706033	SCALE RING
6034	P06706034	HANDWHEEL
6035	P06706035	HUB RETAINER
6036	P06706036	HANDLE
6037	P06706037	SHOULDER CAP SCREW
6038	P06706038	GIB
6039	P06706039	FRONT ANTI-FLOATER
6040	P06706040	REAR ANTI-FLOATER
6051	P06706051	PUMP/MOTOR ASSEMBLY
6053	P06706053	INDICATOR PLATE
6101	P06706101	BALL OILER 1/4"
6102	PSS28M	SET SCREW M6-1 X 30
6103	PSB07M	CAP SCREW M6-1 X 30
6104	PN02M	HEX NUT M10-1.5
6105	PW04M	FLAT WASHER 10MM
6106	PS08M	PHLP HD SCR M5-.8 X 12
6107	PSB06M	CAP SCREW M6-1 X 25
6108	PN02M	HEX NUT M10-1.5
6109	PSB02M	CAP SCREW M6-1 X 20
6110	PSB35M	CAP SCREW M8-1.25 X 60
6111	PSS03M	SET SCREW M6-1 X 8
6112	PSB17M	CAP SCREW M4-.7 X 10
6114	PSB02M	CAP SCREW M6-1 X 20

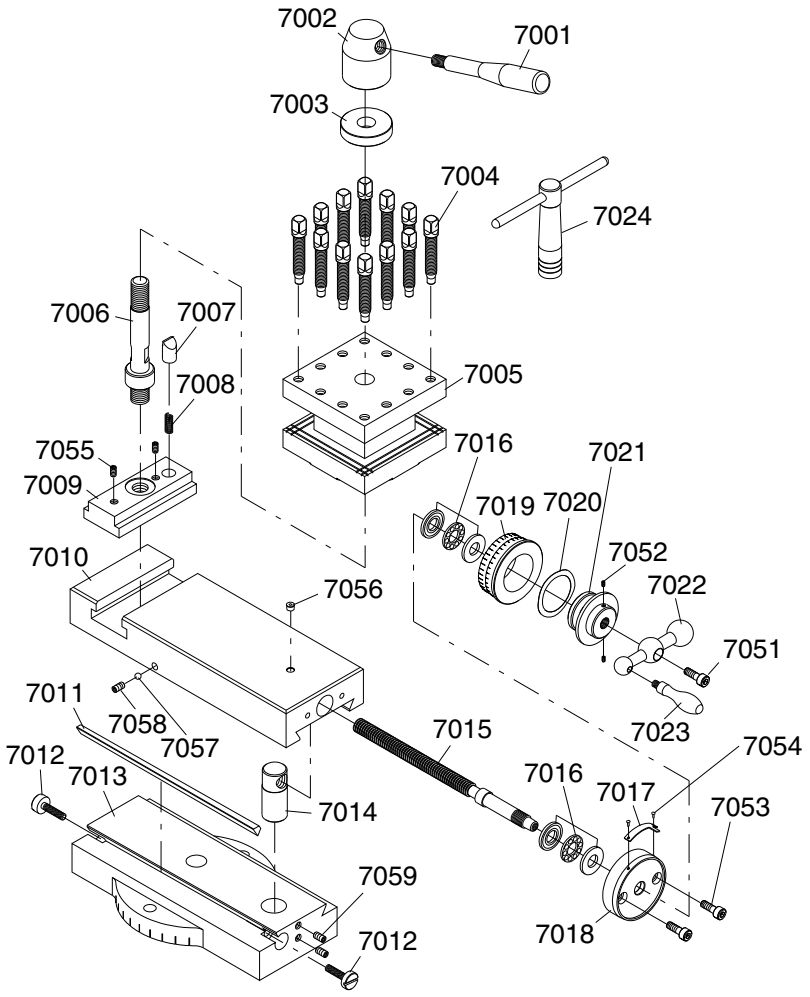
Carriage (Saddle Lubrication System)



REF	PART #	DESCRIPTION
6506	PS08M	PHLP HD SCR M5-.8 X 12
6511	PSS03M	SET SCREW M6-1 X 8
6513	PSB02M	CAP SCREW M6-1 X 20
6515	PSB24M	CAP SCREW M5-.8 X 16
6516	PSS74M	SET SCREW M8-1.25 X 35
6517	PSB169M	CAP SCREW M12-1.75 X 75
6541	P06706541	SPECIAL WASHER
6542	P06706542	GEAR 16T
6543	P06706543	SHAFT

