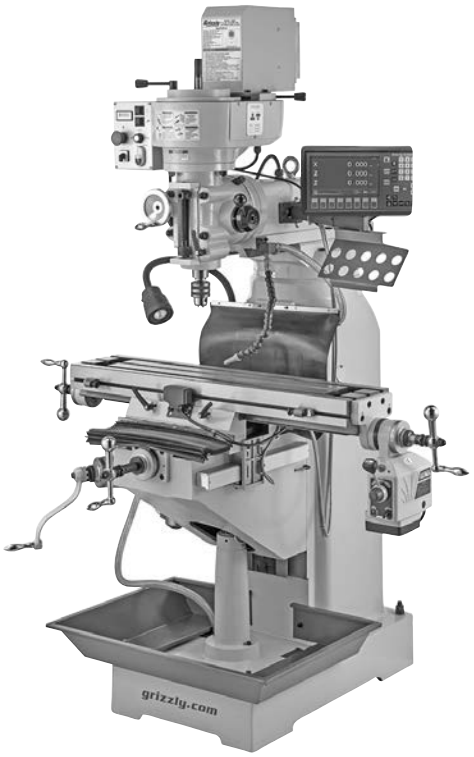
MODEL G0961
8" X 36" VS KNEE MILL
w/POWER FEED & DRO

OWNER'S MANUAL

(For models manufactured since 06/23)



#MNLW22685 PRINTED IN CHINA V1.12.23

******Keep for Future Reference******

⚠ WARNING!

This manual provides critical safety instructions on the proper setup, operation, maintenance, and service of this machine/tool. Save this document, refer to it often, and use it to instruct other operators.

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

The owner of this machine/tool 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, cutting/sanding/grinding tool 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.

Table of Contents

INTRODUCTION

Contact Info

We stand behind our machines! If you have questions or need help, contact us with the information below. Before contacting, make sure you get the **serial number** and **manufacture date** from the machine ID label. This will help us help you faster.

Grizzly Technical Support
1815 W. Battlefield
Springfield, MO 65807
Phone: (570) 546-9663
Email: techsupport@grizzly.com

We want your feedback on this manual. What did you like about it? Where could it be improved? Please take a few minutes to give us feedback.

Grizzly Documentation Manager
P.O. Box 2069
Bellingham, WA 98227-2069
Email: manuals@grizzly.com

⚠CAUTION

No list of safety guidelines can be complete. Every shop environment is different. Always consider safety first, as it applies to your individual working conditions. Use this and other machinery with caution and respect. Failure to do so could result in serious personal injury, damage to equipment, or poor work results.

⚠WARNING

Like all machinery there is potential danger when operating this machine. Accidents are frequently caused by lack of familiarity or failure to pay attention. Use this machine with respect and caution to decrease the risk of operator injury. If normal safety precautions are overlooked or ignored, serious personal injury may occur.

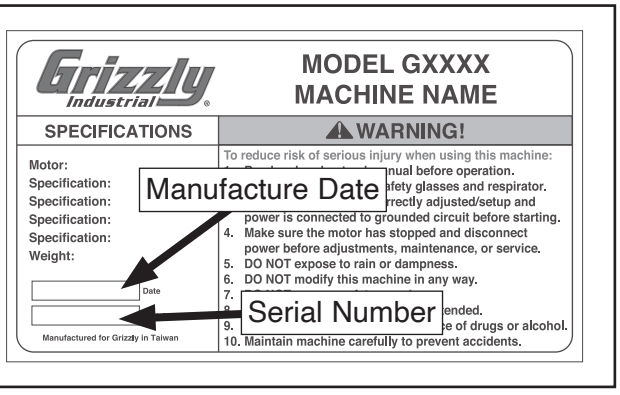
Manual Accuracy

We are proud to provide a high-quality owner's manual with your new machine!

We made every effort to be exact with the instructions, specifications, drawings, and photographs in this manual. Sometimes we make mistakes, but our policy of continuous improvement also means that **sometimes the machine you receive is slightly different than shown in the manual**.

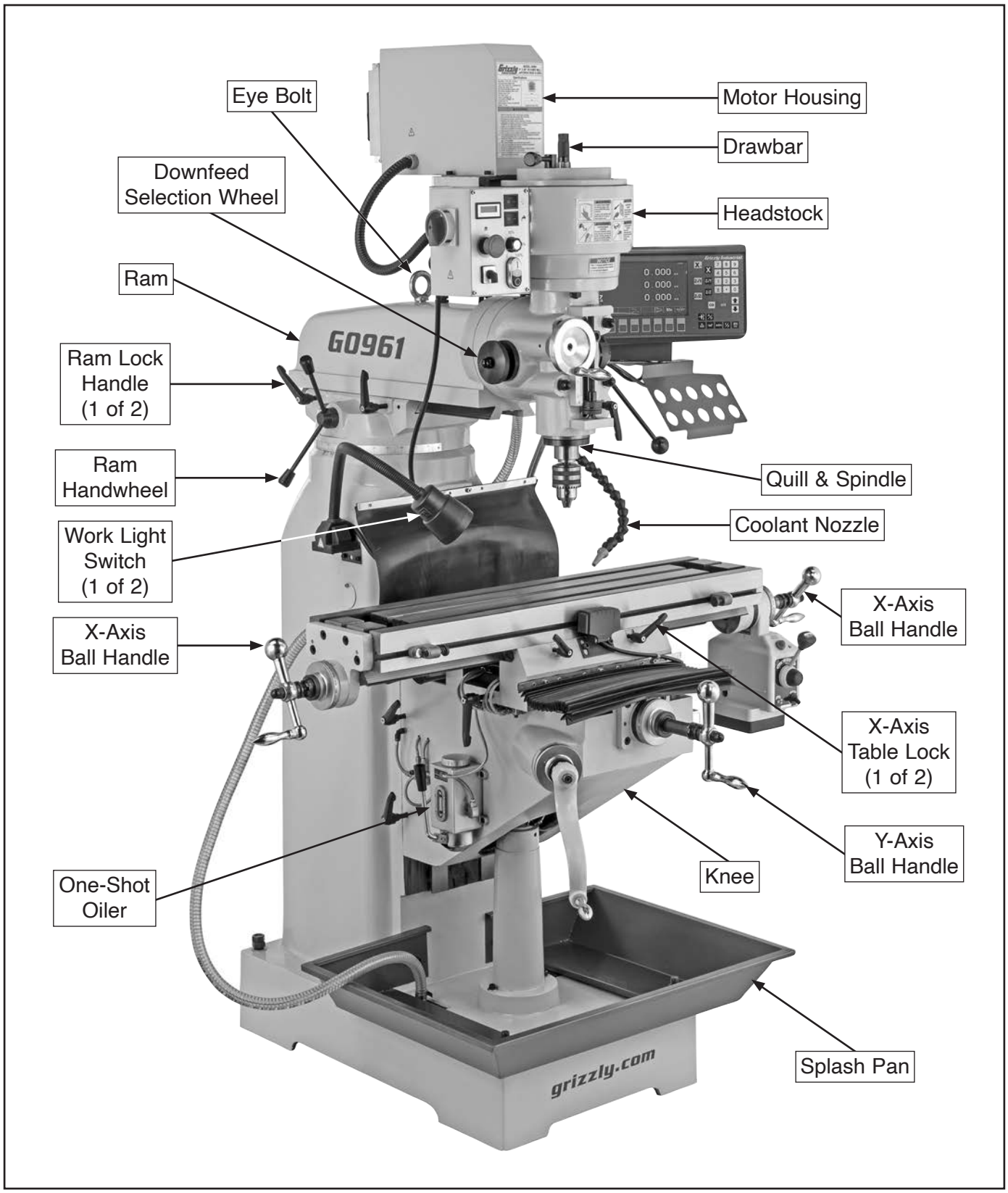
If you find this to be the case, and the difference between the manual and machine leaves you confused or unsure about something, check our website for an updated version. We post current manuals and manual updates for free on our website at **www.grizzly.com**.

Alternatively, you can call our Technical Support for help. Before calling, make sure you write down the **manufacture date** and **serial number** from the machine ID label (see below). This information is required for us to provide proper tech support, and it helps us determine if updated documentation is available for your machine.

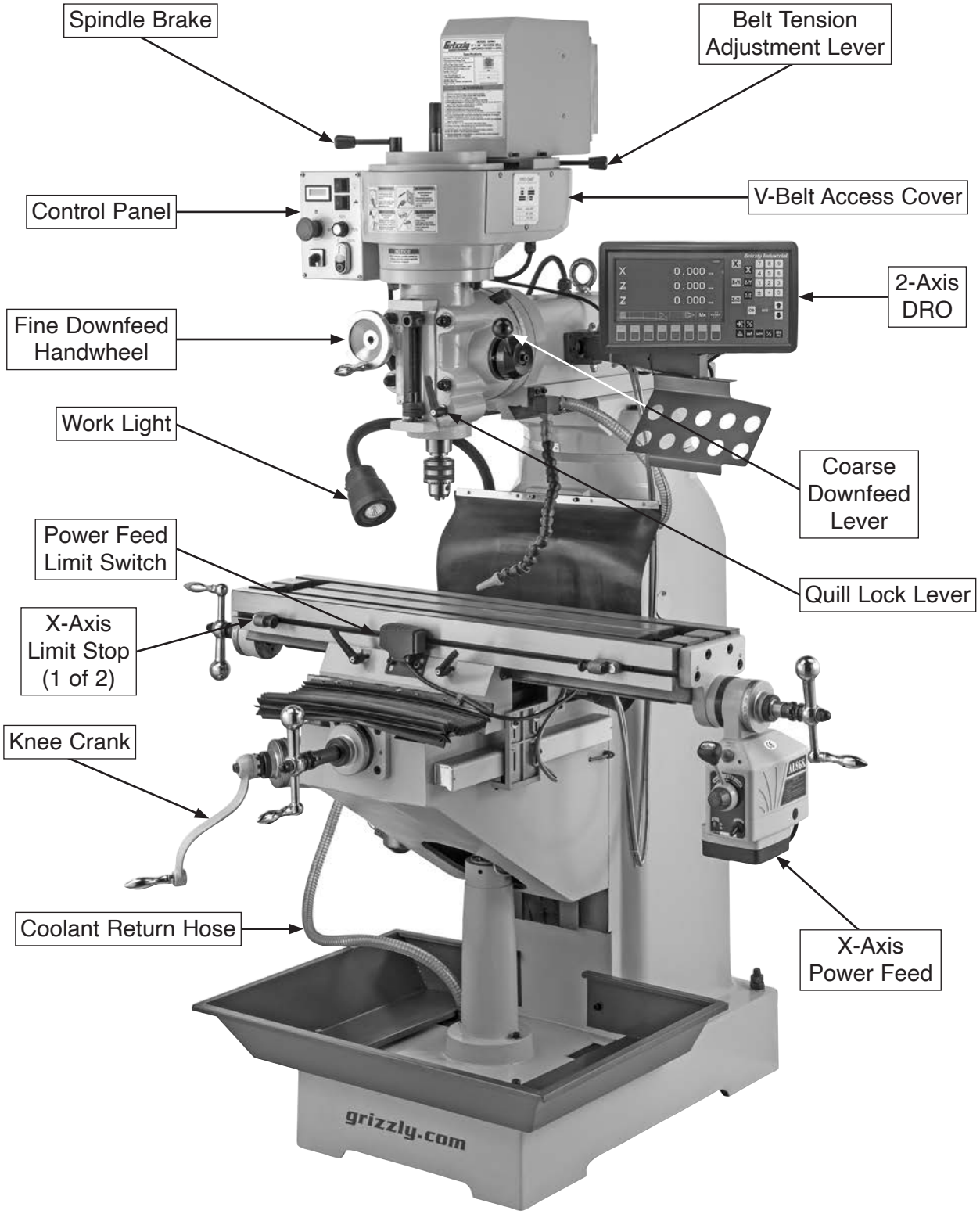


Left Front View Identification

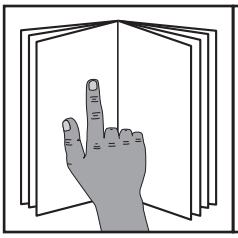
Become familiar with the names and locations of the controls and features shown below to better understand the instructions in this manual.



Right Front View Identification



Controls & Components



⚠WARNING

To reduce your risk of serious injury, read this entire manual BEFORE using machine.

Refer to the following figures and descriptions to become familiar with the basic controls and components of this machine. Understanding these items and how they work will help you understand the rest of the manual and minimize your risk of injury when operating this machine.

Power Controls

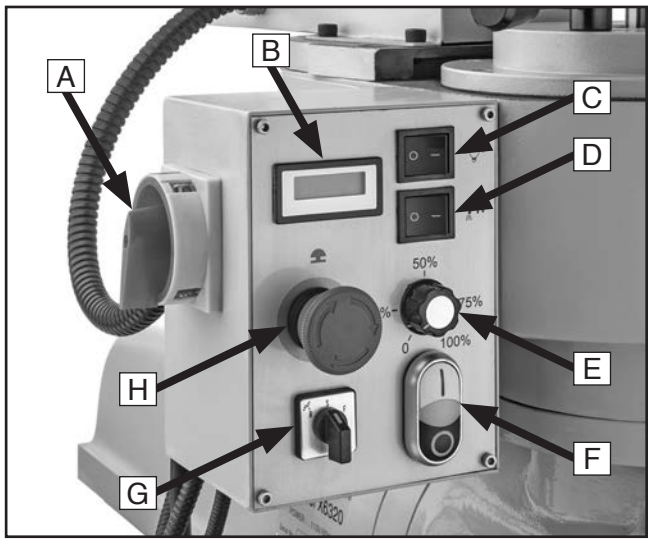


Figure 1. Location of master power switch and control panel components.

A. Master Power Switch: Turns incoming power ***ON*** and ***OFF***.

B. Spindle Speed Digital Readout: Displays spindle RPM.

C. Work Light ON/OFF Switch: Turns work light ***ON*** and ***OFF***. Light may also be turned ***ON/OFF*** using switch on light base.

D. Coolant Pump ON/OFF Switch: Turns coolant pump ***ON*** and ***OFF***, which starts and stops flow of coolant through nozzle.

E. Spindle Speed Dial: Adjusts spindle speed from 100–2,800 RPM.

F. Spindle Start/Stop Button: Starts and stops spindle rotation once spindle forward/reverse switch has been moved to F or R position.

G. Spindle Forward/Reverse Switch: Controls direction of spindle rotation: Forward (F), reverse (R), and stop (S).

H. Emergency Stop Button: Disables power to control panel and stops all machine functions. To reset, twist button clockwise until it pops out.

Headstock

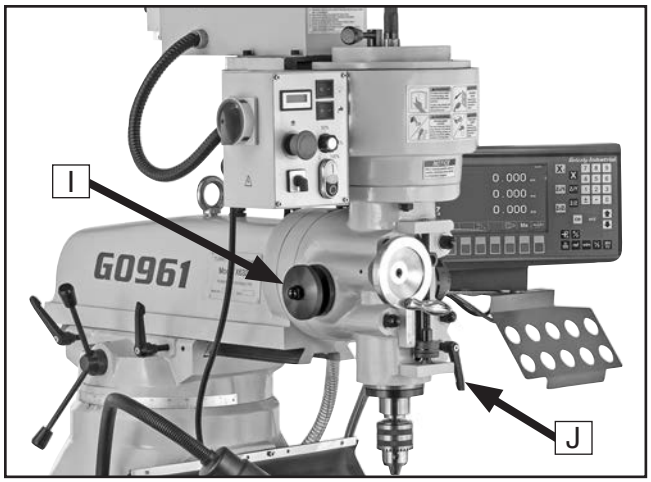


Figure 2. Headstock controls (left).

I. Downfeed Selection Wheel: When tightened, enables fine downfeed handwheel; when loosened, enables coarse downfeed lever.

J. Quill Lock Lever: Locks quill in vertical position.

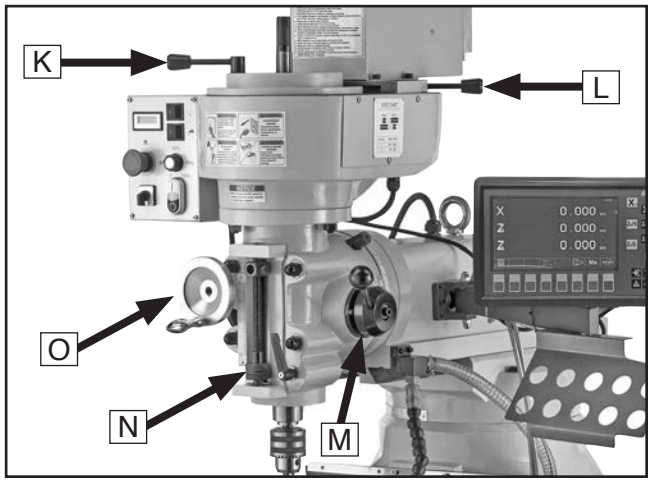


Figure 3. Headstock controls (right).

K. Spindle Brake Lever: Quickly stops spindle after power to spindle is turned ***OFF***.

L. Belt Tension Adjustment Lever: Adjusts V-belt tension by moving position of motor.

M. Coarse Downfeed Lever: Quickly moves quill downward manually and automatically retracts spindle to top position when released. Typically used for drilling operations.

N. Adjustable Downfeed Stop: Limits depth of quill travel. Scale is graduated in increments of 1/16". Typically used for repeat operations.

O. Fine Downfeed Handwheel: Manually controls spindle downfeed for fine Z-axis control.

Table

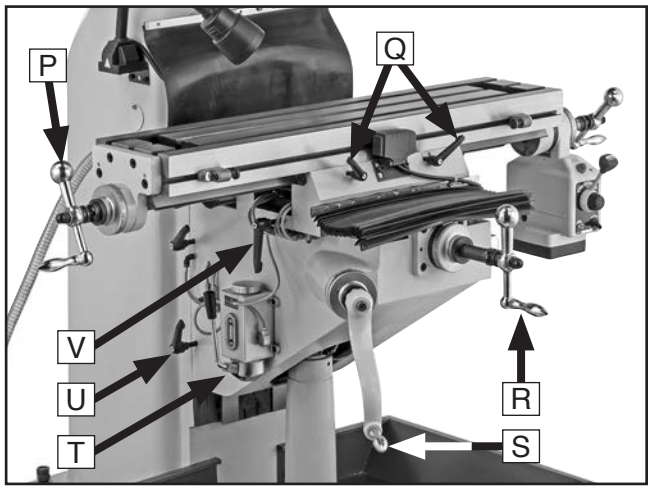


Figure 4. Table controls and components.

P. X-Axis Ball Handle (1 of 2): Manual moves table along X-axis (left and right).

Q. X-Axis Table Locks: Tightens to prevent X-axis table movement for increased rigidity during operations where X-axis should not move.

R. Y-Axis Ball Handle: Manually moves table along Y-axis (front and back).

S. Knee Crank: Manually moves table along Z-axis (up and down).

T. One-Shot Oiler: Lubricates X-, Y-, and Z-axis table ways.

U. Z-Axis Lock Lever (1 of 2): Tightens to prevent Z-axis table movement for increased rigidity during operations where Z-axis should not move.

V. Y-Axis Lock Lever: Tightens to prevent Y-axis table movement for increased rigidity during operations where Y-axis should not move.

Ram

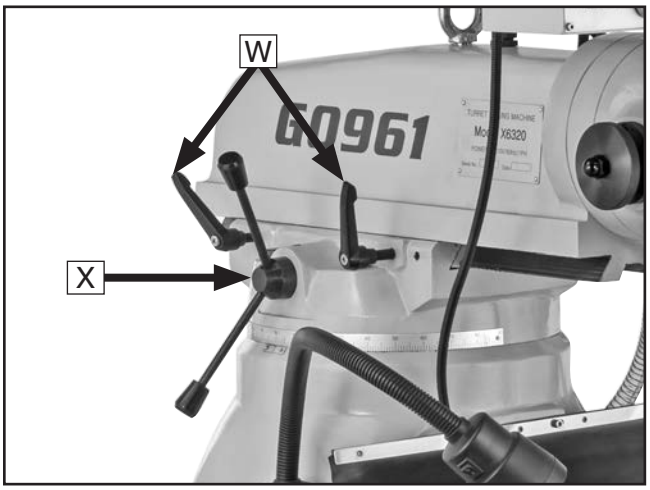


Figure 5. Ram controls.

W. Ram Lock Handles: Secure ram in position.

X. Ram Movement Lever: Moves ram forward/backward along ways.

X-Axis Power Feed

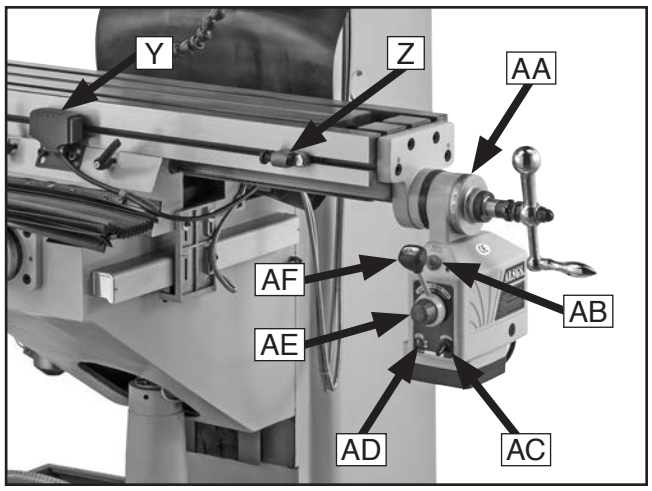


Figure 6. Power feed controls.

Y. X-Axis Limit Switch: Stops powered table movement when it comes in contact with limit stops.

Z. X-Axis Limit Stop (1 of 2): Limits X-axis table travel (one on each end of table).

AA. Graduated Dial: Displays X-axis table movement in 0.001" increments, with each revolution equaling 0.200" of travel.

AB. RAPID SWITCH: Once directional lever has been activated, causes table to travel at full speed while button is held down.

AC. POWER Switch: Enables/disables power to power feed unit.

AD. Reset Button: Resets internal circuit breaker if power feed is overloaded and shuts down.

AE. Speed Dial: Controls speed of X-axis table movement. Turning dial clockwise causes table to move faster.

Note: *A lot of variables are involved when determining proper feed rates. We recommend that you combine research and experimentation to find feed rates that best work for your specific operations.*

AF. Directional Lever: Selects direction of table movement. Center position is neutral.

MACHINE DATA SHEET

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

MODEL G0961 8" X 36" VARIABLE-SPEED KNEE MILL WITH POWER FEED AND DRO

Product Dimensions:

Weight	1731 lbs.
Width (side-to-side) x Depth (front-to-back) x Height	56 x 56 x 76-1/2 in.
Footprint (Length x Width)	19-1/2 x 33 in.
Space Required for Full Range of Movement (Width x Depth)	79-1/2 x 56 in.

Shipping Dimensions:

Type	Wood Crate
Content	Machine
Weight	1940 lbs.
Length x Width x Height	53 x 45 x 84 in.
Must Ship Upright	Yes

Electrical:

Power Requirement	110V, Single-Phase, 60 Hz
Full-Load Current Rating	15.8A
Minimum Circuit Size	20A
Connection Type	Cord & Plug
Power Cord Included	Yes
Power Cord Length	60 in.
Power Cord Gauge	14 AWG
Plug Included	Yes
Included Plug Type	5-15
Switch Type	Control Panel with On/Off Button

Motors:

Main

Horsepower	1.5 HP
Phase	Single-Phase
Amps	15A
Speed	3400 RPM
Type	DC Brushless
Power Transfer	Belt
Bearings	Shielded & Permanently Lubricated

Coolant Pump

Horsepower	60W
Phase	Single-Phase
Amps	0.82A
Speed	2800 RPM
Type	TEFC Induction
Power Transfer	Direct
Bearings	Shielded & Permanently Lubricated

Main Specifications:

Operation Info

Spindle Travel	4-1/16 in.
Max Distance Spindle to Column	15-3/4 in.
Max Distance Spindle to Table	14-1/2 in.
Longitudinal Table Travel (X-Axis)	23 in.
Cross Table Travel (Y-Axis)	9-1/2 in.
Vertical Table Travel (Z-Axis)	13-3/4 in.
Ram Travel	10-1/2 in.
Turret or Column Swivel (Left/Right)	180 deg.
Head Tilt (Left/Right)	90 deg.
Drilling Capacity for Cast Iron	1 in.
Drilling Capacity for Steel	7/8 in.
End Milling Capacity	5/8 in.
Face Milling Capacity	2-1/2 in.

Table Info

Table Length	36 in.
Table Width	8 in.
Table Thickness	2-3/4 in.
Table Weight Capacity	661 lbs.
Number of T-Slots	3
T-Slot Size	5/8 in.
T-Slots Centers	2-1/2 in.
Number of Longitudinal Feeds	Variable
X-Axis Table Power Feed Rate	0 - 3.5 FPM
X/Y-Axis Travel per Handwheel Revolution	0.200 in.
Z-Axis Travel per Handwheel Revolution	0.100 in.

Spindle Info

Spindle Taper	R-8
Number of Vertical Spindle Speeds	Variable
Range of Vertical Spindle Speeds	100 - 2800 RPM
Quill Diameter	3-3/8 in.
Drawbar Thread Size	7/16-20
Drawbar Length	19 in.
Spindle Bearings	Tapered Roller

Construction

Spindle Housing/Quill	Chromed Cast Iron
Table	Precision-Ground Cast Iron
Head	Cast Iron
Column/Base	Cast Iron
Base	Cast Iron
Stand	Cast Iron
Paint Type/Finish	Enamel

Other Specifications:

Country of Origin	China
Warranty	1 Year
Approximate Assembly & Setup Time	2 Hours
Serial Number Location	ID Label
ISO 9001 Factory	Yes

SECTION 1: SAFETY

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. Always use common sense and good judgment.

⚠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 **Alerts the user to useful information about proper operation of the machine to avoid machine damage.**

Safety Instructions for Machinery

⚠WARNING

OWNER'S MANUAL. Read and understand this owner's manual BEFORE using machine.

TRAINED OPERATORS ONLY. Untrained operators have a higher risk of being hurt or killed. Only allow trained/supervised people to use this machine. When machine is not being used, disconnect power, remove switch keys, or lock-out machine to prevent unauthorized use—especially around children. Make your workshop kid proof!

