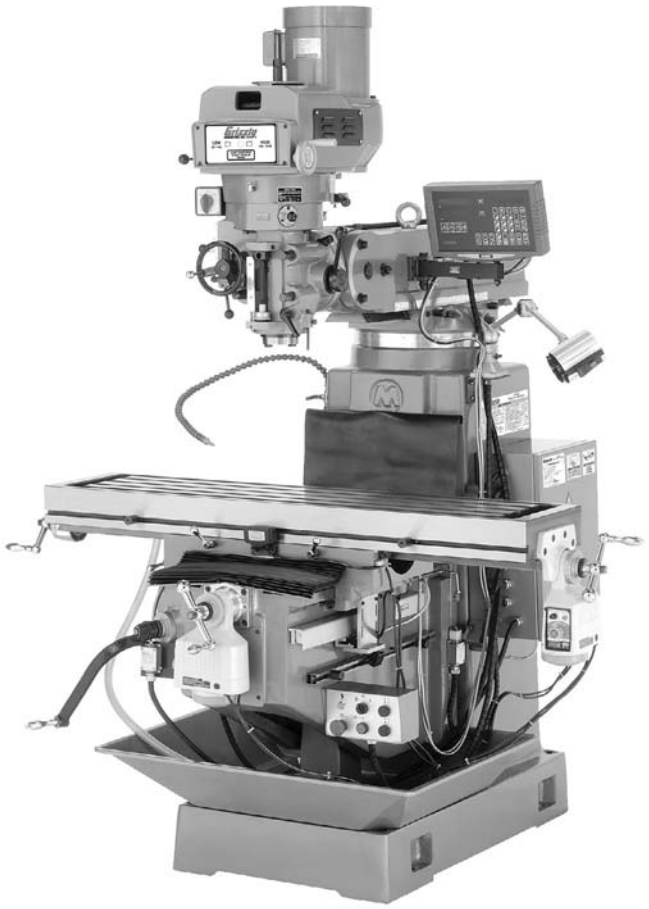
MODEL G0559
12" x 54" MILLING MACHINE
w/POWER FEEDS & DIGITAL READOUT
OWNER'S MANUAL



#TS10889 PRINTED IN CHINA

⚠ WARNING!

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

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

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

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

⚠ WARNING!

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

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

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

Table of Contents

INTRODUCTION

Foreword

We are proud to offer the Model G0559 12" x 54" Milling Machine. This machine is part of a growing Grizzly family of fine metalworking machinery. When used according to the guidelines set forth in this manual, you can expect years of trouble-free, enjoyable operation and proof of Grizzly's commitment to customer satisfaction.

The specifications, drawings, and photographs illustrated in this manual represent the Model G0559 when the manual was prepared. However, owing to Grizzly's policy of continuous improvement, changes may be made at any time with no obligation on the part of Grizzly. For your convenience, we always keep current Grizzly manuals available on our website at **www.grizzly.com**. Any updates to your machine will be reflected in these manuals as soon as they are complete. Visit our site often to check for the latest updates to this manual!

Contact Info

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

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

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

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

Functional Overview

The vertical mill is used to remove material from a workpiece using a rotating tool that is inserted into the spindle of the head, which can positioned in nearly any configuration above the table and workpiece.

During most operations, the tooling rotates in a stationary position while the operator moves the workpiece that is clamped to the table into the cutter in any combination of three paths—longitudinal (X-axis), cross (Y-axis), and vertical (Z-axis). The range of movement for the table is greater than that of the head and spindle. However some operations, such as drilling or tapping, are better accomplished using vertical quill (spindle) movement. There are coarse and fine manual controls for quill movement, and an auto-downfeed mechanism with adjustable speeds.

The high and low spindle speed range is selected using a convenient lever on the side of the head. Speeds are electronically controlled within these ranges by using the variable speed dial and readout on the control panel.

Power feeds provide precision powered longitudinal, cross, and vertical table movement with adjustable limit stops for preset range of motion.

The coolant reservoir in the column base houses a pump that recycles the fluid back up to the workpiece, reducing friction and washing away the resulting swarf from the operation.

The digital readout (DRO) displays the exact X and Y coordinates of the workpiece in relation to the tool, as well as providing many complex tool/workpiece functions and calculations.

Identification

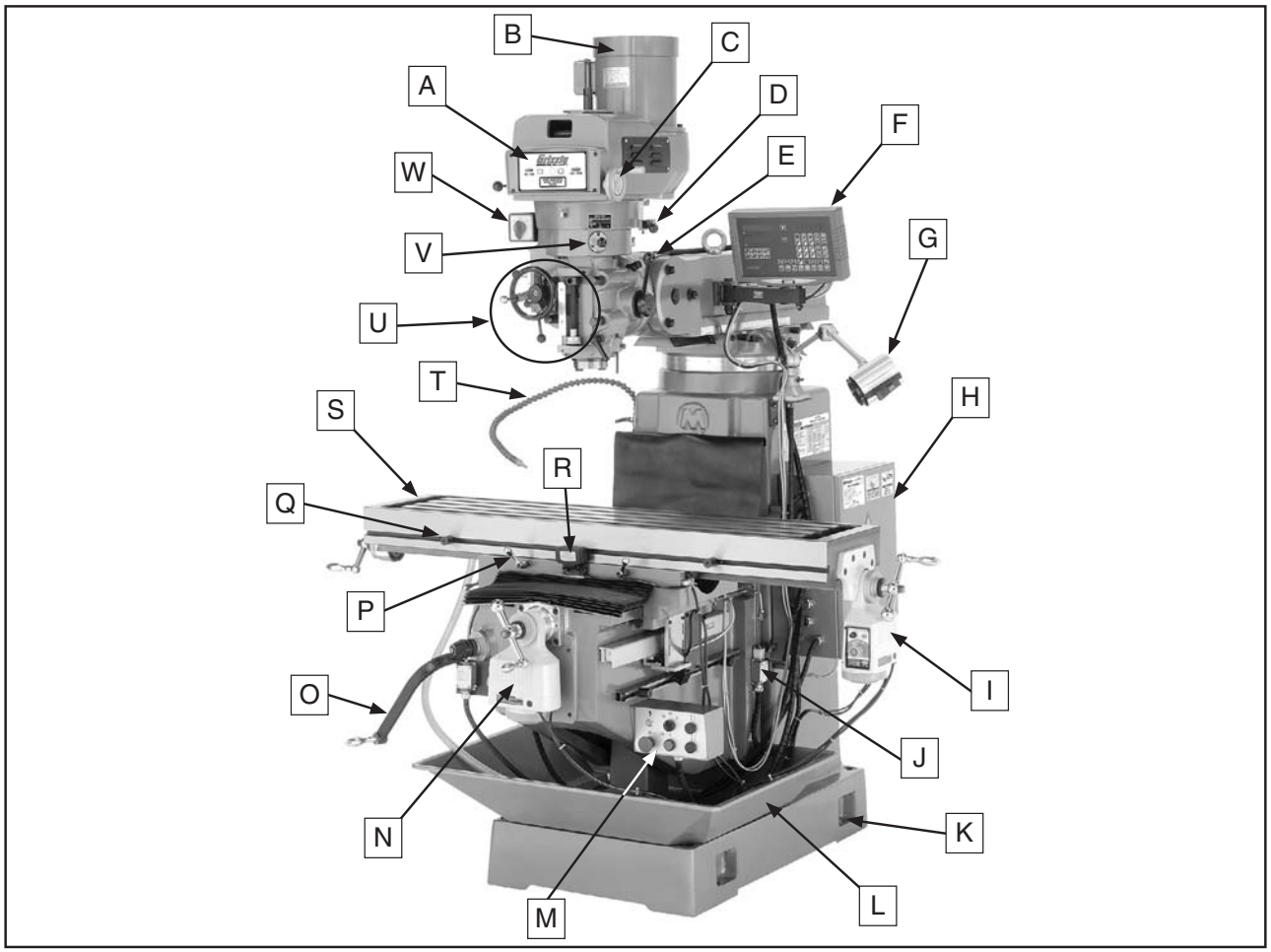


Figure 1. Model G0559 identification, front.

A. Variable Speed Readout
B. Spindle Motor, 5HP 220V 3-Phase
C. Variable Speed Handwheel
D. Speed Range Selector
E. Coarse Downfeed Handle
F. Digital Readout
G. Halogen Work Light
H. Electrical Cabinet
I. Longitudinal (X-Axis) Power Feed & Ball Handle
J. Vertical (Z-Axis) Limit Switch
K. Machine Mounting Point
L. Splash Pan
M. Control Panel (refer to **Page 23** for details)
N. Cross (Y-Axis) Power Feed & Ball Handle
O. Knee (Vertical) Crank Handle
P. Table Lock
Q. Longitudinal Limit Stop
R. Longitudinal Limit Switch
S. Table
T. Coolant Nozzle
U. Fine & Auto-Downfeed Controls (refer to **Page 31** for details)
V. Downfeed Selector
W. Spindle Direction Switch

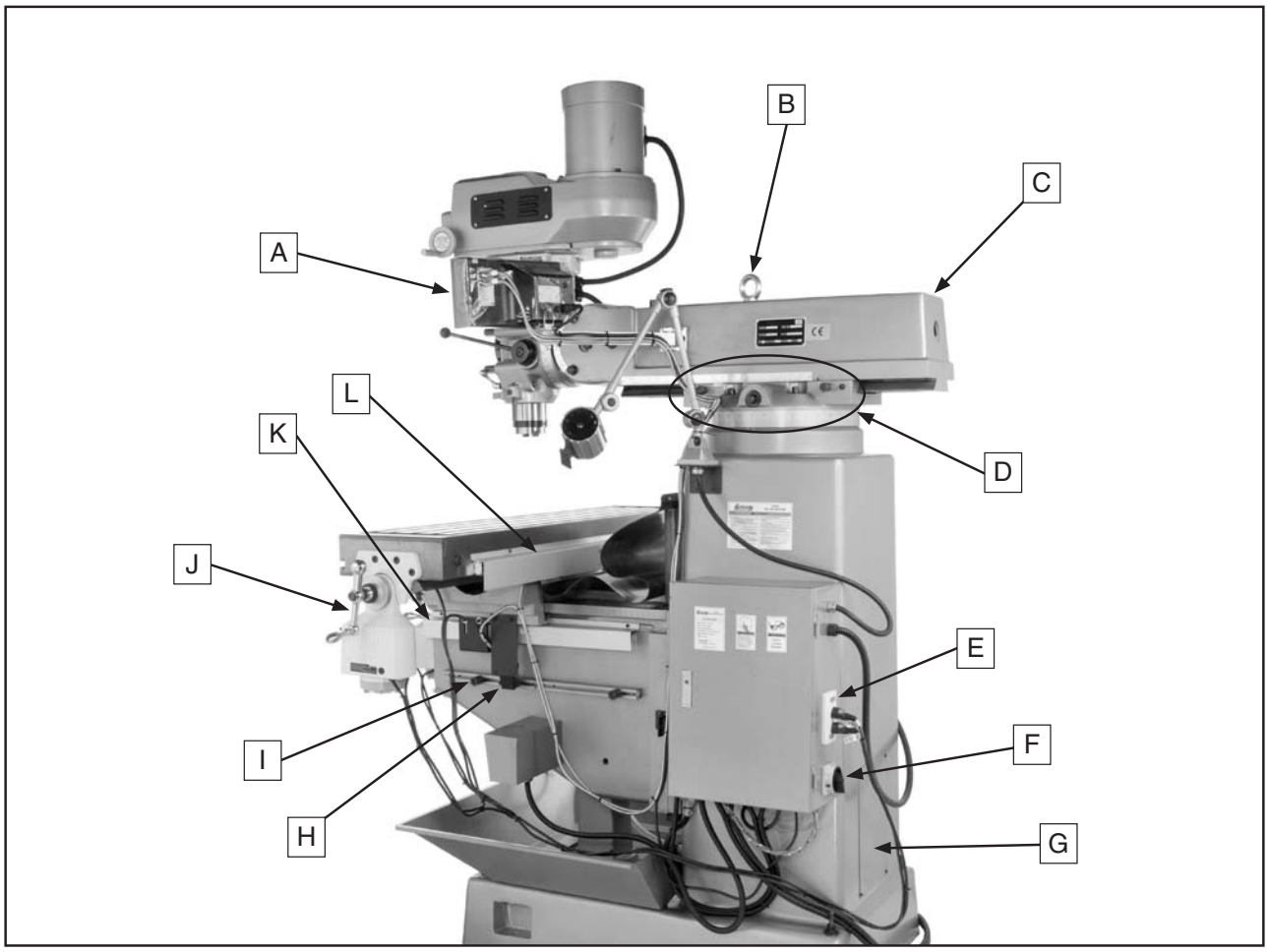


Figure 2. Model G0559 identification, right.

A. Digital Readout
B. Lifting Eye Bolt
C. Ram
D. Turret & Ram Controls
E. 110V Outlets
F. Main Power Switch
G. Coolant Pump & Reservoir Access
H. Cross Limit Switch
I. Cross Limit Stop
J. Longitudinal Power Feed & Ball Handle
K. Cross Digital Readout Scale & Cover
L. Longitudinal Digital Readout Scale & Cover

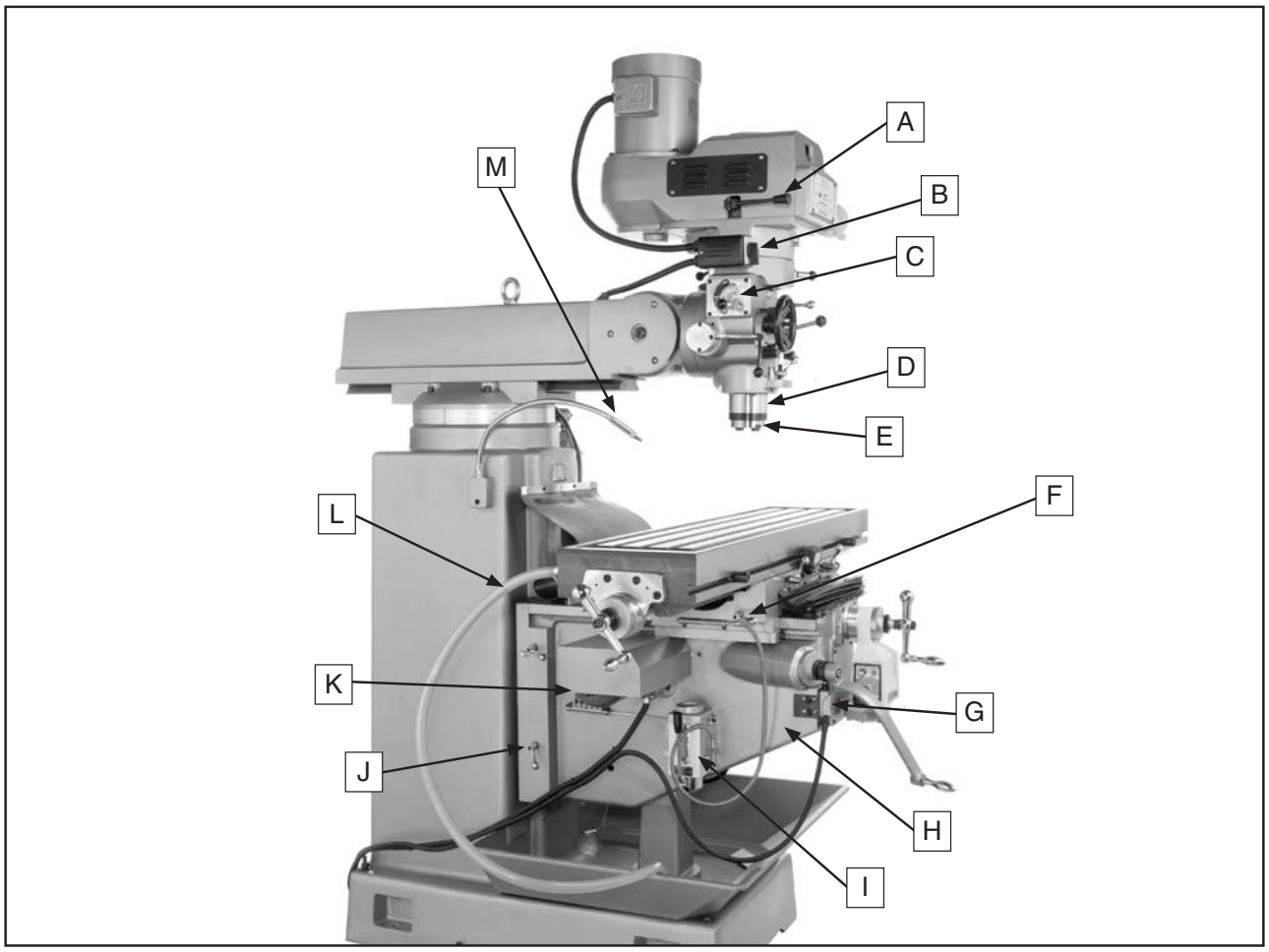


Figure 3. Model G0559 identification, left.

A. Spindle Brake
B. Spindle Direction Switch
C. Downfeed Rate Selector
D. Quill
E. Spindle NT40
F. Saddle Lock
G. Elevation Crank Safety Switch
H. Knee
I. One-Shot Oiler
J. Knee Lock
K. Vertical Motor
L. Coolant Hose
M. Coolant Nozzle

MACHINE DATA SHEET

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

MODEL G0559 LARGE MILLING MACHINE 12 X 54

Product Dimensions:

Weight..... 3300 lbs.
Length/Width/Height..... 73 x 70 x 88 in.
Foot Print (Length/Width)..... 41-1/4 x 25 in.

Shipping Dimensions:

Type..... Wood Crate
Content..... Machine
Weight..... 3623 lbs.
Length/Width/Height..... 66 x 62 x 84 in.

Electrical:

Switch..... Forward/Reverse
Switch Voltage..... 220V
Recommended Breaker Size..... 20 amp
Plug..... No
Phase Converter..... G5845

Motors:

Main

Type..... TEFC Induction
Horsepower..... 5 HP
Voltage..... 220V
Prewired..... 220V
Phase..... Three
Amps..... 11.4A
Speed..... 1725 RPM
Cycle..... 60 Hz
Number Of Speeds..... 1
Power Transfer ..... Variable Belt and Pulley
Bearings..... Shielded, Permanently Lubricated

Elevation

Type..... TEFC Induction
Horsepower..... 1/2 HP
Voltage..... 220V
Prewired..... 220V
Phase..... Three
Amps..... 1.5A
Cycle..... 60 Hz
Number Of Speeds..... 1
Power Transfer ..... Direct Drive
Bearings..... Shielded, Permanently Lubricated

Main Specifications:

Operation Info

Spindle Travel	5 in.
Swing	31 in.
Longitudinal Table Travel	28 in.
Cross Table Travel	15-1/4 in.
Vert. Table Travel	13-1/4 in.
Knee Travel	15-7/8 in.
Ram Travel	18 in.
Head Swivel	Left and Right 90 deg.
Head Tilt	Left and Right 45 deg.
Turret Or Column Swivel	360 deg.
Max. Dist Spindle To Column	36-1/2 in.
Max. Dist Spindle To Table	16 in.
Drilling Cap For Cast Iron	1-3/4 in.
Drilling Cap For Steel	1-3/4 in.
No. Of Vert. Spindle Speeds	Variable
Range Of Vert. Spindle Speeds	90 - 3800 RPM
No. Of Longitudinal Feeds	Variable
Feed Rate	0 - 140 RPM
Quill Dia	3.935 in.
Quill Feed Rates	0.0015, 0.003, 0.006 in.

Table Info

Table Length	54 in.
Table Width	12 in.
Table Thickness	4 in.
No. Of T Slots	3
T Slots Width	5/8 in.
T Slots Height	1.270 in.
T Slots Centers	2-1/2 in.
Stud Size	1/2 in.

Spindle Info

Spindle Taper	NT #40
End Milling Cap	1-1/4 in.
Face Milling Cap	4 in.
Draw Bar Diameter	5/8 in.
Draw Bar TPI	5/8 - 11
Draw Bar Length	11 in.
Spindle Bearings	Angular Contact

Lead Screw Info

Lead Screw Diameter	1-1/4 in.
Lead Screw TPI	5
Lead Screw Length	65 in.

Construction

Spindle Housing Const	Cast Iron
Table Const	Precision Ground Cast Iron
Head Const	Cast Iron
Column Const	Cast Iron
Base Const	Cast Iron
Paint	Enamel

Other

Collars Calibrated	0.001 in.

Other Specifications:

Country Of Origin ..... China
Warranty ..... 1 Year
Serial Number Location ..... Label on Electric Box
Assembly Time ..... 3-1/2 hours

Features:

One Shot Pump Lubrication
Y, Z Covers
Auto Down Feed
Auto Stop with Micro Adjustable Stop
Longitudinal Power Feed
Cross Slide Power Feed
Knee Power Feed
DRO for X and Y Axis
Coated Ways on X and Y Axis
Meehanite Casting
Variable Speed
Chrome Plated Precision Ground Quill
Selectable Resolution to 1 Micrometer
Absolute/Incremental Coordinate Display
Radius Arc Function
Hole Placement Along an Angled Line
200 User Defined Coordinates
200 Auxiliary Zero Points
Circle of Holes Function
Tool Bit Diameter Compensation
Calculator with Trig Functions

Accessories Included:

Drawbar

SECTION 1: SAFETY

⚠WARNING

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

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

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

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

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

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

⚠WARNING

Safety Instructions for Machinery

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

⚠WARNING
Safety Instructions for Machinery

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

⚠WARNING
Additional Safety Instructions For Mills

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

2. **SAFETY ACCESSORIES.** Always use a chip guard 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.** Before starting the machine, be certain the workpiece has been properly clamped to the table. NEVER hold the workpiece by hand during operation.

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

5. **SPINDLE SPEEDS.** 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. **POWER DISRUPTION.** In the event of a local power outage during operation, turn ***OFF*** all switches to avoid possible sudden startup once power is restored.

7. **STOPPING SPINDLE.** DO NOT stop the spindle using your hand. Allow the spindle to stop on its own, or, in the case of an emergency, use the spindle brake.

8. **CLEAN-UP.** DO NOT clear chips by hand or compressed air. Use a brush or vacuum, and never clear chips while the spindle is turning.

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 changing cutting tools, starting any inspection, adjustment, or maintenance procedure.

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

13. **TOOL HOLDING.** Always use the proper tools for your operation. Make sure tools are held firmly in place.

14. **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.

15. **SPINDLE DIRECTION CHANGES.** Never reverse the spindle direction while the spindle is in motion.

16. **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.

⚠WARNING

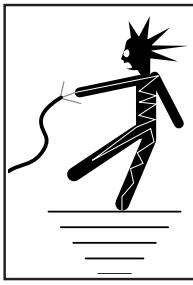
Like all machinery there is potential danger when operating this mill. Accidents are frequently caused by lack of familiarity or failure to pay attention. Use this mill with respect and caution to reduce the risk of operator injury. If normal safety precautions are overlooked or ignored, serious personal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

SECTION 2: CIRCUIT REQUIREMENTS

220V 3-Phase Operation

⚠WARNING

Serious personal injury could occur if you connect the machine to the power source before you have completed the setup process. DO NOT connect the machine to the power source until instructed after setup.



⚠WARNING

Electrocution or fire could result if this machine is not installed to code. You MUST ensure compliance by checking with a qualified electrician!

Full Load Amp Draw

Amp Draw.....12.9 Amp

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.....20 Amps

Minimum Cord Requirements

Use a stranded-copper flexible cord that meets the minimum requirements listed below, does not exceed 50 ft., and has an insulation type that starts with "S." A qualified electrician MUST determine the best cord to use in your environment depending on exposure to moisture, heat, and oils.

220V 3-Phase.....12/4 AWG, 300VAC

Power Connection Device

The power connection device depends on the type of installed or planned service. We recommend using one of the devices shown in **Figure 4**, depending on the voltage being used.

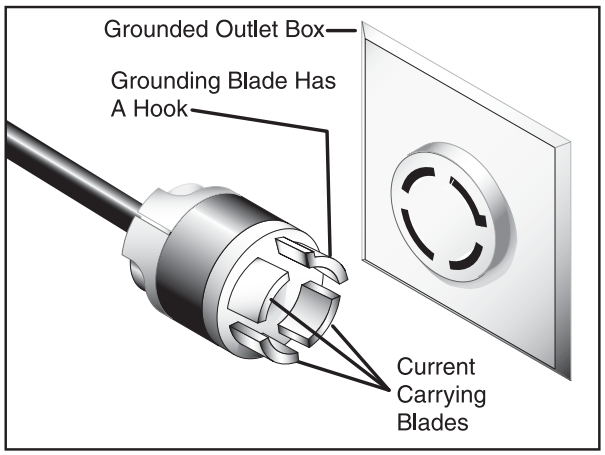


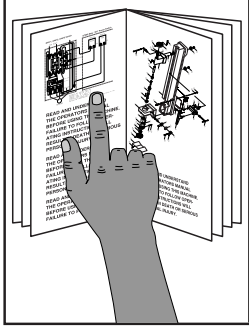
Figure 4. NEMA L15-20 plug and receptacle.

Phase Converter Precaution

The power from the manufactured leg may damage electrical components if connected to the wrong incoming power terminal on your machine. Only connect the manufactured leg to the **L1** terminal (see **Page 51** for identification).

