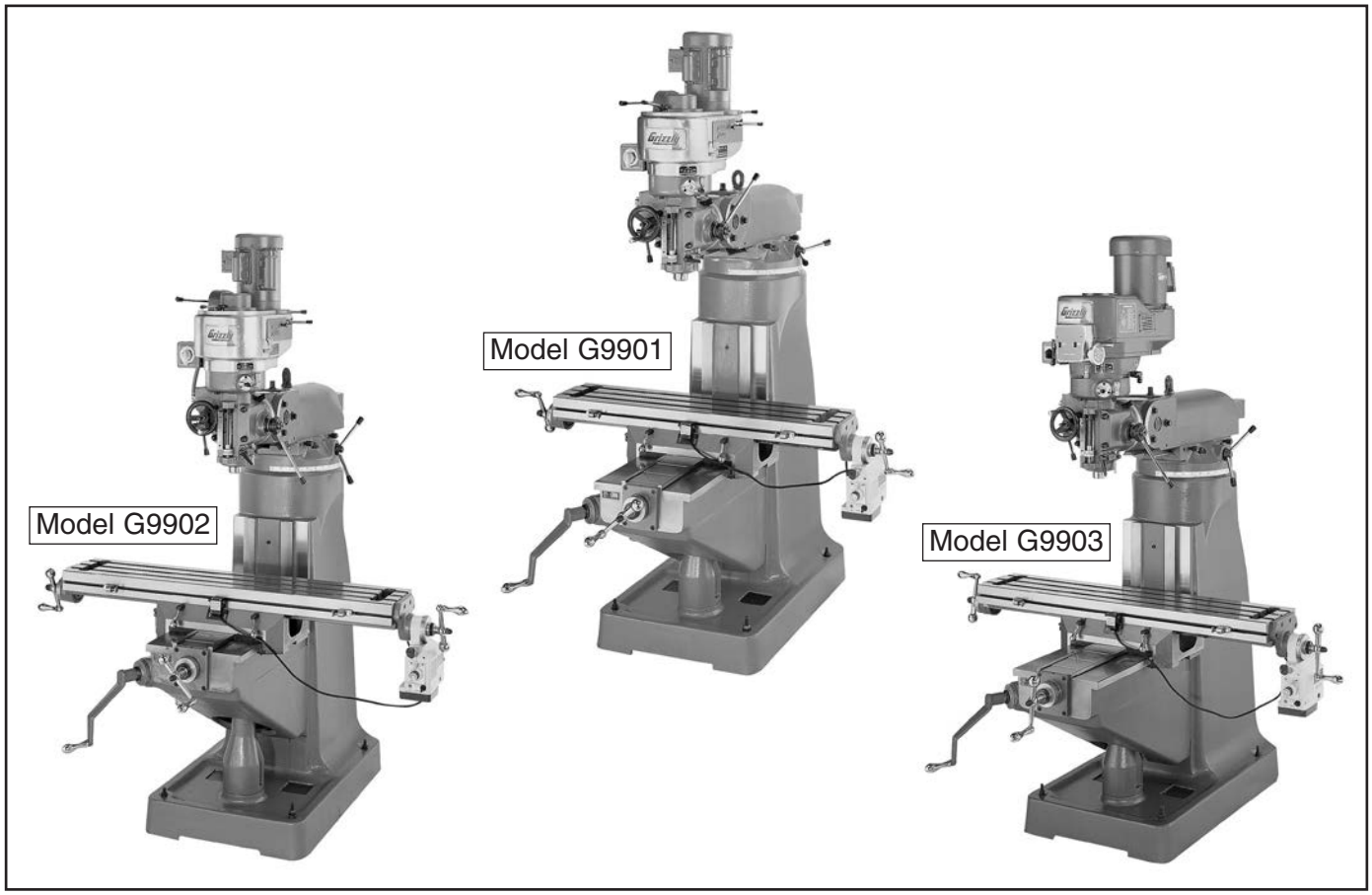
MODEL G9901/G9902/G9903
VERTICAL MILLING MACHINE
w/POWER FEED
OWNER'S MANUAL



#TS9704 PRINTED IN CHINA

⚠ WARNING!