DANGEROUS ENVIRONMENTS. Do not use machinery in areas that are wet, cluttered, or have poor lighting. Operating machinery in these areas greatly increases the risk of accidents and injury.

MENTAL ALERTNESS REQUIRED. Full mental alertness is required for safe operation of machinery. Never operate under the influence of drugs or alcohol, when tired, or when distracted.

ELECTRICAL EQUIPMENT INJURY RISKS. You can be shocked, burned, or killed by touching live electrical components or improperly grounded machinery. To reduce this risk, only allow qualified service personnel to do electrical installation or repair work, and always disconnect power before accessing or exposing electrical equipment.

DISCONNECT POWER FIRST. Always disconnect machine from power supply BEFORE making adjustments, changing tooling, or servicing machine. This prevents an injury risk from unintended startup or contact with live electrical components.

EYE PROTECTION. Always wear ANSI-approved safety glasses or a face shield when operating or observing machinery to reduce the risk of eye injury or blindness from flying particles. Everyday eyeglasses are NOT approved safety glasses.

⚠WARNING

WEARING PROPER APPAREL. Do not wear loose clothing, gloves, neckties, or jewelry that can become entangled in moving parts. Always tie back or cover long hair. Wear non-slip footwear to reduce risk of slipping and losing control or accidentally contacting cutting tool or moving parts.

HAZARDOUS DUST. Dust created by machinery operations may cause cancer, birth defects, or long-term respiratory damage. Be aware of dust hazards associated with each workpiece material. Always wear a NIOSH-approved respirator to reduce your risk.

HEARING PROTECTION. Always wear hearing protection when operating or observing loud machinery. Extended exposure to this noise without hearing protection can cause permanent hearing loss.

REMOVE ADJUSTING TOOLS. Tools left on machinery can become dangerous projectiles upon startup. Never leave chuck keys, wrenches, or any other tools on machine. Always verify removal before starting!

USE CORRECT TOOL FOR THE JOB. Only use this tool for its intended purpose—do not force it or an attachment to do a job for which it was not designed. Never make unapproved modifications—modifying tool or using it differently than intended may result in malfunction or mechanical failure that can lead to personal injury or death!

AWKWARD POSITIONS. Keep proper footing and balance at all times when operating machine. Do not overreach! Avoid awkward hand positions that make workpiece control difficult or increase the risk of accidental injury.

CHILDREN & BYSTANDERS. Keep children and bystanders at a safe distance from the work area. Stop using machine if they become a distraction.

GUARDS & COVERS. Guards and covers reduce accidental contact with moving parts or flying debris. Make sure they are properly installed, undamaged, and working correctly BEFORE operating machine.

FORCING MACHINERY. Do not force machine. It will do the job safer and better at the rate for which it was designed.

NEVER STAND ON MACHINE. Serious injury may occur if machine is tipped or if the cutting tool is unintentionally contacted.

STABLE MACHINE. Unexpected movement during operation greatly increases risk of injury or loss of control. Before starting, verify machine is stable and mobile base (if used) is locked.

USE RECOMMENDED ACCESSORIES. Consult this owner's manual or the manufacturer for recommended accessories. Using improper accessories will increase the risk of serious injury.

UNATTENDED OPERATION. To reduce the risk of accidental injury, turn machine ***OFF*** and ensure all moving parts completely stop before walking away. Never leave machine running while unattended.

MAINTAIN WITH CARE. Follow all maintenance instructions and lubrication schedules to keep machine in good working condition. A machine that is improperly maintained could malfunction, leading to serious personal injury or death.

DAMAGED PARTS. Regularly inspect machine for damaged, loose, or mis-adjusted parts—or any condition that could affect safe operation. Immediately repair/replace BEFORE operating machine. For your own safety, DO NOT operate machine with damaged parts!

MAINTAIN POWER CORDS. When disconnecting cord-connected machines from power, grab and pull the plug—NOT the cord. Pulling the cord may damage the wires inside. Do not handle cord/plug with wet hands. Avoid cord damage by keeping it away from heated surfaces, high traffic areas, harsh chemicals, and wet/damp locations.

EXPERIENCING DIFFICULTIES. If at any time you experience difficulties performing the intended operation, stop using the machine! Contact our Technical Support at (570) 546-9663.

Additional Safety for Milling Machines

⚠WARNING

You can be seriously injured or killed by getting clothing, jewelry, or long hair entangled with rotating cutter/spindle. You can be severely cut or have fingers amputated from contact with rotating cutters. You can be blinded or struck by broken cutting tools, metal chips, workpieces, or adjustment tools thrown from the rotating spindle with great force. To reduce your risk of serious injury when operating this machine, completely heed and understand the following:

UNDERSTAND ALL CONTROLS. Make sure you understand the function and proper use of all controls before starting. This will help you avoid making mistakes that result in serious injury.

AVOIDING ENTANGLEMENT. DO NOT wear loose clothing, gloves, or jewelry, and tie back long hair. Keep all guards in place and secure. Always allow spindle to stop on its own. DO NOT stop spindle using your hand or any other object.

WEAR FACE SHIELD. Always wear a face shield in addition to safety glasses. This provides more complete protection for your face than safety glasses alone.

USE CORRECT SPINDLE SPEED. Follow recommended speeds and feeds for each size and type of cutting tool. This helps avoid tool breakage during operation and ensures best cutting results.

INSPECT CUTTING TOOL. Inspect cutting tools for sharpness, chips, or cracks before each use. Replace dull, chipped, or cracked cutting tools immediately.

PROPERLY SECURE CUTTER. Firmly secure cutting tool or drill bit so it does not fly out of spindle during operation.

POWER DISRUPTION. In the event of a local power outage during operation, turn spindle switch ***OFF*** to avoid a possible sudden startup once power is restored.

CLEAN MACHINE SAFELY. Metal chips or shavings can be razor sharp. DO NOT clear chips by hand or compressed air that can force chips farther into machine—use a brush or vacuum instead. Never clear chips while spindle is turning.

SECURE WORKPIECE TO TABLE. Clamp workpiece to table or secure in a vise mounted to table, so workpiece cannot unexpectedly shift or spin during operation. NEVER hold workpiece by hand during operation.

PROPERLY MAINTAIN MACHINE. Keep machine in proper working condition to help ensure that it functions safely and all guards and other components work as intended. Perform routine inspections and all necessary maintenance. Never operate machine with damaged or worn parts that can break or result in unexpected movement during operation.

DISCONNECT POWER FIRST. To reduce risk of electrocution or injury from unexpected startup, make sure mill/drill is turned ***OFF***, disconnected from power, and all moving parts have come to a complete stop before changing cutting tools or starting any inspection, adjustment, or maintenance procedure.

REMOVE CHUCK KEY & SPINDLE TOOLS. Always remove chuck key, drawbar wrench, and other tools used on the spindle immediately after use. This will prevent them from being thrown by the spindle upon startup.

SECTION 2: POWER SUPPLY

Availability

Before installing the machine, consider the availability and proximity of the required power supply circuit. If an existing circuit does not meet the requirements for this machine, a new circuit must be installed. To minimize the risk of electrocution, fire, or equipment damage, installation work and electrical wiring must be done by an electrician or qualified service personnel in accordance with all applicable codes and standards.

⚠WARNING

Electrocution, fire, shock, or equipment damage may occur if machine is not properly grounded and connected to power supply.

Full-Load Current Rating

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

Full-Load Current Rating at 110V .. 15.8 Amps

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

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

⚠WARNING

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

110V Circuit Requirements

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

Nominal Voltage 110V, 115V, 120V
Cycle ..... 60 Hz
Phase ..... Single-Phase
Power Supply Circuit ..... 20 Amps
Plug/Receptacle ..... NEMA 5-15

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

⚠CAUTION

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

Note: *Circuit requirements in this manual apply to a dedicated circuit—where only one machine will be running on the circuit at a time. If machine will be connected to a shared circuit where multiple machines may be running at the same time, consult an electrician or qualified service personnel to ensure circuit is properly sized for safe operation.*

Grounding & Plug Requirements

This machine MUST be grounded. In the event of certain malfunctions or breakdowns, grounding reduces the risk of electric shock by providing a path of least resistance for electric current.

This machine is equipped with a power cord that has an equipment-grounding wire and a grounding plug. Only insert plug into a matching receptacle (outlet) that is properly installed and grounded in accordance with all local codes and ordinances. DO NOT modify the provided plug!

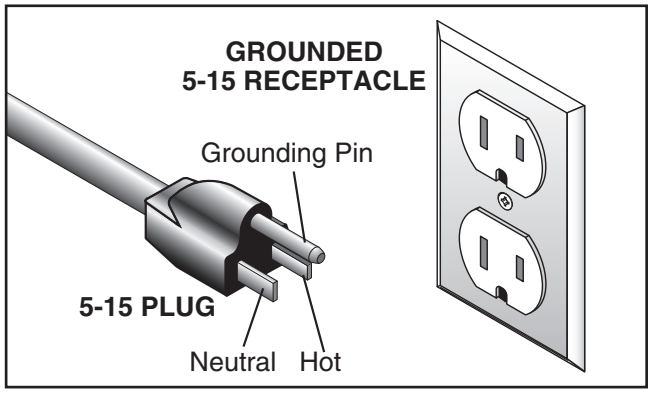
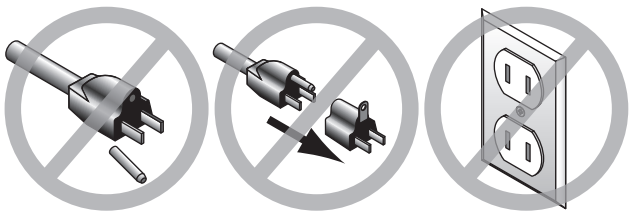


Figure 7. Typical 5-15 plug and receptacle.

⚠CAUTION



SHOCK HAZARD!

Two-prong outlets do not meet the grounding requirements for this machine. Do not modify or use an adapter on the plug provided—if it will not fit the outlet, have a qualified electrician install the proper outlet with a verified ground.

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

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

Extension Cords

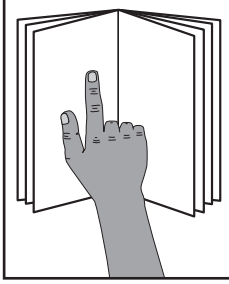
We do not recommend using an extension cord with this machine. If you must use an extension cord, only use it if absolutely necessary and only on a temporary basis.

Extension cords cause voltage drop, which can damage electrical components and shorten motor life. Voltage drop increases as the extension cord size gets longer and the gauge size gets smaller (higher gauge numbers indicate smaller sizes).

Any extension cord used with this machine must be in good condition and contain a ground wire and matching plug/receptacle. Additionally, it must meet the following size requirements:

Minimum Gauge Size.....12 AWG
Maximum Length (Shorter is Better).....50 ft.

SECTION 3: SETUP

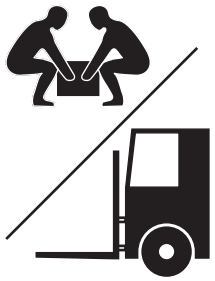


⚠WARNING

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

HEAVY LIFT!

Straining or crushing injury may occur from improperly lifting machine or some of its parts. To reduce this risk, get help from other people and use a forklift (or other lifting equipment) rated for weight of this machine.

Needed for Setup

The following items are needed, but not included, for the setup/assembly of this machine.

Description	Qty
• Additional People	2
• Precision Level	1
• Safety Glasses (for each person)	1 Pr.
• Solvent/Cleaner	1
• Acetone/Lacquer Thinner	As Needed
• Shop Rags	As Needed
• Lifting Equipment (Rated for at least 2,600 lbs.)	1
• Mounting Hardware	As Needed
• Disposable Gloves	As Needed
• Wrenches/Sockets 24mm	2
• Block of Wood	1
• Coolant	As Needed
• Goggles	1 Pr.

Unpacking

This machine was carefully packaged for safe transport. When unpacking, separate all enclosed items from packaging materials and inspect them for shipping damage. ***If items are damaged, please call us immediately at (570) 546-9663.***

IMPORTANT: Save all packaging materials until you are completely satisfied with the machine and have resolved any issues between Grizzly or the shipping agent. *You MUST have the original packaging to file a freight claim. It is also extremely helpful if you need to return your machine later.*

Inventory

The following is a list of items shipped with your machine. Before beginning setup, lay these items out and inventory them.

If any non-proprietary parts are missing (e.g. a nut or a washer), we will gladly replace them; or for the sake of expediency, replacements can be obtained at your local hardware store.

NOTICE

If you cannot find an item on this list, carefully check around/inside the machine and packaging materials. Often, these items get lost in packaging materials while unpacking or they are pre-installed at the factory.

Box 1 (Figure 8)		Qty
A.	Toolbox	1
B.	Oil Can	1
C.	Ball Handles	3
D.	Drill Chuck ¾" JT3 w/Key	1
E.	Phillips Head Screwdriver #2	1
F.	Flat Head Screwdriver ¼"	1
G.	Chuck Key	1
H.	Open-End Wrench 17/19mm	1
I.	Hex Wrench Set 1.5–10mm	1
J.	Drill Chuck Arbor R8-JT3	1
K.	Splash Pan	1

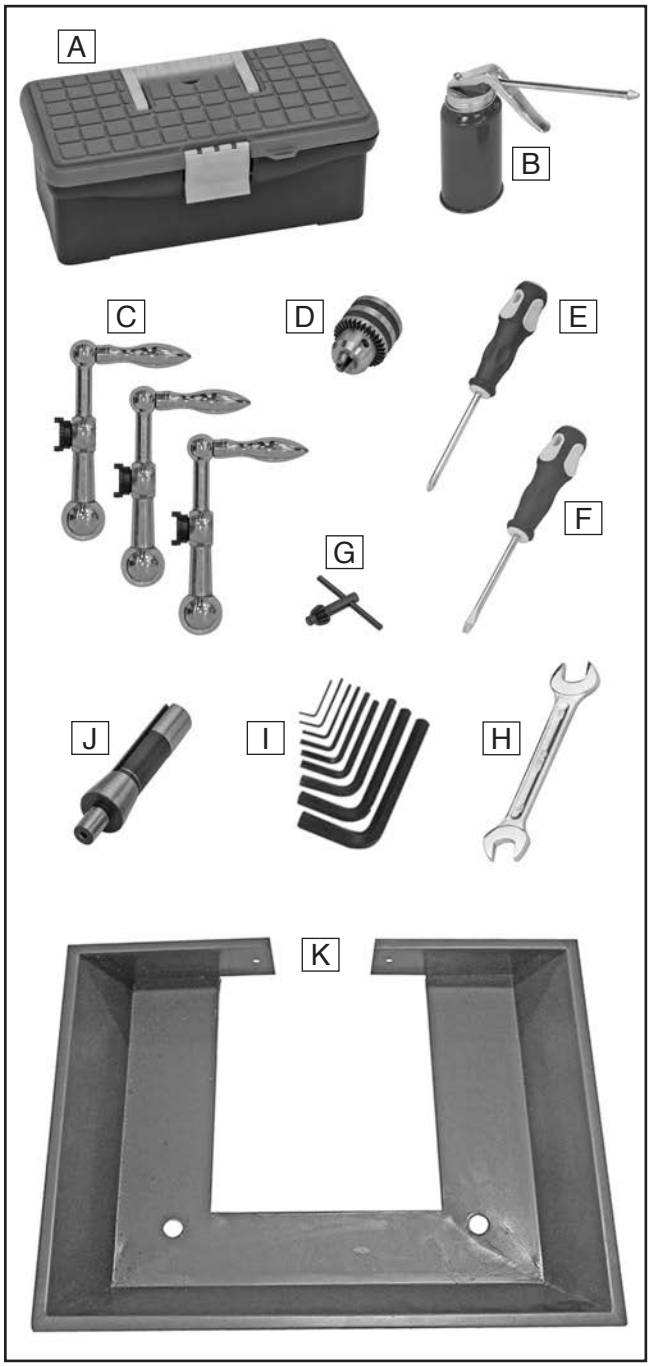


Figure 8. Loose components.

Cleanup

The unpainted surfaces of your machine are coated with a heavy-duty rust preventative that prevents corrosion during shipment and storage. This rust preventative works extremely well, but it will take a little time to clean.

Be patient and do a thorough job cleaning your machine. The time you spend doing this now will give you a better appreciation for the proper care of your machine's unpainted surfaces.

There are many ways to remove this rust preventative, but the following steps work well in a wide variety of situations. Always follow the manufacturer's instructions with any cleaning product you use and make sure you work in a well-ventilated area to minimize exposure to toxic fumes.

Before cleaning, gather the following:
- Disposable rags
- Cleaner/degreaser (WD•40 works well)
- Safety glasses & disposable gloves
- Plastic paint scraper (optional)

Basic steps for removing rust preventative:

1. Put on safety glasses.

2. Coat the rust preventative with a liberal amount of cleaner/degreaser, then let it soak for 5–10 minutes.

3. Wipe off the surfaces. If your cleaner/degreaser is effective, the rust preventative will wipe off easily. If you have a plastic paint scraper, scrape off as much as you can first, then wipe off the rest with the rag.

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

⚠WARNING

Gasoline and petroleum products have low flash points and can explode or cause fire if used to clean machinery. Avoid using these products to clean machinery.

⚠CAUTION

Many cleaning solvents are toxic if inhaled. Only work in a well-ventilated area.

NOTICE

Avoid harsh solvents like acetone or brake parts cleaner that may damage painted surfaces. Always test on a small, inconspicuous location first.

T23692—Orange Power Degreaser
A great product for removing the waxy shipping grease from the ***non-painted*** parts of the machine during clean up.

Figure 9. T23692 Orange Power Degreaser.

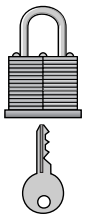
Site Considerations

Weight Load

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

Space Allocation

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



⚠CAUTION

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

Physical Environment

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

Electrical Installation

Place this machine near an existing power source. Make sure all power cords are protected from traffic, material handling, moisture, chemicals, or other hazards. Make sure to leave enough space around machine to disconnect power supply or apply a lockout/tagout device, if required.

Lighting

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

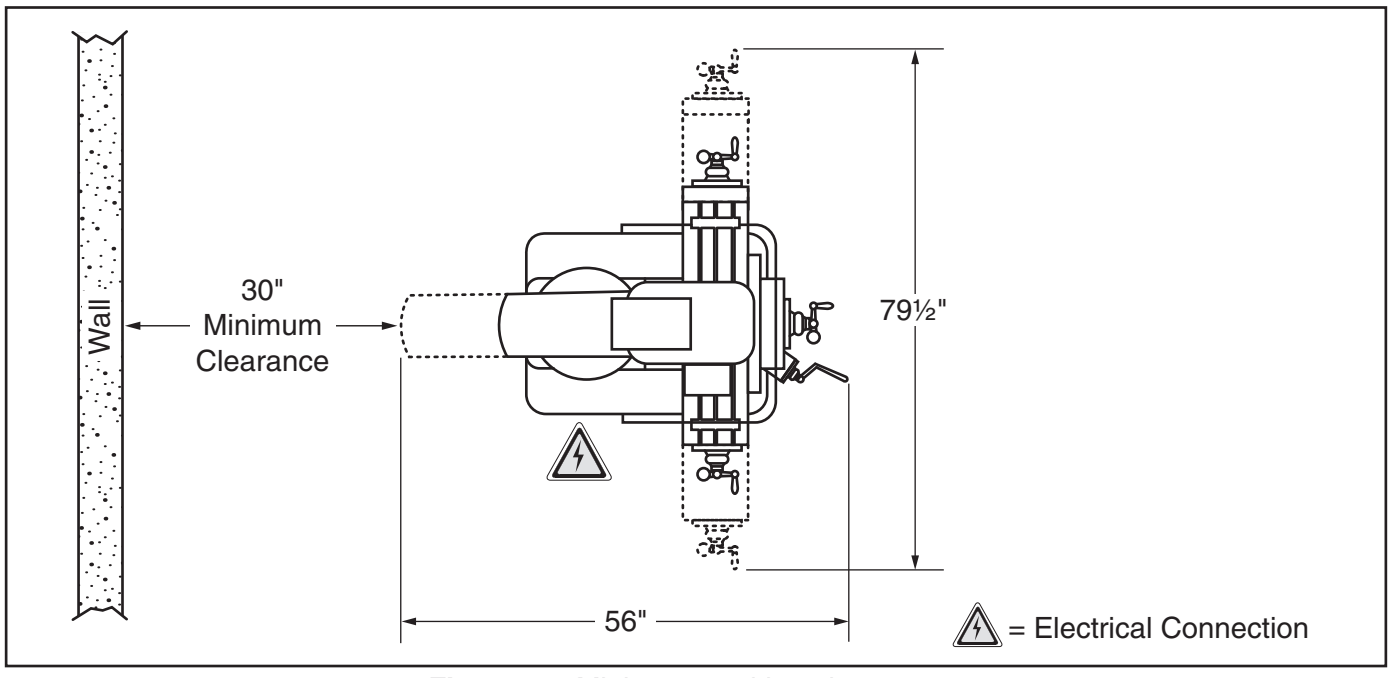


Figure 10. Minimum working clearances.

Lifting & Placing

⚠WARNING

HEAVY LIFT!

Straining or crushing injury may occur from improperly lifting machine or some of its parts. To reduce this risk, get help from other people and use a forklift (or other lifting equipment) rated for weight of this machine.

The Model G0961 requires the use of lifting equipment such as a forklift, engine hoist, or boom crane. DO NOT attempt to lift or move the machine without the necessary assistance from other people. Each piece of lifting equipment must be rated for at least 2600 lbs. to support the dynamic loads that may be generated while lifting.

To lift and place mill:

1. Remove crate sides/top from shipping pallet, then with machine still on pallet, move it to installation location.

2. Unbolt splash pan from pallet and set it aside.

3. Unbolt mill from pallet.

4. Ensure eye bolt (see **Figure 11**) is threaded all the way into ram, and turret lock bolts are tight.

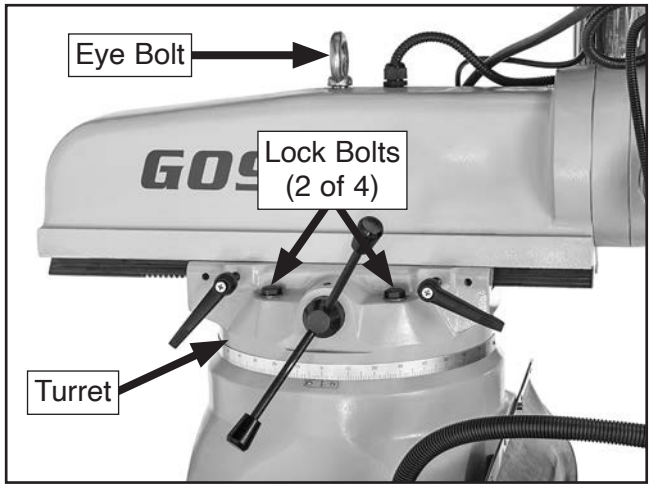


Figure 11. Location of eye bolt and lock bolts.

5. Place lifting hook through eye bolt (see **Figure 12**) and slowly lift mill with forklift enough to clear pallet.

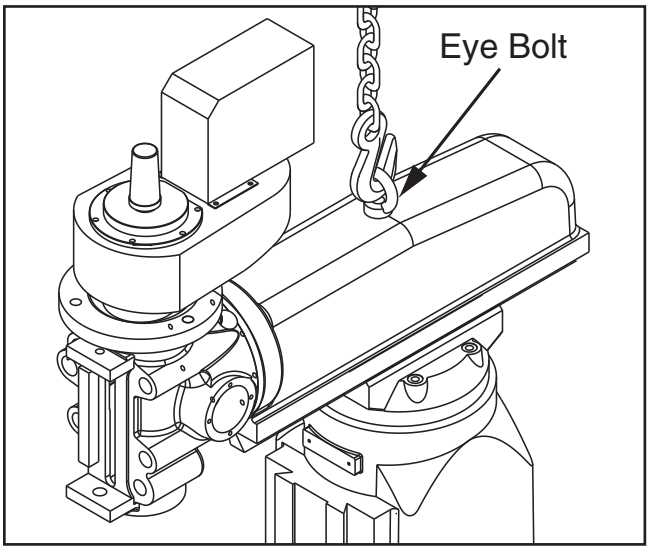


Figure 12. Lifting hook inserted in eye bolt.

6. With other people steadying mill to keep it from swaying, remove shipping pallet, then remove (2) hex bolts, (2) flat washers, and (4) hex nuts from pallet.

7. Remove (2) pre-installed cap screws and flat washers from column base (see **Figure 13**).

8. Position splash pan over mounting holes at front of base and threaded holes at base of column, then secure splash pan as shown in **Figure 13**.

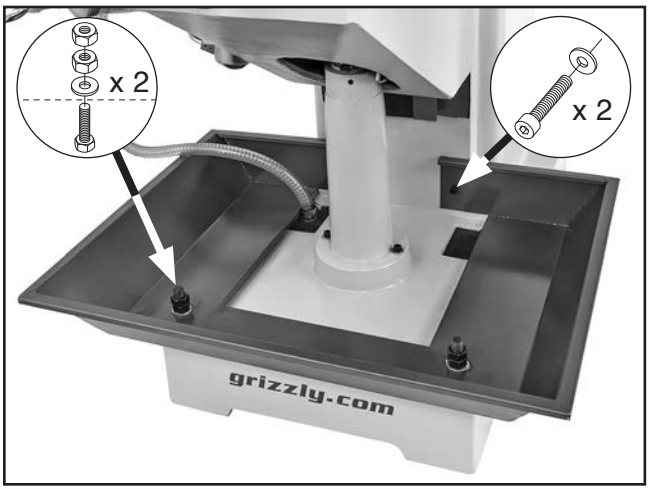


Figure 13. Splash pan installed.

9. Lower mill into final position.

Leveling

Leveling machinery helps precision components, such as dovetail ways, remain straight and flat during the lifespan of the machine. Components on an unleveled machine may slowly twist due to the dynamic loads placed on the machine during operation.

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

See **Figure 14** for an example of a high precision level available from Grizzly.