SECTION 3: SETUP

Setup Safety

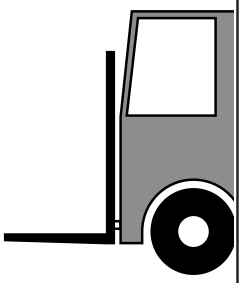


⚠WARNING

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 G0559 is a heavy machine. Serious personal injury may occur if safe moving methods are not used. To be safe, get assistance and use power equipment rated for at least 4000 lbs. to move the shipping crate and remove the machine from the crate.

Items Needed for Placement/Cleaning

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

Description	Qty
Assistants	2
Precision Level	1
Wrench 14mm	1
Safety Glasses	1 Each Person
Safety Lifting Hook & Chain (rated for at least 4000 lbs.)	1
Lifting Straps (rated for at least 4000 lbs.)	2
Power Lifting Equipment (rated for at least 4000 lbs.)	1
Machine Mounting Hardware	As Needed
Cleaning Solvent & Rags	As Needed

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: (Figures 5–6)	**Qty**
A. Splash Pan	1
B. Handles	3
C. Ball Handles	3
D. Fine Downfeed Handwheel	1
E. Hex Wrenches 4, 5, 6, 8mm	1 Each
F. Screwdrivers, Standard & Phillips	1 Each
G. Closed-End Wrenches 17/19, 18/21	1 Each
H. Oil Bottle	1
I. Rear Way Cover	1
J. Front Way Cover	1
K. Digital Readout	1
L. Toolbox	1
M. Elevation Crank Handle	1
N. Digital Readout Manual	1
O. Power Feed Manual	1
P. Coolant Hose & Connector	1

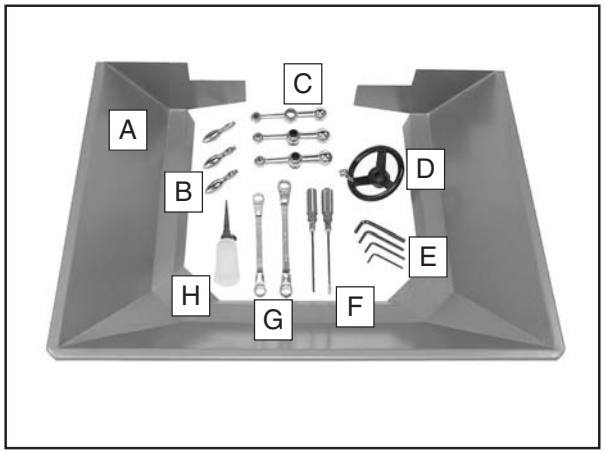


Figure 5. Model G0559 inventory 1.

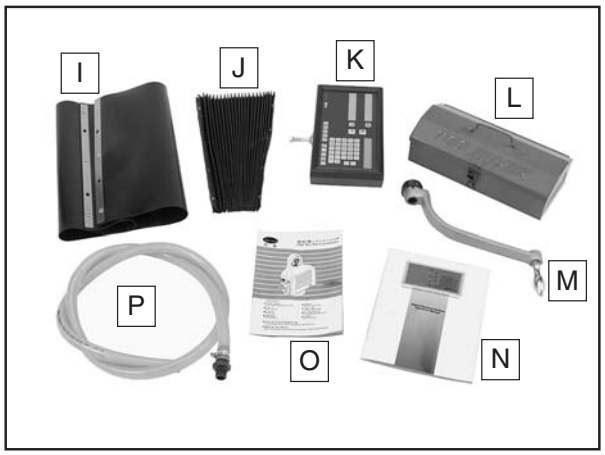
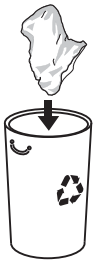


Figure 6. Model G0559 inventory 2.

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.



⚠WARNING

SUFFOCATION HAZARD!

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

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

Site Considerations

Floor Load

Refer to the **Machine Data Sheet** on **Page 6** 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 8** for the minimum working clearances.

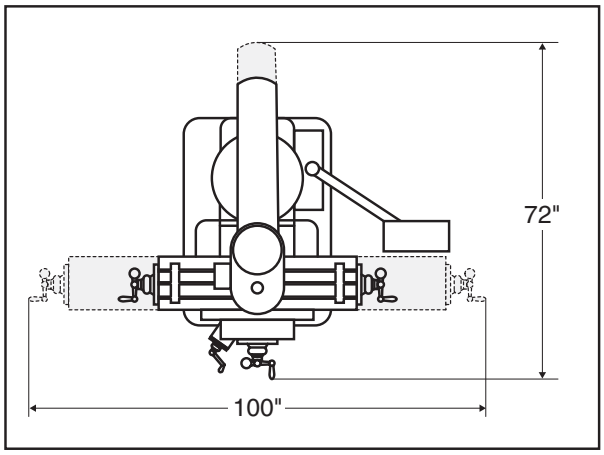
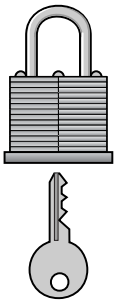


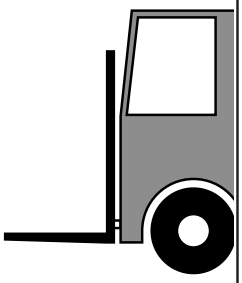
Figure 8. Minimum working clearances.



⚠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 Base Unit



⚠WARNING

The Model G0559 is a heavy machine. Serious personal injury may occur if safe moving methods are not used. To be safe, get assistance and use power equipment rated for at least 4000 lbs. to move the shipping crate and remove the machine from the crate.

After removing the crate from the shipping pallet and placing the small items in a safe location, remove the hex nuts and washers from the four studs securing the machine to the shipping pallet.

The two methods of lifting and moving the machine described below require at least two assistants, and power lifting equipment with a safety hook and chain or lifting straps rated for at least 4000 lbs.

⚠WARNING

Only use lifting safety hook, chain or lifting straps, and power lifting equipment rated for at least 4000 lbs. and in good working condition. Only raise the mill enough to clear shipping pallet and floor obstacles. If the mill falls or tips over while moving it, serious personal injury and property damage could result.

Moving Machine with Eye Bolt

1. Keep the headstock in the same position it was shipped in, similar to **Figure 9**.

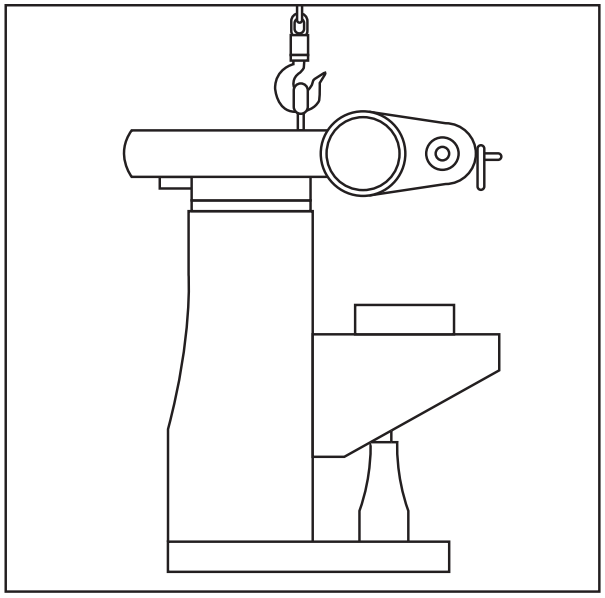


Figure 9. Using the eye bolt to lift the machine.

2. Move the ram so that the eye bolt is aligned with the front edge of the column, then lock the ram in place (refer to **Ram Movement** on **Page 29** for detailed instructions).

3. Make sure the eye bolt is fully tightened into the ram, attach the safety hook to the eye bolt, then lift the mill slowly to make sure the hook is secure and the mill is lifting evenly. Raise the mill only enough to clear the shipping pallet and floor obstacles.

—If the mill tips in one direction, lower the mill to the ground, then adjust the ram or table to balance the weight. Re-tighten all locks before lifting the mill again.

—If the mill lifts evenly, move it to its permanent location.

Note: *Have your assistants steady the load as you move it to keep it from swinging.*

4. Use a precision level to make sure the table is level. Shim between the base and the floor as necessary to avoid warping or cracking the cast iron base.

Moving Machine with Straps

1. Position the head in an upright position, swivel the ram 180°, as shown in **Figure 10**, then lock it in place (refer to **Head Movement** on **Page 27** and **Ram Movement** on **Page 29** for detailed instructions).

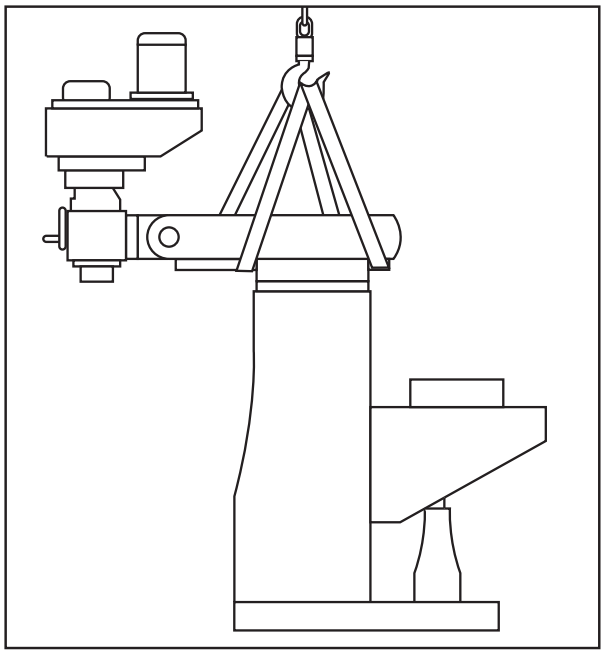


Figure 10. Using lifting straps to lift the machine.

2. Position the lifting straps under the ram with padding between the straps and the mill to protect the ram way.

3. Lift the mill slowly to make sure the hook and lifting straps are secure and the mill is lifting evenly. Lift the mill only enough to clear the shipping pallet and floor obstacles.

   —If the mill tips in one direction, lower it to the ground, then adjust the ram or table to balance the weight. Re-tighten all locks before lifting the mill again.

   —If the mill lifts evenly, move it to its permanent location.

   Note: *Have your assistants steady the load as you move it to keep it from swinging.*

4. Use a precision level to make sure the table is level. Shim between the base and the floor as necessary to avoid warping or cracking the cast iron base.

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. Whichever option you choose, it is necessary to level your machine with a precision level and, if necessary, shim between the base and floor to avoid warping or cracking the cast iron base.

Bolting to Concrete Floors

Lag shield anchors with lag bolts and anchor studs (**Figure 11**) are two popular methods for anchoring an object to a concrete floor. We suggest you research the many options and methods for mounting your machine and choose the best that fits your specific application.

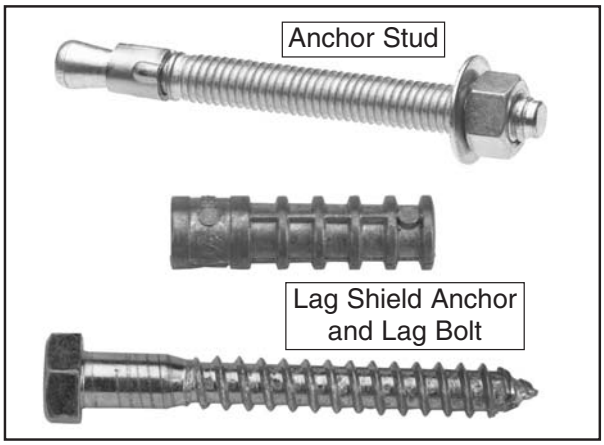


Figure 11. Typical fasteners for mounting to concrete floors.

NOTICE

We strongly recommend securing your machine to the floor if it is hardwired to the power source. Consult with your electrician to determine if this is appropriate for your setup.

Assembly

To assemble your milling machine:

1. If you have not already done so, remove the drawbar from the spindle and tilt the head to a vertical position (refer to **Head Movement** on **Page 27** for detailed instructions).

2. Thread and tighten the handles into the ball handles.

3. Remove the hex nut from both ends of the table leadscrew and from the cross feed leadscrew, then install the ball handles and tighten them in place with the hex nuts (see **Figure 12**).

   Note: *The keyway on the ball handle must align with the key on the leadscrew.*

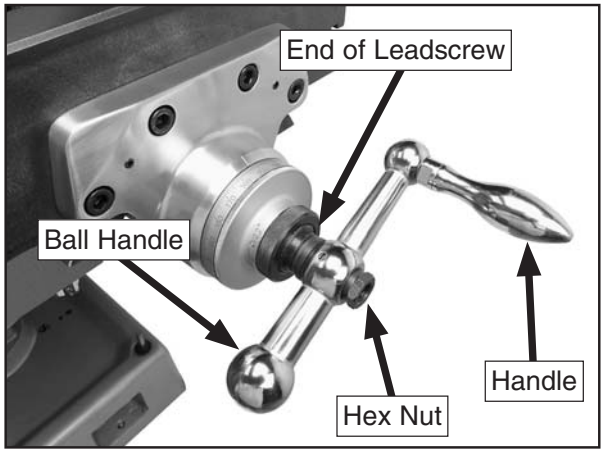


Figure 12. Ball handle installed onto the leadscrew.

4. Move the table all the way forward, then remove the cover protecting the digital readout scale on the back of the table (see **Figure 13**).

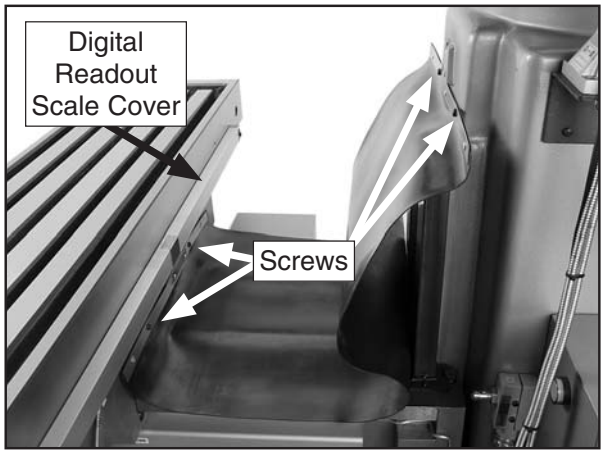


Figure 13. Rear way cover installed (digital readout scale cover removed).

5. Secure the rear way cover to the rear of the saddle and to the column with the four pre-installed Phillips head screws, as shown in **Figure 13**, then re-install the digital readout scale cover.

6. Move the table all the way toward the column, then secure the front way cover to the front of the saddle and the knee with the five pre-installed Phillips head screws, as shown in **Figure 14**.

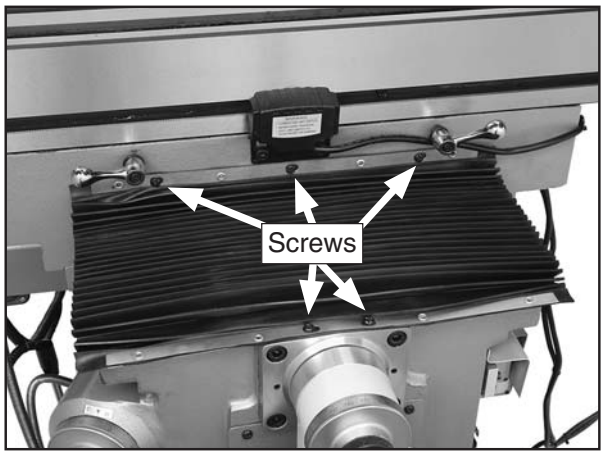


Figure 14. Front way cover installed.

7. Raise the knee and slide the splash pan onto the machine base, as shown in **Figure 15**.

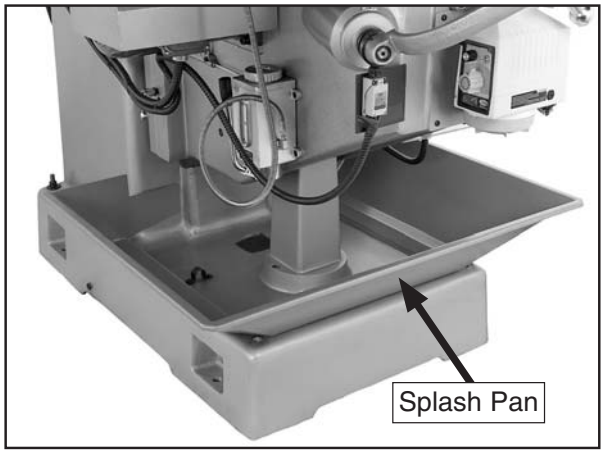


Figure 15. Splash pan installed.

8. Thread the coolant hose connector into the hole on the left rear of the table, then secure the other end of the hose under the clamp on the base, as shown in **Figure 16.**

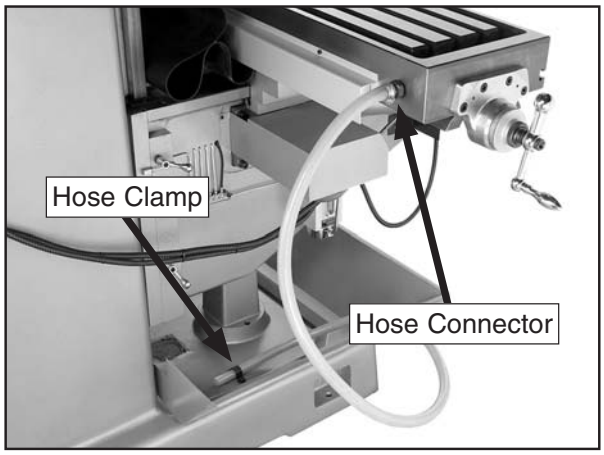


Figure 16. Coolant hose installed.

9. Insert the mounting stud of the digital readout unit into the pivot arm on the right side of the head, as shown in **Figure 17**, and secure it with the bottom hex nut and lock washer.

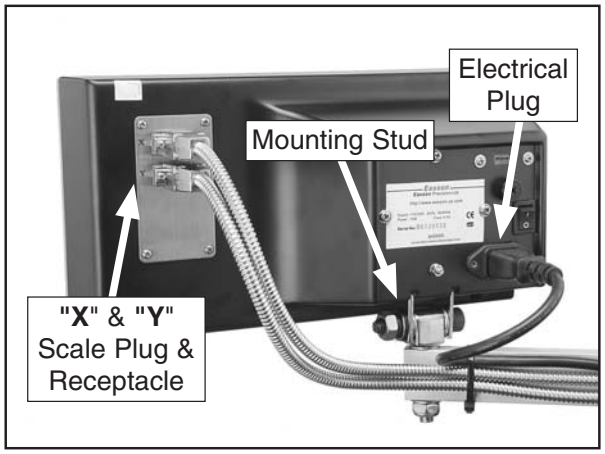


Figure 17. Digital readout installed (rear view).

10. Trace the cable from the digital readout scale on the rear of the table—this will plug into the top "**X**" receptacle on the back of the digital readout. The remaining cable, which is for the cross feed scale, plugs into the bottom "**Y**" receptacle.

11. Taking care not to bend the pins in the receptacles, insert the cable plugs into the appropriate receptacles and tighten the plug screws to secure them.

12. Insert the power plug attached to the digital readout cables into the rear of the digital readout.

13. Plug the power cords for the two power feeds into the 110V receptacles on the rear of the electrical cabinet.

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 emergency stop button safety feature works correctly, and 3) the power feeds and coolant pump work correctly.

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 44**.

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

⚠WARNING

Before starting the mill, make sure you have performed the preceding assembly and adjustment 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!

To test run the machine:

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

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

3. Lubricate the mill, as explained in the **Lubrication** subsection on **Page 40**.

4. Fill the coolant reservoir (refer to **Coolant Reservoir** on **Page 42** for detailed instructions).

5. Connect the machine to the power source, then rotate the main power switch to ON (see **Figure 18**)—the green power lamp on the front edge of the electrical cabinet should light.

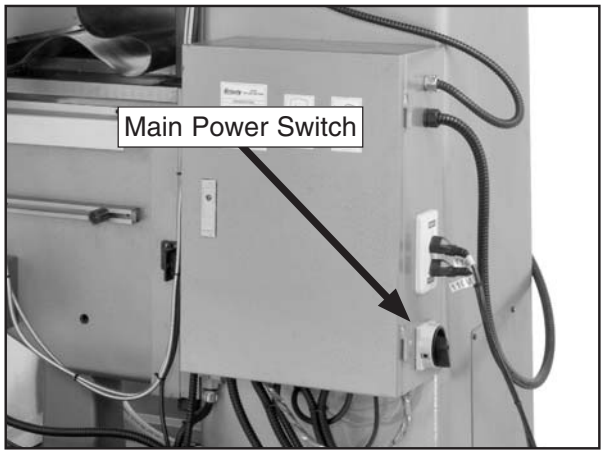


Figure 18. Main power switch on the rear of the electrical cabinet.

6. Push the emergency stop button on the control panel, then twist it clockwise so it pops out. When the emergency stop button pops out, the switch is reset and ready for operation (see **Figure 19**).

   Note: *Refer to the **Basic Controls** subsection on **Page 23** for detailed instruction on using the control panel.*

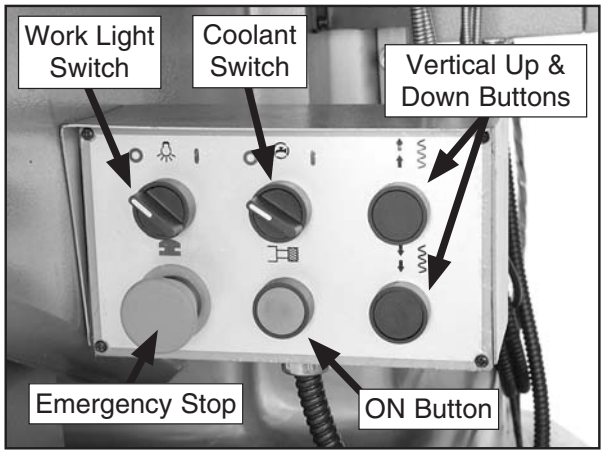


Figure 19. Control panel on right side of the knee.

NOTICE

Continuous operation of this mill without properly and successfully completing all procedures of the *Test Run* could lead to machine damage, and could void the warranty.

7. To start spindle rotation, push the control panel ON button and rotate the spindle direction switch to the left (forward), as shown in **Figure 20**.

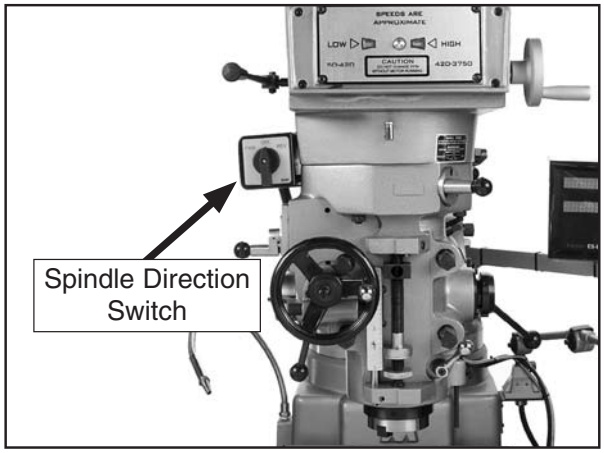


Figure 20. Spindle direction switch in the forward position.

8. Verify that the machine is operating correctly.

—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 stop the machine and disconnect it from power before investigating or correcting potential problems.

9. Verify that the power is not connected out of phase by using the vertical up and down buttons on the control panel to raise and lower the knee.

—If the knee moves opposite of the button used, stop the machine, disconnect the machine from the power source, then swap any two of the three power wires that connect to the machine (refer to the **Electrical Cabinet Wiring Diagram** on **Page 51** for detailed information).

10. Press the emergency stop button to turn the machine ***OFF***, then wait for the spindle to stop on its own.

11. WITHOUT resetting the emergency stop button, rotate the spindle direction switch to forward and press the ON button. The machine should not start.

—If the machine does not start, the emergency stop button safety feature is working correctly.

—If the machine does start (with the emergency stop button pushed in), turn the main power switch ***OFF***, then immediately disconnect power to the machine. The emergency stop button safety feature is not working correctly. This safety feature must work properly before proceeding with regular operations. Call Tech Support for help.

12. Reset the emergency stop button.

13. Point the coolant nozzle onto the table, turn the coolant pump switch to "**I**" or ***ON***, then check for proper operation of the coolant system.

14. Set the longitudinal and cross limit stops, then test the longitudinal and cross power feeds for proper operation (refer to **Power Feeds** on **Page 27** for detailed instructions).

When all of the **Test Run** procedures are successfully completed, proceed to **Spindle Break-In**.

Spindle Break-In

NOTICE

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

It is essential to closely follow the proper break-in procedures to ensure trouble-free performance of your mill.

To perform the spindle break-in procedure:

1. After successfully completing the **Test Run** procedure, make sure the mill is turned ***OFF*** and the spindle is stopped.

2. Move the spindle speed range selector to the LOW position (refer to **Selecting Spindle Speed Range** on **Page 30** for detailed instructions).

3. Turn the machine ***ON***, start spindle rotation, then use the variable speed handwheel to adjust the spindle speed to approximately 300 RPM.

4. Let the mill run at this speed for 20 minutes, then use the spindle direction switch (on the left side of the head) to turn the spindle ***OFF***.

5. Use the spindle direction switch to reverse the spindle direction, then let the mill run for another 20 minutes.

6. Turn the spindle ***OFF*** and wait for it to stop, then move the spindle speed range selector to the HIGH position and start spindle rotation.

