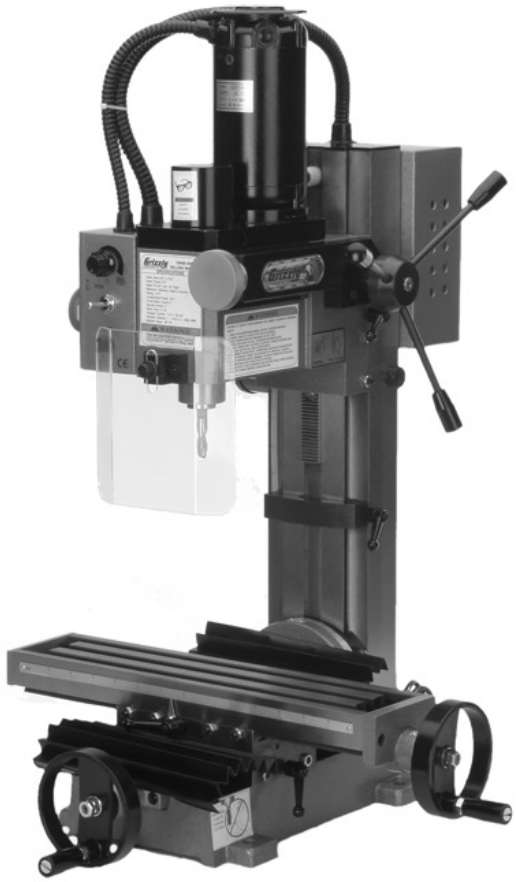
MODEL G8689
MINI MILL
OWNER'S MANUAL



(FOR MODELS MANUFACTURED SINCE 8/06) #PC7203 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.

Table of Contents

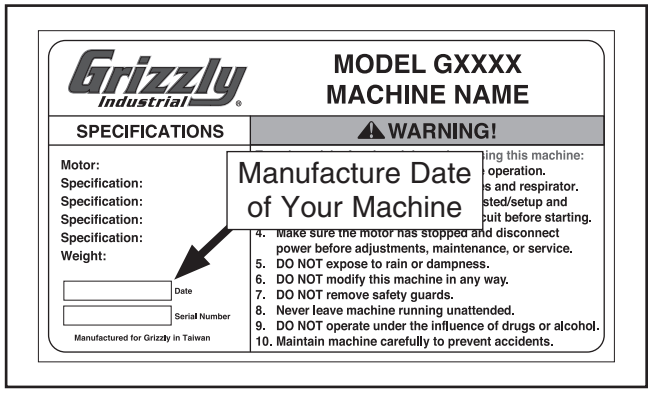
INTRODUCTION

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, check our website for the latest manual update or call technical support for help.

Before calling, find the manufacture date of your machine by looking at the date stamped into the machine ID label (see below). This will help us determine if the manual version you received matches the manufacture date of your machine.



For your convenience, we post all available manuals and manual updates for free on our website at **www.grizzly.com**. Any updates to your model of machine will be reflected in these documents as soon as they are complete.

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

Machine Description

The mill is used to remove material from metal workpieces to form shapes. Tooling is inserted into the spindle of the head, which is positioned 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 two paths of table movement—longitudinal (X-axis) and cross (Y-axis). Vertical travel of the spindle is controlled with the micro and rapid downfeed controls.

MACHINE DATA SHEET

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

MODEL G8689 MINI MILLING MACHINE

Product Dimensions:

Weight..... 101 lbs.
Width (side-to-side) x Depth (front-to-back) x Height..... 20 x 20 x 30-1/4 in.
Footprint (Length x Width)..... 12-1/2 x 8-1/2 in.
Space Required for Full Range of Movement (Width x Depth)..... 20 x 20 in.

Shipping Dimensions:

Type..... Wood Crate
Content..... Machine
Weight..... 149 lbs.
Length x Width x Height..... 20 x 21 x 30 in.
Must Ship Upright..... Yes

Electrical:

Power Requirement..... 110V, Single-Phase, 60 Hz
Prewired Voltage..... 110V
Full-Load Current Rating..... 4.5A
Minimum Circuit Size..... 15A
Connection Type..... Cord & Plug
Power Cord Included..... Yes
Power Cord Length..... 6 ft.
Power Cord Gauge..... 18 AWG
Plug Included..... Yes
Included Plug Type..... 5-15
Switch Type..... ON/OFF Push Button Switch w/Safety Cover

Motors:

Main

Horsepower..... 350W
Phase..... Single-Phase
Amps..... 4.5A
Speed..... 6000 RPM
Type..... Universal
Power Transfer ..... Gear Drive
Bearings..... Shielded & Permanently Lubricated
Centrifugal Switch/Contacts Type..... N/A

Main Specifications:

Operation Info

Max Distance Spindle to Column..... 6-3/8 in.
Max Distance Spindle to Table..... 11-1/2 in.
Longitudinal Table Travel (X-Axis)..... 7-5/16 in.
Cross Table Travel (Y-Axis)..... 4 in.
Vertical Head Travel (Z-Axis)..... 7-1/2 in.
Head Tilt (Left/Right)..... 45 deg.
Drilling Capacity for Cast Iron..... 1/2 in.
Drilling Capacity for Steel..... 1/2 in.
End Milling Capacity..... 1/2 in.
Face Milling Capacity..... 1 in.

Table Info

Table Length	15-3/4 in.
Table Width	3-5/8 in.
Table Thickness	1-1/4 in.
Number of T-Slots	3
T-Slot Size	7/16 in.
T-Slots Centers	1-1/8 in.
X/Y-Axis Travel per Handwheel Revolution	0.062 in.

Spindle Info

Spindle Taper	MT#3
Number of Vertical Spindle Speeds	Variable
Range of Vertical Spindle Speeds	0 – 2500 RPM
Quill Diameter	1.580 in.
Drawbar Thread Size	M12-1.75
Drawbar Length	4 in.
Spindle Bearings	Ball Bearings

Construction

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

Other Specifications:

Country of Origin	China
Warranty	1 Year
Approximate Assembly & Setup Time	30 Minutes
ISO 9001 Factory	Yes
Certified by a Nationally Recognized Testing Laboratory (NRTL)	No

Features:

Two Speed Ranges on Geared Drive
Spring Head Return
Safety Shutoff Switch
Adjustable Depth Stop
Fine Feed Head Control
Clear Guard on Spindle
Rubber Chip Guards on Ways
Zero Setting Dials
Dials Read in Inches
Adjustable Dovetailed Ways on Column

Accessories Included:

1/2" Drill Chuck
2 T-Nuts
3/8" and 1/2" Collets

Identification

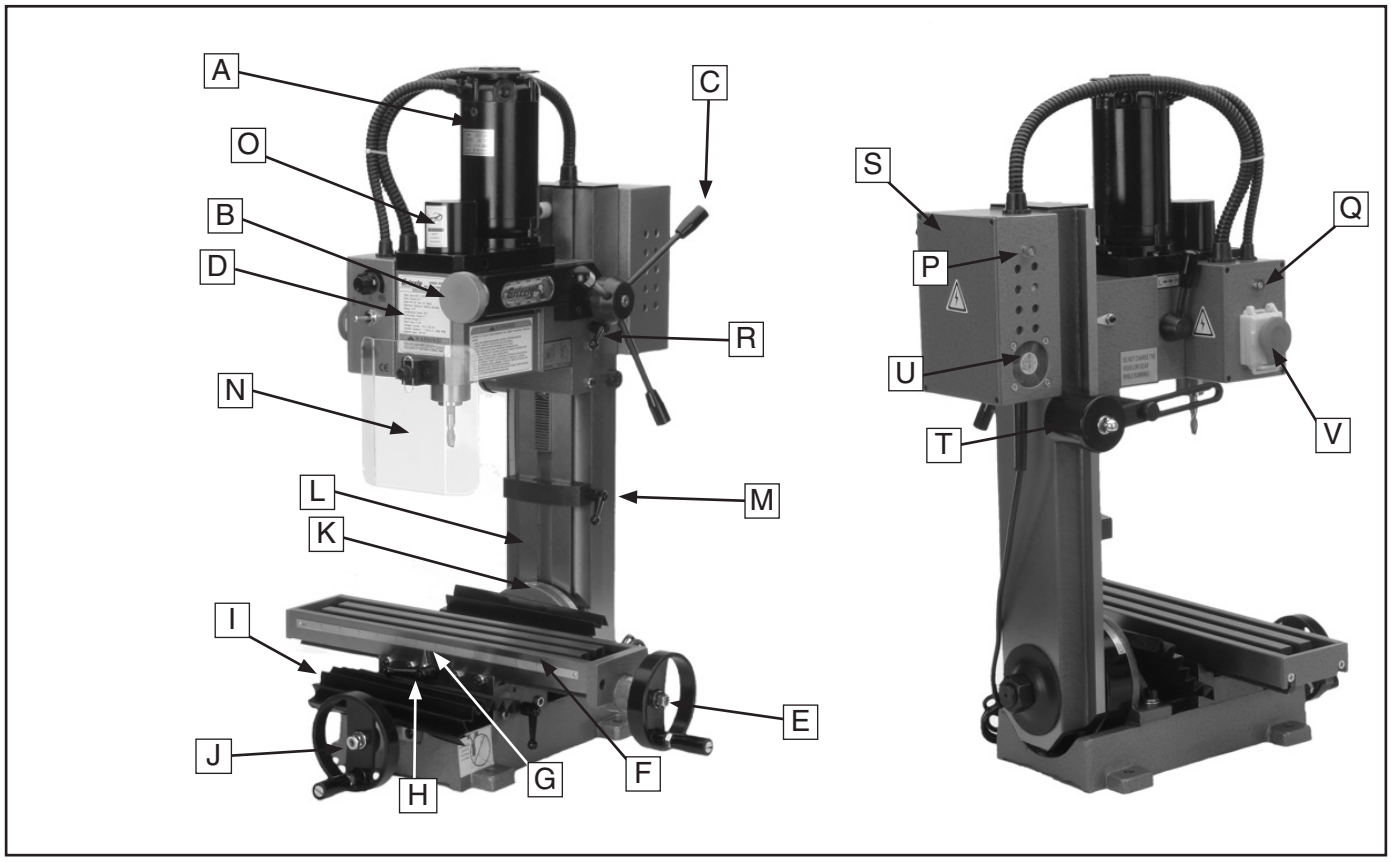


Figure 1. The Model G8689 Mini Mill.

A. Motor
B. Micro Downfeed Knob
C. Rapid Downfeed Lever
D. Headstock
E. Longitudinal Handwheel
F. Table
G. Scale & Pointer
H. Table Lock
I. Way Cover
J. Cross Feed Handwheel
K. Column Pivot & Scale
L. Column
M. Limit Block
N. Chip Shield
O. Spindle Cover
P. System Power Light
Q. Spindle Power Light
R. Column Lock
S. Electrical Box
T. Head Counterbalance Spring
U. Cooling Fan
V. Emergency Stop Button

SECTION 1: SAFETY

⚠WARNING

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

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

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

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

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

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

⚠WARNING

Safety Instructions for Machinery

1. **READ THROUGH THE ENTIRE MANUAL BEFORE STARTING MACHINERY.** Machinery presents serious injury hazards to untrained users.

2. **ALWAYS USE ANSI APPROVED SAFETY GLASSES WHEN OPERATING MACHINERY.** Everyday eyeglasses only have impact resistant lenses, they are NOT safety glasses.

3. **ALWAYS WEAR AN ANSI APPROVED RESPIRATOR WHEN OPERATING MACHINERY THAT PRODUCES DUST.** Wood dust is a carcinogen and can cause cancer and severe respiratory illnesses.

4. **ALWAYS USE HEARING PROTECTION WHEN OPERATING MACHINERY.** Machinery noise can cause permanent hearing damage.

5. **WEAR PROPER APPAREL.** DO NOT wear loose clothing, gloves, neckties, rings, or jewelry which may get caught in moving parts. Wear protective hair covering to contain long hair and wear non-slip footwear.

6. **NEVER OPERATE MACHINERY WHEN TIRED, OR UNDER THE INFLUENCE OF DRUGS OR ALCOHOL.** Be mentally alert at all times when running machinery.

⚠WARNING
Safety Instructions for Machinery

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

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

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

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

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

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

13. **USE A GROUNDED EXTENSION CORD RATED FOR THE MACHINE AMPERAGE.** Undersized cords overheat and lose power. Replace extension cords if they become damaged. DO NOT use extension cords for 220V machinery.

