MODEL G0619
DELUXE SMALL MILL/DRILL
OWNER'S MANUAL
(For models manufactured since 07/18)

#CR8850 PRINTED IN CHINA V2.10.18

⚠ 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.

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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

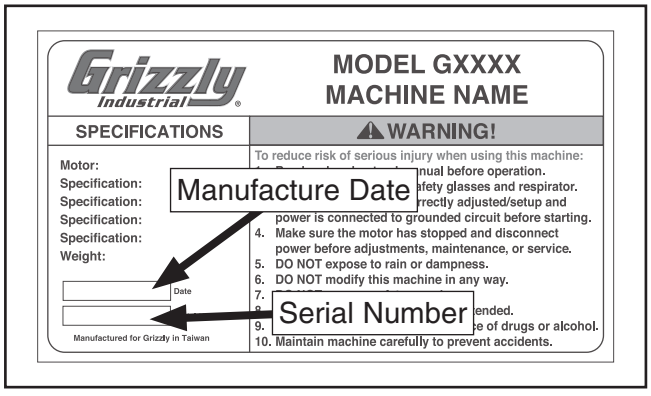
Manual Accuracy

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.



MACHINE DATA SHEET

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

MODEL G0619 6" X 21" MILL / DRILL

Product Dimensions:

Weight	364 lbs.
Width (side-to-side) x Depth (front-to-back) x Height	27 x 30 x 33-3/4 in.
Footprint (Length x Width)	16 x 13 in.
Space Required for Full Range of Movement (Width x Depth)	46 x 30 in.

Shipping Dimensions:

Type	Wood Crate
Content	Machine
Weight	418 lbs.
Length x Width x Height	31 x 32 x 43 in.
Must Ship Upright	Yes

Electrical:

Power Requirement	110V, Single-Phase, 60 Hz
Prewired Voltage	110V
Full-Load Current Rating	12A
Minimum Circuit Size	15A
Connection Type	Cord & Plug
Power Cord Included	Yes
Power Cord Length	7 ft.
Power Cord Gauge	14 AWG
Plug Included	Yes
Included Plug Type	5-15
Switch Type	Forward/Reverse & Button Switches

Motors:

Main

Horsepower	1 HP
Phase	Single-Phase
Amps	12A
Speed	0 – 3500 RPM
Type	Brushless DC (Class F)
Power Transfer	Belt Drive
Bearings	Sealed & Permanently Lubricated
Centrifugal Switch/Contacts Type	N/A

Main Specifications:

Operation Info

Spindle Travel	2-3/4 in.
Max Distance Spindle to Column	9 in.
Max Distance Spindle to Table	14-3/4 in.
Longitudinal Table Travel (X-Axis)	15-7/8 in.
Cross Table Travel (Y-Axis)	5-3/4 in
Vertical Head Travel (Z-Axis)	14-7/8 in.
Head Tilt (Left/Right)	90 deg.
Drilling Capacity for Steel	1 in.
End Milling Capacity	1 in.
Face Milling Capacity	2 in.

Table Info

Table Length	21-5/8 in.
Table Width	6-1/4 in.
Table Thickness	1-1/2 in.
Number of T-Slots	3
T-Slot Size	7/16 in.
T-Slots Centers	1-11/16 in.
X/Y-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 – 1750 RPM
Quill Diameter	2.362 in.
Drawbar Thread Size	7/16-20
Drawbar Length	11-1/2 in.

Construction

Spindle Housing/Quill	Cast Iron
Table	Ground Cast Iron
Column/Base	Cast Iron
Base	Cast Iron
Paint Type/Finish	Enamel

Other Specifications:

Country of Origin	China
Warranty	1 Year
ISO 9001 Factory	Yes
Certified by a Nationally Recognized Testing Laboratory (NRTL)	No

Identification

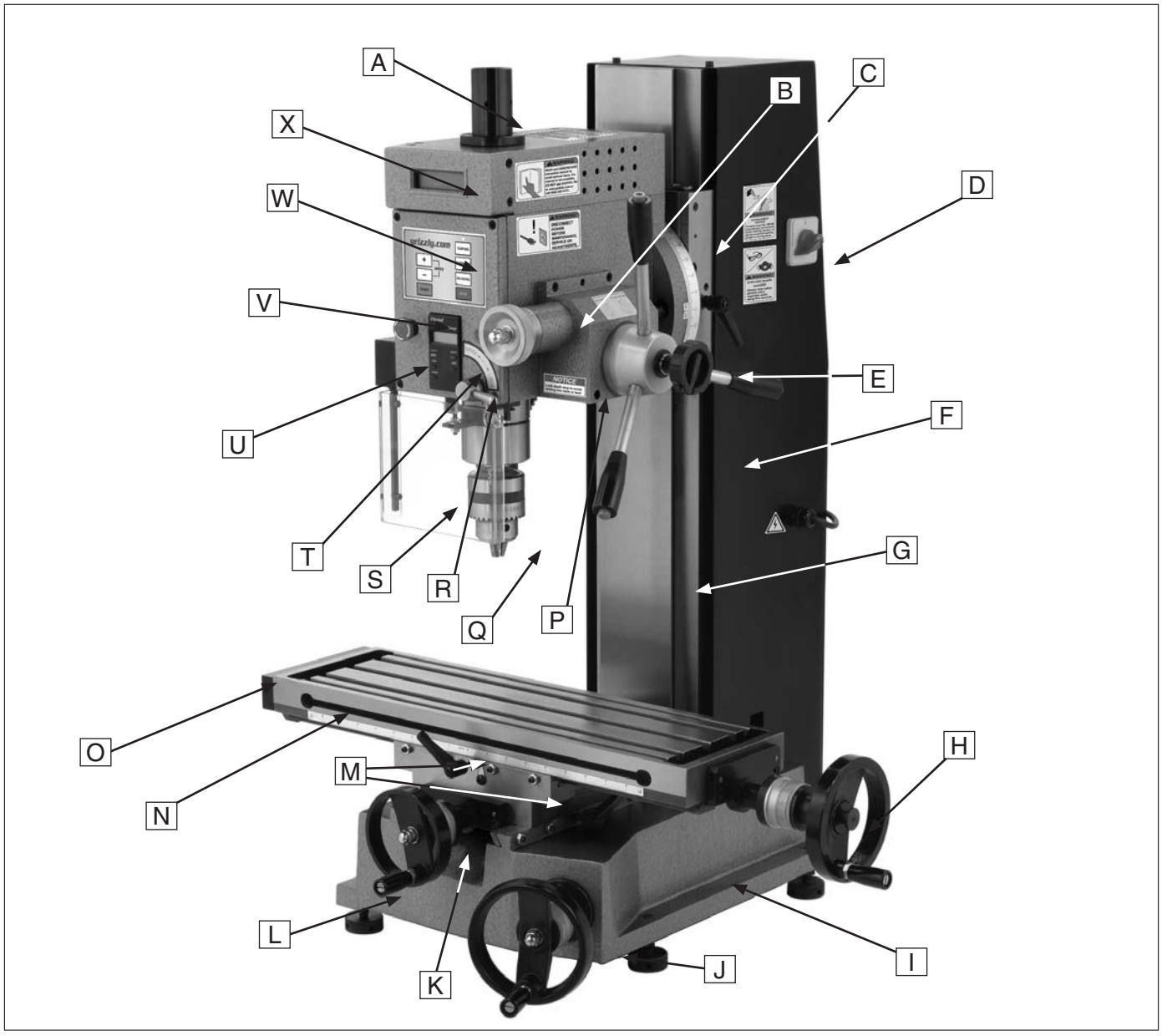


Figure 1. G0619 Identification.

A. Safety Cover and Drawbar
B. Fine Feed Knob
C. Headstock Tilt Scale
D. Main Power Switch
E. Fine Feed Lock Knob w/Assist Lever
F. Quill Feed Lever
G. Precision Dovetailed Column
H. Longitudinal (X-Axis) Handwheel
I. Cast-Iron Base
J. Vertical (Z-Axis) Handwheel
K. Cross (Y-Axis) Handwheel
L. Adjustable Foot
M. Table Locks
N. Longitudinal Scale
O. Milling Table
P. Quill Handle Tapping Button
Q. Drill Chuck
R. Spindle Lock Lever
S. Chip Guard
T. Digital Spindle Depth Unit and Readout
U. Chip Guard Safety Kill Switch
V. Emergency Stop Button
W. Control Panel
X. Digital Spindle RPM Readout

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 clothing, apparel 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 Mill/Drills

⚠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.

⚠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.

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..... 12 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 ..... 15 Amps

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!

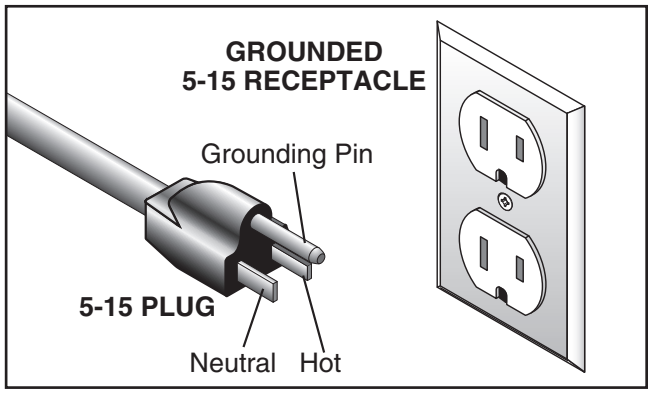
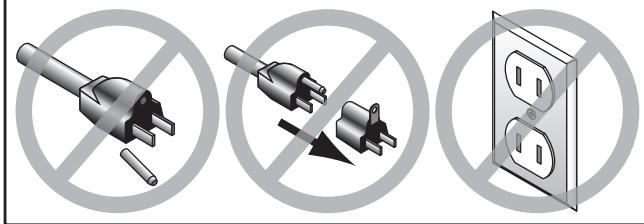


Figure 2. Typical 5-15 plug and receptacle.

⚠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

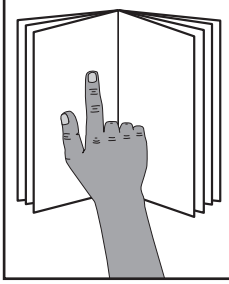
We do not recommend using an extension cord with this machine. If you must use an extension cord, only use it if absolutely necessary and only on a temporary basis.

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 .....14 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.

⚠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.

Needed for Setup

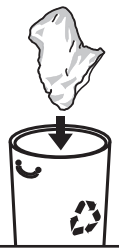
The following items are needed, but not included, for the setup/assembly of this machine.

Description	Qty
• Precision Level	1
• Safety Glasses (for each person)	1
• Solvent	1
• Shop Rags	1
• Metal Shim Stock	1
• Brass Hammer	1
• Power Drill (optional)	1
• Drill Bit 9/16" (optional)	1
• Hex Bolts M12-1.75 (length as needed)	4
• Flat Washers 12mm	8
• Lock Washers 12mm	4
• Hex Nuts M12-1.75	4
• An Assistant	1

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.*



⚠WARNING

SUFFOCATION HAZARD!

Keep children and pets away from plastic bags or packing materials shipped with this machine.

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 (Figures 3–4)		Qty
A.	Assembled Mill/Drill	1
B.	Drill Chuck and JT6 x R8 Arbor	1
C.	Oil Bottle	1
D.	T-Nuts	2
E.	Chuck Key	1
F.	End Wrenches 8/10, 12/14, 17/19mm	1 ea
G.	Spindle Spanner Wrench	1
H.	Hex Wrench Set 3, 4, 5, & 6mm	1 ea
I.	Drawbar Hex Wrench	1

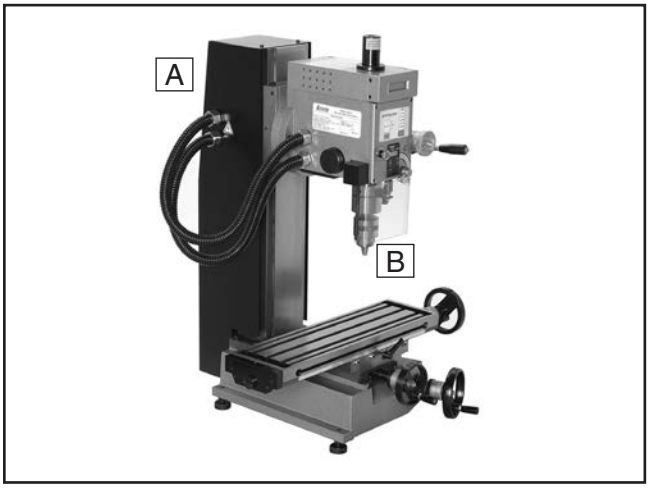


Figure 3. G0619 out of the crate.

