Grizzly Industrial, Inc.®

MODEL G3102/G3103
VERTICAL MILL
OWNER'S MANUAL

#TS11100 PRINTED IN CHINA

⚠ 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

Manual Accuracy

We are proud to offer this manual with your new machine! We've made every effort to be exact with the instructions, specifications, drawings, and photographs of the machine we used when writing this manual. However, sometimes errors do happen and we apologize for them.

Also, owing to our policy of continuous improvement, **your machine may not exactly match the manual**. If you find this to be the case, and the difference between the manual and machine leaves you in doubt, immediately call our technical support for updates or clarification.

For your convenience, we always keep current Grizzly manuals and most updates available on our website at **www.grizzly.com**. Any updates to your machine will be reflected in these documents as soon as they are complete. Visit our site often to check for the latest updates!

Contact Info

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

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

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

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

Functional Overview

The vertical mill is used to remove material from metal workpieces to form shapes. Tooling is inserted into the spindle of the head, which can be positioned in nearly any configuration above the table and workpiece.

During most operations, the tooling rotates in the spindle above the workpiece while the operator moves the workpiece, which is clamped to the table, in any combination of three paths of table movement—longitudinal (X-axis), cross (Y-axis), and vertical (Z-axis). The range of vertical movement for the table is greater than that of the head and spindle. However some operations, such as drilling or tapping, are better accomplished with vertical spindle movement using the coarse or fine downfeed controls.

The operator selects available spindle speeds by configuring the two V-belts across the motor, idler, and spindle pulleys.

The Model G3103 has a longitudinal power feed for consistent powered table movement with adjustable limit stops for a preset range of motion.

Identification

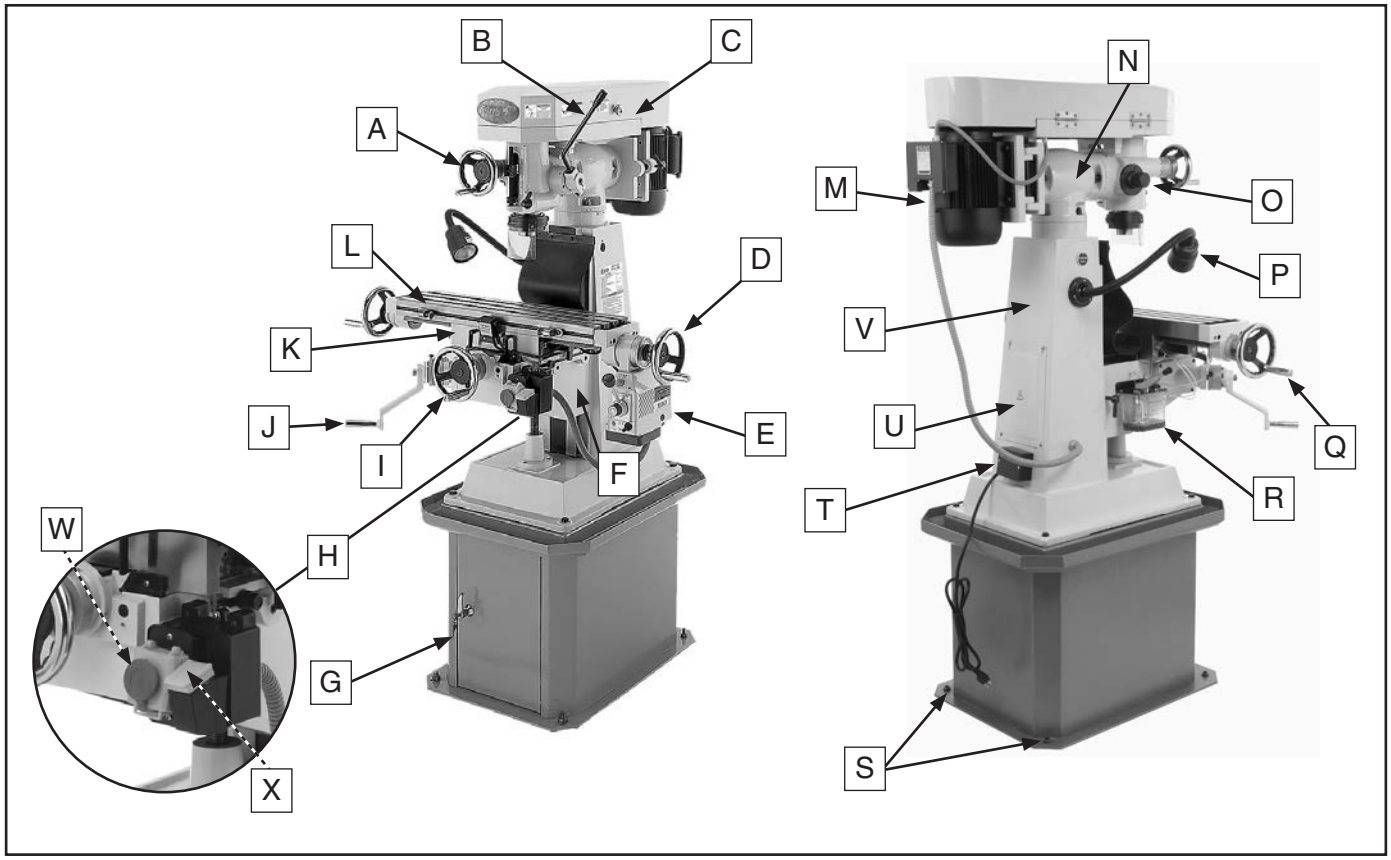


Figure 1. Model G3102/G3103 identification.

A. Fine Downfeed Handwheel
B. Coarse Downfeed Lever
C. V-Belt Cover
D. Longitudinal (X-Axis) Handwheel
E. Longitudinal Power Feed (Model G3103)
F. Knee
G. Cabinet Stand & Door
H. Power ON/OFF Switch & Spindle Direction Switch
I. Cross (Y-Axis) Handwheel
J. Vertical (Z-Axis) Crank
K. Cross Slide
L. Table
M. Spindle Motor
N. Turret
O. Downfeed Selection Knob
P. Halogen Work Light
Q. Longitudinal Handwheel
R. One-Shot Way Oiler
S. Floor Mounting Points
T. Power Connection & Cable
U. Electrical Panel Access Cover
V. Column
W. Power ON/OFF Switch
X. Spindle Direction Switch

MACHINE DATA SHEET

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

MODEL G3102 VERTICAL MILL

Product Dimensions:

Weight..... 800 lbs.
Width (side-to-side) x Depth (front-to-back) x Height..... 45-1/2 x 41 x 66-5/8 in.
Footprint (Length x Width)..... 27-1/2 x 21 in.
Space Required for Full Range of Movement (Width x Depth)..... 60 x 42 in.

Shipping Dimensions:

Type..... Wood Crate
Content..... Machine
Weight..... 904 lbs.
Length x Width x Height..... 37 x 41 x 76 in.
Must Ship Upright..... Yes

Electrical:

Power Requirement..... 110V or 220V, Single-Phase, 60 Hz
Prewired Voltage..... 110V
Full-Load Current Rating..... 16A at 110V, 8A at 220V
Minimum Circuit Size..... 20A at 110V, 15A at 220V
Connection Type..... Cord & Plug
Power Cord Included..... Yes
Power Cord Length..... 6 ft.
Power Cord Gauge..... 14 AWG
Plug Included..... Yes
Included Plug Type..... 5-15 for 110V
Recommended Plug Type..... 6-15 for 220V
Switch Type..... 220V ON/OFF Push Button Magnetic Switch

Motors:

Main

Type..... TEFC Capacitor-Start Induction
Horsepower..... 1.5 HP
Phase..... Single-Phase
Amps..... 16A/8A
Speed..... 1720 RPM
Power Transfer ..... V-Belt Drive
Bearings..... Shielded & Permanently Lubricated

Main Specifications:

Operation Info

Spindle Travel	3 in.
Max Distance Spindle to Column	5-1/2 in.
Max Distance Spindle to Table	12-1/2 in.
Longitudinal Table Travel (X-Axis)	15-5/8 in.
Cross Table Travel (Y-Axis)	6 in.
Vertical Table Travel (Z-Axis)	14 in.
Vertical Head Travel (Z-Axis)	2-1/2 in.
Turret or Column Swivel (Left /Right)	45 deg.
Head Tilt (Left/Right)	45 deg.
Drilling Capacity for Cast Iron	1 in.
Drilling Capacity for Steel	3/4 in.
End Milling Capacity	3/4 in.
Face Milling Capacity	3 in.

Table Info

Table Length	26 in.
Table Width	6-1/8 in.
Table Thickness	1-3/4 in.
Number of T-Slots	3
T-Slot Size	0.56 in.
T-Slots Centers	1-9/16 in.
X/Y-Axis Travel per Handwheel Revolution	0.125 in.
Z-Axis Travel per Handwheel Revolution	0.062 in.

Spindle Info

Spindle Taper	R-8
Number of Vertical Spindle Speeds	9
Range of Vertical Spindle Speeds	240 – 2760 RPM
Quill Diameter	2.950 in.
Drawbar Thread Size	7/16-20
Drawbar Length	12-1/4 in.
Spindle Bearings	Tapered Roller Bearings

Construction

Spindle Housing/Quill	Cast Iron
Table	Surface Ground Cast Iron
Head	Cast Iron
Column/Base	Cast Iron
Base	Cast Iron
Stand	Steel
Paint Type/Finish	Enamel

Other

Recommended Mobile Base	D2058A

Other Specifications:

Country of Origin	China
Warranty	1 Year
Approximate Assembly & Setup Time	1 Hour
ISO 9001 Factory	No
CSA, ETL, or UL Certified/Listed	No

Features:

High Precision Ground Vertical and Cross Ways
Milling Head Micro-Feed
Lower Noise and Convenient Operation
Built-In Work Light

Accessories Included:

Arbor
Drawbar
End Mill
Inner Hexagon Spanner
Oil Gun
Tool Box
Two Head Wrench

MACHINE DATA SHEET

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

MODEL G3103 VERTICAL MILL W/ TABLE POWER FEED

Product Dimensions:

Weight	900 lbs.
Width (side-to-side) x Depth (front-to-back) x Height	45-1/2 x 41 x 66-5/8 in.
Footprint (Length x Width)	27-1/2 x 21 in.
Space Required for Full Range of Movement (Width x Depth)	60 x 42 in.

Shipping Dimensions:

Type	Wood Crate
Content	Machine
Weight	926 lbs.
Length x Width x Height	37 x 41 x 75 in.
Must Ship Upright	Yes

Electrical:

Power Requirement	110V or 220V, Single-Phase, 60 Hz
Prewired Voltage	110V
Full-Load Current Rating	16A at 110V, 8A at 220V
Minimum Circuit Size	20A at 110V, 15A at 220V
Connection Type	Cord & Plug
Power Cord Included	Yes
Power Cord Length	6 ft.
Power Cord Gauge	14 AWG
Plug Included	Yes
Included Plug Type	5-15 for 110V
Recommended Plug Type	6-15 for 220V
Switch Type	ON/OFF Push Button Switch w/Safety Cover

Motors:

Main

Type	TEFC Capacitor-Start Induction
Horsepower	1.5 HP
Phase	Single-Phase
Amps	16A/8A
Speed	1720 RPM
Power Transfer	V-Belt Drive
Bearings	Shielded & Permanently Lubricated

Main Specifications:

Operation Info

Spindle Travel	3 in.
Max Distance Spindle to Column	5-1/2 in.
Max Distance Spindle to Table	12-1/2 in.
Longitudinal Table Travel (X-Axis)	15-5/8 in.
Cross Table Travel (Y-Axis)	6 in.
Vertical Table Travel (Z-Axis)	14 in.
Vertical Head Travel (Z-Axis)	2-1/2 in.
Turret or Column Swivel (Left /Right)	45 deg.
Head Tilt (Left/Right)	45 deg.
Drilling Capacity for Cast Iron	1 in.
Drilling Capacity for Steel	3/4 in.
End Milling Capacity	3/4 in.
Face Milling Capacity	3 in.

Table Info

Table Length	26 in.
Table Width	6-1/8 in.
Table Thickness	1-3/4 in.
Number of T-Slots	3
T-Slot Size	0.56 in.
T-Slots Centers	1-9/16 in.
Number of Longitudinal Feeds	Variable
X-Axis Table Power Feed Rate	0 – 11.67 FPM
X/Y-Axis Travel per Handwheel Revolution	0.125 in.
Z-Axis Travel per Handwheel Revolution	0.062 in.

Spindle Info

Spindle Taper	R-8
Number of Vertical Spindle Speeds	9
Range of Vertical Spindle Speeds	240 – 2760 RPM
Quill Diameter	2.950 in.
Drawbar Thread Size	7/16-20
Drawbar Length	12-1/4 in.
Spindle Bearings	Tapered Roller Bearings

Construction

Spindle Housing/Quill	Cast Iron
Table	Surface Ground Cast Iron
Head	Cast Iron
Column/Base	Cast Iron
Base	Cast Iron
Stand	Steel
Paint Type/Finish	Enamel

Other

Recommended Mobile Base	D2058A

Other Specifications:

Country of Origin	China
Warranty	1 Year
Approximate Assembly & Setup Time	1 Hour
ISO 9001 Factory	No
CSA, ETL, or UL Certified/Listed	No

Features:

High Precision Ground Vertical and Cross Ways
Milling Head Micro-Feed
Lower Noise and Convenient Operation
Built-In Work Light
Servo-Type Variable Speed Power Feed Unit with Limit Switches
Extended Lead Screw on the X-Axis

Accessories Included:

Arbor
Drawbar
End Mill
Inner Hexagon Spanner
Oil Gun
Tool Box
Two Head Wrench

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

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 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 avoid accidental slips, which could cause loss of workpiece control.

HAZARDOUS DUST. Dust created while using machinery may cause cancer, birth defects, or long-term respiratory damage. Be aware of dust hazards associated with each workpiece material, and 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.

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.

CHECK DAMAGED PARTS. Regularly inspect machine for any condition that may affect safe operation. Immediately repair or replace damaged or mis-adjusted parts before operating machine.

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.

⚠WARNING
Additional Safety Instructions for Mills

1. **UNDERSTANDING CONTROLS.** Make sure you understand the use and operation of all controls before starting the mill.

2. **SAFETY ACCESSORIES.** Always keep the chip guard in place in addition to your safety glasses, or use a face shield when milling to reduce the risk of injury from flying chips.

3. **WORK HOLDING.** A workpiece that moves unexpectedly during operation can result in personal injury and damage to tooling and the mill. Before starting the machine, be certain the workpiece has been properly clamped to the table. NEVER hold the workpiece by hand during operation.

4. **REMOVING TOOLS.** Objects that are thrown by the spinning action of the mill can be deadly missiles. Always remove the chuck key, drawbar wrench, and any service tools immediately after use and before starting the mill.

5. **SPINDLE SPEEDS.** For safe and good results, select the spindle speed that is appropriate for the type of work and material. Allow the mill to reach full speed before beginning a cut.

6. **STOPPING SPINDLE.** Your hand was not designed to stop a rapidly spinning metal object. DO NOT stop the spindle using your hand. Allow the spindle to stop on its own.

7. **CLEAN-UP.** Metal chips can cut your hands. DO NOT clear chips by hand or compressed air. Use a brush or vacuum, and never clear chips while the spindle is turning.

8. **MACHINE CARE AND MAINTENANCE.** Never operate the mill with damaged or worn parts that can break apart and cause injury and property damage. Maintain your mill in proper working condition. Perform routine inspections and maintenance promptly. Put away adjustment tools after use.

9. **DISCONNECT POWER.** To avoid possible electrocution, make sure the mill is turned ***OFF***, disconnected from its power source and all moving parts have come to a complete stop before changing cutting tools, starting any inspection, adjustment, or maintenance procedure.

10. **AVOIDING ENTANGLEMENT HAZARDS**. DO NOT wear loose clothing, gloves, or jewelry when operating mill. Tie back long hair and roll up sleeves.

11. **CUTTING TOOL INSPECTION.** Inspect cutting tools for sharpness, chips, or cracks before each use. Replace dull, chipped, or cracked cutting tools immediately. Handle new cutting tools with care. Leading edges are very sharp and can cause lacerations.

12. **POWER DISRUPTION.** In the event of a local power outage during operation, turn ***OFF*** all switches to avoid possible sudden start up once power is restored.

13. **BE ATTENTIVE.** To avoid injury hazards to others, DO NOT leave the mill running unattended for any reason.

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

SECTION 2: CIRCUIT REQUIREMENTS

110/220V Operation

⚠WARNING

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

⚠WARNING

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

Full Load Amperage Draw

Amp Draw at 110V (pre-wired) .....16 Amps
Amp Draw at 220V .....8 Amps

Power Supply Circuit Requirements

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

Minimum Circuit Size (110V).....20 Amps
Minimum Circuit Size (220V) ..... 15 Amps

Power Connection Device

The Model G3102/G3103 comes pre-wired with a NEMA 5-15 plug for connection to power. If you rewire the motor to 220V, we recommend using the plug/receptacle shown in **Figure 2** for 220V.