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

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

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

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

18. **CHECK FOR DAMAGED PARTS BEFORE USING MACHINERY.** Check for binding and alignment of parts, broken parts, part mounting, loose bolts, and any other conditions that may affect machine operation. Repair or replace damaged parts.

19. **USE RECOMMENDED ACCESSORIES.** Refer to the instruction manual for recommended accessories. The use of improper accessories may cause risk of injury.

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

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

22. **DO NOT OVERREACH.** Keep proper footing and balance at all times.

23. **MANY MACHINES WILL EJECT THE WORKPIECE TOWARD THE OPERATOR.** Know and avoid conditions that cause the workpiece to "kickback."

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

25. **ALLERGIC REACTIONS.** Be aware that certain metal shavings and cutting fluids may cause an allergic reaction in people and animals, especially when cutting fumes can be inhaled. Make sure you know what type of metal and cutting fluid you will be exposed to and how to avoid contamination.

⚠WARNING
Additional Safety Instructions for Mini Mill

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

2. **SAFETY ACCESSORIES.** Always use the chip guard in addition to your safety glasses when milling to prevent bodily injury.

3. **WORK HOLDING.** Before starting the machine, be certain the workpiece has been properly clamped to the table. NEVER hold the workpiece by hand when using the mill.

4. **CHUCK KEY SAFETY.** Always remove your chuck key, drawbar wrench, and any service tools immediately after use.

5. **SPINDLE SPEEDS.** Select the spindle speed which is appropriate for the type of work and material. Allow the mill to gain its full speed before beginning a cut.

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

7. **SPINDLE DIRECTION CHANGES.** Never reverse motor direction while the mill is in motion.

8. **STOPPING SPINDLE.** DO NOT stop the mill using your hand against the chuck.

9. **BE ATTENTIVE.** DO NOT leave mill running unattended for any reason.

10. **MACHINE CARE AND MAINTENANCE.** Never operate the mill with damaged or worn parts. Maintain your mill in proper working condition. Perform routine inspections and maintenance promptly. Put away adjustment tools after use.

11. **DISCONNECT POWER.** Make sure the mill is turned ***OFF***, disconnected from its power source and all moving parts have come to a complete stop before starting any inspection, adjustment, or maintenance procedure.

12. **AVOIDING ENTANGLEMENT**. Keep loose clothing articles such as sleeves, belts or jewelry items away from the mill spindle.

13. **TOOL HOLDING.** Always use the proper tools for the material you are milling. Make sure they are held firmly in the proper tool holder for the job.

14. **CLEAN-UP.** DO NOT clear chips by hand. Use a brush, and never clear chips while the mill is turning.

15. **CUTTING TOOL INSPECTION.** Inspect drills and end mills 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.

⚠WARNING

Like all machines there is danger associated with the Model G8689. Accidents are frequently caused by lack of familiarity or failure to pay attention. Use this machine with respect and caution to lessen the possibility of operator injury. If normal safety precautions are overlooked or ignored, serious personal injury may occur.

⚠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.

Glossary Of Terms

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

Arbor: A machine shaft that supports a cutting tool.

Backlash: Wear in a screw or gear mechanism that may result in slippage, vibration and loss of tolerance.

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

Cross Feed: The movement of the table toward or away from the column.

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

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

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

Dividing Head: A milling machine accessory used to divide a circular object into a number of equal parts.

Down Milling or Climb Milling: Feeding the workpiece in the same direction as the cutter rotation.

End Mill: A cutter with cutting surfaces on both its circumference and end.

Facing: cutting across the face of a workpiece, usually to machine a flat surface.

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

Fixture: A device that securely holds the workpiece in place during cutting operation as opposed to a **Jig** which is used to hold and guide a workpiece through an operation.

Gib: A tapered wedge located along a sliding member to take up wear or to ensure a proper fit.

Headstock: The major component that houses the spindle and motor drive system to turn the workpiece.

Leadscrew: The screws that move the table in longitudinal, transverse, or vertical directions.

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

Turret: The part of a mill which rotates on the column and can be set to a specific degree.

Ways: The precision machined and flat tracks on a lathe or mill on which the carriage, tailstock and the mill table and knee slide.

SECTION 2: CIRCUIT REQUIREMENTS

110V 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

This machine draws the following amps under maximum load:

Amp Draw.....4.5 Amps

Power Supply Circuit Requirements

The power supply circuit for your machine MUST be grounded and 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.....15 Amps

Power Connection Device

This machine comes with a plug, similar to **Figure 2**, to connect the machine to power.

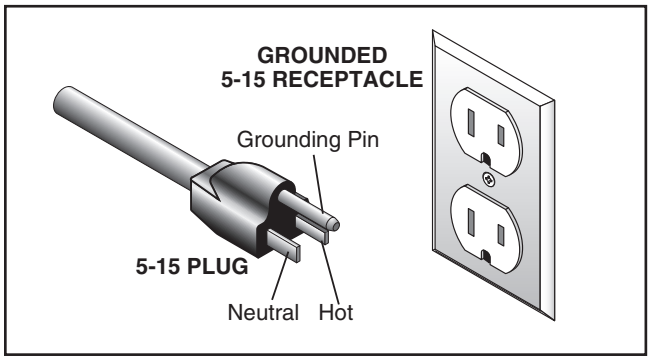
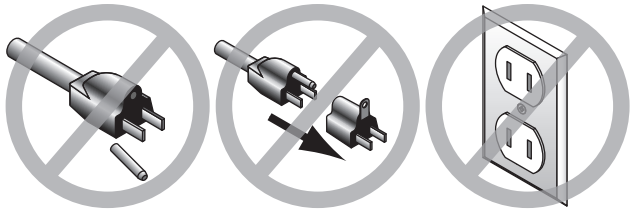


Figure 2. Typical 5-15 plug and receptacle.

⚠CAUTION



SHOCK HAZARD!

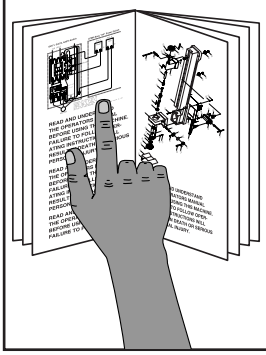
Two-prong outlets do not meet the grounding requirements for this machine. Do not modify or use an adapter on the plug provided—if it will not fit the outlet, have a qualified electrician install the proper outlet with a verified ground.

Extension Cords

We do not recommend using extension cords, but if you find it absolutely necessary:

- Use at least a 16 gauge cord that does not exceed 50 feet in length!
- The extension cord must have a ground wire and plug pin.
- A qualified electrician MUST size cords over 50 feet long to prevent motor damage.

SECTION 3: SET UP



⚠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 set up process!

⚠WARNING

The Model G8689 is a heavy machine. Get assistance and use safe lifting methods when moving heavy machinery.

Needed for Set Up

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

Description	Qty
• Precision Level	1
• Safety Glasses (for each person)	1
• Solvent	1
• Shop Rags	1
• Mounting Hardware	1
• Machinist Square	1
• Metal Shim Stock	1
• Wrench or Socket 9/16"	1
• Brass Hammer	1
• Flat Head Screwdriver	1
• Drill and 3/8" Bit	1

Unpacking

The Model G8689 was carefully packed when it left our warehouse. If you discover the machine is damaged after you have signed for delivery, *please immediately call Customer Service at (570) 546-9663 for advice.*

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

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

Inventory

After all the parts have been removed from the two boxes, you should have the following items:

Box 1: (Figure 3) **Qty**
A. Mini Mill 1
B. Chip Shield 1

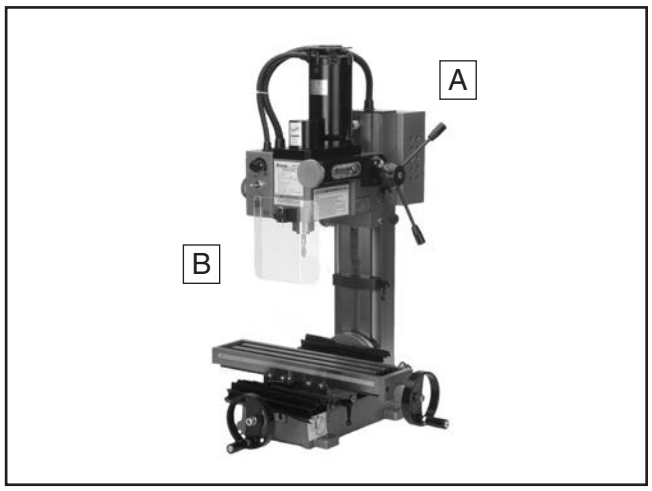


Figure 3. Model G8689 Mini Mill.

Bag Contents: (Figure 4)
C. Hex Key Set 3, 4, 5 & 6mm 1
D. Wrench 8/10mm 1
E. Wrench 14/17mm 1
F. Wrench 17/19mm 1
G. Spanner Wrench 1
H. Wrench 36mm 1
I. Drill Chuck ½"-B16 1
J. Spare Fuse 5 Amp 1
K. Collet MT#3 x ⅜" 1
L. Collet MT#3 x ½" 1
M. Chuck Key 1
N. T-Nuts M10-1.5 1
O. Oil Bottle 1
P. Handwheel Handles 2
Q. Spindle Locking Pin 1
R. Drawbar 1
S. Arbor MT#3-B16 1

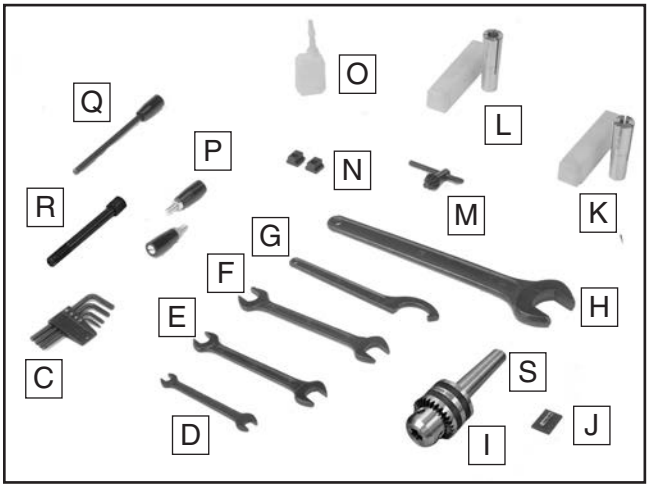
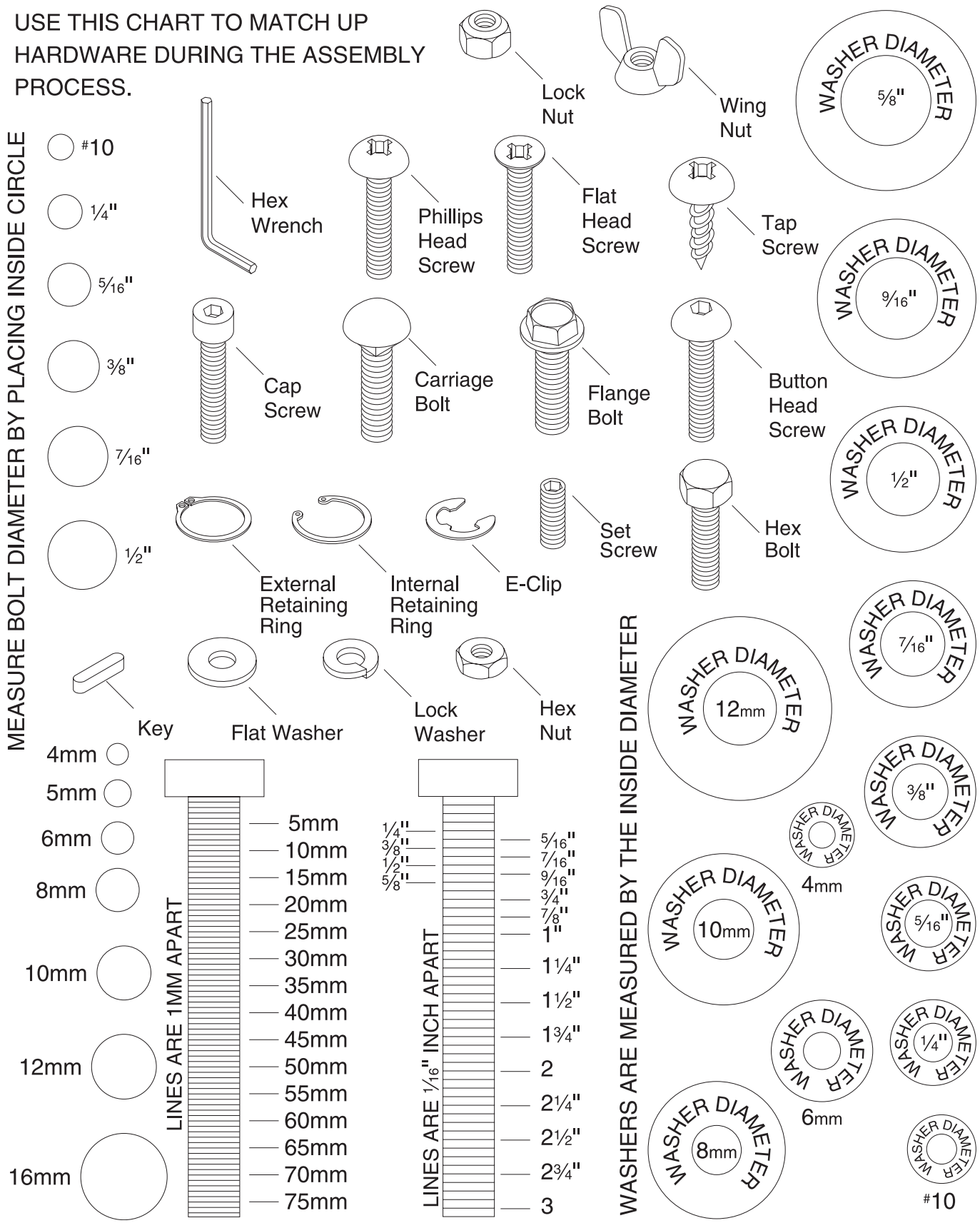