REF	PART #	DESCRIPTION
6544	P06706544	STRAIGHT ADAPTER
6545	P06706545	TUBE 4 X 260
6546	P06706546	ELBOW ADAPTER
6547	P06706547	TUBE 4 X 120
6548	P06706548	OIL FILTER
6549	P06706549	TUBE 6 X 160
6550	P06706550	STRAIGHT ADAPTER
6551	P06706551	LUBRICATOR ASSEMBLY
6552	P06706552	CLAMP PLATE

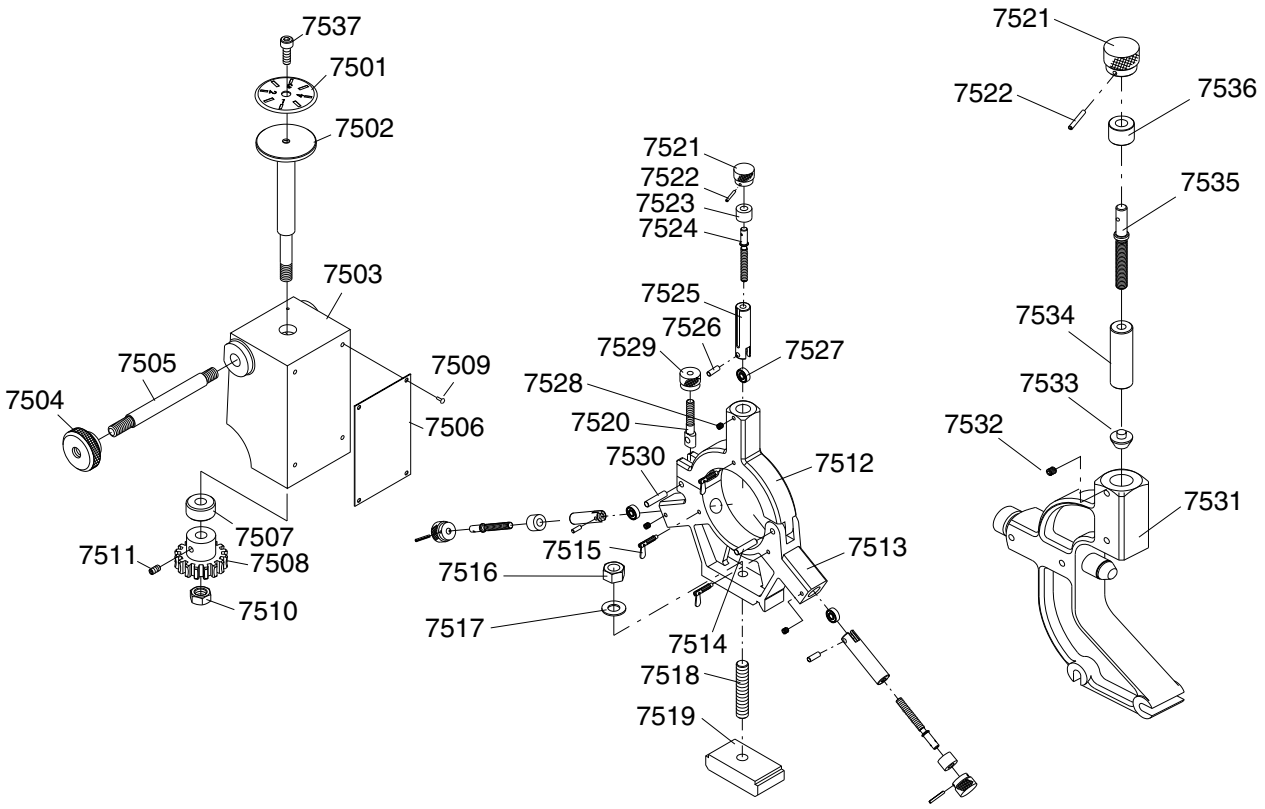
Carriage (Compound and Tool Holder)