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

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

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

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

⚠ WARNING!

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

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

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

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INTRODUCTION

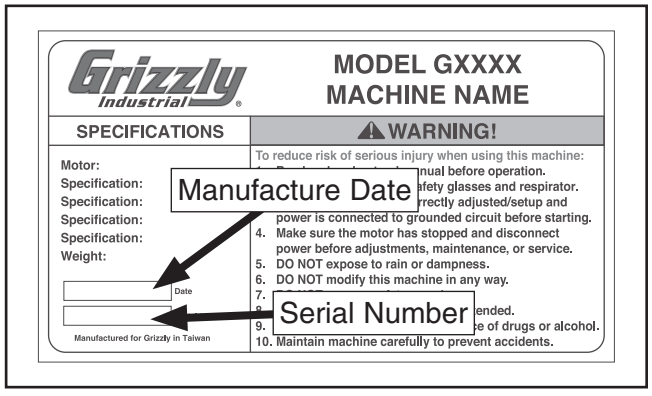
Manual Accuracy

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

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

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

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



Contact Info

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

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

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

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

Machine Description

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

During most operations, the workpiece is clamped to the table, then it is moved into the rotating 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 with vertical quill (spindle) movement, using the coarse or fine downfeed controls.

MACHINE DATA SHEET

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

MODEL G9901 9" X 42" VERTICAL MILL W/ POWER FEED

Product Dimensions:

Weight	2325 lbs.
Width (side-to-side) x Depth (front-to-back) x Height	66 x 59 x 85 in.
Footprint (Length x Width)	36 x 24 in.
Space Required for Full Range of Movement (Width x Depth)	60 x 66-1/2 in.

Shipping Dimensions:

Type	Wood Crate
Content	Machine
Weight	2380 lbs.
Length x Width x Height	55 x 51 x 79 in.
Must Ship Upright	Yes

Electrical:

Power Requirement	110V or 220V, Single-Phase, 60 Hz
Prewired Voltage	220V
Full-Load Current Rating	19A at 110V, 9.5A at 220V
Minimum Circuit Size	30A at 110V, 15A at 220V
Connection Type	Cord & Plug
Power Cord Included	Yes
Power Cord Length	6 ft.
Power Cord Gauge	14 AWG
Plug Included	No
Recommended Plug Type	L5-30 for 110V, 6-15 for 220V
Switch Type	Forward/Reverse Switch

Motors:

Main

Horsepower	2 HP
Phase	Single-Phase
Amps	19A/9.5A
Speed	1725 RPM
Type	TEFC Capacitor-Start Induction
Power Transfer	Belt Drive
Bearings	Shielded & Permanently Lubricated

Main Specifications:

Operation Info

Spindle Travel	5 in.
Max Distance Spindle to Column	20 in.
Max Distance Spindle to Table	18 in.
Longitudinal Table Travel (X-Axis)	25-7/8 in.
Cross Table Travel (Y-Axis)	12-1/2 in.
Vertical Table Travel (Z-Axis)	16 in.
Vertical Head Travel (Z-Axis)	5 in.
Ram Travel	12 in.
Turret or Column Swivel (Left /Right)	360 deg.
Head Tilt (Left/Right)	90 deg.
Head Tilt (Front/Back)	45 deg.
Drilling Capacity for Cast Iron	1-1/2 in.
Drilling Capacity for Steel	1-1/4 in.
End Milling Capacity	7/8 in.
Face Milling Capacity	3 in.

Table Info

Table Length	42 in.
Table Width	9 in.
Table Thickness	2-3/4 in.
Number of T-Slots	3
T-Slot Size	5/8 in.
T-Slots Centers	2-1/2 in.
Number of Longitudinal Feeds	Variable
X-Axis Table Power Feed Rate	0 – 11.67 FPM
X/Y-Axis Travel per Handwheel Revolution	0.200 in.
Z-Axis Travel per Handwheel Revolution	0.100 in.