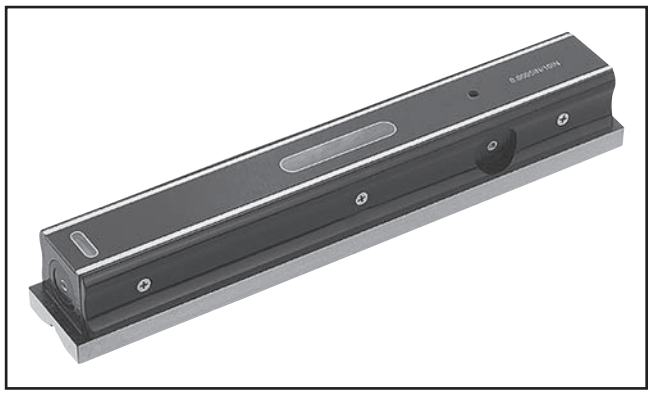


Figure 14. Example of a precision level (Model H2683 shown).

Anchoring to Floor

Number of Mounting Holes 4
Diameter of Mounting Hardware..... ½"

Anchoring machinery to the floor prevents tipping or shifting and reduces vibration that may occur during operation, resulting in a machine that runs slightly quieter and feels more solid.

If the machine will be installed in a commercial or workplace setting, or if it is permanently connected (hardwired) to the power supply, local codes may require that it be anchored to the floor.

If not required by any local codes, fastening the machine to the floor is an optional step. If you choose not to do this with your machine, we recommend placing it on machine mounts, as these provide an easy method for leveling and they have vibration-absorbing pads.

Anchoring to Concrete Floors

Lag shield anchors with lag screws (see below) are a popular way to anchor machinery to a concrete floor, because the anchors sit flush with the floor surface, making it easy to unbolt and move the machine later, if needed. However, anytime local codes apply, you MUST follow the anchoring methodology specified by the code.

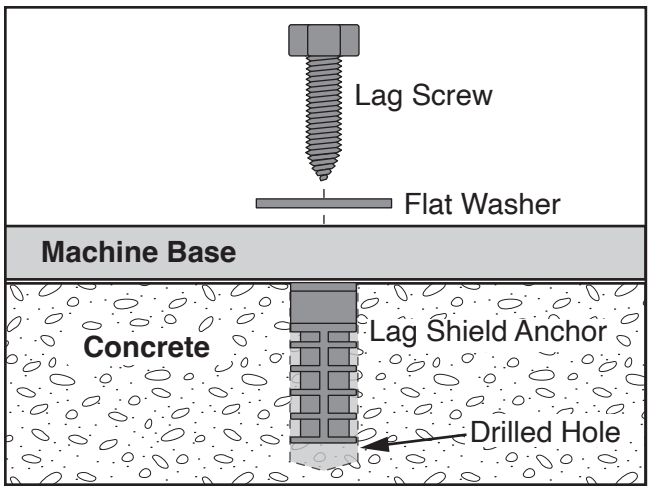


Figure 15. Popular method for anchoring machinery to a concrete floor.

Assembly

The machine must be fully assembled before it can be operated. Before beginning the assembly process, refer to **Needed for Setup** and gather all listed items. To ensure the assembly process goes smoothly, first clean any parts that are covered or coated in heavy-duty rust preventative (if applicable).

Assembling the mill consists of installing the loose components listed in the inventory section.

To assemble machine:

1. Remove acorn nuts and flat washers from X- and Y-axis leadscrews (see **Figure 16**), slide ball handles onto leadscrews, and secure with flat washers and acorn nuts.

   Note: *Tighten acorn nuts until they are snug. Overtightening could increase wear on moving parts.*

2. Slide knee crank (see **Figure 16**) off of Z-axis leadscrew, turn around so handle is facing forward, and slide crank back onto Z-axis leadscrew.

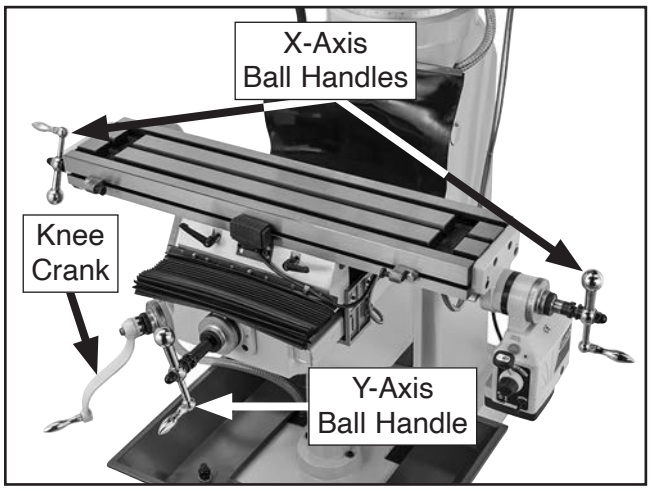


Figure 16. Ball handles and knee crank installed.

Joining Drill Chuck & Arbor

An arbor is included for the drill chuck that comes with this machine. The following procedure describes how to install the arbor in the chuck.

After the arbor is installed in the drill chuck, it is very difficult to separate the assembly. If you would like to use a different chuck in the future, we recommend obtaining a new arbor.

IMPORTANT: DO NOT install the drill chuck and arbor assembly into the spindle until **AFTER** the test run.

To join drill chuck and arbor:

1. Use acetone or lacquer thinner to clean drill chuck and arbor mating surfaces, especially the bore.

2. Retract chuck jaws completely into chuck.

3. Insert small end of arbor into chuck.

4. Hold assembly by the arbor and tap chuck onto a block of wood with medium force, as illustrated below.

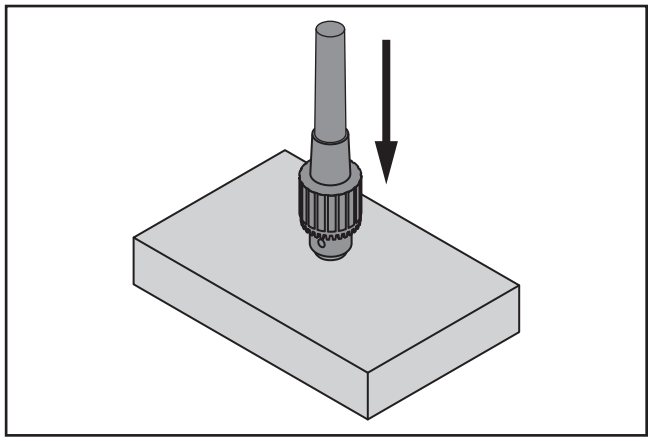


Figure 17. Arbor/chuck assembly.

5. Attempt to separate drill chuck and arbor by hand—if they separate, repeat **Steps 3–4**.

Test Run

Once assembly is complete, test run the machine to ensure it is properly connected to power and safety components are functioning correctly.

If you find an unusual problem during the test run, immediately stop the machine, disconnect it from power, and fix the problem BEFORE operating the machine again. The **Troubleshooting** table in the **SERVICE** section of this manual can help.

The Test Run consists of verifying the following: 1) The motor powers up and runs correctly, 2) the Emergency Stop button works correctly, 3) the coolant system works correctly, and 4) the power feed unit works correctly.

⚠WARNING

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

⚠WARNING

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

Mill Test Run

1. Clear all setup tools away from machine.

2. Move master power switch to OFF position, move spindle direction switch to S (stop) position, turn spindle speed dial to 0 position, and press Emergency Stop button.

3. Connect machine to power supply by inserting power cord plug into matching receptacle.

4. Move master power switch to ON position. Digital readout on control panel will illuminate.

5. Twist Emergency Stop button clockwise until it springs out (see **Figure 18**). This resets button so machine can start.

Figure 18. Resetting Emergency Stop button.

6. Move spindle forward/reverse switch to F (forward) position, and press spindle start button.

7. Turn spindle speed dial clockwise to start spindle rotation. Verify motor starts up and runs smoothly without unusual problems or noises.

8. Press Emergency Stop button to turn machine ***OFF***.

9. Turn spindle speed dial to 0. WITHOUT resetting Emergency Stop button, try to start spindle rotation by pressing start button and turning spindle speed dial clockwise. Spindle should not rotate.

   — If spindle *does not* rotate, safety feature of Emergency Stop button is working correctly.

   — If spindle *does* rotate, immediately turn machine ***OFF*** and disconnect power. Safety feature of Emergency Stop button is NOT working properly and must be replaced before further using machine.

NOTICE

Operating coolant pump on this mill without correct amount of coolant in reservoir could damage it and void the warranty. ALWAYS make sure there is the correct amount of coolant in reservoir before using pump.

10. Check coolant level in reservoir, and add coolant if necessary (refer to **Checking/ Adding Coolant** on **Page 40**).

11. Twist Emergency Stop button clockwise until it springs out (see **Figure 18**).

12. Move coolant pump switch to ON (I) position, open nozzle valve, verify coolant flows from nozzle, then move coolant pump switch to OFF (O) position.

Power Feed Test Run

The mill comes with a power feed unit for X-axis table travel. Proper operation of the limit switch attached to the front middle of the table is critical for the safe use of this power feed unit. If the power feed does not operate as expected during the following steps, disconnect it from power and review **Troubleshooting** on **Page 43**.

To test run power feed:

1. Make sure all tools, cables, and other items are well clear of table movement.

2. Refer to **Table Movement**, beginning on **Page 27**, to understand how power feed, table locks, and limit switch function.

3. Loosen X-axis table locks on front of table.

4. Make sure directional lever is in neutral (middle) position, turn speed dial completely counterclockwise, and ensure ON/OFF switch is in OFF position, then plug power feed into a 110V outlet.

5. Move POWER switch up to turn power feed ***ON***.

6. Move directional lever all the way left, slowly turn speed dial clockwise to increase speed, then confirm table is moving left.

7. Watch for table limit stop to press against limit switch plunger and stop table movement.

   — If power feed stops, then power feed limit switch is working correctly. Proceed to **Step 8**.

   — If power feed *does not* stop, then power feed limit switch is not working correctly. Immediately turn machine ***OFF*** and disconnect power. Contact Tech Support before continuing with Test Run.

8. Move directional lever through neutral (middle) position and all the way right. Table should begin moving right.

9. Confirm table stops moving when limit stop presses against limit switch plunger.

   — If power feed stops, then power feed limit switch is working correctly. Proceed to **Step 10**.

   — If power feed *does not* stop, then power feed limit switch is not working correctly. Immediately turn machine ***OFF*** and disconnect power. Contact Tech Support before continuing with Test Run.

10. Move directional lever to neutral (middle) position, turn speed dial completely counterclockwise, and move POWER switch down to turn power feed ***OFF***.

Congratulations! The **Test Run** is complete. Continue to the **Spindle Break-In** and **Inspections & Adjustments** procedures.

Spindle Break-In

The spindle break-in procedure distributes lubrication throughout the bearings to reduce the risk of early bearing failure if there are any "dry" spots or areas where lubrication has settled in the bearings. You ***must*** complete this procedure ***before*** placing operational loads on the spindle for the first time when the machine is new or if it has been sitting idle for longer than 6 months.

Always start the spindle break-in at the lowest speed to minimize wear if there *are* dry spots. Allow the spindle to run long enough to warm up and distribute the bearing grease, then incrementally increase spindle speeds and repeat this process at each speed until reaching the maximum spindle speed. Following the break-in procedure in this progressive manner helps minimize any potential wear that could occur before lubrication is fully distributed.

NOTICE

Complete spindle bearing break-in procedure to prevent rapid wear and tear of spindle components once mill is placed into operation.

NOTICE

DO NOT perform this procedure independently of Test Run section. Mill could be seriously damaged if controls are set differently than instructed in that section.

To perform spindle break-in:

1. Make sure spindle area is free of obstructions.

2. Configure V-belts on pulleys for position 2 (see **Spindle Speed** on **Page 31**).

3. Connect machine to power.

4. Press spindle start button, then slowly rotate spindle speed dial until readout reads 100. Run spindle at this speed for 10 minutes.

5. Press spindle stop button and allow spindle to come to complete stop, then move spindle forward/reverse switch to reverse (R) position.

6. Press spindle start button and allow spindle to run in reverse for an additional 10 minutes.

7. Repeat **Steps 4–6** with spindle speed dial at 50%, then again at 100%.

8. Turn machine ***OFF***, allow spindle to come to complete stop, then DISCONNECT MACHINE FROM POWER!

9. Configure V-belts on pulleys to position 1 (refer to **Spindle Speed Chart** on **Page 32**).

10. Repeat **Steps 3–7** with first speed being 400 RPM.

11. Turn machine ***OFF***.

Congratulations! Spindle break-in is now complete.

Inspections & Adjustments

The following list of adjustments were performed at the factory before the machine was shipped:

Be aware that machine components can shift during the shipping process. Pay careful attention to these adjustments during machine operation. If adjustments are not set per procedures in this manual or personal preferences, re-adjust them.

NOTICE

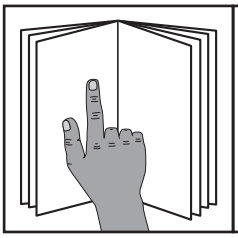
During first 16 hours of use, V-belts will stretch and seat into pulley grooves. V-belts must be properly tensioned after this period to ensure proper power transmission and avoid reducing life of belts. Refer to *Spindle Speed* on *Page 31*.

SECTION 4: OPERATIONS

Operation Overview

The purpose of this overview is to provide the novice machine operator with a basic understanding of how the machine is used during operation, so the machine controls/components discussed later in this manual are easier to understand.

Due to the generic nature of this overview, it is **not** intended to be an instructional guide. To learn more about specific operations, read this entire manual, seek additional training from experienced machine operators, and do additional research outside of this manual by reading "how-to" books, trade magazines, or websites.

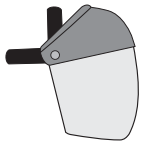


⚠WARNING

To reduce your risk of serious injury, read this entire manual BEFORE using machine.

⚠WARNING

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



NOTICE

If you are not experienced with this type of machine, WE STRONGLY RECOMMEND that you seek additional training outside of this manual. Read books/magazines or get formal training before beginning any projects. Regardless of the content in this section, Grizzly Industrial will not be held liable for accidents caused by lack of training.

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

1. Examines workpiece to make sure it is suitable for operation.
2. Firmly clamps workpiece to table or a mill vise securely mounted to table.
3. Installs correct cutting tool for operation.
4. Uses downfeed and table controls to correctly position cutting tool and workpiece for operation. If X-axis power feed will be used during operation, operator confirms speed and length of table movement required.
5. Configures machine for correct spindle speed of operation.
6. Puts on personal protective equipment, and makes sure workpiece and table are clear of all tools, cords, and other items.
7. Turns machine ***ON***, then starts spindle rotation and performs operation.
8. Turns machine ***OFF***.

Table Movement

The table travels in three directions, as illustrated in **Figure 19**.

These movements are controlled by table handwheels and the Z-axis crank. Additionally, the table can be moved along the X- or Y-axis with the power feed unit.

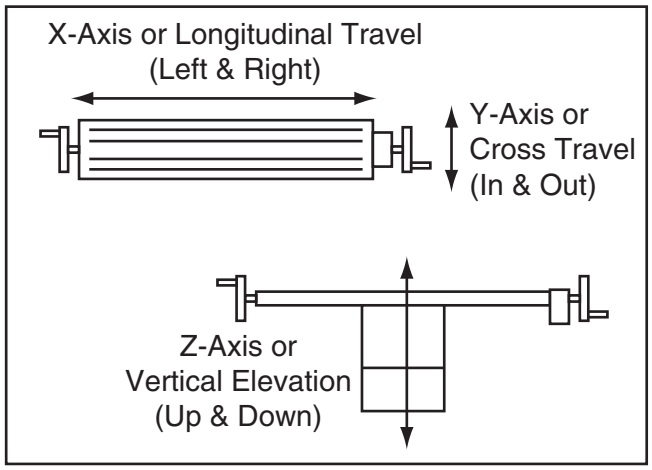


Figure 19. The directions of table movement.

Graduated Index Rings

The table ball handles and knee crank have graduated index rings (see **Figure 20**) that are used to determine table movement in the increments listed below:

Axis	Individual Increment	One Full Revolution
X	0.001"	0.200"
Y	0.001"	0.200"
Z	0.001"	0.100"

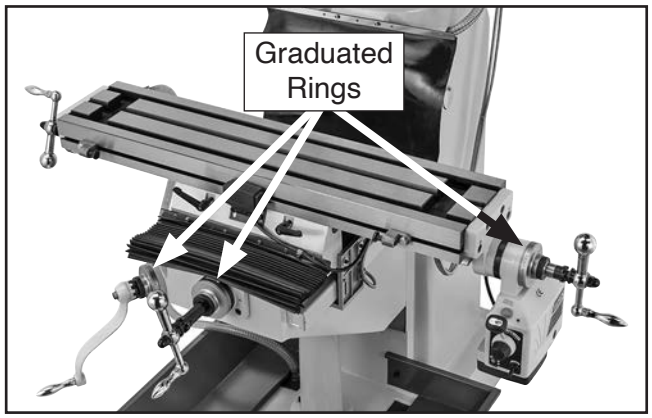


Figure 20. Locations of graduated rings.

NOTICE

Always keep table locked in place unless table movement is required for your operation. Unexpected table and workpiece movement could cause tooling to bind with workpiece, which may damage tooling or workpiece.

Table Locks

Use table locks to increase the rigidity of the table when movement of that axis is not required for the operation.

Refer to **Figure 21** to identify the locks for each table axis.

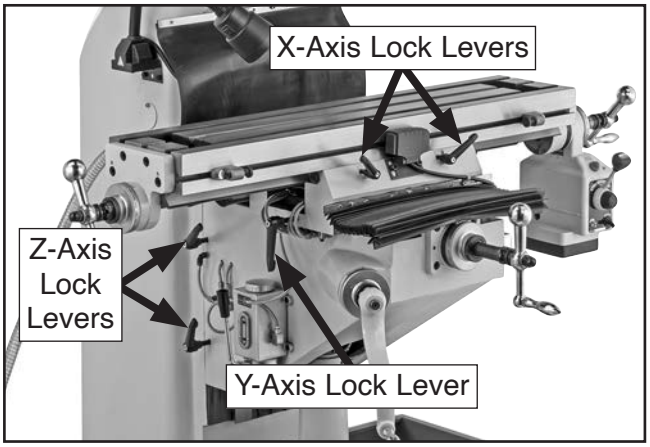


Figure 21. Locations of table locks.

Limit Stops

Use limit stops (see **Figure 22**) in conjunction with the power feed unit to set the total amount of travel. The limit stops come into contact with the limit switch and stop power feed motion.

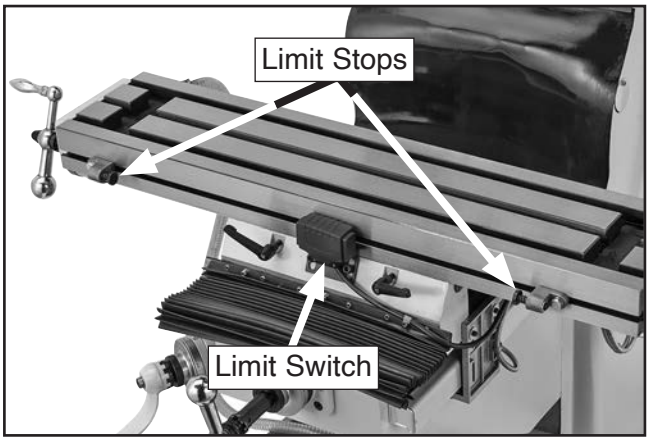


Figure 22. Locations of limit switch and stops.

X-Axis Power Feed

Tool Needed **Qty**
Wrench or Socket 14mm 1

To operate X-axis power feed:

1. Loosen X-axis table locks.

2. Position limit stops along front table slot to limit distance of table travel that is correct for operation.

3. Turn speed dial all the way counterclockwise to slowest setting, move direction lever to neutral (middle) position, and move POWER switch down (see **Figure 23**).

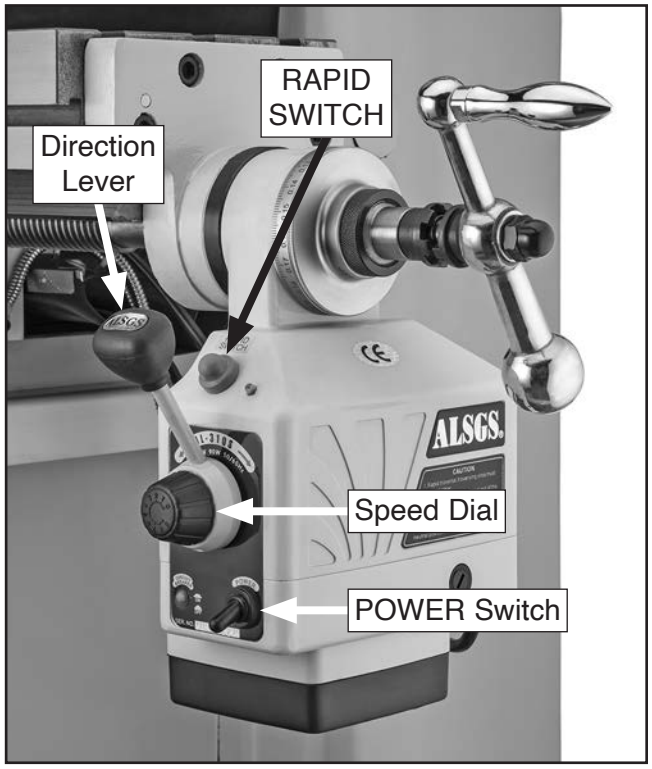


Figure 23. Power feed controls.

4. Connect power feed to power supply.

5. Move POWER switch up to turn power feed ***ON***.

6. With hand poised over POWER switch in case you need to suddenly turn unit ***OFF***, move direction lever in desired direction of table travel.

7. Use speed dial to slowly bring speed of movement up to desired rate.

   Note: *Once table is in motion, press and hold RAPID SWITCH (see **Figure 23**) to move table at full speed. Table will resume previous speed once switch is released.*

8. When finished using power feed, turn unit ***OFF***, rotate speed dial all the way counterclockwise, and move directional lever to neutral (middle) position to avoid unexpected table movement when next using power feed.

Head Tilt

Head Tilt (Left/Right) .....90°

Items Needed	**Qty**
Open-End Wrench 19mm	1

To tilt head:

1. DISCONNECT MACHINE FROM POWER!

2. Loosen (4) acorn nuts that secure head to ram (see **Figure 24**).

3. Rotate tilting bolt until head is in desired position (see **Figure 24**).

Note: *Use angle scale shown in **Figure 25** as a guide for setting tilt angle.*

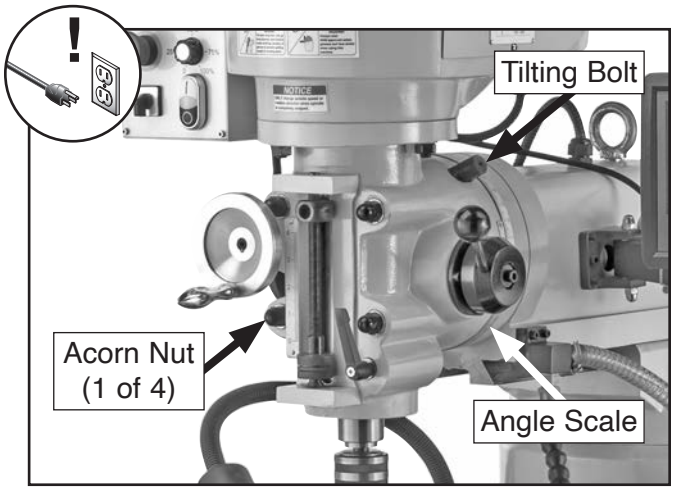


Figure 24. Head tilting controls.

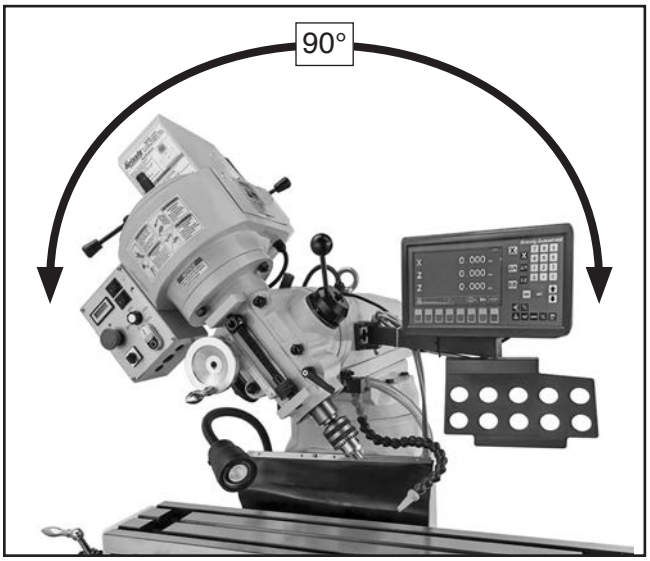


Figure 25. Head tilted to left.

4. Tighten acorn nuts to secure head to ram before resuming operation.

NOTICE

When positioning head back to 0° after tilting it, you will need to tram it to make certain spindle is precisely perpendicular to table to ensure proper milling accuracy. Refer to *Tramming Spindle* section on *Page 46* for detailed instructions.

Ram Movement

Ram Travel ..... 10½"
Turret or Column Swivel (Left/Right) ..... 180°

Tool Needed	Qty
Open-End Wrench 19mm	1

Moving Ram Forward/Backward

1. DISCONNECT MACHINE FROM POWER!

2. Loosen ram lock handles shown in **Figure 26**.

3. Rotate ram movement lever (see **Figure 26**) to move ram until spindle is in desired position.

4. Tighten ram lock handles (see **Figure 26**) to secure ram movement before resuming operation.

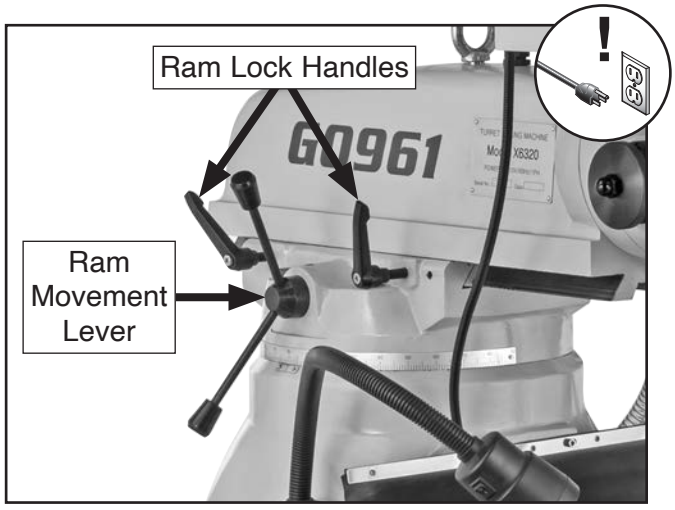


Figure 26. Ram movement controls.