REF	PART #	DESCRIPTION
7001	P06707001	LEVER
7002	P06707002	TURRET NUT
7003	P06707003	SPACER WASHER
7004	P06707004	TOOLING BOLT M10-1.5 X 52
7005	P06707005	TURRET BODY
7006	P06707006	TURRET SHAFT
7007	P06707007	DETENT PIN
7008	P06707008	COMPRESSION SPRING 6 X 27
7009	P06707009	T-NUT
7010	P06707010	COMPOUND
7011	P06707011	GIB
7012	P06707012	GIB SCREW
7013	P06707013	COMPOUND SLIDE
7014	P06707014	PIN NUT
7015	P06707015	LEAD SCREW
7016	P51102	THRUST BEARING 51102
7017	P06707017	SCALE

REF	PART #	DESCRIPTION
7018	P06707018	HUB
7019	P06707019	DIAL
7020	P06707020	WAVY WASHER
7021	P06707021	BUSHING
7022	P06707022	HANDLE CRANK
7023	P06707023	HANDLE
7024	P06707024	T-WRENCH
7051	PSB01M	CAP SCREW M6-1 X 16
7052	PSS04M	SET SCREW M6-1 X 12
7053	PSB26M	CAP SCREW M6-1 X 12
7054	P06707054	RIVET 2MM
7055	PSS14M	SET SCREW M8-1.25 X 12
7056	P06707056	BALL OILER 1/4"
7057	P06707057	STEEL BALL 1/4"
7058	PSS14M	SET SCREW M8-1.25 X 12
7059	PSS03M	SET SCREW M6-1 X 8

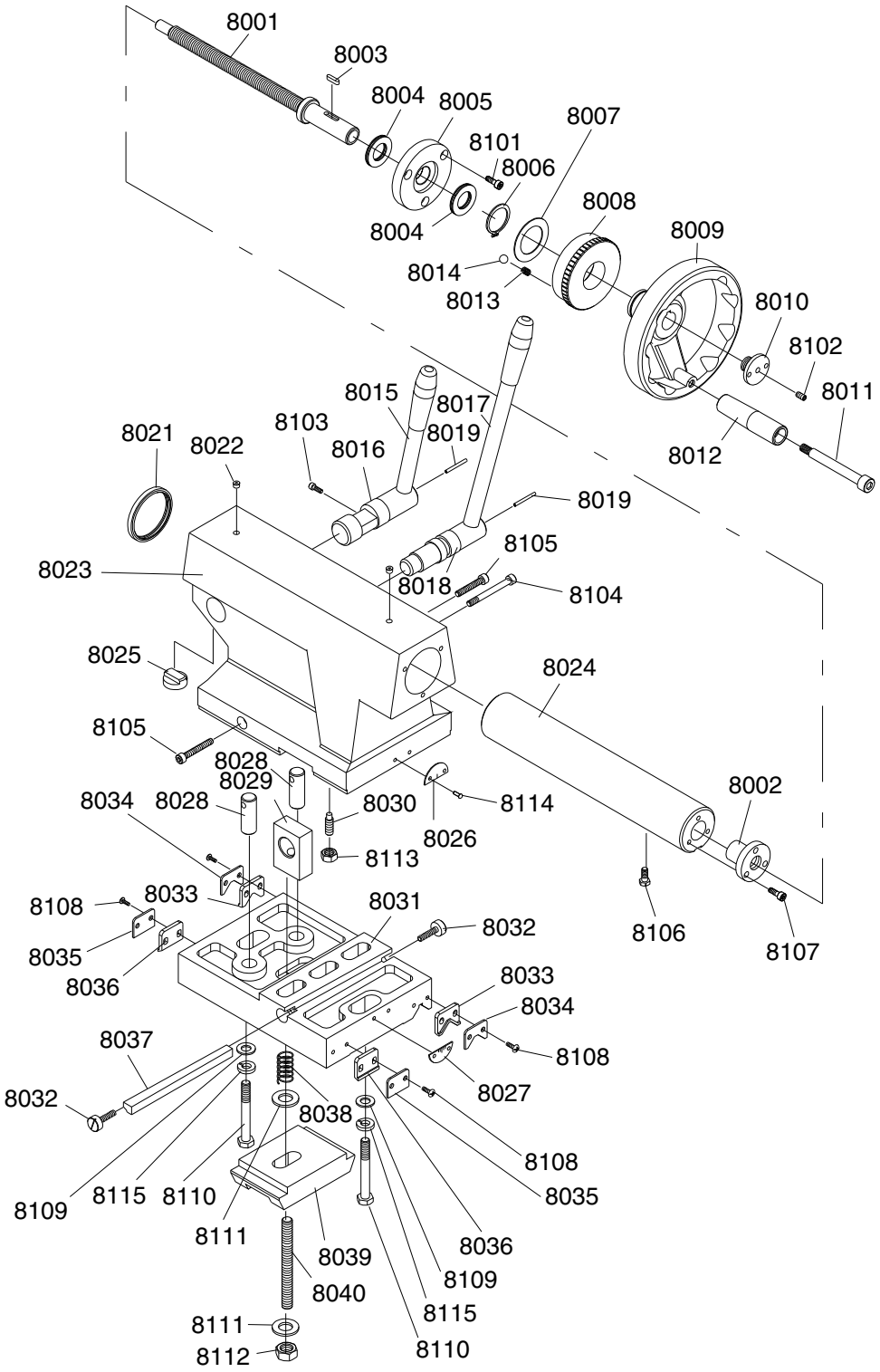
Bed (Thread Dial and Rests)