Figure 4. Bag contents.

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

Hardware Recognition Chart

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



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 5**. 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 5. Cleaner/degreasers available from Grizzly.

Site Considerations

Workbench Load

The Model G8689 weighs 101 lbs. and has a base footprint of 8½" W x 12" D. Make sure the workbench you mount the Model G8689 Mini Mill to is sturdy enough to support its weight and rigid enough so it will not tip over during use.

Working Clearances

Consider existing and anticipated needs, size of material to be processed through each machine, and space for auxiliary stands, work tables or other machinery when establishing a location for your mill. See **Figure 6** for the minimum working clearances of the Model G8689.

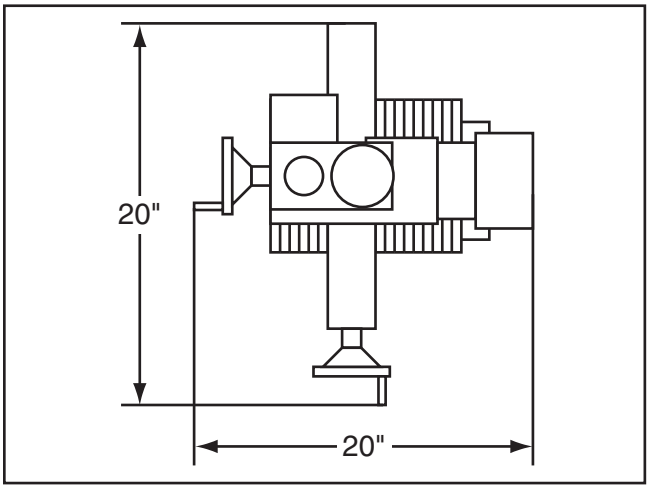
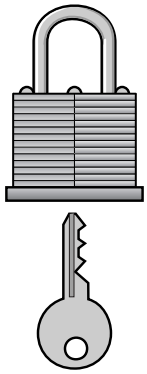


Figure 6. Working clearances.



⚠CAUTION

Unsupervised children and visitors inside your shop could cause serious personal injury to themselves. Lock all entrances to the shop when you are away and DO NOT allow unsupervised children or visitors in your shop at any time!

Mounting to Workbench

The Model G8689 should be bolted to a workbench to provide maximum rigidity and safety.

Components and Hardware Needed:	**Qty**
Hex Bolts 3/8-16 x (length needed)	4
Flat Washers 3/8"	8
Hex Nuts 3/8"-16	4

Tools Needed:	**Qty**
9/16" Wrench or Socket	1
Drill with 3/8" Bit	1

To mount the mini mill to the workbench:

1. Determine the best position for the mill on the workbench.

   Note: *For the best performance, make sure the cross feed and the longitudinal handwheels extend out beyond the edge of the table surface. This will allow unrestricted handwheel operation.*

2. Mark your hole locations using the mounting holes in the base as a guide.

3. Drill the holes needed in the workbench.

4. Place a precision level on the mill table and shim the mill until it is level side to side and front to back.

5. Mount the mill to the workbench using four 3/8"-16 carriage bolts with washers and hex nuts.

Installing Handwheel Handles

The handwheels on the Model G8689 come installed, you will only need to install the handwheel handles.

Components and Hardware Needed:	**Qty**
Handwheel Handles	2

Tools Needed:	**Qty**
Flat Head Screwdriver	1

To attach the handles to the handwheels:

1. Using the screwdriver, screw the thread of the handles into the cross feed and longitudinal handwheels.

Drill Chuck Removal

The Model G8689 may have shipped with the chip guard in place and the drill chuck installed in the spindle. If this is the case, go ahead and remove them at this time.

Tools Needed:	**Qty**
Brass Hammer	1
Spindle Locking Pin	1
Wrench 17/19mm	1

To remove the chuck and arbor from the spindle:

1. DISCONNECT MILL FROM POWER!

2. Remove the chip guard for easier access to the chuck.

3. Remove the plastic cap that covers the drawbar.

4. Insert the spindle locking pin into the hole on the side of the head. Rotate the chuck by hand until the pin falls into the notch on the spindle shaft, preventing the spindle from turning (see **Figure 7**).

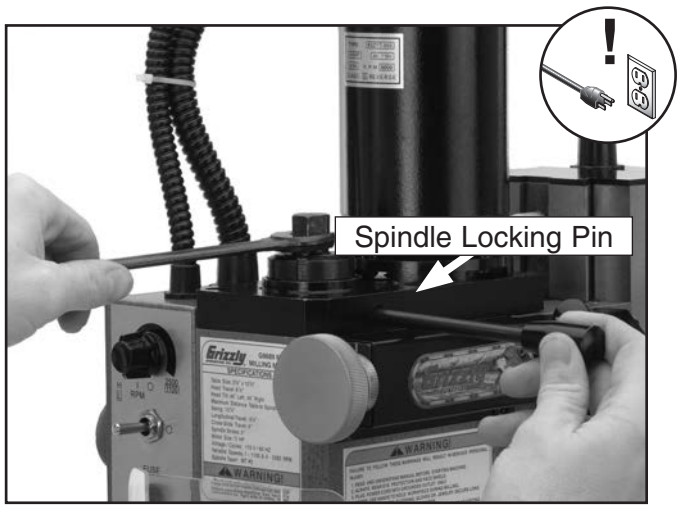


Figure 7. Loosening the drawbar.

5. Using the 17mm wrench, loosen the drawbar but DO NOT remove it.

NOTICE

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

6. Tap the top of the drawbar with the brass hammer. This will unseat the taper of the arbor and the spindle (see **Figure 8**).

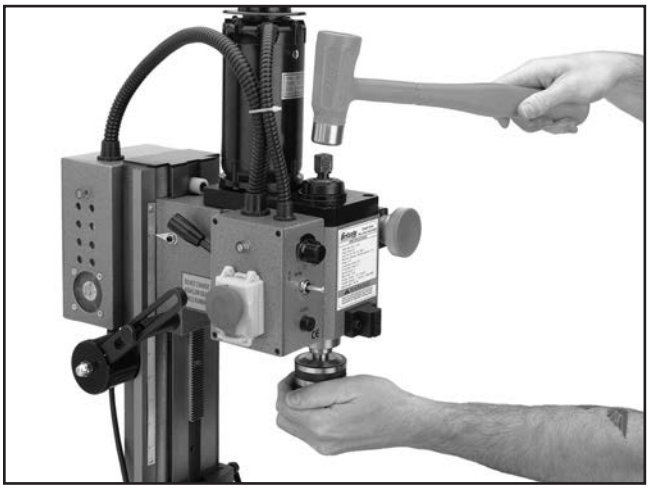


Figure 8. Striking the drawbar.

7. Hold one hand under the chuck and finish loosening the drawbar by hand until it falls out of the spindle (see **Figure 9**).

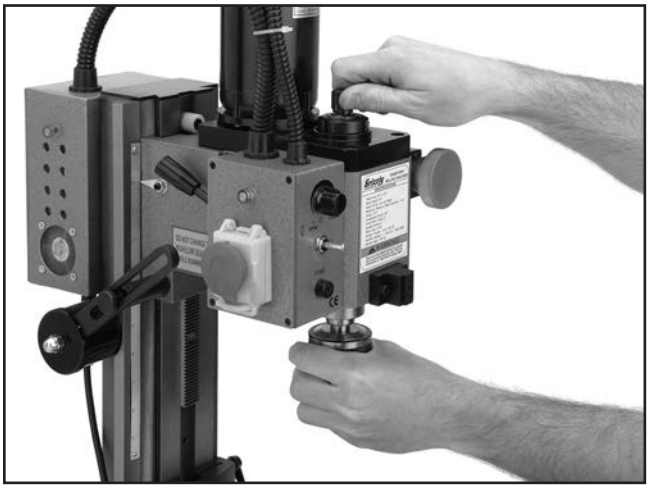


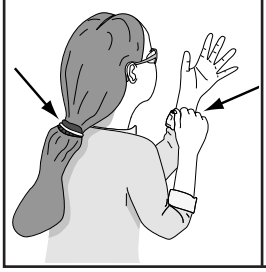
Figure 9. Removing the arbor.

SECTION 4: OPERATIONS

⚠WARNING

Damage to your eyes, lungs, and ears could result from using this machine without proper protective gear. Always wear safety glasses, a respirator, and hearing protection when operating this machine.





⚠WARNING

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

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.

Control Panel

It is vital that you become familiar with the control panel before operating the Model G8689. Three separate switches control the power on the mill (see **Figure 10**).

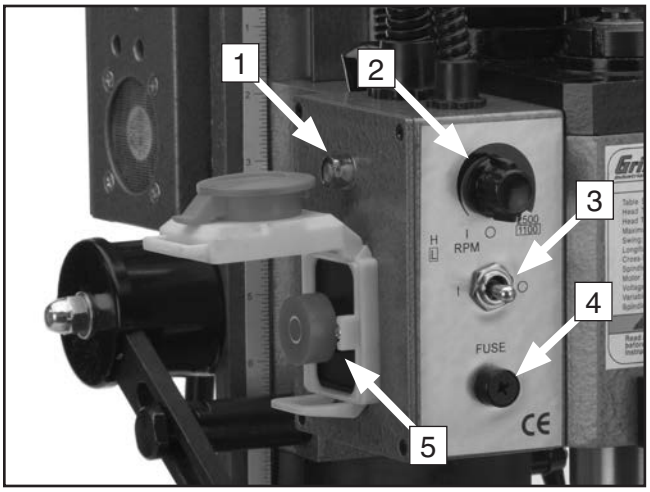


Figure 10. Control panel components.

1. POWER INDICATOR Light: Shines when the system power is ***ON***.

2. SPINDLE ON & RPM Control Knob: Turns the spindle ***ON*** and controls the spindle RPM.

3. SYSTEM ON Toggle Switch: This toggle switch delivers power to the system.

4. Fuse Socket: Houses a 5 Amp system fuse.

5. EMERGENCY STOP Button: Immediately disconnects power to the system. Once pressed, this button must be released to allow use of the SYSTEM ON Toggle Switch.

Note: *After using the EMERGENCY STOP Button it will be necessary to reset the SPINDLE ON & RPM Control Knob and the SYSTEM ON Toggle Switch.*

Test Run and Spindle Break-in

The Model G8689 has two speed ranges: Low range is 0–1100; high range is 0–2500 RPM.

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

To begin the start up and break-in procedure:

1. Follow all lubrication procedures highlighted in **Lubrication** in **Section 6: MAINTENANCE** on **Page 28.**

2. Make sure there are no obstructions around or underneath the spindle. Remove the drawbar if there is no arbor or collet in the spindle.