7. Set the spindle speed at approximately 2150 RPM, then repeat **Steps 4–5**.

8. Turn the mill ***OFF***. The spindle break-in 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 44**.

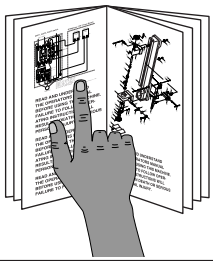
Factory adjustments that should be verified:

1. Gib adjustment (**Page 46**).

2. Leadscrew backlash adjustment (**Page 47**).

SECTION 4: OPERATIONS

Operation Safety

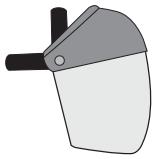


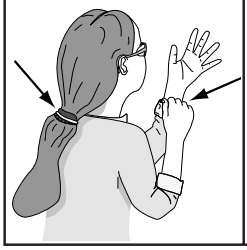
⚠WARNING

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





⚠WARNING

Loose hair, 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.

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.

Basic Controls

Refer to **Figures 21–23** and the following descriptions to become familiar with the basic controls of this mill.

A. Main Power Switch: Turns the power ON/OFF to the entire machine. Turning this switch OFF does not disconnect the machine from the power source.

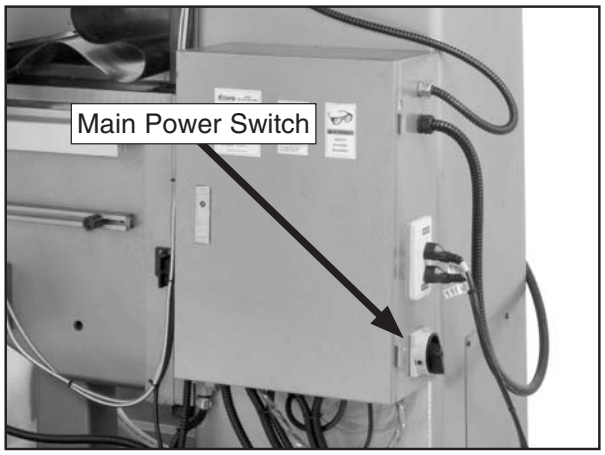


Figure 21. Main power switch on the rear of the electrical cabinet.

B. Work Light Switch: Turns the halogen work light ON/OFF. There is also a switch at the base of the work light.

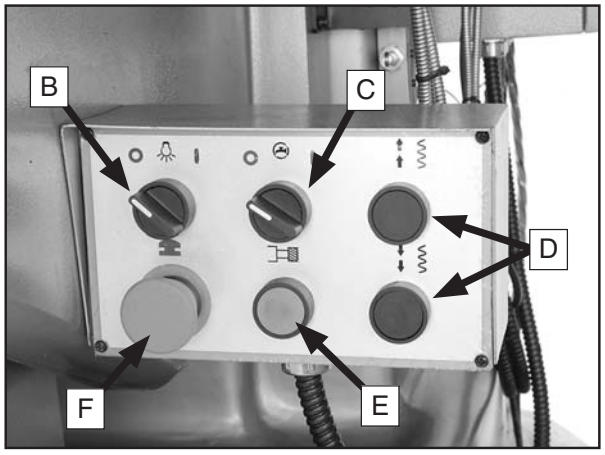


Figure 22. Control panel on the right of the knee.

C. Coolant Pump Switch: Starts/stops the flow of coolant through the coolant nozzle.

NOTICE

Running the coolant pump without adequate coolant in the reservoir may permanently damage the coolant pump motor. This is considered abuse and is not covered by the warranty.

D. Elevation Up & Down Buttons: Controls the vertical movement of the knee and table.

E. ON Button: Allows power to flow to the spindle motor. The spindle direction switch must be used to start spindle rotation.

F. Emergency Stop Button: Stops the flow of power to the spindle motor, the coolant pump, and the vertical motor. After resetting this button, the ON button must be pressed to resume operations.

G. Spindle Direction Switch: Starts, stops, and reverses the direction of spindle rotation.

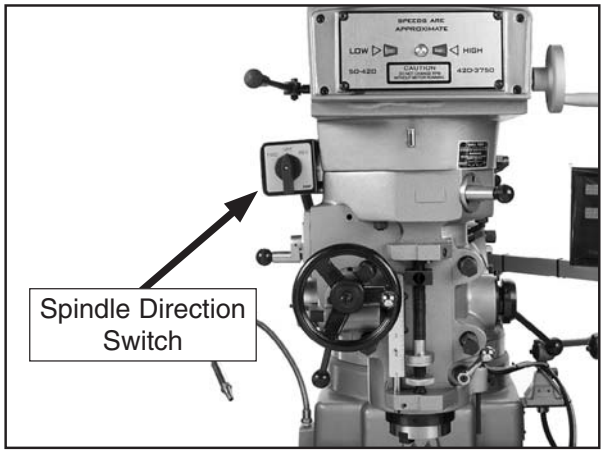


Figure 23. Spindle direction switch in the forward position.

Table Movement

The mill table has three paths of movement (see **Figure 24**): 1) Longitudinal (X-axis) controlled by the ball handles or power feed, 2) cross feed (Y-axis) controlled by the ball handle or power feed, and the vertical (Z-axis) controlled by the knee crank or the vertical up and down buttons on the control panel.

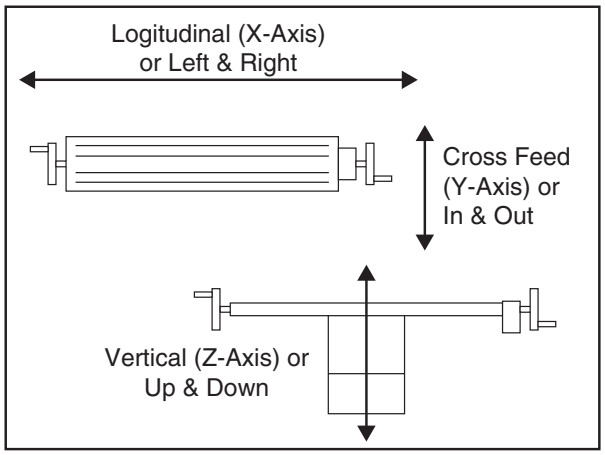


Figure 24. The three paths of movement for the mill table.

Digital Readout

The digital readout (see **Figure 25**) displays the exact coordinates for longitudinal (X-axis) and cross (Y-axis) positioning of the table and workpiece. Refer to the **Digital Readout Manual** included with your mill for operational instructions regarding the many functions of this unit.

Figure 25. Digital readout.

Vertical (Knee)

Graduated Dial Increments	Resolution
Each Mark	0.001"
One Revolution	0.100"

When the vertical crank handle is engaged for manual operation, the safety switch below the crank disables the vertical power feed (see **Figure 26**). Push the handle into the leadscrew to engage it for manual operation. Pull it out to dis-engage it from the safety switch, which enables the use of the vertical power feed.

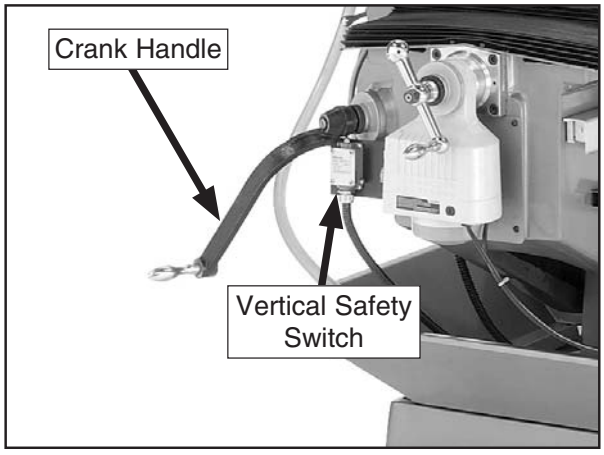


Figure 26. Vertical crank handle and safety switch.

Locks

Use the table, saddle, and knee locks shown in **Figure 27** to secure the table in position.

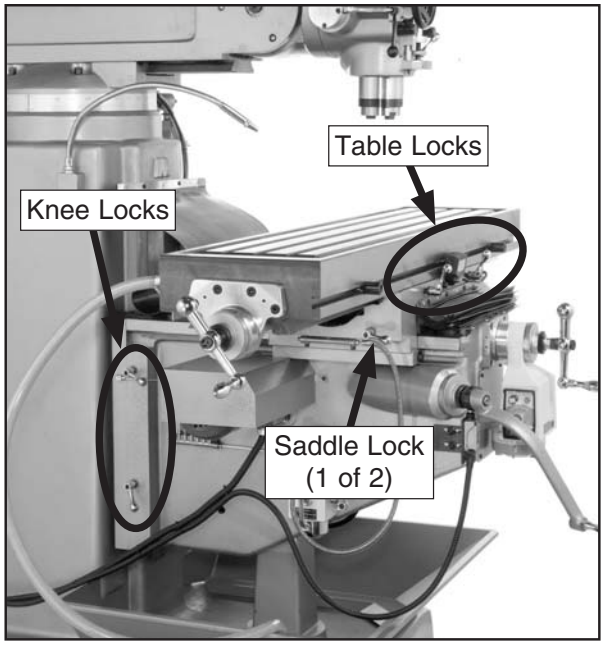


Figure 27. Table, saddle, and knee locks.

⚠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, which could result in personal injury or damage to the cutter and workpiece.

Longitudinal & Cross Power Feeds

Graduated Dial Increments	Resolution
Each Mark	0.001"
One Revolution	0.200"

Besides the ball handles for manual longitudinal and cross table movement, your mill is equipped with power feed systems for each of these paths. Refer to **Figures 28–29** and the following descriptions to understand the functions of the power feed systems.

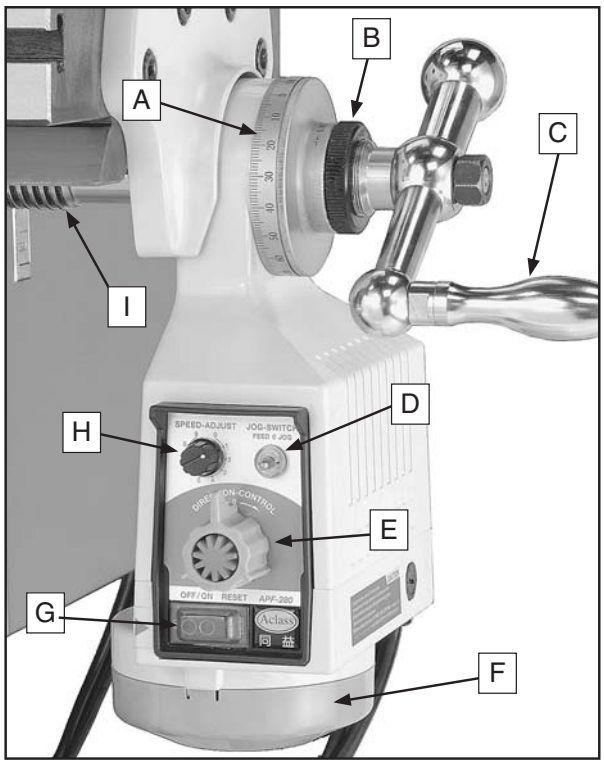


Figure 28. Power feed unit.

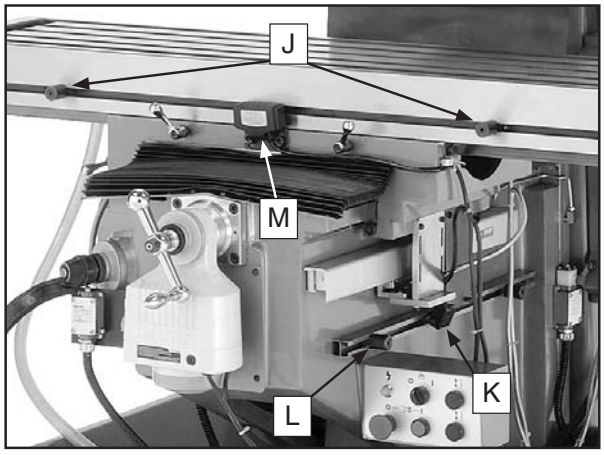


Figure 29. Limit stops and switches.

A. Graduated Dial: Rotates with the leadscrew and displays the distance of table travel in 0.001" increments.

B. Dial Lock Collar: Locks the position of the graduated dial relative to the leadscrew. Loosen this collar to adjust the dial to a different setting.

C. Ball Handle: Manually moves the table along the path when rotated.

D. Feed/Jog Switch: When positioned to the left, provides continuous travel along the direction chosen. When in the center position, stops movement. When moved to the right, jogs table movement.

E. Direction Switch: Selects the direction of travel, and stops movement when in the center position.

F. Lexan Gear Cover: Covers the Lexan gear that is designed to protect more expensive components of the power feed or machine in case of a table crash.

G. Power Switch: Turns the power feed ON/OFF and lights when the power flows to the unit.

H. Speed Dial: Controls the rate of travel for the power feed.

I. Leadscrew: When rotating, provides the table movement along this path.

J. Table Limit Stop: Sets the outer limit for longitudinal table movement.

K. Cross Limit Switch: Stops the cross power feed when it engages one of the limit stops.

L. Cross Limit Stop: Sets the outer limit for cross table movement.

M. Table Limit Switch: Stops the longitudinal power feed when it engages one of the limit stops.

⚠CAUTION

Stay clear of the spinning ball handles when using the power feeds to avoid entanglement and personal injury.

Tools Needed	Qty
Hex Wrench 6mm	1

To operate the longitudinal or cross power feed:

1. Loosen the table lock for the desired path of travel.

2. Position the limit stops along their slot to confine the distance you want the table to travel, then tighten the cap screws to secure them in place.

3. Rotate the speed dial to the slowest speed, move the feed/jog switch to the center OFF position, then turn the direction switch to the desired direction of travel.

4. Use the power switch to turn the power feed ***ON***, move the feed/jog switch to the left to start table movement, then adjust the speed dial for the desired feed rate.

   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.*

5. When you are finished using the power feed, position the feed/jog switch and the direction switch to the center OFF position, then use the power switch to turn the unit ***OFF***.

Head Movement

The mill head tilts 45° back-and-forth, and rotates 90° from left-to-right (see **Figures 30–31**).

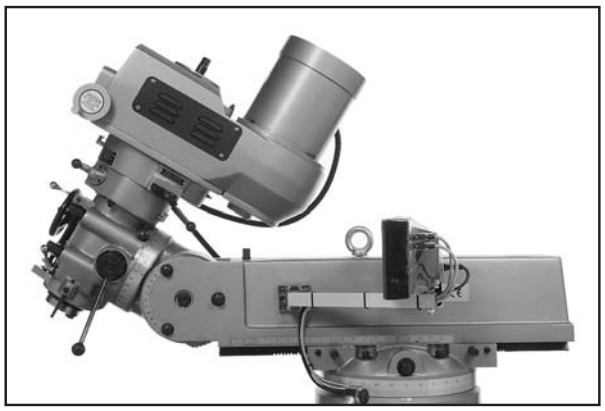


Figure 30. Head tilted back 30°.

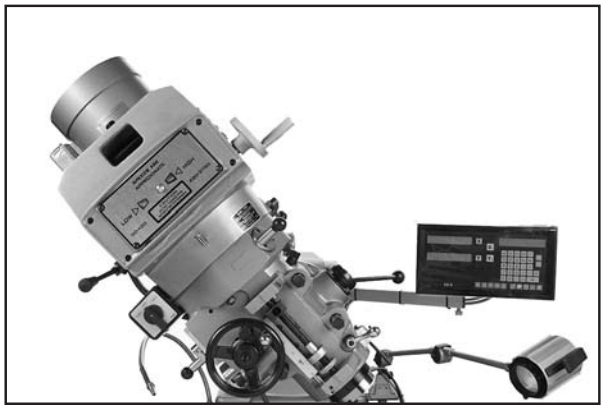


Figure 31. Head tilted to the left 45°.

Continued on next page ⟶

Tools Needed	Qty
Wrench 19mm	1
Wrench 21mm	1

Tilting the Head

1. DISCONNECT THE MILL FROM POWER!

2. Loosen the three tilt locking bolts shown in **Figure 32**.

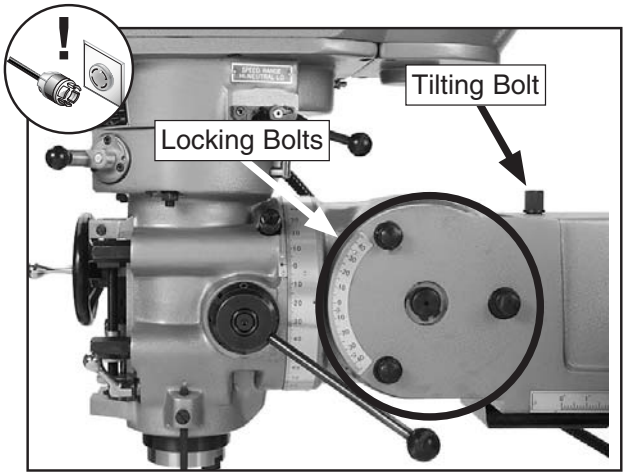


Figure 32. Head tilting bolts.

3. With one hand helping to support the weight of the head, slowly rotate the tilting bolt.

   Note: *Turn the tilting bolt clockwise to tilt the head back, and counterclockwise to tilt it forward.*

4. Re-tighten the locking bolts to secure the head in place.

⚠CAUTION

Always lock the head firmly in place after adjusting the tilt or rotation. Unexpected movement of the head during operations could cause the cutter to bind with the workpiece, which could result in personal injury or machine damage.

Rotating the Head

1. DISCONNECT THE MILL FROM POWER!

2. Loosen the four locking bolts on the face of the head shown in **Figure 33**.

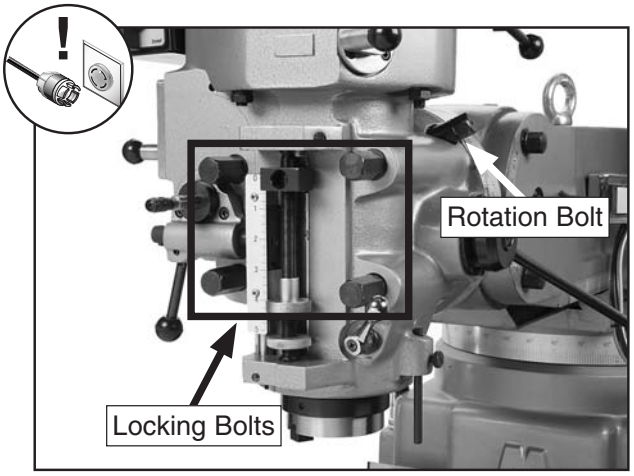


Figure 33. Head rotation bolts.

3. With one hand helping to support the weight of the head, slowly turn the rotation bolt.

   Note: *Turn the rotation bolt clockwise to rotate the head to the left, and counterclockwise to rotate it to the right.*

4. Re-tighten the locking bolts to secure the head in place.

Ram Movement

The ram moves back-and-forth horizontally, and rotates 360° around the column.

Tools Needed	Qty
Wrench 17mm	1
Wrench 19mm	1

Moving Ram Back-and-Forth

1. DISCONNECT THE MILL FROM POWER!

2. Loosen the two locking bolts shown in **Figure 34**.

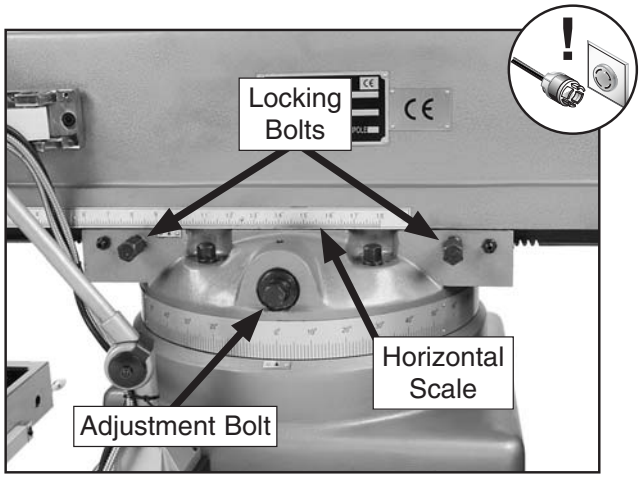


Figure 34. Ram horizontal movement bolts.

3. Slowly turn the adjustment bolt to move the ram to the desired position along the horizontal scale.

   Note: *Turn the adjustment bolt clockwise to move the ram back, and counterclockwise to move the ram forward.*

4. Re-tighten the locking bolts to secure the ram in place.

Rotating the Ram

1. DISCONNECT THE MILL FROM POWER!

2. Loosen the four locking bolts (two on either side of the ram) on top of the turret (see **Figure 35**).

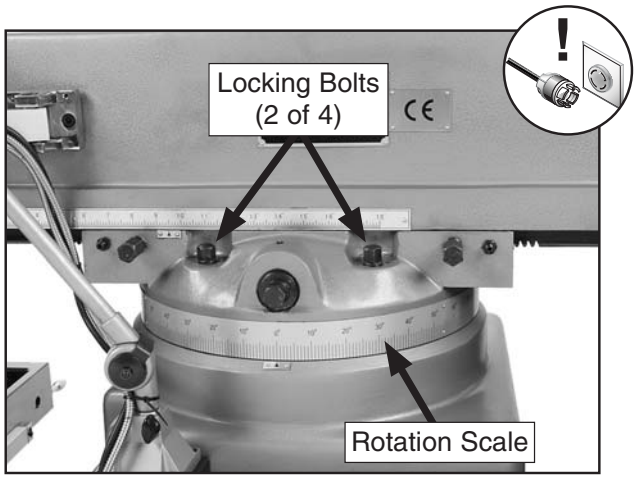


Figure 35. Ram rotation locking bolts.

3. Manually rotate the ram around the column to the desired position on the rotation scale.

   Note: *Take care not to entangle or stretch the electrical cabling as you move the ram and head.*

4. Re-tighten the four locking bolts to secure the ram in place on the turret.

⚠CAUTION

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

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) adjust the spindle speed controls for the calculated RPM.

Calculating Spindle Speed

1. Use the table in **Figure 36** 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 36. 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:

$$\frac{\textbf{Cutting Speed (SFM) x 4}}{\textbf{Tool Diameter (in inches)}} = \textbf{RPM}$$

Adjusting Spindle Speed

1. Make sure the spindle motor is turned ***OFF*** and the spindle is stopped.

2. Select the range in the chart below that includes the spindle speed that you have calculated for your workpiece.

Range	RPM
Low Range	90–420
High Range	420–3800

Figure 37. Spindle speed ranges.

NOTICE

To avoid damage to the drive system, make sure the spindle motor is turned *OFF* and the spindle is stopped BEFORE you change the *spindle speed range*.

3. Press the speed range selector handle in toward the head to retract the locking pin and move it. Make sure the locking pin is seated in the indent for the speed range you have chosen (see **Figure 38**).

   Note: *Move the handle to the **forward** position for the **high** range, and to the **rear** position for the **low** range.*

   As you move the selector handle, it may be necessary to rotate the spindle by hand to jog and mesh the gears.

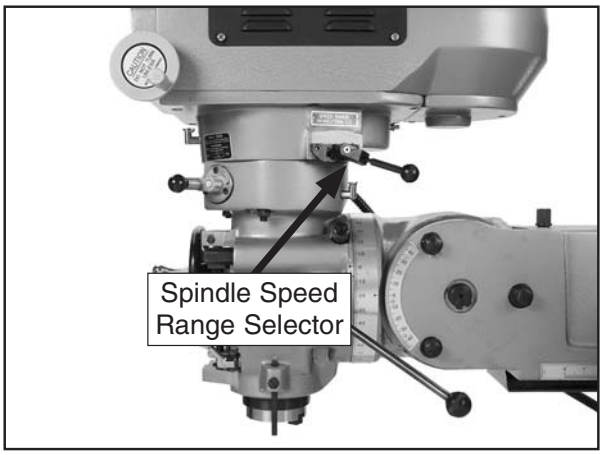


Figure 38. Spindle speed range selector.

4. With the spindle turned ***ON***, rotate the variable speed handwheel until the calculated spindle speed is displayed in the speed readout window on the head (see **Figure 39**).

   Note: *The window on the left is for the low range, and the window on the right is for the high range.*

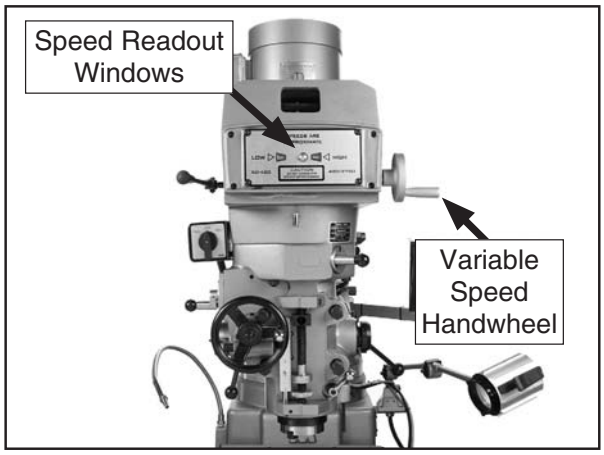


Figure 39. Variable speed handwheel and readout windows.

NOTICE

Always have the spindle rotating BEFORE using the variable speed handwheel to avoid damage to the variable speed system.

Downfeed Controls

The quill downfeed movement is controlled by three mechanisms: 1) The coarse downfeed handle, 2) the fine downfeed handwheel, and 3) the auto-downfeed system.