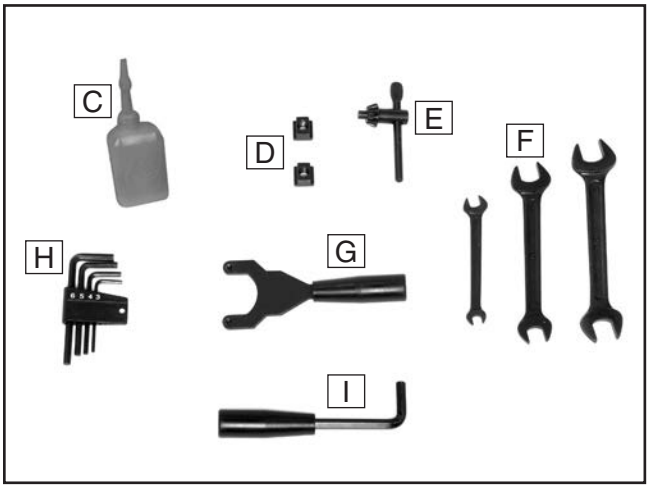
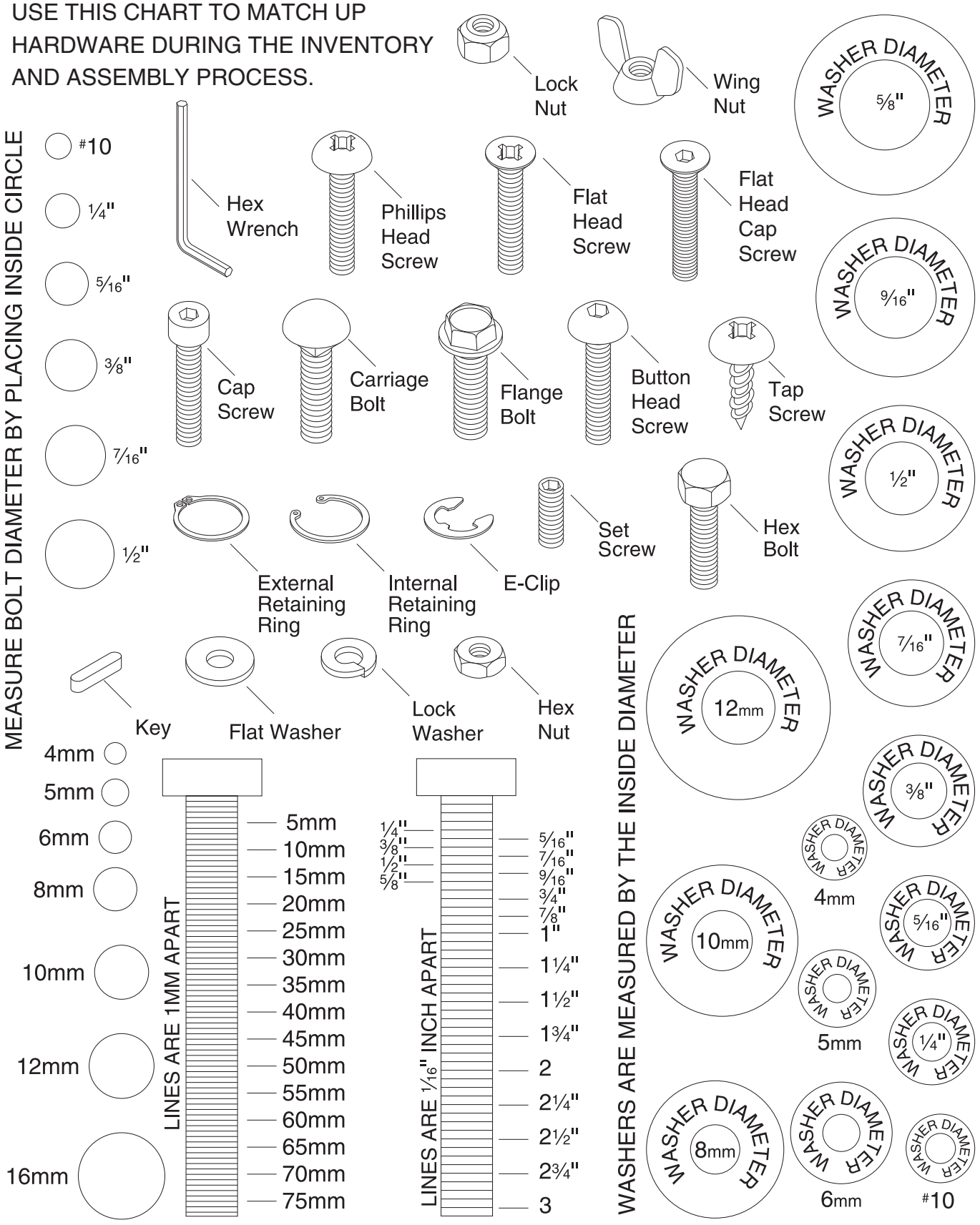


Figure 4. Inventory.

Hardware Recognition Chart

USE THIS CHART TO MATCH UP HARDWARE DURING THE INVENTORY AND ASSEMBLY PROCESS.



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.

NOTICE

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

Site Considerations

Workbench Load

Refer to the **Machine Data Sheet** for the weight and footprint specifications of your machine. Some workbenches may require additional reinforcement to support the weight of the machine and workpiece materials.

Placement Location

Consider anticipated workpiece sizes and additional space needed for auxiliary stands, work tables, or other machinery when establishing a location for this machine in the shop. Below is the minimum amount of space needed for the machine.

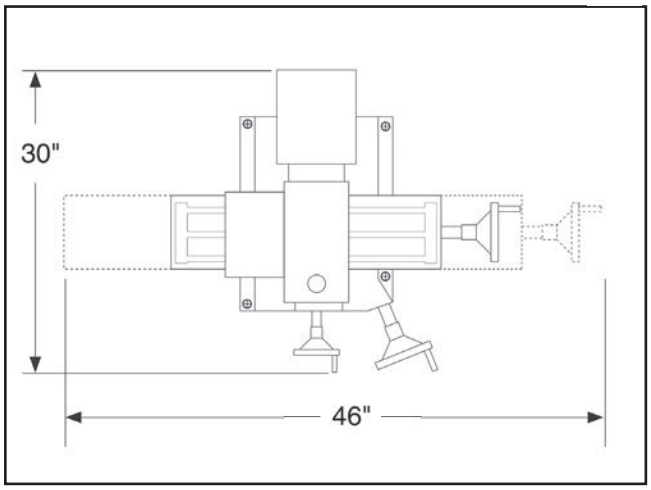
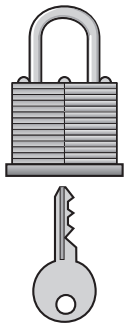


Figure 5. Minimum working clearances and mill/drill mounting bolt pattern.



⚠CAUTION

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

Bench Mounting

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

The base of this machine has mounting holes that allow it to be fastened to a workbench or other mounting surface to prevent it from moving during operation and causing accidental injury or damage.

The strongest mounting option is a "Through Mount" (see example below) where holes are drilled all the way through the workbench—and hex bolts, washers, and hex nuts are used to secure the machine in place.

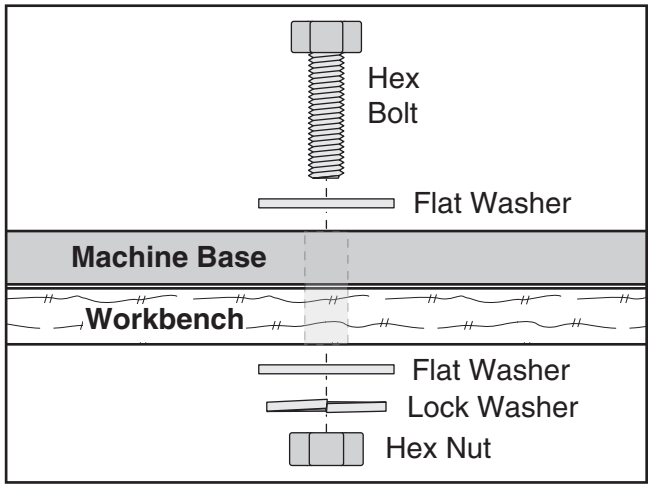


Figure 6. "Through Mount" setup.

Another option is a "direct mount" (see example below) where the machine is secured directly to the workbench with lag screws and washers.

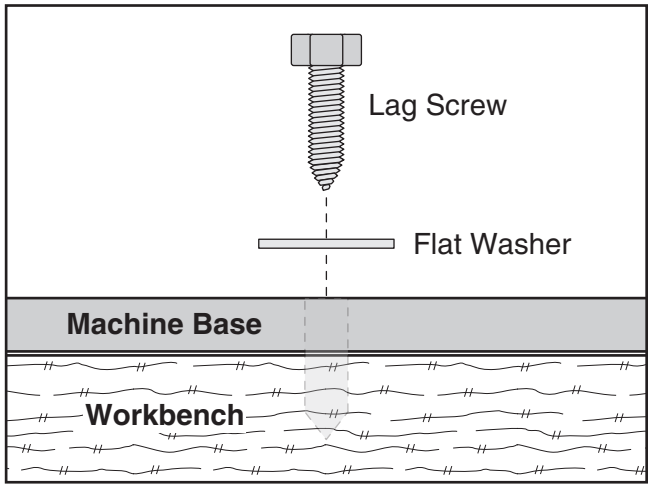


Figure 7. "Direct Mount" setup.

Foot Mounting

Items Needed: **Qty**
Foot with Hex Nut M12-1.75..... 4

Four leveling feet have been included with your mill/drill. However, for greater safety and better performance, we recommend bolting your machine to a sturdy workbench.

To adjust the feet on the mill/drill:

1. Place your precision level on the mill/drill table.

2. Loosen the hex nut(s), as shown in **Figure 8**, and turn the feet until the mill/drill is level side-to-side and front-to-back**.**

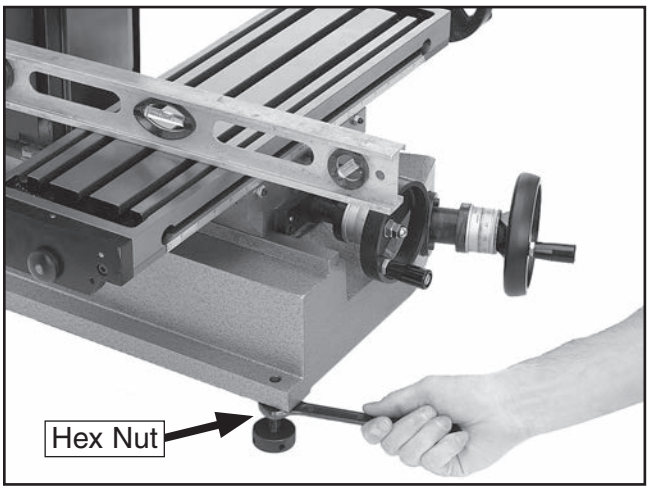


Figure 8. Leveling the mill/drill.

3. Retighten the hex nuts.

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 E-Stop button safety feature 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.

To test run machine:

1. Clear all setup tools away from machine.
2. Press EMERGENCY STOP button in.
3. Connect machine to power by inserting power cord plug into a matching receptacle.
4. Twist EMERGENCY STOP button clockwise until it springs out (see **Figure 9**). This resets the switch so the machine can start.

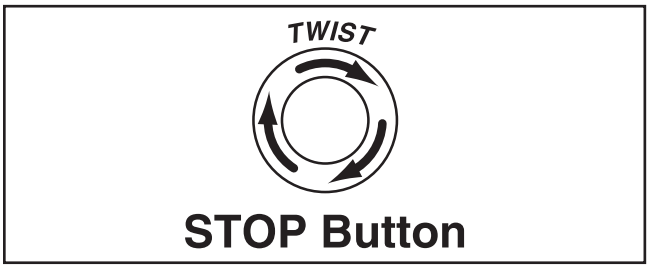


Figure 9. Resetting the switch.

5. Press START button to turn machine ***ON***. Verify motor starts up and runs smoothly without any unusual problems or noises.
6. Press EMERGENCY STOP button to turn machine ***OFF***.
7. WITHOUT resetting EMERGENCY STOP button, try to start machine by pressing the START button. The machine should not start.

   —If the machine *does not* start, the safety feature of the EMERGENCY STOP button is working correctly. Congratulations! The Test Run is complete.

   —If the machine *does* start, immediately turn it ***OFF*** and disconnect power. The safety feature of the EMERGENCY STOP button is NOT working properly and must be replaced before further using the machine.

Spindle Bearing Break-In

NOTICE

You must complete this procedure to maintain the warranty. Failure to do this could cause rapid wear-and-tear of spindle bearings once they are placed under load.

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.

To perform spindle bearing break-in procedure:

1. Perform all lubrication procedures highlighted in **Maintenance** section.

2. Make sure there are no obstructions around or underneath the spindle.

3. Remove the drawbar if there is no arbor or collet in the spindle.

4. Close the chip guard.

5. Make sure all switchtes are ***OFF,*** and connect the mill/drill to the power source**.**

6. Turn main power switch ***ON***, and push the START button (see **Figure 10**) on the control panel. The spindle will begin to turn at a low RPM.

Figure 10. Control panel.

7. Now push the + button until the mill/drill reaches approximately 600 RPM, then let it run for a minimum of 10 minutes.

   —If you suspect the mill/drill is not working correctly, shut the mill/drill ***OFF***, disconnect it from power, and use the **Troubleshooting** table on **Page 30** to correct the problem before proceeding further.

   —If the mill/drill is running smoothly, proceed to **Step 8**.

8. Increase the speed to 1000 RPM and let it run for another 10 minutes.

9. Increase the speed to 1750 RPM and let it run for another 10 minutes.

10. Turn the mill/drill ***OFF.***

11. Set the spindle to rotate in the opposite direction, then start it and let it run at 1750 RPM for another 10 minutes.

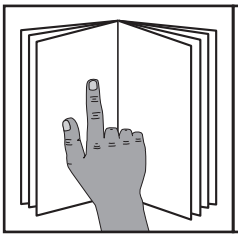
12. Turn the mill/drill ***OFF.***

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.

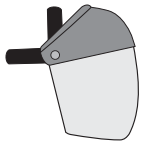


⚠WARNING

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 milling/drilling.
2. Securely clamps workpiece to table.
3. With machine disconnected from power, installs correct tooling.
4. Adjusts headstock height above table.
5. Puts on personal protective equipment.
6. Connects machine to power and turns main power switch ***ON***.
7. Presses FORWARD or REVERSE button to suit cutting operation/tooling.
8. Sets correct spindle speed for operation, then presses START button to being operation.
9. Uses table, headstock, or downfeed controls to perform operation.
10. Pushes STOP button when operation is complete.
11. Waits for spindle to completely stop before removing workpiece or changing spindle direction.
12. Disconnects mill/drill from power before changing tooling.

Spindle Height Control

Spindle height is changed by unlocking the quill lock and using the down feed handles or the fine feed knob (see **Figure 11**). The digital spindle height readout indicates the spindle height.

To change the spindle position:

1. Unlock the quill lock lever and loosen the fine feed lock knob.

   Tip: *Use the comfort lever (see **Figure 11**) for additional leverage to unlock the fine feed lock knob if the knob is too tight. Do not use the comfort lever to tighten the knob.*

2. Pull down on the quill feed levers to lower or raise the spindle. Lock the quill lock to hold the spindle in a particular position if you choose.