Spindle Info

Spindle Taper	R-8
Number of Vertical Spindle Speeds	8
Range of Vertical Spindle Speeds	78 – 2400 RPM
Quill Diameter	3-3/8 in.
Quill Feed Rates	0.0019, 0.0035, 0.0058 in./rev.
Drawbar Thread Size	7/16-20
Drawbar Length	24-3/16 in.
Spindle Bearings	Angular Contact Bearings

Construction

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

Other Specifications:

Country of Origin	China
Warranty	1 Year
Approximate Assembly & Setup Time	2-1/2 Hours
Serial Number Location	ID Label on Front of Knee
ISO 9001 Factory	No
Certified by a Nationally Recognized Testing Laboratory (NRTL)	No

MACHINE DATA SHEET

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

MODEL G9902 9" X 49" VERTICAL MILL W/ POWER FEED & SINGLE-PHASE

Product Dimensions:

Weight	2340 lbs.
Width (side-to-side) x Depth (front-to-back) x Height	66 x 67 x 85 in.
Footprint (Length x Width)	36 x 24 in.
Space Required for Full Range of Movement (Width x Depth)	60 x 66-1/2 in.

Shipping Dimensions:

Type	Wood Crate
Content	Machine
Weight	2412 lbs.
Length x Width x Height	55 x 50 x 77 in.
Must Ship Upright	Yes

Electrical:

Power Requirement	110V or 220V, Single-Phase, 60 Hz
Prewired Voltage	220V
Full-Load Current Rating	26A at 110V, 13A at 220V
Minimum Circuit Size	30A at 110V, 15A at 220V
Connection Type	Cord & Plug
Power Cord Included	Yes
Power Cord Length	6 ft.
Power Cord Gauge	14 AWG
Plug Included	No
Recommended Plug Type	L5-30 for 110V, 6-15 for 220V
Switch Type	Forward/Reverse Switch

Motors:

Main

Horsepower	2 HP
Phase	Single-Phase
Amps	26A/13A
Speed	1725 RPM
Type	TEFC Capacitor-Start Induction
Power Transfer	Belt Drive
Bearings	Shielded & Permanently Lubricated

Main Specifications:

Operation Info

Spindle Travel	5 in.
Max Distance Spindle to Column	20 in.
Max Distance Spindle to Table	18 in.
Longitudinal Table Travel (X-Axis)	30-3/4 in.
Cross Table Travel (Y-Axis)	12-1/2 in.
Vertical Table Travel (Z-Axis)	16 in.
Vertical Head Travel (Z-Axis)	5 in.
Ram Travel	12 in.
Turret or Column Swivel (Left /Right)	360 deg.
Head Tilt (Left/Right)	90 deg.
Head Tilt (Front/Back)	45 deg.
Drilling Capacity for Cast Iron	1-1/4 in.
Drilling Capacity for Steel	1 in.
End Milling Capacity	1 in.
Face Milling Capacity	3 in.

Table Info

Table Length	49 in.
Table Width	9 in.
Table Thickness	2-3/4 in.
Number of T-Slots	3
T-Slot Size	5/8 in.
T-Slots Centers	2-1/2 in.
Number of Longitudinal Feeds	Variable
X-Axis Table Power Feed Rate	0 – 11.67 FPM
X/Y-Axis Travel per Handwheel Revolution	0.200 in.
Z-Axis Travel per Handwheel Revolution	0.100 in.