3. With the spindle at a complete stop, shift the speed range lever into the low range (see **Figure 11**).

   Note: *If the lever will not drop into gear at first, rotate the spindle by hand while holding light pressure on the lever. When the gears engage, the lever will fall into place.*

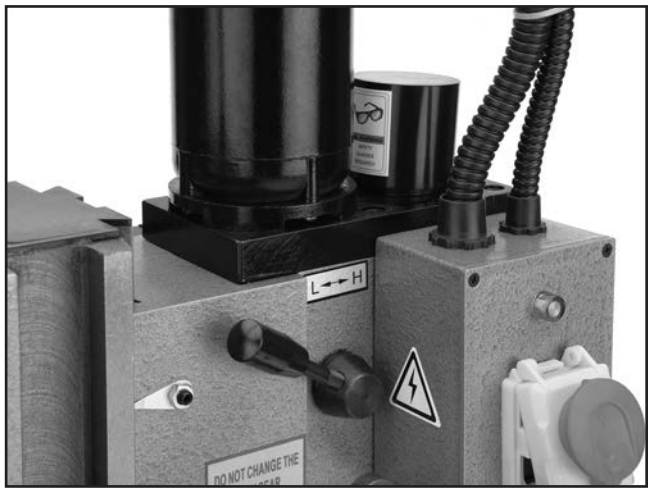


Figure 11. Speed range lever.

4. Turn the SPINDLE ON & RPM CONTROL KNOB ***ON*** and let the mill run for a minimum of 10 minutes on a low speed. The mill should run smoothly with minimal noise and vibration.

   —If you suspect the mill is not working correctly, shut the mill ***OFF*** and correct the problem before proceeding further.

   —If the mill is running smoothly, proceed.

NOTICE

DO NOT attempt to change speed ranges with the spindle *ON.* Damage to the spindle gearing will occur.

5. Slowly increase the RPM and allow it to run at a medium RPM for another ten minutes.

6. Slowly increase the RPM and allow it to run at a high RPM for another ten minutes.

7. Turn the mill ***OFF.*** Switch to the high range and repeat **Steps 4–6**.

NOTICE

Failure to follow start up and spindle break-in procedures will likely cause rapid deterioration of spindle and other related parts.

Power Shutdown

It is important to shut the power ***OFF*** when the mill is not in use. Leaving the power ***ON*** keeps the circuit board cooling fan running. This will cause unnecessary wear on the fan and electrical system.

To completely shut the system power *OFF:*

1. Turn the SPINDLE ON & RPM Control Knob ***OFF.***

2. Turn the SYSTEM ON Toggle Switch ***OFF.***

3. Press the EMERGENCY STOP BUTTON. At this point the green power light and the amber fan power light should not be lit.

   Note: *The EMERGENCY STOP Button is a flap style button that lays over the switch. Closing the flap shuts **OFF** power to the system. The system can be re-activated by opening the switch cover. This is done by pushing in and up on the button and allowing the inner button to release.*

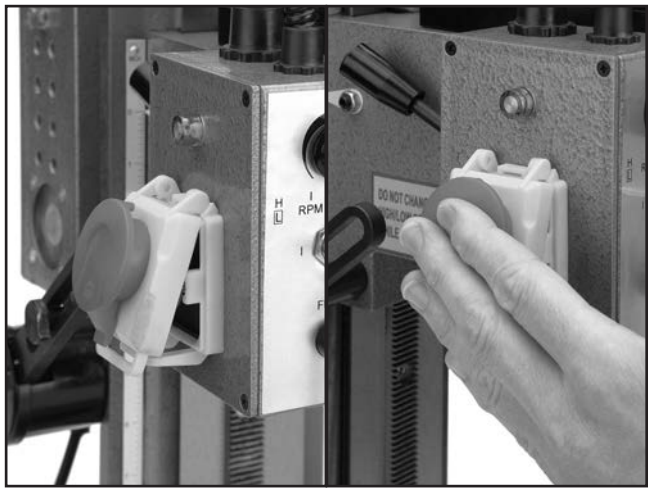


Figure 12. EMERGENCY STOP Button.

Rapid & Micro Downfeed Controls

The Model G8689 spindle height is controlled by two methods. The rapid downfeed works similar to a drill press. The micro downfeed will allow you to make adjustments to 0.001". One full revolution is 0.060".

To use the rapid downfeed:

1. Make sure the column lock is released from the head.

2. Pull the downfeed handle hub out to disengage the teeth as shown in **Figure 13.**

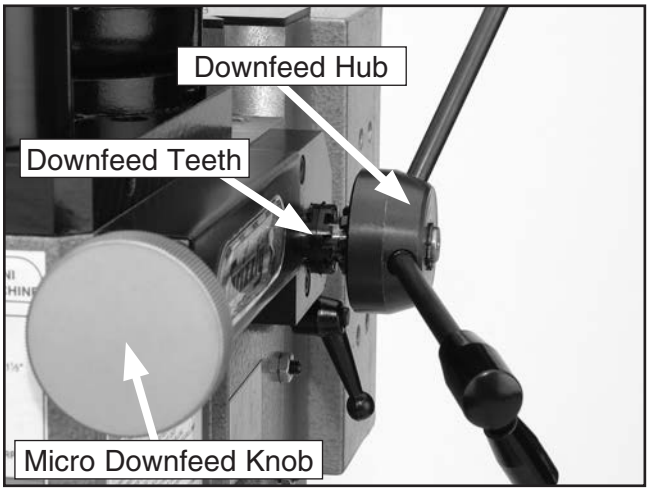


Figure 13. Downfeed handle.

3. Turn the levers to lower and raise the head.

To use the micro downfeed:

1. Make sure the column lock is released from the head.

2. Push the feed handle hub in so the teeth engage.

3. Turn the micro downfeed knob to the desired depth.

Limit Block

The limit block can be set when you want to limit the amount of head travel. Repeated hole drilling of the same depth is a perfect use for this feature.

To set the limit block:

1. Determine the depth of cut.

2. Move the head to that position, then lock in place with the column lock.

3. Loosen the lock handle and slide the limit block so it sits tight against the bottom of the head (see **Figure 14**).

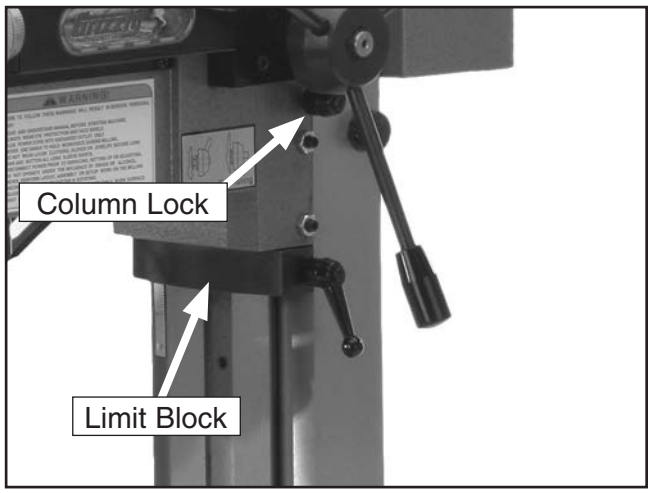


Figure 14. Limit block in place.

4. Tighten in position.

Note: *The limit block can lose its position after repeated contact with the head. To limit this possibility make sure the head only makes gentle contact with the limit block. Both the rapid and micro downfeed controls can overpower the limit block if excessive force is used.*

Table Travel

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

Longitudinal Feed:
The longitudinal feed or X axis, is moved by a handwheel at the end of the table. The handwheel will move the table in both directions side to side. One complete revolution of the handwheel moves the longitudinal feed 0.0625". There is also a scale on the front of the table for use when a tight tolerance is not required. The longitudinal feed can be locked in position by the two lever screws located on the front of the table (see **Figure 15**).

Cross Feed:
The cross feed or Y axis, is moved with the handwheel on the front of the table base. One complete revolution of the handwheel moves the cross slide 0.0625". The cross feed can be locked into position by a lever screw, located on the right side of the cross slide underneath the table (see **Figure 15**).

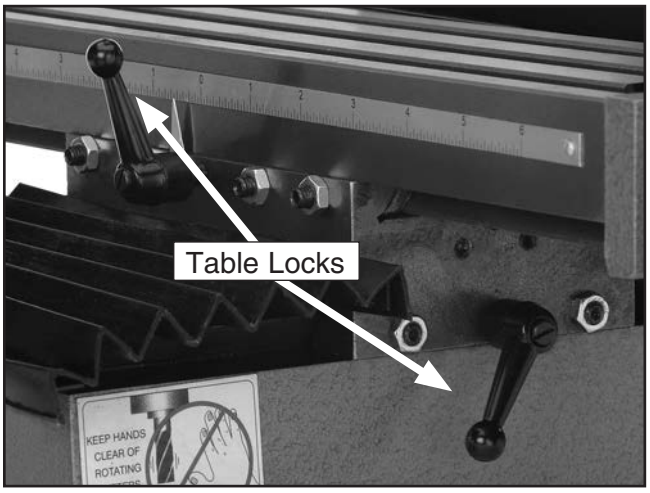


Figure 15. Table locks.

Graduated Dials

The handwheels and the micro-downfeed adjustment knob have graduated dials. Each mark represents 0.001" of movement and one full revolution of the micro-downfeed knob equals 0.060" The graduated dials float and can be indexed or "zeroed". One full revolution of the handwheel equals 0.0625".

Example:
Suppose you want to drill a series of holes with ½" centers (0.500"). After locating the first hole placement and drilling, you would zero the graduated dial of the appropriate axis, move the table 0.500" in that direction and drill the next hole.

Backlash

The subject of backlash and graduated dials are somewhat interconnected. When you change direction of the table in either axis, you must correct the graduated dial for backlash.

To correct for backlash:

1. Turn the handwheel and move the table the opposite direction of your next operation.

2. Turn the handwheel to move the table in the intended direction.

3. The exact moment the lead screw catches and the table begins to move, backlash has been eliminated and the graduated dial can be "zeroed."

   Note: *You will not need to adjust for backlash as long as the table keeps moving in the same direction.*

Column Angle Adjustment

For machining operations requiring an angle, the column of the Model G8689 can be adjusted up to 45° in either direction of the vertical axis.

To adjust the angle:

1. Make sure the mill is securely fastened to your workbench or table as described on **Page 15.**

2. Using the 36mm wrench, loosen but do not remove the column adjuster nut and support the weight of the head with your free hand.

3. Position the head and column to the desired angle and tighten the nut (see **Figure 16**).

Note: *If a high degree of accuracy is required, use additional methods for confirming the angle.*

⚠CAUTION

A falling head can crush or pinch. Keep the head supported when loosening the locking bolt and positioning head. If this caution is ignored moderate personal injury could occur.

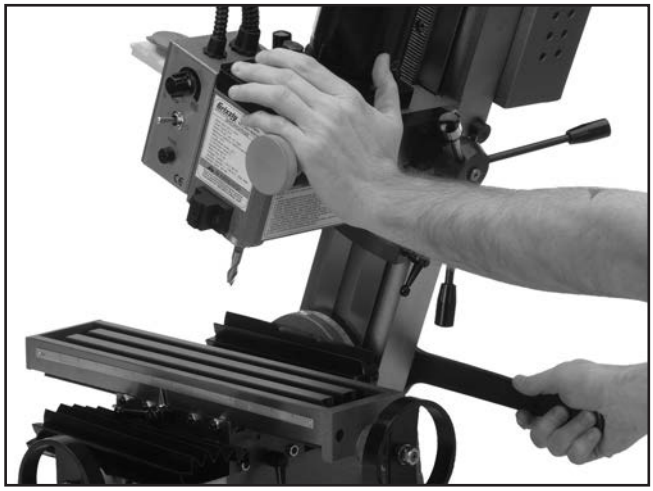


Figure 16. Supporting head during positioning.

MT#3 Collets

The Model G8689 features an MT#3 spindle taper, which only accepts MT#3 collets. MT#3 collets come in many sizes, typically ranging from 1/16" to 7/8" and 2mm to 20mm. You will need a collet to match the diameter of the shank of the tool you want to hold.