Using the Coarse Downfeed Handle

1. Turn the spindle ***OFF*** and wait for the spindle to stop.

2. Pull the downfeed selector knob out and rotate it clockwise to the forward manual position (see **Figure 40**).

   Note: *Make sure the pin of the selector knob is firmly seated in the indent.*

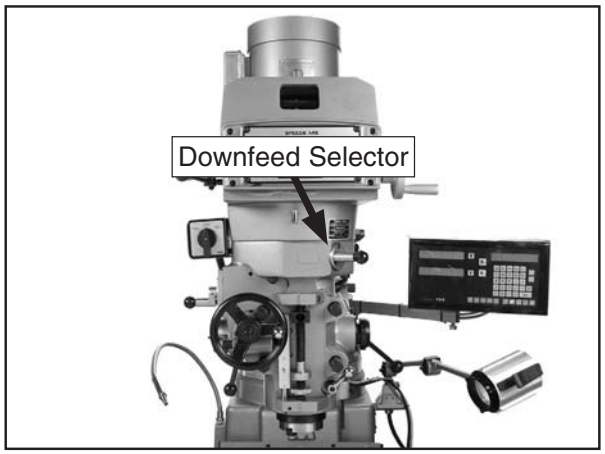


Figure 40. Downfeed selector.

Continued on next page ⟶

3. Align the pin in the coarse downfeed handle hub with one of the holes in the handle base, then firmly seat the handle into the base, as shown in **Figure 41**.

   Note: *If necessary, use the set screw on the side of the handle hub to adjust the detent ball tension so the handle can be installed and removed easily.*

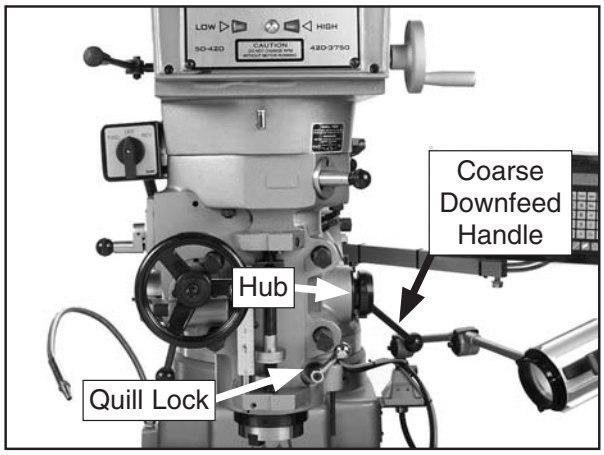


Figure 41. Coarse downfeed handle installed.

4. Make sure the quill lock is loose, then rotate the coarse downfeed handle around its hub to control the depth of the spindle.

Fine & Auto-Downfeed Components

There are a number of devices that are used for fine and auto-downfeed control. Refer to **Figure 42** and the following descriptions to understand the functions of these devices.

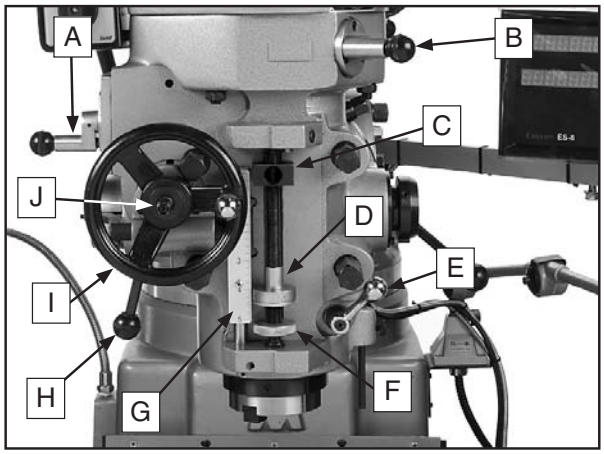


Figure 42. Fine and auto-downfeed controls.

A. Downfeed Rate Selector: Configures the auto-downfeed for one of three downfeed rates (see **Figure 43**). Downfeed rates are expressed in inches per revolution of the spindle (IPR).

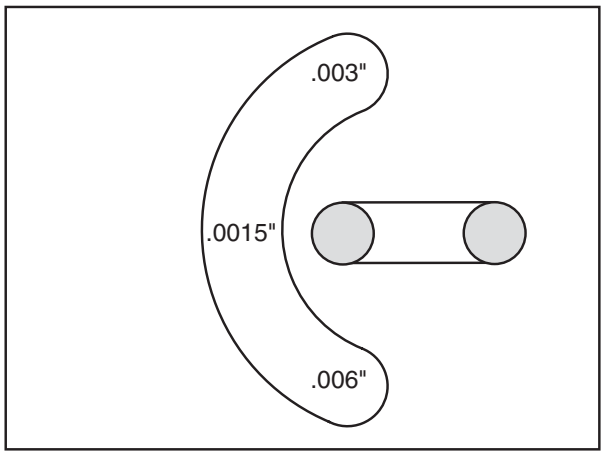


Figure 43. Auto-downfeed rates.

B. Downfeed Selector: Changes downfeed control to manual control when in the forward position, and to auto-downfeed when in the rear position.

C. Quill Dog: Moves with the quill and disengages the downfeed clutch lever to stop quill movement when it meets with the top or the downfeed stop.

D. Downfeed Stop: Sets the maximum depth of quill downfeed.

E. Quill Lock: Locks the quill in position. Loosen this before performing a downfeed operation.

F. Downfeed Stop Lock: Locks the downfeed stop in position.

G. Downfeed Scale: Shows the distance traveled by the quill. Use this scale to position the downfeed stop.

H. Downfeed Clutch Lever: Engages the downfeed gearing to use the fine downfeed handwheel or auto-downfeed.

I. Fine Downfeed Handwheel: Provides a slower and precise control for quill downfeed.

J. Downfeed Direction Pin: Starts (in or out), stops (middle), or reverses the direction of quill downfeed when in auto-downfeed mode.

Using the Fine Downfeed Handwheel

1. Turn the spindle ***OFF*** and wait for the spindle to stop.

2. Pull the downfeed selector knob out and rotate it clockwise to the forward manual position.

3. Use the coarse downfeed handle to lower the quill until you can engage the downfeed clutch lever by pulling the handle out to the left.

4. Make sure the downfeed direction pin is in the middle (neutral) position.

5. Rotate the fine downfeed handwheel to control the depth of the quill.

Using Auto-Downfeed

1. Turn the spindle ***OFF*** and wait for the spindle to stop.

2. Pull the downfeed selector knob out and rotate it clockwise to the rear auto-downfeed position.

3. Adjust the downfeed stop to the desired depth, then use the downfeed stop lock to secure it in place.

   Note: *The downfeed stop is marked in increments of 0.001", with one full revolution equal to 0.050" of quill movement.*

4. Move the downfeed direction pin to the center (stop) position.

   Note: *The downfeed direction pin has three positions: 1) In for one direction, 2) center for stop, and 3) out for the other direction. The direction of quill movement for the in and out positions is relative to the direction of spindle rotation.*

5. Make sure the downfeed clutch lever is disengaged (handle to the right).

6. Start spindle rotation in the desired direction.

7. Move the downfeed rate selector to the rate that is correct for your operation.

8. Push or pull the downfeed direction pin to select the desired direction of quill travel.

NOTICE

When the spindle speed range is changed, spindle rotation will reverse and so will the direction of quill travel when in auto-downfeed mode.

9. To start quill movement, use the coarse downfeed handle to lower the quill until you can engage the downfeed clutch lever by pulling the handle out to the left.

   Note: *If quill travel is upward, the clutch lever will disengage when the quill dog reaches the top and quill movement will stop. If quill travel is downward, the clutch lever will dis-engage when the quill dog meets the downfeed stop, and the quill will spring quickly back to the top.*

NOTICE

To avoid damage to the system gearing, never use auto-downfeed for spindle speeds over 2500 RPM.

Spindle Brake

Your mill is equipped with a spindle brake that is operated by using the brake lever on the left side of the head (see **Figure 44**). The spindle brake will slow or stop the spindle after rotation is turned ***OFF***.

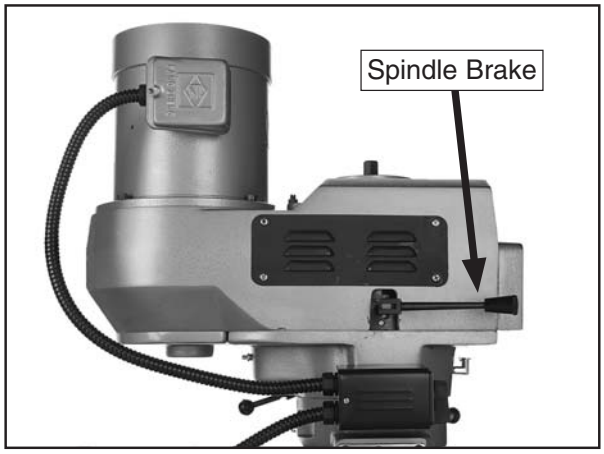


Figure 44. Spindle brake.

Loading/Unloading Tooling

Your mill is equipped with an NT40 spindle and a 5/8"-11 x 11" drawbar that includes one spacer for tool attachment flexibility.

Tools Needed	Qty
Wrench 21mm	1

Loading Tooling

1. DISCONNECT THE MILL FROM POWER!

2. Clean any debris or oily substances from the mating surfaces of the NT40 tool holder and spindle tapers.

3. Align the spindle lugs with the slots on the tool holder, then push the tool firmly into the spindle taper to seat it, as shown in **Figure 45**.

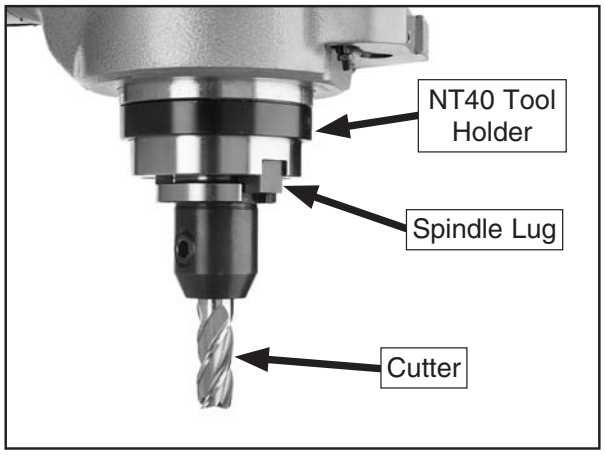


Figure 45. Cutting tool and holder installed into the spindle.

⚠CAUTION

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

4. While holding the tool in place, insert the drawbar through the top of the spindle, as shown in **Figure 46**, then thread it into the tool.

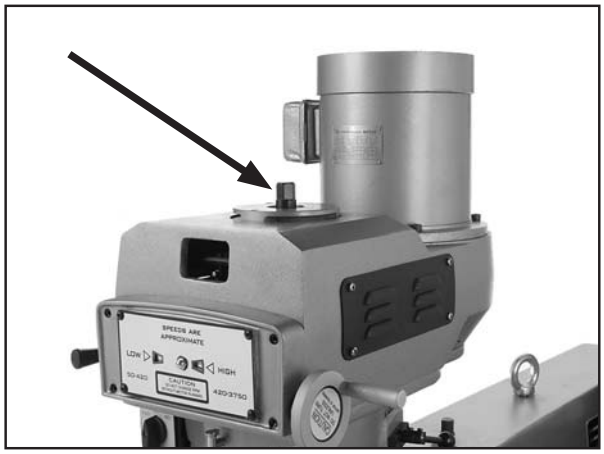


Figure 46. Drawbar inserted through the top of the spindle.

5. Only tighten the drawbar into the tool holder until it is snug.

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

Unloading Tooling

1. DISCONNECT THE MILL FROM POWER!

2. Keep the spindle engaged with either the low or high speed range to stop the spindle from rotating.

3. Support the tool and holder with one hand, then completely un-thread the drawbar.

   —If the tool holder does not immediately release from the spindle taper when the drawbar is loosened, thread the drawbar back into the tool holder two complete turns, then tap the top of the drawbar with a dead-blow hammer or rubber mallet to break the tool holder loose.

SECTION 5: ACCESSORIES

G1076—52-PC. Clamping Kit ½"
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.

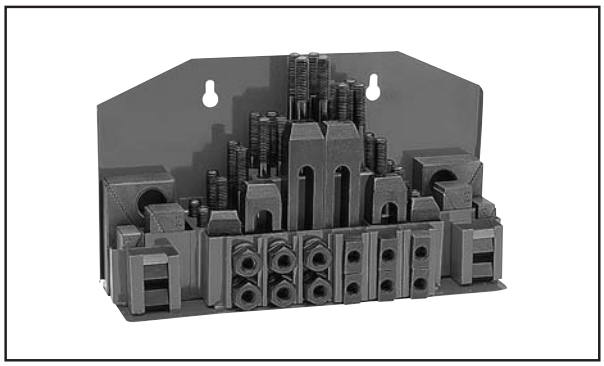


Figure 47. G1076 52-PC. Clamping Kit.

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 48. Primrose Armor Plate Lubricant.

Call 1-800-523-4777 To Order

H8368—Electric Power Drawbar
Reduce your tool changing time to a fraction. This easy-to-use Power Drawbar kit will enable you to make tool changes in a flash on both manual and CNC milling machines. It has enough torque for tapers ranging from R-8 to NT50 and simple installation is supported by complete instructions. Specifications: Motor 220V, 7.5 maximum amperage draw, 2100 RPM, and 240 ft/lbs.

Figure 49. H8368 electric power drawbar.

T10063—Milling Vise 12 5/16" x 6 9/16"
T10064—Milling Vise 17 1/8" x 8 3/4"
- 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.

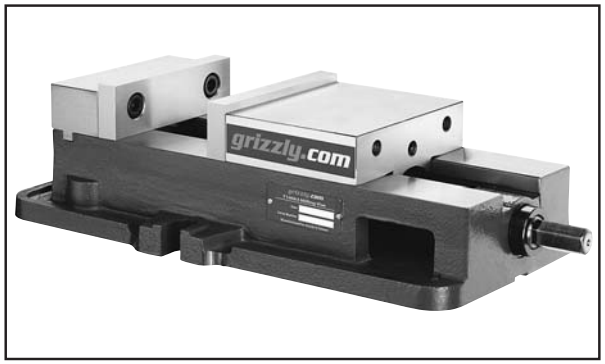


Figure 50. T10064 Milling vise (handle included, but not shown.

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.

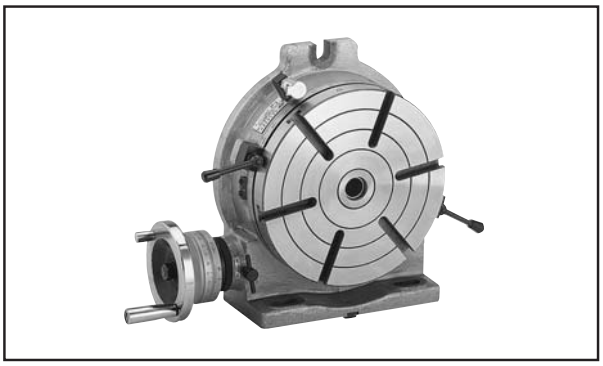


Figure 51. G9299 10" Yuasa-Type Rotary Table.

T20501—Face Shield, 4" Crown, Clear
T20502—Face Shield, 7" Crown, Clear
T20448—Economy Clear Safety Glasses
T20452—"Kirova" Anti-Reflective Glasses
T20456—"Dakura" Clear Safety Glasses
H0736—Shop Fox® Safety Glasses
These glasses meet ANSI Z87.1-2003 specifications. Buy extras for visitors or employees. You can't be too careful with shop safety!

Figure 52. 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 53. Recommended products for protecting unpainted cast iron/steel part on machinery.

NT40 End Mill Holders
H5792—⅜"
H5793—½"
H5794—⅝"
H5795—¾"
H5796—1"
H5797—1¼"
H5798—1½"
Sized to fit all common end mill shanks, these precision NT40 end mill holders fit any NT40 taper.

Figure 54. NT40 End Mill Holder.

Call 1-800-523-4777 To Order

H5791—ER40 Quick Change Collet Set
This self-ejecting system offers quick change outs and precise, rigid control. This set comes supplied with an NT40 collet chuck, wrench and fitted plastic case. ER40 collets are sized 1/8", 1/4", 3/8", 1/2", 5/8", 3/4", 7/8" and 1".

Figure 55. H5791 ER40 Quick Change Collet Set.

H5802—NT40 to MT#2 Sleeve
H5803—NT40 to MT#3 Sleeve
H8139—NT40 to R8 Adapter

Figure 56. NT40 Sleeves and Adapter.

G5758—5" x 7" Tilt Table
G5759—7" x 10" Tilt Table
Set your work at any angle from –45° to +45° with these sturdy Tilt Tables. Heavy-duty construction includes T-slots, two locking screws, and precision base with a scale.

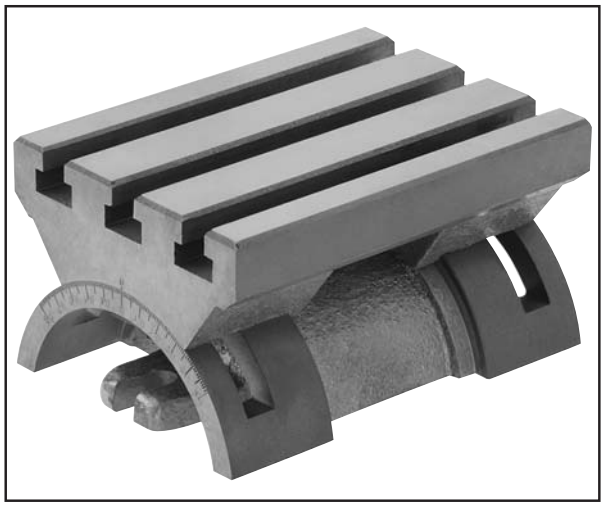


Figure 57. Tilt Table.

G5641—1-2-3 Blocks
G5642—2-4-6 Blocks
These blocks are extremely handy for layout and set up work. Matched blocks are hardened and precision ground so all six sides are square to within 0.0003". These blocks also feature five tapped holes and 18 untapped holes for clamping. Sold in pairs. G5641 tapped holes are 3/8"-16, and overall size is 1" x 2" x 3". G5642 tapped holes are 5/8"11, and overall size is 2" x 4" x 6".

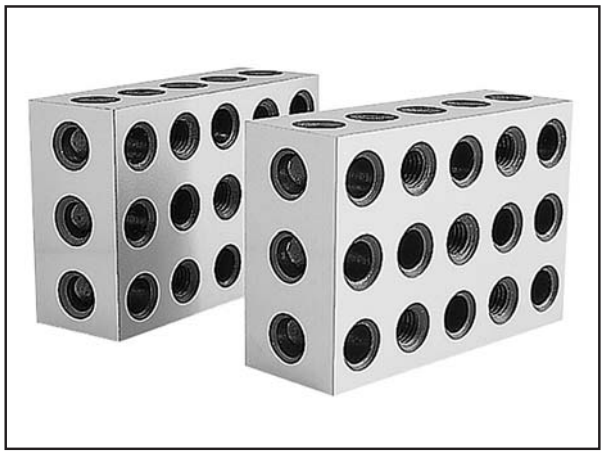
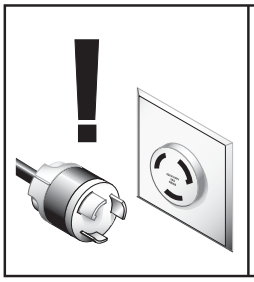


Figure 58. 1-2-3 and 4-5-6 Blocks.

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.
- Damaged tooling.
- Worn or damaged wires.
- Check/fill the coolant reservoir (**Page 42**).
- Clean debris and built-up grime off the mill.
- Any other unsafe condition.

Every 8 Hours of Operation:
- Use the one-shot oiler (**Page 40**).
- Lubricate the quill gearing (**Page 40**).

Every 40 Hours of Operation:
- Lubricate the bull gear (**Page 41**).
- Lubricate the ram way (**Page 41**).
- Lubricate the vertical leadscrew bevel gears (**Page 41**).

Every 120 Hours of Operation:
- Lubricate the longitudinal and cross power feed gearing (**Page 41**).
- Change the coolant (**Page 43**).

Note: *This maintenance schedule is based on average usage. Adjust the maintenance schedule to match your 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 you or bystanders.

Clean debris and grime from the coolant return screen on the base of the machine and the fluid slots in the table.

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 like Primrose Armor Plate Way Oil**,** G96® Gun Treatment, SLIPIT®, or Boeshield® T-9 (see **Section 5: Accessories** on **Page 36** for more details).

Lubrication

Your mill has numerous moving metal-to-metal contacts that require proper lubrication to help ensure efficient 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.

Before adding lubricant, clean debris and grime from the lubrication devices to avoid contaminating the components and the new lubrication.

DISCONNECT THE MILL FROM POWER BEFORE PERFORMING LUBRICATION!

NOTICE

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

One-Shot 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 column (knee), saddle, and table, as well the longitudinal, cross feed, and vertical leadscrews.

Pull the handle (see **Figure 59**) and release it to send the lubricant through the lines.

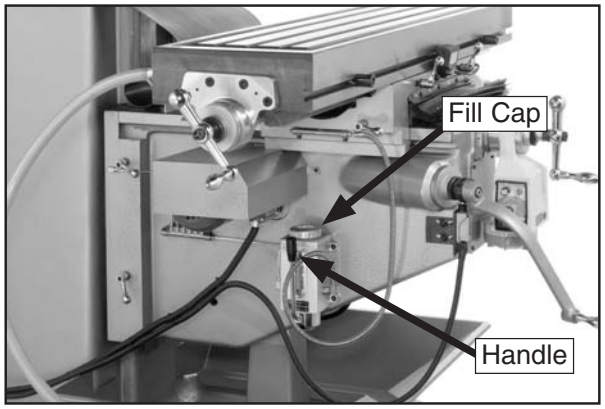


Figure 59. One-shot oiler (on left side of knee).

Quill Gearing

Lubricant	Frequency	Qty
ISO 68 Lubricant or Equivalent	Every 8 Hours of Operation	5 Drops

Lift the caps of the oil cups shown in **Figure 60** to add the lubricant.

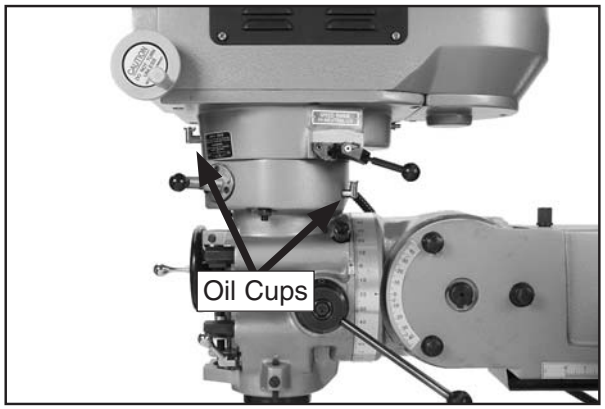


Figure 60. Quill gearing oil cups.

Bull Gear

Lubricant	Frequency	Qty
NLGI #2 Grease	Every 40 Hours of Operation	2 Pumps from Grease Gun

Use a grease gun to add lubricant to the fitting shown in **Figure 61**.

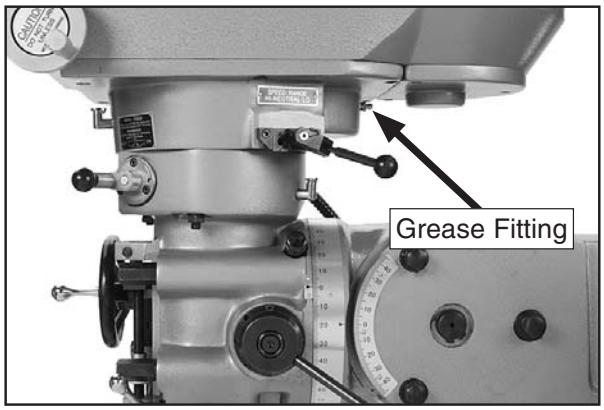


Figure 61. Bull gear grease fitting.

Ram Way

Lubricant	Frequency	Qty
Way Oil	Every 40 Hours of Operation	Thin Coat

Use a shop rag and mineral spirits to wipe away the old lubricant and built-up grime, then brush on a thin coat of way oil to the ram way and rack (see **Figure 62**).

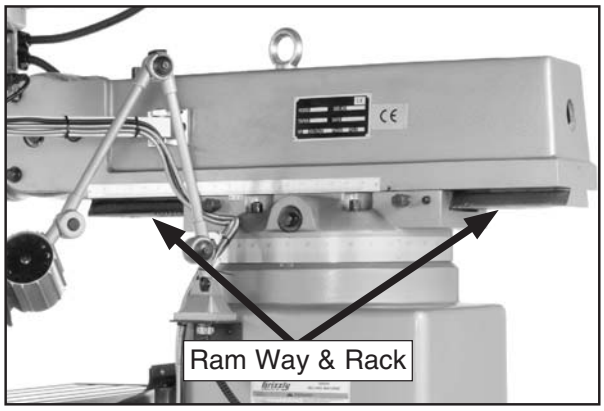


Figure 62. Ram way and rack.

Vertical Leadscrew Bevel Gears

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

Use a shop rag and mineral spirits to wipe away the old lubricant and built-up grime, then brush a thin coat of grease on the bevel gears (see **Figure 63**).