NOTICE

Always lock ram firmly in place after moving it. Unexpected movement of ram and head during operations could damage cutter or workpiece.

Rotating Ram on Turret

1. DISCONNECT MACHINE FROM POWER!

2. Loosen (4) lock bolts (two on each side of ram) that secure ram to turret (see **Figure 27**).

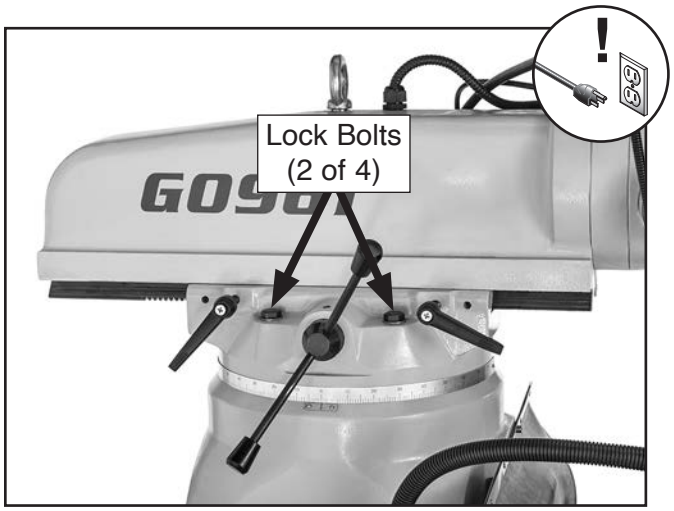


Figure 27. Location of lock bolts on turret.

3. Make sure cables and hoses do not get entangled or stretched, and that work lamp and DRO are clear of rotation path as you rotate ram on turret.

4. Tighten (4) lock bolts that secure ram on turret before resuming operation.

Spindle Speed

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

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

Determining Spindle Speed

Many variables affect the optimum spindle speed to use for any given operation, but the two most important are the recommended cutting speed for the workpiece material and the diameter of the cutting tool, as noted in **Figure 28**:

$$\frac{\text{*Recommended Cutting Speed (FPM)} \times 12}{\text{Tool Diameter (in inches)} \times 3.14} = \text{RPM}$$

*Double if using carbide cutting tool

Figure 28. Spindle speed formula for milling.

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

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

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

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

Cutting Speeds for High Speed Steel (HSS) Cutting Tools

Workpiece Material	Cutting Speed (sfm)
Aluminum & Aluminum Alloys	300
Brass & Bronze	150
Copper	100
Cast Iron, soft	80
Cast Iron, hard	50
Mild Steel	90
Cast Steel	80
Alloy Steel, hard	40
Tool Steel	50
Stainless Steel	60
Titanium	50
Plastics	300-800
Wood	300-500

Note: For carbide cutting tools, double the cutting speed. These values are a guideline only. Refer to the *MACHINERY'S HANDBOOK* for more detailed information.

Figure 29. Cutting speed table.

Setting Spindle Speed Range

The Model G0961 has two spindle speed ranges: 100–750 RPM and 400–2800 RPM. Setting the spindle speed requires positioning the V-belts on the appropriate pulleys for the desired speed range, then using the spindle speed dial on the control panel to fine tune the precise spindle speed once spindle rotation has begun.

Tool Needed	Qty
Wrench or Socket 19mm	1

To set spindle speed range:

1. DISCONNECT MACHINE FROM POWER!

2. Remove V-belt access cover, loosen hex nut shown in **Figure 30**, and pull adjustment lever forward to release V-belt tension.

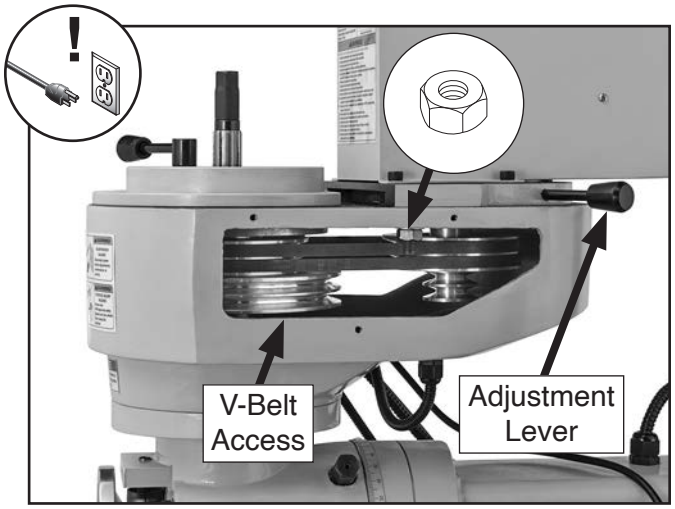


Figure 30. V-belt location.

3. Use chart below or refer to spindle speed chart on headstock to find appropriate spindle speed for your operation (see **Figure 31**).

SPINDLE SPEED CHART

SPINDLE MOTOR

1

1

2

2

POSITION	SPINDLE SPEED
1	400 – 2800
2	100 – 750

Figure 31. Spindle speed chart.

4. Position V-belts on pulleys for desired spindle speed range.

5. Push adjustment lever backward with moderate force to tension V-belts, tighten hex nut loosened in **Step 2**, then install V-belt access cover.

Spindle Downfeed

Use **Figure 32** and the descriptions below to understand the downfeed components that control the spindle downfeed travel.

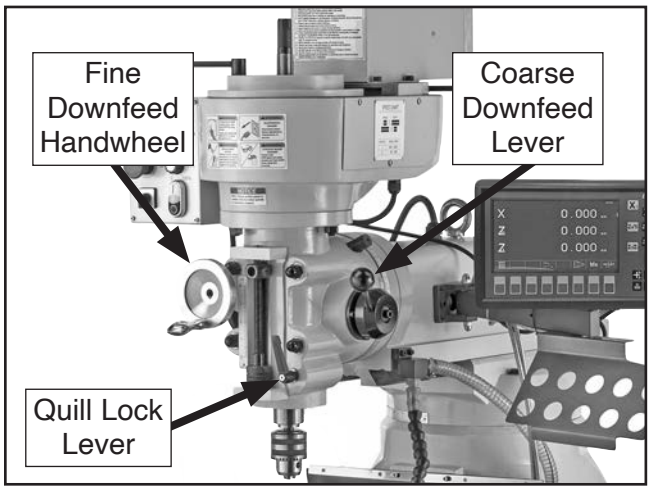


Figure 32. Spindle downfeed controls.

Coarse Downfeed Lever: Allows you to manually control downfeed travel of spindle in a rapid manner. The spindle automatically returns to the top position when pressure is released from the lever, making this ideal for drilling operations.

Fine Downfeed Handwheel: Manually controls downfeed travel in a slow, precise manner. Unlike coarse downfeed, the spindle does not automatically retract, which makes this ideal for fine positioning of the spindle/cutter for milling operations. The attached graduated dial has increments of 0.001" with one full revolution representing 0.100" of travel.

Quill Lock Lever: Secures the quill in place for increased stability during milling operations. Typically only used after first positioning spindle/cutter with fine downfeed handwheel.

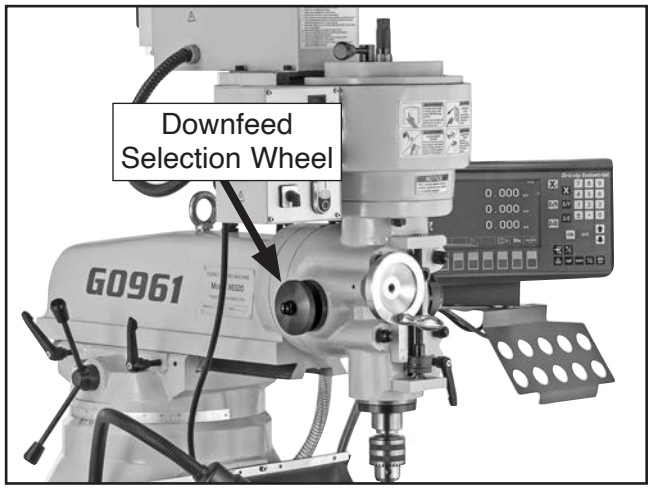


Figure 33. Downfeed selection controls.

Downfeed Selection Wheel: When tightened, engages the fine downfeed handwheel; when loosened, engages the coarse downfeed lever.

Coarse Downfeed

When the coarse downfeed is engaged, pull the coarse downfeed lever down to lower the spindle. An internal coil spring helps raise the spindle up when you stop applying downward pressure on the lever.

Note: *To maintain control of the upward spindle travel and the rotating bit in your workpiece, always continue holding the lever until the spindle returns to the top position. Letting go of the coarse downfeed lever when the spindle is in the lowered position will cause the spindle to retract too quickly and slam up into the headstock or lift the workpiece and cause it to spin out of control.*

The coarse downfeed lever may be indexed around the hub by pulling the base straight out, rotating the lever to the desired position, then pushing the base back in to the hub.

Fine Downfeed

When the fine downfeed is engaged, the spindle only moves up or down when the handwheel (see **Figure 34**) is rotated. There is no automatic spindle return to the top position, as with the coarse downfeed lever. This level of control allows the spindle height to be locked in place with the quill lock when milling a flat surface across the face of a workpiece.

Note: *The graduated dial on the fine downfeed handle measures spindle movement in 0.001" increments, with one full revolution equaling 0.100" of spindle travel.*

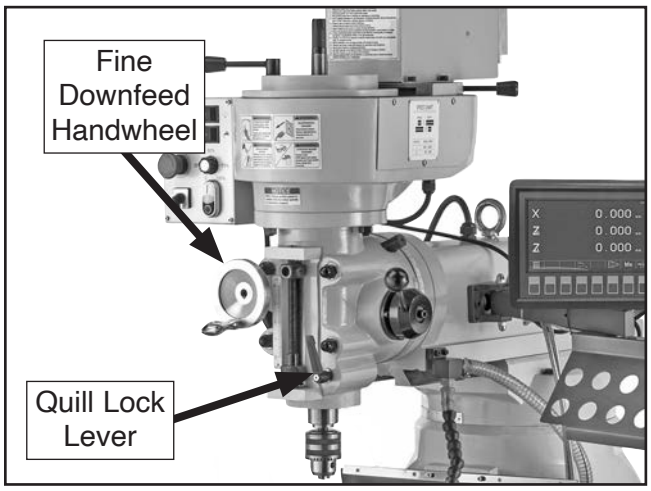


Figure 34. Fine downfeed controls.

Using Fine Downfeed Controls

In the following example, the fine downfeed controls are used to mill 0.010" off a workpiece:

1. Use Z-axis crank to adjust workpiece surface just below cutting tool, then secure headstock with Z-axis lock levers.
2. Tighten downfeed selection wheel (see **Figure 33**) to engage fine downfeed handwheel.
3. Loosen quill lock.
4. Rotate fine downfeed handwheel clockwise and lower cutting tool so it just touches workpiece.
5. Move workpiece out of the way.
6. Using graduated dial to gauge spindle movement, rotate fine downfeed handwheel clockwise 0.010".
7. Tighten quill lock.
8. Turn mill ***ON*** and perform cutting pass.

Spindle Brake

After pressing the spindle stop button, move the brake lever forward or backward to bring the spindle to a full stop (see **Figure 35**).

NOTICE

To avoid premature wear of brake system, use spindle brake ONLY after power to spindle has been turned *OFF*.

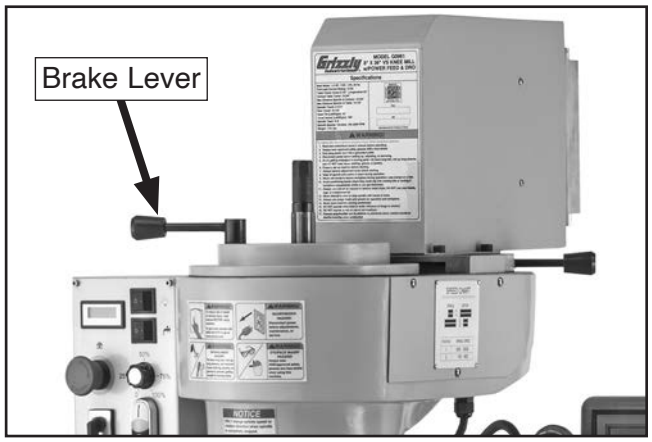


Figure 35. Location of brake lever.

NOTICE

To evenly wear brake shoes, alternate direction you move lever when braking.

Loading/Unloading Tooling

This machine is equipped with an R-8 spindle taper and a 7/16"-20 drawbar (see **Figure 36**).

Figure 36. Upper portion of drawbar.

Items Needed	Qty
Wrench or Socket 19mm	1
Brass Hammer	1
Heavy Leather Gloves	1 Pair
Shop Rags	As Needed

Loading Tooling

1. DISCONNECT MACHINE FROM POWER!

2. Clean any debris or oily substances from inside spindle taper and mating surface of tooling.

   Note: *Debris or oily substances can prevent tooling and spindle from properly mating. This condition can cause excessive vibration, poor cutting results, or tool/workpiece damage.*

3. Align keyway of tool with pin inside spindle taper, firmly push tool into spindle to seat it.

⚠CAUTION

Cutting tools are sharp and can easily cause laceration injuries. Use heavy leather gloves or shop rags to protect your hands when handling cutting tools.

4. With one hand holding tool in place, insert drawbar into spindle from top of headstock (see **Figure 37**), then thread it into tooling by hand until snug.

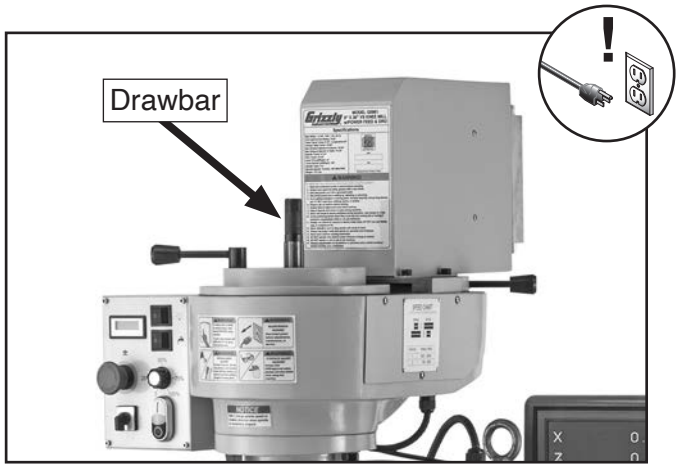


Figure 37. Drawbar loaded in spindle.

5. Tighten drawbar an additional ¼ turn.

   Note: *Do not overtighten drawbar. Overtightening makes tool removal difficult and may damage arbor and threads.*

Unloading Tooling

1. DISCONNECT MACHINE FROM POWER!

2. Loosen drawbar one full rotation.

   Note: *Make sure drawbar has at least three threads engaged with tooling, or drawbar and tool threads could be damaged in next step.*

3. Tap top of drawbar with hammer to unseat taper.

4. Support tool with one hand and fully unthread drawbar from tool.

SECTION 5: ACCESSORIES

⚠WARNING

Installing unapproved accessories may cause machine to malfunction, resulting in serious personal injury or machine damage. To reduce this risk, only install accessories recommended for this machine by Grizzly.

NOTICE

Refer to our website or latest catalog for additional recommended accessories.

SB1280—Precision R-8 Collet Set
This set of 12 precision R-8 collets includes sizes from 1/8"–7/8" and will take a 7/16"-20 drawbar. Each collet is hardened to 55-60 Rc, and is precision ground to a total runout of less than 0.00059".

Figure 38. SB1280 Precision R-8 Collet Set.

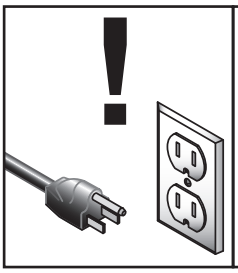
SB1365—South Bend Way Oil ISO-68
T26419—Syn–O–Gen Synthetic Grease

Figure 39. Recommended products for machine lubrication.

T23962—ISO-68 Moly-D Way Oil, 5 Gal.
T23963—ISO-32 Moly-D Machine Oil, 5 Gal.
T26685—ISO-32 Moly-D Machine Oil, 1 Gal.
Moly-D oils are some of the best we've found for maintaining the critical components of machinery because they tend to resist run-off and maintain their lubricity under a variety of conditions—as well as reduce chatter or slip. Buy in bulk and save with 1- or 5-gallon quantities.

Figure 40. ISO-68 and ISO-32 machine oil.

SECTION 6: MAINTENANCE



⚠WARNING

To reduce risk of shock or accidental startup, always disconnect machine from power before adjustments, maintenance, or service.

Schedule

For optimum performance from this machine, this maintenance schedule must be strictly followed.

Ongoing

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

- Loose mounting bolts.
- Damaged or dull tooling.
- Worn or damaged wires.
- Worn or loose V-belts.
- V-belt access cover missing.
- Any other unsafe condition.

Daily, Before Connecting to Power

- Move master power switch to the OFF position and press Emergency Stop button to prevent spindle startup when connected to power.
- Make sure X-axis power feed unit is turned ***OFF*** to prevent unintentional table movement when connected to power.
- Check coolant reservoir in base. Fill if necessary (see **Page 40**).
- Perform all required lubrication tasks (see **Page 38**).
- Check table movement in all three axes for loose/tight gibs. Adjust gibs if necessary.

Daily, After Operations

- Push Emergency Stop button, move master power switch to OFF position, and disconnect machine from power.
- Vacuum/clean all chips and swarf from the table, slides, and base.
- Wipe down all unpainted or machined surfaces with a high-quality rust preventative.

Cleaning & Protecting

Metal chips and other debris left on the machine will invite oxidation and a gummy residue build-up around the moving parts. Use a brush and shop vacuum to remove chips and debris from the working surfaces of the mill. Never blow off the mill with compressed air, as this will force metal chips deep into the mechanisms and may cause injury to yourself or bystanders.

Remove any rust build-up from unpainted cast-iron surfaces of your mill and treat them with a non-staining lubricant after cleaning.

Keep unpainted cast-iron surfaces rust-free with regular applications of products like SLIPIT® (see **Figure 41** and the Grizzly catalog or website).

G5562—SLIPIT® 1 Qt. Gel
G5563—SLIPIT® 11 Oz. Spray

Figure 41. Recommended products for protecting unpainted cast iron/steel parts on machinery.

Lubrication

The mill has numerous moving metal-to-metal contacts that require regular and proper lubrication to ensure efficient and long-lasting operation.

Use the schedule and information in the chart below as a daily guide for lubrication tasks.

Other than the lubrication points covered in this section, all other bearings are internally lubricated and sealed at the factory. Simply leave them alone unless they need to be replaced.

DISCONNECT MACHINE FROM POWER before performing any lubrication task!

IMPORTANT: Before adding lubricant, clean all debris and grime from part and nearby area to prevent contamination of new lubricant.

Lubrication Task	(Hours of Operation)	Page Ref.
Table Ways	4–8	**38**
Table Leadscrews	4–8	**38**
Ram Ways	4–8	**38**
Quill Exterior	40	**39**
Power Feed Gears	40	**39**
Head Tilt Pinion	40	**40**

NOTICE

The recommended lubrication schedule is based on light-to-medium usage. Keeping in mind that lubrication helps to protect the value and operation of the mill, these lubrication tasks may need to be performed more frequently depending on usage.

Items Needed **Qty**
Open-End Wrench or Socket 19mm 1
Hex Wrench 3mm..... 1
Shop Rags..... As Needed

Table Ways & Leadscrews (One-Shot Oiler)

Oil Type ..... SB1365 or ISO 68 Equivalent
Oil Amount..... One Pull of Pump Handle
Check/Add Frequency..... 4–8 Hrs. of Operation

The one-shot oiler is connected to a series of tubes that carry the lubricant to wear points along the table horizontal and vertical ways, and the X-, Y-, and Z-axis leadscrews.

Move the table as necessary to access the entire length of the table ways and leadscrews, and use mineral spirits, shop rags, and a brush to clean them.

Pull out the handle on the one-shot oiler and release it to send the oil through the tubes (see **Figure 42**), then move the table through all paths of movement to evenly distribute the lubricant.

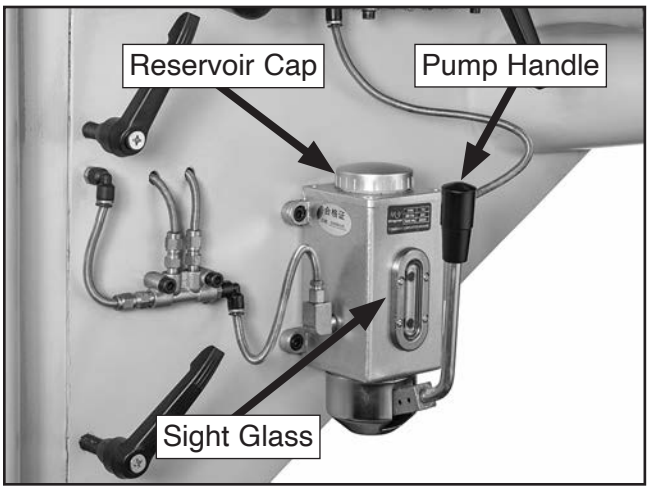


Figure 42. One-shot oiler.

Use the sight glass on the oiler to know when to re-fill the reservoir. The reservoir capacity is ½ liter.

Ram Ways

Oil Type ..... SB1365 or ISO 68 Equivalent
Oil Amount.....Thin Coat
Check/Add Frequency.....40 Hrs. of Operation

Move the ram as necessary to gain access to the entire length of the dovetail ways (see **Figure 43**). Use mineral spirits and shop rags to clean the ways, then use a clean shop rag to apply a thin coat of lubricant to the ways.

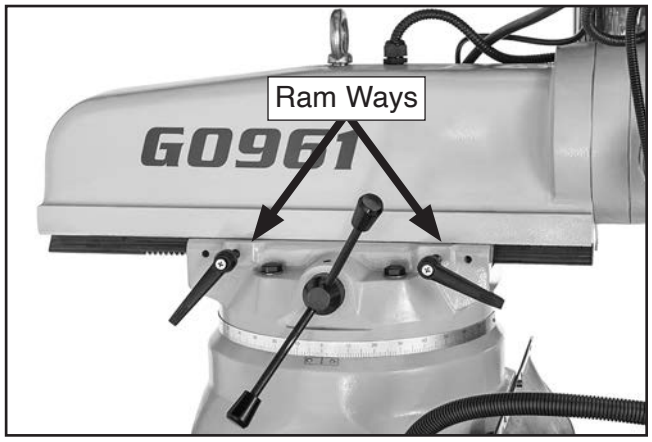


Figure 43. Ram ways.

Quill Exterior

Oil Type ..... SB1365 or ISO 68 Equivalent
Oil Amount.....Thin Coat
Lubrication Frequency ..... 4–8 Hrs. of Operation

Fully extend the spindle to expose the quill (see **Figure 44**), then use an oily shop rag to apply a thin coat of lubricant to the smooth surface of the quill.

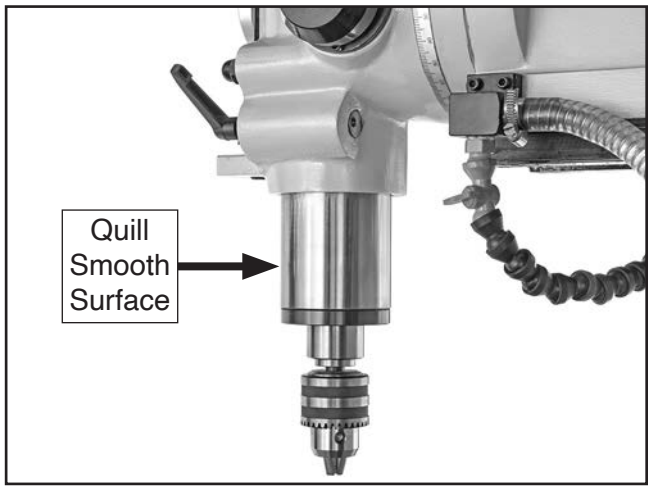


Figure 44. Quill lubrication.

Power Feed Gears

Grease Type ..... T26419 or NLGI#2 Equivalent
Amount .....Thin Coat
Add Frequency .....40 Hrs. of Operation

To lubricate power feed gears:

1. DISCONNECT MACHINE FROM POWER!

2. Remove acorn nut, flat washer, ball handle, and compression spring from power unit end of X-axis leadscrew (see **Figure 45**).

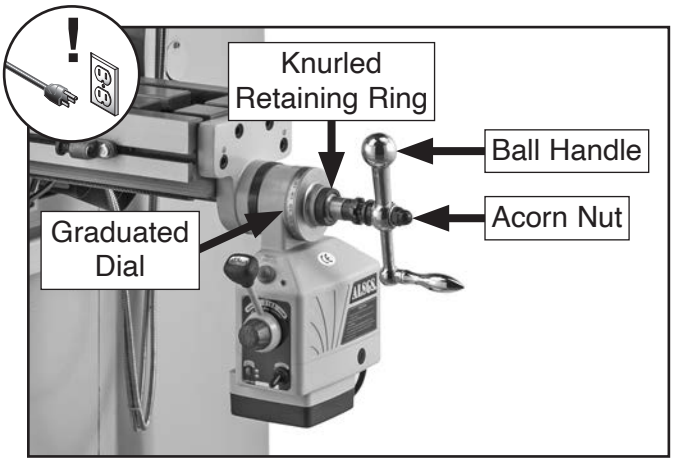


Figure 45. Ball handle components.