To install the MT#3 collet:

1. DISCONNECT MILL FROM POWER!
2. Remove the drawbar cap.
3. Carefully clean the surface of the collet and spindle taper. Ensure that it is free of debris and grease of any kind.
4. Insert the cutting tool into the collet.
5. Insert the collet up into the spindle taper.
6. Slide the collet the rest of the way in until it makes contact with the threads at the end of the drawbar.
7. Using your fingers, thread the drawbar in the collet until the collet draws up into the spindle taper.
8. While supporting the tool in the collet with one hand, tighten the drawbar with the 17mm wrench in your opposite hand.

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

NOTICE

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

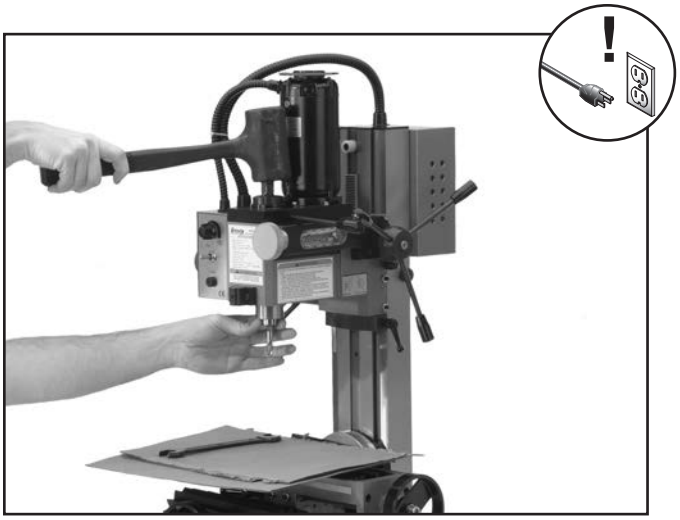


Figure 17. Collet removal.

To remove the collet:

1. DISCONNECT MILL FROM POWER!
2. Tighten the column locks then insert the spindle locking pin into the hole on the side of the head.
3. Protect the table surface with a piece of cardboard or hold the cutter or tool with a shop towel to prevent it from falling out of the collet.
4. Using the 17mm wrench, loosen the drawbar but DO NOT remove it.
5. Using the brass hammer, tap the drawbar to unseat the taper (see **Figure 17**).
6. Unscrew the rest of the drawbar by hand and remove the collet.

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

CAUTION

LACERATION HAZARD! Leading edges of end mills and other cutting tools can be very sharp. Mishandling can cause lacerations. Protect your hands with glove or shop towel.

Setting RPM

It is essential to closely follow the proper cutting speed and proper feed to reduce undue strain on all moving parts and for operator safety.

Prior to machining, you need to determine the RPM needed to cut your workpiece, and then set the RPM on the machine.

To determine the needed RPM:

1. Use the table in **Figure 18** to determine the cutting speed required for the material of your workpiece.

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

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

   (Cutting Speed x 4) / Tool Diameter = RPM

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

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

Figure 18. Cutting speed table for HSS cutting tools.

⚠WARNING

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

NOTICE

Failure to follow RPM and Feed Rate Guidelines will put undue strain on moving parts, shorten tool life, and create poor workpiece results.

SECTION 5: ACCESSORIES

G7895—Citrus Degreaser
This citrus based degreaser is perfect for cleaning protectant off of new equipment. It also works for cleaning auto parts, tools, concrete, and porcelain surfaces. Natural, safe for the environment, and contains no CFC's.

Figure 19. G7895 Citrus Degreaser.

H1412—4 oz. Cutting & Tapping Fluid
H1413—16 oz. Cutting & Tapping Fluid
H1414—1 Gallon Cutting & Tapping Fluid
This cutting and tapping fluid is non-ozone depleting and is safe for ferrous and non-ferrous metals with an engineered formula that clings to the cutting tool and provides phenomenal lubrication during cutting and tapping.

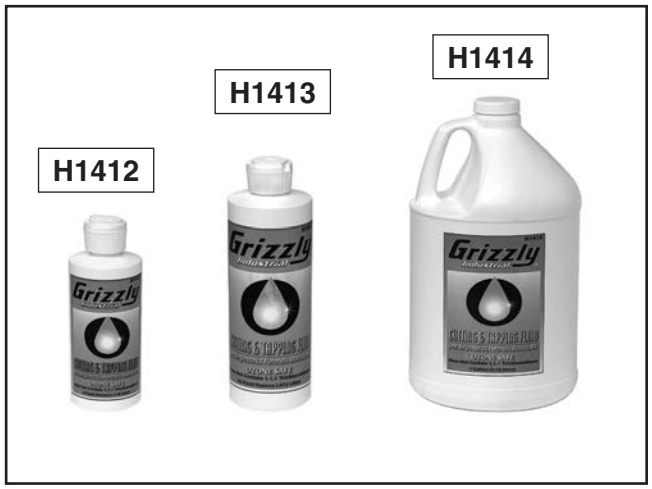


Figure 20. Grizzly® Cutting & Tapping Fluid.

G9002—2½" Swivel Base Milling Vise
G5971— 3½" Swivel Base Milling Vise
G5972—4" Swivel Base Milling Vise
G5973—5" Swivel Base Milling Vise
G5974—6" Swivel Base Milling Vise
G5975—8" Swivel Base Milling Vise
Vises feature 360° rotation with fine graduations, drop forged handle, precision ground jaw faces, enclosed acme screw and detachable swivel base.

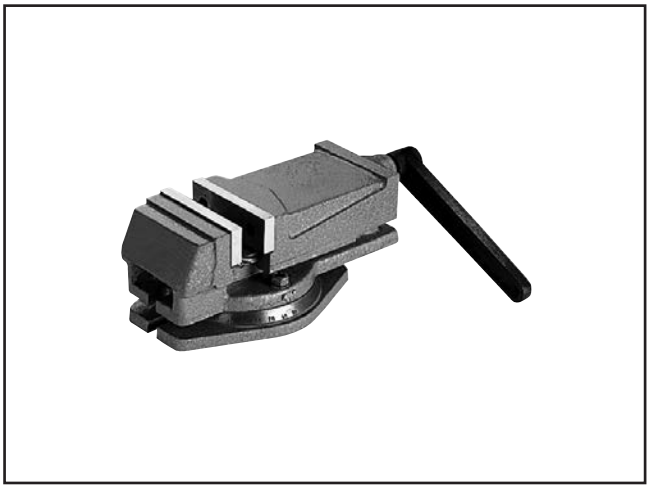


Figure 21. Swivel base milling vise.

G5641—1-2-3 Blocks
G9815—Parallel Set
Blocks are square to within .0003". Measure 1" x 2" x 3". Parallel set measures 6" long by ½", ⅝", ¾", ⅞", 1", 1⅛", 1¼", 1⅛", 1⅜", 1½", and 1⅝".

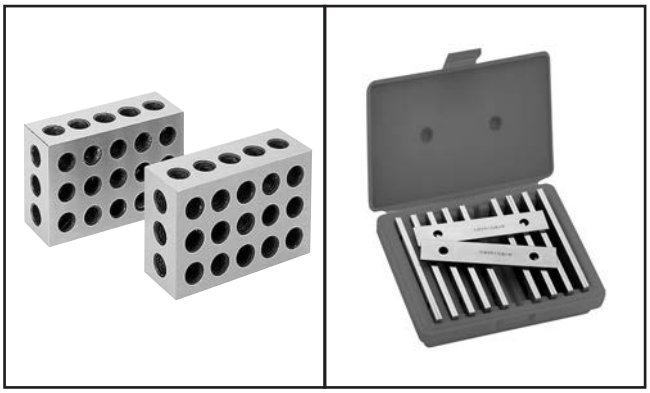


Figure 22. G5641 1-2-3 Blocks and G9815 Parallel Set.

Call 1-800-523-4777 To Order

G9765—9-PC. Ball End Mill Set
Features 2 flute ball nose end mills. Includes the following sizes: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8" and 3/4".

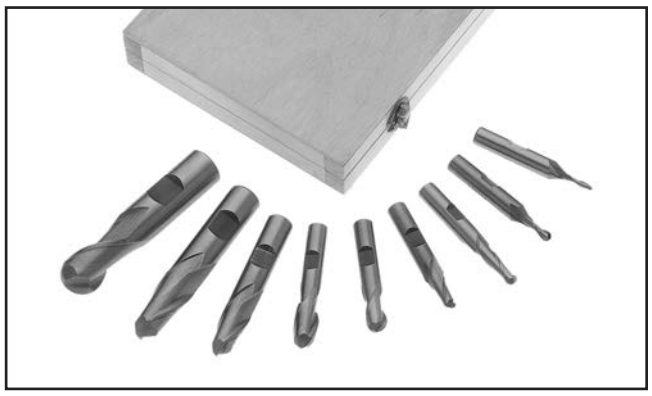


Figure 23. G9765 9 PC. Ball End Mill Set.

G9610—Test Indicator
.03" Range/.001" Resolution
G9611—Test Indicator
.008" Range/.0001" Resolution
G9612—Test Indicator
.030" Range/.0005" Resolution
These test indicators have an easy to read dial and a pivoting stylus that moves at right angles to the dial face.

Figure 24. Test Indicator.

H3022—Measurement Tool Set
Includes magnetic base, 1" dial indicator (.001"), and 6" dial caliper (.001"). The extremely low price has made this a very popular seller!

Figure 25. H3022 Measurement Tool Set.

G2871—Boeshield® T-9 12 oz Spray
G2870—Boeshield® T-9 4 oz Spray
Perfect for unpainted cast iron surfaces, this ozone friendly protective spray penetrates deep and really holds up against corrosive environments. Lubricates metals for months and is also safe for use on most paints, plastics, and vinyls. Developed by Boeing engineers for aircraft applications—this is the best!

Figure 26. Boeshield Spray.

Call 1-800-523-4777 To Order

G7314—700 lb. Capacity SHOP FOX® Stand
A perfect stand for mounting your smaller machines on. Sturdy and rugged for everyday shop use.

Figure 27. G7313 SHOP FOX® Stand.

G2861—2½" Face Mill
G2863—MT#3 Arbor
This 2½" Face Mill accepts four carbide inserts. Comes with an R-8 arbor. Order the MT#3 arbor separately.

Figure 28. G2861 Face mill.

Call 1-800-523-4777 To Order

H2690—MT#3 Quick Change Collet Set
An affordable quick change collet system with ultra precision. These spring collets are hardened and ground to exacting tolerances and offer incredible holding power. This set includes an MT#3 arbor and nut, spanner wrench, plastic carrying case and collets sized ⅛", ¼", ⅜", ½", ⅝", ¾", ⅞", and 1". What's more, the nut features a self-ejecting rim! A set like this will truly speed up any tool changing process. Drawbar size is ⅜" x 16.

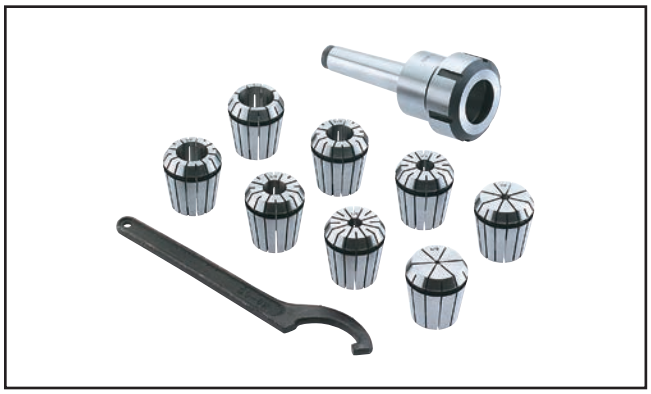


Figure 29. H2690 MT#3 Quick Change Collet Set.

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

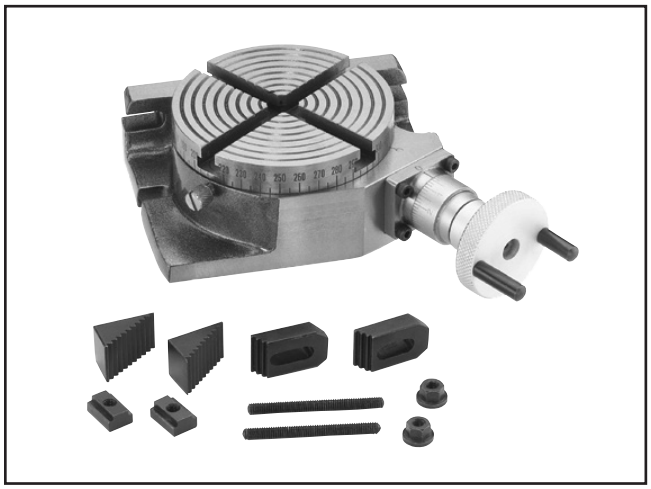
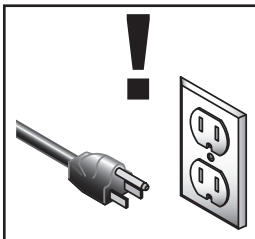


Figure 30. H5685 4" Rotary Table.