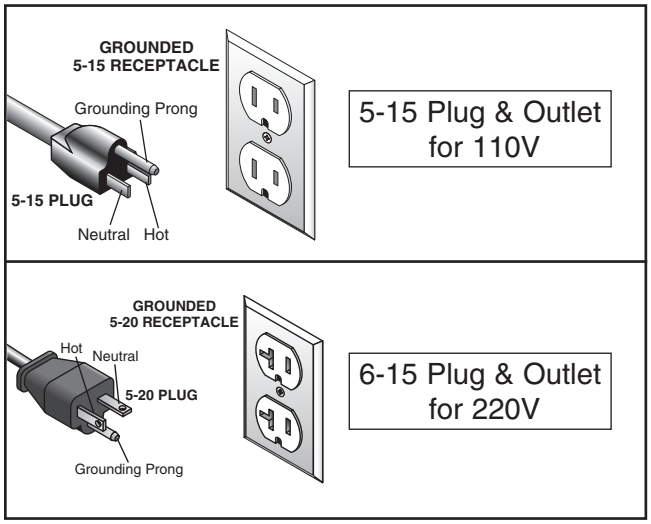


Figure 2. Recommended plug types.

Extension Cords

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

- For 110V, use at least a 12 gauge cord that does not exceed 50 feet in length.
- For 220V, use at least a 14 gauge cord that does not exceed 50 feet in length.
- The extension cord must have a ground wire and plug pin.

NOTICE

The Model G3102/G3103 is pre-wired for 110V operation. If you plan to operate your machine at 220V, follow the *220V Conversion* procedure on the next page and refer to the wiring diagram on *Page 44*.

220V Conversion

To operate your mill with 220V power, you must: 1) replace the 110V power ON/OFF switch with the included 220V switch, 2) re-wire the motor, 3) re-wire the transformer, and 4) install a NEMA 6-15 plug and receptacle.

Refer to **Page 44** for the full **220V Conversion Wiring Diagram**.

⚠WARNING

You MUST disconnect the mill from the power source before beginning any of the following 220V conversion procedures to avoid serious personal injury or death by electrocution.

Replacing the Power Switch

Record the wire connections on the 110V switch before you remove it, then replace it with the included 220V power switch and make the same wire connections.

Re-Wiring the Motor

1. Remove the cover of the motor wiring junction box.

2. Re-configure the two metal terminal jumpers so that terminals **Z2** and **U2** are connected and **U2** and **V1** are connected, as shown in **Figure 3**.

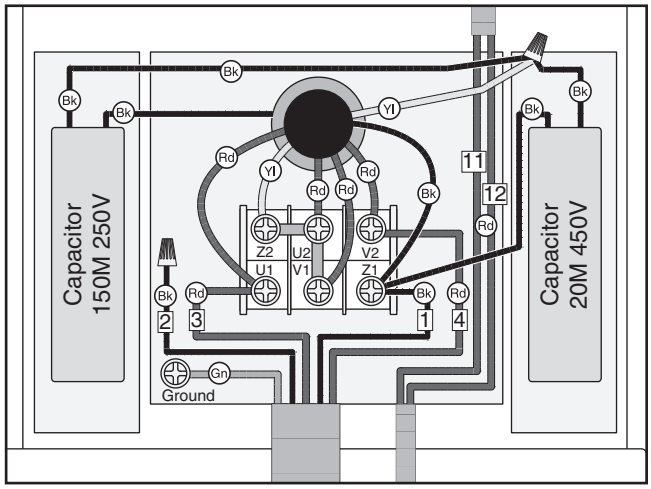


Figure 3. Motor configured for 220V operation.

3. Remove the wire from the **Z2** terminal and terminate it with a wire cap and electrical tape (see **Figure 3**), then re-install the wiring junction box cover.

Re-Wiring the Transformer

Remove the electrical panel access cover on the rear of the column, then move the wire from the 115V terminal on the transformer to the 230V terminal, as shown in **Figure 4**.

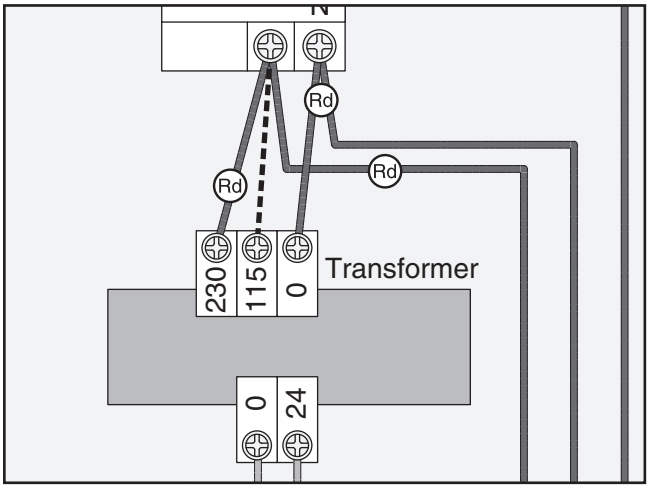


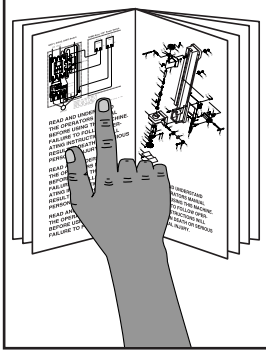
Figure 4. Electrical panel transformer configured for 220V operation.

⚠WARNING

Covers, guards, and safety devices on this machine are provided for your safety. Always keep them secured in place before connecting the machine to power to avoid serious personal injury.

SECTION 3: SETUP

Setup Safety

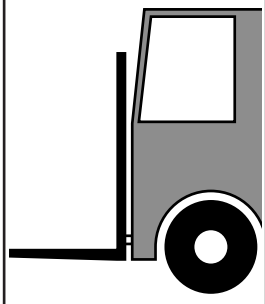


WARNING

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

WARNING

Wear safety glasses during the entire setup process!



WARNING

The Model G3102/G3103 is a heavy machine. Serious personal injury may occur if safe moving methods are not used. To be safe, get assistance and use a fork lift rated for at least 1500 lbs. to move the shipping crate and remove the machine from the crate.

Items Needed for Setup

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

Description	Qty
• Assistant	1
• Safety Glasses	1 Per Person
• Solid Round High-Grade Steel Bar 5/8–3/4"D x 3'L or longer	1
• Fork Lift (rated for at least 1500 lbs)	1
• Precision Level	1
• Metal Shims	As Needed
• Floor Mounting Hardware	As Needed
• Shop Rags & Cleaning Solvent	As Needed
• Standard Screwdriver	1
• Hex Wrench 3mm	1
• Wrench or Socket 16mm	1

Unpacking

Your machine was carefully packaged for safe transportation. Remove the packaging materials from around your machine and inspect it. If you discover the machine is damaged, *please immediately call Customer Service at (570) 546-9663 for advice.*

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

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

Inventory

The following is a description of the main components shipped with your machine. Lay the components out to inventory them.

Note: *If you can't find an item on this list, check the mounting location on the machine or examine the packaging materials carefully. Occasionally we pre-install certain components for shipping purposes.*

Inventory: (Figure 5)		**Qty**
A.	V-Belts A-32 & A-37	1 Each
B.	Handwheels	2
C.	Toolbox	1
D.	Power ON/OFF Switch 220V	1
E.	Hex Wrenches 3, 4, 5, 6mm	1 Each
F.	Handles	4
G.	Wrenches 10/12mm & 16/18mm	1 Each
H.	Face Mill 3"	1
I.	Screwdrivers Standard & Phillips	1 Each
J.	Drawbar 7/16"-14 x 10 1/2"	1
K.	Table T-Bolts	2

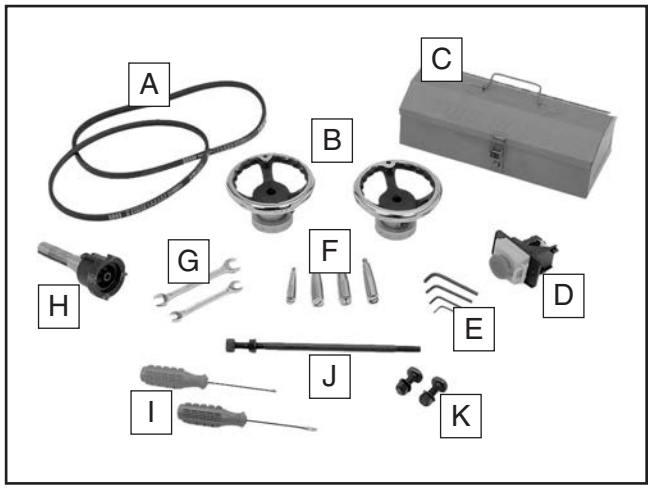
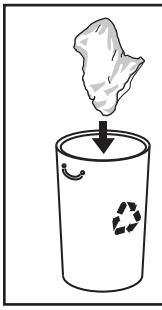


Figure 5. Model G3102/G3103 inventory.



⚠WARNING

SUFFOCATION HAZARD!

Immediately discard all plastic bags and packing materials to eliminate choking/suffocation hazards for children and animals.

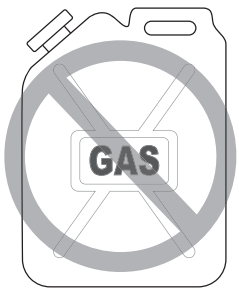
⚠CAUTION

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.

If any nonproprietary 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.

Clean Up

The unpainted surfaces are coated with a waxy oil to prevent corrosion during shipment. Remove this protective coating with a solvent cleaner or degreaser, such as shown in **Figure 6**. For thorough cleaning, some parts must be removed. **For optimum performance, clean all moving parts or sliding contact surfaces.** Avoid chlorine-based solvents, such as acetone or brake parts cleaner that may damage painted surfaces. Always follow the manufacturer's instructions when using any type of cleaning product.



⚠WARNING

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

⚠CAUTION

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

G2544—Solvent Cleaner & Degreaser
H9692—Orange Power Degreaser
Great products for removing shipping grease.

Figure 6. Cleaner/degreasers available from Grizzly.

Site Considerations

Floor Load

Refer to the **Machine Data Sheet** beginning on **Page 4** for the weight and footprint specifications of your machine. Some residential floors may require additional reinforcement to support both the machine and operator.

Placement Location

Consider existing and anticipated needs, size of material to be processed through each machine, and space for auxiliary stands, work tables or other machinery when establishing a location for your new machine. See **Figure 7** for the minimum working clearances.

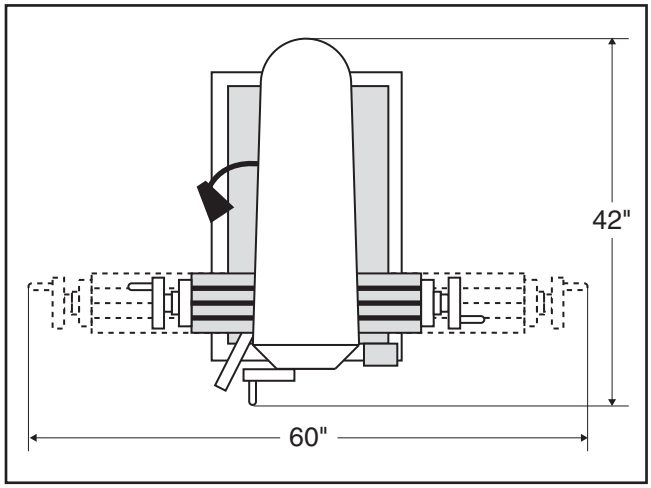
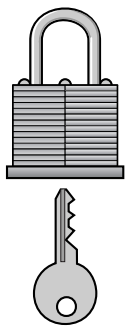


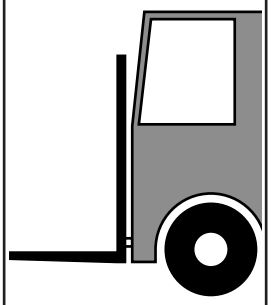
Figure 7. Minimum working clearances.



⚠CAUTION

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

Moving & Placing Mill



⚠WARNING

The Model G3102/G3103 is a heavy machine. Serious personal injury may occur if safe moving methods are not used. To be safe, get assistance and use a fork lift rated for at least 1500 lbs. to move the shipping crate and remove the machine from the crate.

To move and place your mill:

1. After removing the crate from the shipping pallet, insert a ⅝–¾"D x 3'L solid round steel bar through the hoisting holes on both sides of the column.

   Note: *Make sure the round bar is high grade steel capable of holding the load without bending.*

2. Place the forklift forks under the bar and close to the column on both sides, as shown in **Figure 8**.

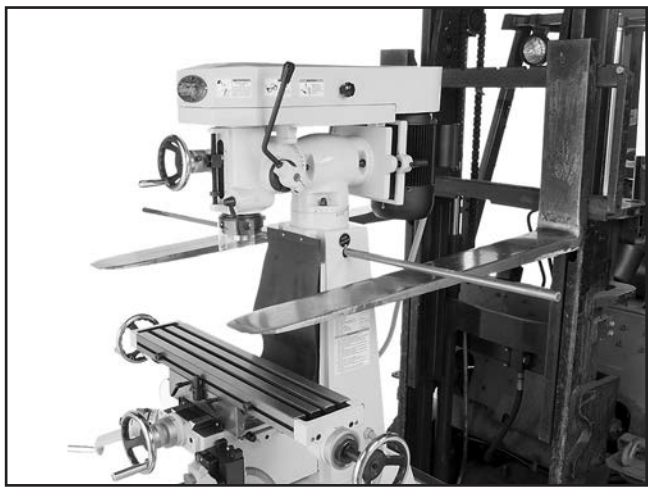


Figure 8. Lifting the mill.

3. Unbolt the mill from the shipping pallet.

4. With assistance to steady the machine, lift it just enough to clear the shipping pallet and floor obstacles, then move it to the prepared location.

5. When mounting the machine, use shims and a precision level to make sure the table is level from side-to-side and front-to-back.

   Note: *You can either place the shims between the steel cabinet stand and the floor, or between the cast iron base and the cabinet stand.*

NOTICE

We strongly recommend bolting your machine to the floor if it is hardwired to the power source. Consult with your electrician to ensure compliance with local codes.

Mounting to Shop Floor

Although not required, we recommend that you mount your new machine to the floor. Because this is an optional step and floor materials may vary, floor mounting hardware is not included. Generally, you can either bolt your machine to the floor or mount it on machine mounts. Both options are described below. Whichever option you choose, it is necessary to level your machine with a precision level.

Bolting to Concrete Floors

Anchor studs and lag shield anchors with lag bolts are two popular methods for anchoring an object to a concrete floor (see **Figure 9**. We suggest you research the many options and methods for mounting your machine and choose the best that fits your specific application.

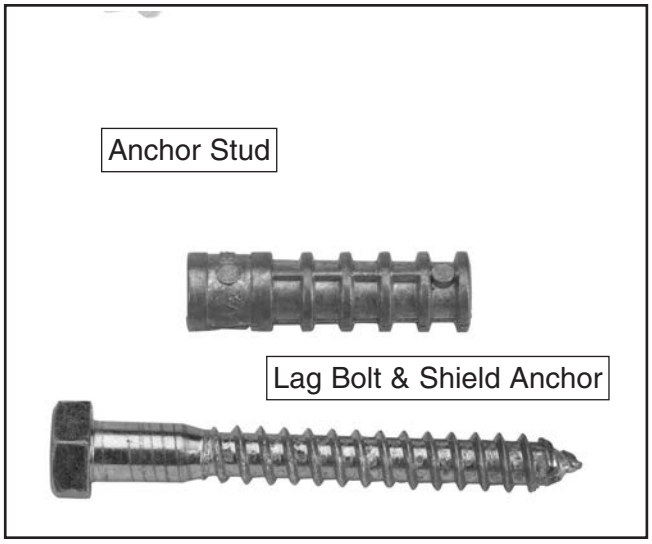


Figure 9. Typical fasteners for mounting to concrete floors.

Using Machine Mounts

Using machine mounts, shown in **Figure 10**, gives the advantage of fast leveling and vibration reduction. The large size of the foot pads distributes the weight of the machine to reduce strain on the floor.

Figure 10. Machine mount example.

Assembly

To assemble your mill:

1. Install the four handles into the table handwheels and the elevation crank (see **Figure 11**).

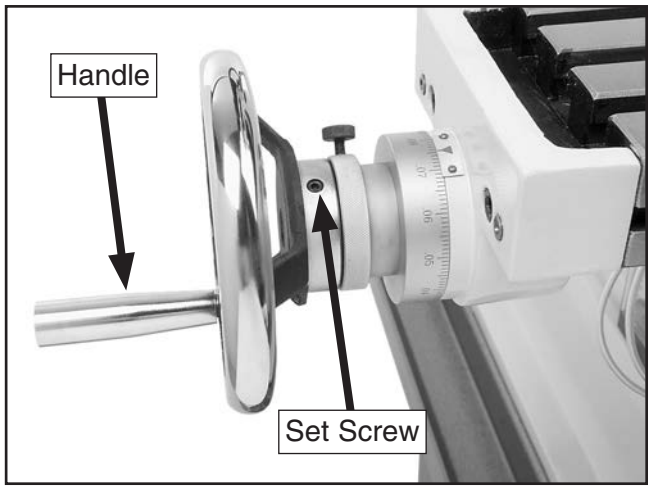


Figure 11. Handle and handwheel installed.

2. Remove the tape that secures the keys to the left longitudinal and cross leadscrews, slide the handwheels onto the shaft, then tighten the set screws in the handwheel hub to secure them.

3. Loosen the three turret rotation lock nuts (see **Figure 12**), manually center the head over table, then re-tighten the lock nuts.