   Tip: *Milling with the quill fully extended, can cause tool chatter. For maximum spindle rigidity when milling, it is better to keep the spindle retracted into the headstock as far as possible with the quill lock lever locked, and the fine feed lock knob tightened.*

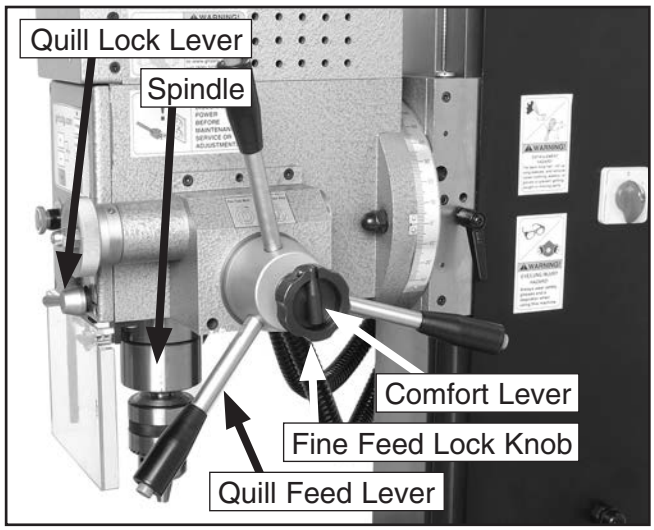


Figure 11. Spindle controls.

Drill Chuck

To install the drill chuck and arbor:

1. DISCONNECT THE MILL/DRILL FROM POWER!

2. Insert the chuck arbor into the spindle so it engages the alignment pin inside of the spindle and makes contact with the drawbar threads.

3. Thread the drawbar into the arbor until the arbor seated up into the spindle taper.

4. While supporting the chuck and arbor with one hand, snug the drawbar with the drawbar hex wrench.

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

To remove the chuck and arbor from the spindle:

1. DISCONNECT THE MILL/DRILL FROM POWER!

2. Remove the safety cap that covers the drawbar.

3. Lock the quill in place with the quill lock.

4. Insert the pin spanner into the two holes at the bottom of the spindle (see **Figure 12**).

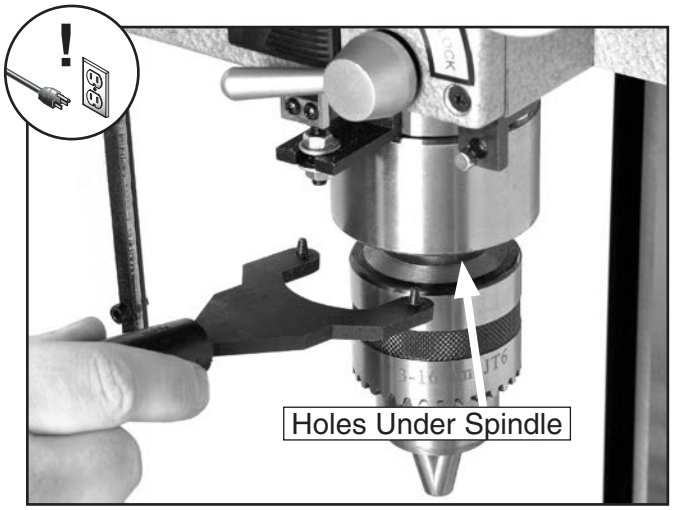


Figure 12. Spindle holes.

5. Using the 17mm wrench, loosen the drawbar one turn only. DO NOT remove it.

NOTICE

DO NOT completely unscrew the drawbar before striking it with the hammer. You will damage the threads on the drawbar and the arbor.

6. Tap the top of the drawbar with the hammer. This will unseat the taper of the arbor from the spindle (see **Figure 13**).

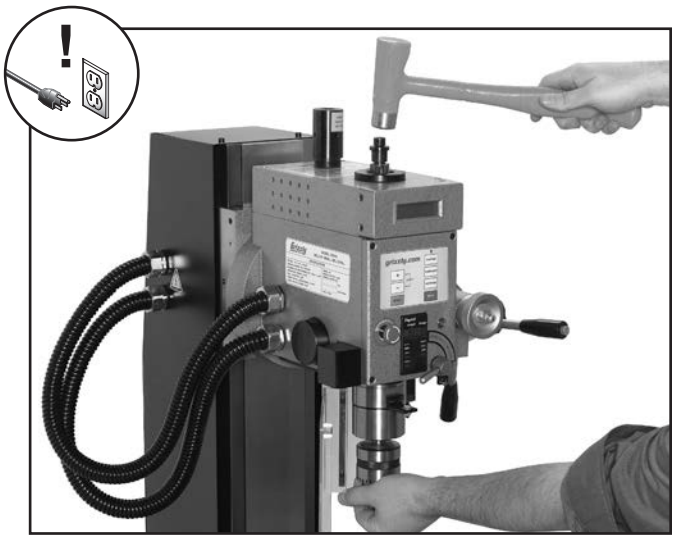


Figure 13. Tapping on the drawbar.

7. Hold one hand under the chuck and finish loosening the drawbar by hand until it falls out of the spindle.

   Note: *The chuck is attached to the arbor using a JT6 taper. This attachment is considered to be semi-permanent. There should be no need to remove the chuck from the arbor. Inspect the chuck from time to time to make sure it is still tight on the arbor. If it is loose, use a dead-blow or other soft headed hammer to re-seat the taper.*

R-8 Collets

If you do not use the drill chuck and arbor, you need to use a collet to insert the cutting tool into the spindle. Your Model G0619 features an R-8 spindle taper, which gives the freedom to use standard R-8 collets. These optional collets come in many sizes, typically ranging from 1/16" to 7/8" and 3mm to 20mm, and should be matched to your cutting tool shank size.

To install the R-8 collet:

1. DISCONNECT THE MILL/DRILL FROM POWER!

2. Unscrew the drawbar cap.

3. Carefully clean the surface of the collet and spindle taper. Ensure that it is free of debris and is lightly oiled.

4. Insert the cutting tool into the collet, then insert the collet up into the spindle taper.

5. Rotate the collet so it engages the alignment pin inside of the spindle, then slide the collet upward until it makes contact with the drawbar threads.

6. Thread the drawbar into the collet until the collet draws up into the spindle taper.

7. While supporting the tool in the collet with one hand, snug the drawbar with the drawbar hex wrench in your opposite hand.

   Note: *Do not overtighten the drawbar. Overtightening makes collet removal difficult and will damage the drawbar threads, collet, and the spindle taper. Keep in mind that the taper keeps the collet and tool in place. The drawbar simply aids in seating the taper.*

To remove the collet:

1. DISCONNECT THE MILL/DRILL FROM POWER!

2. Tighten the headstock lock.

⚠CAUTION

LACERATION HAZARD! Leading edges of end mills and other cutting tools can be very sharp. Protect your hands with gloves or a shop towel when handling.

3. Protect the table surface with a piece of cardboard or hold the cutter/tool with a shop towel to prevent it from falling out of the collet.

4. Using the drawbar hex wrench, loosen the drawbar but DO NOT remove it.

NOTICE

DO NOT completely unscrew the drawbar before striking it with the hammer. You will damage the threads on the drawbar and the arbor.

5. Using the brass hammer, tap the drawbar to unseat the taper.

6. Unscrew the rest of the drawbar by hand and remove the collet.

   Note: *When not in use, always remove collets and cutting tools from the spindle taper. Oxidation may cause the collet to seize and make it hard to remove later.*

Headstock Travel (Z-Axis and Rotation)

Headstock height is adjustable in the vertical Z-axis to accept large workpieces. For unique milling operations, the headstock can be tilted right or left between 0° and 90°. Your mill/drill has a dovetailed slide that allows you to reposition the headstock and change tooling without losing your alignment with a hole or milling path.

To raise or lower the headstock:

1. Unlock the headstock slide lock lever shown in **Figure 14**.

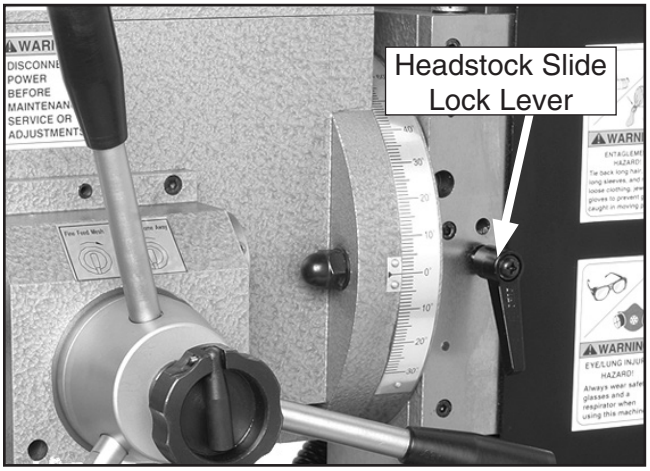


Figure 14. Headstock slide controls.

2. Turn the Z-axis handwheel shown in **Figure 15** to raise or lower the headstock, then lock the headstock slide lock lever.

   Note: *For maximum spindle rigidity when milling, keep the spindle retracted into the headstock as far as possible with the quill lock lever locked and with the fine feed lock knob tightened.*

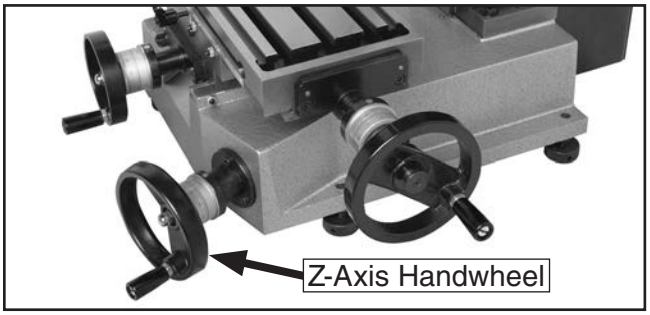


Figure 15. Z-axis control.

To tilt the headstock to the left or right:

1. DISCONNECT THE MILL/DRILL FROM POWER.

2. Using a 17mm wrench, loosen both headstock tilt acorn lock nuts (**Figure 16**).

3. Insert a 6mm hex wrench into the index pin release port (**Figure 16**), and turn the hex wrench clockwise to disengage the spring-loaded index pin from the headstock.

4. While watching the tilt scale, rotate the headstock to the required angle, and retighten the tilt acorn lock nuts to hold the headstock in place.

   Note: *The index pin is spring loaded and serves only as a quick way to return the headstock close to zero. It is not intended to be an absolute zero degree stop. No other index holes exist at other angles in the headstock.*

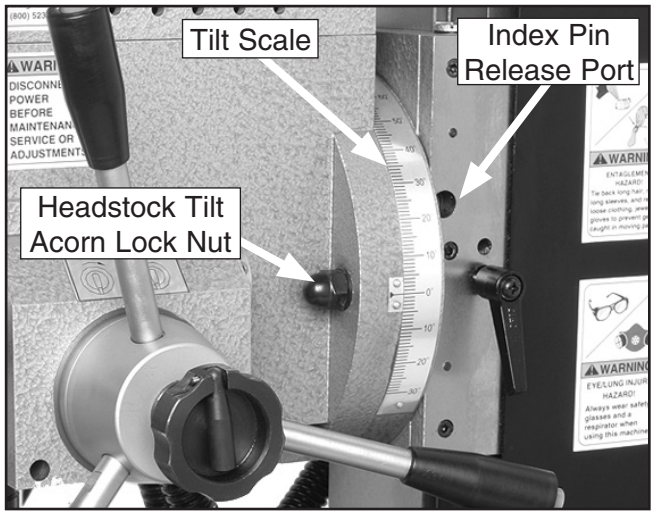


Figure 16. Headstock tilt controls.

Table Travel (X-Axis and Y-Axis)

The table can be moved in the X-axis and Y-axis.

Longitudinal Feed
The longitudinal feed or (X-axis) is moved by the handwheel shown in **Figure 17** at the end of the table. The handwheel will move the table in both directions side-to-side. One complete revolution of the handwheel moves the longitudinal feed 0.100". There is also a scale on the front of the table for use when a tight tolerance is not required. The longitudinal feed can be locked in position by a table lock located on the front of the table (see **Figure 18**).

Cross Feed
The cross feed or (Y-axis) in **Figure 17**, is moved with the handwheel on the front of the table base. One complete revolution of the handwheel moves the cross slide 0.100". The cross feed can be locked into position by a table lock located on the right side of the cross slide underneath the table (see **Figure 18**).

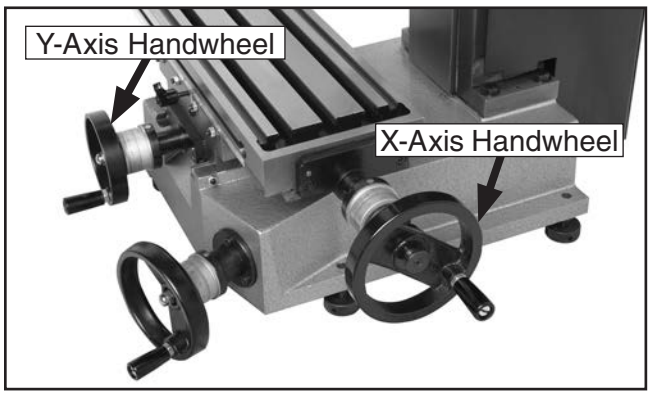


Figure 17. Table X and Y-axis controls.

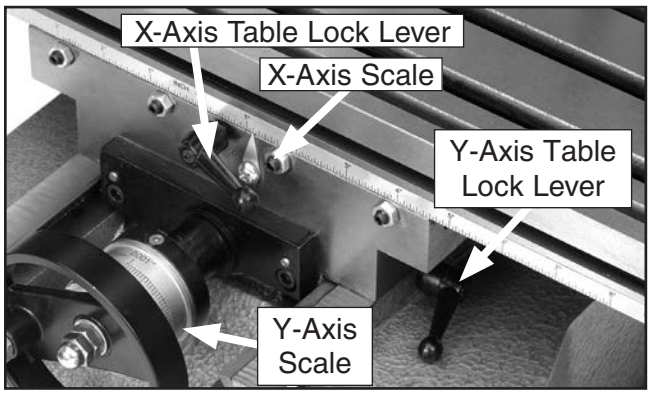


Figure 18. Table locks and scales.