3. Unthread set screw in detente sleeve, then remove sleeve; unthread and remove knurled retaining ring and graduated dial ring from end of leadscrew.

4. Remove brass bevel gear from leadscrew, then remove leadscrew alignment key (see **Figure 46**).

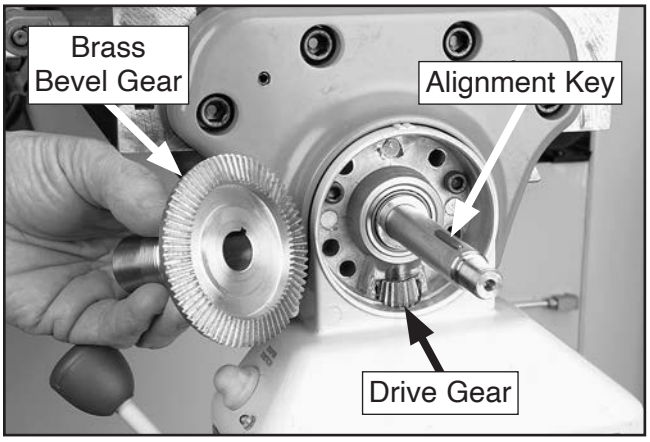


Figure 46. Example of power feed gears.

5. Brush a light coat of grease on bevel gear teeth and drive gear.

6. Install alignment key, align bevel gear keyway with key, slide gear onto leadscrew, and mesh teeth with drive gear.

7. Re-install components in same order they were removed.

8. Move table with ball handle to check gear movement and distribute grease on gears. If movement is not smooth, repeat **Steps 2–7** until it is.

Head Tilt Pinion

The interaction between the cast iron surfaces of this device (see **Figure 47**) produces a dry powder that provides adequate lubrication.

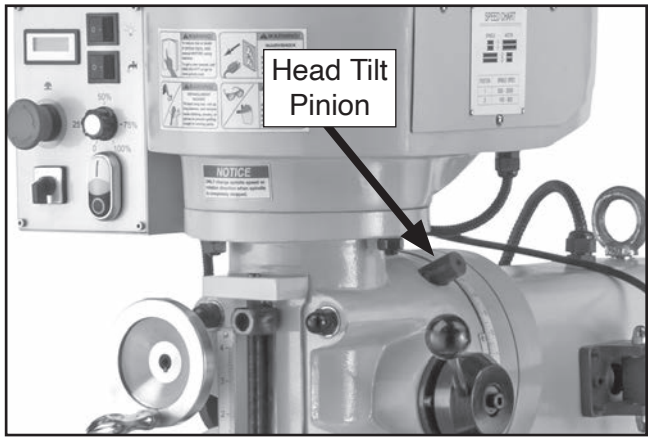


Figure 47. Head tilt pinion.

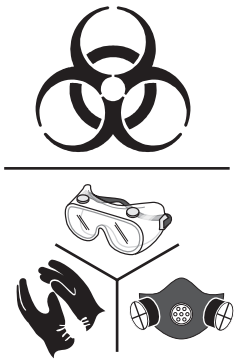
Do not apply any other lubricant because it could produce a stiff compound, which may interfere with smooth movement.

Checking/Adding Coolant

Hazards

As some coolant ages, dangerous microbes can proliferate and create a biological hazard. The risk of exposure to this hazard can be greatly reduced by replacing the old coolant on a regular basis, as indicated in the maintenance schedule.

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



⚠WARNING

BIOLOGICAL & POISON HAZARD!

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

A small amount of coolant is lost during normal operation. Check the coolant reservoir regularly and fill it if necessary. We recommend changing the coolant every three months or sooner if it develops an unpleasant odor. However, be sure to follow the coolant manufacturer's instructions when checking, adding, or changing coolant.

Coolant Type ..... H9240 or Water-Soluble Equiv
Coolant Amount..... 5.25 Gallons
Check/Add Frequency ..... 3 Months

NOTICE

Running coolant pump without adequate coolant in reservoir may permanently damage coolant pump, which will not be covered by warranty.

Checking/Adding Coolant

Items Needed	Qty
Hex Wrench 4mm	1
Goggles	1 Per Person
Gloves	1 Per Person
Respirator	1 Per Person
New Coolant	As Needed
Disposable Shop Rags	As Needed

To check or add coolant:

1. DISCONNECT MACHINE FROM POWER!

2. Clean away debris and grime from coolant return screen (see **Figure 48**) and surrounding area, then remove screen from base.

Figure 48. Coolant return screen removed.

3. Use a clean metal tool as a dip stick to measure level of coolant in reservoir. If lower than 1½" (measured from bottom of tank), add coolant by pouring it into return screen hole.

4. Install return screen before resuming milling operations.

Changing Coolant

Items Needed	Qty
Hex Wrench 4mm	1
Catch Pan	1
Empty Bucket 6-Gal.	1
Rubber Hose (optional)	1
Goggles	1 Per Person
Gloves	1 Per Person
Respirator	1 Per Person
New Coolant	Approx. 5.25 Gallons
Disposable Shop Rags	As Needed

To change coolant:

1. Put on personal protective equipment.

2. Position coolant nozzle in catch pan, then use coolant pump to drain reservoir.

   Note: *When catch pan is near full, empty it into a 6-gallon bucket, then repeat process until reservoir is empty.*

   Tip: *Alternately, slide rubber hose onto coolant nozzle and point it into 6-gallon bucket.*

3. DISCONNECT MACHINE FROM POWER!

4. Remove coolant reservoir access panel (see **Figure 49**) from rear of column.

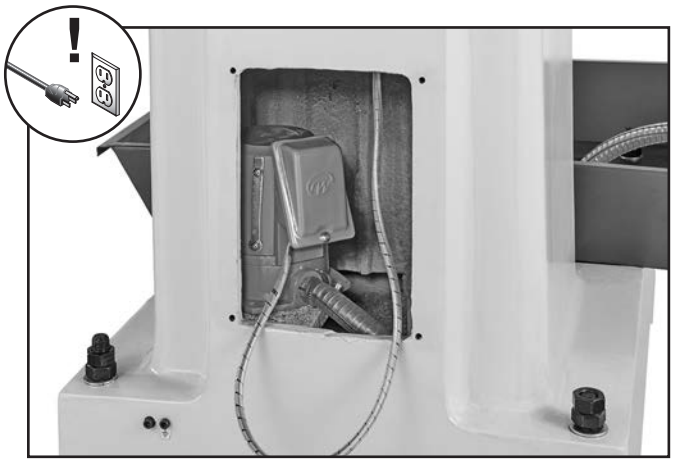


Figure 49. Location of coolant pump.

5. Remove (4) cap screws securing pump and move it out of the way.

6. Thoroughly clean out bottom of reservoir and base of pump. Make sure interior is dry before adding new coolant.

   Note: *Use a cleaning solvent that is compatible with type of coolant. For instance, if you are using a water-based coolant, then use a water-based cleaning solvent. Also, use magnets to remove any metal chips left behind.*

7. When reservoir and pump are clean and dry, replace pump and access panel.

8. Clean away debris and grime from coolant drain screens on base of mill, then pour coolant through right-hand screen to fill reservoir (see **Figure 48**).

Machine Storage

The machine must be properly prepared if it will be stored for any period of time. Doing this will help prevent the development of rust and corrosion and ensure the mill remains in good condition for later use.

Note: *When taking the machine out of storage, repeat the* ***Test Run*** *and* ***Spindle Break-In*** *procedures.*

Preparing Mill for Storage

1. DISCONNECT MACHINE FROM POWER!

2. Lubricate machine as directed in **Lubrication** on **Page 38.**

3. Clean out coolant reservoir as directed in **Changing Coolant** on **Page 41**.

4. Thoroughly clean all unpainted, bare metal surfaces, then coat them with quality rust preventative. Take care to ensure these surfaces are completely covered but rust preventative is kept off painted surfaces.

   Note: *If the machine will be out of service for only a short period of time, use way oil in place of rust preventative.*

5. Place a few moisture-absorbing desiccant packs inside control panel enclosure.

6. Cover and place machine in a dry area that is out of direct sunlight and away from hazardous fumes, paint, solvents, or gas. Fumes and sunlight can bleach or discolor paint and plastic parts.

Bringing Mill Out of Storage

1. Remove moisture-absorbing desiccant packs from control panel enclosure.

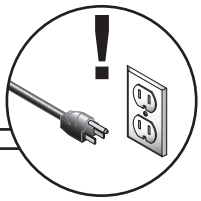
2. Repeat **Test Run** and **Spindle Break-In** procedures, beginning on **Page 22**.

3. Add coolant, as described in **Checking/ Adding Coolant** on **Page 41**.

SECTION 7: SERVICE

Review the troubleshooting procedures in this section if a problem develops with your machine. If you need replacement parts or additional help with a procedure, call our Technical Support. **Note:** *Please gather the serial number and manufacture date of your machine before calling.*

Troubleshooting



Motor & Electrical

Symptom	Possible Cause	Possible Solution
Machine does not start, or power supply breaker immediately trips after startup.	1. Master power switch in OFF position. 2. Emergency Stop button depressed/at fault. 3. Incorrect power supply voltage or circuit size. 4. Motor speed potentiometer at fault. 5. Power supply circuit breaker tripped or fuse blown. 6. Wiring broken, disconnected, or corroded. 7. Start/Stop button at fault. 8. Spindle rotation switch at fault. 9. Circuit board at fault. 10. Transformer at fault. 11. Motor or motor bearings at fault.	1. Turn master power switch to ON position. 2. Rotate Emergency Stop button head to reset. Replace if at fault. 3. Ensure correct power supply voltage and circuit size. 4. Test/replace if at fault. 5. Ensure circuit is free of shorts. Reset circuit breaker or replace fuse. 6. Fix broken wires or disconnected/corroded connections. 7. Replace switch. 8. Replace switch. 9. Inspect/replace if at fault. 10. Inspect transformer; replace if at fault. 11. Replace motor.
Machine stalls or is underpowered.	1. Feed rate/cutting speed too fast. 2. Wrong workpiece material. 3. Motor circuit board at fault. 4. Motor speed potentiometer at fault. 5. Belt(s) slipping/pulleys misaligned. 6. Pulley slipping on shaft. 7. Machine undersized for task. 8. Motor overheated. 9. Extension cord too long. 10. Spindle rotation switch at fault. 11. Motor or motor bearings at fault.	1. Decrease feed rate/cutting speed (**Page 31**). 2. Use correct type/size of metal. 3. Inspect/replace if at fault. 4. Test and replace if at fault. 5. Clean/tension/replace belt(s); ensure pulleys are aligned. 6. Tighten/replace loose pulley/shaft. 7. Use correct cutter/bit; reduce feed rate; reduce spindle RPM (**Page 31**); use cutting fluid if possible. 8. Clean motor, let cool, and reduce workload. 9. Move machine closer to power supply; use shorter extension cord. 10. Test/replace switch. 11. Replace motor.
Machine has vibration or noisy operation.	1. Motor or component loose. 2. V-belt(s) worn, loose, pulleys misaligned or belt slapping cover. 3. Pulley loose. 4. Spindle loose, improperly installed or damaged. 5. Chuck or cutter at fault. 6. Motor bearings at fault.	1. Replace damaged or missing bolts/nuts or tighten if loose. 2. Inspect/replace belts with a new matched set. Re-align pulleys if necessary. 3. Secure pulley on shaft. 4. Tighten loose spindle, re-install spindle, ensuring mating surfaces are clean; replace spindle if damaged. 5. Replace unbalanced chuck; replace/resharpen cutter; use correct feed rate. 6. Test by rotating shaft; rotational grinding/loose shaft requires bearing replacement.

Operations

Symptom	Possible Cause	Possible Solution
Tool loose in spindle.	1. Cutter/tooling loose. 2. Cutting tool not fully drawn up into spindle taper. 3. Debris on cutting tool or in spindle taper. 4. Taking too big of a cut.	1. Secure cutter/tooling. 2. Tighten drawbar. 3. Clean cutting tool and spindle taper. 4. Reduce depth of cut and allow chips to clear.
Breaking tools or cutters.	1. Spindle speed/feed rate too fast for depth of cut, cutting tool size, or workpiece material. 2. Improper or no lubricant/cutting tool getting too hot. 3. Dull/incorrect cutting tool. 4. Cutting tool too small. 5. Spindle extended too far down during or at beginning of operation. 6. Taking too big of a cut.	1. Reduce spindle speed (**Page 31**); reduce feed rate; take lighter cut. 2. Use proper lubricant for operation. 3. Sharpen/replace cutting tool. 4. Use larger cutting tool and slower feed rate. 5. Fully retract spindle and lower headstock. This increases rigidity. 6. Lessen depth of cut and allow chips to clear.
Workpiece or tool vibrates or chatters during operation.	1. Table locks not tight. 2. Workpiece not secure. 3. Spindle speed/feed rate too fast. 4. Gibs too loose. 5. Bit chattering. 6. Spindle extended too far down. 7. Quill lock lever not tight. 8. Chuck/cutter at fault. 9. Bump on V-belt.	1. Tighten table locks (**Page 27**). 2. Properly clamp workpiece on table or in vise. 3. Reduce spindle speed (**Page 31**); reduce feed rate. 4. Tighten gibs (**Page 49**). 5. Replace/sharpen bit; index bit to workpiece; reduce feed rate. 6. Fully retract spindle and lower headstock. This increases rigidity. 7. Tighten quill lock lever (**Page 5**). 8. Replace unbalanced chuck; replace/resharpen cutter. 9. Replace V-belt(s)
Table hard to move.	1. Table locks tightened down. 2. Chips loaded up on ways. 3. Ways and leadscrews need lubrication. 4. Gibs too tight. 5. Table limit stops interfering. 6. X/Y/Z-Axis leadscrews binding.	1. Release table locks (**Page 27**). 2. Frequently clean away chips during operations. 3. Lubricate ways and leadscrews (**Page 38**). 4. Adjust gibs (**Page 49**). 5. Adjust table limit stops out of the way (**Page 27**). 6. Clean and lubricate leadscrews (**Page 38**); adjust leadscrew backlash (**Page 48**).
Ram hard to move.	1. Ram lock(s) or gib at fault. 2. Ram lock bolt(s) at fault. 3. Ram ways binding. 4. Gibs too tight.	1. Loosen/replace lock lever and adjust gib (**Page 49**). 2. Loosen/replace lock bolt(s). 3. Clean/relubricate ram ways (**Page 38**). 4. Adjust gibs (**Page 49**).
Headstock hard to move.	1. Headstock acorn nuts too tight. 2. Headstock tilting bolt at fault.	1. Loosen acorn nuts (**Page 29**). 2. Loosen/replace tilting bolt.
Bad surface finish.	1. Spindle speed/feed rate too fast. 2. Workpiece not secure. 3. Dull/incorrect cutting tool. 4. Wrong rotation direction of cutting tool. 5. Spindle extended too far down during or at beginning of operation.	1. Reduce spindle speed (**Page 31**); reduce feed rate. 2. Properly clamp workpiece on table or in vise. 3. Sharpen/replace cutting tool; select better tool for operation. 4. Check for proper direction of cutting tool rotation. 5. Fully retract spindle and lower headstock. This increases rigidity.
Cutting results not square.	1. Spindle not exactly 90° to table. 2. Table travel inconsistent.	1. Tram spindle (**Page 46**). 2. Adjust gibs (**Page 49**).

Operations (Cont.)

Symptom	Possible Cause	Possible Solution
Lack of power at spindle.	1. V-belts loose. 2. Incorrect power supply voltage.	1. Properly tension V-belts (**Page 31**). 2. Ensure power supply meets correct circuit requirements (**Page 13**).
Motor or spindle overheats.	1. Mill/drill operated at maximum speed for extended period. 2. Fan cover clogged.	1. Allow mill/drill to cool; avoid operating at maximum speed for long times. 2. Clean motor, let cool, and reduce workload.
Spindle forward/reverse switch does not work.	1. Switch not in forward (F) or reverse (R) mode. 2. Wiring broken, disconnected, or corroded.	1. Move switch to forward (F) or reverse (R) mode. 2. Fix broken wires or disconnected/corroded connections.
Power feed does not move table or slips.	1. Table locks tightened down. 2. Drive selector not engaged. 3. Sheared pin. 4. Gears not meshing/teeth missing. 5. Motor shaft and gear shaft not engaged. 6. Table limit switch engaged/at fault.	1. Release table locks (**Page 27**). 2. Select speed, engage drive selector. 3. Replace pin. 4. Check gears and adjust/replace. 5. Replace clutch. 6. Test/repair/replace.
Lamp will not light.	1. Power not turned ***ON***. 2. Bulb burned out. 3. Wiring broken, disconnected, or corroded. 4. On/Off switch at fault	1. Use On/Off switch to turn lamp ***ON***. 2. Replace bulb. 3. Fix broken wires or disconnected/corroded connections. 4. Test/replace switch.
DRO does not give reading.	1. DRO not turned ***ON***. 2. Fuse blown. 3. Wiring broken, disconnected, or corroded. 4. Initial reading incorrect. 5. Sensors at fault. 6. Spacing between sensor and scale incorrect. 7. DRO at fault.	1. Press DRO ON/Power button. 2. Replace fuse. 3. Fix broken wires or disconnected/corroded connections. 4. Tare/Zero/Reset DRO at beginning point. 5. Test/replace sensors as necessary. 6. Adjust spacing between sensor and scale. 7. Replace DRO.

Tramming Spindle

After positioning the head at an angle and when your operation requires that the spindle axis be precisely perpendicular to the table, you must tram or align the spindle with the table to ensure the spindle is exactly 90° to the table.

This procedure involves mounting a dial test indicator to the quill or spindle, rotating it around the table, and adjusting the spindle axis (Z-axis) 90° to the table X- and Y-axes, as illustrated in **Figure 50**.

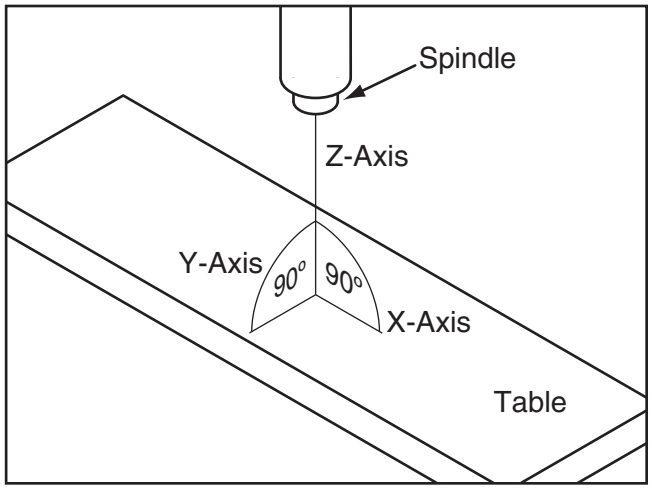


Figure 50. Spindle Z-axis perpendicular to the table X- and Y-axis.

We encourage you to research the many variations of spindle tramming to find the one that works best for you. If you do not already have a preference for performing this operation, use the following widely used procedure for accurately tramming the spindle to the table.

Keep in mind that all workpiece top surfaces are not exactly parallel with the table top. You may choose to tram the spindle to the top surface of the workpiece after it is mounted instead of that of the table.

Tools Needed **Qty**

Dial Test Indicator
(with at least 0.0005" resolution) 1
Indicator Holder
(mounted on the quill/spindle) 1
Precision Parallel Block
(at least 9" in length) 1

Note: *A precision-ground plate can be substituted for parallel blocks. Keep in mind that the farther the indicator point can be placed from spindle axis, the more accurate alignment measurements will be.*

To tram spindle to table:

1. DISCONNECT MACHINE FROM POWER!

2. Prepare mill for tramming by performing following tasks:

   - Verify table is clean by running your hand over the top of it. If necessary, stone table to remove all nicks and burrs, then clean off all debris.

   - Position table for milling operation you intend to perform after tramming—preferably centered with saddle.

   - Tighten any table, knee, quill, or ram locks that should be tight during intended milling operation.

3. Place parallel block underneath spindle.

4. Install indicator holder in spindle or on quill, then mount indicator so that point is as parallel to block as possible (see **Figure 51**).

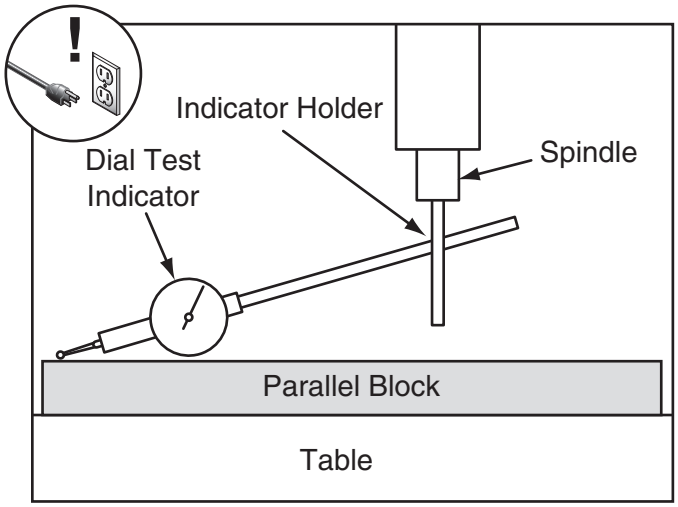


Figure 51. Dial test indicator mounted.

5. To measure spindle alignment along X-axis, place parallel block directly under spindle and indicator across length of table, as illustrated in **Figure 52**.

Note: *If you must position quill or knee to accommodate above step, then review tasks in **Step 2** to make sure mill is properly prepared for tramming.*

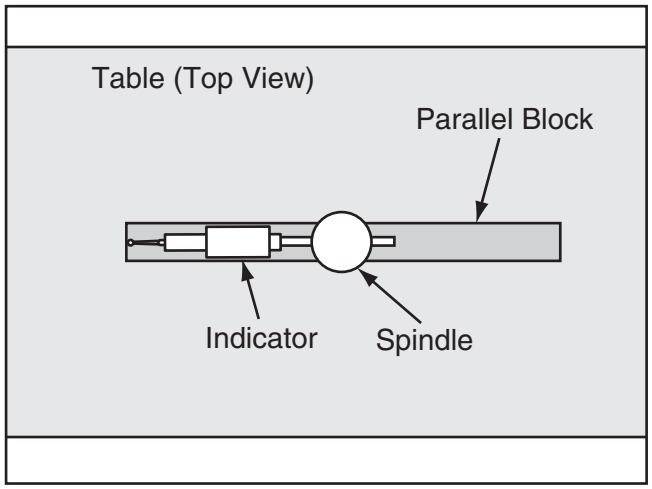


Figure 52. Parallel block and indicator positioned for the X-axis measurement (top view).

Note: *Your general goal in next steps is to get difference of indicator readings between ends of parallel bar down to 0.0005". However, acceptable variance will depend on requirements for your operation.*

6. Rotate spindle by hand so that indicator point rests on one end of parallel block, as illustrated in **Figures 51**–**52**, then zero dial.

7. Rotate spindle so that indicator point rests in same manner on other end of block, then read dial.

— If indicator dial still reads zero or is within the acceptable variance, continue on with **Step 8**.

— If indicator dial has moved from zero beyond acceptable variance, you will need to compensate for that amount by rotating head left or right. Repeat **Steps 6**–**7** until you are satisfied with spindle axis alignment along table X-axis.

Note: *Keep one rotation lock bolt just snug so head does not move loosely while you adjust it. Remember to tighten all rotation lock bolts after adjusting head.*

8. Place parallel block directly under spindle and across width of table, as illustrated in **Figure 53**.

9. Rotate spindle so indicator point rests on parallel block, as illustrated in **Figure 53**, then zero dial.

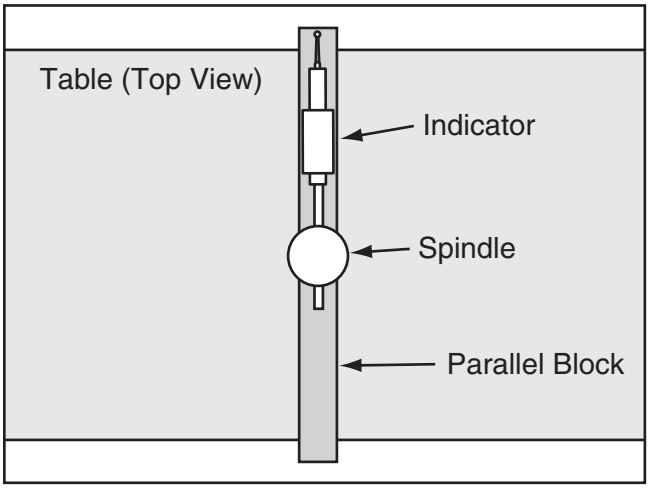


Figure 53. Parallel block and indicator positioned for Y-axis measurement (top view).

10. Rotate spindle so that indicator point rests on other end of block in same manner, then read dial.

— If indicator dial still reads zero or is within acceptable variance, spindle is precisely perpendicular to table in both X- and Y-axes, and tramming procedure is complete.

— If indicator dial has moved from zero beyond acceptable variance, you will need to compensate for that amount by tilting head forward or backward. Repeat **Steps 9**–**10** until you are satisfied with spindle axis alignment along table Y-axis.

Note: *Keep one tilt lock bolt snug so head does not move loosely while you adjust it. Remember to tighten all tilt lock bolts after adjusting head.*

Adjusting Leadscrew Backlash

Leadscrew backlash is the amount of free play movement in the leadscrew (when the leadscrew moves but the table does not) after changing the direction of rotation.

A leadscrew must have a certain amount of backlash to rotate easily, but over time, it increases with wear. Generally, 0.005"–0.010" leadscrew backlash is acceptable to ensure smooth movement and reduce premature thread wear.