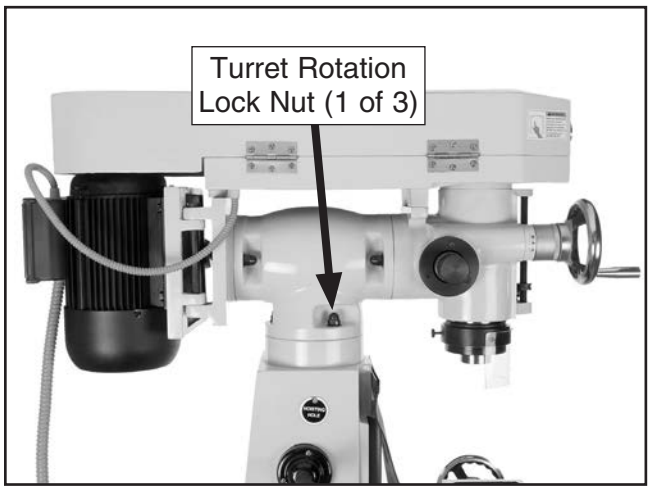


Figure 12. Turret rotation lock nut.

⚠WARNING

Before starting the mill, make sure you have performed the preceding assembly instructions, and you have read through the rest of the manual and are familiar with the various functions and safety features on this machine. Failure to follow this warning could result in serious personal injury or even death!

Test Run

Once the assembly is complete, test run your machine to make sure it runs properly and is ready for regular operation. The test run consists of verifying the following: 1) The motor powers up and runs correctly, 2) the spindle direction switch operates correctly, and 3) the V-belt cover safety switch works properly.

If, during the test run, you cannot easily locate the source of an unusual noise or vibration, stop using the machine immediately, then review **Troubleshooting** on **Page 37**.

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

To test run the machine:

1. Make sure you understand the safety instructions at the beginning of the manual and that the machine is set up properly.

2. Make sure all tools and objects used during setup are cleared away from the machine.

3. Connect the machine to the power source.

4. Verify that the machine is operating correctly by lifting the power ON/OFF switch cap and pushing the ON button.

   —When operating correctly, the machine runs smoothly with little or no vibration or rubbing noises.

   —Investigate and correct strange or unusual noises or vibrations before operating the machine further. Always turn the machine ***OFF*** and disconnect it from power before investigating or correcting potential problems.

5. Turn the machine ***OFF*** and wait for the spindle to come to a complete stop.

6. Use the spindle direction switch to change the direction of spindle rotation.

7. Turn the mill ***ON*** and verify that the spindle is rotating in the opposite direction.

8. Turn the machine ***OFF*** and wait for the spindle to stop.

9. Lift the V-belt cover so that it stays up on its own.

10. Keeping your hands away from the V-belts and pulleys, verify the V-belt cover safety switch is operating correctly by attempting to turn the machine ***ON***.

    —If the machine DOES NOT start, the V-belt cover safety switch is working correctly. The **Test Run** procedure is complete.

    —If the machine DOES start with the V-belt cover lifted, immediately turn the machine ***OFF*** and disconnect it from power. The V-belt cover safety switch is not working correctly. This safety feature must work properly before proceeding with regular operations. Call Tech Support for help.

After all of the **Test Run** procedures are successfully completed, proceed to **Spindle Break-in** on the next page.

Spindle Break-In

NOTICE

Successfully complete the spindle break-in procedure to avoid rapid wear of the spindle components when placed into operation.

To perform the spindle break-in procedure:

1. DISCONNECT MACHINE FROM POWER!
2. Configure the V-belts for a spindle speed of 360 RPM (refer to **Setting Spindle Speed** on **Page 27**).
3. Connect the machine to power, then turn it ***ON*** and let it run for 20 minutes.
4. Turn the machine ***OFF*** and wait for the spindle to stop.
5. Use the spindle direction switch to reverse the spindle rotation, then turn the mill ***ON*** and let it run for another 20 minutes.
6. Turn the machine ***OFF***, disconnect it from power, then configure the V-belts for a spindle speed of 2220 RPM.
7. Repeat **Steps 3–5** for this speed.
8. Turn the mill ***OFF***. The spindle break-in procedure is now complete and the machine is ready for operation.

Recommended Adjustments

For your convenience, the adjustments listed below have been performed at the factory.

However, because of the many variables involved with shipping, we recommend that you at least verify the following adjustments to ensure the best possible results from your new machine.

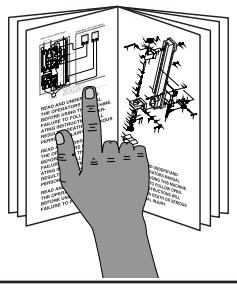
Step-by-step instructions for these adjustments can be found in the **SERVICE** section starting on **Page 37**.

Factory adjustments that should be verified:

1. Gib adjustment (**Page 39**).
2. Leadscrew backlash adjustment (**Page 40**).

SECTION 4: OPERATIONS

Operation Safety

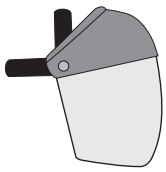


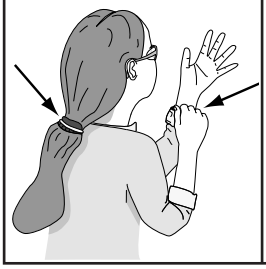
⚠WARNING

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

⚠WARNING

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





⚠WARNING

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

⚠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.

Table Movement

Your mill table has three paths of movement controlled by the handwheels or crank (see **Figure 13**): 1) Longitudinal (X-axis), 2) cross (Y-axis), and 3) vertical (Z-axis).

The graduated dials on the handwheels and crank are marked in increments of 0.001", with one full revolution moving the table 0.125".

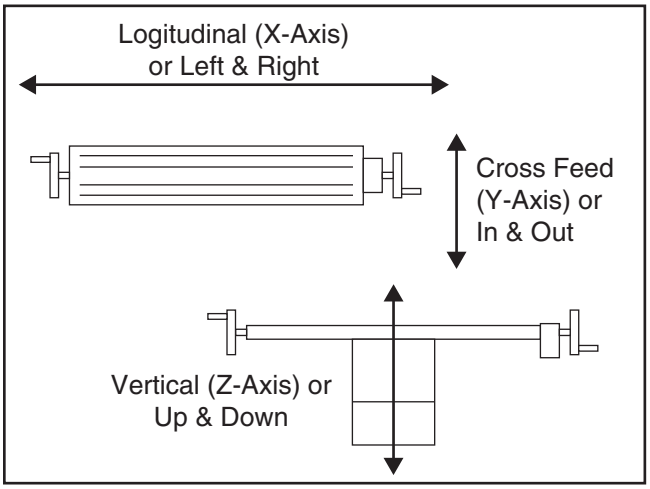


Figure 13. The three paths of table movement.

The Model G3103 also has a longitudinal power feed unit (refer to **Power Feed** on **Page 25** for detailed instructions).

NOTICE

If you have never used this type of machine or equipment before, WE STRONGLY RECOMMEND that you read books, trade 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.

Locks

Use the table, cross slide, and knee locks shown in **Figures 14–15** to secure the table in position when controlled movement of the workpiece and table are not needed during operation.

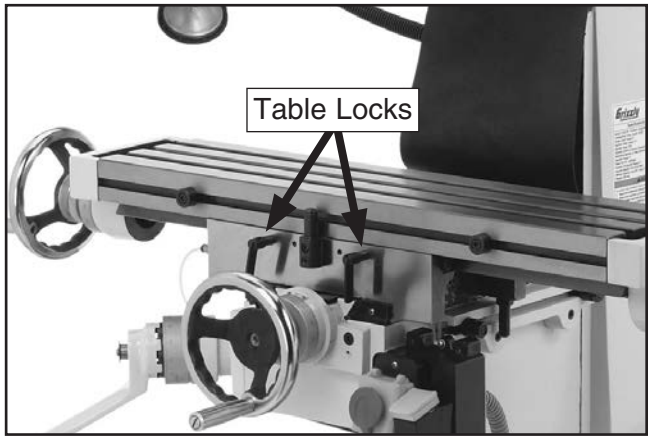


Figure 14. Table locks.

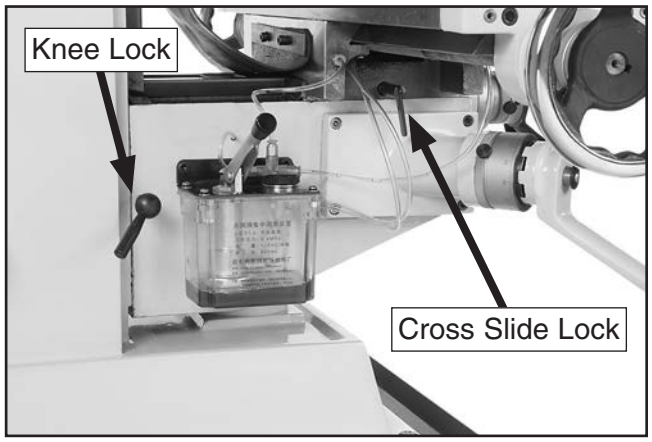


Figure 15. Knee and cross slide locks.

⚠CAUTION

Always keep the table locked in place unless controlled movement is required for your operation. Unexpected table movement during operations could cause the cutter to bind with the workpiece resulting in damage to the cutter and workpiece, and possible personal injury.

Limit Stops

Position the limit stops along the limit stop tracks to confine the distance the table or cross slide can travel (see **Figures 16–18**).

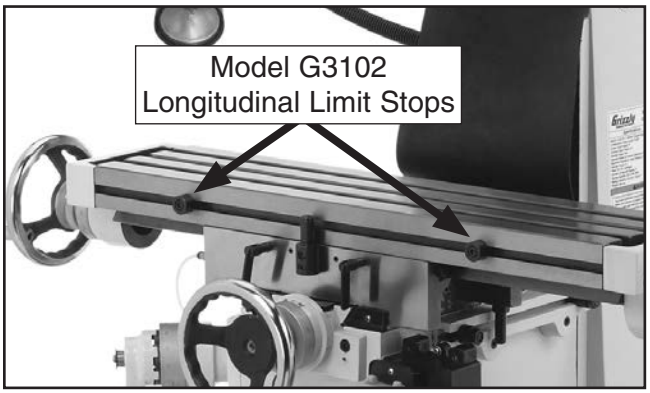


Figure 16. Model G3102 longitudinal limit stops.

Note: *The longitudinal limit stops on the Model G3103 are adjusted for use with the limit switch & power feed (refer to* ***Power Feed*** *on* ***Page 25*** *for more information).*

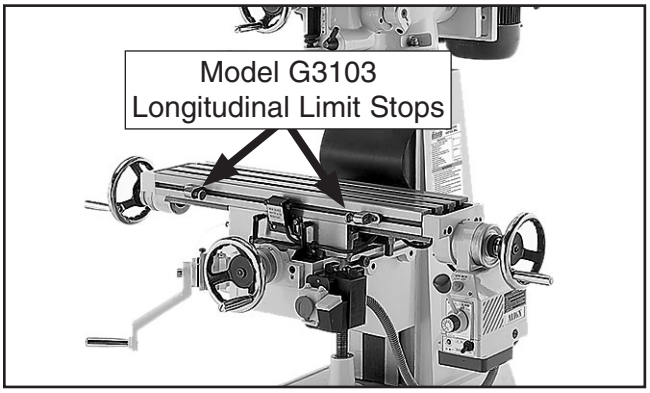


Figure 17. Model G3103 longitudinal limit stops.

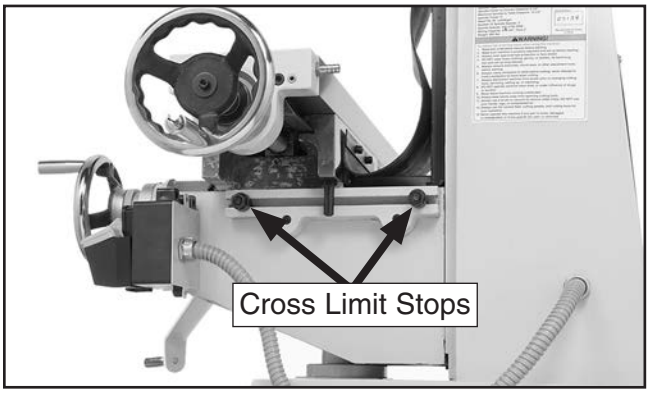


Figure 18. Cross limit stops.

Model G3103 Power Feed

The Model G3103 is equipped with a power feed system for controlled X-axis table movement. Refer to **Figure 19** and the following descriptions to understand the functions of these devices.

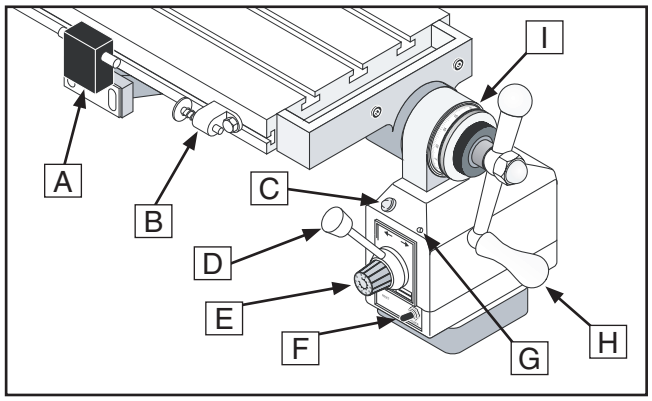


Figure 19. Longitudinal power feed system.

A. Limit Switch: Stops powered table movement when either limit stop presses a plunger on the switch.

B. Limit Stop: Activates the limit switch. Secure these devices along the limit slot to confine table movement.

C. Rapid Movement Button: When pressed, moves the table at the maximum speed in the direction selected.

D. Direction Lever: Starts, reverses, and stops longitudinal table movement.

E. Speed Dial: Controls the speed that the table moves—turn the dial clockwise to increase the speed.

F. ON/OFF Switch: The master power switch for the power feed.

G. Power Lamp: Lights when the power feed is turned ***ON***.

H. Ball Handle: Manually positions the table.

I. Graduated Dial: Marked in 0.001" increments, each complete revolution is equal to 0.125" of longitudinal table travel.

⚠CAUTION

Stay away from the spinning longitudinal handwheels when using the power feed to avoid entanglement and personal injury.

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

To operate the longitudinal power feed:

1. Loosen the table locks.

2. Position the longitudinal limit stops (see **Figure 20**) along the table to confine the longitudinal distance you want the table to travel, then tighten the cap screws to secure them in place.

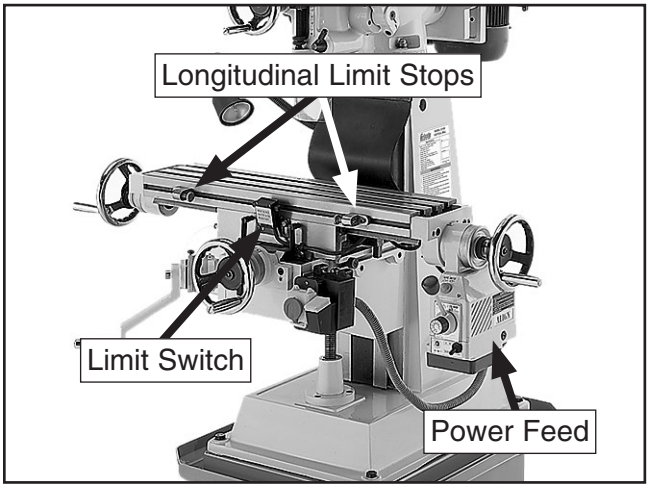


Figure 20. Longitudinal power feed, limit stops, and limit switch (Model G3103 only).

⚠CAUTION

Be sure there is enough running clearance between the table, spindle, vise/clamps, or jigs before turning the power feed *ON*. Be aware that all of these objects represent potential pinch points.

3. Rotate the speed dial all the way to the left, then use the direction lever to select the direction of table travel.

4. Flip the ON/OFF switch up to turn the power feed ***ON***.

5. Adjust the speed dial to move the table at the correct speed for your operation.

   Note: *Power feed rates are difficult to precisely adjust. We recommend that you experiment with different dial settings to find the feed rate that best works for your operation.*

6. When you are through using the power feed, move the direction lever to the center neutral position, then flip the ON/OFF switch down to turn the power feed ***OFF***.

Head Tilt

The head tilts 90° from left to right (see **Figure 21**).

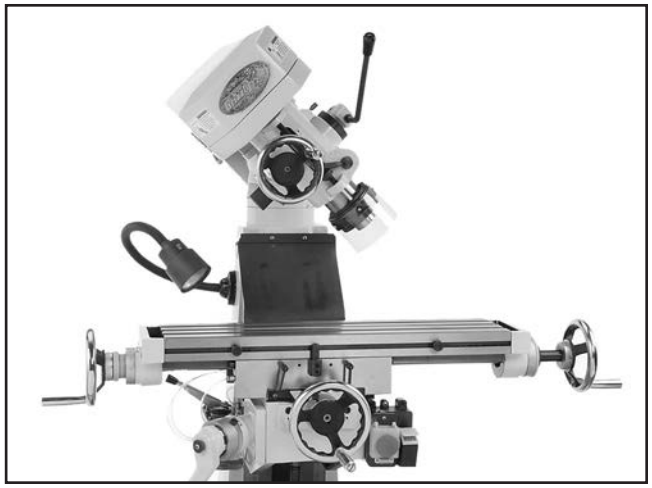


Figure 21. Head tilted 45° to the left.