Spindle Info

Spindle Taper	R-8
Number of Vertical Spindle Speeds	8
Range of Vertical Spindle Speeds	78 – 2400 RPM
Quill Diameter	3-3/8 in.
Quill Feed Rates	0.0019, 0.0035, 0.0058 in./rev.
Drawbar Thread Size	7/16-20
Drawbar Length	18 in.
Spindle Bearings	Ball Bearings

Construction

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

Other Specifications:

Country of Origin	China
Warranty	1 Year
Approximate Assembly & Setup Time	1-1/2 Hours
Serial Number Location	ID Label on Front of Knee
ISO 9001 Factory	No
Certified by a Nationally Recognized Testing Laboratory (NRTL)	No

MACHINE DATA SHEET

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

MODEL G9903 9" X 49" VERTICAL MILL W/ POWER FEED, 3-PHASE VS

Product Dimensions:

Weight	2400 lbs.
Width (side-to-side) x Depth (front-to-back) x Height	66 x 67 x 85 in.
Footprint (Length x Width)	36 x 24 in.
Space Required for Full Range of Movement (Width x Depth)	61 x 66-1/2 in.

Shipping Dimensions:

Type	Wood Crate
Content	Machine
Weight	2468 lbs.
Length x Width x Height	55 x 50 x 78 in.
Must Ship Upright	Yes

Electrical:

Power Requirement	220V or 440V, 3-Phase, 60 Hz
Prewired Voltage	220V
Full-Load Current Rating	6.2A at 220V, 3.1A at 440V
Minimum Circuit Size	15A at 220V, 15A at 440V
Connection Type	Cord at 220V, Perman
Power Cord Included	Yes
Power Cord Length	6 ft.
Power Cord Gauge	14 AWG
Plug Included	No
Recommended Plug Type	15-15 for 220V
Switch Type	Forward/Reverse Switch
Recommended Phase Converter	G5841

Motors:

Main

Horsepower	2 HP
Phase	3-Phase
Amps	6.2A/3.1A
Speed	1725 RPM
Type	TEFC Induction
Power Transfer	Belt Drive w/Variable-Speed Pulley
Bearings	Shielded & Permanently Lubricated

Main Specifications:

Operation Info

Spindle Travel	5 in.
Max Distance Spindle to Column	20 in.
Max Distance Spindle to Table	18 in.
Longitudinal Table Travel (X-Axis)	27 in.
Cross Table Travel (Y-Axis)	12-1/2 in.
Vertical Table Travel (Z-Axis)	16 in.
Vertical Head Travel (Z-Axis)	5 in.
Ram Travel	12 in.
Turret or Column Swivel (Left /Right)	360 deg.
Head Tilt (Left/Right)	90 deg.
Head Tilt (Front/Back)	45 deg.
Drilling Capacity for Cast Iron	1-1/4 in.
Drilling Capacity for Steel	1 in.
End Milling Capacity	1 in.
Face Milling Capacity	3 in.

Table Info

Table Length	49 in.
Table Width	9 in.
Table Thickness	2-3/4 in.
Number of T-Slots	3
T-Slot Size	5/8 in.
T-Slots Centers	2-1/2 in.
Number of Longitudinal Feeds	Variable
X-Axis Table Power Feed Rate	0 – 11.67 FPM
X/Y-Axis Travel per Handwheel Revolution	0.200 in.
Z-Axis Travel per Handwheel Revolution	0.100 in.

Spindle Info

Spindle Taper	R-8
Number of Vertical Spindle Speeds	Variable
Range of Vertical Spindle Speeds	70 – 4200 RPM
Quill Diameter	3-3/8 in.
Quill Feed Rates	0.0019, 0.0035, 0.0058 in./rev.
Drawbar Thread Size	7/16-20
Drawbar Length	18 in.
Spindle Bearings	Ball Bearings

Construction

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

Other Specifications:

Country of Origin	China
Warranty	1 Year
Approximate Assembly & Setup Time	1-1/2 Hours
Serial Number Location	ID Label on Front of Knee
ISO 9001 Factory	No
Certified by a Nationally Recognized Testing Laboratory (NRTL)	No