Tools Needed	Qty
Hex Wrenches 3, 5, 6mm	1 Ea.
Dead Blow Hammer	1

X-Axis Leadscrew Backlash

1. DISCONNECT MACHINE FROM POWER!

2. Loosen (2) cap screws on X-axis leadscrew nut accessed from underneath left side of table (see **Figure 54**).

3. Rotate adjustment plate on leadscrew nut (see **Figure 54**) in small increments, then check amount of backlash.

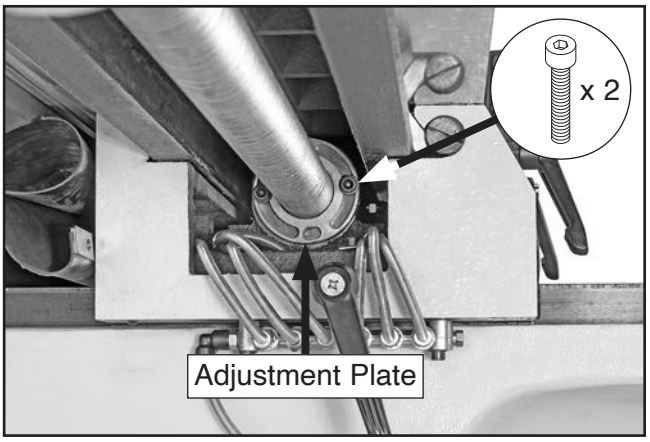


Figure 54. Location of X-axis leadscrew nut cap screws and adjustment plate.

4. When satisfied with adjustment, tighten (2) cap screws.

Y-Axis Leadscrew Backlash

1. DISCONNECT MACHINE FROM POWER!

2. Remove hex nut and ball handle from Y-axis leadscrew (see **Figure 55**).

   Note: *In next step, take care not to misplace leadscrew key as you remove parts.*

3. Unthread and remove knurled retaining ring, graduated dial ring, and leadscrew key (see **Figure 55**).

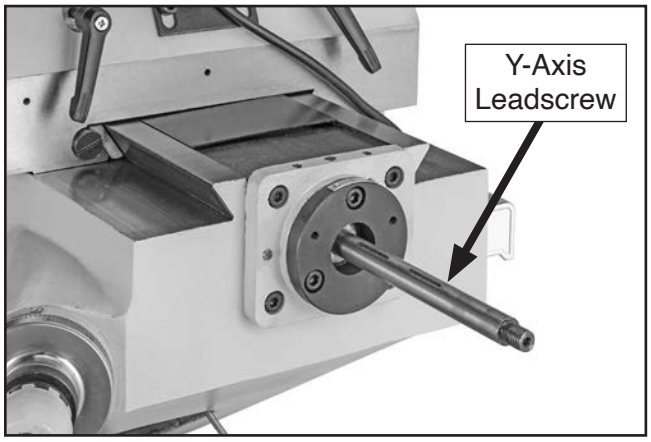


Figure 55. Ball handle, ring, and key removed from Y-axis leadscrew.

4. Remove (4) cap screws from bearing housing, then remove housing (see **Figure 56**).

   Note: *It may be necessary to use a dead blow hammer or rubber mallet on housing to knock it loose.*

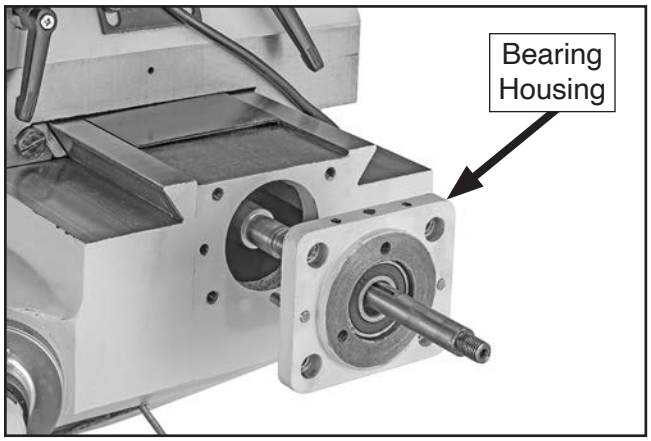


Figure 56. Y-axis bearing housing.

5. Loosen (2) cap screws on face of adjustment shown in **Figure 57**.

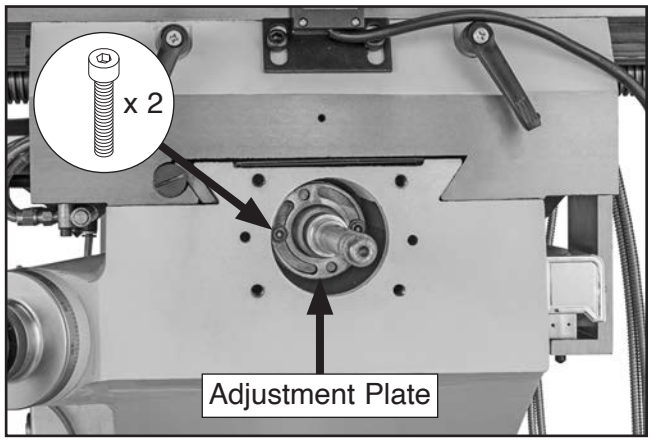


Figure 57. Y-axis leadscrew adjustment plate and cap screws.

6. Install key on leadscrew in order to use ball handle in next step.

7. Rotate adjustment plate on leadscrew nut in small increments, slide ball handle onto leadscrew, then check amount of backlash.

8. When you are satisfied with adjustment, tighten (2) cap screws.

9. Re-install parts previously removed in reverse order.

Adjusting Gibs

Gibs are tapered lengths of metal that are sandwiched between two moving surfaces. Gibs control the gap between these surfaces and how they slide past one another. Correctly adjusting the gibs is critical to producing good results.

Correctly positioning gibs is a matter of trial and error and patience. Tight gibs make movement more accurate but stiff. Loose gibs make movement sloppy but easier to do. The goal of gib adjustment is to remove unnecessary sloppiness without causing the ways to bind.

Gibs are adjusted with a screw on each end of the gib, that move the tapered gib back and forth to increase or decrease the friction pressure between the sliding surfaces. Many experienced machinists adjust the gibs just to the point where they can feel a slight drag in movement.

Note: *It will be necessary to remove small parts, such as way wipers and covers, to access the gib adjustment screws.*

Tools Needed	**Qty**
Flat Head Screwdriver ½"	1
Hex Wrench 4mm	1

Adjusting Table Gibs

Refer to **Figures 58–60** to identify the locations of the X-, Y-, and Z-axis gibs, and one of the two adjustment screws for each.

To adjust table gibs:

1. DISCONNECT MACHINE FROM POWER!

2. Make sure all table/knee locks are loose.

3. Loosen (1) gib adjustment screw, then tighten opposite screw the same amount to move gib.

4. Use ball handles/crank to move table/knee until you feel a slight drag in path of movement. Repeat **Steps 3–4** as necessary.

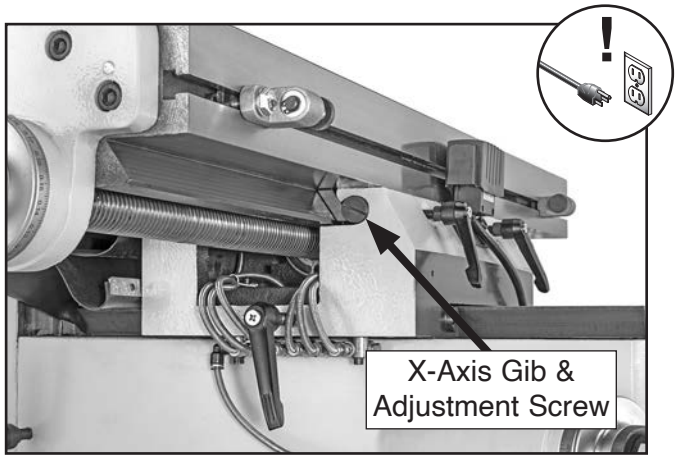


Figure 58. X-axis gib and adjustment screw underneath left side of table.

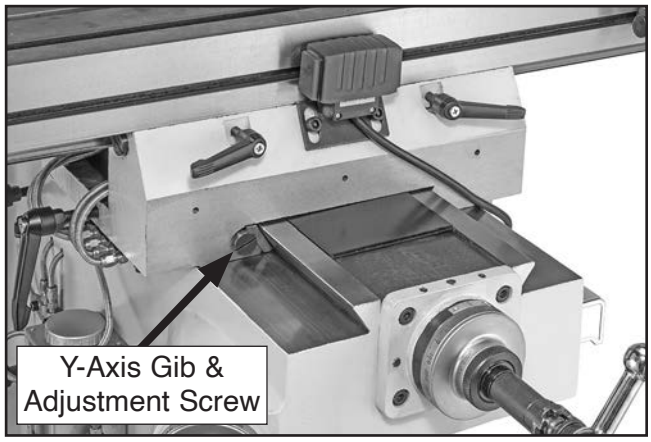


Figure 59. Y-axis gib and adjustment screw.

Figure 60. Z-axis gib and adjustment screw.

Adjusting Ram Gib

1. DISCONNECT MACHINE FROM POWER!

2. Make sure all ram lock handles are loose.

3. Loosen (1) gib adjustment screw (see **Figure 61**), then loosen opposite screw same amount to move gib.

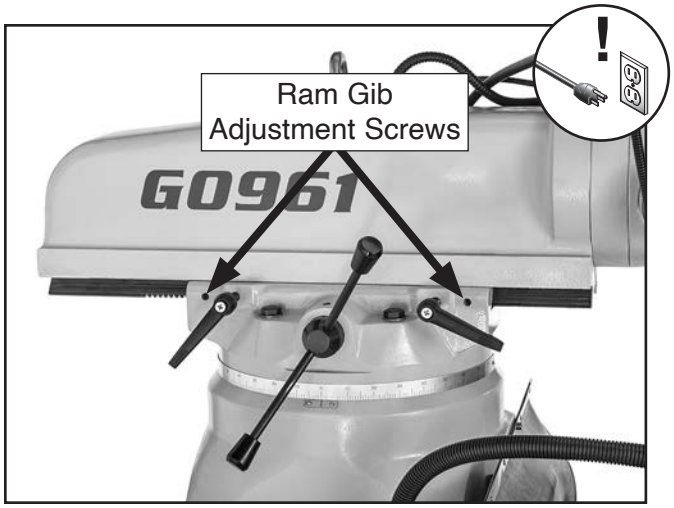


Figure 61. Ram gib adjustment screws.

4. Use ram movement lever to move ram until you feel a slight drag in the path of movement. Repeat **Steps 3–4** as necessary.

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. Compare the manufacture date of your machine to the one stated in this manual, and study this section carefully.

If there are differences between your machine and what is shown in this section, call Technical Support at (570) 546-9663 for assistance BEFORE making any changes to the wiring on your machine. An updated wiring diagram may be available. **Note:** *Please gather the serial number and manufacture date of your machine before calling. This information can be found on the main machine label.*

⚠WARNING
Wiring Safety Instructions

SHOCK HAZARD. Working on wiring that is connected to a power source is extremely dangerous. Touching electrified parts will result in personal injury including but not limited to severe burns, electrocution, or death. Disconnect the power from the machine before servicing electrical components!

MODIFICATIONS. Modifying the wiring beyond what is shown in the diagram may lead to unpredictable results, including serious injury or fire. This includes the installation of unapproved aftermarket parts.

WIRE CONNECTIONS. All connections must be tight to prevent wires from loosening during machine operation. Double-check all wires disconnected or connected during any wiring task to ensure tight connections.

CIRCUIT REQUIREMENTS. You MUST follow the requirements at the beginning of this manual when connecting your machine to a power source.

WIRE/COMPONENT DAMAGE. Damaged wires or components increase the risk of serious personal injury, fire, or machine damage. If you notice that any wires or components are damaged while performing a wiring task, replace those wires or components.

MOTOR WIRING. The motor wiring shown in these diagrams is current at the time of printing but may not match your machine. If you find this to be the case, use the wiring diagram inside the motor junction box.

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

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

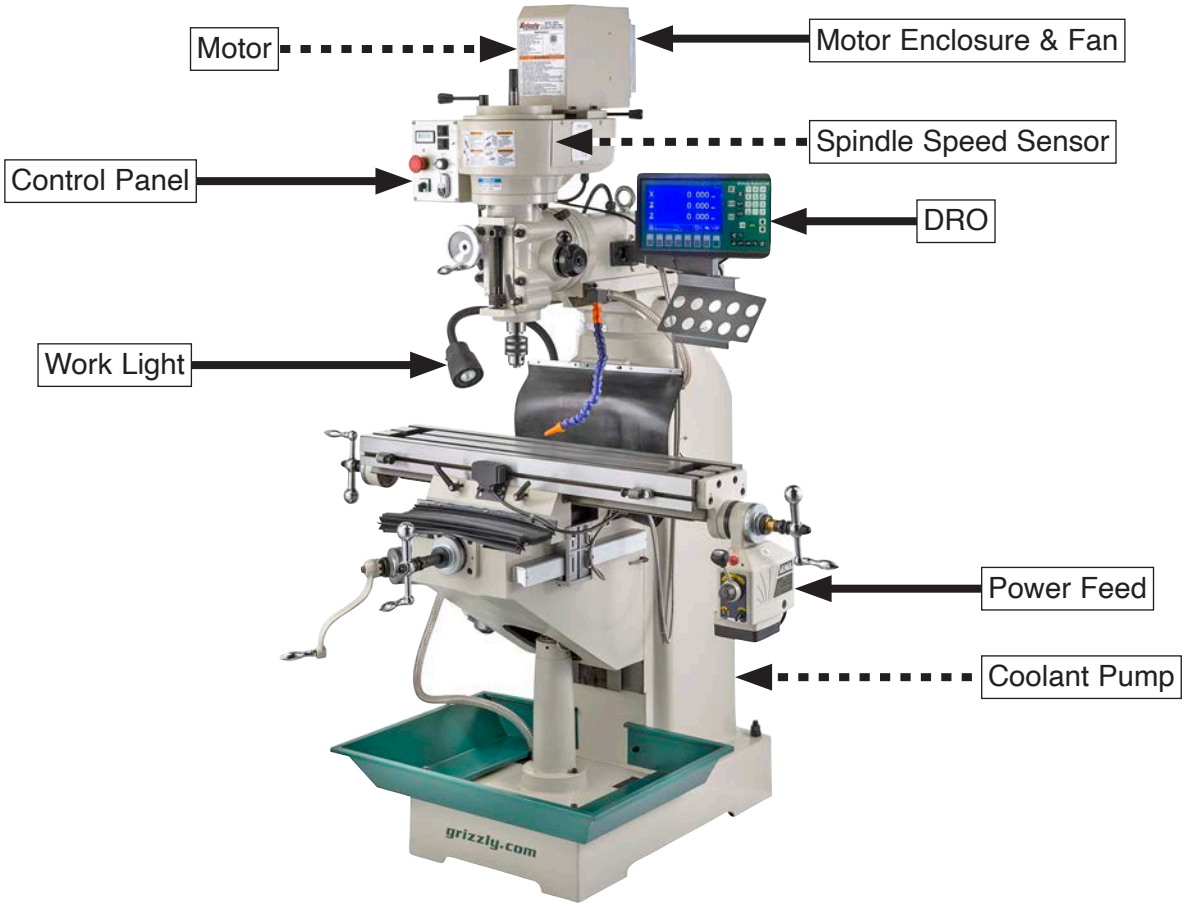
NOTICE

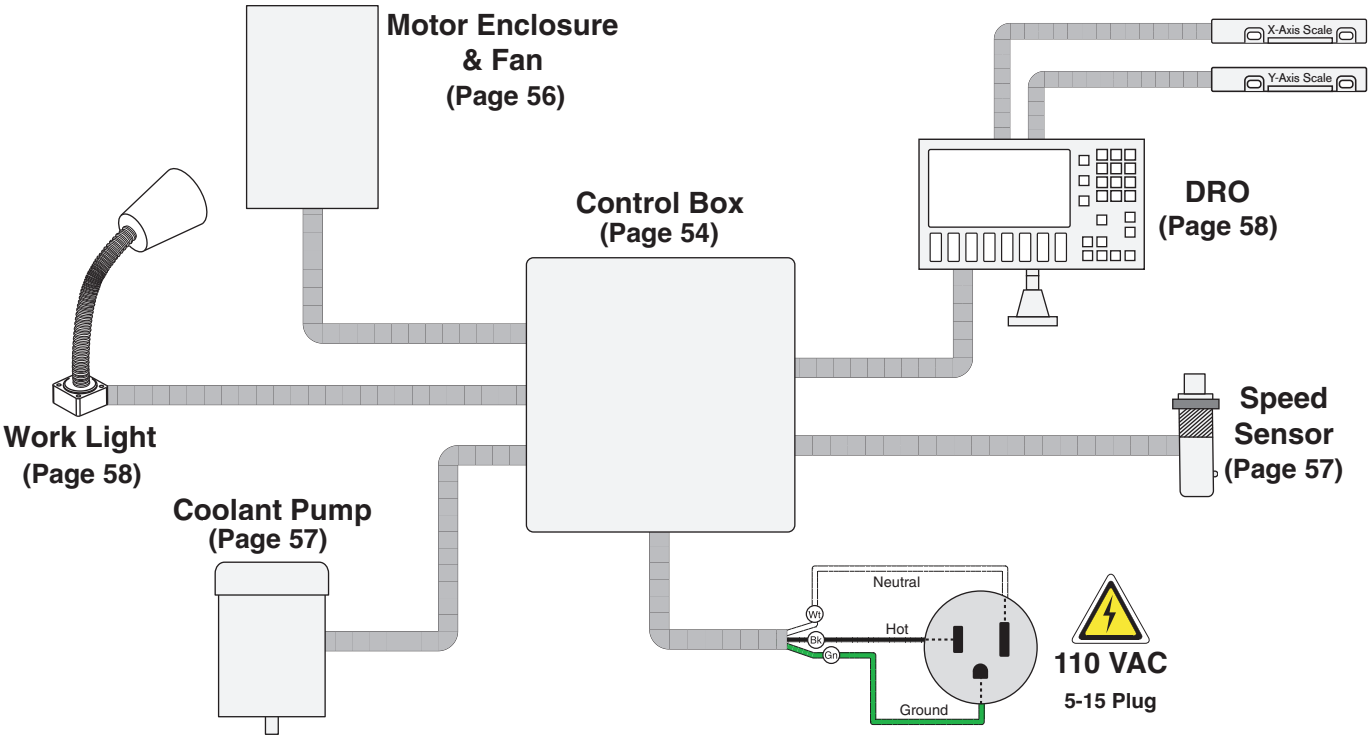
The photos and diagrams included in this section are best viewed in color. You can view these pages in color at www.grizzly.com.

COLOR KEY

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

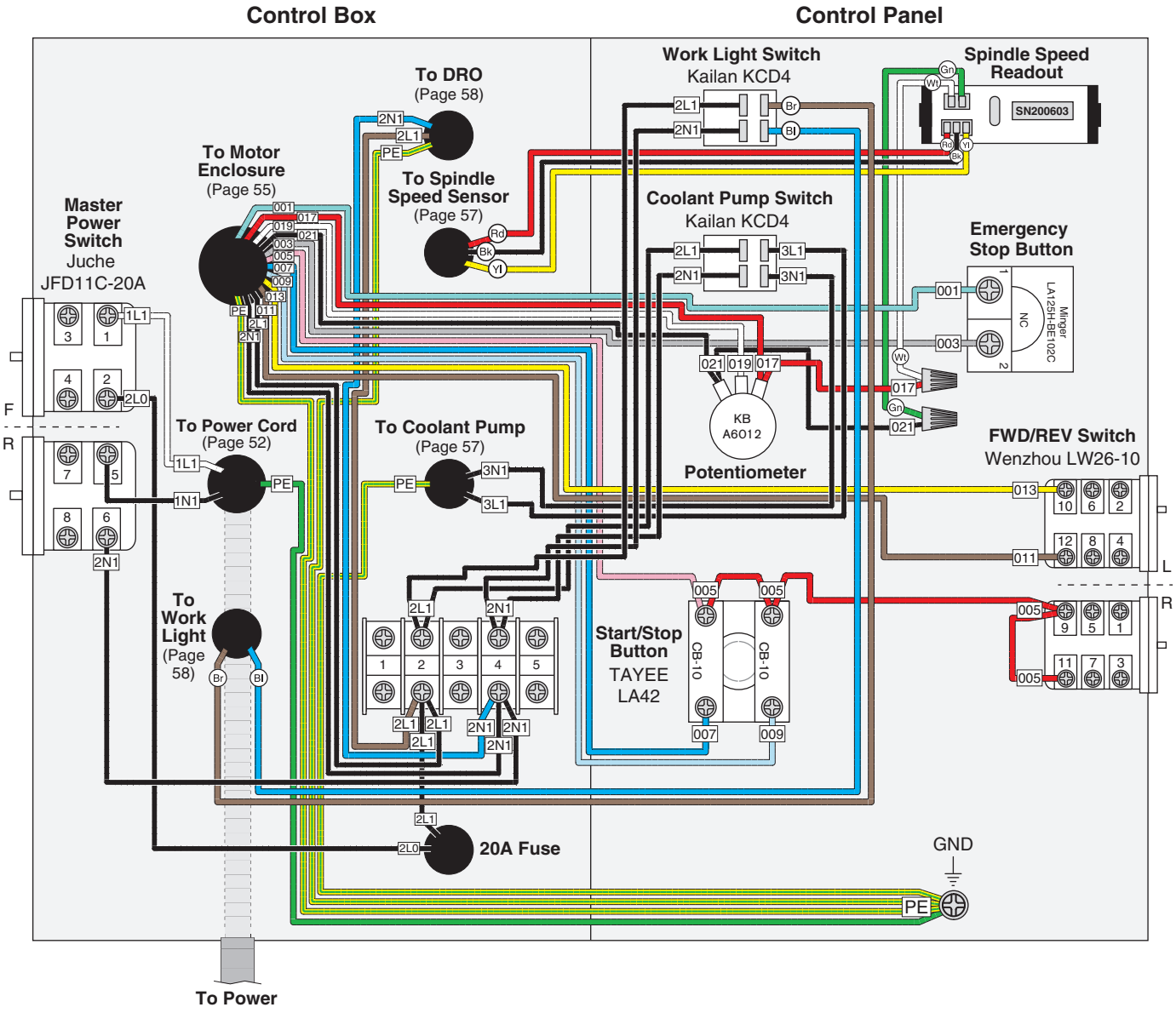
Wiring Overview





STOP ***READ ELECTRICAL SAFETY ON PAGE 51!***

Control Box Wiring



Control Box

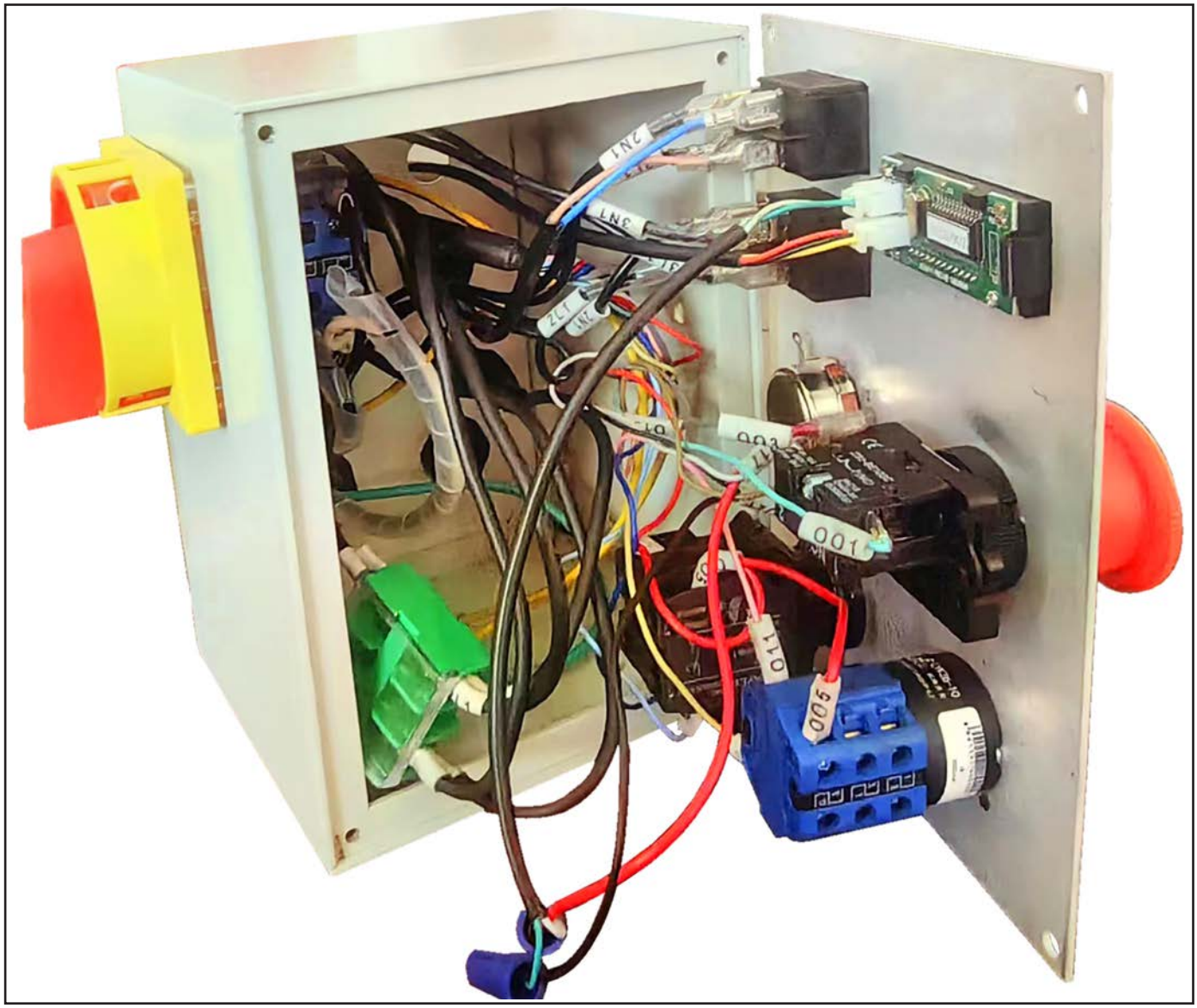


Figure 62. Control box wiring.