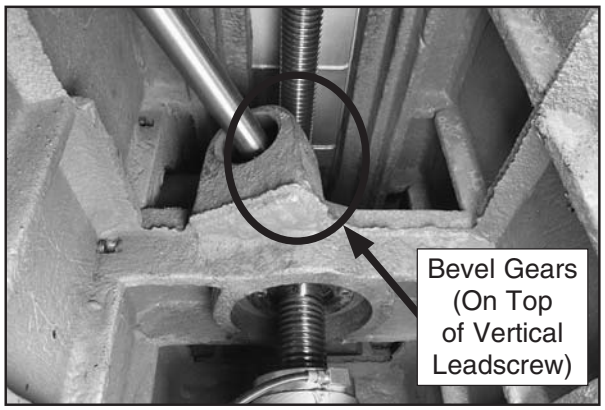


Figure 63. Vertical leadscrew bevel gears (viewed from under the knee).

Longitudinal & Cross Power Feed Gearing

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

Remove the ball handles and spacers, then, taking care to retain the key on the leadscrew, slide the graduated dial off. Use a shop rag and mineral spirits to clean the drive and brass gears, apply a thin coat of grease, then re-install the components (see **Figure 64**).

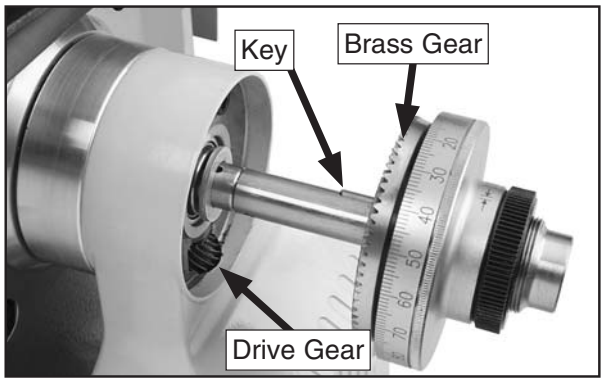


Figure 64. Power feed gearing.

Coolant

⚠WARNING

Coolant is a potent and extremely poisonous solution to humans and animals. Use personal protective equipment when handling coolant to prevent infections or poisoning.

A small amount of coolant is lost during normal operation. Check the coolant reservoir regularly and fill it if necessary.

Tools Needed	Qty
Phillips Screwdriver	1

Checking/Adding Coolant

1. DISCONNECT THE MILL FROM POWER!

2. Remove the coolant reservoir access panel on the rear of the column, as shown in **Figure 65**.

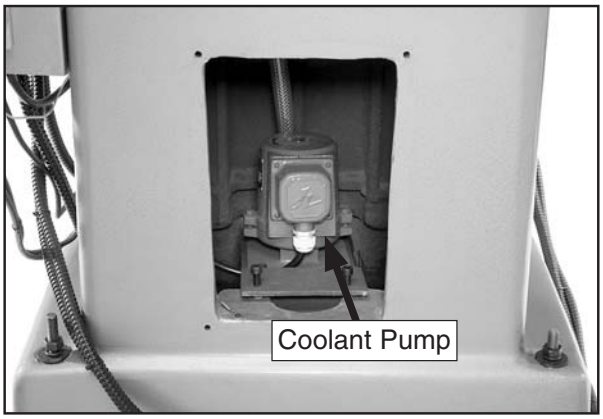


Figure 65. Coolant reservoir access panel removed.

3. Use a clean metal tool to measure the level of coolant in the reservoir. If the level is lower than 3", add coolant.

4. Re-install the access panel before resuming milling operations.

⚠WARNING

Always use non-flammable water-based coolant to avoid explosions when the fluid comes in contact with hot metal chips from the milling operation. For best results, always follow the coolant manufacturer's recommendations for coolant/water ratios.

NOTICE

Running the coolant pump without adequate coolant in the reservoir may permanently damage the coolant pump motor. This is considered abuse and is not covered by the warranty.

⚠WARNING

The coolant reservoir on this mill is designed to store only coolant. During storage some fluids grow dangerous microbes, or, due to the collection of toxic metal chips in the fluid, the fluid can become a potent and extremely poisonous solution to humans and animals.

Use the correct personal protection equipment when handling coolant to prevent infections and poisoning.

Follow Federal, State, and the coolant manufacturer's requirements to properly dispose of used coolant.

The coolant reservoir of your mill holds approximately 6–7 gallons (22–27 liters) of fluid. We recommend changing the coolant every 120 hours of operation or sooner if it develops an unpleasant odor.

Tools Needed	Qty
Phillips Screwdriver	1
Hex Wrench 8mm	1
Catch Pan	1

Changing Coolant

1. DISCONNECT THE MILL FROM POWER!

2. Remove the coolant reservoir access panel.

3. Position the catch pan under the drain plug located on the left side of the base, then remove the plug (see **Figure 66**).

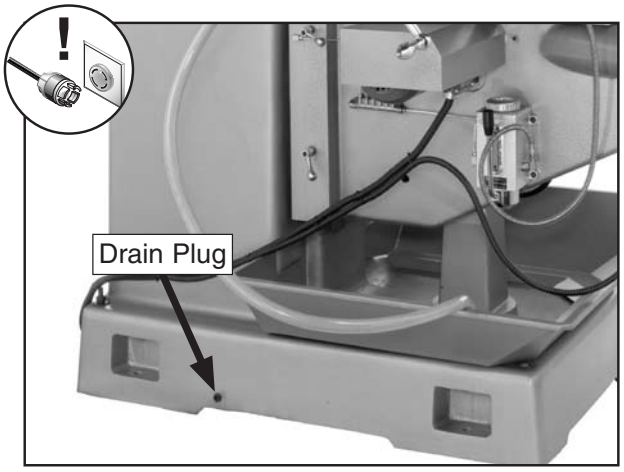


Figure 66. Coolant drain plug on the base left side.

4. Clean the debris and sludge from reservoir, and coolant pump, and the return screen on the base.

5. Re-install the drain plug, fill the reservoir with coolant, then re-install the access panel.

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. Emergency stop button is pushed in or 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. ON button is at fault. 6. Motor windings or motor is at fault.	1. Turn the emergency stop button clockwise until it pops out; replace if faulty. 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 53**). 5. Replace faulty ON button. 6. 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. Gearbox is at fault. 5. Motor connection is wired incorrectly. 6. Plug/receptacle is at fault. 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. Select appropriate spindle speed range; replace broken or slipping gears. 5. Correct motor wiring connections. 6. Test for good contacts; correct the wiring. 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. 6. Machine is incorrectly mounted or sits unevenly. 7. Motor fan is rubbing on fan cover. 8. Motor bearings are at fault. 9. Gearbox is 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. 6. Tighten/replace mounting bolts in floor; relocate/shim machine. 7. Replace dented fan cover or fan. 8. Test by rotating shaft; rotational grinding/loose shaft requires bearing replacement. 9. Rebuild gearbox for bad gear(s)/bearing(s).

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 30**). 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 30**). 5. Adjust gibs properly (**Page 46**).
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. Lubricate ways (**Page 40**). 4. Adjust gibs properly (**Page 46**).
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 30**). 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 46**).
Longitudinal or cross power feed chatters or grinds on operation.	1. Bevel gear is loose. 2. Power feed unit is at fault.	1. Tighten ball handle hex nut. 2. Replace.
Vertical power feed does not work.	1. Vertical crank engaged, tripping safety switch. 2. Safety switch/motor at fault.	1. Disengage vertical crank. 2. Test/repair/replace.

Adjusting Gibs

Gibs control the accuracy of table and ram 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, saddle, and knee has a tapered gib that is sandwiched between the stationary and moving surfaces. The saddle and knee have a gib on both sides of the device. 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.

DISCONNECT THE MILL FROM POWER BEFORE ADJUSTING THE GIBS!

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.

Refer to **Figures 67–69** for the locations of the table, saddle, and knee gib adjustment screws.

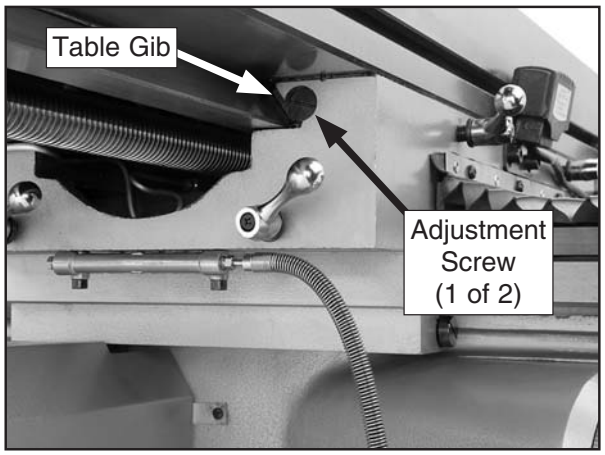


Figure 67. Table gib and adjustment screw (viewed from left side of the table).

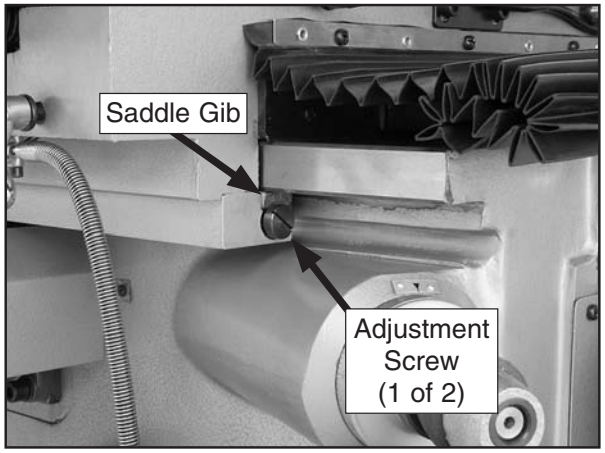


Figure 68. Left saddle gib and adjustment screw (viewed from left front of the saddle).

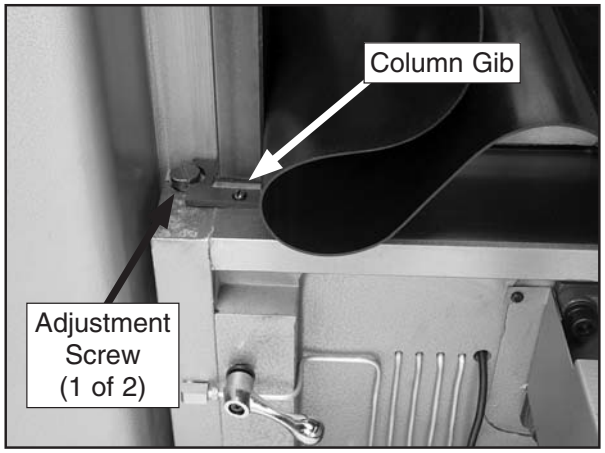


Figure 69. Left knee gib and adjustment (viewed from left top of the knee).

Adjusting Backlash

Leadscrew backlash is the amount of motion the leadscrew rotates before the device begins to move. Leadscrews always have a certain amount of backlash that will increase with wear. Generally, 0.005"–0.010" of backlash is acceptable.

Tools Needed	Qty
Phillips Screwdriver	1
Wrench 19mm	1
Hex Wrench 5mm	1

To adjust leadscrew backlash:

1. DISCONNECT THE MILL FROM POWER!

2. Remove the front way cover, move the table all the way back, then remove the ball handle and keyed spacers from the cross feed leadscrew.

3. Remove the graduated dial assembly, then the key and the remaining spacers from the leadscrew.

   Note: *Take care to secure the small parts as you take them off and note the order of assembly.*

4. Remove the two cap screws that hold the power feed unit to the bearing bracket (see **Figure 70**).

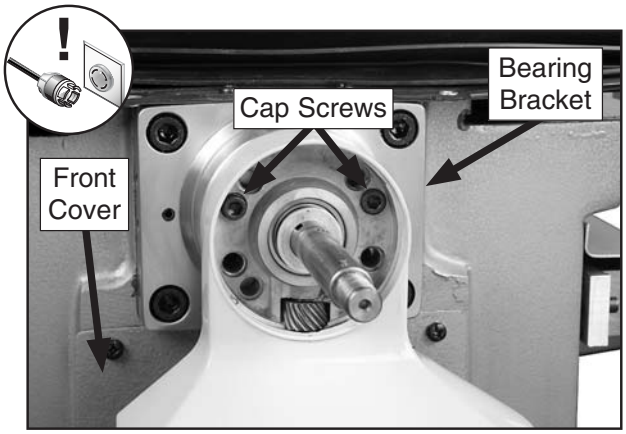


Figure 70. Power feed secured to bearing bracket.

5. Carefully slide the power feed unit off the leadscrew and lay it aside, then remove the front cover.

6. Loosen the two cap screws on the leadscrew nut shown in **Figure 71**, then rotate the adjustment plate in small increments.

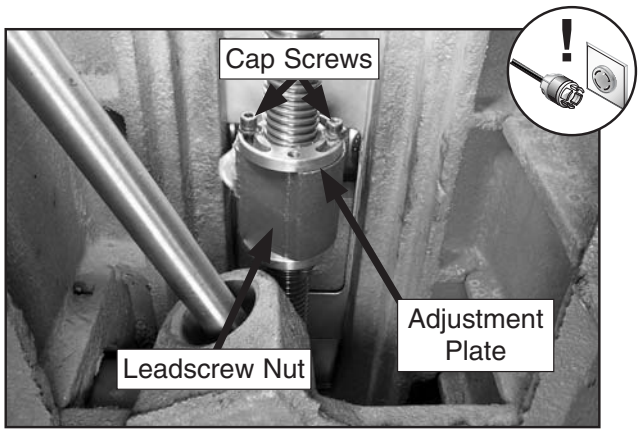


Figure 71. Cross feed leadscrew nut and backlash adjustment plate.

7. Re-install the key and ball handle onto the leadscrew, then test the backlash by rocking the handle back-and-forth.

8. When you are satisfied with the amount of backlash, re-tighten the adjustment plate cap screws.

9. Make sure all surfaces are clean of debris, then re-install the components removed for this procedure.

The longitudinal leadscrew backlash is adjusted in the same manner. Refer to **Figure 72** for the location of the longitudinal backlash adjustment plate as viewed from the left underside of the table.

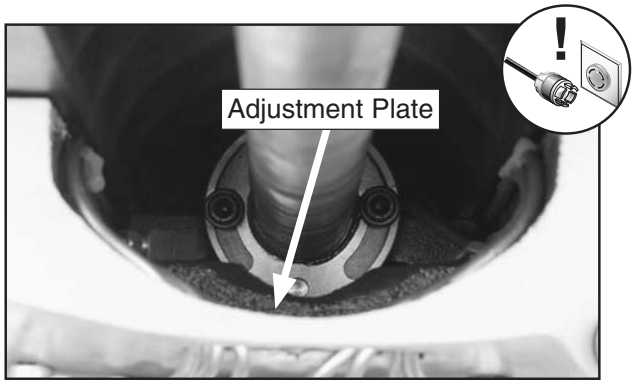


Figure 72. Longitudinal backlash adjustment plate.

SECTION 8: WIRING

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

⚠WARNING
Electrical Safety Instructions

1. **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.

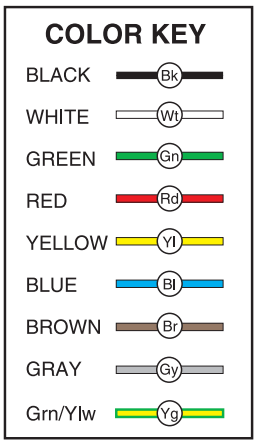
2. **CIRCUIT REQUIREMENTS.** You MUST follow the **CIRCUIT REQUIREMENTS** section on **Page 12**. **If you are unsure about the wiring codes in your area or you plan to connect your machine to a shared circuit, consult a qualified electrician.**

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.

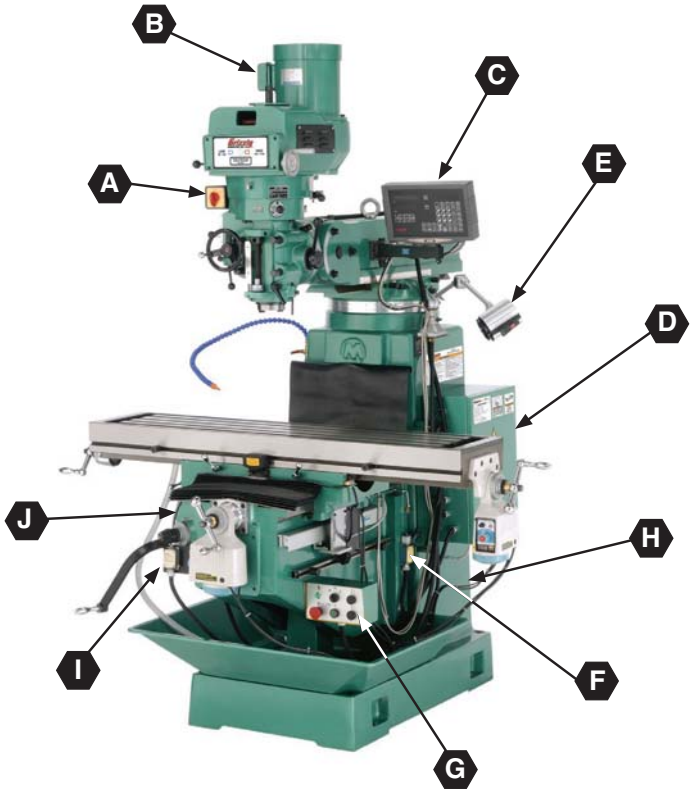
5. **EXPERIENCING DIFFICULTIES.** If at any time you are experiencing difficulties understanding the information included in this section, contact our Technical Support at (570) 546-9663.

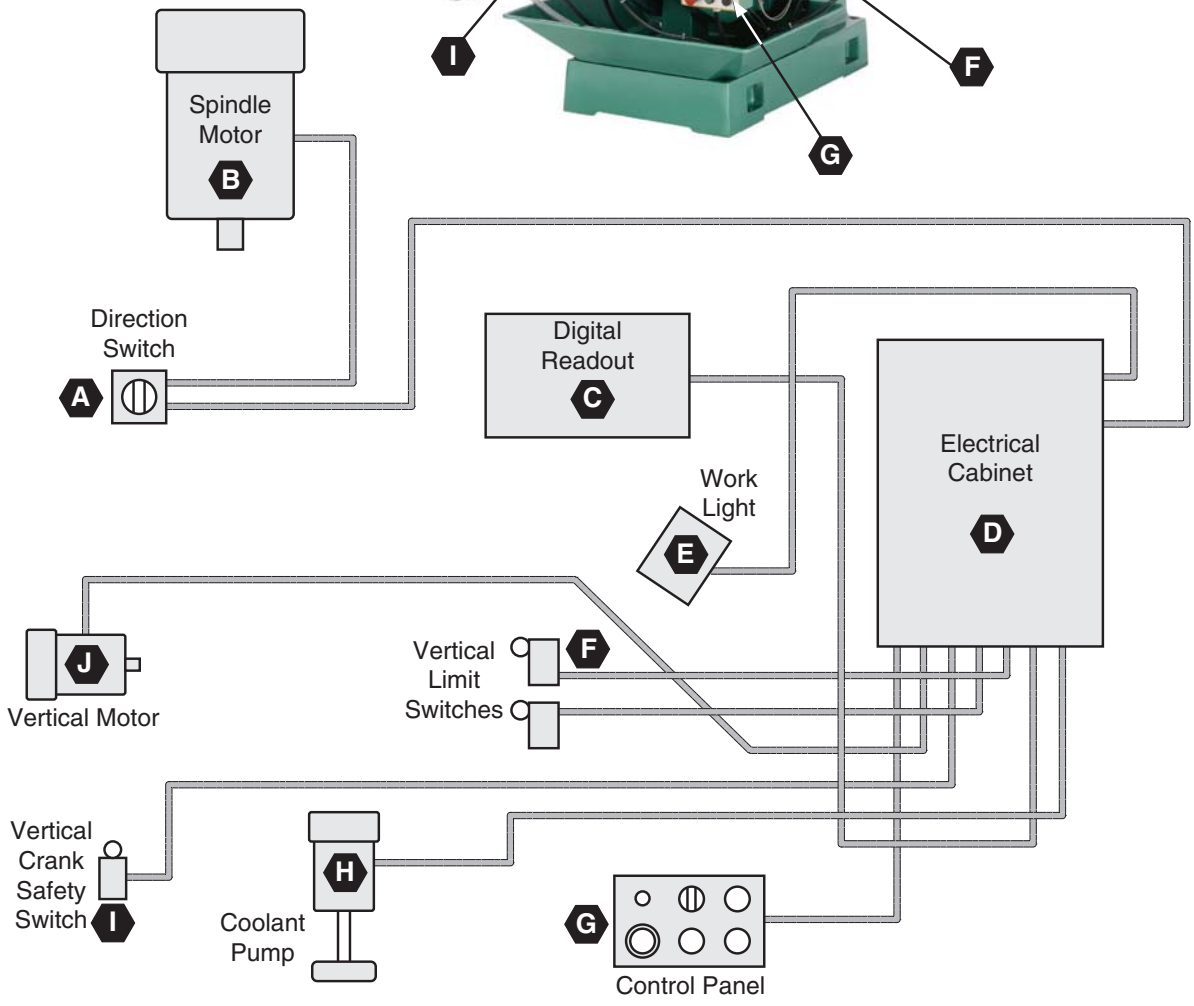
NOTICE
The photos and diagrams included in this section are best viewed in color. You can view these pages in color at *www.grizzly.com.*



Wiring Overview

Wiring Diagrams:





Electrical Cabinet Wiring

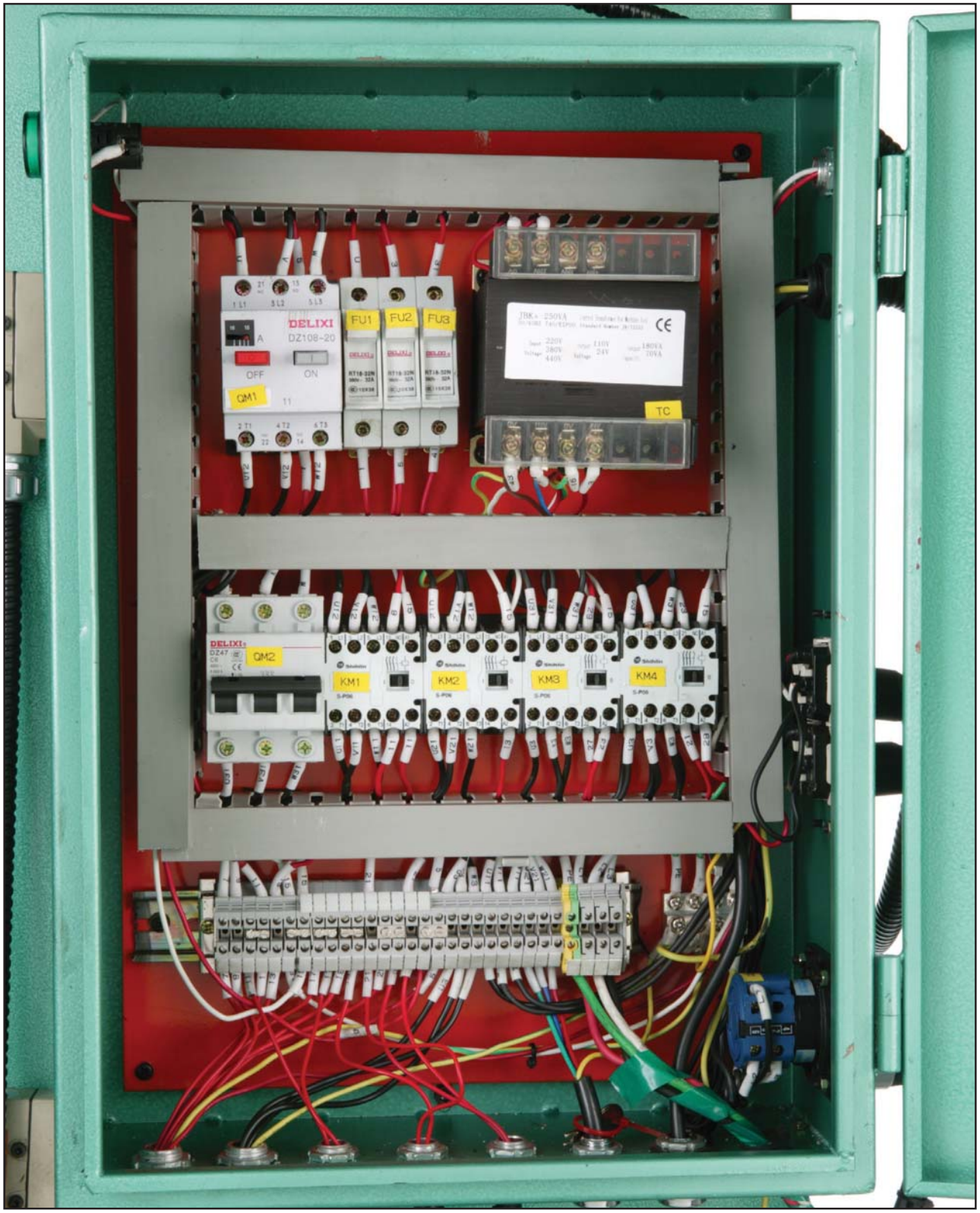
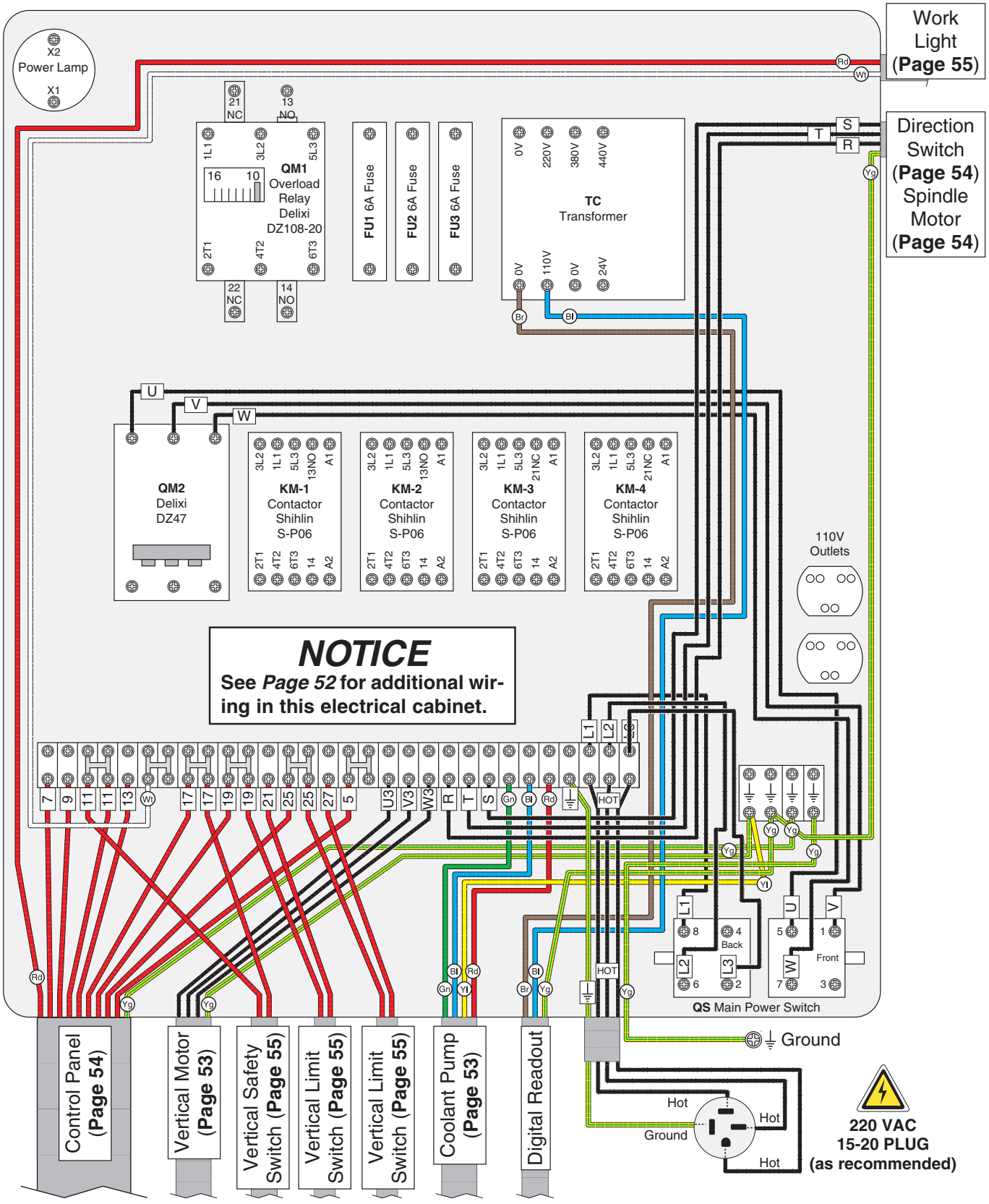