Tools Needed	**Qty**
Wrench 19mm	1

To tilt the head:

1. DISCONNECT THE MILL FROM POWER!

2. Loosen the four locking hex nuts on either side of the turret (see **Figure 22**).

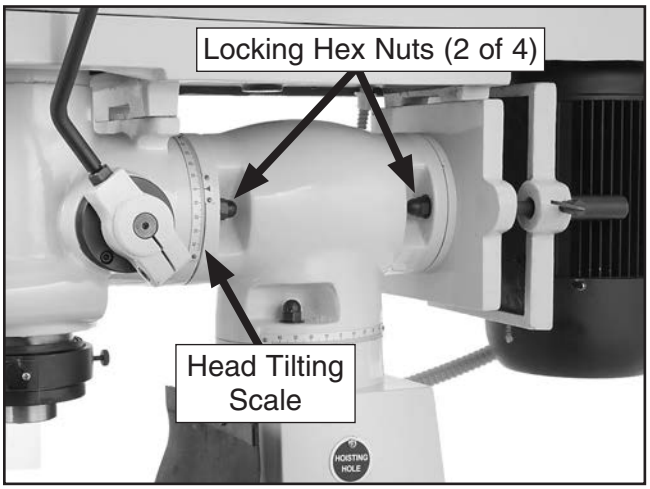


Figure 22. Head tilting locking hex nuts (2 of 4 shown).

3. Manually tilt the head to the left or right and use the head tilting scale to determine the angle.

4. Re-tighten the four locking hex nuts to secure the head.

Turret Rotation

The turret rotates 360° around the column (see **Figure 23**).

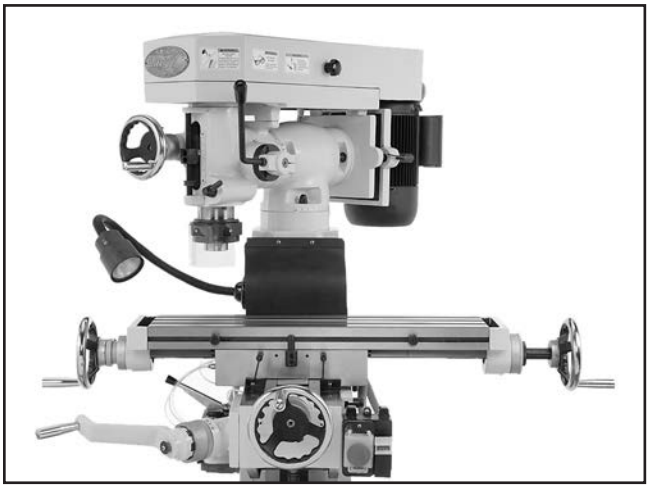


Figure 23. Head and turret rotated 45° to the left.

Tools Needed **Qty**
Wrench 19mm 1

To rotate the turret:

1. DISCONNECT THE MILL FROM POWER!

2. Loosen the three locking hex nuts on the turret (see **Figure 24**).

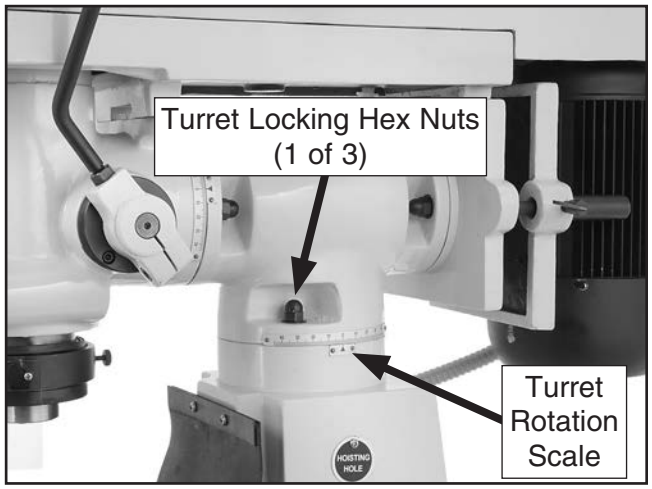


Figure 24. Turret rotation locking hex nuts (1 of 3 shown).

3. Manually rotate the head and turret around the column to the left or right and use the turret rotation scale to determine the amount of rotation.

4. Re-tighten the three turret locking hex nuts to secure the head and turret in place before beginning operations.

⚠CAUTION

Always lock the head firmly in place after adjusting its position. Unexpected movement of the head during operations could cause the cutter to bind with the workpiece causing damage to the cutter and workpiece, and possible personal injury.

Setting Spindle Speed

To select the correct spindle speed (RPM) for your milling operation, you will need to: 1) Determine the spindle speed needed for your workpiece, and 2) configure the V-belts for the selected spindle speed.

Calculating Spindle Speed

1. Use the table in **Figure 25** to determine the cutting speed or surface feet per minute (SFM) required for your workpiece material.

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 25. Cutting speed table for HSS cutting tools.

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

3. Use the following formula to calculate the required spindle speed (RPM) for your operation:

$$\frac{{}^{*}\text{Recommended Cutting Speed (FPM)} \times 12}{\text{Tool Dia. (inches)} \times 3.14} = \text{Spindle Speed}$$

Configuring V-Belts

1. DISCONNECT MACHINE FROM POWER!

2. Open the V-belt cover.

3. Support the motor with one hand and loosen the motor lock shown in **Figure 26**.

   Note: *The motor lock secures the position of the tension pin. This pin has an internal spring that keeps it in contact with the head casting when you loosen the lock and re-position the motor.*

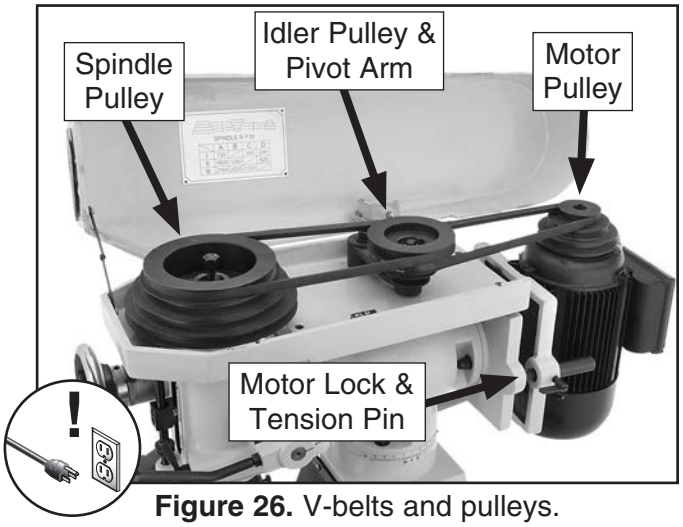
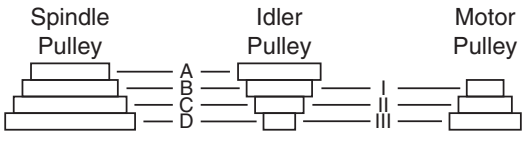


Figure 26. V-belts and pulleys.

4. Press the motor toward the front to release the tension on the V-belts, then use the motor lock to secure it in position.

5. Refer to the V-belt configuration chart in **Figure 27** (also found on the inside of the V-belt cover) to configure the V-belts on the pulleys for the selected spindle speed.



SPINDLE R.P.M.

	A	B	C	D
I	730		360	240
II	1600	1280		520
III	2760	2220	1320	

Figure 27. V-belt configuration chart.

6. When the V-belts are properly positioned on the pulleys, loosen the motor lock, pull the motor away from the machine with moderate force to tension the V-belts, then lock the tension pin in place by re-tightening the motor lock.

   Note: *The pivot arm of the idler pulley will equally distribute the tension between the two V-belts.*

7. Check the V-belt tension by applying moderate pressure on the V-belt with your finger between two pulleys. The proper amount of deflection of the V-belt for this machine is approximately ½" (see **Figure 28**).

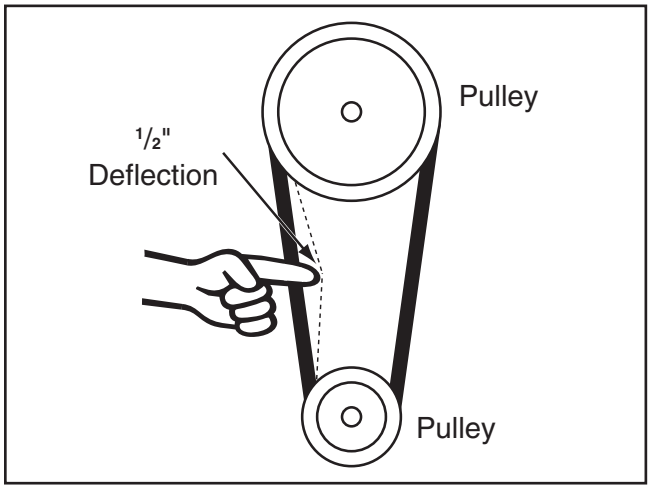


Figure 28. The correct amount of V-belt deflection when properly tensioned.

8. Close the V-belt cover before beginning operations.

Example of Setting Spindle Speed with HSS Cutting Tool

If you want make a surface cut on a hard cast iron workpiece using a ⅝" (0.625") HSS cutter, do the following:

Step 1: Examine the mill cutting speed table in **Figure 25** to find the recommended cutting speed to be 50 SFM, then use the formula on **Page 27** to find the correct spindle speed (RPM).

Step 2: 50 SFM (from the chart) x 4 = 200.

Step 3: 200 / 0.625" (diameter of cutter) = 320.

Step 4: Find the nearest spindle speed in the V-belt configuration chart in **Figure 27**, which is 360 RPM.

Step 5: Note the V-belt configuration in the chart above and to the left of the speed of 360 RPM, which is **CI**.

Step 6: Position the motor V-belt on the third pulley from the bottom of the idler and motor pulleys, as shown in **Figure 29**, then position the spindle V-belt on the second pulley from the bottom of the spindle and idler pulley.

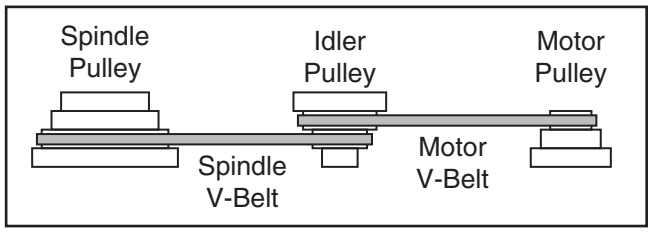


Figure 29. V-belts configured for a spindle speed of 360 RPM.

NOTICE

When using a carbide cutting tool, double the cutting speed found in the cutting speed table in *Figure 25* on *Page 27*.

Downfeed Controls

Refer to the following descriptions and **Figures 30–31** to understand the functions of the downfeed controls for the quill/spindle.

A. Quill Dog: Moves with the quill. Use the pointer on the side with the downfeed scale to determine the depth of downfeed travel.

B. Downfeed Scale: Displays in inches the amount of quill travel.

C. Coarse Downfeed Lever: When this lever is enabled with the downfeed selector, it raises/lowers the quill quickly.

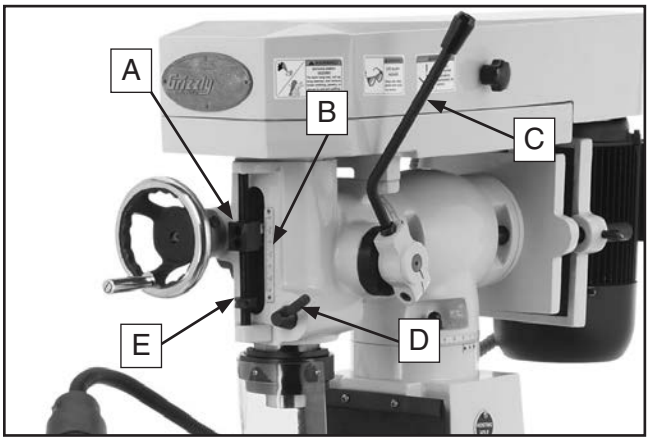


Figure 30. Downfeed controls viewed from the right side.

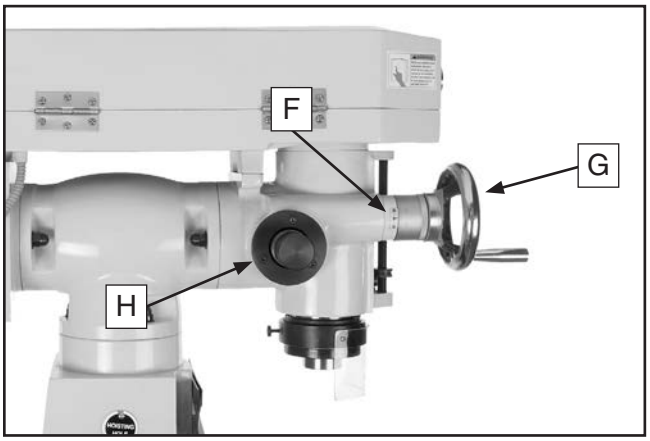


Figure 31. Downfeed controls viewed from the left side.

D. Quill Lock: Locks the quill in place but does not affect spindle rotation.

E. Downfeed Stop & Lock Wheels: Stops the downfeed travel when the quill dog reaches this point. Set the stop wheel along the downfeed scale for the desired depth of cut, then secure it in place by tightening the lock wheel up to it.

F. Graduated Scale: Displays quill travel in 0.001" increments when the fine downfeed handwheel is used, with one full revolution represents 0.100" of quill travel.

G. Fine Downfeed Handwheel: When enabled, it raises/lowers the quill in small increments.

H. Downfeed Selector: Enables either the coarse or fine downfeed control. Tighten the selector to enable the fine downfeed handwheel, and loosen it to enable the coarse downfeed lever.

Loading/Unloading Tooling

Your mill is equipped with a 7/16"-20 x 10½" drawbar (see **Figure 32**).

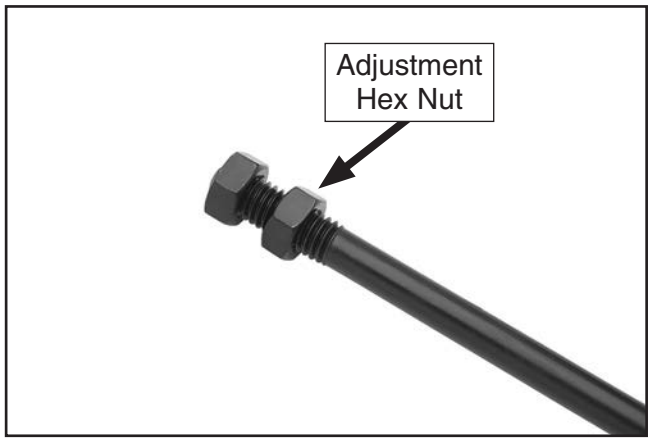


Figure 32. Drawbar and adjustment nut.

Tools Needed	**Qty**
Wrench 19mm	1

Loading Tooling

1. DISCONNECT MACHINE FROM POWER!

2. Clean any debris or oily substances from the mating surfaces of the spindle and tool tapers.

3. Open the V-belt cover, rotate the adjustment hex nut to the top of the drawbar, then place the drawbar through the top of the spindle (see **Figure 33**).

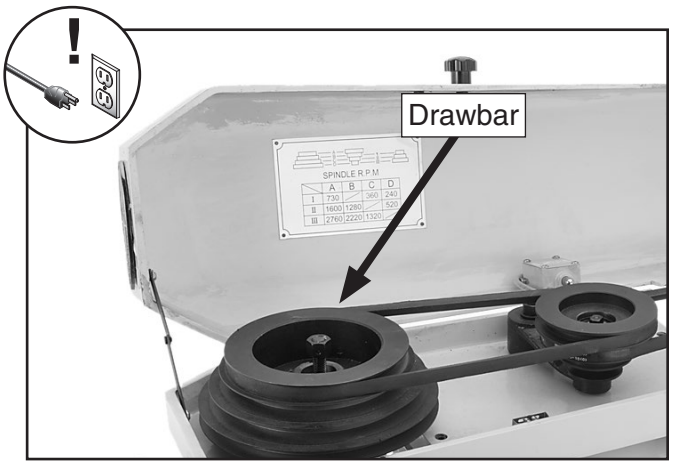


Figure 33. Drawbar inserted through the top of the spindle.

⚠CAUTION

Cutting tools are sharp and can quickly cut your hands. Always protect your hands when handling cutting tools.

4. Slowly rotate the tool as you insert it into the spindle until you feel the spindle key slip into the tool keyway (see **Figure 34**).

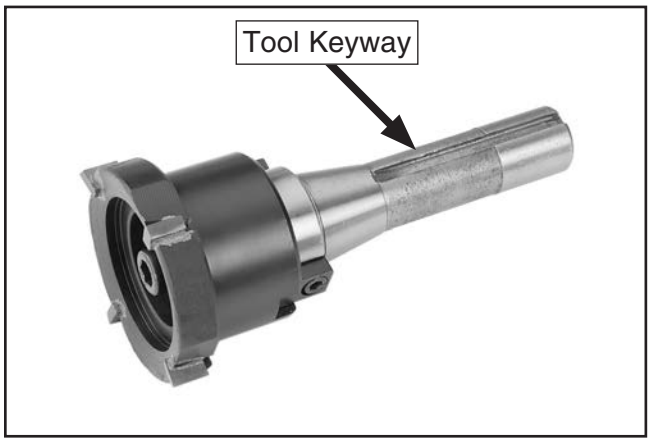


Figure 34. Example of the tool keyway.

5. Thread the drawbar into the tool by hand until it is snug.

6. Fully seat the tool into the spindle by tightening the drawbar adjustment hex nut down to draw the tool up only until it is snug.