REF	PART #	DESCRIPTION
7501	P06707501	DIAL SCALE
7502	P06707502	DIAL SHAFT
7503	P06707503	THREAD DIAL CASTING
7504	P06707504	THUMB NUT M8-1.25
7505	P06707505	STUD M8-1.25 X 107
7506	P06707506	THREADING PLATE
7507	P06707507	SPACER
7508	P06707508	DIAL GEAR 16T
7509	P06707509	RIVET 2MM
7510	PN03M	HEX NUT M8-1.25
7511	PSS02M	SET SCREW M6-1 X 6
7512	P06707512	TOP CASTING
7513	P06707513	BASE CASTING
7514	P06707514	HINGE PIN
7515	P06707515	WING BOLT
7516	PN09M	HEX NUT M12-1.75
7517	PW06M	FLAT WASHER 12MM
7518	P06707518	STUD M12-1.75 X 75
7519	P06707519	CLAMP PLATE

REF	PART #	DESCRIPTION
7520	P06707520	CLAMP SCREW
7521	P06707521	ADJUSTING KNOB
7522	PRP51M	ROLL PIN 4 X 40
7523	P06707523	COLLAR
7524	P06707524	FINGER SCREW
7525	P06707525	FINGER
7526	P06707526	AXLE PIN
7527	P627	BALL BEARING 627ZZ
7528	PSS20M	SET SCREW M8-1.25 X 8
7529	P06707529	KNOB NUT
7530	P06707530	DOWEL PIN 9.5 X 45MM
7531	P06707531	CASTING
7532	PSS20M	SET SCREW M8-1.25 X 8
7533	P06707533	BRASS TIP
7534	P06707534	FINGER
7535	P06707535	FINGER SCREW
7536	P06707536	COLLAR
7537	PSB04M	CAP SCREW M6-1 X 10

Bed (Tailstock)