Control Panel

It is vital that you become familiar with the power controls before operating the Model G0619 (see **Figure 19**).

A. Spindle RPM Display: Shows spindle RPM with an accuracy of +/- 10%.

B. Spindle Rotation Mode: Shows the direction the spindle is turning.

C. Spindle Mode: Shows STOP when the spindle is stopped. When spindle is rotating, the "STOP" indication disappears.

D. Spindle START Button: Press START, and the spindle will rotate at 200 RPM in the milling/drilling mode, and the spindle rotation buttons on the control panel are enabled. The Green LED tapping lamp will not glow, and the spindle rotation buttons on the ends of the rack handles are disabled.

E. SPEED Buttons: Press to select a milling/drilling or tapping RPM. In the milling/drilling mode the range is between 200 and 1750 RPM. In the tapping mode, the range is between 100 and 500 RPM.

F. Spindle Rotation Buttons: Press these buttons to change spindle rotation direction for milling/drilling operations. Spindle direction can be changed at any RPM without stopping the spindle first.

G. Spindle STOP Button: Stops spindle rotation. If you press the START button, the spindle speed will return to the last spindle RPM setting.

H. Tapping Button: Switches the mill/drill into tapping mode only when the motor is running. When in tapping mode, the LED tapping lamp glows and the RPM automatically drops to approximately 500 RPM. The spindle rotation buttons on the ends of the rack handles are also enabled and the spindle rotation buttons on the control panel are disabled.

I. Green LED Lamp: Glows when the machine is in the tapping mode, and does not glow in the milling/drilling mode.

J. Emergency Stop Button: Stops the mill/drill. Rotate the button clockwise until it pops back out to reset it.

K. Green Main Power Lamp: Glows when the main power switch is turned to the to the ON position.

L. Zero Button: Zeros the digital spindle scale.

M. Spindle Height Digital Display: Shows height of spindle.

N. mm/in Button: Toggles units of measure between metric and inch conventions.

O. Digital Spindle Scale ON/OFF Button: Turns the digital spindle scale ***ON*** or ***OFF***.

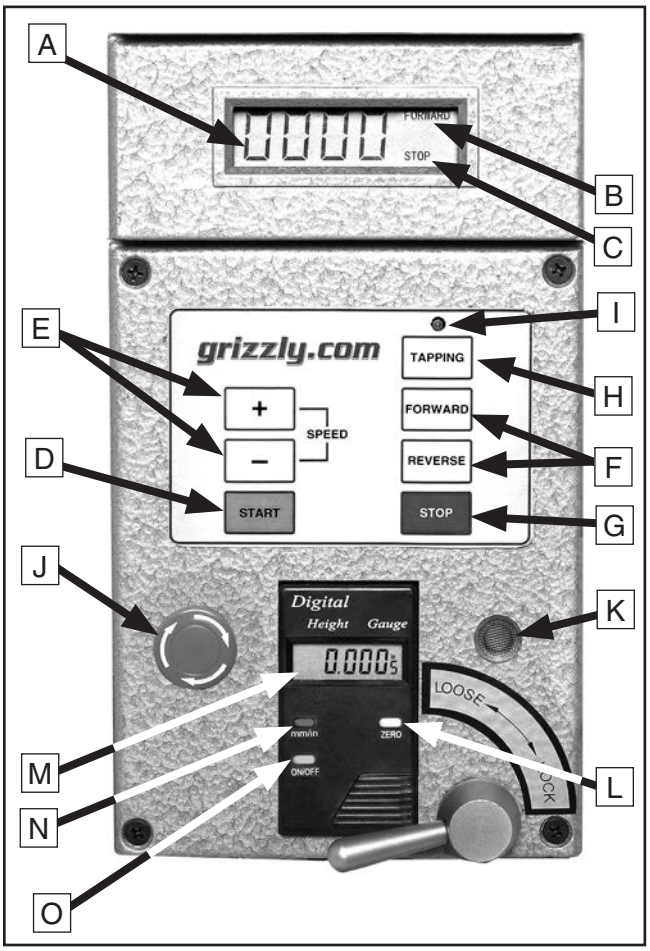


Figure 19. Control panel.

Calculating Spindle RPM

Closely follow the proper cutting speed and proper feed to reduce undue strain on all moving parts and increase operator safety.

Prior to milling, determine the RPM needed to cut your workpiece, then set the RPM on the machine.

To determine the needed RPM:

1. Use the table in **Figure 20** to determine the cutting speed required for the material of your workpiece.

2. Measure the diameter of your cutting tool in inches.

3. Use the following formula to determine the needed RPM for your operation:

   (Cutting Speed x 4) /Tool Diameter = RPM

Cutting Speeds for High Speed Steel (HSS) Cutting Tools	
Workpiece Material	Cutting Speed (sfm)
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 20. Cutting speed table for HSS cutting tools.

Milling/Drilling Mode

This mill/drill is designed to use most end mills, drill bits, and face cutters that are 2" in diameter or less. The milling table has a coolant trough with drain for an optional cutting fluid system.

⚠WARNING

Failure to follow RPM and Feed Rate Guidelines may threaten operator safety from ejected parts or broken tools.

To mill a workpiece:

1. Refer to **Control Panel** on **Page 20**, and learn the how to use the machine controls.

2. Zero the spindle height scale and select units of measure.

3. Clamp the workpiece to the milling table, and adjust the headstock to the needed height, depth of cut, and milling path.

   Remember: Milling with the quill fully extended, can cause tool chatter. For maximum spindle rigidity, keep the spindle retracted into the headstock as far as possible with the quill lock lever locked and the fine feed lock knob tightened.

4. Refer to **Calculating Spindle RPM** on **Page 22** to find the best spindle RPM.

5. Put on your safety glasses, turn the power switch ***ON***, and press the **START** button.

6. Push the **FORWARD** or **REVERSE** button to select the appropriate cutting direction for the type of cutter that you are using.

7. Press the **SPEED** button to select the appropriate milling speed for the diameter of cutter and type of material to be cut.

8. Use the X-axis or Y-axis handwheels to feed the workpiece into the cutter slowly. If you are only milling in one direction, lock the unused table slide in place. Refer to **Table Travel** on **Page 19** for lock lever location.

Tapping Mode

This mill/drill is designed to change spindle direction without stopping the spindle first. The wayed column allows for drill and tap changes and headstock repositioning without loosing the tool registration. Using the mill/drill in the tapping mode takes some level of skill, so make sure to practice using this feature. Avoid cutting threads in blind holes where the tap may bottom out and break before you can push the **REVERSE** button.

⚠WARNING

Failure to follow RPM and Feed Rate Guidelines may threaten operator safety from ejected parts or broken tools.

To drill and thread a hole:

1. Refer to **Control Panel** on **Page 20,** and learn the how to use the machine controls.

2. Zero the spindle height scale and select units of measure, and calculate your maximum tapping depth without bottoming-out the tap.

3. Clamp the workpiece to the milling table, and adjust the headstock to the needed height for drilling and tapping.

4. Put on your safety glasses, turn the power switch ***ON***, and press the **START** button.

5. Drill your hole with the appropriate speed and drill bit size for the tap. For large holes you may have to drill a pilot hole.

6. Install the tap, and apply tapping fluid or oil when needed.

7. Push **START**, then the **TAPPING** button, and then the **SPEED** button. The safest tapping speed is 100 RPM.

8. Begin threading, but without disengaging the threads, frequently push the **FORWARD** and **REVERSE** buttons on the downfeed handles to cut and back-out the tap to eject the chips from the hole and prevent thread galling.

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.

H8178—Variable-Speed Power Feed Kit
For those repetitive power-fed milling operations, this fantastic 110V power feed retrofit kit offers consistent speed control in both left and right directions for your Model G0619 Deluxe Small Mill/Drill machine. Let it do your work!

Figure 21. Variable-speed power feed kit.

H8177—Worktable with Angle
Enjoy having an economical way to support your workpiece at an array of angles. This high-quality tilting worktable is quick and easy to set up and use.

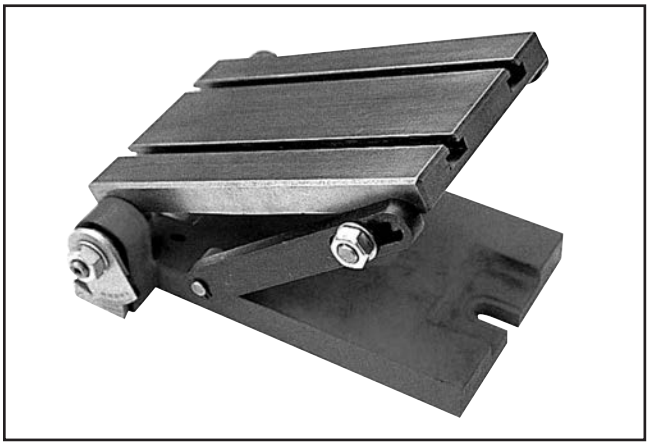


Figure 22. Worktable with angle.

G7154—5" Swivel Base Milling Vise
G7155—6" Swivel Base Milling Vise
G7156—4" Swivel Base Milling Vise
Vises feature 360° rotation with fine graduations, precision ground jaw faces, and robust clamping screws.

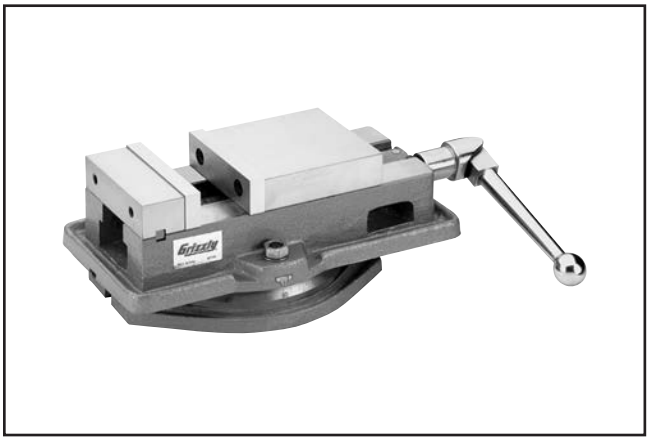


Figure 23. Swivel base milling vise.

G9324—Boring Head Combo Set
Hardened and ground adjusting screws along with a wide base design guarantee a long life and trouble-free use. Includes a 2" boring head, R-8 arbor with 7/16"-20 TPI, and a 12-piece 3/4" boring bar set.

Figure 24. G9324 Boring Head Combo Set.

G9760—20-Pc. 2 & 4 Flute TiN End Mill Set
Includes these sizes and styles in two and four flute styles: 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 9/16", 5/8", 3/8", 11/16", and 3/4".

Figure 25. G9760 20-Pc. End Mill Set.

SB1349—16-Pc. Quick-Change Collet Set, R8
These spring collets are hardened and ground to exacting tolerances and offer incredible holding power. This set includes an R-8 arbor, spanner wrench, plastic carrying case and collets sized 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 9/16", 5/8", 11/16", 3/4", 13/16", 7/8", 15/16", and 1". What's more, the nut features a self-ejecting rim! Drawbar size is 7/16"-20.

Figure 26. SB1349 R8 Quick-Change Collet Set.

H5685—4" Rotary Table
The perfect rotary table for all you model makers and those doing smaller precision work. Comes with clamping kit.

Figure 27. H5685 4" Rotary Table.

T25437—Mini Mill Retrofit Kit - Pro Series Microstepper
Upgrade the 2.5-Amp Compact Controller to an 8-Amp Pro-Series Microstepping Controller for more speed and power. Includes FlashCut CNC Windows-based software, (3) NEMA 23 454 oz.-in. stepper motors with 10' cables, motor mounts, pulleys, belts, and associated hardware. Designed for our G0619 Deluxe Small Mill/Drill.

Figure 28. Model T25437 Mini Mill Retrofit Kit.

T24342—Spindle Lock
Simply bolt the Spindle Lock onto the head of your mill and within minutes you have an easy-to-use way of "locking" your spindle for tool changes. Just press the big button in front and the plunger locks into the groove of the spline. When your tool change is complete, simply release the button and the plunger springs away from the spline to avoid nasty disasters. (Of course, you still have to remember to remove your drawbar wrench!)

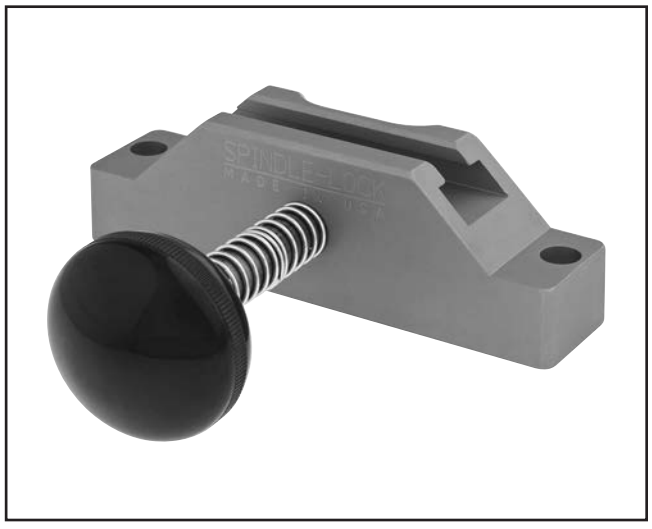


Figure 29. T24342 Spindle Lock.

T25547—Spindle Brake
This Spindle Brake replaces the pin spanner wrench and makes tool changes fast, convenient, and safe. It enables one-handed loosening and tightening of tool-less chucks; simply slide the spindle brake disc down into place and the spindle is locked and power to the mill is cut. When the tool change is complete, just lift the Spindle Brake disc up over the top of the spindle and drawbar, and power is restored to the mill. Priest Tools has made this to exacting specifications in precision machining centers for our G0619 Mill; the disc is made of 303 Stainless Steel and the plate is made of 6061-T6511 Aluminum. The disc is symmetrical and operates the same whether mounted on its front or back. Made in the USA.