   Note: *Over-tightening the drawbar could make removing the tool difficult.*

Unloading Tooling

1. DISCONNECT MACHINE FROM POWER!

2. Keep one hand on the tool, loosen the adjustment hex nut, then completely unthread the drawbar.

   —If the tool does not release from the spindle when the drawbar is unthreaded, turn the drawbar back into the tool two full turns, then tap the top of the drawbar with a dead-blow hammer or rubber mallet until the tool releases.

SECTION 5: ACCESSORIES

H6087—2 Axis Digital Readout (8" x 20")
H7848—3 Axis Digital Readout (8" x 20" x 16¾")
You will be amazed the list of features for these DROs that include: selectable resolution down to 5μm, absolute/incremental coordinate display, arc function, line of holes function, angled cuts function, 199 user defined datum points, centering/cutter offset, double sealed scales, inches/millimeters, calculator with trig functions, and linear error compensation.

Figure 35. 3 Axis Digital Read Out.

G1075—52-PC. Clamping Kit
This clamping kit includes 24 studs, 6 step block pairs, 6 T-nuts, 6 flange nuts, 4 coupling nuts, and 6 end hold-downs. The rack is slotted so it can be mounted close to the machine for easy access. Made for ½" T-slots.

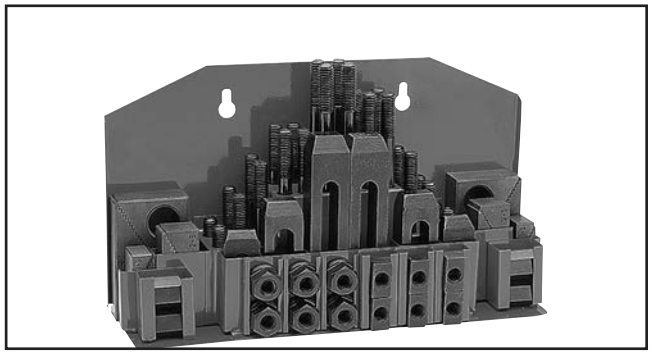


Figure 36. G1075 52-PC. Clamping Kit.

H8257—Primrose Armor Plate with Moly-D Machine and Way Oil 1 Quart
This superior machine and way lubricant prevents stick slip and chatter due to anti-friction capabilities resulting in greater precision machining capabilities. Provides the thinnest oil film possible while effectively providing needed lubrication and rust/corrosion protection. Adhesive/cohesive components are added for vertical surfaces. Resists squeeze out, running, dripping and non-gumming.

"This is good stuff! I use it on my lathes at home."
S. Balolia – President

Figure 37. Primrose Armor Plate Lubricant.

T10063—Milling Vise 12 5/16" x 6 9/16"
T10064—Milling Vise 17⅛" x 8¾"
- Ultra precise in flatness, parallelism and verticality.
- Anti-lift mechanism ensures the workpiece does not lift when jaws are tightened.
- Ductile iron body.
- Flame hardened vise bed and jaws.
- Sealed bearing system.
- 8200 lbs. of clamping pressure.

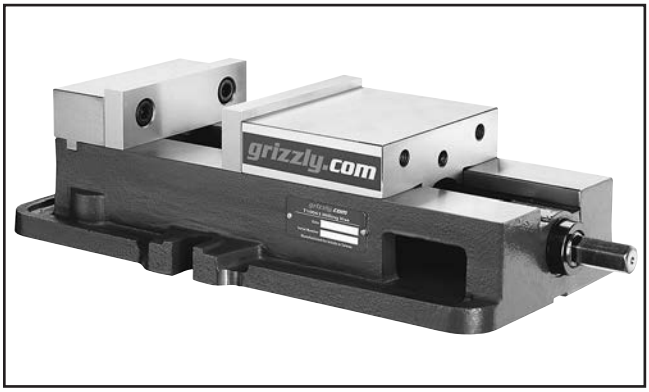


Figure 38. T10064 Milling vise (handle included, but not shown.

G9299—10" Yuasa-Type Rotary Table
This high precision rotary table features extra deep coolant channels, dual positive action locks, very low profiles, 10 second vernier scales, gear drives with oil immersion and satin chrome dials. See the current Grizzly catalog for full specifications. Features: 4.330" overall height (horizontal), 6.750" height to center hole (vertical), #3 Morse Taper, 0.465" T-slot width, and 117 lb approximate shipping weight.

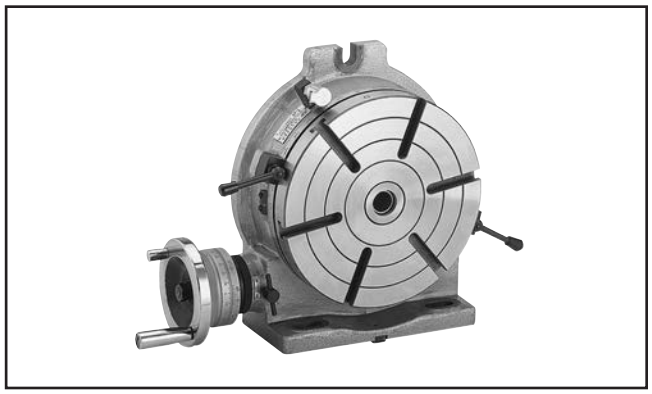


Figure 39. G9299 10" Yuasa-Type Rotary Table.

T20501—Face Shield Crown Protector 4"
T20502—Face Shield Crown Protector 7"
T20503—Face Shield Window
T20451—"Kirova" Clear Safety Glasses
T20452—"Kirova" Anti-Reflective S. Glasses
H7194—Bifocal Safety Glasses 1.5
H7195—Bifocal Safety Glasses 2.0
H7196—Bifocal Safety Glasses 2.5

Figure 40. Our most popular eye protection.

G5562—SLIPIT® 1 Qt. Gel
G5563—SLIPIT® 12 oz Spray
G2871—Boeshield® T-9 12 oz Spray
G2870—Boeshield® T-9 4 oz Spray
H3788—G96® Gun Treatment 12 oz Spray
H3789—G96® Gun Treatment 4.5 oz Spray

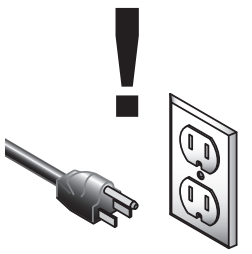
Figure 41. Recommended products for protecting unpainted cast iron/steel part on machinery.

H8370—Power Feed for Mills
If you want to get the most out of your mill, you really need a power feed. This power feed comes with everything required to start milling with exact control. Comes supplied with a mounting bracket, gear, auto-stop limit switch with moveable stop pins, gear guard, and motor. Specs: 0–140 RPM, 200 RPM rapid switch, 440 in/lb. maximum torque, 110V 60Hz motor, 4:1 bevel drive gear.

Figure 42. H8370 power feed.

Call 1-800-523-4777 To Order

SECTION 6: MAINTENANCE



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

Schedule

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

Before Daily Operation:
- Check/tighten loose mounting bolts.
- Check/sharpen/replace worn or damaged tooling.
- Check/repair/replace worn or damaged wires.
- Check for any other unsafe condition.
- Use the one-shot way oiler (**Page 34**).

Every 8 Hours of Operation:
- Use the one-shot way oiler (**Page 34**).
- Clean the mill.

Every 40 Hours of Operation:
- Lubricate the longitudinal, cross, and vertical leadscrews (**Page 34**).

Every 120 Hours of Operation:
- Lubricate quill downfeed gears (**Page 35**).

Note: *This maintenance schedule is based on average usage. Adjust the maintenance schedule to match your actual usage to keep your mill running smoothly and to protect your investment.*

Cleaning & Protecting

Use a brush and shop vacuum to remove chips and debris from the mill. Never blow off the mill with compressed air, as this will force metal chips deep into the mechanisms and may injure yourself or bystanders.

Wipe built-up grime from the mill with a rag and a mild solvent. Remove any rust from the unpainted cast iron surfaces of your mill, then treat them with regular applications of products such as Primrose Armor Plate Way Oil**,** G96® Gun Treatment, SLIPIT®, or Boeshield® T-9 (see **Section 5: Accessories** on **Page 31** for more details).

Lubrication

Your mill has numerous metal sliding surfaces that require proper lubrication to help ensure smooth and long-lasting mill operation.

Other than 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.

NOTICE

Follow the lubrication practices outlined in this manual. Failure to do so could lead to premature failure of your mill and will void the warranty.

One-Shot Way Oiler

Lubricant	Frequency	Qty
ISO 68 Lubricant or Equivalent	Every 8 Hours of Operation	1 Pump

The oil lines running from the one-shot oiler feed lubrication to the ways of the table, cross slide, and knee (column).

Make sure the oil reservoir is full, then pull the handle (see **Figure 43**) and release it to send the lubricant through the lines.

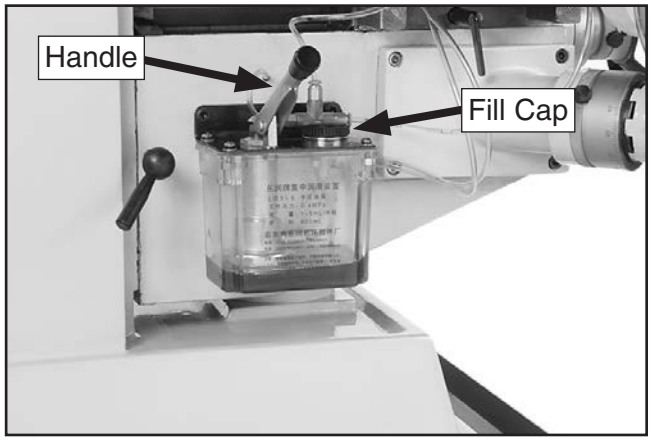


Figure 43. One-shot way oiler.

Leadscrews

Lubricant	Frequency	Qty
NLGI #2 Grease or Equivalent	Every 40 Hours of Operation	Thin Coat

Use solvent to clean the debris and grime from the leadscrews shown in **Figures 44–46**, then wipe them dry. Brush a thin coat of lubricant on the threads of the leadscrews, then rotate the leadscrew through its full path to distribute the grease.

Figure 44. Longitudinal leadscrew as viewed from the underneath right side of the table.

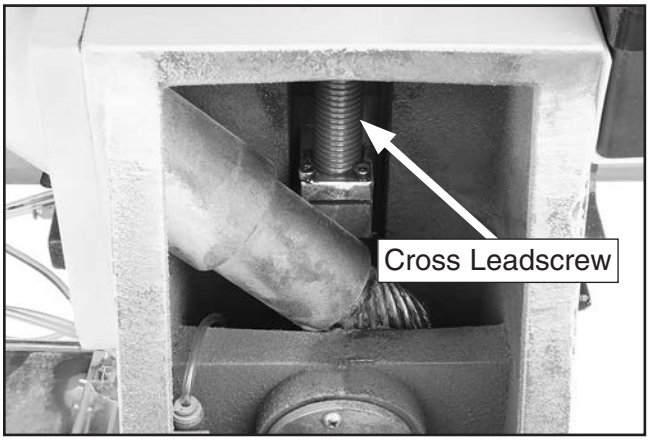


Figure 45. Cross leadscrew viewed from underneath the knee.

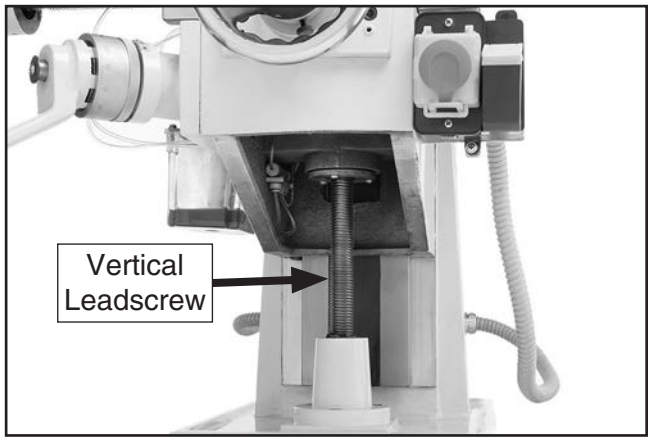


Figure 46. Vertical leadscrew viewed from underneath the knee.

Quill Downfeed Gears

Lubricant	Frequency	Qty
NLGI #2 Grease or Equivalent	Every 120 Hours of Operation	Thin Coat

Tools Needed **Qty**
Hex Wrench 4mm..... 1
Hex Wrench 6mm..... 1
External Retaining Ring Pliers 1

To lubricate the quill downfeed gears:

1. DISCONNECT MACHINE FROM POWER!

2. Use the quill lock to keep the quill from moving during the following steps.

3. Loosen the set screw securing the coarse downfeed lever assembly to the quill gear shaft, then remove the assembly from the shaft (see **Figure 47**).

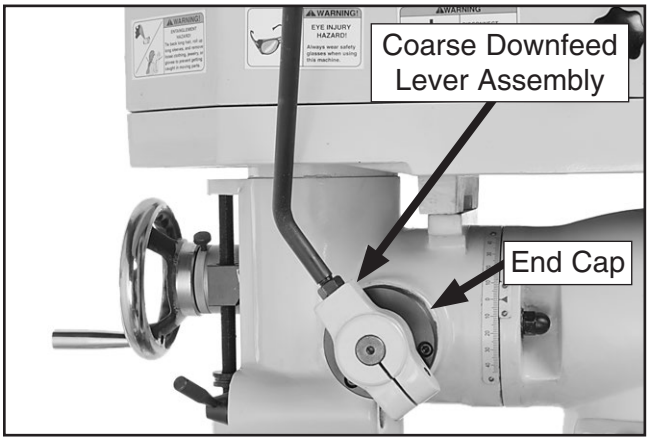


Figure 47. Coarse downfeed lever assembly and end cap.

4. Remove the external retaining ring in front of the end cap from the quill gear shaft, then remove the end cap.

   Note: *As the end cap becomes loose, it will spin slightly as the spring inside the cavity unwinds—this is normal.*

5. Clean away any grime from inside the cavity and the gear shaft, then use the nozzle of a grease gun to apply a small amount of lubricant to the teeth of the gear shaft and the quill pinion (see **Figure 48**).

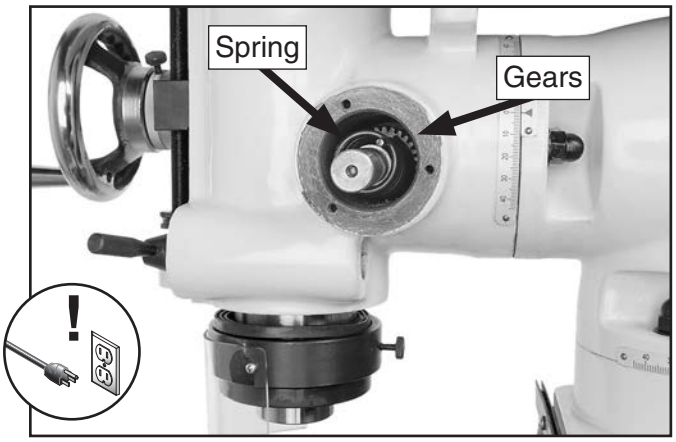


Figure 48. Right side of quill gear shaft exposed.

6. Remove the end cap from the left side of the quill gear shaft that surrounds the downfeed selector (see **Figure 49**).

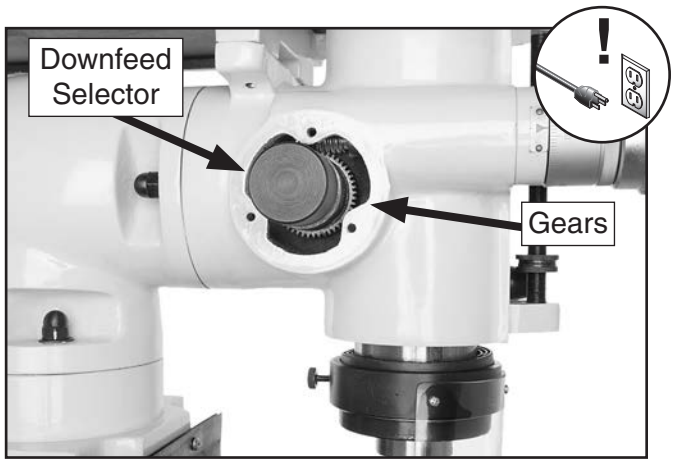


Figure 49. Left side of quill gear shaft exposed.

7. Clean away any grime from inside the cavity and the gear shaft, then use the nozzle of a grease gun to apply a small amount of lubricant to the teeth of the gear shaft and the fine downfeed worm gear.

8. Re-install the parts in the reverse order they were removed.

Note: *When re-installing the end cap on the right side of the quill gear shaft, insert the prong on the spring into the inside hole of the end cap shown in* ***Figure 50****, then rotate the end cap approximately ⅓ turn clockwise to tension the spring before securing it to the head.*

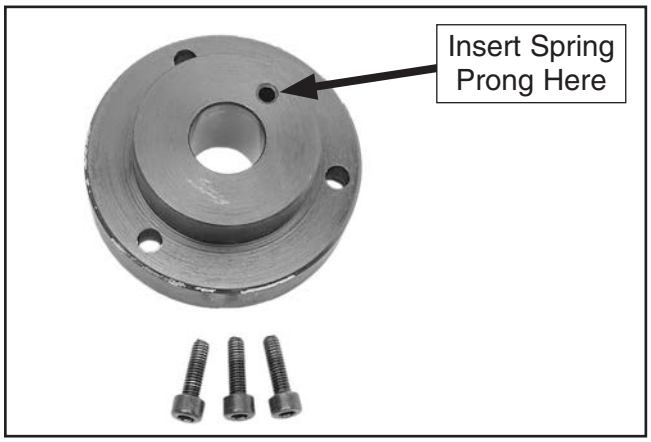
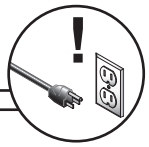


Figure 50. End cap from the right side of the quill gear shaft.