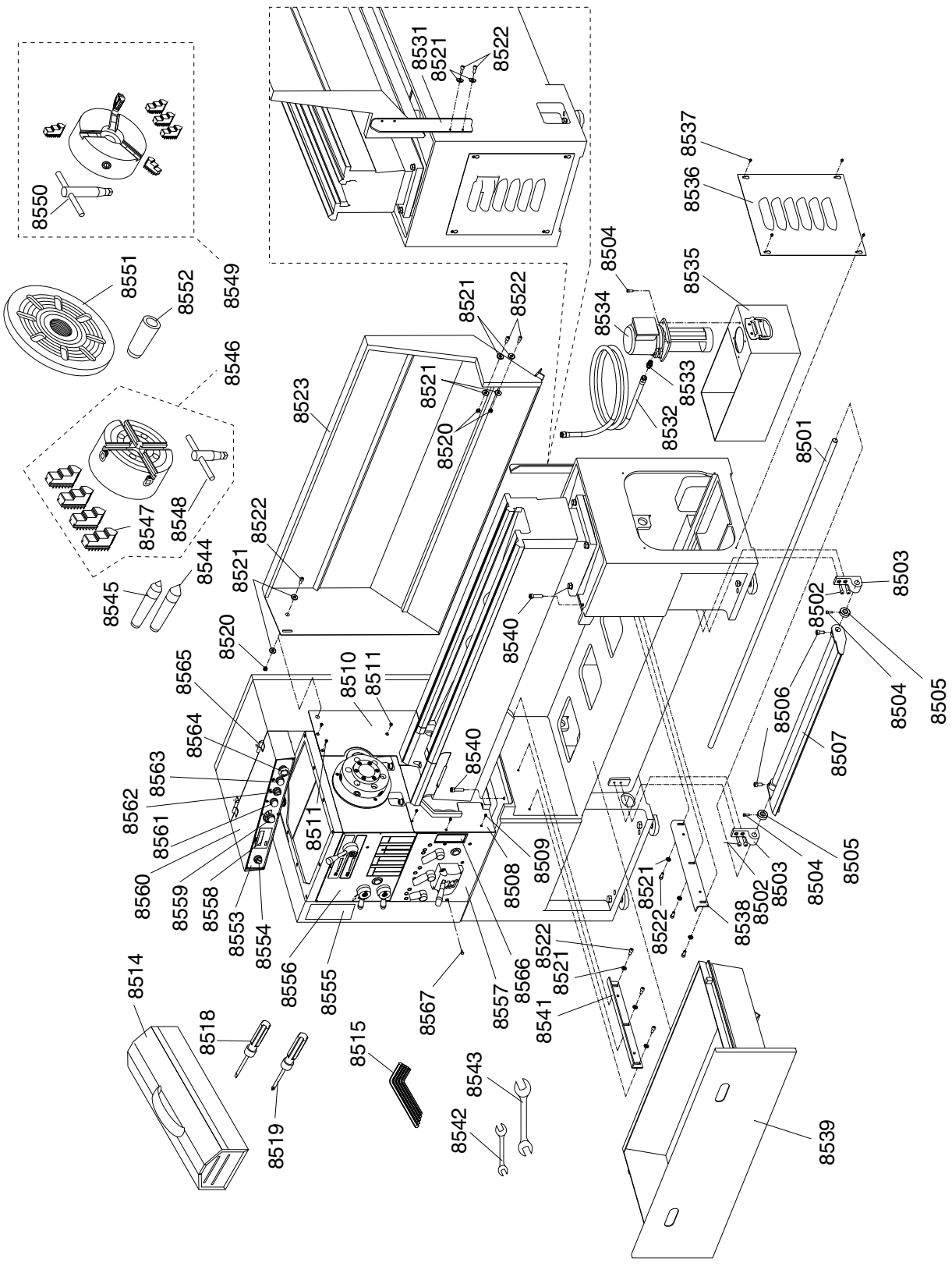


Bed (Tailstock) Parts List

REF	PART #	DESCRIPTION
8001	P06708001	LEAD SCREW
8002	P06708002	LEADSCREW NUT
8003	PK34M	KEY 5 X 5 X 20
8004	P06708004	THRUST BEARING AS2035
8005	P06708005	FLANGE
8006	PR37M	EXT RETAINING RING 32MM
8007	P06708007	SPACER
8008	P06708008	INDEX RING
8009	P06708009	HANDWHEEL
8010	P06708010	HANDWHEEL RETAINER
8011	P06708011	SHOULDER CAP SCR M8-1.25 X 90
8012	P06708012	HANDLE
8013	P06708013	COMPRESSION SPRING 6.2 X 16
8014	P06708014	STEEL BALL 1/4"
8015	P06708015	LEVER
8016	P06708016	CAM SHAFT
8017	P06708017	LEVER
8018	P06708018	CAM SHAFT
8019	PRP04M	ROLL PIN 4 X 24
8021	P06708021	OIL SEAL
8022	P06708022	BALL OILER 1/4"
8023	P06708023	TAILSTOCK HOUSING
8024	P06708024	QUILL
8025	P06708025	GUIDE KEY
8026	P06708026	SCALE PLATE
8027	P06708027	SCALE PLATE
8028	P06708028	PIN NUT