SECTION 6: MAINTENANCE



⚠WARNING

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

Schedule

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

Daily Check:
- Loose mounting bolts.
- Mill is clean and lubricated.
- Worn or damaged wires.
- Any other unsafe condition.
- Mill is completely powered down at the end of use.
- Excess cutting fluids and chips have been removed and unpainted surfaces are dry and protected.

Monthly Check:
- Gibs are adjusted properly.
- Electrical cooling fan is operational.

Cleaning

Cleaning the Model G8689 is relatively easy. Remove excess cutting fluid and chips, and wipe off the remaining moisture with a dry cloth. Treat all unpainted cast iron and steel with a non-staining lubricant after cleaning.

Unpainted Cast Iron

Protect the unpainted cast iron surfaces on the table by wiping the table clean after every use—this ensures moisture does not remain on bare metal surfaces.

Keep tables rust-free with regular applications of products like G96® Gun Treatment, SLIPIT®, or Boeshield® T-9 (see **SECTION 5: ACCESSORIES** on **Page 24** for more details).

Lubrication

Regular lubrication will ensure your mill performs at its highest potential.

Place two to three drops of ISO 68 or SAE 20W non-detergent oil or similar lubricant directly on the following areas each time you use your mill (see **Figures 31 & 32**). An oil bottle has been provided for this purpose.

A. On the Ways of the Cross Slide and Saddle
B. At the Column Pivot
C. Column Ways

Apply a light weight lithium based grease directly to these points once a month or more frequently as needed.

D. Longitudinal Leadscrew
E. Cross Feed Leadscrew
F. Column Gear Rack

Note: *You will need to move the covers out of the way to gain access to the A & E lubrication points.*

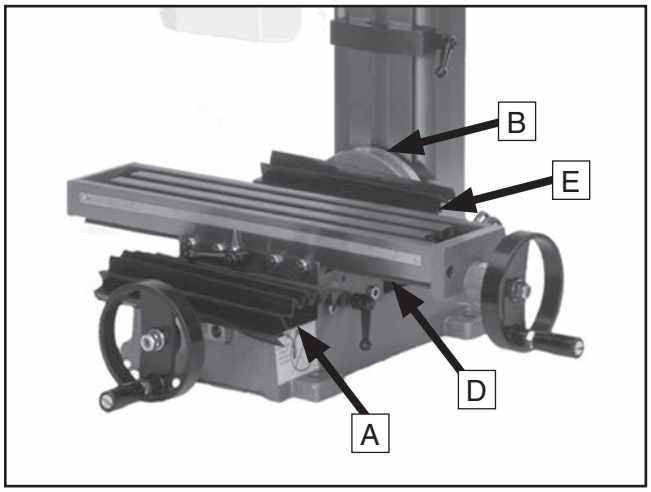


Figure 31. Points of lubrication.

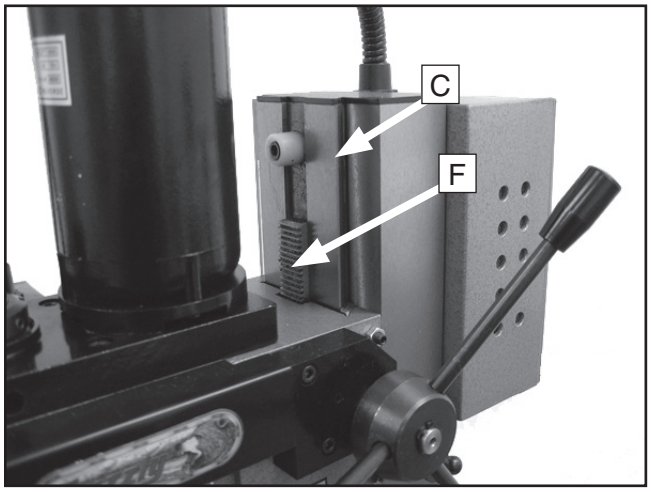


Figure 32. Upper column lubrication points.

NOTICE

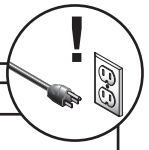
Lack of lubrication causes poor machine performance. Keep your mill lubricated to reduce wear on parts and discourage oxidation..

SECTION 7: SERVICE

About Service

This section is provided for your convenience—it is not a substitute for the Grizzly Service Department. If any adjustments arise that are not described in this manual, you need replacement parts, or you are unsure of how to perform the procedures in this section, then feel free to call our Technical Support line.

Troubleshooting



Symptom	Possible Cause	Possible Solution
Motor will not start.	1. Low voltage. 2. Open circuit in motor or loose connections. 3. Blow system fuse.	1. Check power line for proper voltage. 2. Inspect all lead connections on motor for loose or open connections. 3. Replace fuse.
Motor will not start; fuses or circuit breakers blow.	1. Short circuit in line cord or plug.	1. Repair or replace cord or plug for damaged insulation and shorted wires.
Motor shuts off unexpectedly.	1. Motor is overloaded due to high feed rate. 2. Thermal protection unit is overheated.	1. Reduce feed rate and amount of material removed. 2. Wait for system to cool down.
Motor overheats.	1. Motor overloaded. 2. Air circulation through the motor restricted. 3. Motor brushes are wearing.	1. Reduce load on motor. 2. Clean out motor to provide normal air circulation. 3. Inspect motor brushes, replace if necessary.
Motor stalls (resulting in blown fuses or tripped circuit).	1. Short circuit in motor or loose connections. 2. Low voltage. 3. Incorrect fuses or circuit breakers in power line. 4. Motor overloaded.	1. Repair or replace connections on motor for loose or shorted terminals or worn insulation. 2. Correct the low voltage conditions. 3. Install correct fuses or circuit breakers. 4. Reduce load on motor.
Cutter slows when cutting.	1. Brushes worn.	1. Replace brushes (**page 30**).
Poor surface finishes.	1. Feed rate to fast. 2. Dull cutter. 3. Lock not tightened down. 4. Gibs loose.	1. Slow feed rate. 2. Always use newly sharpened cutters. 3. Tighten column and table locks when possible to maintain rigidity. 4. Adjust gibs.
Vibration when running or cutting.	1. Loose table. 2. Loose gibs. 3. Feed rate too high.	1. Tighten table locks. 2. Adjust gibs. 3. Slow feed rate or adjust RPM.
Difficulty removing collet from spindle.	1. Debris in spindle taper or collet taper or both. 2. Head not locked in position.	1. Keep all taper surfaces spotlessly clean. 2. Lock head in place on column

Adjusting Gibs

The function of the gibs is to take out play in the table, and cross slide, and column without causing the slides to bind. The gibs are pre-adjusted at the factory and should not need further adjustment until many hours of machine use. If the movement seems too tight at first, make sure the locks are fully released. Next, make sure the bedways are thoroughly cleaned of rust preventative and lubricated with oil.

Tools Needed: **Qty**
Wrench 10mm 1
Hex Wrench 3mm..... 1

Each gib has multiple lock nuts and set screws that need to be adjusted. Make your adjustments equally and in small increments.

To adjust the gibs: (see Figure 33)

1. DISCONNECT MILL FROM POWER!
2. Loosen the lock nuts.
3. Move the table and slightly tighten each set screw. When properly adjusted, the gib should offer slight resistance without binding.
4. Tighten the lock nuts.

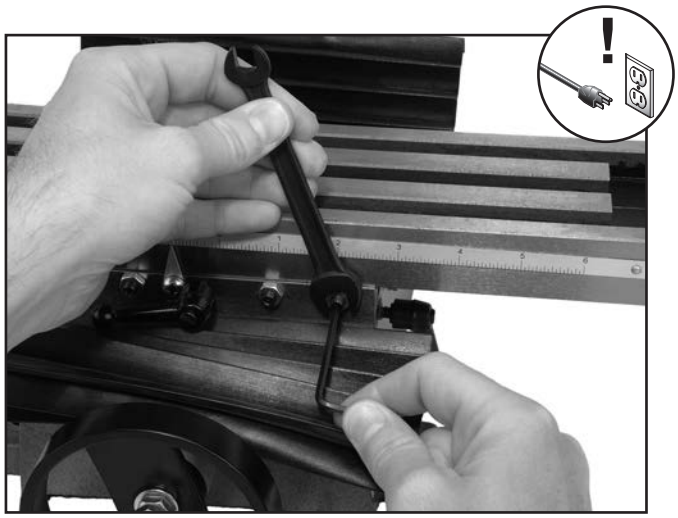


Figure 33. Gib adjustment.

Replacing Motor Brushes

After some period of time, the carbon brushes on the DC motor will need to be replaced. Always replace the brushes in pairs. Use part # P8689187.

Tools Needed: **Qty**
Flat Head Screwdriver 1

To replace the motor brushes:

1. Unscrew the cap from the motor housing.
2. Remove the spring and carbon brush.
3. Replace with a new spring and carbon brush.
4. Screw the cap back into the motor housing.

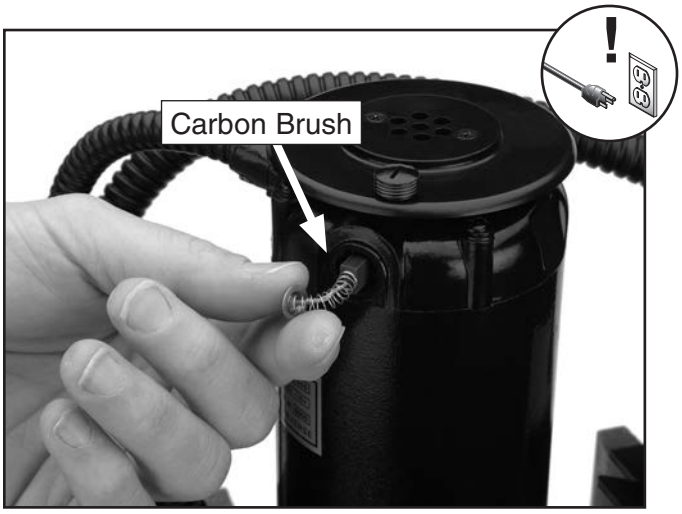


Figure 34. Carbon brush removal.

Fuse Replacement

A 5 Amp fuse is housed in the body near the main controls.

Tools Needed: **Qty**
Phillips Head Screwdriver..... 1

To replace the fuse:

1. DISCONNECT MILL FROM POWER!

2. Loosen the fuse cap.

3. Remove and replace the fuse from the fuse cradle (see **Figure 35**).

4. Replace the fuse cap.

Figure 35. Fuse replacement.

Head Counterbalance Spring

The head counterbalance spring helps keep the mill head in position. This spring has been set and adjusted at the factory and needs no further adjustment. DO NOT attempt to make adjustments to this spring. It is under high tension; if it uncoils it will be very hard to return to its original position.

⚠WARNING

This spring is under high tension! DO NOT remove the cover or the spring. THE SPRING WILL RAPIDLY UNCOIL CAUSING PERSONAL INJURY.