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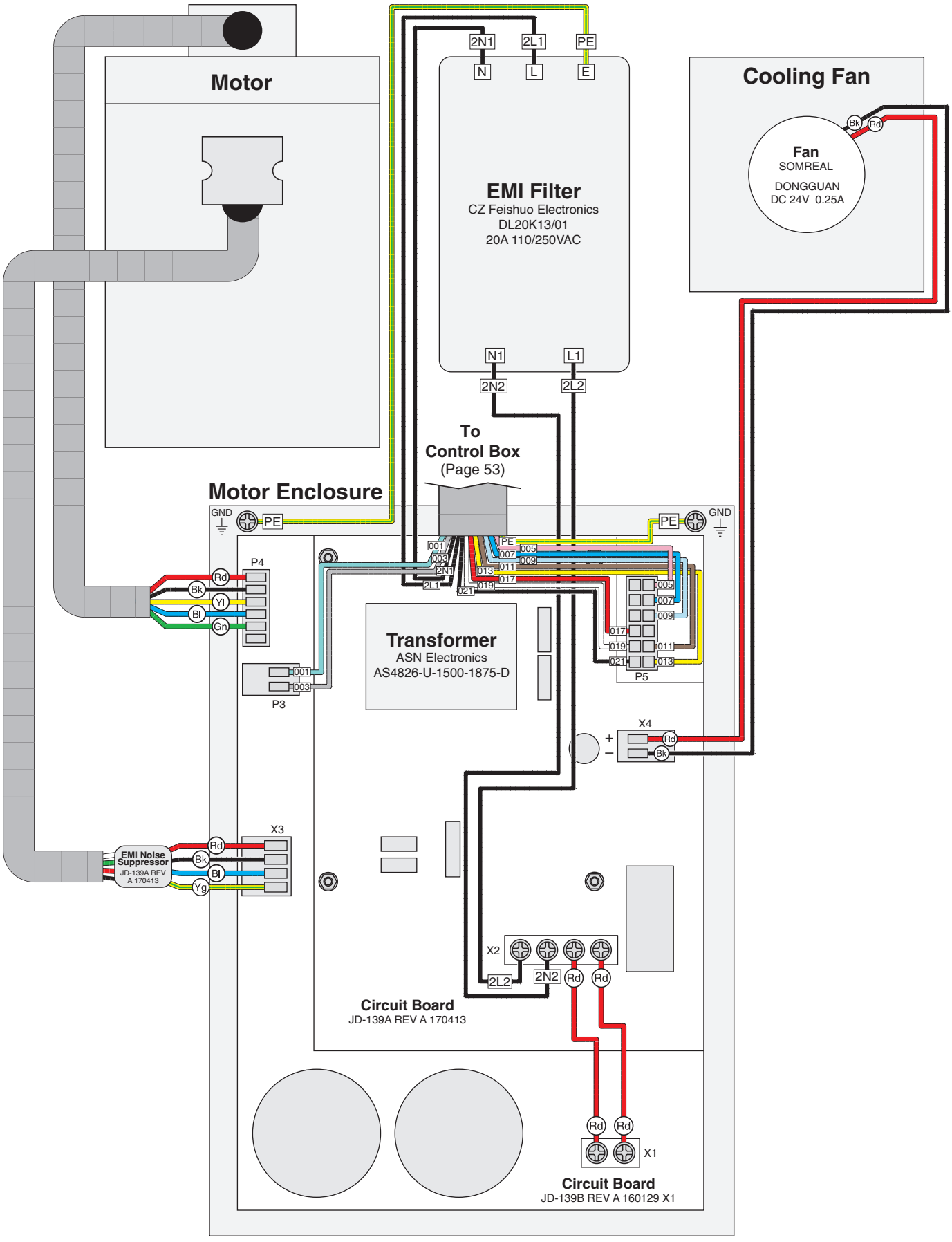
Motor Enclosure



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Motor Enclosure

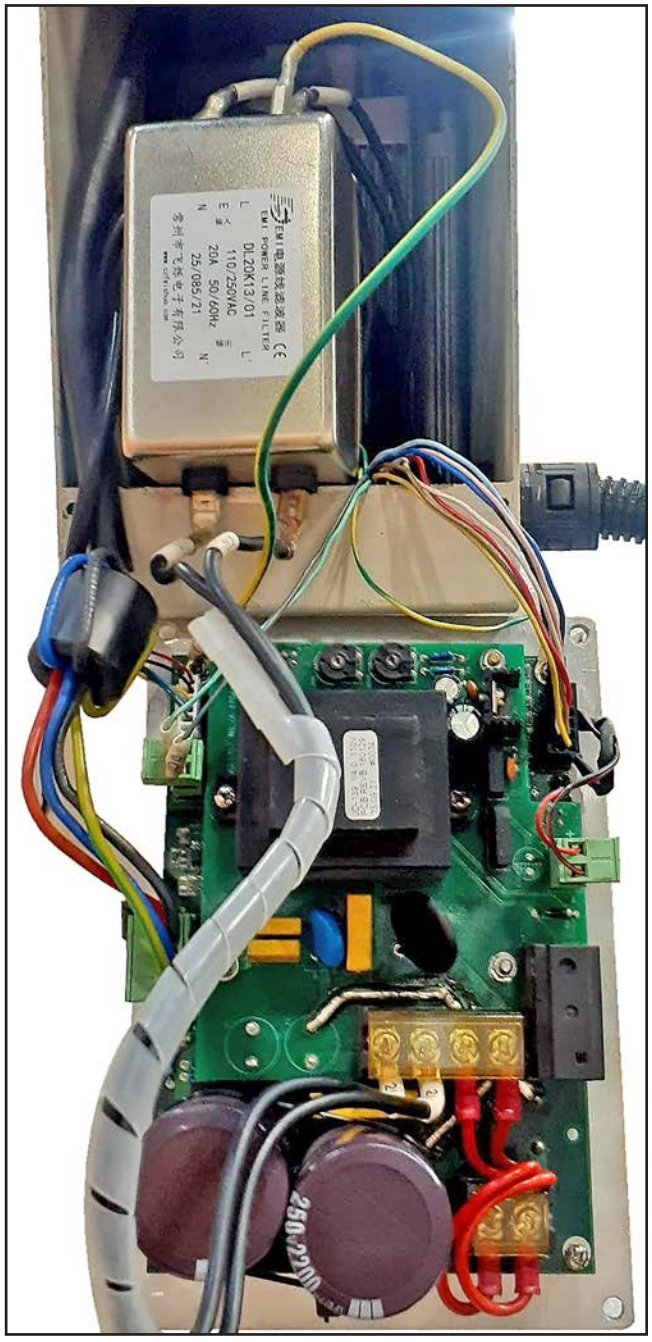

Figure 63. Motor enclosure wiring.

Figure 64. Cooling fan wiring.

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Coolant Pump Wiring

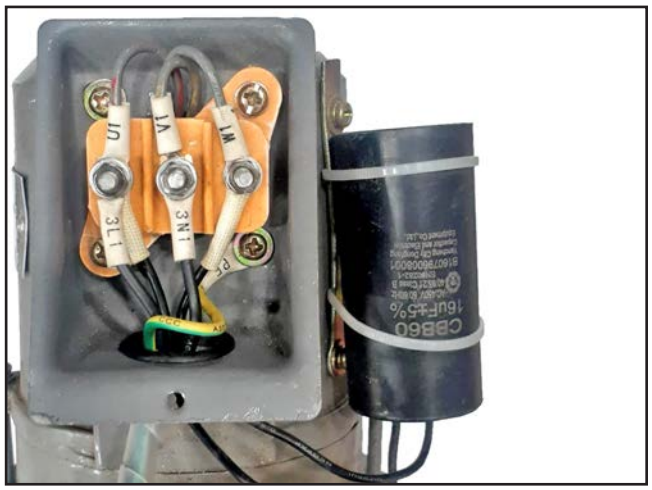
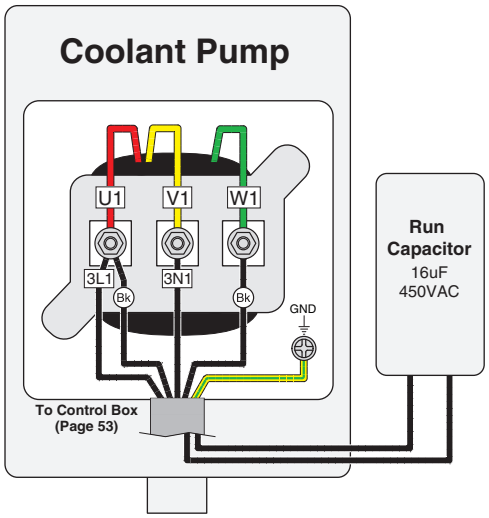


Figure 65. Coolant pump wiring.



Power Feed Limit Switch Wiring

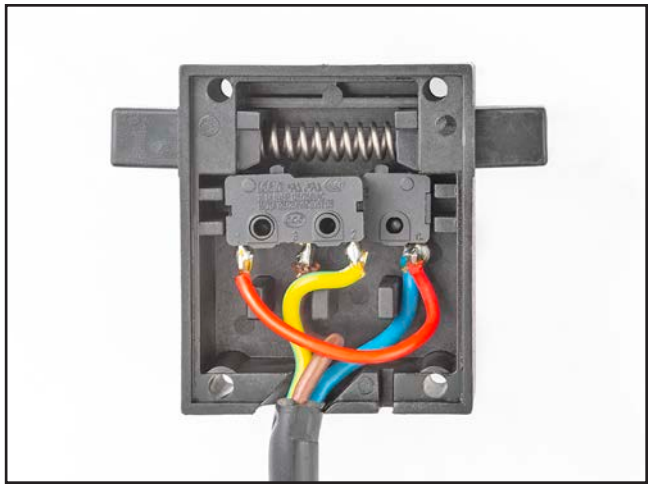
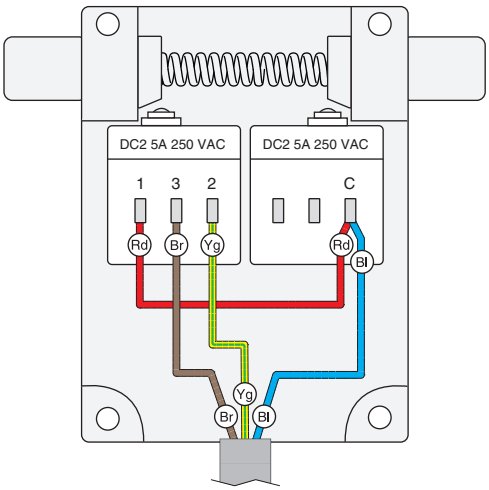
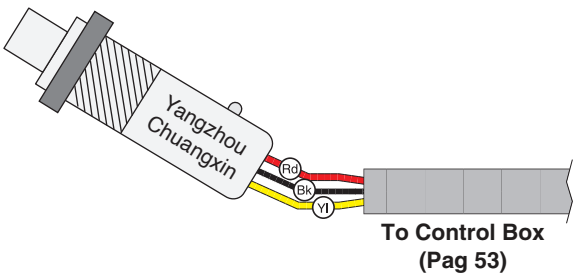


Figure 66. Power feed limit switch wiring.



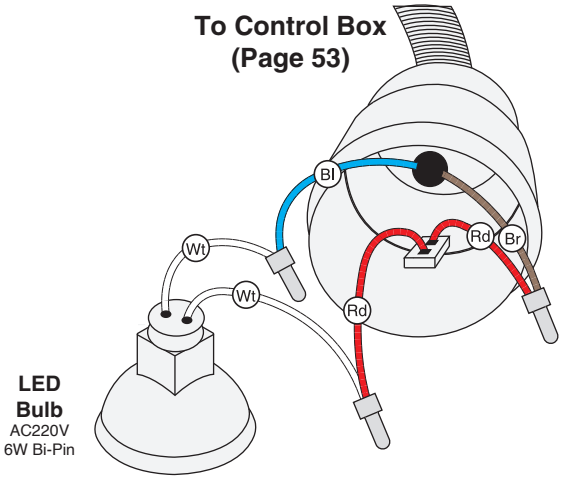
Spindle Speed Sensor Wiring

Figure 67. Spindle speed sensor wiring.



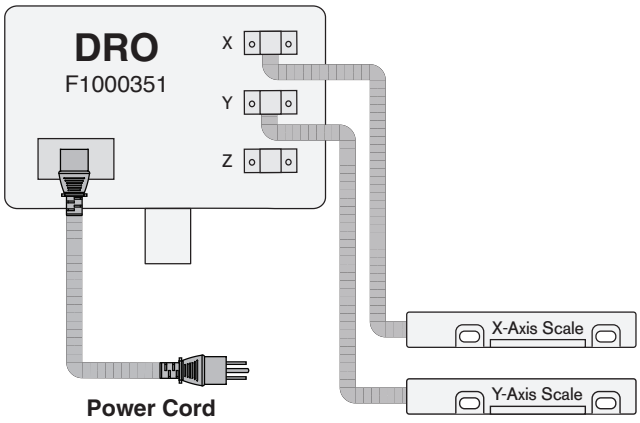
LED Work Light Wiring

Figure 68. LED work light wiring.



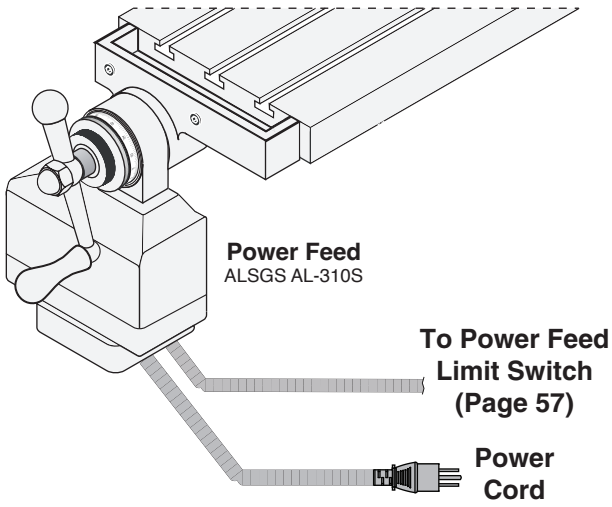
DRO Wiring

Figure 69. DRO wiring.



Power Feed Wiring

Figure 70. Power feed wiring.

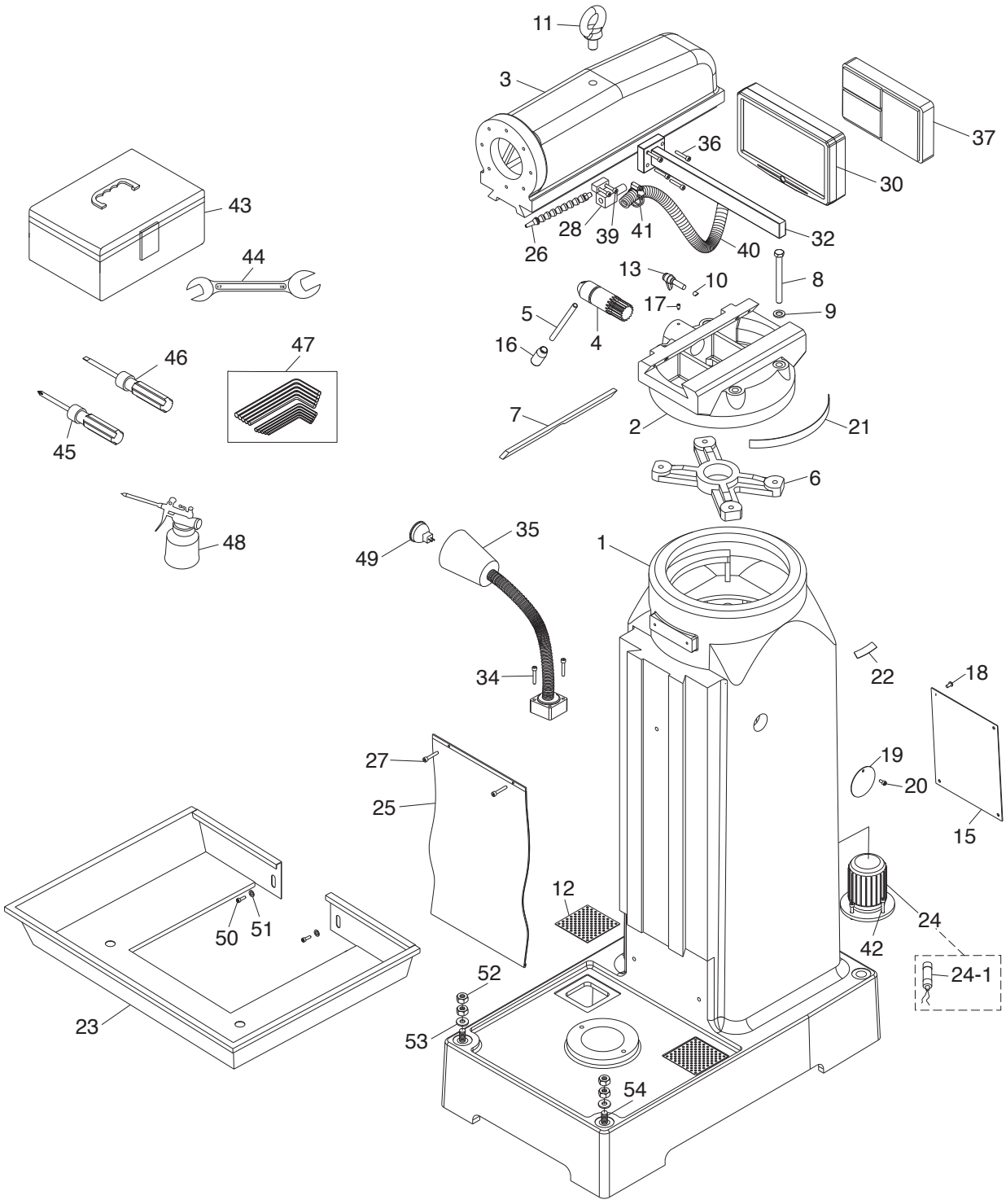


STOP ***READ ELECTRICAL SAFETY ON PAGE 51!***

SECTION 9: PARTS

We do our best to stock replacement parts when possible, but we cannot guarantee that all parts shown are available for purchase. Call **(800) 523-4777** or visit **www.grizzly.com/parts** to check for availability.

Main



Main Parts List

REF	PART #	DESCRIPTION
1	P0961001	COLUMN
2	P0961002	TURRET
3	P0961003	RAM
4	P0961004	RAM PINION
5	P0961005	RAM MOVEMENT LEVER
6	P0961006	TURRET BRACKET
7	P0961007	RAM GIB
8	P0961008	HEX BOLT M12-1.75 X 120
9	P0961009	FLAT WASHER 12MM
10	P0961010	RAM LOCK PLUNGER
11	P0961011	EYE BOLT 32, M20-2.5 X 30
12	P0961012	COOLANT SCREEN
13	P0961013	ADJ HANDLE M10-1.5 X 32, 94
15	P0961015	COLUMN COVER
16	P0961016	KNOB M10-1.5, D25, TAPERED
17	P0961017	SET SCREW M6-1 X 12
18	P0961018	CAP SCREW M5-.8 X 10
19	P0961019	PLATE
20	P0961020	CAP SCREW M5-.8 X 10
21	P0961021	TURRET ROTATION SCALE
22	P0961022	SCALE INDICATOR PLATE
23	P0961023	SPLASH PAN
24	P0961024	COOLANT PUMP 60W, 110V, 1-PH
24-1	P0961024-1	R CAPACITOR 16M 450V
25	P0961025	WAY COVER

REF	PART #	DESCRIPTION
26	P0961026	COOLANT HOSE W/NOZZLE
27	P0961027	CAP SCREW M5-.8 X 20
28	P0961028	COOLANT MANIFOLD
30	P0961030	DRO COVER, PLASTIC
32	P0961032	DRO MOUNTING ARM
34	P0961034	CAP SCREW M6-1 X 20
35	P0961035	LED WORK LAMP
36	P0961036	CAP SCREW M5-.8 X 30
37	P0961037	DRO DISPLAY GRIZZLY F000351
39	P0961039	CAP SCREW M6-1 X 25
40	P0961040	COOLANT HOSE 16 X 1200
41	P0961041	HOSE CLAMP 14-27MM
42	P0961042	CAP SCREW M6-1 X 30
43	P0961043	TOOL BOX EMPTY
44	P0961044	COMBO WRENCH 17 X 19 OPEN-END
45	P0961045	PHILLIPS SCREWDRIVER
46	P0961046	FLAT HEAD SCREWDRIVER
47	P0961047	HEX WRENCH SET
48	P0961048	OIL GUN
49	P0961049	LED BULB AC220V 6W BI-PIN
50	P0961050	CAP SCREW M8-1.25 X 12
51	P0961051	FLAT WASHER 8MM
52	P0961052	HEX NUT M16-2
53	P0961053	FLAT WASHER 16MM
54	P0961054	HEX BOLT M16-2 x 100

Table & Knee

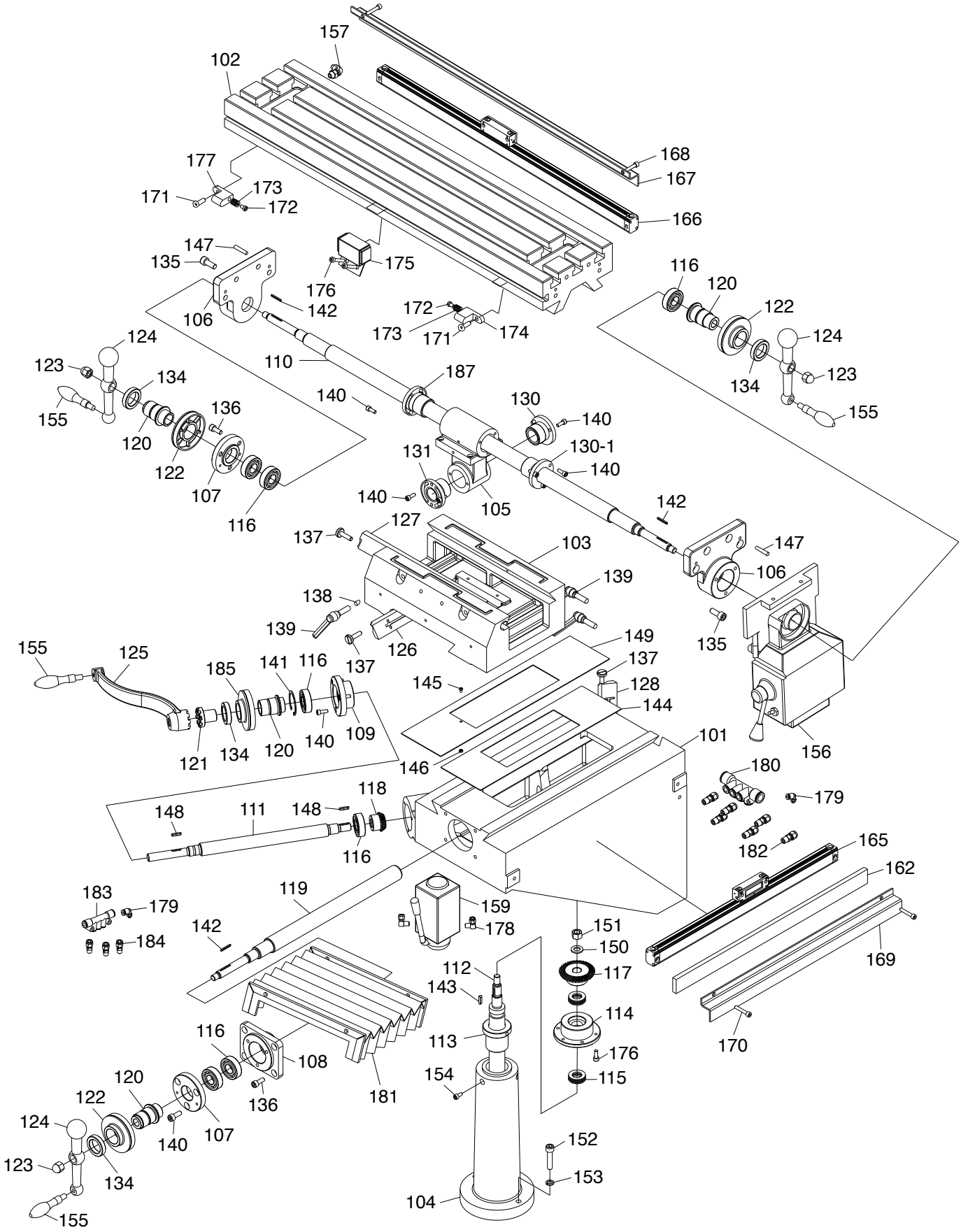
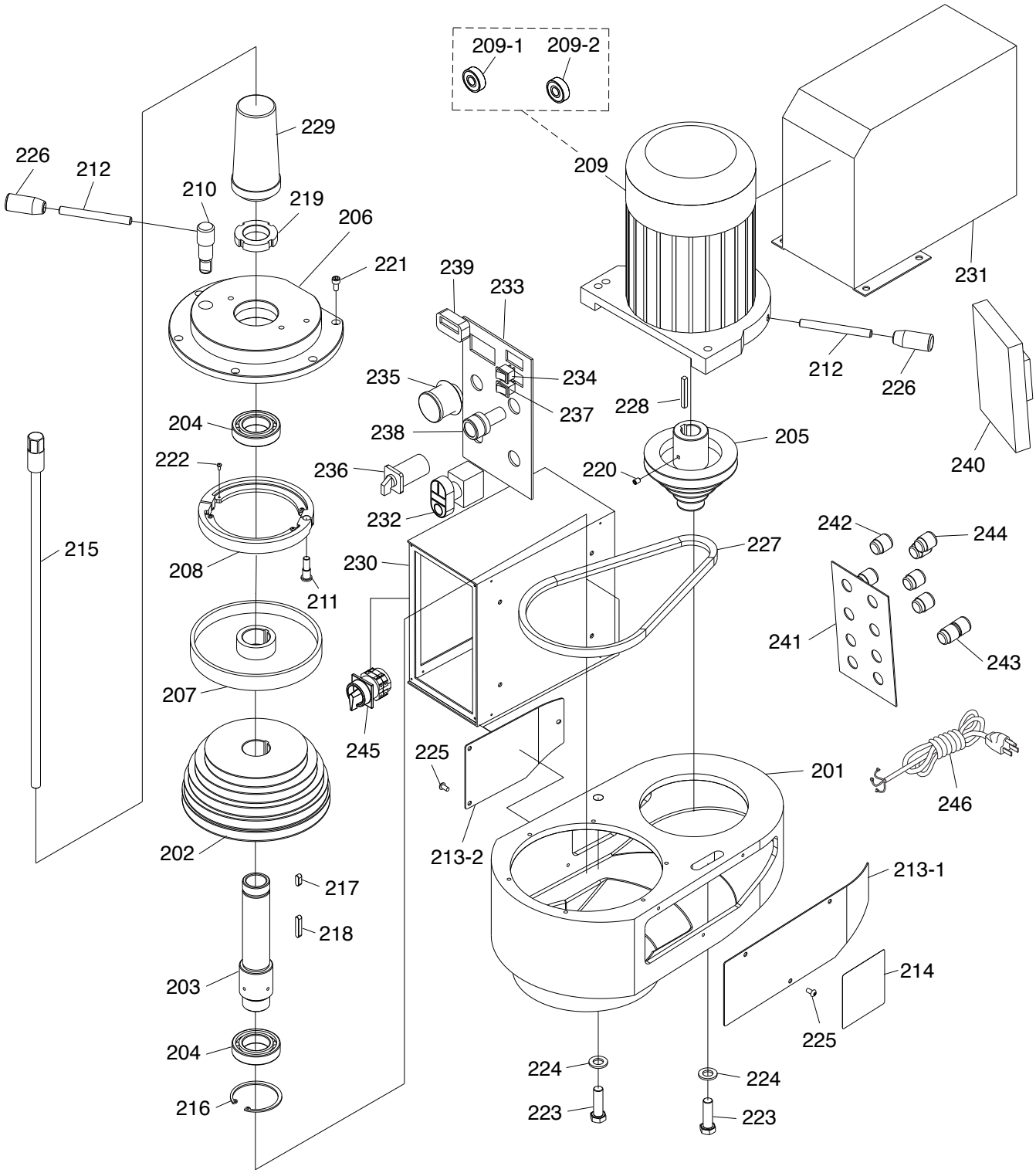