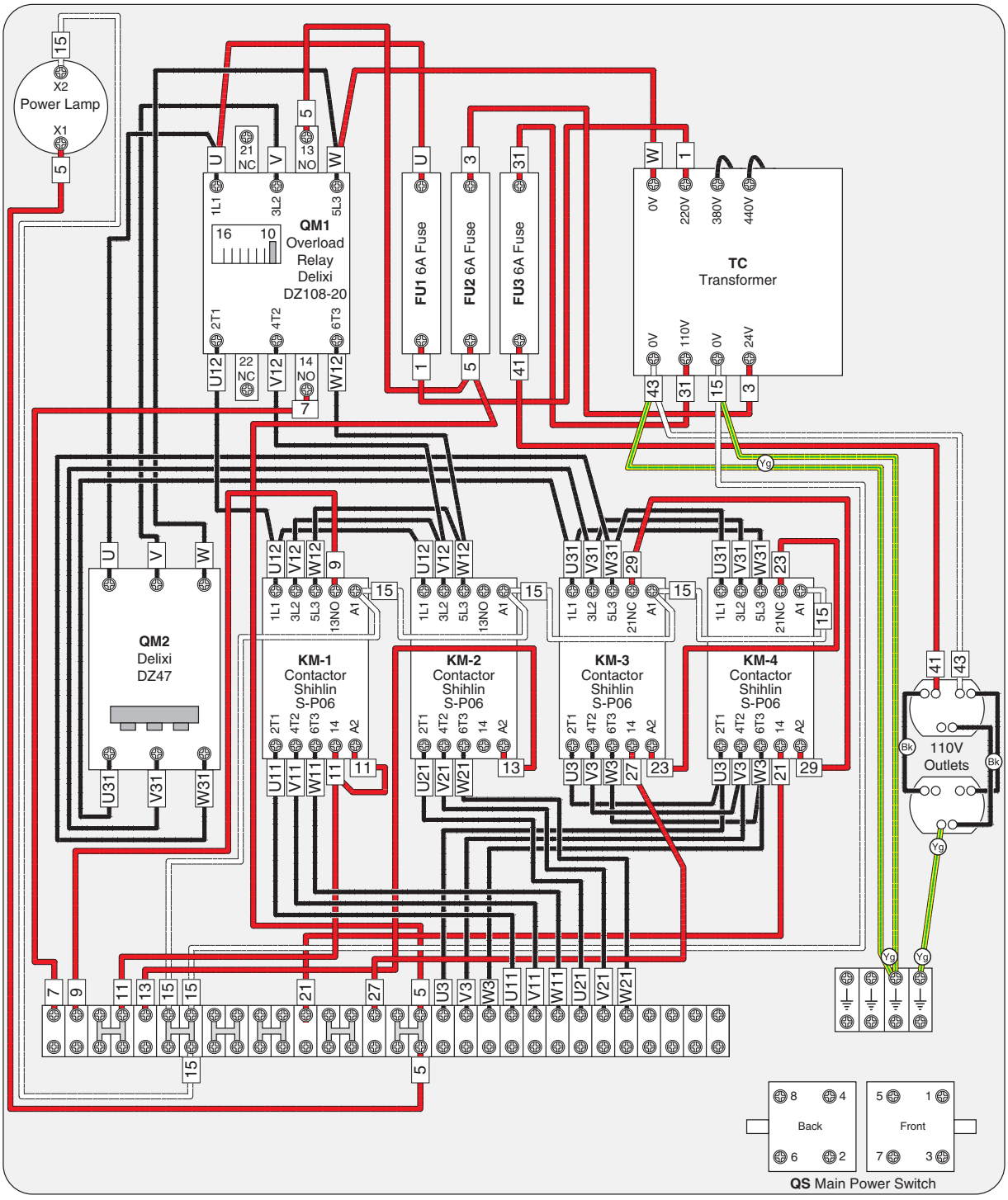
Figure 73. Electrical cabinet wiring (wiring diagram on **Pages 51–52**)

Electrical Cabinet Wiring Diagram (A)



STOP ***READ ELECTRICAL SAFETY ON PAGE 48!***

Electrical Cabinet Wiring Diagram (B)



NOTICE

See *Page 51* for additional wiring in this electrical cabinet.

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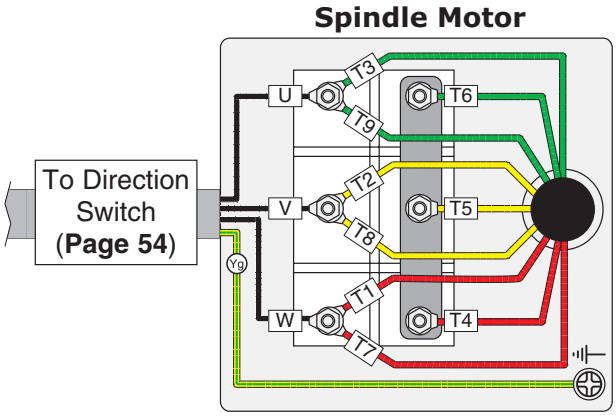
Motor Wiring Diagrams

Spindle Motor



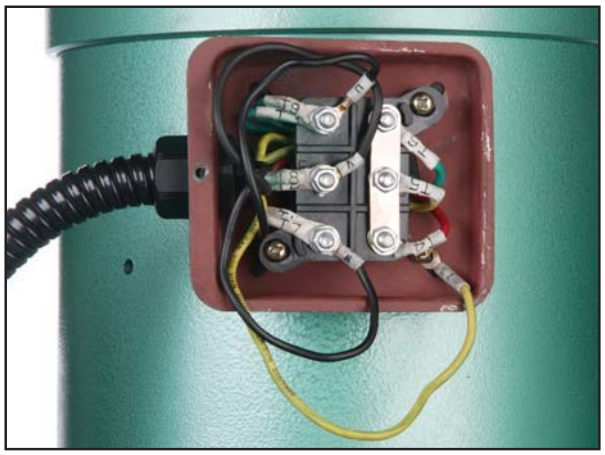


Figure 74. Spindle motor wiring.

Vertical Motor

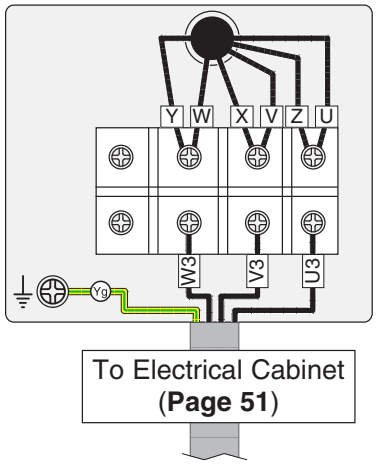
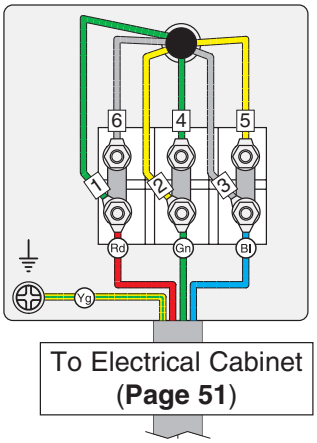


Figure 75. Vertical motor wiring.

Coolant Pump



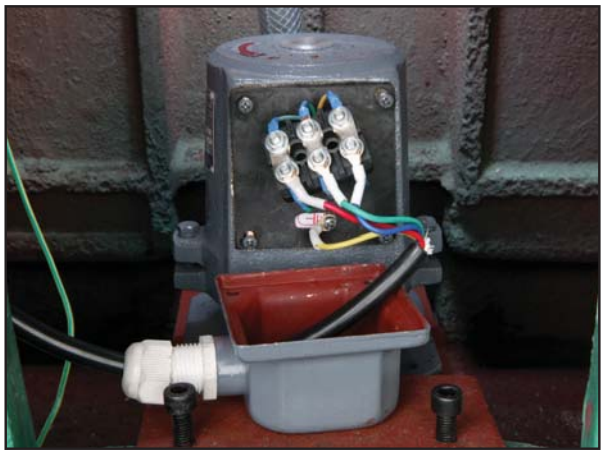
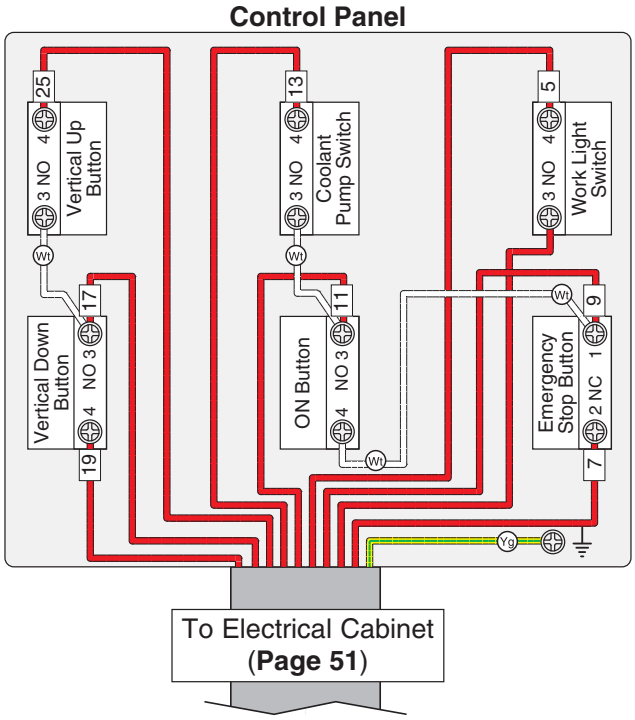


Figure 76. Coolant pump wiring.

Electrical Components Wiring Diagrams (A)



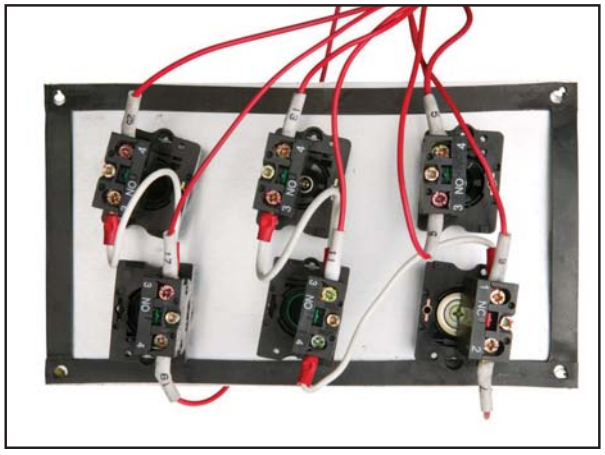


Figure 77. Control panel wiring (viewed from the rear)

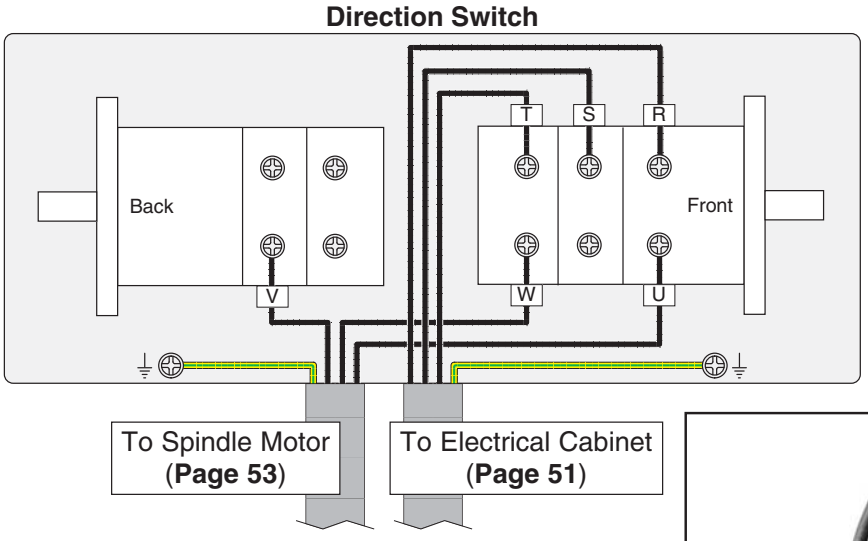


Figure 78. Direction switch wiring.

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Electrical Components Wiring Diagrams (B)

Vertical Limit Switches

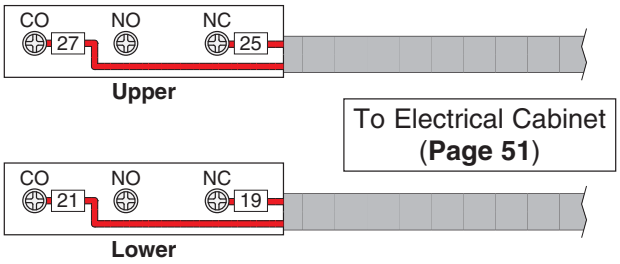
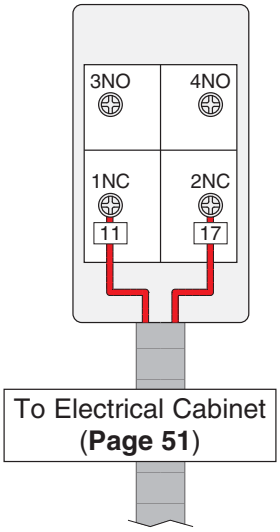


Figure 79. Vertical limit switch wiring.

Vertical Crank Safety Switch



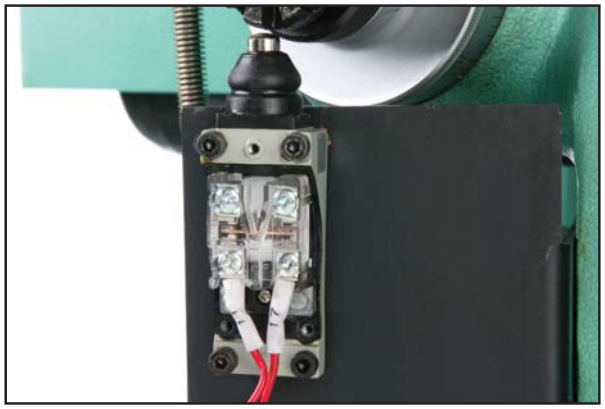
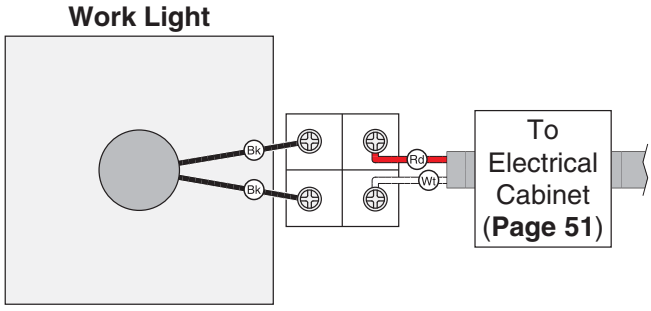


Figure 80. Vertical crank safety switch wiring.

Work Light



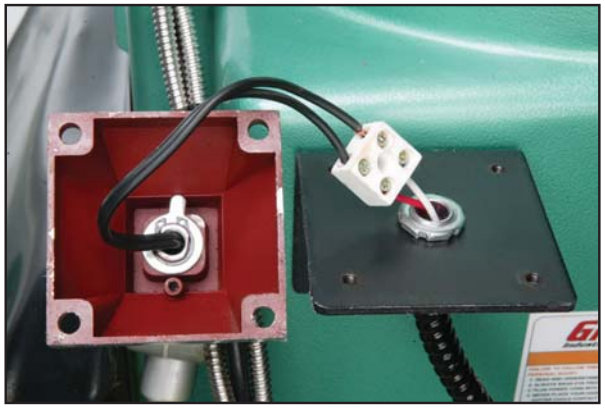
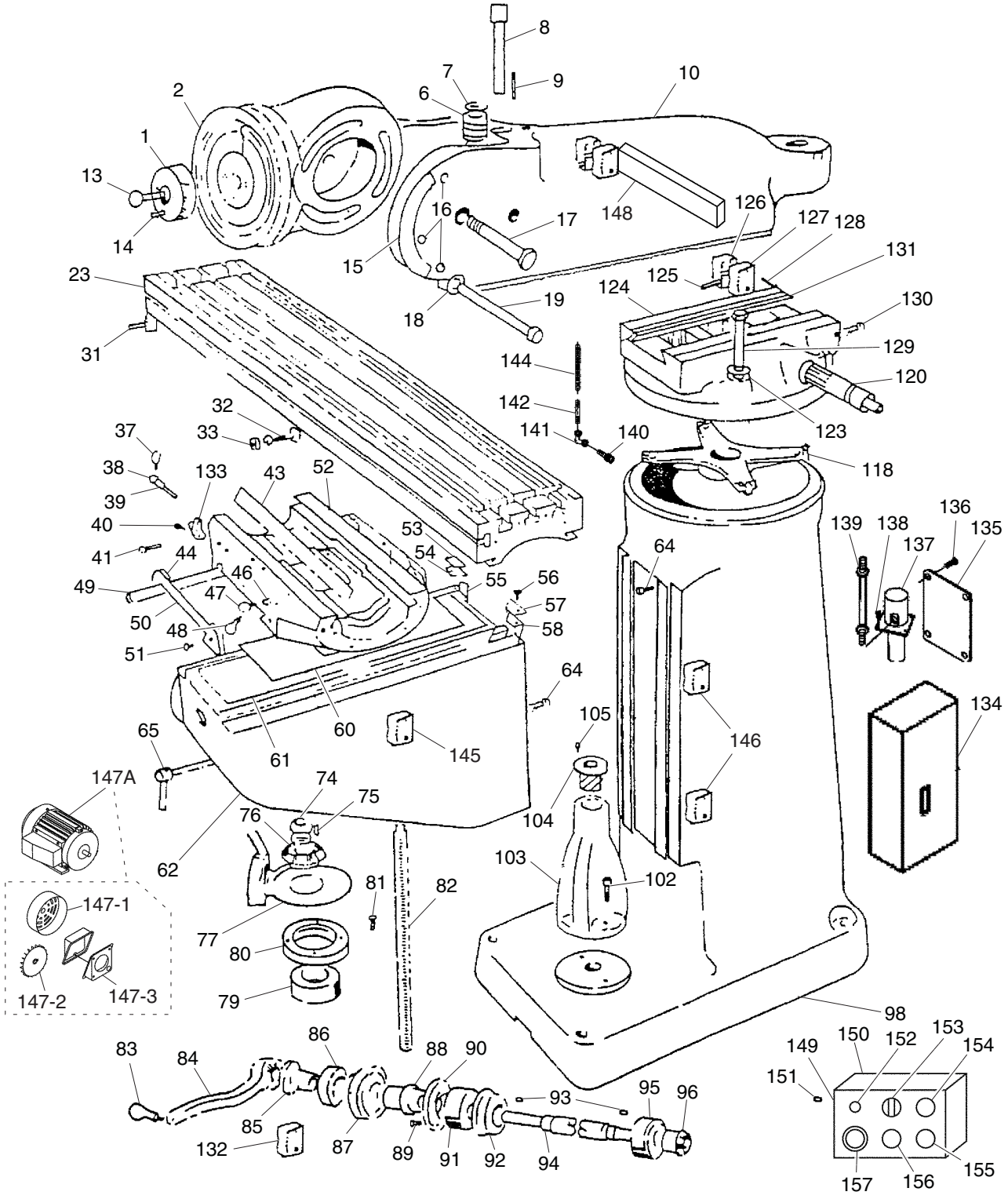


Figure 81. Work light wiring.