SECTION 7: SERVICE

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

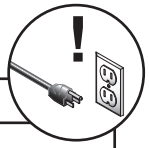
Troubleshooting



Motor & Electrical

Symptom	Possible Cause	Possible Solution
Machine does not start or a breaker trips.	1. ON/OFF button is at fault. 2. Plug/receptacle is at fault or wired incorrectly. 3. Power supply is switched ***OFF*** or is at fault. 4. Motor connection wired incorrectly. 5. Motor windings or motor is at fault.	1. Replace faulty ON/OFF button. 2. Test for good contacts; correct the wiring. 3. Ensure hot lines have correct voltage on all legs and main power supply is switched ***ON***. 4. Correct motor wiring connections (**Page 42**). 5. Replace motor.
Machine stalls or is overloaded.	1. Machine is undersized for the task. 2. Workpiece alignment is poor. 3. Dull or incorrect cutting tool. 4. Motor connection is wired incorrectly. 5. Plug/receptacle is at fault. 6. V-belts loose or worn. 7. Pulley/sprocket slipping on shaft. 8. Motor bearings are at fault. 9. Motor has overheated. 10. Motor is at fault.	1. Use smaller sharp tooling; reduce the feed rate; reduce the spindle RPM; use coolant. 2. Eliminate workpiece binding; use vise or clamps as required for workpiece alignment control. 3. Use sharp and correct cutting tool for the operation. 4. Correct motor wiring connections (**Page 42**). 5. Test for good contacts; correct the wiring. 6. Properly tension V-belts (**Page 28**). 7. Replace loose pulley/shaft. 8. Test by rotating shaft; rotational grinding/loose shaft requires bearing replacement. 9. Clean off motor, let cool, and reduce workload. 10. Test and repair or replace.
Machine has vibration or noisy operation.	1. Tool holder or cutter is at fault. 2. Workpiece alignment is poor. 3. Motor or component is loose. 4. Pulley is loose. 5. Machine is incorrectly mounted or sits unevenly. 6. Motor fan is rubbing on fan cover. 7. Motor bearings are at fault.	1. Replace out-of-round tool holder; replace/resharpen cutter; use appropriate feed rate and cutting RPM. 2. Eliminate workpiece binding; use vise or clamps as required for workpiece alignment control. 3. Inspect/replace stripped or damaged bolts/nuts, and re-tighten with thread locking fluid. 4. Realign/replace shaft, pulley, setscrew, and key as required. 5. Tighten/replace mounting bolts in floor; relocate/shim machine. 6. Replace dented fan cover or fan. 7. Test by rotating shaft; rotational grinding/loose shaft requires bearing replacement.

Operation



Symptom	Possible Cause	Possible Solution
Tool slips in collet.	1. Collet is not fully drawn into spindle taper. 2. Wrong size collet. 3. Debris on collet or spindle mating surface. 4. Excessive depth of cut.	1. Snug up drawbar. 2. Use correct collet for shank diameter. 3. Remove oil and debris from collet and spindle mating surfaces, then re-install. 4. Decrease depth of cut and allow chips to clear.
Breaking tooling.	1. Spindle speed/feed rate too fast. 2. Tooling getting too hot. 3. Excessive depth of cut.	1. Use correct spindle RPM and feed rate (**Page 27**). 2. Use coolant; reduce spindle RPM/feed rate. 3. Decrease depth of cut and allow chips to clear.
Machine is loud when cutting; overheats or bogs down in the cut.	1. Excessive depth of cut. 2. Dull tooling. 3. Feed rate too fast.	1. Decrease depth of cut and allow chips to clear. 2. Use sharp tooling. 3. Decrease feed rate.
Workpiece vibrates or chatters during operation.	1. Locks not tight. 2. Workpiece not securely clamped to table or mill vise. 3. Tooling not secure or is damaged. 4. Spindle speed/feed rate too fast. 5. Gibs are too loose.	1. Tighten all locks on mill that are not associated with movement for the operation. 2. Check that clamping is tight and sufficient for the operation; make sure mill vise is tight to table. 3. Secure tooling; replace if damaged. 4. Use correct spindle RPM and feed rate (**Page 27**). 5. Adjust gibs properly (**Page 39**).
Table hard to move.	1. Locks are tightened down. 2. Chips have loaded up on the ways. 3. Ways are dry and in need of lubrication. 4. Gibs are too tight.	1. Fully loosen locks needed for movement. 2. Frequently clean away chips that load up during operations. 3. Use one-shot way oiler to lubricate ways (**Page 34**). 4. Adjust gibs properly (**Page 39**).
Bad surface finish.	1. Wrong spindle speed/feed rate. 2. Dull/damaged tooling; wrong tooling for operation. 3. Wrong spindle rotation for tooling. 4. Workpiece not securely clamped to table or mill vise. 5. Gibs are too loose.	1. Use correct spindle RPM and feed rate (**Page 27**). 2. Sharpen/replace tooling; use correct tooling for operation. 3. Check for proper spindle rotation for tooling. 4. Check that clamping is tight and sufficient for the operation; make sure mill vise is tight to table. 5. Adjust gibs properly (**Page 39**).

Adjusting Gibs

Gibs control the accuracy of the table movements along the ways. Tight gibs make the movements more accurate, but harder to move. Loose gibs make the movements sloppy, but easier to move. The goal of gib adjustment is to remove unnecessary sloppiness without causing the ways to bind.

NOTICE

Excessively loose gibs may cause poor workpiece finishes, and may cause undue wear of sliding surfaces and ways. Overtightening the gibs may cause premature wear of these sliding devices.

Each sliding surface for the table, cross slide, and knee has a tapered gib that is sandwiched between the stationary and moving surfaces. The cross slide and knee have a gib on both sides. There are two adjustment screws, one on each end of each gib, that move the tapered gib back and forth increasing or decreasing friction of the sliding surfaces.

To adjust the gibs:

1. DISCONNECT THE MILL FROM POWER!

Note: *Minor parts will need to be removed to access some of the gib adjustment screws.*

2. Loosen one adjustment screw and tighten the other the same amount to move the gib until you feel a slight drag in that path of movement.

Note: *Refer to **Figures 51–53** for the locations of the table, cross slide, and knee gib adjustment screws.*

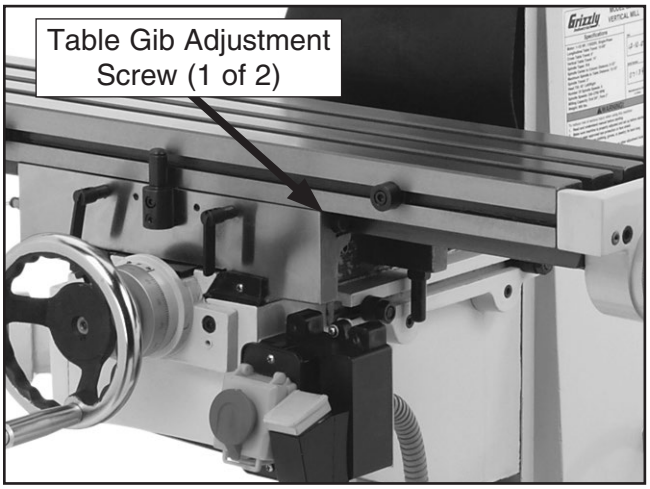


Figure 51. Table gib adjustment screw (1 of 2).

Figure 52. Saddle gib adjustment screw (1 of 2).

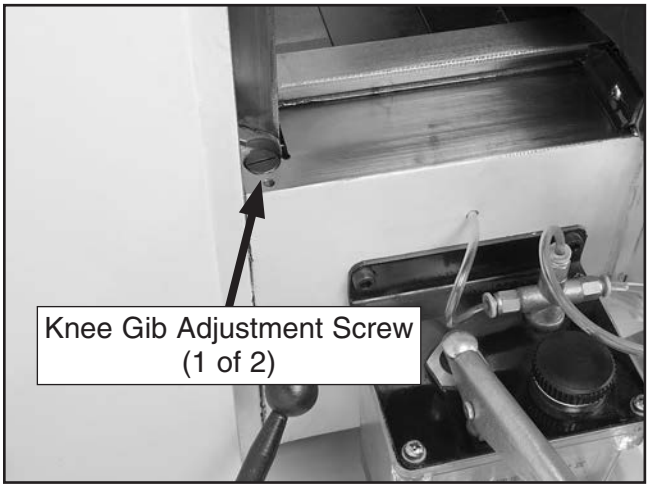


Figure 53. Knee gib adjustment screw (1 of 2).

Adjusting Backlash

Leadscrew backlash is the amount of play in a lead screw. It is felt when turning a handwheel in one direction, then turning it in the other direction. The distance that the handwheel moves without moving the leadscrew or attached components is the backlash.

When turning the handwheel in only one direction, the backlash is taken up with the initial turn of the handwheel and will not reoccur until the handwheel is rotated in the opposite direction.

When adjusting backlash, tighten the components enough to remove backlash, but not so much that the components bind the leadscrew, making it hard to turn. Overtightening will cause excessive wear to the leadscrew and nut. Generally, 0.005"–0.010" of backlash is acceptable.

The backlash of the longitudinal and cross leadscrew can be adjusted by changing the gap in the leadscrew nuts (see **Figures 54–55**).

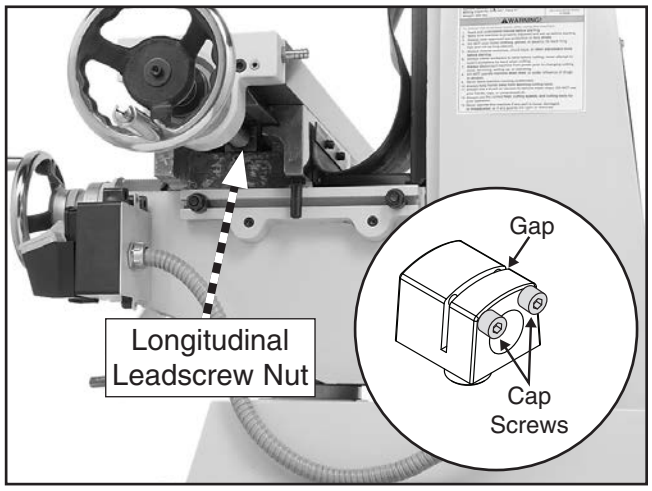


Figure 54. Longitudinal leadscrew nut.

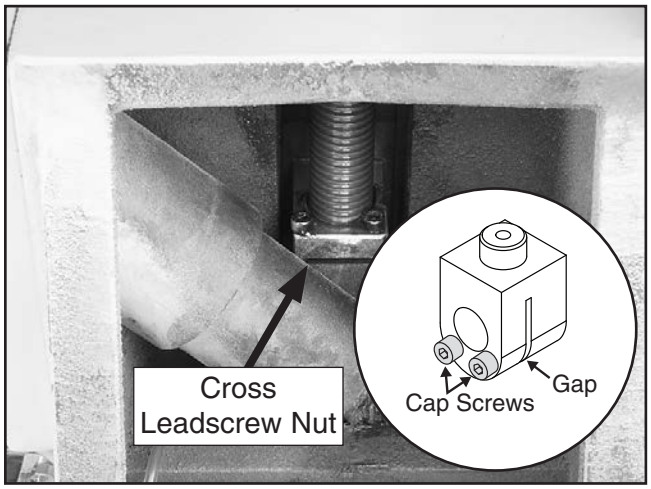


Figure 55. Cross leadscrew nut.

Use a 5mm hex wrench to tighten or loosen the cap screws on the leadscrew nuts shown in **Figures 54–55**, then test the amount of backlash by slowly rocking the handwheels back-and-forth.

SECTION 8: ELECTRICAL

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

⚠WARNING
Electrical Safety Instructions

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

2. **CIRCUIT REQUIREMENTS.** You MUST follow the **CIRCUIT REQUIREMENTS** section on **Page 13**. **If you are unsure about the wiring codes in your area or you plan to connect your machine to a shared circuit, consult a qualified electrician.**

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

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

5. **CONVERTING TO 220V OPERATION.** The Model G3102/G3103 is pre-wired for 110V operation. If you plan to operate your machine at 220V, you must do the following: 1) install the 220V power switch (included), 2) rewire the motor, 3) rewire the transformer on the control panel, and 4) change the power plug and receptacle to NEMA 6-15 type. Refer to **Pages 14 & 44** for instructions and wiring diagrams.

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

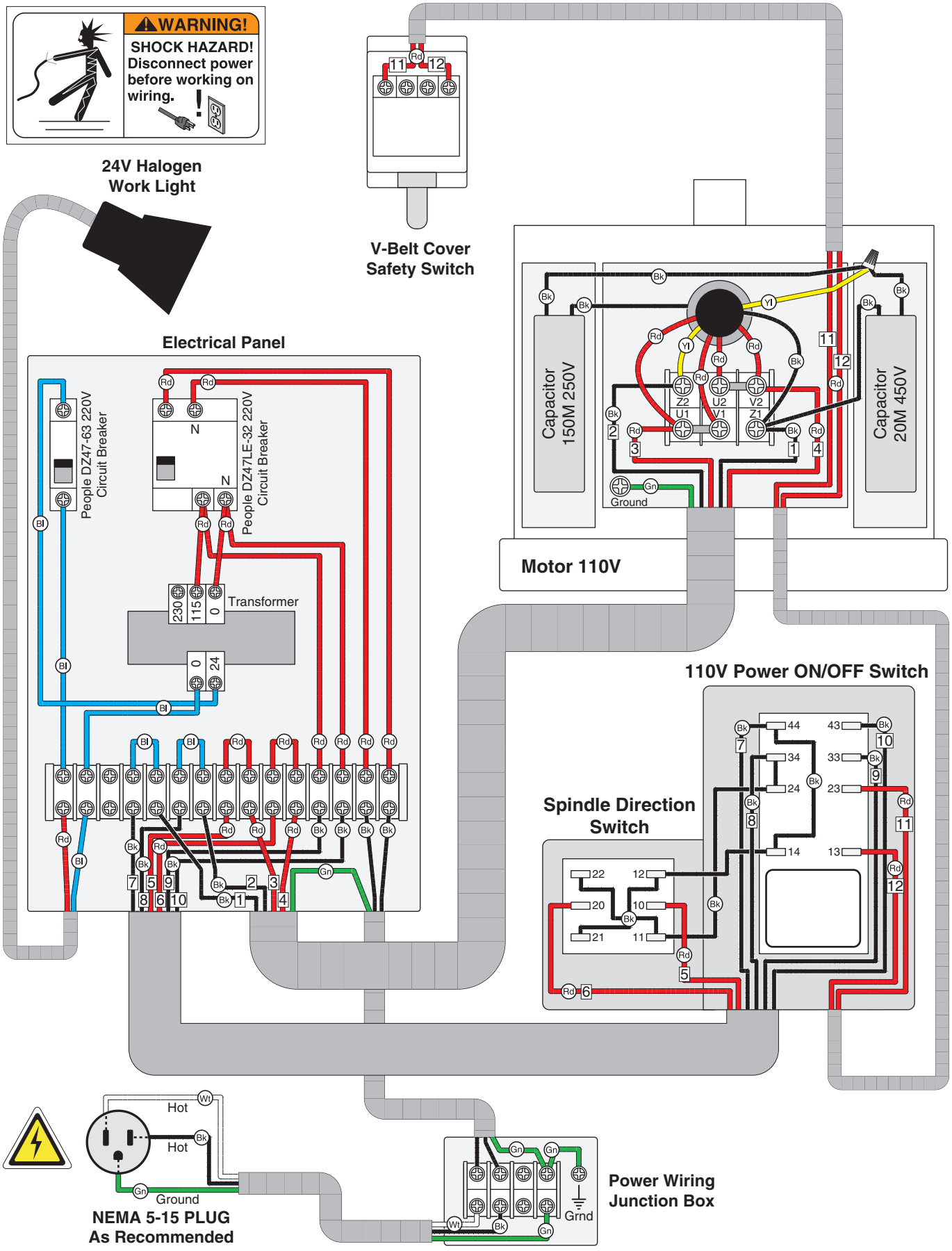
NOTICE

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

COLOR KEY

BLACK	Bk
WHITE	Wt
GREEN	Gn
RED	Rd
YELLOW	Yl
BLUE	Bl
BROWN	Br
GRAY	Gy
Grn/Ylw	Yg

110V Electrical Wiring Diagram



STOP *READ ELECTRICAL SAFETY ON PAGE 41!*

Electrical Wiring Photos

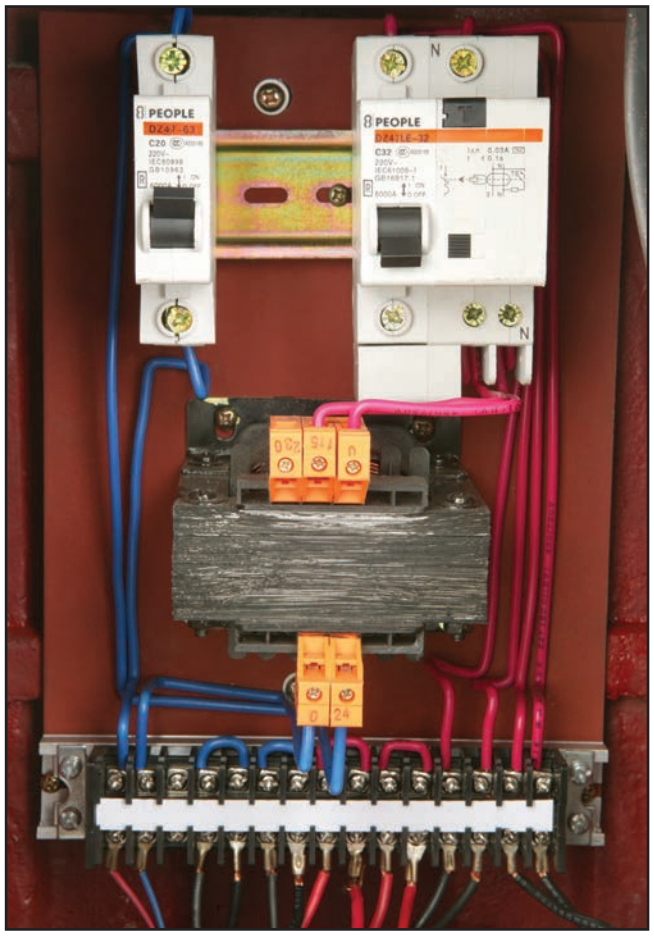


Figure 56. Electrical panel wiring.