REF	PART #	DESCRIPTION
8029	P06708029	PIVOT BLOCK
8030	PSS09M	SET SCREW M8-1.25 X 20
8031	P06708031	BASE
8032	P06708032	GIB SCREW
8033	P06708033	WIPER
8034	P06708034	PLATE
8035	P06708035	PLATE
8036	P06708036	WIPER
8037	P06708037	GIB
8038	P06708038	COMPRESSION SPRING 25 X 45
8039	P06708039	CLAMP BLOCK
8040	P06708040	STUD M14-2
8101	PSB01M	CAP SCREW M6-1 X 16
8102	PSS04M	SET SCREW M6-1 X 12
8103	PSB26M	CAP SCREW M6-1 X 12
8104	PSB128M	CAP SCREW M8-1.25 X 70
8105	PSB35M	CAP SCREW M8-1.25 X 60
8106	PB05M	HEX BOLT M6-1 X 8
8107	PSB01M	CAP SCREW M6-1 X 16
8108	PS08M	PHLP HD SCR M5-.8 X 12
8109	PW04M	FLAT WASHER 10MM
8110	PB34M	HEX BOLT M10-1.5 X 60
8111	PW10M	FLAT WASHER 14MM
8112	PN32M	HEX NUT M14-2
8113	PN03M	HEX NUT M8-1.25
8114	P06708114	RIVET 2MM
8115	PLW06M	LOCK WASHER 10MM