Figure 30. T25547 Spindle Brake.

G5679—Steel Parallel Set
These ground and hardened sets feature four pairs of 6" long parallels that are accurate to within .0003" in parallelism and .0002" in height. Comes in a wooden case. Type: ½".

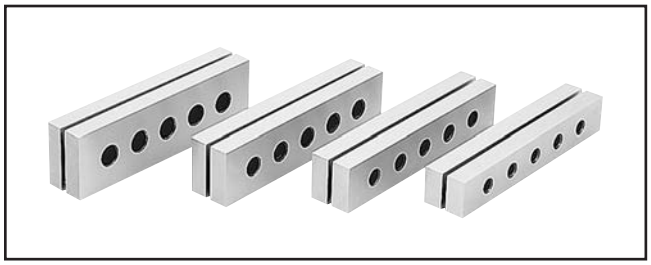
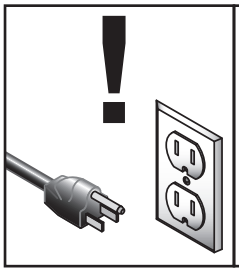


Figure 31. Model G5679 Steel Parallel Set.

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

Daily Check:
- Mill/drill is disconnected from power when not in use.
- Loose mounting bolts.
- Mill/drill is clean and lubricated.
- Worn or damaged wires.
- Any other unsafe condition.

Monthly Check:
- Gibs are adjusted properly.

Annual or Biannual Check:
- Lubricate headstock lead screw and gears.

Lubrication

Regular lubrication will ensure your mill/drill performs at its highest potential. Place two to three drops of a general machine oil directly on the ways of the cross slide and saddle. An oil bottle has been provided for this purpose. Nine ball oilers (**Figures 32**–**34**) should be lubricated daily with several drops of oil.

Protect the unpainted cast iron surfaces with regular applications of products like G96® Gun Treatment, SLIPIT®, or Boeshield® T-9.

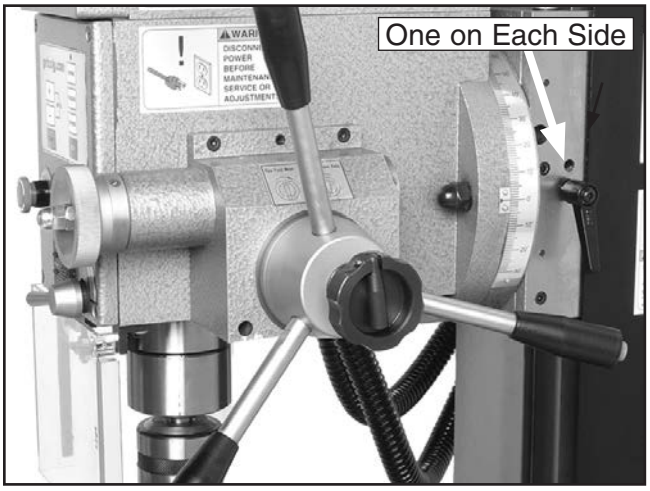


Figure 32. Headstock ball oiler locations.

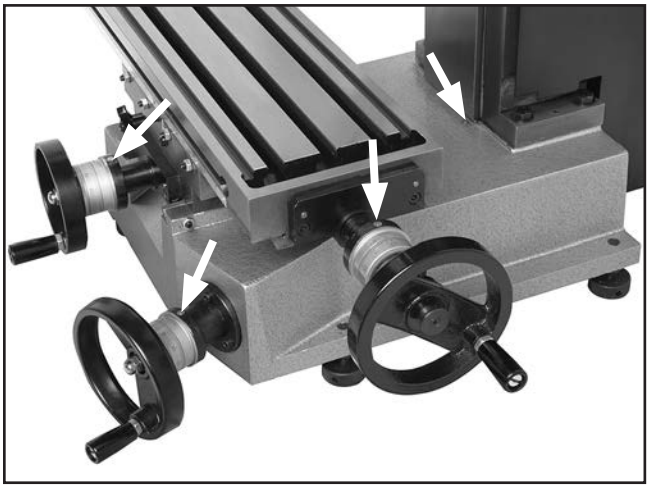


Figure 33. Table and base ball oiler locations.

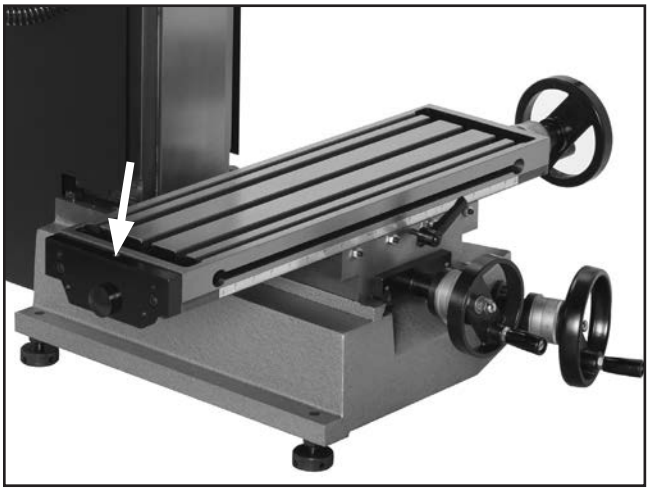
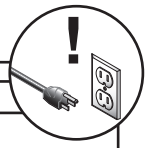


Figure 34. Table ball oiler location.

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



Symptom	Possible Cause	Possible Solution
Motor will not start.	1. Emergency stop button is pressed. 2. Chip guard switch at fault. 3. Main power switch at fault. 4. Blown power supply fuse. 5. Blown inverter fuse. 6. Shorted capacitor. 7. Shorted transformer. 8. Open circuit in motor or loose connections.	1. Reset switch or replace bad switch. 2. Fully close chip guard, or replace bad switch (**Page 35**). 3. Turn dial on, or replace bad switch (**Page 34**). 4. Repair short and replace 20A fuse (**Page 34**). 5. Repair short and replace 15A fuse (**Page 34**). 6. Replace both capacitors (**Page 34**). 7. Replace transformer (**Page 36**). 8. Inspect circuit boards, wiring connections, plugs, and repair/replace as required (**Page 34**).
Feed handle tapping button does not work.	1. Machine is not in "Tapping Mode." 2. Tapping button slip ring switch is at fault. 3. General electrical problem.	1. Press the START and then the TAPPING buttons (**Page 23**). 2. Replace tapping button slip ring switch (**Page 35**). 3. Inspect circuit boards, wiring connections, plugs, and repair/replace as required (**Page 34**).
Control panel FORWARD and REVERSE buttons do not work.	1. Machine is not in "Mill/Drill Mode." 2. General electrical problem.	1. Press the STOP and then the START buttons (**Page 23**). 2. Inspect circuit boards, wiring connections, plugs, and repair/replace as required (**Page 34**).
Poor surface finishes.	1. Feed rate too fast. 2. Dull cutter. 3. Lock not tightened down. 4. Gibs loose.	1. Slow feed rate. 2. Always use newly sharpened cutters. 3. Tighten column and table locks when possible to maintain rigidity. 4. Adjust gib (**Page 31**).
Vibration when running or cutting.	1. Feed rate too high. 2. Loose table. 3. Loose gibs.	1. Slow feed rate or adjust RPM. 2. Tighten table locks. 3. Adjust gib (**Page 31**).
Headstock hard to raise.	1. Headstock lock or gib is at fault. 2. Headstock leadscrew is binding.	1. Loosen/replace lock lever and adjust gib (**Page 31**). 2. Clean and relubricate headstock leadscrew and gears (**Page 32**).

Gibs and Backlash

During the life of your mill drill, you may have to adjust the gibs and the handwheels to remove any lash or looseness that is a result of normal wear. Do not overtighten the gibs or half-nuts, or premature wear will occur.

Tools Needed:	**Qty**
Wrench 10mm	1
Hex Wrench 3mm	1
#3 Flat Tip Screwdriver	1

To adjust the table gibs and the handwheel backlash:

1. DISCONNECT MACHINE FROM POWER!

2. Loosen the lock nuts (see **Figure 35**).

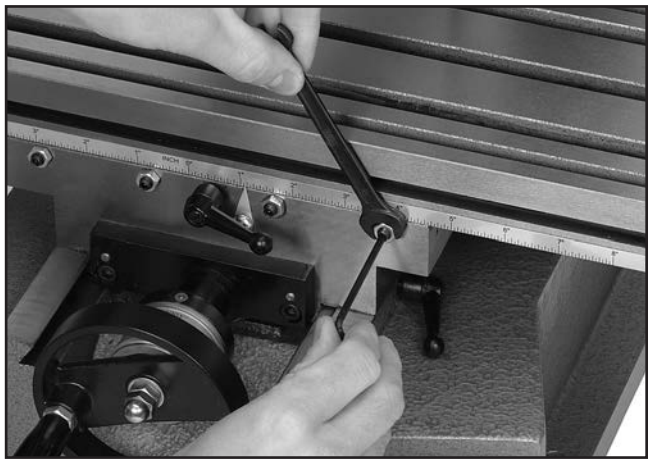


Figure 35. Gib adjustment.

3. When properly adjusted, the table should move with slight resistance as felt in the handwheel. Each gib has multiple lock nuts and set screws that must also be adjusted. Make your adjustments equally and in small increments.

4. Tighten the lock nuts.

5. Locate the X-axis lead screw half-nut (see **Figure 36**), and adjust both cap screws until the handwheel has approximately 0.003" backlash as shown by the dial.

6. Repeat **Step 5** on the Y-axis leadscrew half-nut and lubricate the lead screws and gibs.

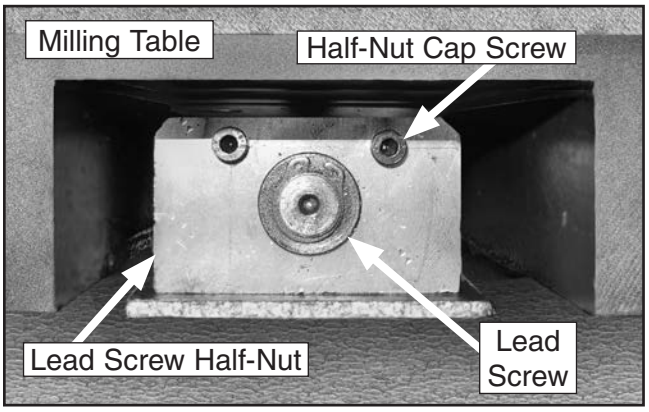


Figure 36. Handwheel backlash adjustment.

To adjust the headstock gibs:

1. DISCONNECT MACHINE FROM POWER!

2. Loosen the headstock lock lever (see **Figure 37**).

3. Loosen or tighten the upper and lower gib screws (**Figure 37**) in an alternating manner to adjust the headstock gib.

   The headstock should slide smoothly with no play or looseness. Do not overtighten the gibs or premature slide and gib wear will occur.

4. Lubricate the headstock way and gib.

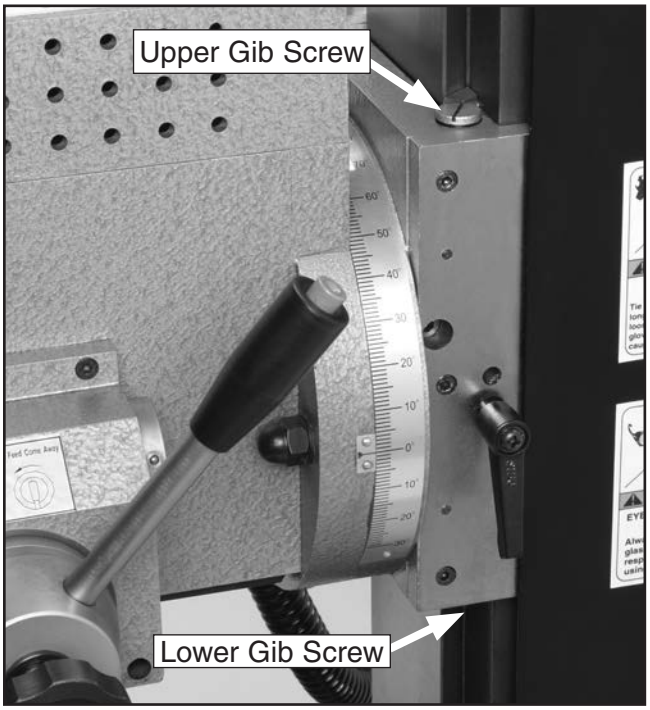


Figure 37. Headstock gib adjustment.

Service Lubrication

On an annual basis, or every six months under heavy use, we recommend that you clean and lubricate the headstock leadscrew and gears with white lithium grease and a light machine oil.

Tools Needed:	**Qty**
Hex Wrench 4mm	1
Tube of White Lithium Grease	1
Paint Brush for Grease Application	1
Oil Bottle of General Machine Oil	1
Mineral Spirits	1 cup

To lubricate the leadscrew and gears:

1. DISCONNECT THE MILL/DRILL FROM POWER!
2. Use the hex wrench to remove the two lower cap screws from the cabinet assembly (see **Figure 38**).
3. Hold the cabinet assembly, and remove the two upper cap screws (see **Figure 38**).
4. Carefully lift and swing the cabinet assembly out of the way from the column, and rest it aside.
5. Using mineral spirits, a toothbrush, and rags, thoroughly clean the leadscrew and gears.
6. Paint the headstock leadscrew and gear teeth with lithium grease, and oil the bearings as outlined in **Figure 38**.
7. Re-install the cabinet assembly on the column.