Electrical Components

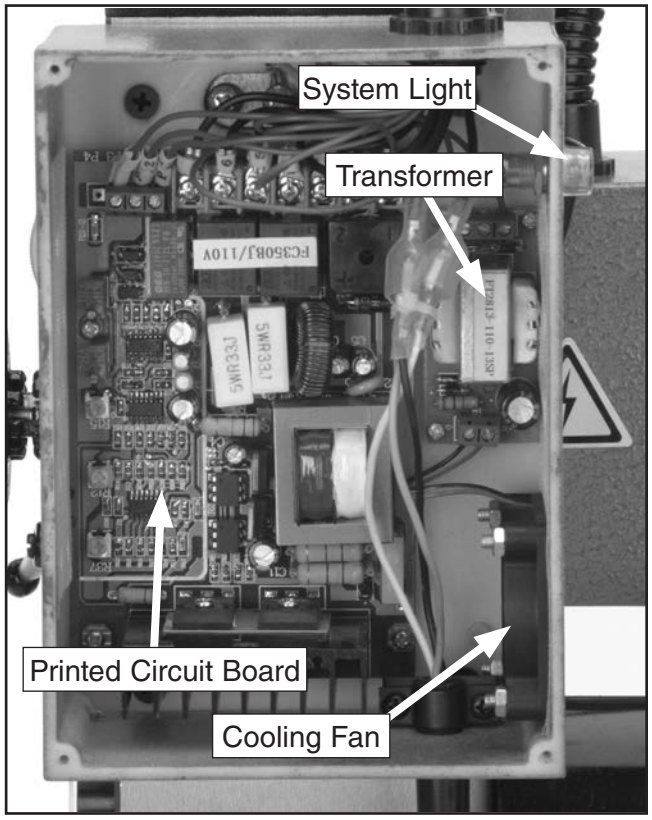


Figure 36. G8689 Electrical box.

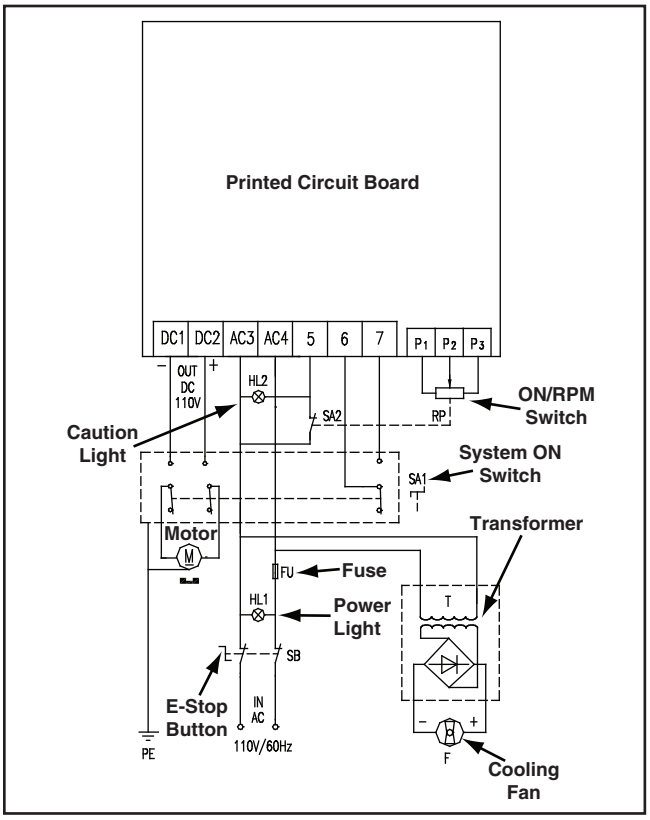


Figure 38. G8689 Wiring diagram.

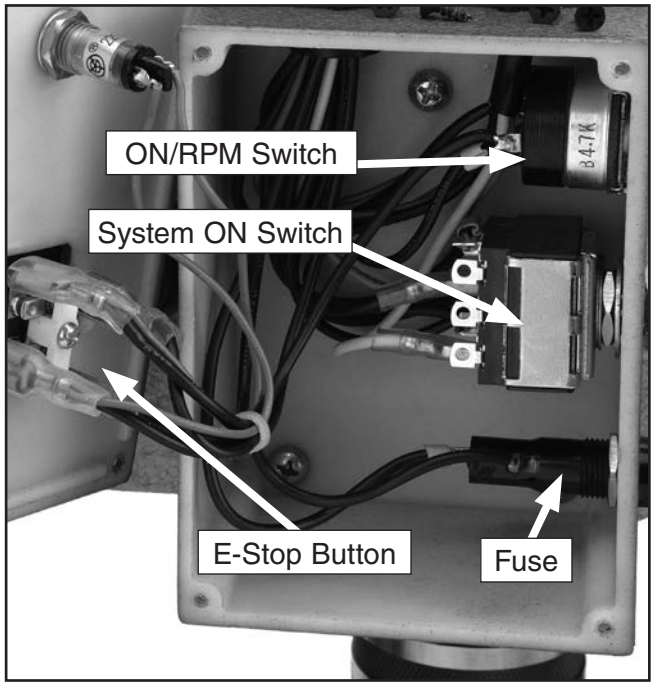
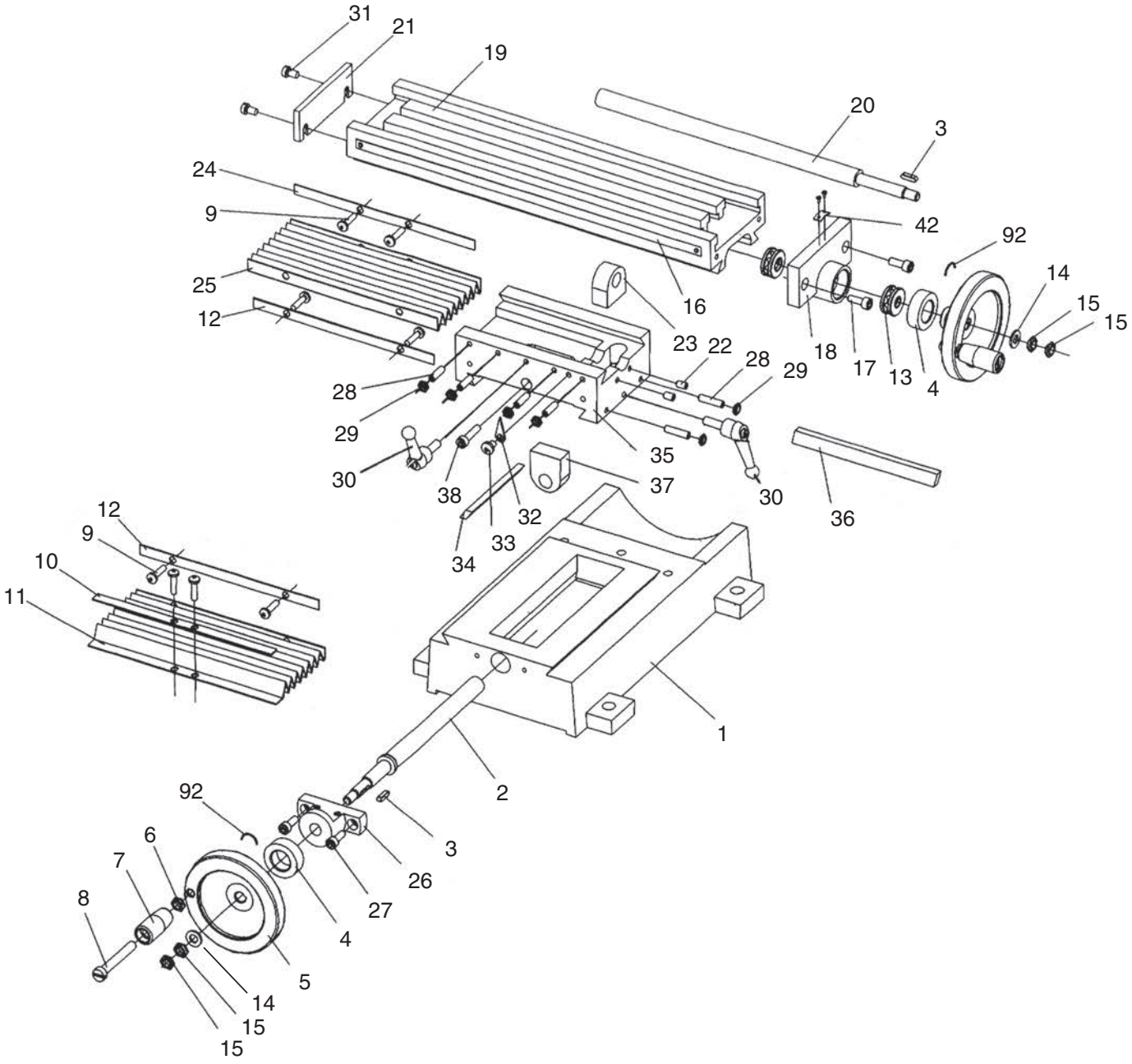


Figure 37. G8689 Control box.

Figure 39. G8689 Control panel.