Accessories and Coolant System

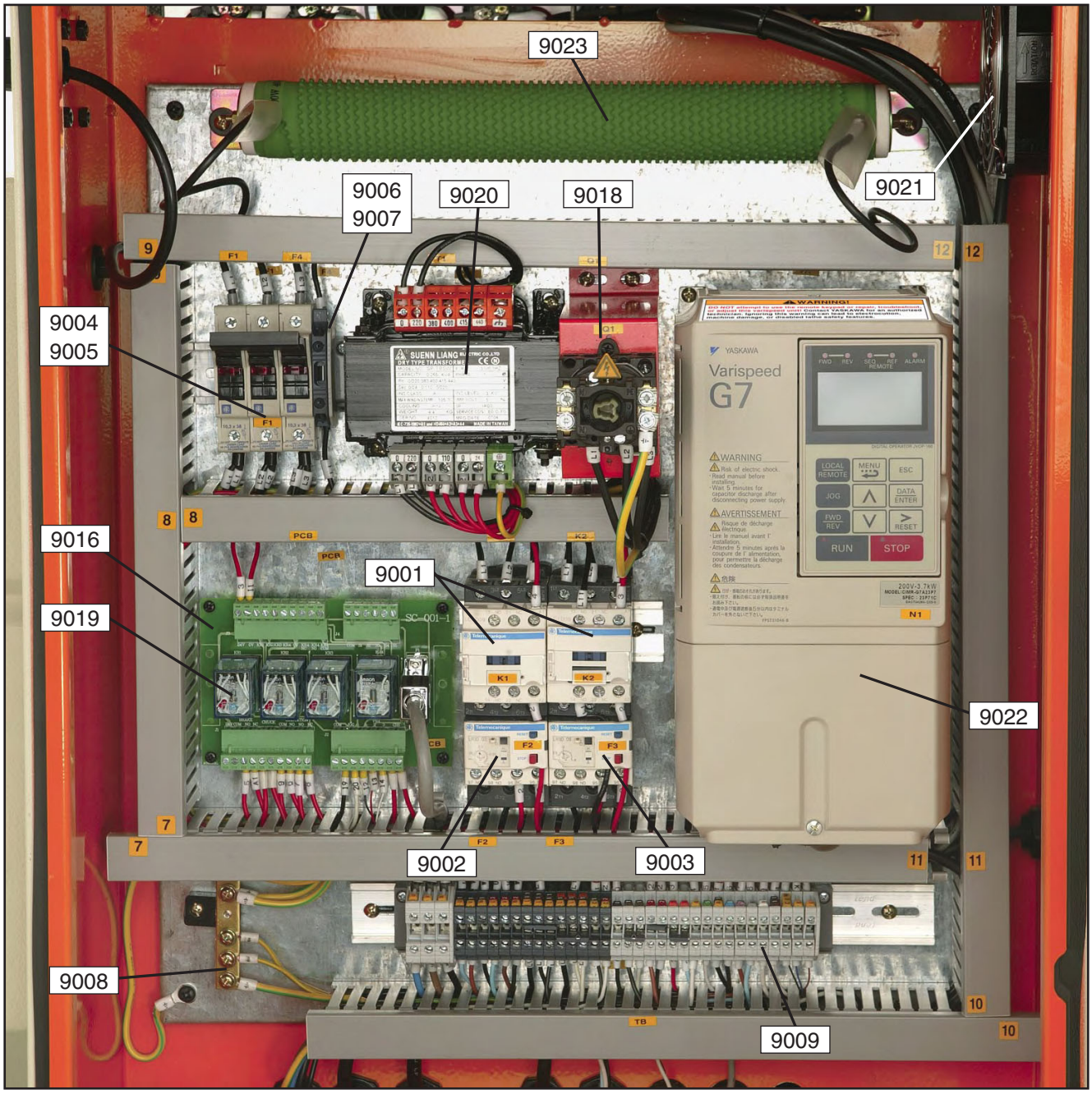


Accessories and Coolant System Parts List

REF	PART #	DESCRIPTION
8501	P06708501	SHAFT
8502	PSB31M	CAP SCREW M8-1.25 X 25
8503	P06708503	PEDAL BRACKET
8504	PSB01M	CAP SCREW M6-1 X 16
8505	P06708505	COLLAR
8506	PSB61M	CAP SCREW M10-1.5 X 20
8507	P06708507	FOOT PEDAL
8508	P06708508	COVER
8509	PS05M	PHLP HD SCR M5-.8 X 8
8510	P06708510	PLATE
8511	PFH30M	FLAT HD SCR M5-.8 X 8
8514	P06708514	TOOL BOX
8515	P06708515	10-PIECE HEX WRENCH SET
8518	P06708518	STANDARD SCREWDRIVER #2
8519	P06708519	PHILLIPS SCREWDRIVER #2
8520	PN03M	HEX NUT M8-1.25
8521	PW01M	FLAT WASHER 8MM
8522	PSB14M	CAP SCREW M8-1.25 X 20
8523	P06708523	BACK SPLASH
8531	P06708531	ANGLE
8532	P06708532	COOLANT HOSE
8533	P06708533	NIPPLE
8534	P06708534	COOLANT PUMP/MOTOR 220V
8535	P06708535	COOLANT TANK
8536	P06708536	COVER
8537	PS68M	PHLP HD SCR M6-1 X 10
8538	P06708538	ANGLE
8539	P06708539	CHIP DRAWER

REF	PART #	DESCRIPTION
8540	PSB70M	CAP SCREW M10-1.5 X 45
8541	P06708541	ANGLE
8542	P06708542	COMBO WRENCH 14-17MM
8543	P06708543	COMBO WRENCH 22-24MM
8544	P06708544	MT#4 STANDARD DEAD CENTER
8545	P06708545	MT#4 CARBIDE TIP DEAD CENTER
8546	P06708546	COMPLETE 10" 4-JAW CHUCK D1-6
8547	P06708547	REPLACEMENT 4-JAW CHUCK JAW
8548	P06708548	4-JAW CHUCK WRENCH
8549	P06708549	COMPLETE 9" 3-JAW CHUCK D1-6
8550	P06708550	3-JAW CHUCK WRENCH
8551	P06708551	COMPLETE 12" FACE PLATE D1-6
8552	P06708552	MT#6/MT#3 SPINDLE ADAPTER
8553	P06708553	CONTROL PANEL
8554	P06708554	CSS SWITCH
8555	P06708555	THREADING AND FEED CHART
8556	P06708556	HEADSTOCK FACE PANEL
8557	P06708557	GEARBOX FACE PANEL
8558	P06708558	DIGITAL TACHOMETER
8559	P06708559	SPINDLE SPEED SWITCH
8560	P06708560	CONTROL PANEL BOX
8561	P06708561	POWER LAMP
8562	P06708562	PUMP SWITCH
8563	P06708563	JOG BUTTON
8564	P06708564	EMERGENCY STOP BUTTON
8565	P06708565	COMPLETE HINGE ASSEMBLY
8566	P06708566	COVER
8567	PS17M	PHLP HD SCR M4-.7 X 6

Electrical (Main Electrical Box)



REF	PART #	DESCRIPTION
9001	P06709001	CONTACTOR TELE LC1D09 220VAC
9002	P06709002	THERMAL RELAY TELE LR3D 05 0.63-1A
9003	P06709003	THERMAL RELAY TELE LR3D 07 1.6-2.5A
9004	P06709004	MAIN FUSE BUS 3-PH
9005	P06709005	FUSE 20A 10.3 X 38MM
9006	P06709006	FUSE HOUSING
9007	P06709007	FUSE 5A 5.2 X 20.2MM
9008	P06709008	GROUNDING JUNCTION BLOCK