SECTION 9: PARTS

Base Machine Breakdown



Base Machine Parts List

REF	PART #	DESCRIPTION
1	P0559001	QUILL HOUSING ADJUST GEAR
2	P0559002	RAM ADAPTER
6	P0559006	VERT. ADJUSTING WORM GEAR
7	P0559007	WORM THRUST WASHER
8	P0559008	VERTICAL WORM SHAFT
9	P0559009	WORM KEY
10	P0559010	RAM
13	P0559013	CAP SCREW
14	P0559014	ROLL PIN
15	P0559015	SCALE
16	P0559016	RIVET
17	P0559017	ADAPTER PIVOT PIN
18	P0559018	CHAMFERED WASHER
19	P0559019	ADAPTER LOCKING BOLT
23	P0559023	TABLE
31	P0559031	LIMIT STOP T-BOLT
32	P0559032	TABLE STOP PIECE
33	PN02M	HEX NUT M10-1.5
37	P0559037	TABLE LOCK BOLT HANDLE
38	P0559038	SADDLE LOCK BOLT
39	P0559039	SADDLE LOCK PLUNGER
40	P0559040	CAP SCREW
41	P0559041	GIB ADJUSTING SCREW
43	P0559043	SADDLE TABLE GIB STOP BRACKET
44	P0559044	SADDLE WAY WIPER
46	P0559046	TABLE LOCK PLUNGER
47	P0559047	TABLE LOCK BOLT
48	P0559048	TABLE LOCK BOLT HANDLE
49	P0559049	SADDLE GIB
50	P0559050	SADDLE WIPER PLATE
51	PS08M	PHLP HD SCR M5-.8 X 12
52	P0559052	SADDLE
53	P0559053	COLUMN WAY WIPER LEFT
54	P0559054	WAY WIPER PLATE LEFT
55	P0559055	COLUMN GIB
56	PSB33M	CAP SCREW M5-.8 X 12
57	P0559057	COLUMN WAY WIPER RIGHT
58	P0559058	WAY WIPER PLATE RIGHT
60	P0559060	CHIP GUARD UPPER
61	P0559061	CHIP GUARD LOWER

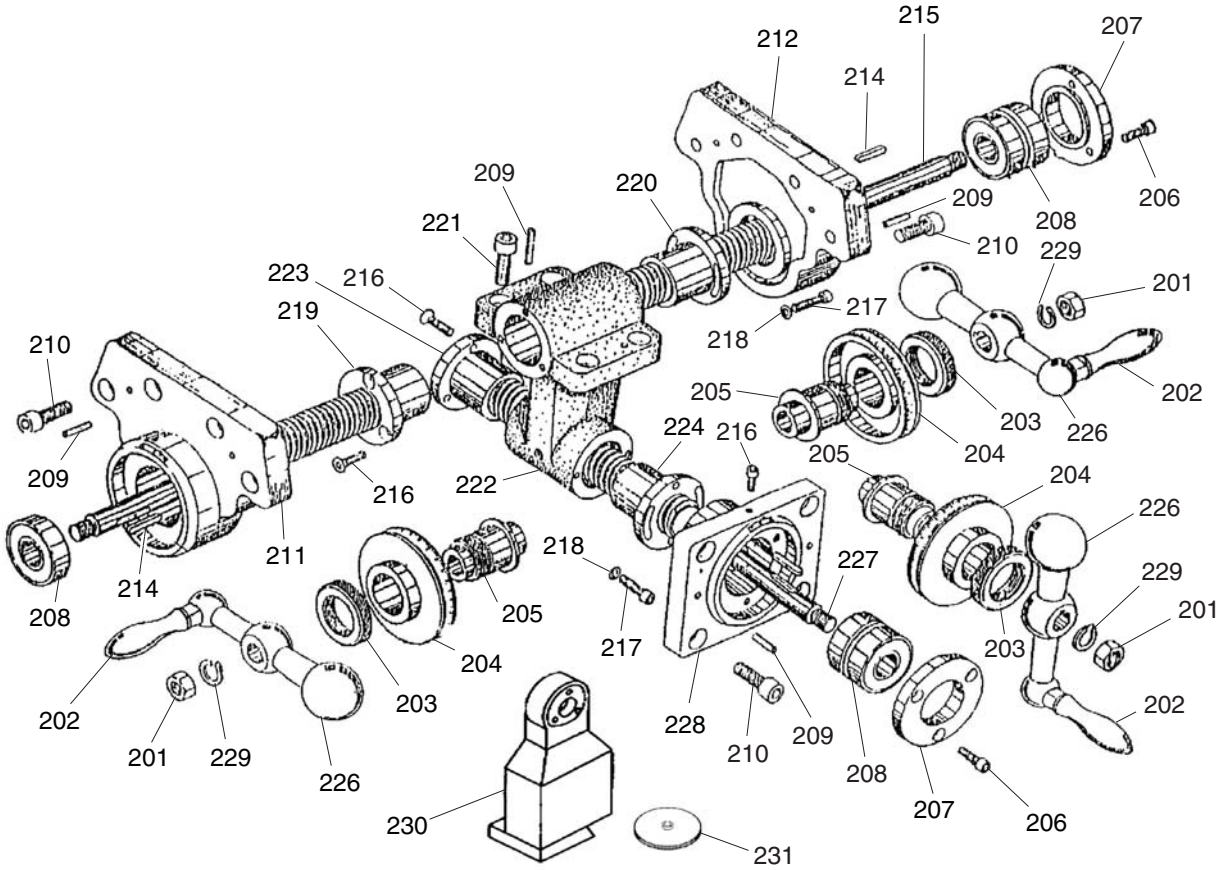
REF	PART #	DESCRIPTION
62	P0559062	KNEE
64	P0559064	STOP SCREW
65	P0559065	LOCK HANDLE
74	PN01	HEX NUT 1/2-20
75	PK23M	KEY 5 X 5 X 25
76	PW10M	FLAT WASHER 13MM
77	P0559077	BEVEL GEAR
79	P6305	BALL BEARING 6306
80	P0559080	BEARING RETAINING RING
81	PSB01M	CAP SCREW M6-1 X 16
82	P0559082	ELEVATION LEADSCREW
83	P0559083	HANDLE
84	P0559084	ELEVATION CRANK
85	P0559085	GEARSHAFT CLUTCH INSERT
86	P0559086	DIAL LOCK NUT
87	P0559087	GRADUATED DIAL
88	P0559088	DIAL HOLDER
89	PSB02M	CAP SCREW M6-1 X 20
90	P0559090	BEARING RETAINING RING
91	P0559091	BALL BEARING 20 X 47 X 14MM
92	P0559092	BEARING CAP
93	PK48M	KEY 4 X 4 X 20
94	P0559094	ELEVATION CRANK SHAFT
95	P0559095	BALL BEARING 20 X 47 X 14MM
96	P0559096	BEVEL PINION
98	P0559098	COLUMN
102	P0559102	CAP SCREW
103	P0559103	PEDESTAL
104	P0559104	ELEVATION LEADSCREW NUT
105	PSB01M	CAP SCREW M6-1 X 16
118	P0559118	TURRET SPIDER
120	P0559120	RAM PINION
123	P0559123	CHAMFERED WASHER
124	P0559124	TURRET
125	P0559125	RAM CLAMP BAR
126	P0559126	RAM CLAMP UNTAPPED
127	P0559127	RAM CLAMP TAPPED
128	P0559128	ROLL PIN
129	P0559129	LOCKING BOLT
130	P0559130	GIB ADJUSTMENT SCREW

Base Machine Parts List

REF	PART #	DESCRIPTION
131	P0559131	RAM GIB
132	P0559132	KNEE CRANK SAFETY SWITCH
133	P0559133	LONGITUDINAL LIMIT SWITCH
134	P0559134	ELECTRICAL CABINET
135	P0559135	COOLANT PUMP ACCESS COVER
136	PS09M	PHLP HD SCR M5-.8 X 10
137	P0559137	COOLANT PUMP
138	PSB28M	CAP SCREW M6-1 X 15
139	P0559139	COOLANT HOSE 3/8 ID
140	P0559140	PIPE NIPPLE 3/8
141	P0559141	ELBOW JOINT 3/8
142	P0559142	PIPE 3/8
144	P0559144	COOLANT NOZZLE
145	P0559145	CROSS LIMIT SWITCH
146	P0559146	COLUMN LIMIT SWITCH

REF	PART #	DESCRIPTION
147A	P0559147A	VERTICAL MOTOR 1/8HP 220V 3PH
147-1	P0559147-1	MOTOR FAN COVER
147-2	P0559147-2	MOTOR FAN
147-3	P0559147-3	MOTOR WIRING JUNCTION BOX
148	P0559148	DIGITAL R.O. PIVOT ARM ASSY
149	P0559149	CONTROL PANEL
150	P0559150	CONTROL PANEL BOX
151	PS09M	PHLP HD SCR M5-.8 X 10
152	P0559152	WORK LIGHT SWITCH
153	P0559153	COOLANT PUMP SWITCH
154	P0559154	ELEVATION UP BUTTON
155	P0559155	ELEVATION DOWN BUTTON
156	P0559156	ON BUTTON
157	P0559157	EMERGENCY STOP BUTTON

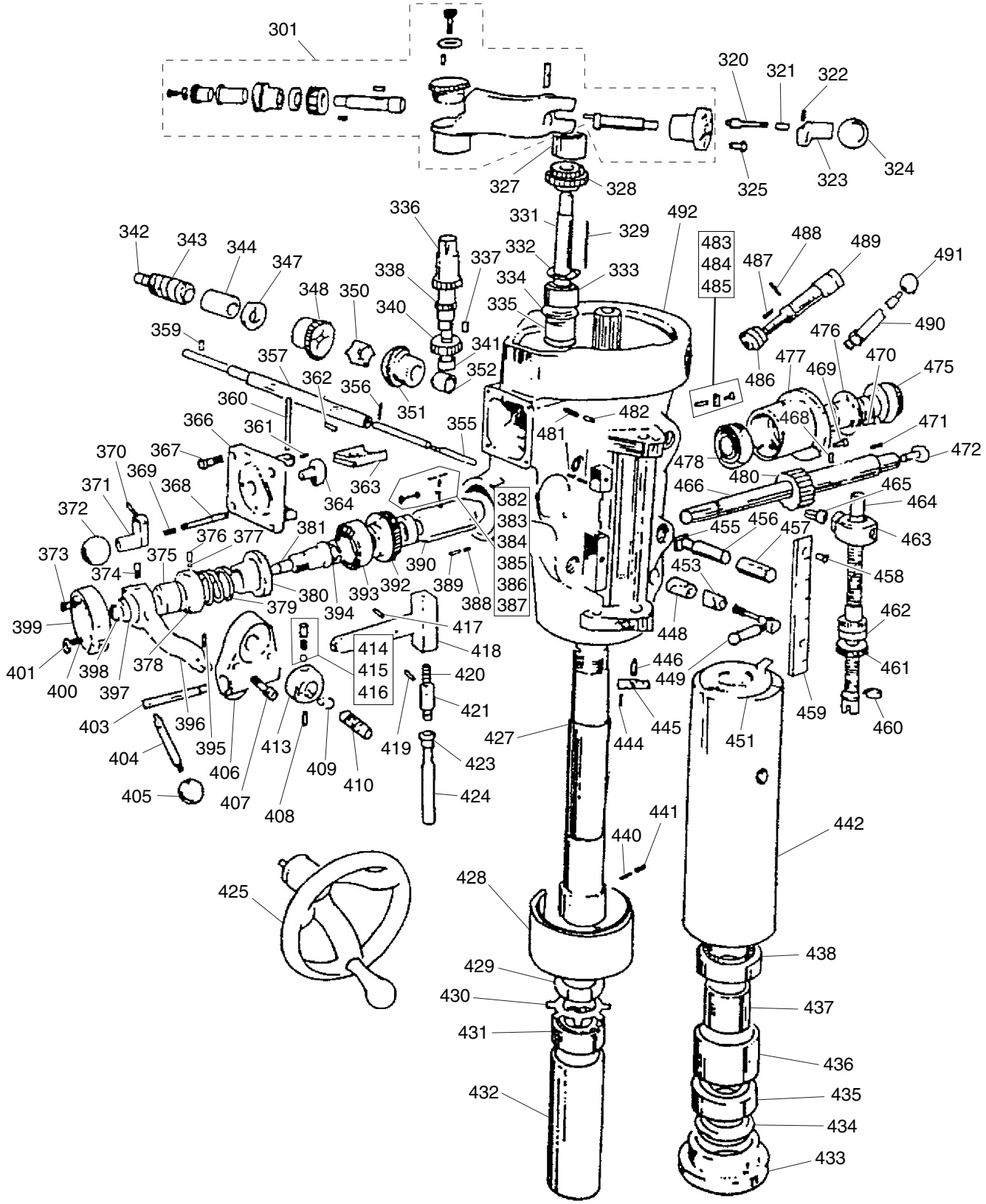
Longitudinal & Cross Leadscrews Breakdown & Parts List



REF	PART #	DESCRIPTION
201	PN01	HEX NUT 1/2-20
202	P0559202	BALL CRANK HANDLE
203	P0559203	DIAL LOCK NUT
204	P0559204	GRADUATED DIAL
205	P0559205	DIAL HOLDER
206	PSB04M	CAP SCREW M6-1 X 10
207	P0559207	BEARING RETAINER RING
208	P204-20	BALL BEARING 204-20
209	P0559209	ROLL PIN
210	PB56M	CAP SCREW M10-1.5 X 20
211	P0559211	LEFT BEARING BRACKET
212	P0559212	RIGHT BEARING BRACKET
214	PK92M	KEY 3 X 3 X 25
215	P0559215	LONGITUDINAL LEADSCREW
216	PSB02M	CAP SCREW M6-1 X 20

REF	PART #	DESCRIPTION
217	PSB02M	CAP SCREW M6-1 X 20
218	PW03M	FLAT WASHER 6MM
219	P0559219	LONG. LEADSCREW NUT LEFT
220	P0559220	LONG. LEADSCREW NUT RIGHT
221	PB56M	CAP SCREW M10-1.5 X 20
222	P0559222	LEADSCREW NUT BRACKET
223	P0559223	CROSS LEADSCREW NUT REAR
224	P0559224	CROSS LEADSCREW NUT FRONT
226	P0559226	BALL HANDLE
227	P0559227	CROSS LEADSCREW
228	P0559228	BEARING BRACKET
229	PLW07	LOCK WASHER 1/2
230	P0559230	POWER FEED ASSEMBLY
231	P0559231	POWER FEED LEXAN GEAR

Head Breakdown



Head Parts List

REF	PART #	DESCRIPTION
301	P0559301	DOWNFEED SHAFT ASSEMBLY
320	P0559320	GEARSHAFT PLUNGER
321	P0559321	COMPRESSION SPRING
322	PRP42M	ROLL PIN 3 X 20
323	P0559323	SHIFT CRANK
324	P0559324	KNOB
325	PSB15M	CAP SCREW M5-.8 X 20
327	P0559327	CLUSTER GEAR SHAFT BEARING
328	P0559328	CLUSTER GEAR
329	P0559329	CLUSTER GEAR KEY
331	P0559331	CLUSTER GEAR SHAFT
332	PR06M	EXT RETAINING RING 16MM
333	P0559333	BALL BEARING 23.8 X 16 X 13.5MM
334	P0559334	THRUST BEARING 22 X 16 X 2.5MM
335	P0559335	FEED REVERSE BEVEL PINION
336	P0559336	FEED GEAR
337	PK39M	KEY 3 X 3 X 10
338	P0559338	CLUSTER GEAR INPUT SHAFT
340	P0559340	FEED GEAR
341	P0559341	NEEDLE BEARING 9.5 X 14 X 13MM
342	P0559342	BUSHING
343	P0559343	WORM GEAR
344	P0559344	FEED WORM SHAFT BUSHING
347	P0559347	FEED WORM SHAFT WASHER
348	P0559348	FEED REVERSE BEVEL GEAR
350	P0559350	FEED REVERSE CLUTCH
351	P0559351	FEED REVERSE BEVEL GEAR
352	P0559352	BUSHING
355	P0559355	REVERSE CLUTCH ROD
356	PRP61M	ROLL PIN 3 X 12
357	P0559357	FEED WORM SHAFT
359	P0559359	PIN
360	P0559360	FEED SHAFT ROD
361	PSS07M	SET SCREW M5-.8 X 5
362	PK39M	KEY 3 X 3 X 10
363	P0559363	FEED GEAR SHIFT CRANK
364	P0559364	CLUSTER GEAR SHAFT CRANK
366	P0559366	CLUSTER GEAR COVER
367	PSB24M	CAP SCREW M5-.8 X 16
368	P0559368	GEAR SHIFT PLUNGER
369	P0559369	COMPRESSION SPRING
370	P0559370	SHIFT CRANK
371	PRP42M	ROLL PIN 3 X 20
372	P0559372	KNOB
373	PSB108M	CAP SCREW M5-.8 X 45
374	P0559374	CLUTCH RING PIN
375	P0559375	CLUTCH RING
376	PSS03M	SET SCREW M6-1 X 8
377	P0559377	BRASS PLUG
378	P0559378	OVERLOAD CLUTCH LOCKNUT

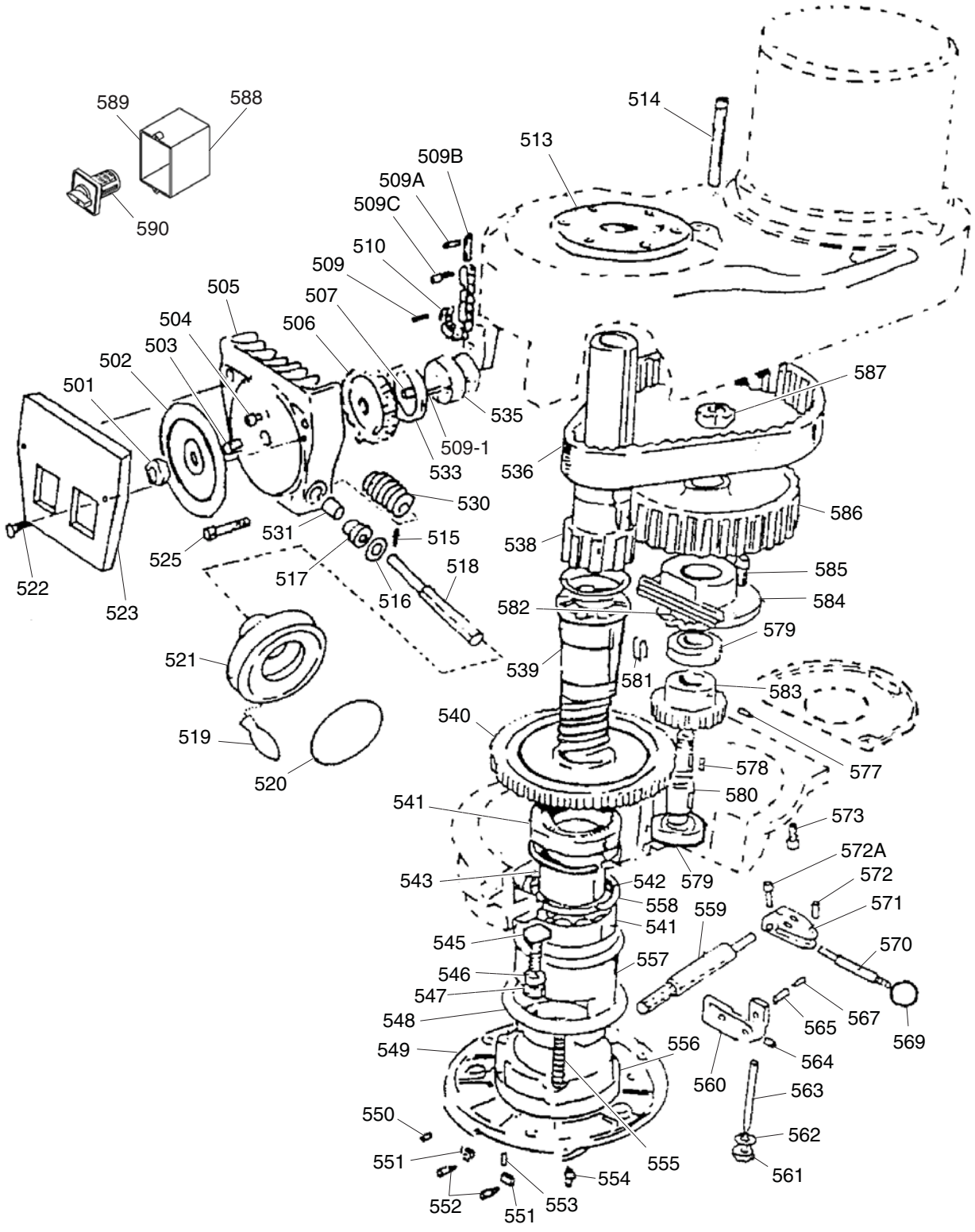
REF	PART #	DESCRIPTION
379	P0559379	SAFETY CLUTCH SPRING
380	P0559380	OVERLOAD CLUTCH
381	P0559381	OVERLOAD CLUTCH SLEEVE
382	P0559382	LOCK WASHER
383	P0559383	PHLP HD SCR
384	P0559384	LOCK SCREW
385	PSS02M	SET SCREW M6-.8 X 6
386	P0559386	LOCK SCREW
387	PSS02M	SET SCREW M6-.8 X 6
388	P0559388	COMPRESSION SPRING
389	P0559389	CLUTCH LEVER SPRING PLUNGER
390	P0559390	QUILL PINION SHAFT BUSHING
392	P0559392	OVERLOAD CLUTCH WORM GEAR
393	P0559393	OVERLOAD CLUTCH RING
394	PR05M	EXT RETAINING RING 15MM
395	P0559395	DOWEL PIN
396	P0559396	OVERLOAD CLUTCH TRIP LEVER
397	P0559397	OVERLOAD CLUTCH WASHER
398	PR01M	EXT RETAINING RING 10MM
399	P0559399	CLUTCH ARM COVER
400	PSS11M	SET SCREW M6-1 X 16
401	P0559401	CAM BRACKET LOCK NUT
403	P0559403	CAM ROD
404	P0559404	TRIP HANDLE
405	PSW03-1	KNOB
406	P0559406	FEED TRIP BRACKET
407	PSB02M	CAP SCREW M6-1 X 20
408	PSS02M	SET SCREW M6-1 X 6
409	PK39M	KEY 3 X 3 X 10
410	P0559410	FEED REVERSE KNOB STUD
413	P0559413	HANDWHEEL CLUTCH
414	P0559414	STEEL BALL
415	P0559415	COMPRESSION SPRING
416	PSS20M	SET SCREW M8-1.25 X 8
417	PRP02M	ROLL PIN 3 X 16
418	P0559418	CAM ROD SLEEVE
419	PRP61M	ROLL PIN 3 X 12
420	P0559420	COMPRESSION SPRING
421	P0559421	TRIP PLUNGER
423	P0559423	TRIP PLUNGER BUSHING
424	P0559424	FEED TRIP PLUNGER
425	P0559425	HANDWHEEL
427	P0559427	SPINDLE
428	P0559428	QUILL SKIRT
429	P0559429	SPANNER NUT
430	P0559430	SPANNER LOCK WASHER
431	P7008	ANG. CONTACT BEARING 7008ZZ
432	P0559432	SLEEVE
433	P0559433	QUILL NOSE
434	P0559434	SPINDLE DIRT SHIELD

Head Parts List

REF	PART #	DESCRIPTION
435	P0559435	ANG. CONTACT BEARING 7010ZZ
436	P0559436	BEARING SPACER
437	P0559437	BUSHING
438	P0559438	BEARING
440	P0559440	SPECIAL SOCKET SET SCREW
441	P0559441	COLLET ALIGNMENT SCREW
442	P0559442	QUILL
444	PSS50M	SET SCREW M4-.7 X 20
445	P0559445	FEED TRIP LEVER
446	P0559446	TRIP LEVER PIN
448	P0559448	QUILL LOCK SLEEVE
449	P0559449	LOCK HANDLE
451	P0559451	FELT WASHER
453	P0559453	QUILL LOCK SLEEVE TAPPED
455	P0559455	T-BOLT
456	P0559456	LOWER CLAMPING BOLT SPACER
457	P0559457	CLAMPING BOLT LOCK
458	PS17M	PHLP HD SCR M4-.7 X 6
459	P0559459	SCALE
460	P0559460	PHLP HD SCR
461	P0559461	QUILL LOCK NUT
462	P0559462	QUILL STOP NUT
463	P0559463	QUILL DOG
464	P0559464	QUILL SCREW

REF	PART #	DESCRIPTION
465	PSB75M	CAP SCREW M10-1.5 X 18
466	P0559466	QUILL PINION SHAFT
468	PRP01M	ROLL PIN 4 X 17
469	PS02M	PHLP HD SCR M4-.7 X 12
470	PRP35M	ROLL PIN 5 X 10
471	P0559471	KEY 3 X 3 X 18
472	P0559472	PINION SHAFT HUB SCREW
475	P0559475	RACK FEED HANDLE HUB
476	P0559476	PINION SHAFT HUB SLEEVE
477	P0559477	SPRING COVER
478	P0559478	TORSION SPRING
480	P0559480	QUILL PINION
481	PSS11M	SET SCREW M6-1 X 16
482	P0559482	SPECIAL SCREW
483	P0559483	REVERSE TRIP BALL LEVER
484	P0559484	FEED REVERSE TRIP PLUNGER
485	P0559485	REVERSE TRIP BALL LEVER SCREW
486	P0559486	WORM GEAR
487	PK48M	KEY 4 X 4 X 20
489	P0559489	WORM SHAFT
490	P0559490	PINION SHAFT HUB HANDLE
491	P0559491	KNOB
492	P0559492	HEAD CASTING