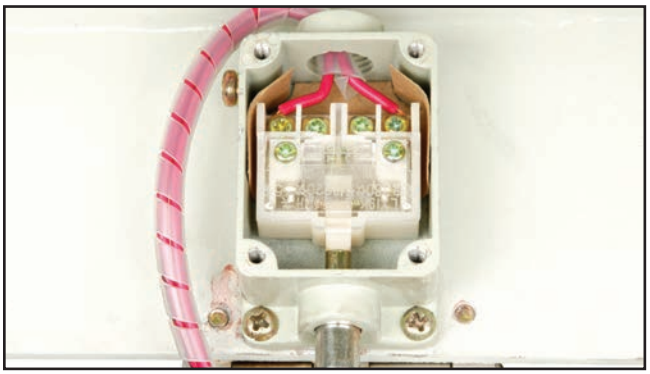


Figure 58. V-belt cover safety switch wiring.

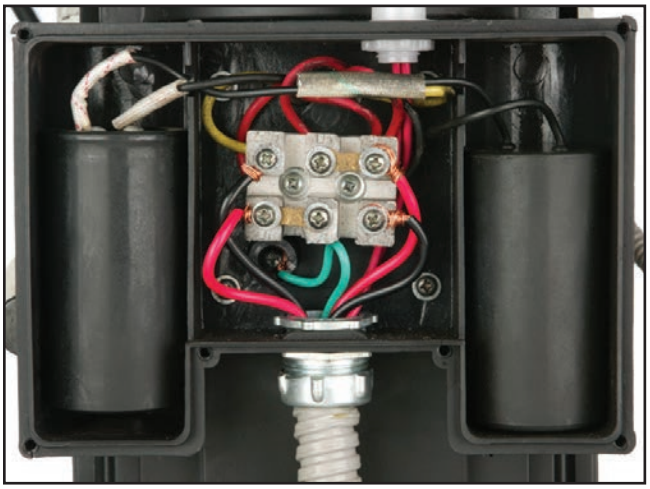


Figure 59. 110V motor wiring.

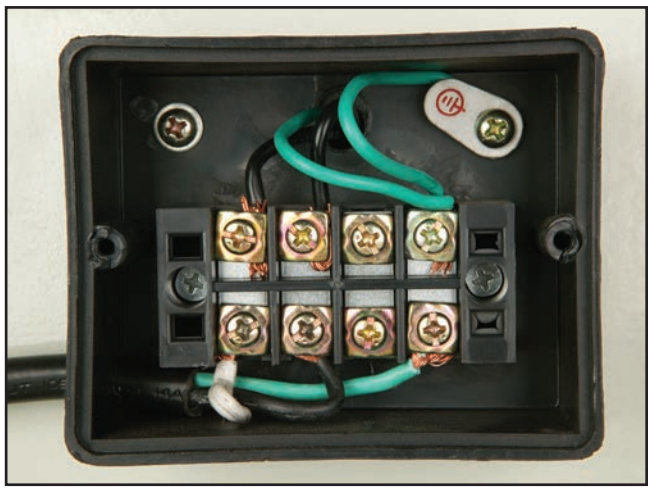


Figure 57. Power wiring junction box.

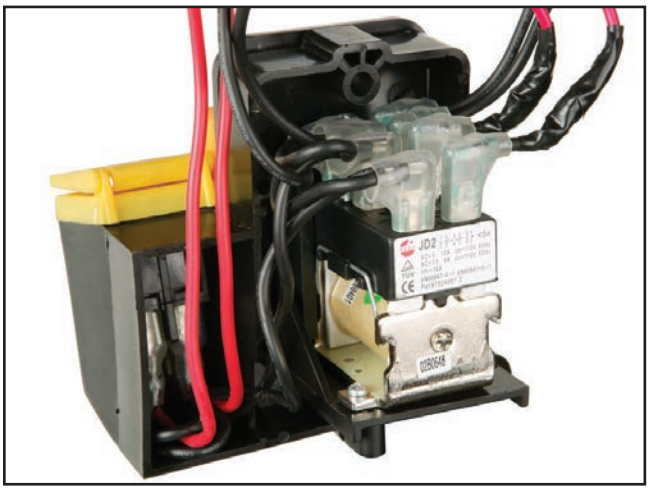
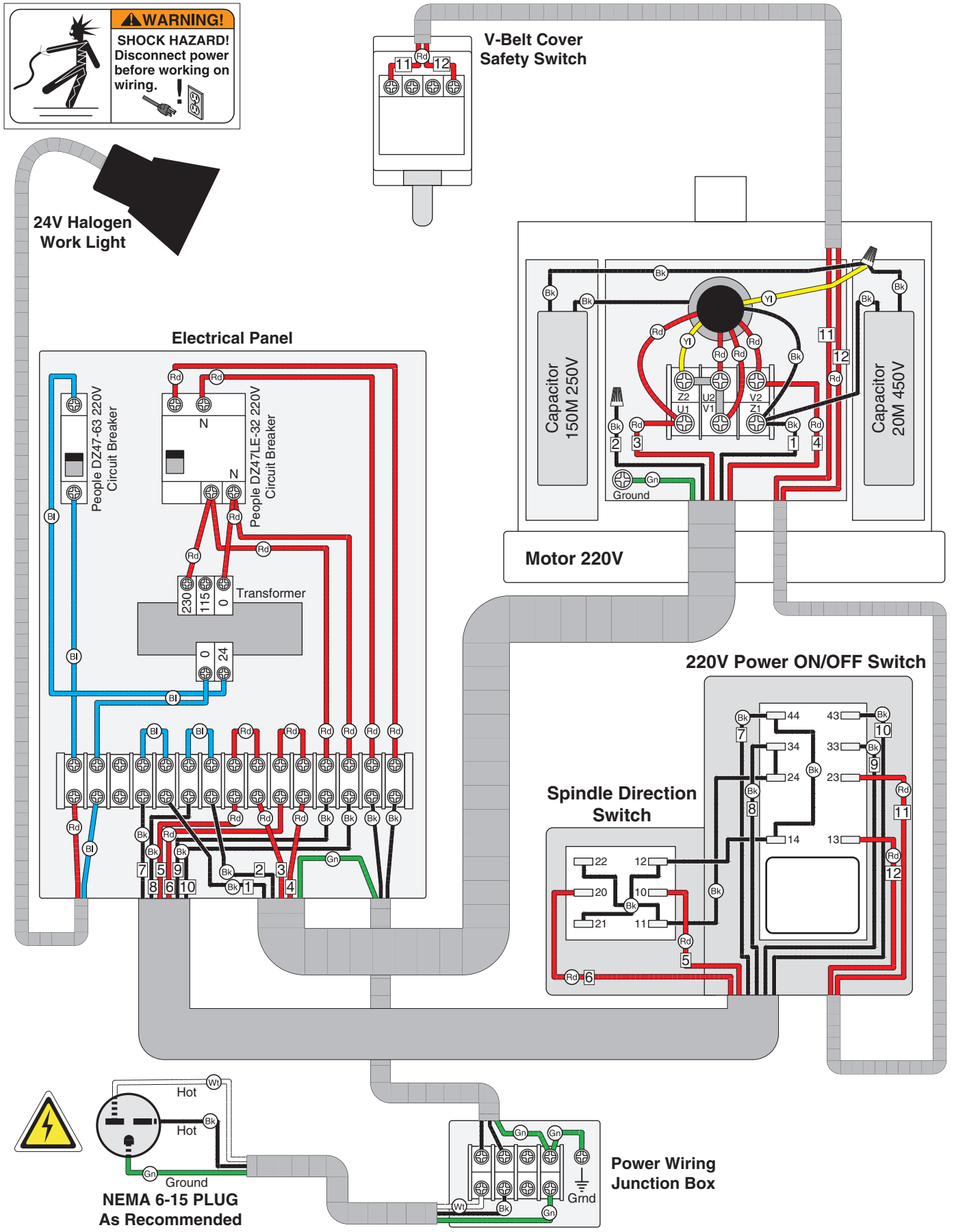


Figure 60. Power ON/OFF and spindle direction switches.

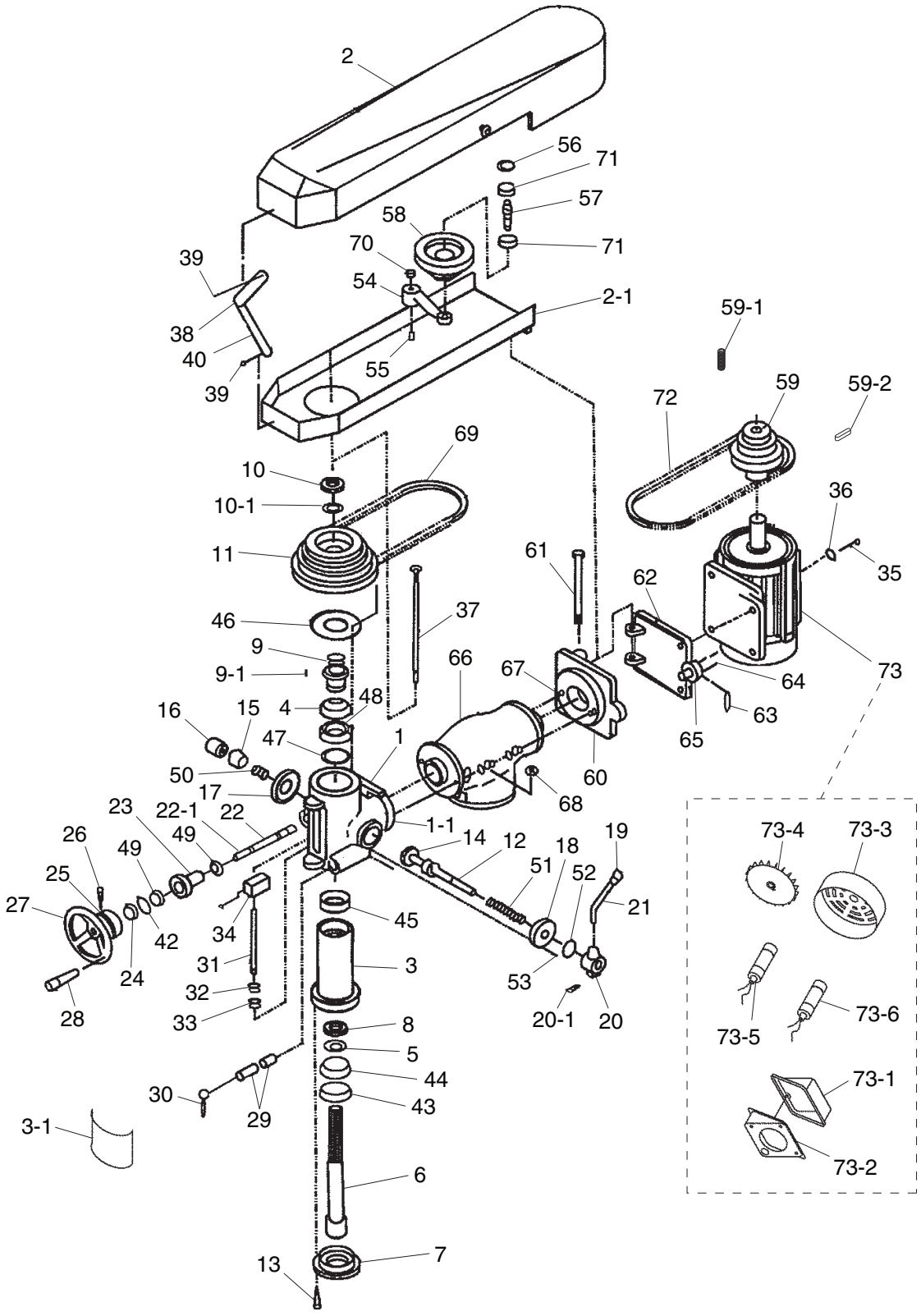
220V Wiring Diagram



STOP *READ ELECTRICAL SAFETY ON PAGE 41!*

SECTION 9: PARTS

Head Breakdown

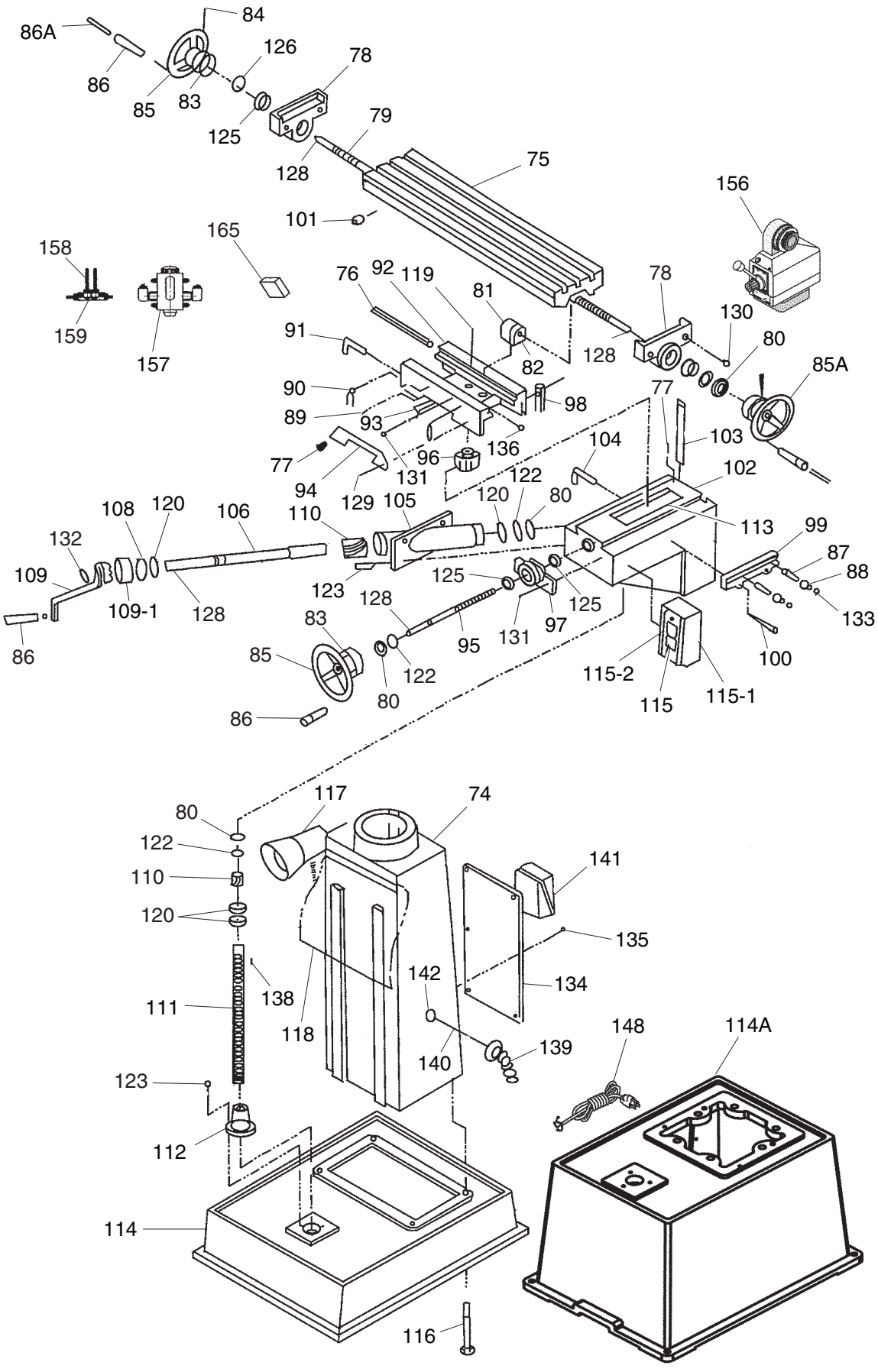


Head Parts List

REF	PART #	DESCRIPTION
1	P3102001	HEAD CASTING
1-1	P3102001-1	HEAD ROTATION SCALE
2	P3102002	BELT HOUSING COVER
2-1	P3102002-1	BELT HOUSING BASE
3	P3102003	QUILL
3-1	P3102003-1	PLASTIC QUILL GUARD
4	P3102004	BALL BEARING 6009ZZ
5	P3102005	SPANNER WASHER 30MM
6	P3102006	SPINDLE
7	P3102007	SPINDLE END CAP
8	P3102008	SPANNER NUT M30-1.5
9	P3102009	SPINDLE SLEEVE
9-1	P3102009-1	KEY 5 X 5 X 20
10	P3102010	SPANNER NUT M45-1.5
10-1	P3102010-1	SPANNER WASHER 45MM
11	P3102011	SPINDLE PULLEY
12	P3102012	QUILL PINION SHAFT
13	P3102013	CAP SCREW M5-.8 X 10
14	P3102014	CLUTCH WORM GEAR
15	P3102015	CLUTCH
16	P3102016	CLUTCH ADJUSTING NUT M18-1.5 X 35
17	P3102017	CLUTCH COVER
18	P3102018	PINION SHAFT SEAT
19	P3102019	KNOB
20	P3102020	COARSE LEVER HUB
20-1	P3102020-1	SET SCREW M6-1 X 45
21	P3102021	COARSE LEVER
22	P3102022	WORM SHAFT
22-1	P3102022-1	KEY 5 X 5 X 20
23	P3102023	WORM SHAFT SLEEVE
24	P3102024	SPANNER NUT M14-1.5
25	P3102025	GRADUATED DIAL
26	P3102026	DIAL SCREW M5-.8 X 10
27	P3102027	HANDWHEEL
28	P3102028	HANDLE
29	P3102029	QUILL LOCKING BLOCK
30	P3102030	QUILL LOCKING BOLT M10-1.25 X 101
31	P3102031	DOWNFEED SCREW M12-1.25 X 184
32	P3102032	DOWNFEED STOP WHEEL M12-1.25
33	P3102033	DOWNFEED LOCK WHEEL M12-1.25
34	P3102034	QUILL DOG
35	P3102035	HEX BOLT M8-1.25 X 20
36	P3102036	FLAT WASHER 8MM
37	P3102037	DRAWBAR