REF	PART #	DESCRIPTION
9009	P06709009	MAIN JUNCTION BLOCK
9016	P06709016	CIRCUIT BOARD ASSEMBLY
9018	P06709018	MASTER POWER SWITCH
9019	P06709019	RELAY OMRON MY4NJ 24VAC
9020	P06709020	TRANSFORMER S LIANG SP-TBSW
9021	P06709021	FAN
9022	P06709022	VARISPEED UNIT YASKAWA G7
9023	P06709023	RESISTOR 900W 40-OHM

Notes

WARRANTY AND RETURNS

Grizzly Industrial, Inc. warrants every product it sells for a period of **1 year** to the original purchaser from the date of purchase. This warranty does not apply to defects due directly or indirectly to misuse, abuse, negligence, accidents, repairs or alterations or lack of maintenance. This is Grizzly's sole written warranty and any and all warranties that may be implied by law, including any merchantability or fitness, for any particular purpose, are hereby limited to the duration of this written warranty. We do not warrant or represent that the merchandise complies with the provisions of any law or acts unless the manufacturer so warrants. In no event shall Grizzly's liability under this warranty exceed the purchase price paid for the product and any legal actions brought against Grizzly shall be tried in the State of Washington, County of Whatcom.

We shall in no event be liable for death, injuries to persons or property or for incidental, contingent, special, or consequential damages arising from the use of our products.

To take advantage of this warranty, contact us by mail or phone and give us all the details. We will then issue you a "Return Number,'' which must be clearly posted on the outside as well as the inside of the carton. We will not accept any item back without this number. Proof of purchase must accompany the merchandise.

The manufacturers reserve the right to change specifications at any time because they constantly strive to achieve better quality equipment. We make every effort to ensure that our products meet high quality and durability standards and we hope you never need to use this warranty.

Please feel free to write or call us if you have any questions about the machine or the manual.

Thank you again for your business and continued support. We hope to serve you again soon.

Grizzly Industrial, Inc. WARRANTY CARD

Name _____

Street _____

City _____ State _____ Zip _____

Phone # _____ Email _____ Invoice # _____

Model # _____ Order # _____ Serial # _____

The following information is given on a voluntary basis. It will be used for marketing purposes to help us develop better products and services. ***Of course, all information is strictly confidential.***

1. How did you learn about us?

____ Advertisement ____ Friend ____ Catalog
____ Card Deck ____ Website ____ Other:

2. Which of the following magazines do you subscribe to?

____ Cabinet Maker
____ Family Handyman
____ Hand Loader
____ Handy
____ Home Shop Machinist
____ Journal of Light Cont.
____ Live Steam
____ Model Airplane News
____ Modeltec
____ Old House Journal
____ Popular Mechanics
____ Popular Science
____ Popular Woodworking
____ Practical Homeowner
____ Precision Shooter
____ Projects in Metal
____ RC Modeler
____ Rifle
____ Shop Notes
____ Shotgun News
____ Today's Homeowner
____ Wood
____ Wooden Boat
____ Woodshop News
____ Woodsmith
____ Woodwork
____ Woodworker West
____ Woodworker's Journal
____ Other:

3. What is your annual household income?

____ $20,000-$29,000 ____ $30,000-$39,000 ____ $40,000-$49,000
____ $50,000-$59,000 ____ $60,000-$69,000 ____ $70,000+

4. What is your age group?

____ 20-29 ____ 30-39 ____ 40-49
____ 50-59 ____ 60-69 ____ 70+

5. How long have you been a woodworker/metalworker?

____ 0-2 Years ____ 2-8 Years ____ 8-20 Years ____ 20+ Years

6. How many of your machines or tools are Grizzly?

____ 0-2 ____ 3-5 ____ 6-9 ____ 10+

7. Do you think your machine represents a good value? _____ Yes _____ No

8. Would you recommend Grizzly Industrial to a friend? _____ Yes _____ No

9. Would you allow us to use your name as a reference for Grizzly customers in your area?
Note: *We never use names more than 3 times.* _____ Yes _____ No

10. Comments: _____

_____

_____

CUT ALONG DOTTED LINE

FOLD ALONG DOTTED LINE

Place
Stamp
Here

GRIZZLY INDUSTRIAL, INC.
P.O. BOX 2069
BELLINGHAM, WA 98227-2069

FOLD ALONG DOTTED LINE

Send a Grizzly Catalog to a friend:

Name_____

Street_____

City_____State_____Zip_____

TAPE ALONG EDGES--PLEASE DO NOT STAPLE