Upper Drive System Breakdown

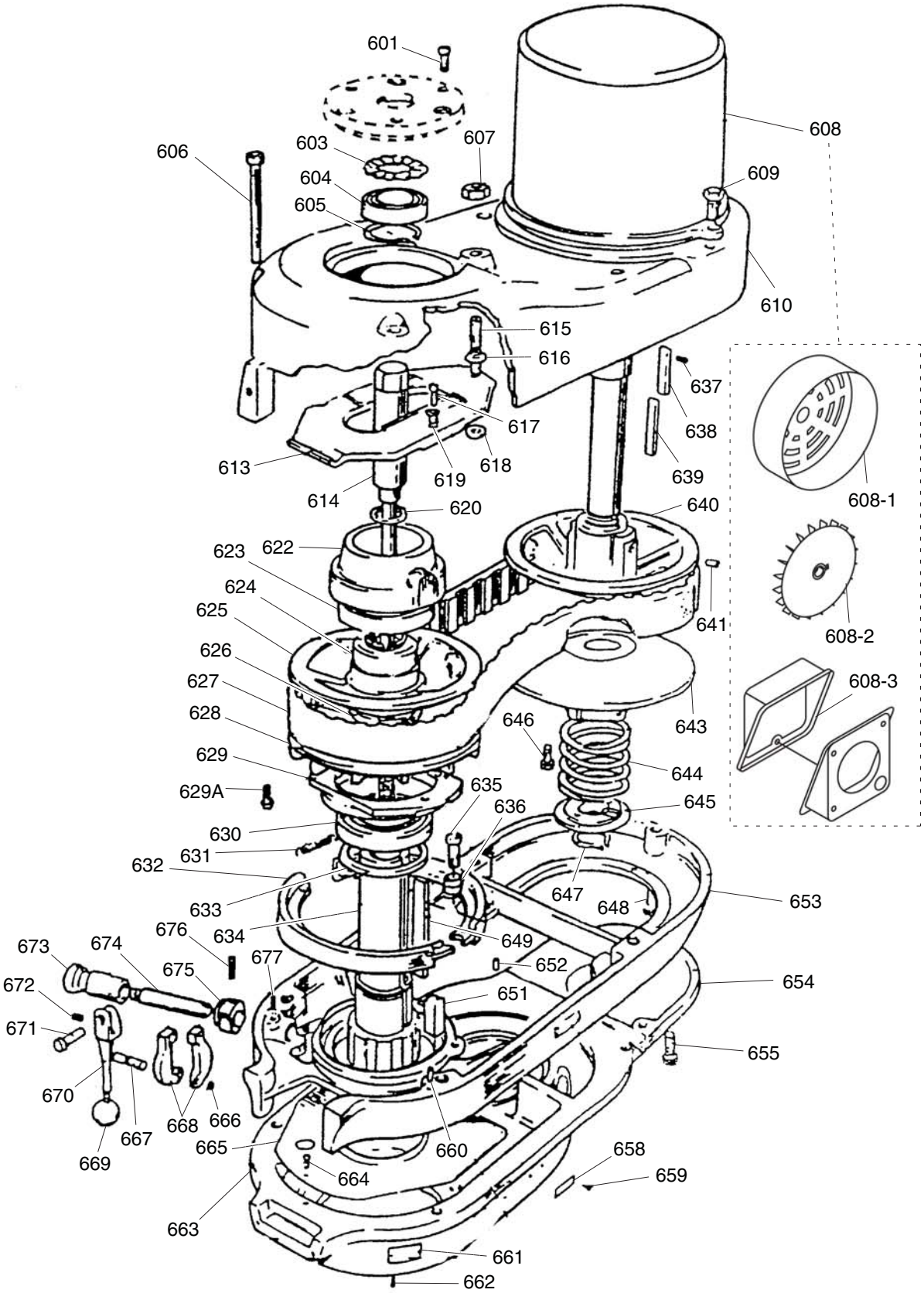


Upper Drive System Parts List

REF	PART #	DESCRIPTION
501	PN02	HEX NUT 5/16-18
502	P0559502	SPEED READOUT DIAL
503	P0559503	BRONZE BEARING
504	PSS11M	SET SCREW M6-1 X 16
505	P0559505	SPEED CHANGER HOUSING
506	P0559506	SPEED CHANGER CHIP SHIELD
507	PS05M	PHLP HD SCR M5-.8 X 8
509	P0559509	ROLL PIN 3 X 24
509-1	PRP19M	ROLL PIN 4 X 14
509A	PRP76M	ROLL PIN 4 X 16
509B	P0559509B	SPEED CHANGE STUD
509C	P0559509C	COTTER PIN
510	P0559510	SPEED CHANGER CHAIN
513	P0559513	TOP BEARING CAP
514	PSB74	CAP SCREW 3/8-16 X 2
515	P0559515	ROLL PIN
516	P0559516	COMPRESSION SPRING
517	P0559517	BALL BEARING 11 X 16 X 19 X 16MM
518	P0559518	SPEED CHANGE SHAFT
519	P0559519	HANDLE
520	P0559520	CAUTION PLATE
521	P0559521	SPEED CHANGE HANDWHEEL
522	PFH30M	FLAT HD SCR M5-.8 X 8
523	P0559523	PLASTIC FACE PLATE
525	PSB48M	CAP SCREW M6-1 X 35
530	P0559530	WORM GEAR
531	P0559531	ROLLER BEARING 16 X 12 X 13MM
533	P0559533	SPEED CHANGER SPUR GEAR 32T
535	P0559535	SPEED CHANGE CHAIN DRUM
536	P0559536	COGGED TOOTH BELT 560 8M
538	P0559538	TIMING PULLEY CLUTCH SLEEVE
539	P0559539	SPLINED GEAR HUB
540	P0559540	SPINDLE BULL GEAR ASSY
541	P0559541	BALL BEARING 35 X 72 X 17MM
542	P0559542	RETAINING RING
543	P0559543	BULL GEAR BEARING SPACER
545	P0559545	T-BOLT
546	P0559546	FLAT WASHER
547	P0559547	HEX NUT

REF	PART #	DESCRIPTION
548	P0559548	GEAR SLEEVE WASHER
549	P0559549	FIXED CLUTCH BRACKET
550	P0559550	SET SCREW
551	P0559551	CLUTCH BRACKET GUIDE
552	PSB85M	CAP SCREW M6-1 X 6
553	P0559553	DOWEL PIN
554	P0559554	OIL CUP
555	P0559555	COMPRESSION SPRING
556	P0559556	BEARING LOCK NUT
557	P0559557	BEARING SLEEVE
558	P0559558	WAVY WASHER
559	P0559559	BULL GEAR SHIFT PINION
560	P0559560	HI-LOW DETENT PLATE
561	PN09M	HEX NUT M12-1.75
562	PLW05	LOCK WASHER 7/16
563	P0559563	STUD
564	PSS51M	SET SCREW M4-.7 X 8
565	P0559565	ADJUSTABLE PLATE
567	P0559567	COMPRESSION SPRING
569	P0559569	KNOB
570	P0559570	HI/LOW SHIFT CRANK
571	P0559571	HI/LOW PINION BLOCK
572	P0559572	ROLL PIN
572A	PSB17M	CAP SCREW M4-.7 X 5
573	PSS25M	SET SCREW M6-1 X 20
577	PSS02M	SET SCREW M6-1 X 6
578	PK08M	KEY 5 X 5 X 16
579	P0559579	BALL BEARING 17 X 40 X 12MM
580	P0559580	BULL GEAR PINION SHAFT
581	PK70M	KEY 8 X 8 X 12
582	P0559582	WAVY WASHER
583	P0559583	BULL GEAR PINION
584	P0559584	BULL GEAR PINION BEARING CAP
585	PSB16M	CAP SCREW M4-.7 X 16
586	P0559586	TIMING BELT PULLEY
587	P0559587	HEX NUT M24-2.5
588	P0559588	SWITCH BOX
589	P0559589	SWITCH BOX COVER
590	P0559590	SPINDLE DIRECTION SWITCH

Lower Drive System Breakdown

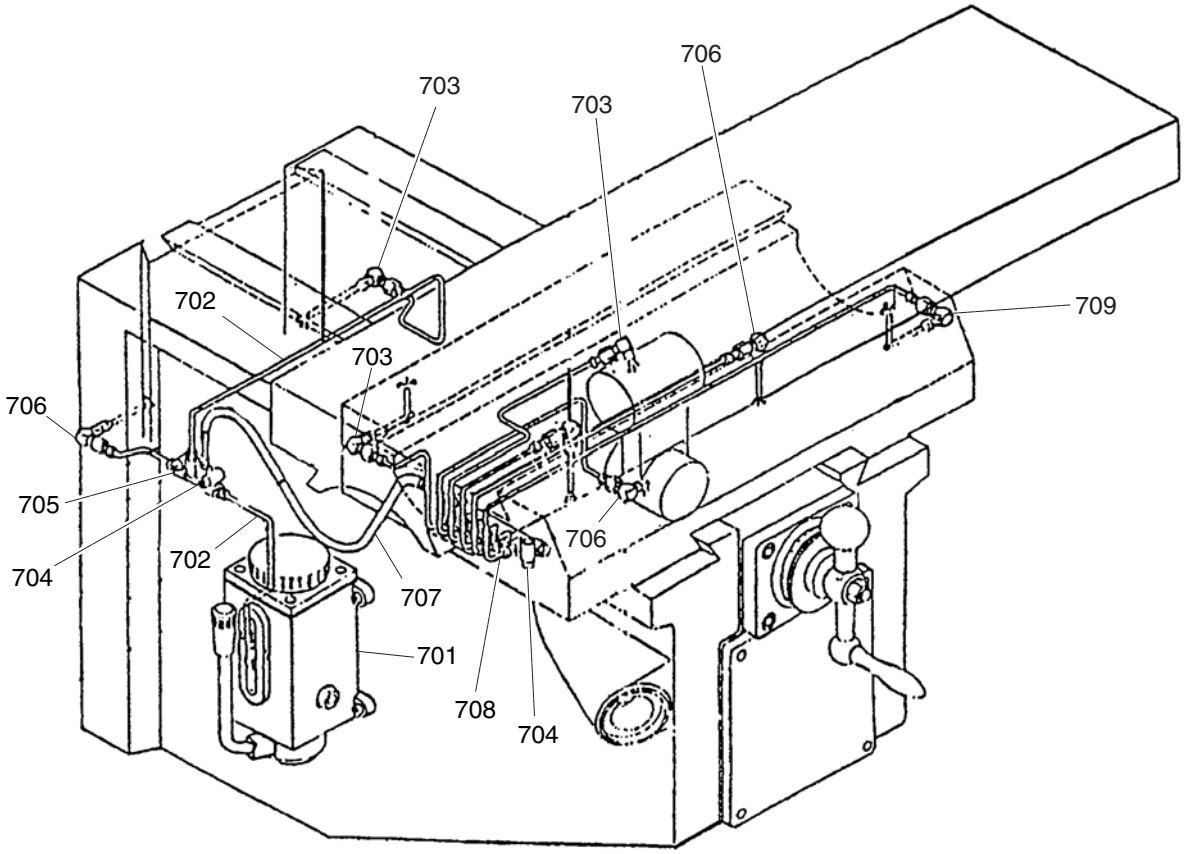


Lower Drive System Parts List

REF	PART #	DESCRIPTION
601	PSB15M	CAP SCREW M5-.8 X 20
603	P0559603	WAVY WASHER 14MM
604	P0559604	BALL BEARING 35 X 62 X 14MM
605	PR56M	EXT RETAINING RING 45MM
606	P0559606	CAP SCREW
607	PN08	HEX NUT 3/8-16
608	P0559608	SPINDLE MOTOR 5HP 220V 3-PH
608-1	P0559608-1	MOTOR FAN COVER
608-2	P0559608-2	MOTOR FAN
608-3	P0559608-3	MOTOR WIRING JUNCTION BOX
609	PB24	HEX BOLT 3/8-16 X 1-3/8
610	P0559610	BELT HOUSING
613	P0559613	SPEED CHANGE PLATE
614	P0559614	DRAWBAR
615	P0559615	COTTER PIN
616	P0559616	SPEED CHANGE PLATE PIVOT STUD
617	PSB16M	CAP SCREW M4-.7 X 16
618	PW04M	FLAT WASHER 10MM
619	P0559619	PIVOT SLEEVE
620	P0559620	DRAWBAR WASHER
622	P0559622	PULLEY BEARING HOUSING
623	P0559623	BALL BEARING
624	P0559624	PLASTIC INSERT
625	P0559625	ADJUSTABLE DISC
626	PR43M	EXT RETAINING RING 50MM
627	P0559627	TIMING BELT 900VC3830
628	P0559628	STATIONARY DISC
629	P0559629	BRAKE BEARING CAP
629A	PSB74M	CAP SCREW M6-1 X 18
630	P0559630	BALL BEARING
631	P0559631	BRAKE SPRING
632	P0559632	BRAKE SHOE ASSY
633	P0559633	SPINDLE PULLEY SPACER
634	P0559634	SPINDLE PULLEY HUB
635	PB03	HEX BOLT 5/16-18 X 1
636	P0559636	BRAKE SHOE PIVOT SLEEVE
637	P0559637	ROLL DOWEL PIN

REF	PART #	DESCRIPTION
638	P0559638	DRIVE KEY
639	P0559639	MOTOR SHAFT KEY
640	P0559640	STATIONARY MOTOR DISC
641	PSS02M	SET SCREW M6-1 X 6
643	P0559643	ADJUSTABLE MOTOR DISC
644	P0559644	MOTOR SHAFT SPRING
645	P0559645	ADJUSTABLE DISC SPRING COLLAR
646	P0559646	CAP SCREW
647	P0559647	RETAINING RING
648	PSB15M	CAP SCREW M5-.8 X 20
649	P0559649	PLASTIC KEY
651	P0559651	KEY
652	P0559652	TAPER PIN
653	P0559653	BELT HOUSING BASE
654	P0559654	MOTOR PULLEY COVER
655	PSB15M	CAP SCREW M5-.8 X 20
658	P0559658	HI-LOW RANGE NAMEPLATE
659	P0559659	RIVET
660	P0559660	TAPER PIN
661	P0559661	QUILL FEED NAMEPLATE
662	P0559662	RIVET
663	P0559663	GEAR HOUSING
664	PS107M	PHLP HD SCR M6-1 X 20
665	P0559665	GEAR HOUSING PLATE
666	PR39M	EXT RETAINING RING 8MM
667	P0559667	BRAKE FINGER PIVOT STUD
668	P0559668	BRAKE OPERATING FINGER
669	P0559669	KNOB
670	P0559670	BRAKE LOCK HANDLE
671	P0559671	BRAKE LOCK PIN
672	PSS02M	SET SCREW M6-1 X 6
673	P0559673	BRAKE LOCK SHAFT SLEEVE
674	P0559674	BRAKE LOCK SHAFT
675	P0559675	BRAKE LOCK CAM
676	PRP103M	ROLL PIN 6 X 6
677	PSS02M	SET SCREW M6-1 X 6

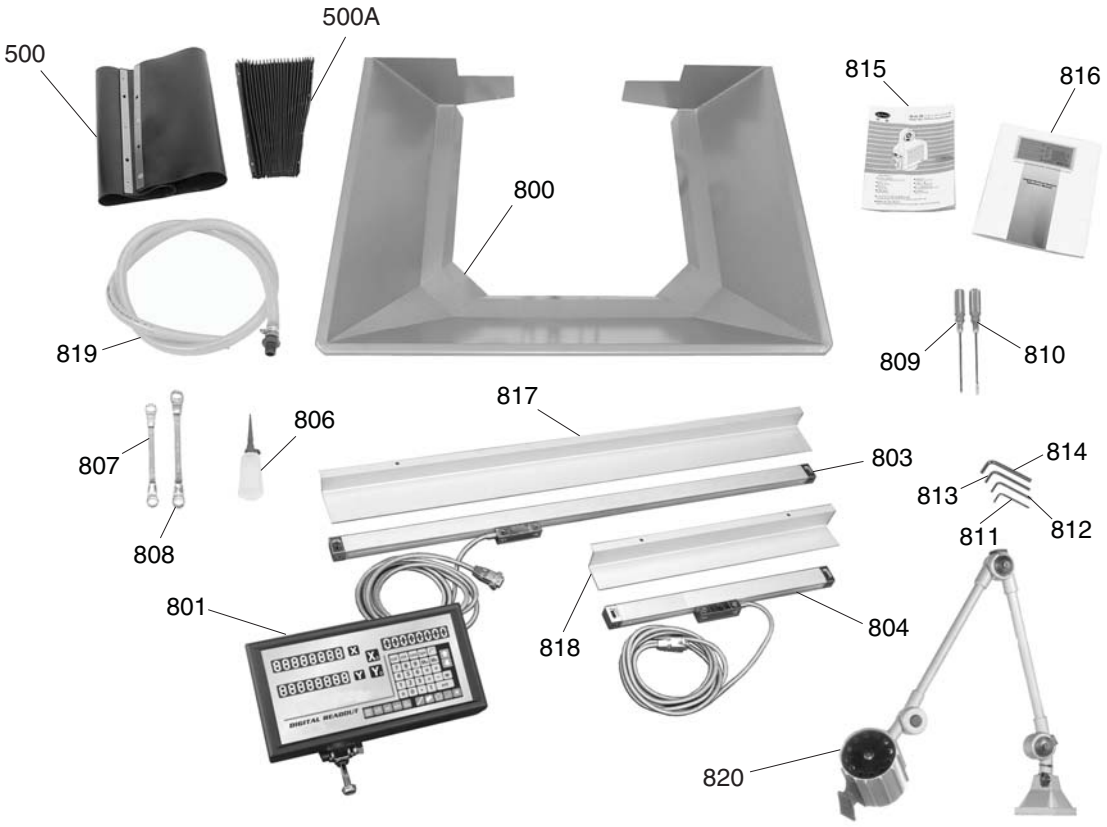
One-Shot Oiler Breakdown & Parts List



REF	PART #	DESCRIPTION
701	P0559701	ONE-SHOT OILER
702	P0559702	ALUMINUM PIPE
703	P0559703	OIL DISTRIBUTOR CPS4
704	P0559704	HEX BOLT
705	P0559705	OIL DISTRIBUTOR A4

REF	PART #	DESCRIPTION
706	P0559706	OIL DISTRIBUTOR CPS3
707	P0559707	STEEL FLEXIBLE TUBE
708	P0559708	OIL DISTRIBUTOR A8
709	P0559709	OIL DISTRIBUTOR CPS5

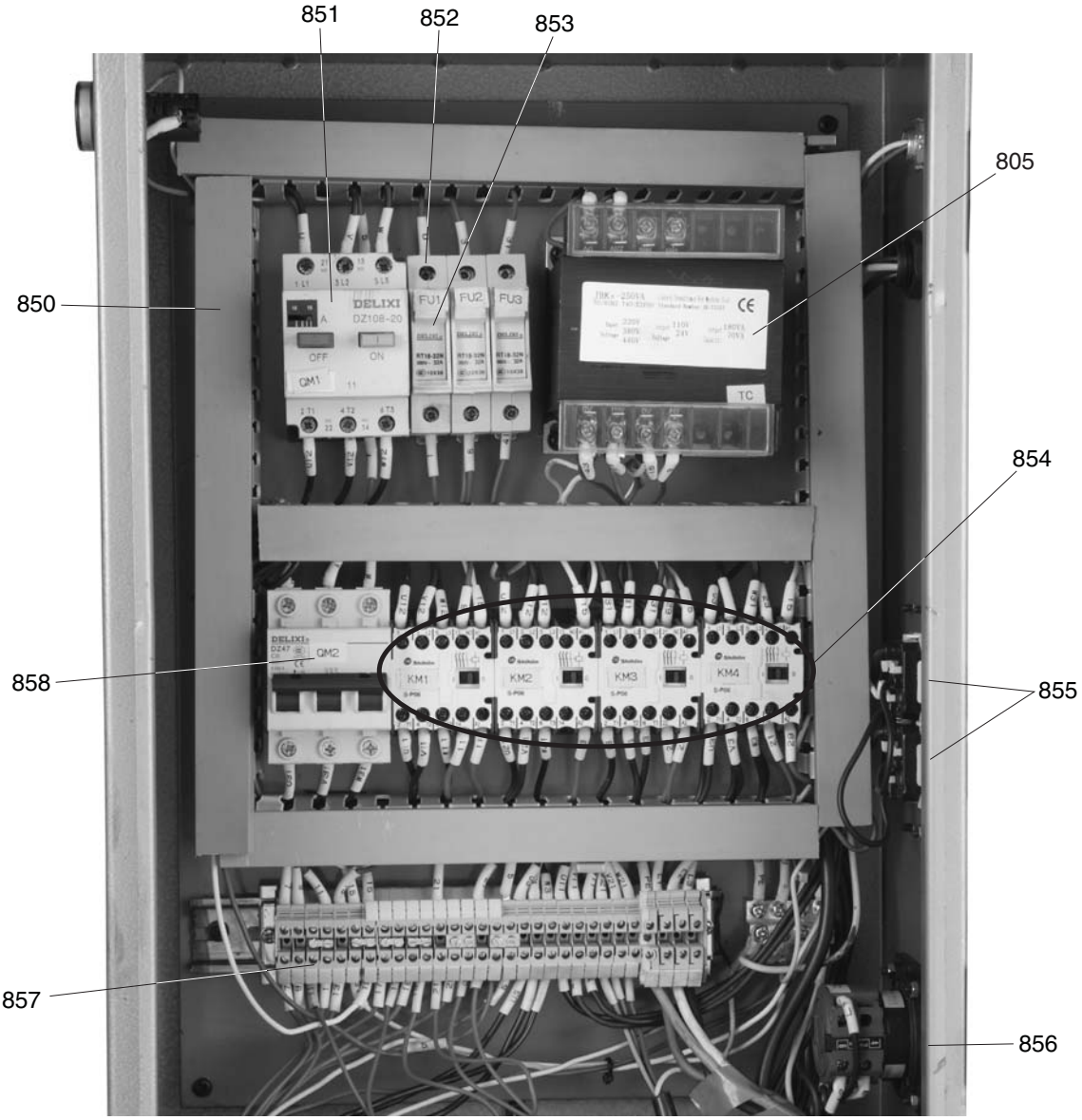
Accessories Breakdown & Parts List



REF	PART #	DESCRIPTION
500	P0559500	RUBBER WAY COVER
500A	P0559500A	RUBBER CHIP DEFLECTOR
800	P0559800	SPLASH PAN
801	P0559801	DIGITAL DISPLAY UNIT
803	P0559803	X-AXIS SCALE
804	P0559804	Y-AXIS SCALE
806	P0559806	OIL BOTTLE
807	PWR1719	WRENCH 17/19
808	P0559808	WRENCH 18/21
809	PSDP2	SCREWDRIVER PHILLIPS #2
810	PSDF2	SCREWDRIVER STANDARD #2

REF	PART #	DESCRIPTION
811	PAW04M	HEX WRENCH 4MM
812	PAW05M	HEX WRENCH 5MM
813	PAW06M	HEX WRENCH 6MM
814	PAW08M	HEX WRENCH 8MM
815	P0559815	POWER FEED MANUAL
816	P0559816	DIGITAL READOUT MANUAL
817	P0559817	X-AXIS SCALE COVER
818	P0559818	Y-AXIS SCALE COVER
819	P0559819	COOLANT RETURN HOSE
820	P0559820	HALOGEN WORK LIGHT ASSY

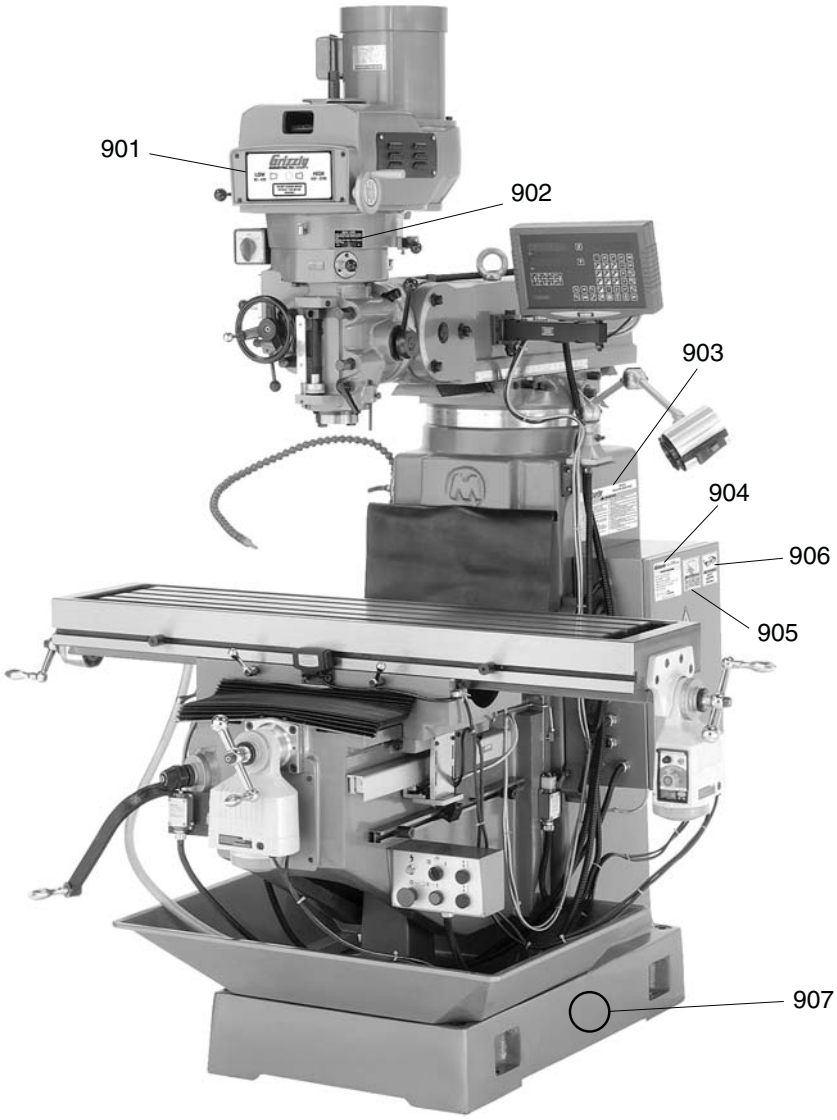
Electrical Cabinet Breakdown & Parts List



REF	PART #	DESCRIPTION
805	P0559805	TRANSFORMER JBK JB/T5555 220V
850	P0559850	WIRE MANAGEMENT ASSY
851	P0559851	OL RELAY DELIXI DZ108-20 220V
852	P0559852	FUSE HOLDER DELIXI RT-18-32N
853	P0559853	FUSE 6A

REF	PART #	DESCRIPTION
854	P0559854	CONTACTOR SHIHLIN S-P06 220V
855	P0559855	ELECTRICAL OUTLET 110V
856	P0559856	MAIN POWER SWITCH
857	P0559857	TERMINAL BLOCK 30-P
858	P0559858	CIRC. BREAKER DELIXI DZ47 220V

Label Placement



REF	PART #	DESCRIPTION
901	P0559901	SPEED READOUT LABEL
902	P0559902	DOWNFEED SELECTION LABEL
903	P0559903	WARNINGS LABEL
904	P0559904	MACHINE ID LABEL

REF	PART #	DESCRIPTION
905	PLABEL-12A	READ MANUAL LABEL
906	PLABEL-11A	EYE HAZARD LABEL
907	PPAINT-1	GRIZZLY GREEN 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 _____ Invoice # _____

Model # _____ Order # _____ Serial # _____

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

1. How did you learn about us?

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

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

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

3. What is your annual household income?

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

4. What is your age group?

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

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

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

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

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

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

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

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

10. Comments: _____

_____

_____

_____

CUT ALONG DOTTED LINE

FOLD ALONG DOTTED LINE

Place
Stamp
Here

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

FOLD ALONG DOTTED LINE

Send a Grizzly Catalog to a friend:

Name_____

Street_____

City_____State_____Zip_____

TAPE ALONG EDGES--PLEASE DO NOT STAPLE

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.