Identification

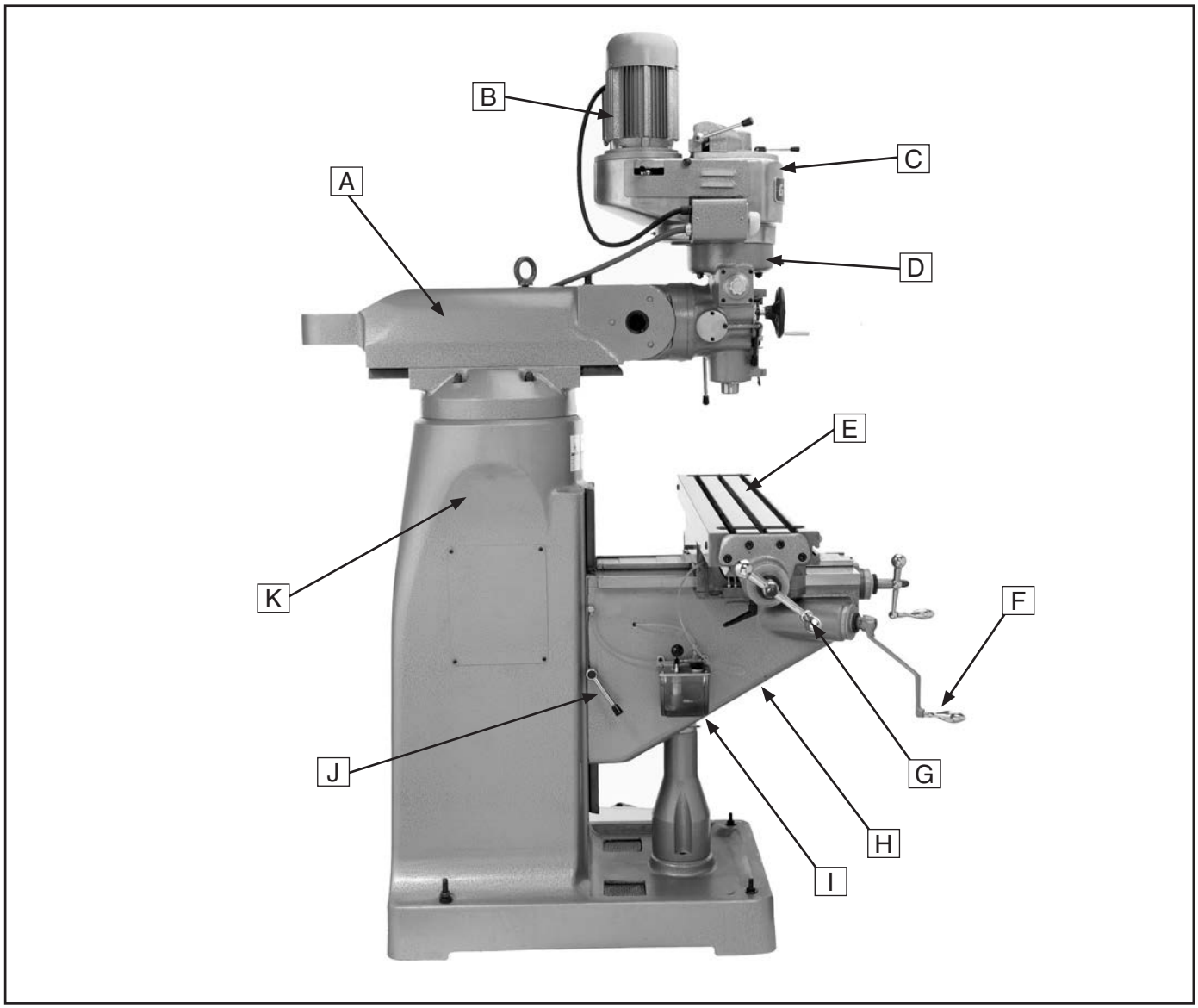


Figure 1. Identification, left side (Model G9902 shown).