G8689 Table Assembly

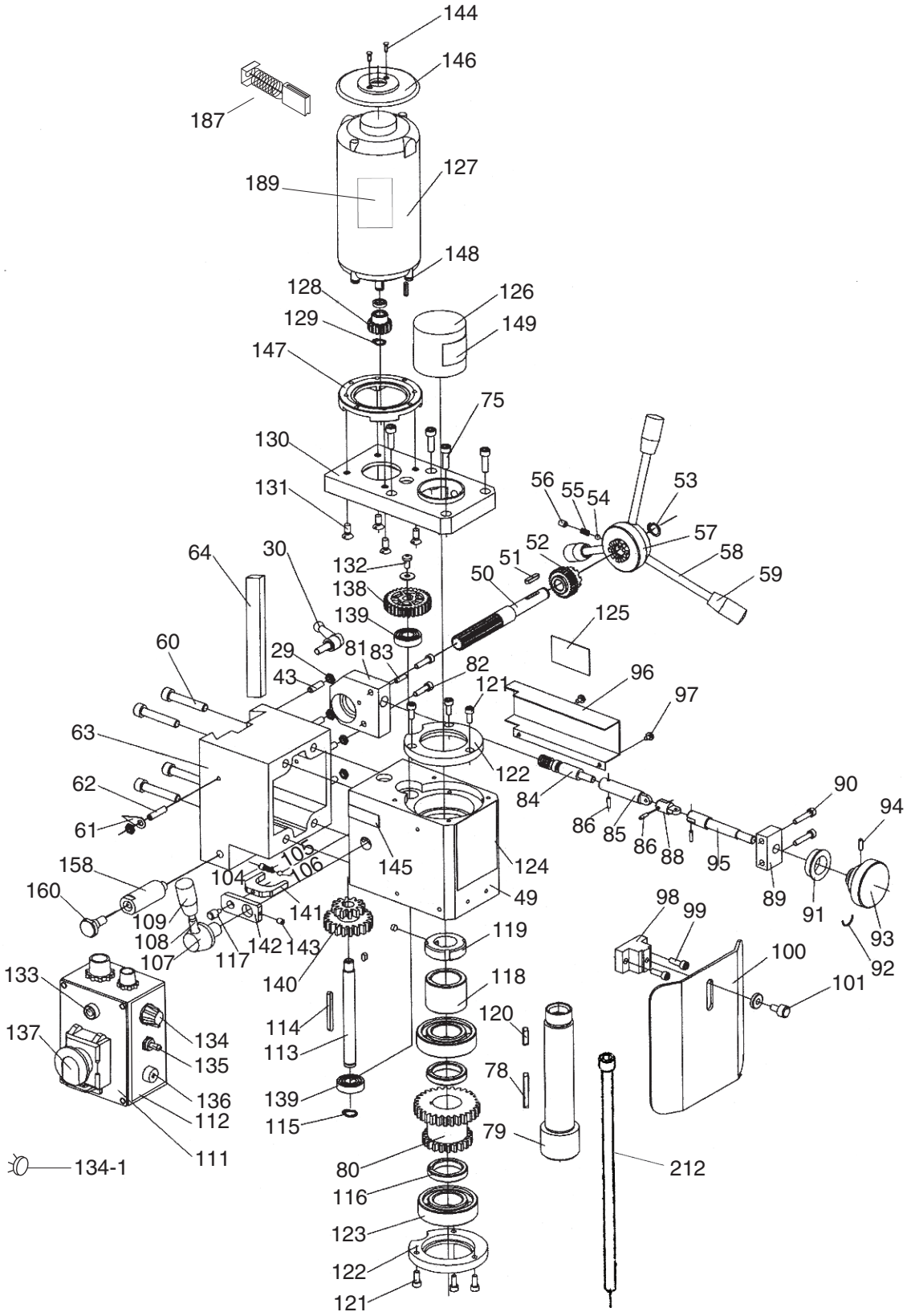


G8689 Parts List

REF	PART #	DESCRIPTION
1	P8689001	BASE
2	P8689002	Y-AXIS LEAD SCREW
3	P8689003	KEY 4 X 4 X 16
4	P8689004	DIAL
5	P8689005	HANDWHEEL
6	P8689006	HEX NUT M8-1.25
7	P8689007	HANDLE
8	P8689008	SHOULDER BOLT M8-1.25 X 55
9	P8689009	CAP SCREW M6-1 X 8
10	P8689010	HOLDING PLATE
11	P8689011	DUST GUARD COVER
12	P8689012	HOLDING PLATE
13	P8689013	BALL BEARING 8200
14	P8689014	FLAT WASHER 8MM
15	P8689015	HEX NUT M8-1.25
16	P8689016	X-AXIS SCALE
17	P8689017	CAP SCREW M6-1 X 16
18	P8689018	X-AXIS BEARING SEAT
19	P8689019	WORKING TABLE
20	P8689020	X-AXIS LEAD SCREW
21	P8689021	END COVER
22	P8689022	SET SCREW M6-1 X 10
23	P8689023	X-AXIS SCREW NUT
24	P8689024	HOLDING PLATE
25	P8689025	DUST GUARD COVER
26	P8689026	SCREW SEAT
27	P8689027	CAP SCREW M6-1 X 16
28	P8689028	SET SCREW M6-1 X 22
29	P8689029	HEX NUT M6-1
30	P8689030	LOCK HANDLE
31	P8689031	PHLP HD SCR M6-1 X 10
32	P8689032	POINTER
33	P8689033	PHLP HD SCR M6-1 X 8
34	P8689034	Y-AXIS GIB
35	P8689035	SADDLE
36	P8689036	X-AXIS GIB
37	P8689037	Y- AXIS SCREW NUT
38	P8689038	CAP SCREW M6-1 X 25
39	P8689039	PIVOT PLATE
40	P8689040	LOCK WASHER 10MM
41	P8689041	CAP SCREW M10-1.5 X 30
42	P8689042	POINTER
43	P8689043	SET SCREW M6-1 X 22
44	P8689044	SCALE
45	P8689045	GIB
46	P8689046	GEAR RACK 13 1/8"
47	P8689047	FLAT HD SCR M6-1 X 12

REF	PART #	DESCRIPTION
49	P8689049	SPINDLE BOX
50	P8689050	PINION
51	P8689051	KEY 4 X 4 X 25
52	P8689052	BEVEL GEAR
53	P8689053	EXT RETAINING RING 12MM
54	P8689054	STEEL BALL 5MM
55	P8689055	COMPRESSION SPRING .4 X .8 X 10
56	P8689056	SET SCREW M6-1 X 8
57	P8689057	HANDLE STOCK
58	P8689058	OPERATING LEVER
59	P8689059	LEVER CAP
60	P8689060	CAP SCREW M8-1.25 X 25
61	P8689061	POINTER
62	P8689062	SET SCREW M6-1 X 25
63	P8689063	SPINDLE BOX SEAT
64	P8689064	GIB
65	P8689065	LIMIT BLOCK
66	P8689066	GIB
67	P8689067	SCALE
68	P8689068	COLUMN
69	P8689069	ELECTRIC BOX
70	P8689070	LOCK NUT M24-3
71	P8689071	UNIQUE FLAT WASHER 10MM
72	P8689072	CONNECTING STRUT
75	P8689075	CAP SCREW M6-1 X 20
78	P8689078	KEY 5 X 5 X 40
79	P8689079	SPINDLE
80	P8689080	TRANSMISSION GEAR (WIDE)
81	P8689081	SUPPORT BLOCK
82	P8689082	PHLP HD SCR M5-.8 X 20
83	P8689083	SOLID PIN 4 X 15
84	P8689084	WORM
85	P8689085	SLEEVE
86	P8689086	ROLL PIN 3 X 12
88	P8689088	ADJUSTABLE UNION
89	P8689089	BRACKET
90	P8689090	PHLP HD SCR M5-.8 X 25
91	P8689091	DIAL
92	P8689092	FLAT SPRING
93	P8689093	SMALL HANDWHEEL
94	P8689094	SET SCREW M5-.8 X 16
95	P8689095	SMALL SHAFT
96	P8689096	COVER
97	P8689097	PHLP HD SCR M4-.7 X 6
98	P8689098	DUST COVER SUPPORT
99	P8689099	CAP SCREW M5-.8 X 16

G8689 Head Assembly

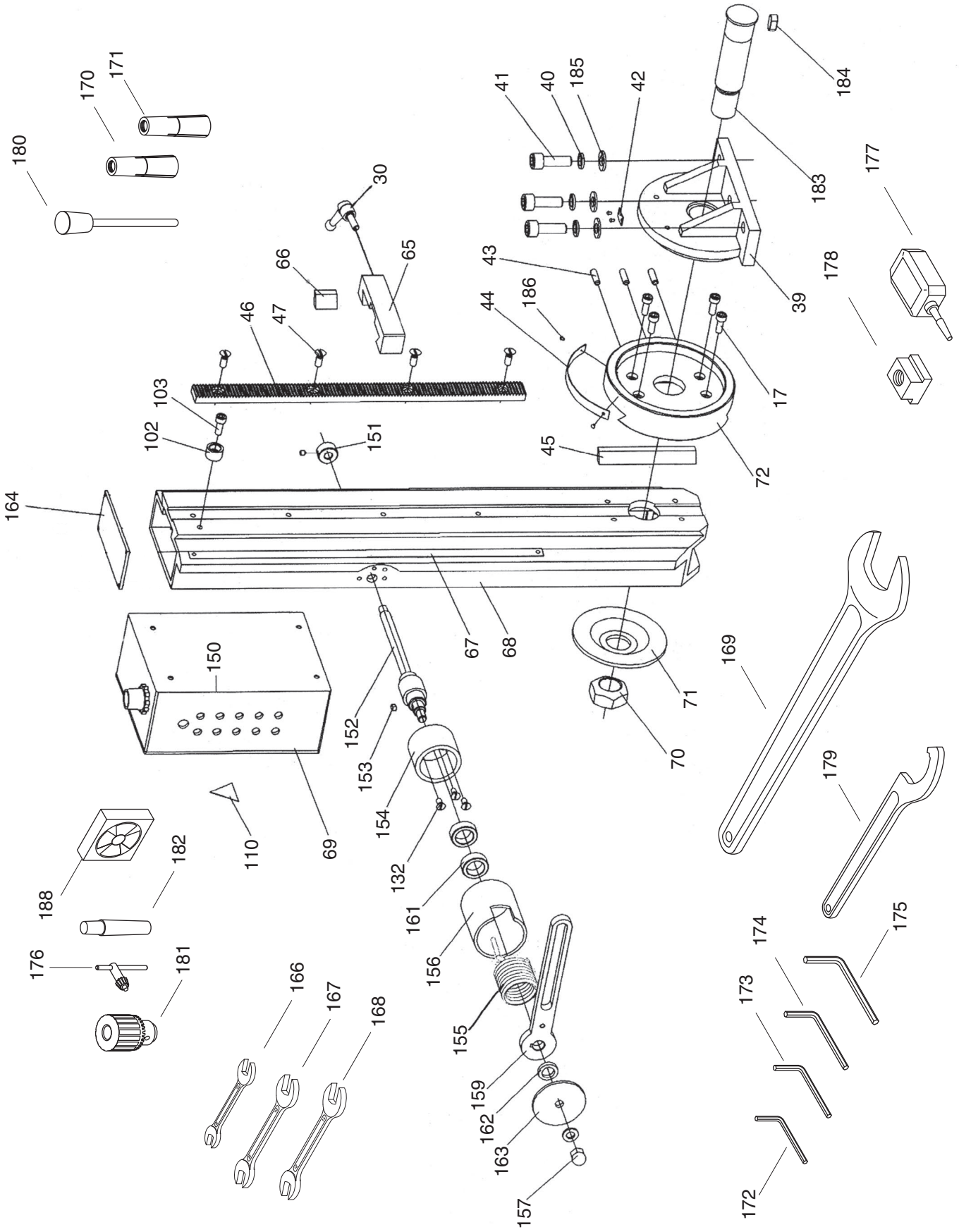


G8689 Parts List

REF	PART #	DESCRIPTION
100	P8689100	CHIP GUARD
101	P8689101	KNURLED SCREW M6-1 X 12
102	P8689102	SPACER
103	P8689103	CAP SCREW M6-1 X 16
104	P8689104	SET SCREW M6-1 X 6
105	P8689105	COMPRESSION SPRING
106	P8689106	STEEL BALL 5MM
107	P8689107	HANDLE SEAT
108	P8689108	OPERATING LEVER
109	P8689109	HANDLE
110	P8689110	ELECTRICITY LABEL
111	P8689111	CONTROLLER BOX W/ELEC
112	P8689112	LABEL FOR CONTROLLER
113	P8689113	IDLER SHAFT
114	P8689114	KEY 4 X 4 X 45
115	P8689115	INT RETAINING RING 12MM
116	P8689116	SPACING RING
117	P8689117	SMALL SHAFT
118	P8689118	SPACING RING
119	P8689119	SPINDLE NUT
120	P8689120	KEY 5 X 5 X 30
121	P8689121	CAP SCREW M5-.8 X 8
122	P8689122	BEARING COVER
123	P8689123	BALL BEARING 6206ZZ
124	P8689124	MACHINE ID LABEL
125	P8689125	FINE FEED LABEL
126	P8689126	PROTECTING COVER
127	P8689127	MOTOR
128	P8689128	MOTOR GEAR
129	P8689129	INT RETAINING RING 10MM
130	P8689130	MOTOR SEAT
131	P8689131	FLAT HD SCR M6-1 X 12
132	P8689132	PHLP HD SCR M5-.8 X 8
133	P8689133	LAMP
134	P8689134	SPEED CONTROL KNOB
134-1	P8689134-1	POTENTIOMETER
135	P8689135	SWITCH
136	P8689136	FUSE BOX
137	P8689137	EMERGENCY STOP SWITCH
138	P8689138	GEAR
139	P8689139	BALL BEARING 6001ZZ
140	P8689140	TRANSMISSION GEAR (NARROW)
141	P8689141	BAR
142	P8689142	LINKING BOARD
143	P8689143	SET SCREW M5-.8 X 8
144	P8689144	SELF TAP SCR ST2.9 X 8

REF	PART #	DESCRIPTION
145	P8689145	HIGH/LOW LABEL
146	P8689146	MOTOR COVER
147	P8689147	MOTOR FLANGE
148	P8689148	PHLP HD SCR M6-1 X 10
149	P8689149	READ MANUAL
150	P8689150	PC BOARD
151	P8689151	COLLAR
152	P8689152	ROTOR SHAFT
153	P8689153	KEY 4 X 4 X 6
154	P8689154	SPRING SUPPORT
155	P8689155	TORSION SPRING
156	P8689156	COVER
157	P8689157	ACORN NUT M8-1.25
158	P8689158	STUD
159	P8689159	SUPPORTING SHANK
160	P8689160	SHLDR BOLT M8-1.25 X 25
161	P8689161	SLEEVE
162	P8689162	FLAT WASHER 8MM
163	P8689163	COVER
164	P8689164	TOP COVER
166	P8689166	WRENCH 8 X 10
167	P8689167	WRENCH 14 X 17
168	P8689168	WRENCH 17 X 19
169	P8689169	WRENCH 36MM
170	P8689170	COLLET MT#3 X 3/8
171	P8689171	COLLET MT#3 X 1/2
172	P8689172	HEX WRENCH 3MM
173	P8689173	HEX WRENCH 4MM
174	P8689174	HEX WRENCH 5MM
175	P8689175	HEX WRENCH 6MM
176	P8689176	CHUCK KEY
177	P8689177	OILER
178	P8689178	T-NUTS M10-1.5
179	P8689179	SPANNER WRENCH
180	P8689180	LOCKING PIN
181	P8689181	DRILL CHUCK 1/2-B16
182	P8689182	ARBOR MT#3-B16
183	P8689183	SHAFT
184	P8689184	KEY 8 X 8 X 12
185	P8689185	FLAT WASHER 10MM
186	P8689186	RIVET
187	P8689187	MOTOR BRUSH
188	P8689188	COOLING FAN
189	P8689189	FACE SHIELD & SAFETY GLASSES
212	P8689212	DRAWBAR

G8689 Column Assembly



Grizzly Industrial, Inc. WARRANTY CARD

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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?

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____ Card Deck	____ Website	____ Other:

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

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

3. What is your annual household income?

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

4. What is your age group?

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

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

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

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

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

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

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

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

10. Comments: _____

_____

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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.