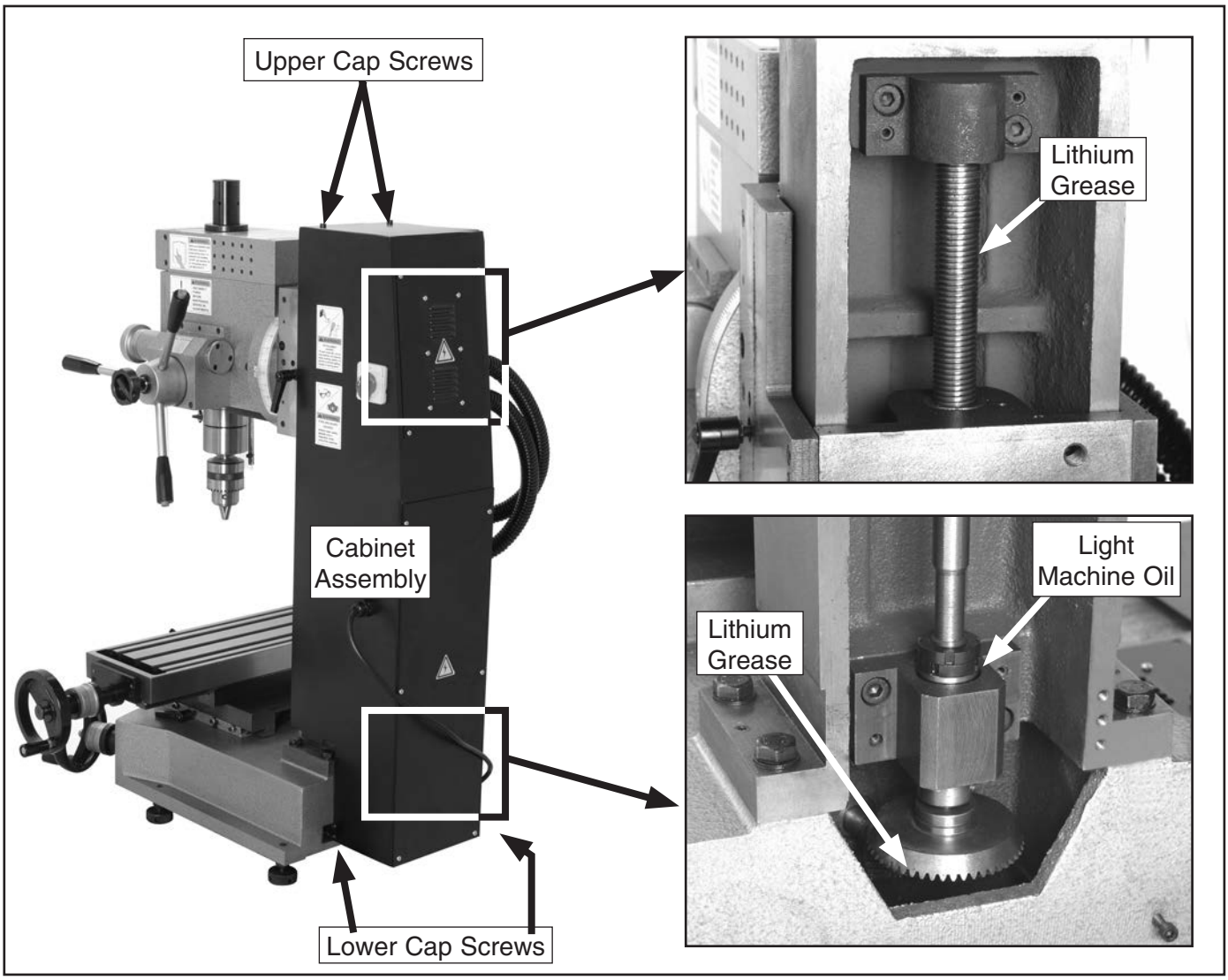


Figure 38. Headstock leadscrew access and lubrication.

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		

Electrical Components

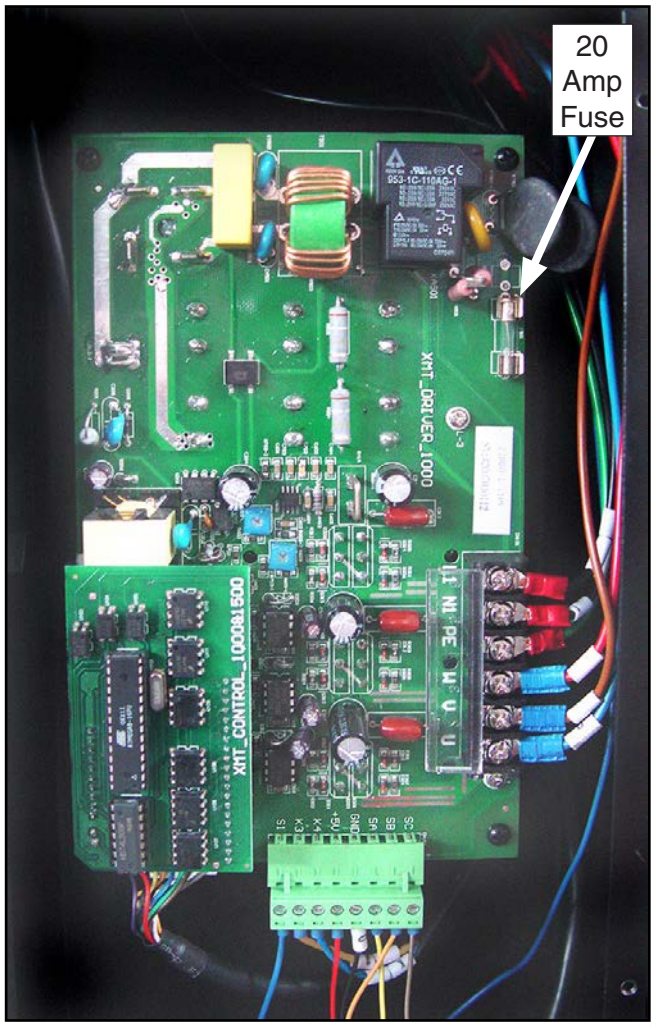


Figure 39. Motor power supply circuit board.

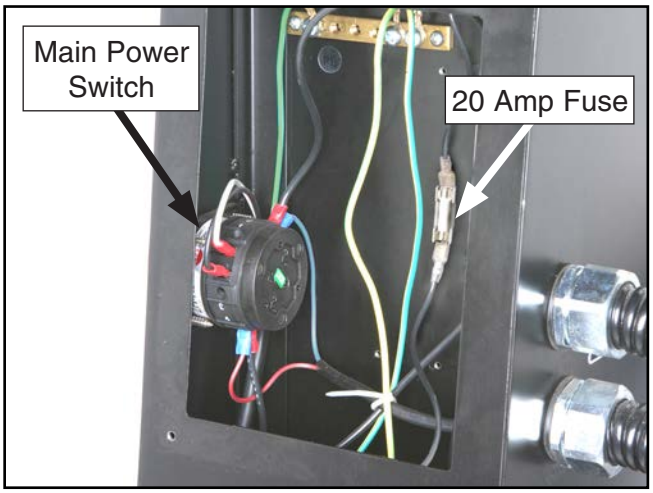


Figure 40. Main power switch and fuse.

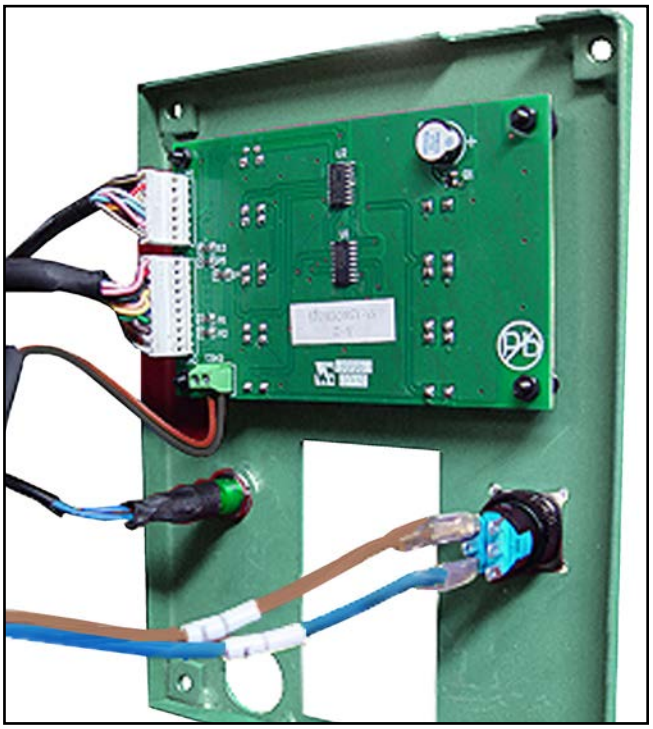


Figure 41. Control panel electrical.

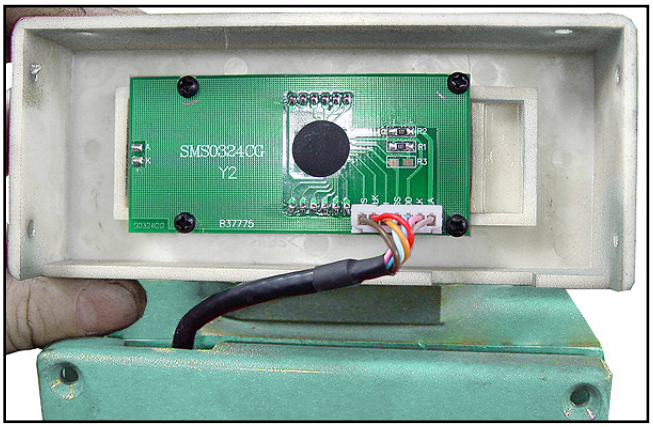


Figure 44. Tachometer electrical.

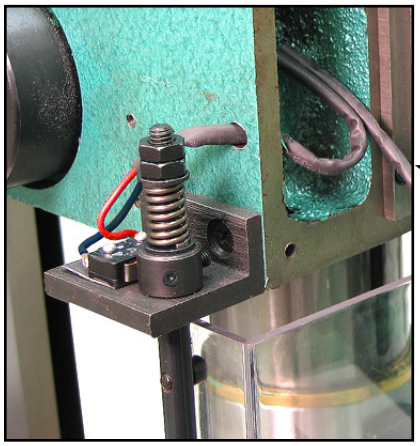
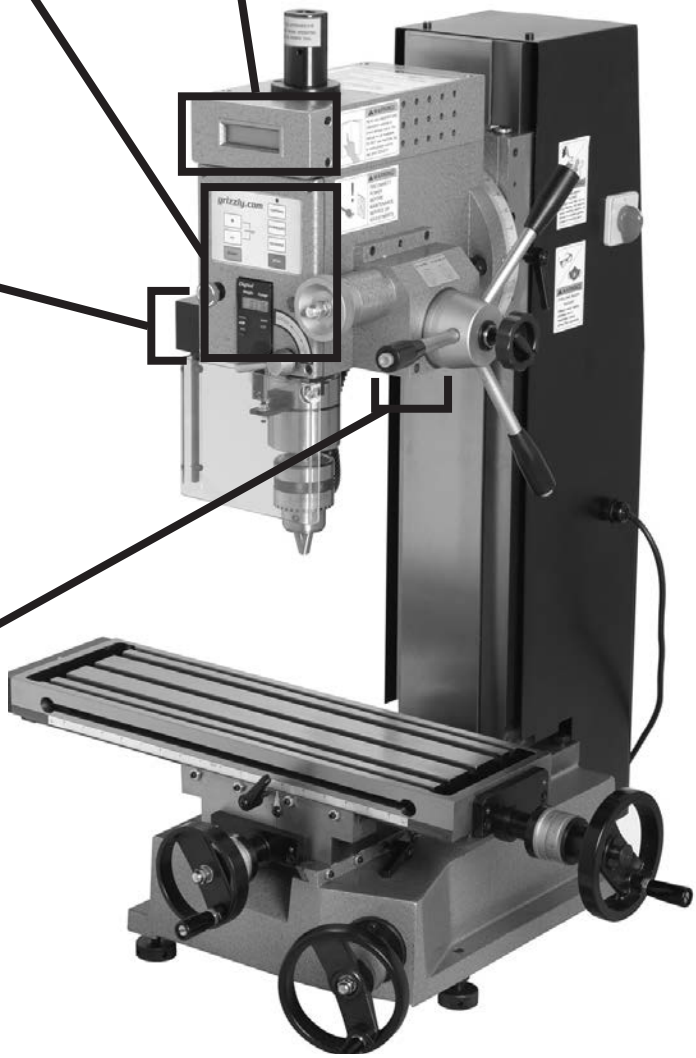
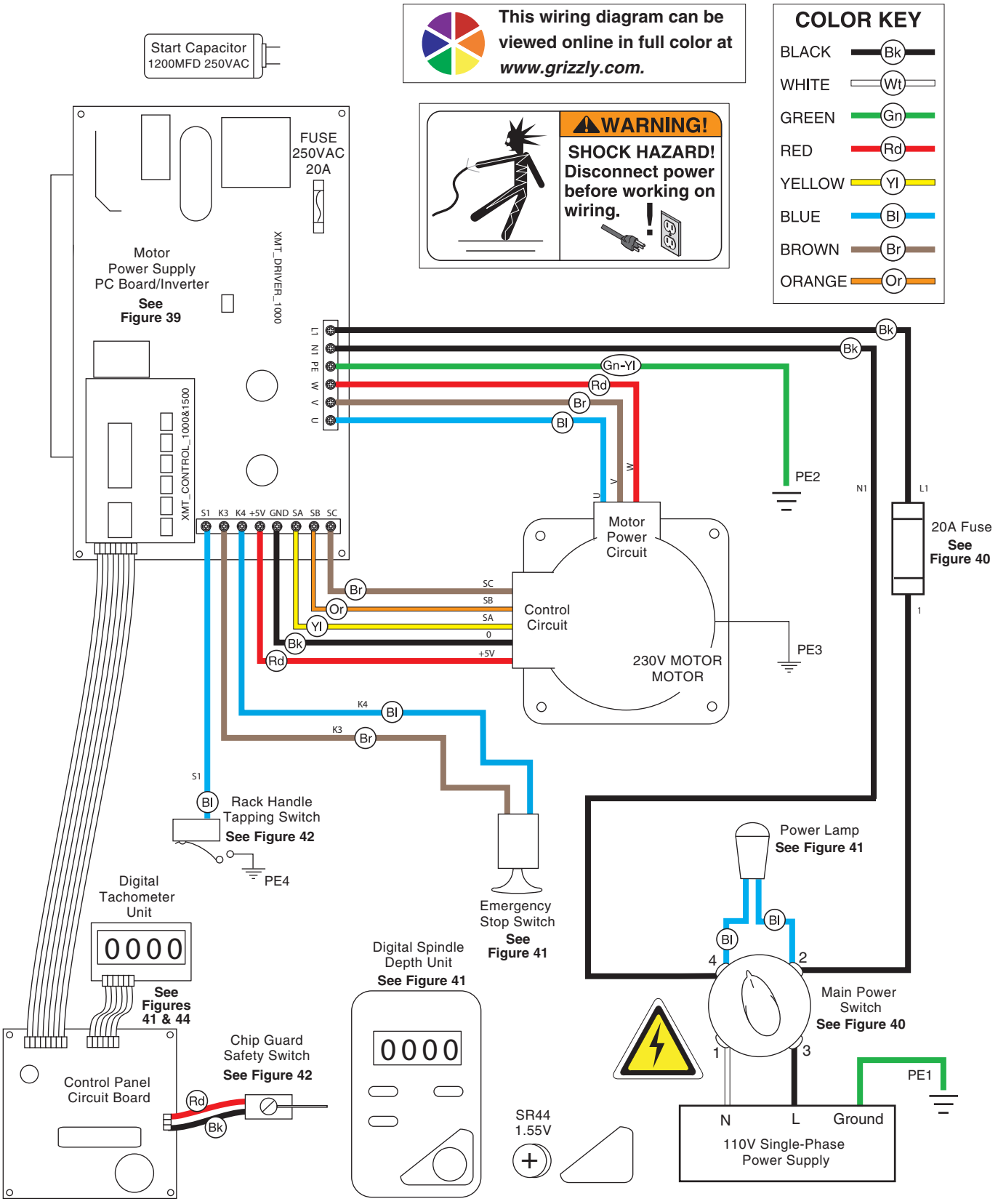


Figure 42. Chip guard safety switch.