REF	PART #	DESCRIPTION
38	P3102038	RIVET C5 X 15
39	P3102039	PHLP HD SCR M5-.8 X 10
40	P3102040	COVER SUPPORTING ARM
42	P3102042	SPANNER WASHER M14
43	P3102043	ANGULAR THRUST BEARING 36207
44	P3102044	BALL BEARING 6007ZZ
45	P3102045	BALL BEARING 6206ZZ
46	P3102046	BEARING COVER
47	P3102047	EXT RETAINING RING 75MM
48	P3102048	BALL BEARING 6009ZZ
49	P3102049	THRUST BEARING 8102
50	P3102050	COMPRESSION SPRING
51	P3102051	COMPRESSION SPRING
52	P3102052	EXT RETAINING RING 19MM
53	P3102053	CAP SCREW M6-1 X 15
54	P3102054	SWIVEL ARM
55	P3102055	SWIVEL STUD
56	P3102056	EXT RETAINING RING 35MM
57	P3102057	PULLEY PIVOT STUD
58	P3102058	IDLER PULLEY
59	P3102059	MOTOR PULLEY
59-1	P3102059-1	SET SCREW M6-1 X 16
59-2	P3102059-2	KEY 6 X 6 X 30
60	P3102060	MOTOR MOUNT ADAPTER
61	P3102061	MOTOR PIVOT BOLT
62	P3102062	MOTOR MOUNT
63	P3102063	V-BELT TENSION LOCK
64	P3102064	V-BELT TENSION SHAFT
65	P3102065	V-BELT TENSION PIN
66	P3102066	TURRET
67	P3102067	SPECIAL BOLT
68	P3102068	FLAT WASHER 10MM
69	P3102069	V-BELT 4L370
70	P3102070	HEX NUT M12-1.75
71	P3102071	BALL BEARING 6003ZZ
72	P3102072	V-BELT 4L320
73	P3102073	MOTOR 1-1/2HP 110/220V 1PH
73-1	P3102073-1	MOTOR JUNCTION BOX COVER
73-2	P3102073-2	MOTOR JUNCTION BOX
73-3	P3102073-3	MOTOR FAN COVER
73-4	P3102073-4	MOTOR FAN
73-5	P3102073-5	S CAPACITOR 150M 250V 1-5/8 X 3-1/8
73-6	P3102073-6	R CAPACITOR 20M 450V 1-5/8 X 3-1/8

Main Breakdown

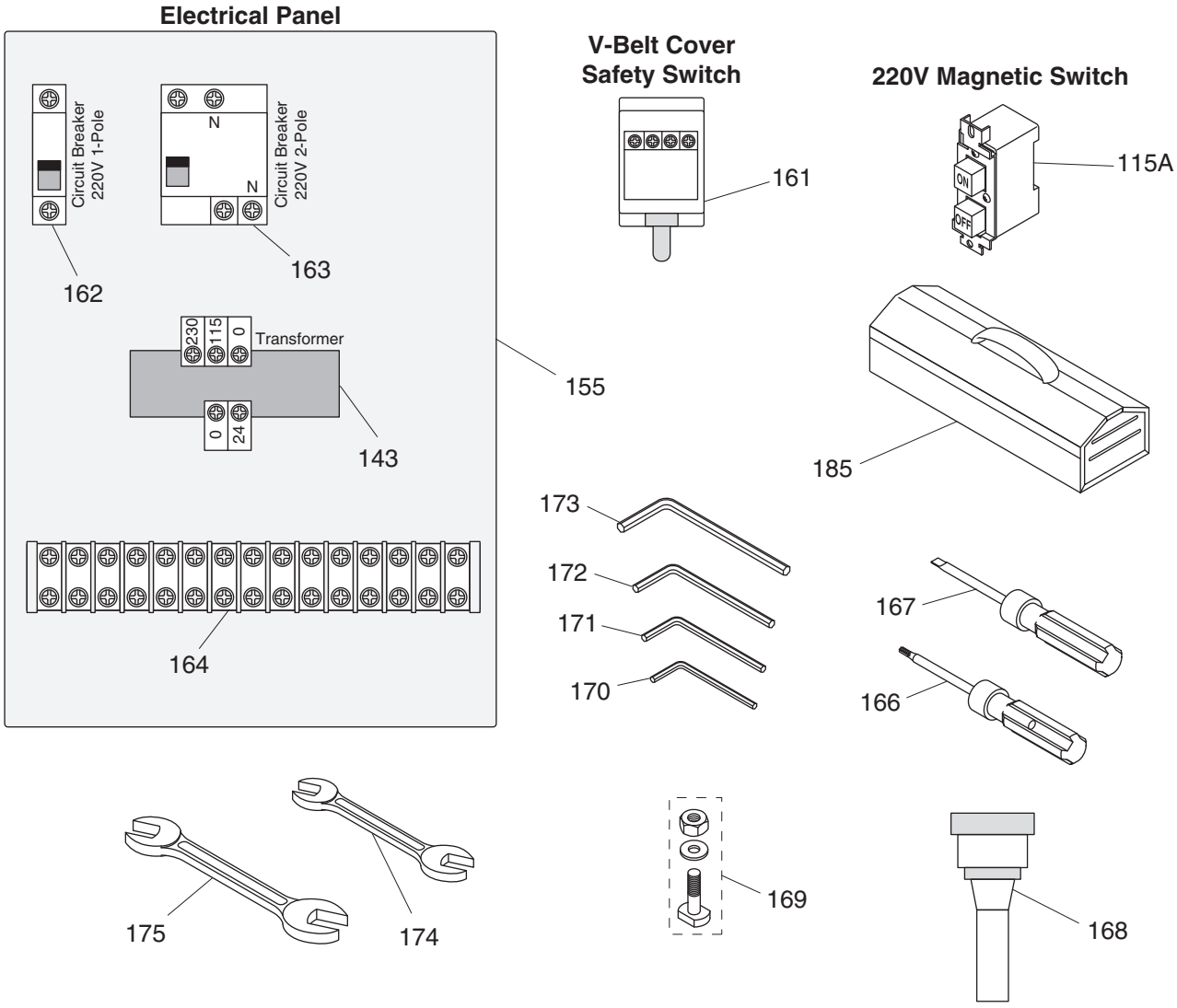


Main Parts List

REF	PART #	DESCRIPTION
74	P3102074	COLUMN
75	P3102075	TABLE
76	P3102076	TABLE GIB
77	P3102077	GIB ADJUSTING SCREW M6-1 X 32
78	P3102078	LONGITUDINAL BEARING BRACKET
79	P3102079	LONGITUDINAL LEADSCREW
80	P3102080	SPANNER NUT M20-1.5
81	P3102081	LONGITUDINAL LEADSCREW NUT
82	P3102082	CAP SCREW M5-.8 X 25
83	P3102083	GRADUATED DIAL
84	P3102084	DIAL SCREW M5-.8 X 10
85	P3102085	HANDWHEEL LEFT-SIDE
85A	P3102085A	HANDWHEEL RIGHT SIDE
86	P3102086	HANDLE
86A	P3102086A	HANDLE SCREWS
87	P3102087	CAP SCREW M6-1 X 15
88	P3102088	SLEEVE
89	P3102089	LIMIT STOP
90	P3102090	TABLE LOCK M10-1.5 X 24
91	P3102091	TABLE LOCK HANDLE
92	P3102092	SADDLE
93	P3102093	SADDLE GIB
94	P3102094	RUBBER WIPER
95	P3102095	CROSS LEADSCREW
96	P3102096	CROSS LEADSCREW NUT
97	P3102097	BEARING BRACKET
98	P3102098	CROSS STOP BLOCK
99	P3102099	LIMIT STOP TRACK
100	P3102100	CAP SCREW M6-1 X 25
101	P3102101	SLEEVE
102	P3102102	KNEE
103	P3102103	KNEE GIB
104	P3102104	KNEE LOCK M5-.8 X 10
105	P3102105	GEAR SHAFT SLEEVE
106	P3102106	GEAR SHAFT
108	P3102108	ELEVATING HANDLE CLUTCH
109	P3102109	ELEVATION CRANK
109-1	P3102109-1	KNEE GRADUATED DIAL
110	P3102110	ELEVATION GEAR
111	P3102111	ELEVATION LEADSCREW
112	P3102112	ELEVATION LEADSCREW BASE

REF	PART #	DESCRIPTION
113	P3102113	CHIP GUARD
114	P3102114	BASE
114A	P3102114A	CABINET STAND
115	P3102115	POWER ON/OFF SWITCH 110V
115-1	P3102115-1	BLACK SWITCH BOX
115-2	P3102115-2	SPINDLE DIRECTION SWITCH
116	P3102116	HEX BOLT M14-2 X 50
117	P3102117	HALOGEN WORK LIGHT ASSY
118	P3102118	WAY COVER
119	P3102119	HEX BOLT M6-1 X 25
120	P3102120	BALL BEARING 6905ZZ
122	P3102122	SPANNER WASHER 20MM
123	P3102123	CAP SCREW M8-1.25 X 20
125	P3102125	BALL BEARING 6806ZZ
126	P3102126	SPECIAL RETAINING RING
128	P3102128	KEY 5 X 5 X 20
129	P3102129	PHLP HD SCR M8-1.25 X 20
130	P3102130	CAP SCREW M8-1.25 X 20
131	P3102131	CAP SCREW M8-1.25 X 20
132	P3102132	SPECIAL RETAINING RING
133	P3102133	CAP SCREW M5-.8 X 25
134	P3102134	REAR COLUMN COVER
135	P3102135	PHLP HD SCR M6-1 X 16
136	P3102136	CAP SCREW M8-1.25 X 45
138	P3102138	KEY 5 X 5 X 20
139	P3102139	CONDUIT
140	P3102140	CABLE
141	P3102141	POWER WIRING JUNCTION BOX
142	P3102142	STRAIN RELIEF
148	P3102148	POWER CABLE W/ 5-15 PLUG
156	P3102156	POWER FEED (3103)
157	P3102157	ONE-SHOT OILER
158	P3102158	TUBING 4.1MM
159	P3102159	BRASS COUPLING 8MM
161	P3102161	V-BELT SAFETY SWITCH
162	P3102162	CIRCUIT BREAKER 1-POLE 220V
163	P3102163	CIRCUIT BREAKER 2-POLE 220V
164	P3102164	TERMINAL BLOCK 15-POLE
165	P3102165	LONG. LIMIT BLOCK (G3102)
165	P3102165	LONG. LIMIT SWITCH (G3103)

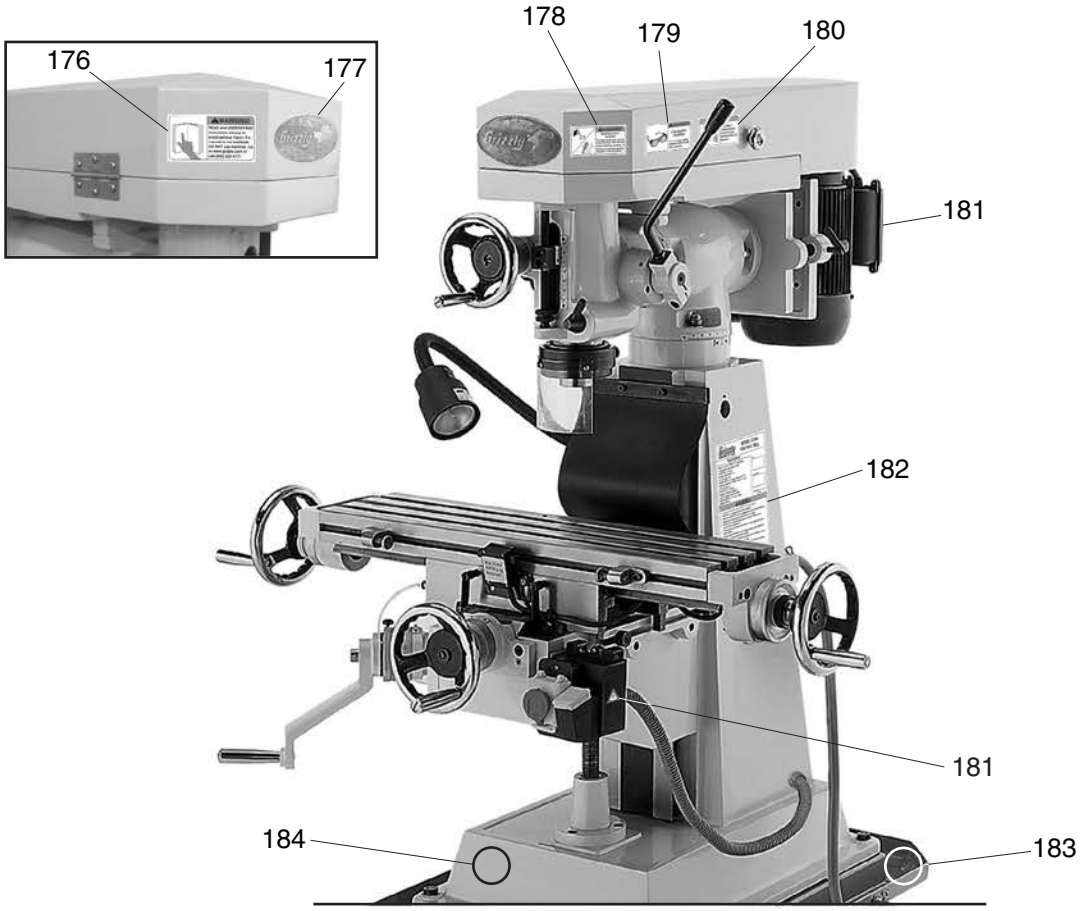
Electrical & Accessories Breakdown



REF	PART #	DESCRIPTION
115A	P3102115A	MAGNETIC SWITCH 220V
143	P3102143	TRANSFORMER
161	P3102161	V-BELT SAFETY SWITCH
162	P3102162	CIRCUIT BREAKER 1-POLE 220V
163	P3102163	CIRCUIT BREAKER 2-POLE 220V
164	P3102164	TERMINAL BLOCK 15-POLE
166	P3102166	SCREWDRIVER PHILLIPS #2
167	P3102167	SCREWDRIVER FLAT #2
168	P3102168	FACE MILL 3"

REF	PART #	DESCRIPTION
169	P3102169	T-BOLT ASSY 3/8-16
170	P3102170	HEX WRENCH 3MM
171	P3102171	HEX WRENCH 4MM
172	P3102172	HEX WRENCH 5MM
173	P3102173	HEX WRENCH 6MM
174	P3102174	WRENCH 10/12MM
175	P3102175	WRENCH 16/18MM
185	P3102185	TOOLBOX

Label Placement



REF	PART #	DESCRIPTION
176	P3102176	READ MANUAL LABEL HL
177	P3102177	GRIZZLY OVAL NAMPLATE SMALL
178	P3102178	ENTANGLEMENT HAZARD LABEL HL
179	P3102179	EYE INJURY HAZARD LABEL HL
180	P3102180	DISCONNECT WARNING LABEL HL

REF	PART #	DESCRIPTION
181	P3102181	ELECTRICITY LABEL
182	P3102182	MACHINE ID LABEL (G3102))
182	P3103182	MACHINE ID LABEL (G3103)
183	P3102183	GRIZZLY GREEN TOUCH UP PAINT
184	P3102184	GRIZZLY PUTTY TOUCH UP PAINT

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

3. What is your annual household income?

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

4. What is your age group?

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

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

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

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

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

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

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

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

10. Comments: _____

_____

_____

_____

CUT ALONG DOTTED LINE

FOLD ALONG DOTTED LINE

Place
Stamp
Here

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

FOLD ALONG DOTTED LINE

Send a Grizzly Catalog to a friend:

Name_____

Street_____

City_____State_____Zip_____

TAPE ALONG EDGES--PLEASE DO NOT STAPLE

WARRANTY AND RETURNS

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

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

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

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

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

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