Table & Knee Parts List

REF	PART #	DESCRIPTION
101	P0961101	KNEE
102	P0961102	TABLE
103	P0961103	SADDLE
104	P0961104	Z-AXIS LEADSCREW HOUSING
105	P0961105	LEADSCREW BRACKET
106	P0961106	TABLE BEARING BRACKET
107	P0961107	BEARING RETAINER COVER
108	P0961108	Y-AXIS BEARING BRACKET
109	P0961109	BEARING SEAT
110	P0961110	X-AXIS LEADSCREW
111	P0961111	Z-AXIS CRANK SHAFT
112	P0961112	Z-AXIS LEADSCREW
113	P0961113	Z-AXIS LEADSCREW NUT
114	P0961114	Z-AXIS BEARING HOUSING
115	P0961115	THRUST BEARING 51104
116	P0961116	BALL BEARING 6204-2RS
117	P0961117	HELICAL BEVEL GEAR 36T
118	P0961118	HELICAL BEVEL GEAR 18T
119	P0961119	Y-AXIS LEADSCREW
120	P0961120	REAR DIAL RETAINER
121	P0961121	CRANK CLUTCH
122	P0961122	X-AXIS DIAL
123	P0961123	ACORN NUT M12-1.75
124	P0961124	BALL HANDLE D39, 177MM
125	P0961125	Z-AXIS CRANK HANDLE
126	P0961126	Y-AXIS GIB
127	P0961127	X-AXIS GIB
128	P0961128	Z-AXIS GIB
130	P0961130	Y-AXIS LEADSCREW NUT, REAR
131	P0961131	Y-AXIS LEADSCREW NUT, FRONT
134	P0961134	KNURLED NUT M32-1.5
135	P0961135	CAP SCREW M10-1.5 X 25
136	P0961136	CAP SCREW M8-1.25 X 20
137	P0961137	GIB ADJUSTING SCREW
138	P0961138	TABLE LOCK PLUNGER
139	P0961139	ADJUSTABLE HANDLE M10-1.5 X 32, 29
140	P0961140	CAP SCREW M6-1 X 16
141	P0961141	EXT RETAINING RING 47MM
142	P0961142	KEY 3 X 3 X 28

REF	PART #	DESCRIPTION
143	P0961143	KEY 5 X 5 X 20
144	P0961144	CHIP GUARD (LOWER)
145	P0961145	HEX BOLT M4-.7 X 10
146	P0961146	HEX NUT M4-.7
147	P0961147	ROLL PIN 6 X 35
148	P0961148	KEY 4 X 4 X 20
150	P0961150	FLAT WASHER 12MM
151	P0961151	HEX NUT M12-1.75
152	P0961152	CAP SCREW M10-1.5 X 45
153	P0961153	FLAT WASHER 10MM
154	P0961154	CAP SCREW M6-1 X 12
155	P0961155	REVOLVING HANDLE 23 X 74, M10-1.5 X 14
156	P0961156	POWER FEED UNIT ALSGS AL-310S
157	P0961157	PIPE ELBOW 3/8 NPT X 3/8
159	P0961159	ONE-SHOT OILER ASSEMBLY
162	P0961162	DRO POSITION SENSOR MOUNTING PLATE
165	P0961165	Y-AXIS POSITION SENSOR
166	P0961166	X-AXIS POSITION SENSOR
167	P0961167	X-AXIS POSITION SENSOR COVER
168	P0961168	CAP SCREW M5-0.8 X 20
169	P0961169	Y-AXIS POSITION SENSOR COVER
170	P0961170	CAP SCREW M5-0.8 X 20
171	P0961171	HEX BOLT M6-1 X 25
172	P0961172	SET SCREW M8-1.25 X 15
173	P0961173	COMPRESSION SPRING 1.2 X 11 X 39
174	P0961174	RIGHT TRAVEL STOP
175	P0961175	LIMIT SWITCH LM-310 QINGDAO LONGSHANG
176	P0961176	CAP SCREW M5-0.8 X 20
177	P0961177	LEFT TRAVEL STOP
178	P0961178	PIPE ELBOW 8-06
179	P0961179	PIPE ELBOW 6
180	P0961180	OIL MANIFOLD 8-WAY
181	P0961181	Y-AXIS DUST COVER
182	P0961182	METERING PIPE JOINT
183	P0961183	OIL MANIFOLD 4-WAY
184	P0961184	METERING PIPE JOINT
185	P0961185	Z-AXIS DIAL
186	P0961186	X-AXIS LEADSCREW NUT, LEFT
187	P0961187	X-AXIS LEADSCREW NUT,RIGHT

Motor & Belt Housing

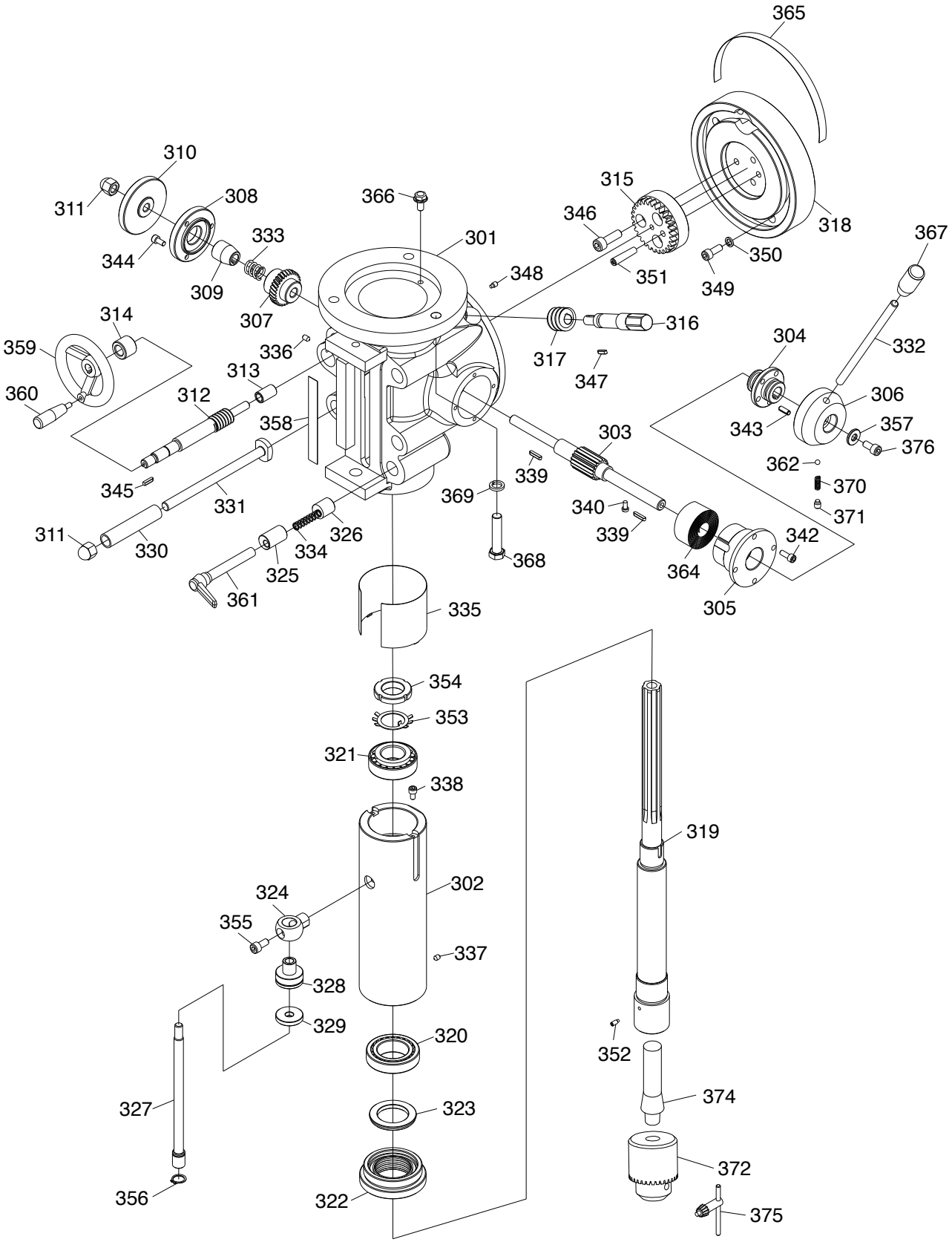


Motor & Belt Housing Parts List

REF	PART #	DESCRIPTION
201	P0961201	BELT HOUSING
202	P0961202	SPINDLE PULLEY
203	P0961203	SPINDLE SHAFT
204	P0961204	BALL BEARING 6007-2RS
205	P0961205	MOTOR PULLEY
206	P0961206	BRAKE DRUM HOUSING
207	P0961207	BRAKE DRUM
208	P0961208	BRAKE PAD (2PC SET)
209	P0961209	MOTOR 1.5HP 110VDC BRUSHLESS
209-1	P0961209-1	BALL BEARING 6205-OPEN (FRONT)
209-2	P0961209-2	BALL BEARING 6205-OPEN (REAR)
210	P0961210	BRAKE CAM
211	P0961211	CAP SCREW M8-1.25 X 20
212	P0961212	BRAKE MOVEMENT LEVER
213-1	P0961213-1	PULLEY HOUSING COVER (RIGHT)
213-2	P0961213-2	PULLEY HOUSING COVER (LEFT)
214	P0961214	SPINDLE SPEED CHART
215	P0961215	DRAWBAR 7/16-20 X 19
216	P0961216	INT RETAINING RING 62MM
217	P0961217	KEY 6 X 6 X 16
218	P0961218	KEY 6 X 6 X 32
219	P0961219	SPANNER NUT M35-1.5
220	P0961220	SET SCREW M6-1 X 10 CONE-PT
221	P0961221	CAP SCREW M6-1 X 12
222	P0961222	CAP SCREW M3-.5 X 6

REF	PART #	DESCRIPTION
223	P0961223	HEX BOLT M12-1.75 X 40
224	P0961224	FLAT WASHER 12MM
225	P0961225	PHLP HD SCR M5-.8 X 10
226	P0961226	KNOB M10-1.5, D25, TAPERED
227	P0961227	V-BELT A720
228	P0961228	KEY 6 X 6 X 45
229	P0961229	DRAWBAR COVER
230	P0961230	ELECTRICAL BOX
231	P0961231	MOTOR COVER
232	P0961232	START/STOP BUTTON TAYEE LA42
233	P0961233	CONTROL PANEL
234	P0961234	WORK LIGHT SWITCH KCD4 KAILAN
235	P0961235	E-STOP SWITCH MINGER LA125H-BE101C
236	P0961236	SPINDLE SWITCH LW26-10 WENZHOU
237	P0961237	COOLANT PUMP SWITCH KCD4 KAILAN
238	P0961238	POTENTIOMETER KB A6012
239	P0961239	RPM DISPLAY UNIT SN200603
240	P0961240	CIRCUIT BOARD AND FAN JD139 110V JIAYI
241	P0961241	ELECTRICAL BOARD
242	P0961242	STRAIN RELIEF TYPE-3 M16-1.5
243	P0961243	STRAIN RELIEF TYPE-3 M20-1.5
244	P0961244	STRAIN RELIEF TYPE-3 M24-1.5
245	P0961245	MAIN POWER SWITCH JFD11C-20A JUCHE
246	P0961246	POWER CORD 14G 3W 60" 5-15P

Headstock

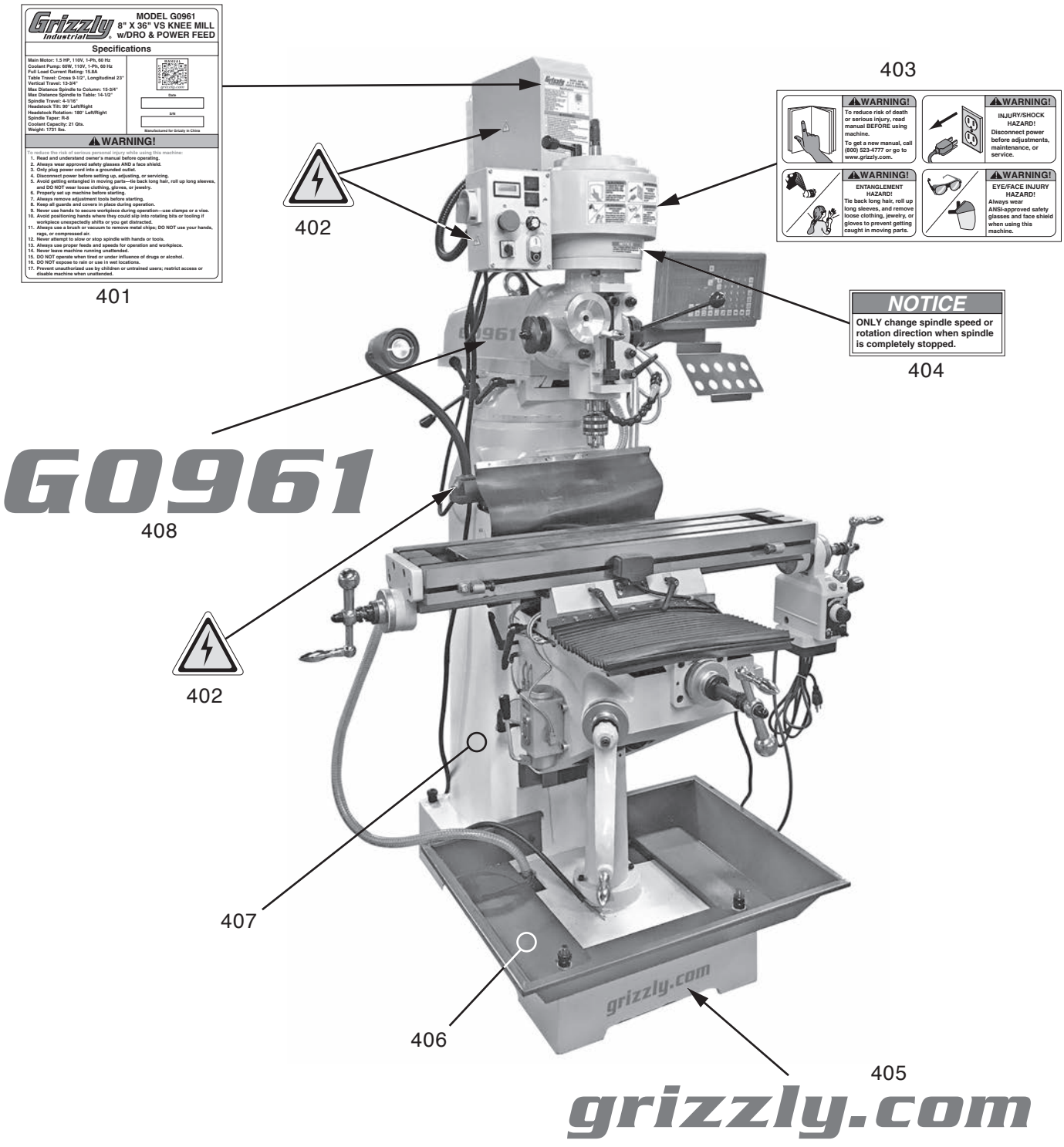


Headstock Parts List

REF	PART #	DESCRIPTION
301	P0961301	QUILL HOUSING
302	P0961302	QUILL
303	P0961303	QUILL PINION SHAFT
304	P0961304	PINION SHAFT HUB
305	P0961305	SPRING COVER
306	P0961306	COARSE DOWNFEED LEVER HUB
307	P0961307	WORM GEAR 30T
308	P0961308	WORM GEAR COVER
309	P0961309	TAPER SLEEVE
310	P0961310	DOWNFEED SELECTION WHEEL
311	P0961311	ACORN NUT M12-1.75
312	P0961312	WORM GEAR SHAFT
313	P0961313	BUSHING 10 X 15 X 25
314	P0961314	FINE DOWNFEED GRADUATED DIAL
315	P0961315	GEAR 28T
316	P0961316	HEAD TILT PINION GEAR SHAFT
317	P0961317	HEAD TILT PINION GEAR
318	P0961318	HEAD ADAPTER
319	P0961319	SPINDLE R8
320	P0961320	TAPERED ROLLER BEARING 32008
321	P0961321	TAPERED ROLLER BEARING 32008
322	P0961322	QUILL END CAP
323	P0961323	QUILL SEAL
324	P0961324	QUILL STOP KNOB
325	P0961325	QUILL LOCK SLEEVE
326	P0961326	QUILL LOCK SLEEVE
327	P0961327	QUILL DEPTH STOP LEADSCREW M12-1.5 X 220
328	P0961328	UPPER QUILL MICROSTOP
329	P0961329	LOWER QUILL MICROSTOP
330	P0961330	SPACER 15 X 92
331	P0961331	T-BOLT M12-1.75 X 180
332	P0961332	SPINDLE MOVEMENT LEVER
333	P0961333	COMPRESSION SPRING 2.2 X 17.7 X 24
334	P0961334	COMPRESSION SPRING 1 X 10 X 42
335	P0961335	QUILL SKIRT
336	P0961336	SET SCREW M6-1 X 10 CONE-PT
337	P0961337	SET SCREW M6-1 X 8 CONE-PT

REF	PART #	DESCRIPTION
338	P0961338	CAP SCREW M6-1 X 10
339	P0961339	KEY 4 X 4 X 20, RE
340	P0961340	FLAT HD SCR M5-.8 X 10
342	P0961342	CAP SCREW M6-1 X 16
343	P0961343	ROLL PIN 6 X 16
344	P0961344	CAP SCREW M10-1.5 X 30
345	P0961345	KEY 4 X 4 X 16, RE
346	P0961346	CAP SCREW M10-1.5 X 30
347	P0961347	KEY 4 X 4 X 16, RE
348	P0961348	CAP SCREW M6-1 X 10
349	P0961349	CAP SCREW M8-1.25 X 20
350	P0961350	LOCK WASHER 8MM
351	P0961351	ROLL PIN 8 X 40
352	P0961352	CAP SCREW M5-.8 X 12
353	P0961353	SPANNER LOCK WASHER 30MM
354	P0961354	SPANNER NUT M30-1.5
355	P0961355	CAP SCREW M8-1.25 X 16
356	P0961356	EXT RETAINING RING 16MM
357	P0961357	FLAT WASHER 8MM
358	P0961358	QUILL DEPTH SCALE
359	P0961359	FINE DOWNFEED HANDWHEEL
360	P0961360	REVOLVING HANDLE 21 X 74, M8-1.25 X 14
361	P0961361	ADJUSTABLE HANDLE M12-1.75 X 80, 71
362	P0961362	STEEL BALL 8MM
364	P0961364	FLAT COIL SPRING
365	P0961365	SCALE
366	P0961366	FLANGE BOLT M8-1.25 X 16
367	P0961367	KNOB M10-1.5, D35, TAPERED
368	P0961368	HEX BOLT M12-1.75 X 55
369	P0961369	LOCK WASHER 12MM
370	P0961370	COMPRESSION SPRING 1 X 6.5 X 18
371	P0961371	SET SCREW M8-1.25 X 10
372	P0961372	DRILL CHUCK JT3 5-20MM
374	P0961374	DRILL CHUCK ARBOR R8-JT3
375	P0961375	DRILL CHUCK KEY
376	P0961376	CAP SCREW M8-1.25 X 12

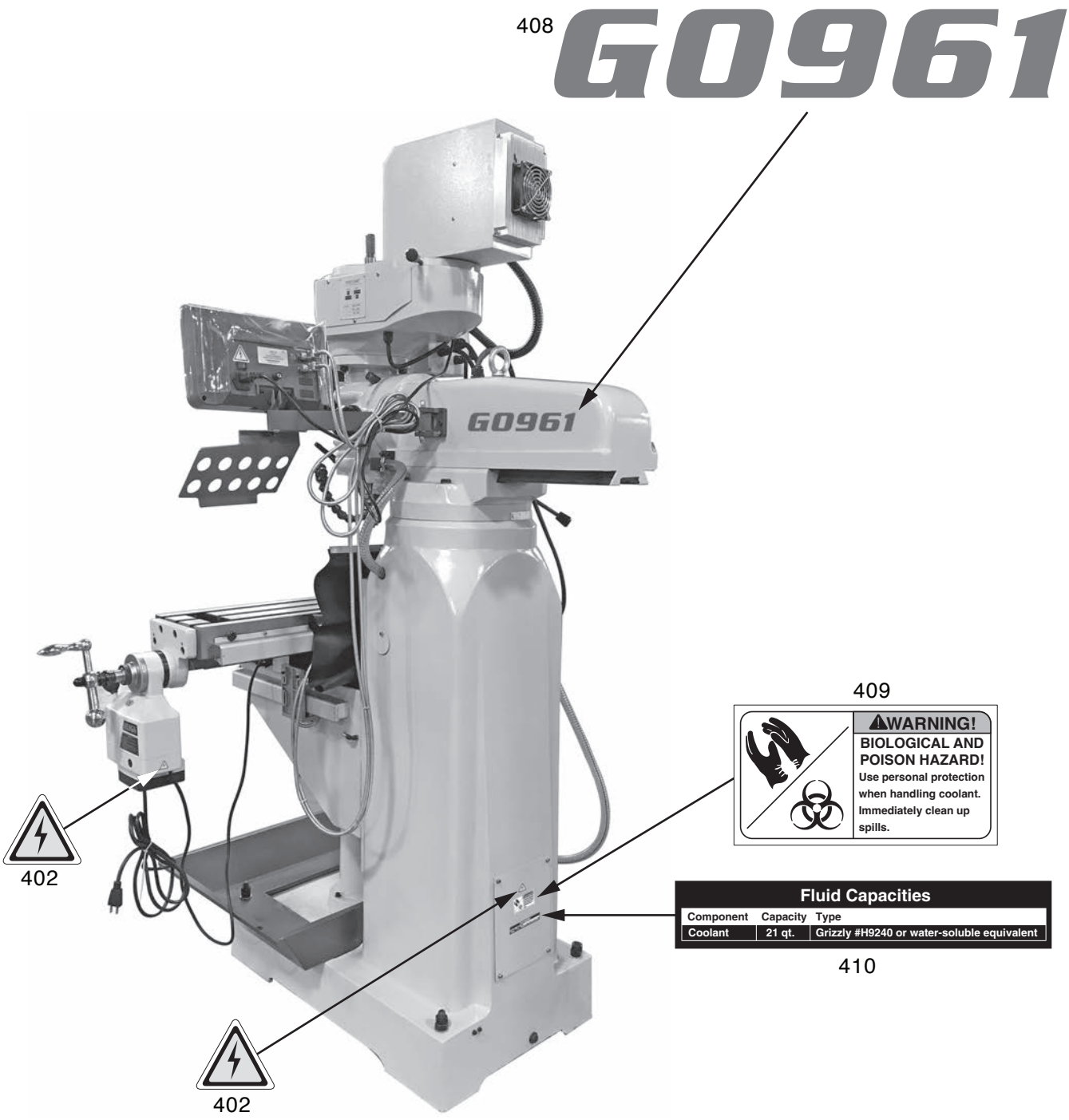
Labels & Cosmetics



REF	PART #	DESCRIPTION
401	P0961401	MACHINE ID LABEL
402	P0961402	ELECTRICITY LABEL
403	P0961403	COMBO WARNING LABEL
404	P0961404	NOTICE LABEL

REF	PART #	DESCRIPTION
405	P0961405	GRIZZLY.COM LABEL
406	P0961406	TOUCH-UP PAINT, GRIZZLY GREEN
407	P0961407	TOUCH-UP PAINT, GRIZZLY BEIGE
408	P0961408	MODEL NUMBER LABEL

Labels & Cosmetics (Cont.)



REF	PART #	DESCRIPTION
402	P0961402	ELECTRICITY LABEL
408	P0961408	MODEL NUMBER LABEL

REF	PART #	DESCRIPTION
409	P0961409	WARNING LABEL
410	P0961410	FLUID CAPACITIES LABEL

⚠WARNING

Safety labels help reduce the risk of serious injury caused by machine hazards. If any label comes off or becomes unreadable, the owner of this machine MUST replace it in the original location before resuming operations. For replacements, contact (800) 523-4777 or www.grizzly.com.

WARRANTY & 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.

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.

In the event you need to use 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.

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.

For further information about the warranty, visit **https://www.grizzly.com/forms/warranty** or scan the QR code below to be automatically directed to our warranty page.

WARRANTY

grizzly.com