Figure 43. Tapping button slip ring contact.



Wiring Diagram

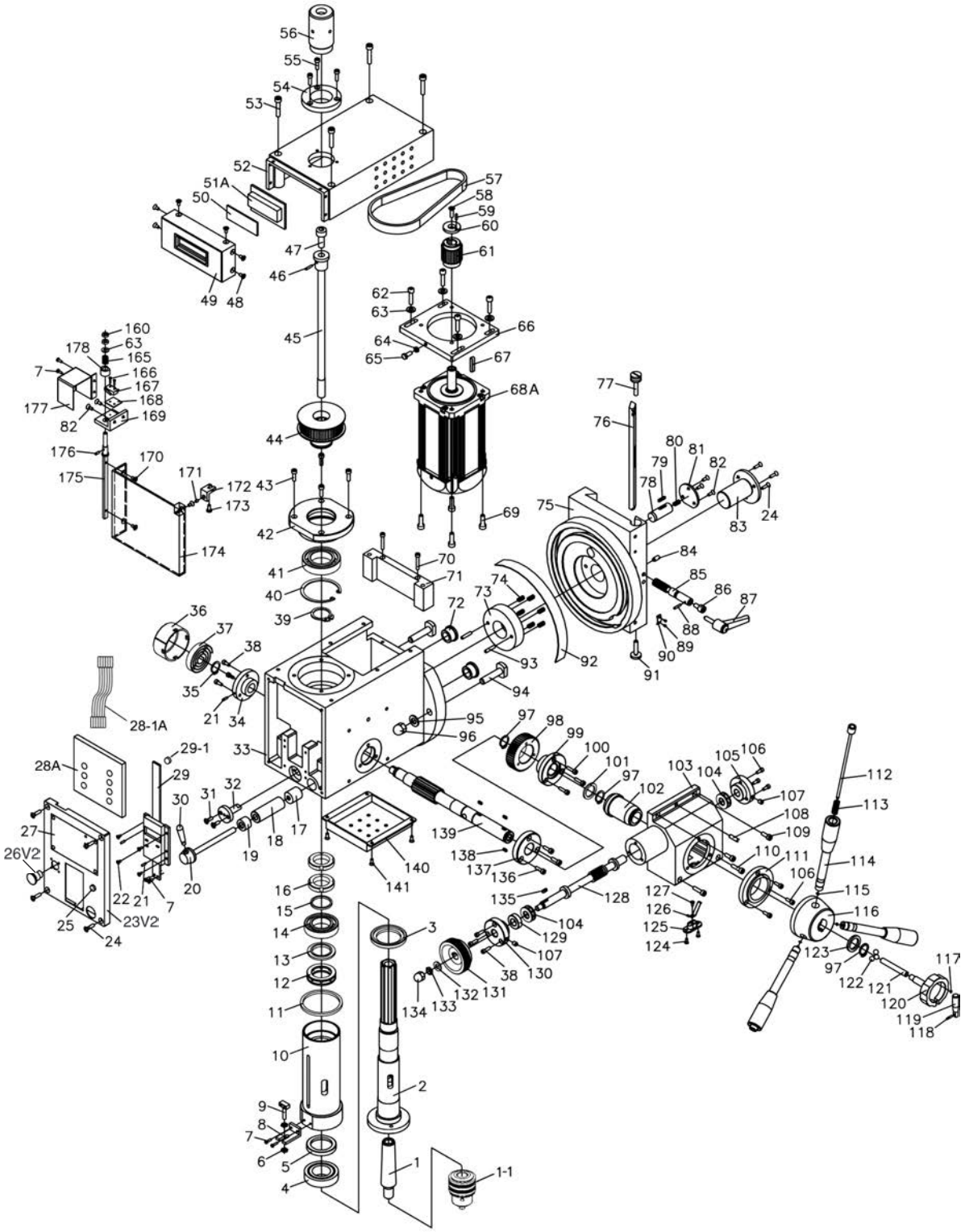


STOP **READ ELECTRICAL SAFETY ON PAGE 33!**

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.

Headstock & Controls



Headstock & Controls Parts List

REF	PART #	DESCRIPTION
1	P0619001	DRILL CHUCK ARBOR R8 X JT6, 140MM L
1-1	P0619001-1	CHUCK 1-16MM JT6
2	P0619002	SPINDLE
3	P0619003	OIL SEAL
4	P0619004	TAPER ROLLER BEARING 32907
5	P0619005	OIL SEAL
6	P0619006	HEX NUT M5-.8
7	P0619007	PHLP HD SCR M3-.5 X 8
8	P0619008	DISPLAY BRACKET
9	P0619009	T-BLOCK HEAD STUD
10	P0619010	SPINDLE SLEEVE
11	P0619011	SLEEVE LIMIT PAD
12	P0619012	BALL BEARING 8106
13	P0619013	THRUST WASHER 30MM BLACK
14	P0619014	BALL BEARING 6006ZZ
15	P0619015	THRUST WASHER
16	P0619016	SPANNER NUT M2-.4 X 1.5
17	P0619017	SHORT LOCK SLEEVE
18	P0619018	LONG LOCK SLEEVE
19	P0619019	LOCK SPACER
20	P0619020	HUB AND LOCK BOLT
21	P0619021	ROLL PIN 3 X 8
22	P0619022	PHLP HD SCR M3-.5 X 8
23V2	P0619023V2	CONTROL PANEL V2.07.18
24	P0619024	FLAT HD SCR M4-.7 X 16
25	P0619025	INDICATOR LIGHT
26V2	P0619026V2	E-STOP BUTTON KEDU HY57B V2.07.18
27	P0619027	TOUCH PANEL
28-1A	P0619028-1A	HARNESS W/PLUGS V2.04.07
28A	P0619028A	CONTROL PANEL PC BOARD V2.04.07
29	P0619029	DIGITAL SPINDLE DEPTH UNIT
29-1	P0619029-1	BATTERY SR44
30	P0619030	LEVER
31	P0619031	FLAT HD SCR M3-.5 X 10
32	P0619032	SPINDLE ORIENTATION SHAFT
33	P0619033	HEADSTOCK
34	P0619034	SUPPORT FLANGE
35	P0619035	EXT RETAINING RING 16MM
36	P0619036	TORSION SPRING COVER
37	P0619037	TORSION SPRING
38	P0619038	CAP SCREW M4-.7 X 12
39	P0619039	EXT RETAINING RING 35MM
40	P0619040	INT RETAINING RING 65MM
41	P0619041	BALL BEARING 6007ZZ
42	P0619042	BEARING HOUSING
43	P0619043	CAP SCREW M5-.8 X 16
44	P0619044	COGGED PULLEY
45	P0619045	DRAWBAR 7/16-20 TPI
46	P0619046	TAPER PIN 3 X 18
47	P0619047	CAP SCREW M10-1.5 X 16
48	P0619048	FLAT HD SCR M4-.7 X 6

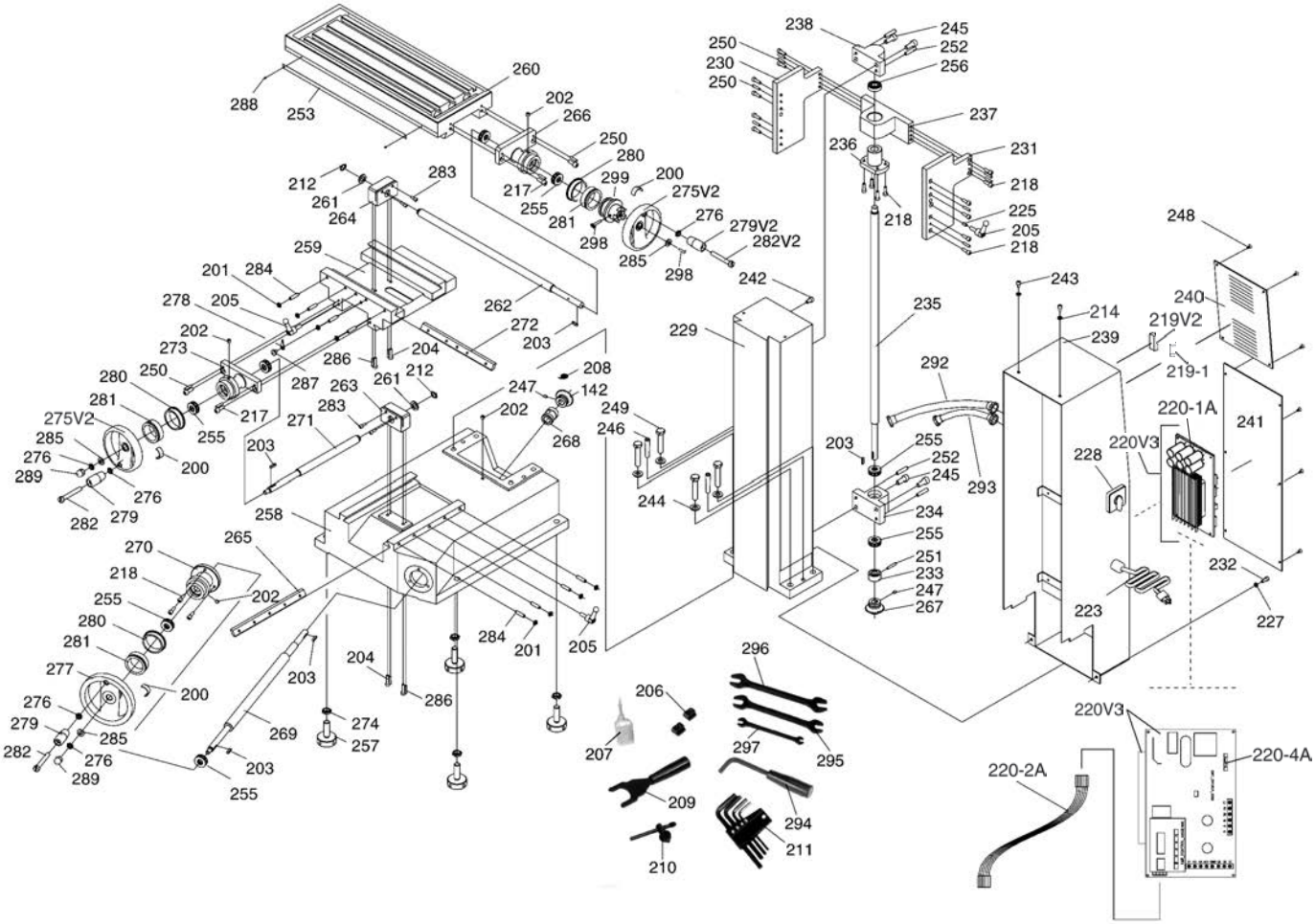
REF	PART #	DESCRIPTION
49	P0619049	DISPLAY HOUSING
50	P0619050	LENSE
51A	P0619051A	DIGITAL SPEED DISPLAY UNIT V2.04.07
52	P0619052	BELT COVER
53	P0619053	CAP SCREW M6-1 X 40
54	P0619054	SPINDLE COVER BASE
55	P0619055	CAP SCREW M4-.7 X 10
56	P0619056	SPINDLE COVER
57	P0619057	COGGED BELT 5M400
58	P0619058	SPECIAL SCREW M6-1 X 16
59	P0619059	ROLL PIN 3 X 10
60	P0619060	PINNED WASHER
61	P0619061	COGGED DRIVE PULLY
62	P0619062	CAP SCREW M6-1 X 20
63	P0619063	FLAT WASHER 6MM
64	P0619064	HEX NUT M5-.8
65	P0619065	HEX BOLT M5-.8 X 25
66	P0619066	MOTOR SUPPORT PLATE
67	P0619067	KEY 5 X 5 X 25
68A	P0619068A	MOTOR 230V V2.04.07
69	P0619069	CAP SCREW M5-.8 X 20
70	P0619070	CAP SCREW M4-.7 X 35
71	P0619071	GUIDE
72	P0619072	SLEEVE
73	P0619073	FRICTION DISC
74	P0619074	COMPRESSION SPRING
75	P0619075	VERTICAL SLIDE
76	P0619076	GIB
77	P0619077	ADJUSTING SCREW
78	P0619078	SHORT GEAR SHAFT
79	P0619079	KEY 4 X 4 X 12
80	P0619080	COMPRESSION SPRING
81	P0619081	PLATE
82	P0619082	FLAT HD SCR M4-.7 X 10
83	P0619083	PIVOT HUB
84	P0619084	SET SCREW M6-1 X 8
85	P0619085	INLAY SHAFT
86	P0619086	END SHAFT
87	P0619087	LEVER ASSEMBLY
88	P0619088	TAPER PIN 3 X 10MM
89	P0619089	RIVET 2 X 4MM
90	P0619090	POINTER PLATE
91	P0619091	ADJUST SCREW
92	P0619092	ANGLE GAUGE
93	P0619093	ROLL PIN 5 X 20
94	P0619094	T-BOLT
95	P0619095	FLAT WASHER 10MM
96	P0619096	ACORN NUT M10-1.5
97	P0619097	EXT RETAINING RING 20MM
98	P0619098	PINION GEAR
99	P0619099	PINION FLANGE

Headstock & Controls Parts List (Cont.)

REF	PART #	DESCRIPTION
100	P0619100	CAP SCREW M4-.7 X 16
101	P0619101	THRUST WASHER 20MM BLACK
102	P0619102	SLIP-RING ASSEMBLY
103	P0619103	WORM HOUSING
104	P0619104	BALL BEARING 8101
105	P0619105	SUPPORT FLANGE
106	P0619106	CAP SCREW M4-.7 X 10
107	P0619107	BALL OILER
108	P0619108	SCREW LOCK SLEEVE 6 X 20
109	P0619109	CAP SCREW M5-.8 X 16
110	P0619110	CAP SCREW M5-.8 X 20
111	P0619111	FLANGE
112	P0619112	BUTTON CONTROL ROD
113	P0619113	COMPRESSION SPRING
114	P0619114	HANDLE ASSEMBLY
115	P0619115	EXT RETAINING RING 4MM
116	P0619116	RACK HUB
117	P0619117	ROLL PIN 3 X 14
118	P0619118	SMALL MAGNETIC BLOCK
119	P0619119	UNIVERSAL HANDLE
120	P0619120	SPINDLE LOCK HANDKNOB
121	P0619121	LOCK SHAFT
122	P0619122	STEEL BALL 8MM
123	P0619123	RING
124	P0619124	PHLP HD SCR M3-.5 X 6
125	P0619125	LIMIT SWITCH
126	P0619126	CONTACT ARM
127	P0619127	PHLP HD SCR M3-.5 X 6
128	P0619128	WORM SHAFT

REF	PART #	DESCRIPTION
129	P0619129	SPACER
130	P0619130	SUPPORT FLANGE
131	P0619131	WORM HANDWHEEL
132	P0619132	FLAT WASHER 8MM
133	P0619133	HEX NUT M8-1.25
134	P0619134	ACORN NUT M8-1.25
135	P0619135	KEY 4 X 4 X 10
136	P0619136	CAP SCREW M5-.8 X 12
137	P0619137	SUPPORT FLANGE
138	P0619138	KEY 4 X 4 X 8
139	P0619139	GEAR SHAFT
140	P0619140	VENT COVER
141	P0619141	CAP SCREW M4-.7 X 10
142	P0619142	GEAR 24T
160	P0619160	HEX NUT M6-1
165	P0619165	COMPRESSION SPRING
166	P0619166	PHLP HD SCR M2-.4 X 10
167	P0619167	LIMIT SWITCH
168	P0619168	INSULATION WASHER 12MM BLACK
169	P0619169	SUPPORT PLATE
170	P0619170	CAP SCREW M4-.7 X 8
171	P0619171	MAGNET
172	P0619172	BLOCK
173	P0619173	PHLP HD SCR M4-.7 X 10
174	P0619174	SAFETY LENSE
175	P0619175	SHAFT
176	P0619176	ROLL PIN 3 X 8
177	P0619177	COVER
178	P0619178	SPACER

Column, Table & Inverter

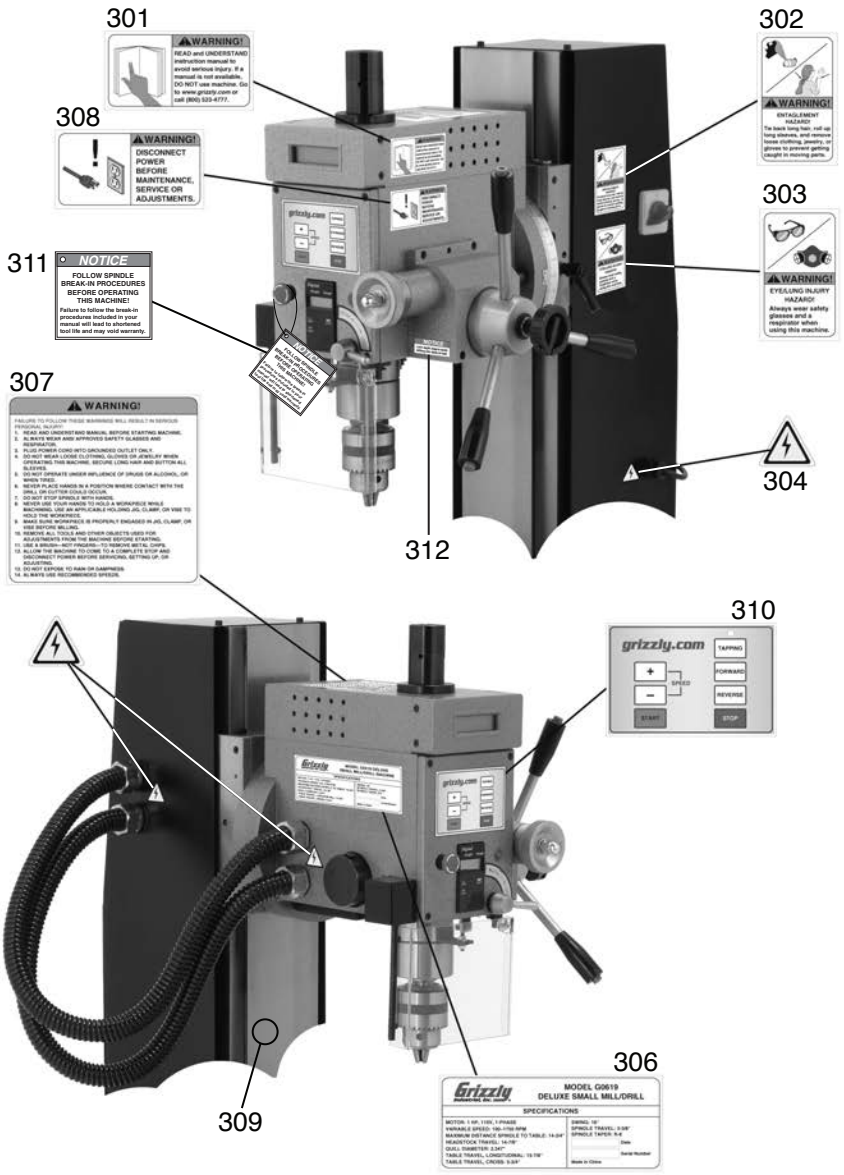


Column, Table & Inverter Parts List

REF	PART #	DESCRIPTION
200	P0619200	FLAT SPRING
201	P0619201	HEX NUT M6-1
202	P0619202	BALL OILER
203	P0619203	KEY 4 X 4 X 16
204	P0619204	CAP SCREW M5-.8 X 20
205	P0619205	UNIVERSAL LEVER
206	P0619206	T-NUT
207	P0619207	OIL BOTTLE
208	P0619208	EXT RETAINING RING 10MM
209	P0619209	WRENCH SPINDLE SPANNER
210	P0619210	CHUCK KEY
211	P0619211	HEX WRENCH SET 3, 4, 5, 6MM
212	P0619212	EXT RETAINING RING 16MM
213	P0619213	ROLL PIN 3 X 10
214	P0619214	FLAT WASHER 5MM
217	P0619217	CAP SCREW M6-1 X 16
218	P0619218	CAP SCREW M5-.8 X 16
219V2	P0619219V2	FUSE HOUSING ASSY V2.04.07
219-1	P0619219-1	FUSE 20A 31MM
220-1A	P0619220-1A	S CAPACITOR 1000M 250V 1 X 2 V2.04.07
220-2A	P0619220-2A	HARNESS W/PLUGS V2.04.07
220-4A	P0619220-4A	FUSE 20A V2.04.07
220V3	P0619220V3	MOTOR PC BOARD/INVERTER V3.07.18
223	P0619223	POWER CORD
225	P0619225	ROLL PIN 5 X 10
227	P0619227	FLAT WASHER 8MM
228	P0619228	MAIN POWER SWITCH
229	P0619229	COLUMN
230	P0619230	PLATE LEFT
231	P0619231	PLATE RIGHT
232	P0619232	CAP SCREW M5-.8 X 12
233	P0619233	LIMIT SLEEVE
234	P0619234	BEARING SEAT LOWER
235	P0619235	VERTICAL LEADSCREW
236	P0619236	VERTICAL LEAD NUT
237	P0619237	SUPPORT
238	P0619238	UPPER BEARING SEAT
239	P0619239	REAR CABINET
240	P0619240	VENTED COVER
241	P0619241	LARGE COVER
242	P0619242	CAP SCREW M6-1 X 10
243	P0619243	CAP SCREW M5-.8 X 8
244	P0619244	FLAT WASHER 10MM
245	P0619245	CAP SCREW M8-1.25 X 20
246	P0619246	ROLL PIN 8 X 50
247	P0619247	SET SCREW M5-.8 X 8
248	P0619248	PHLP HD SCR M4-.7 X 6
249	P0619249	HEX BOLT M10-1.5 X 50

REF	PART #	DESCRIPTION
250	P0619250	ROLL PIN 4 X 20
251	P0619251	ROLL PIN 4 X 25
252	P0619252	THREADED TAPER PIN M4-.7 X 30
253	P0619253	RULER
255	P0619255	BEARING 8101
256	P0619256	BEARING 60016001ZZ
257	P0619257	ADJUSTABLE FOOT
258	P0619258	BASE
259	P0619259	SADDLE
260	P0619260	WORKTABLE
261	P0619261	SPACER
262	P0619262	X-AXIS LEADSCREW
263	P0619263	Y-AXIS LEADSCREW NUT
264	P0619264	X-AXIS LEADSCREW NUT
265	P0619265	Y-AXIS GIB
266	P0619266	X-AXIS BEARING SEAT - RIGHT
266-1	P0619266-1	X-AXIS BEARING SEAT - LEFT
267	P0619267	GEAR 48T
268	P0619268	SLEEVE
269	P0619269	Z-AXIS SHAFT
270	P0619270	SUPPORT FLANGE
271	P0619271	Y-AXIS LEADSCREW
272	P0619272	X-AXIS GIB
273	P0619273	Y-AXIS BEARING SEAT
274	P0619274	HEX NUT M12-1.75
275V2	P0619275V2	HANDWHEEL 4-3/4" V2.10.08
276	P0619276	HEX NUT M8-1.25
277	P0619277	HANDWHEEL
278	P0619278	POINTER
279V2	P0619279V2	HANDLE SLEEVE V2.10.08
280	P0619280	INLAY RING
281	P0619281	GRADUATED DIAL
282V2	P0619282V2	HANDLE SLEEVE SHLDR SCR V2.10.08
283	P0619283	CAP SCREW M4-.7 X 12
284	P0619284	SET SCREW M6-1 X 25
285	P0619285	HANDWHEEL FLAT WASHER
286	P0619286	ROLL PIN 3 X 20
287	P0619287	PHLP HD SCR M6-1 X 6
288	P0619288	RIVET 2 X 5MM NAMEPLATE, STEEL
289	P0619289	ACORN NUT M8-1.25
292	P0619292	SEALED FLEX CONDUIT (LONG)
293	P0619293	SEALED FLEX CONDUIT (SHORT)
294	P0619294	DRAWBAR HEX WRENCH
295	P0619295	COMBO WRENCH 12/14
296	P0619296	COMBO WRENCH 17/19
297	P0619297	COMBO WRENCH 8/10
298	P0619298	FLAT HD SCR M4-.7 X 6
299	P0619299	CLUTCH HUB

Labels & Cosmetics



REF	PART #	DESCRIPTION
301	P0619301	READ MANUAL LABEL
302	P0619302	ENTANGLEMENT HAZARD LABEL
303	P0619303	EYE AND FACE HAZARD LABEL
304	P0619304	ELECTRICAL HAZARD LABEL
306	P0619306	MACHINE ID LABEL
307	P0619307	GENERAL WARNING LABEL

REF	PART #	DESCRIPTION
308	P0619308	DISCONNECT POWER
309	P0619309	TOUCH-UP PAINT, GRIZZLY GREEN
310	P0619310	TOUCH PANEL LABEL
311	P0619311	SPINDLE BREAK-IN NOTICE
312	P0619312	DEPTH STOP NOTICE LABEL

⚠WARNING

Safety labels warn about machine hazards and ways to prevent injury. The owner of this machine MUST maintain the original location and readability of the labels on the machine. If any label is removed or becomes unreadable, REPLACE that label before using the machine again. Contact Grizzly at (800) 523-4777 or www.grizzly.com to order new labels.

Grizzly Industrial, Inc. WARRANTY CARD

Name _____

Street _____

City _____ State _____ Zip _____

Phone # _____ Email _____

Model # _____ Order # _____ Serial # _____

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

1. How did you learn about us?

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

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

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

3. What is your annual household income?

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

4. What is your age group?

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

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

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

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

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

7. Do you think your machine represents a good value? _____Yes _____No

8. Would you recommend Grizzly Industrial to a friend? _____Yes _____No

9. Would you allow us to use your name as a reference for Grizzly customers in your area?
Note: *We never use names more than 3 times.* _____Yes _____No

10. Comments: _____

_____

_____

_____

CUT ALONG DOTTED LINE

FOLD ALONG DOTTED LINE

Place
Stamp
Here

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

FOLD ALONG DOTTED LINE

Send a Grizzly Catalog to a friend:

Name_____

Street_____

City_____State_____Zip_____

TAPE ALONG EDGES--PLEASE DO NOT STAPLE

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.

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

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

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

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