A. Ram
B. Motor
C. Drive System
D. Headstock
E. Table
F. Z-Axis (Vertical Elevation) Crank
G. X-Axis (Longitudinal) Ball Handle
H. Knee
I. One-Shot Oiler
J. Z-Axis Lock Handle
K. Column

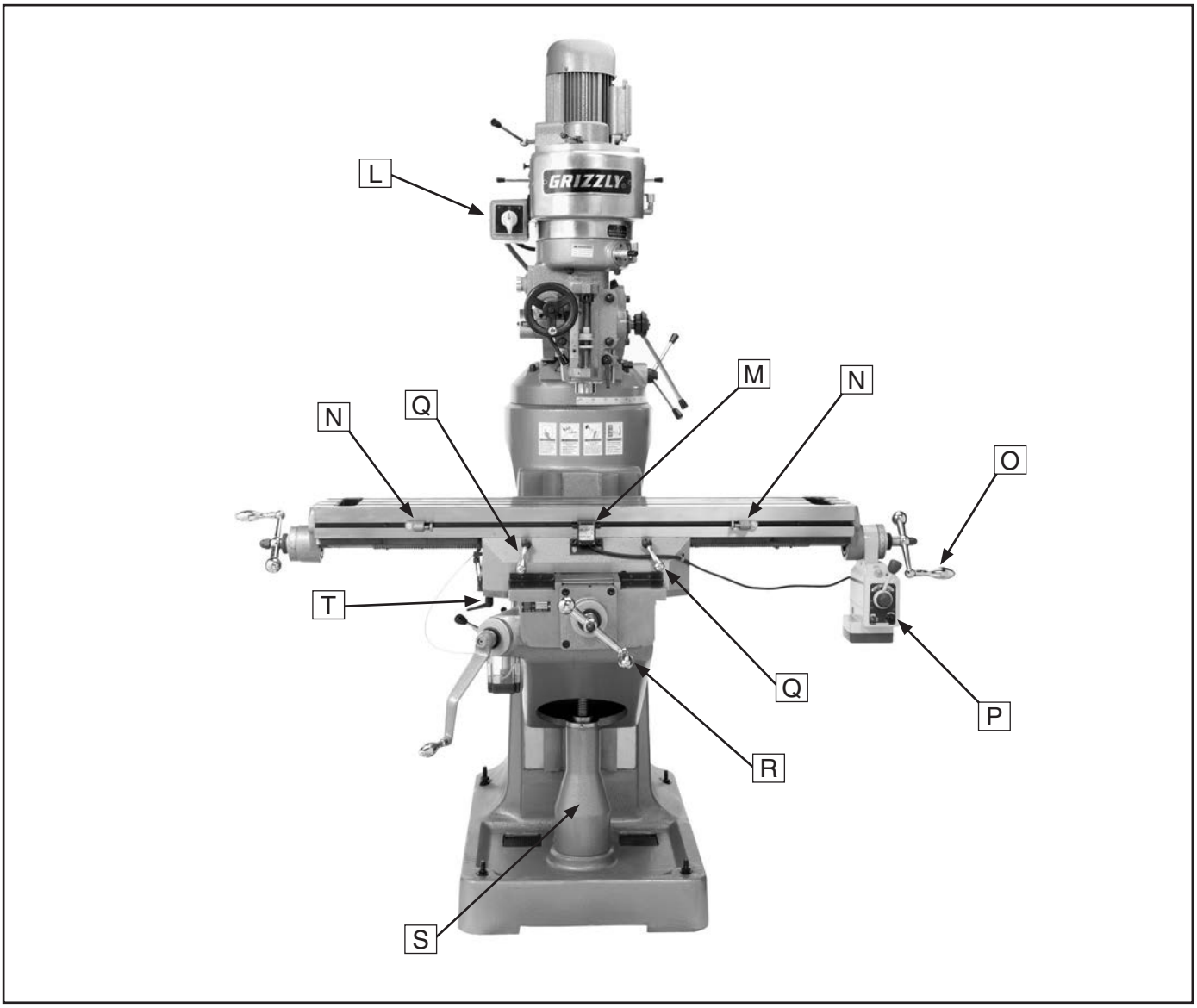


Figure 2. Identification, front (Model G9902 shown).

L. Forward/Reverse Power Switch
M. X-Axis (Longitudinal) Limit Switch
N. X-Axis Limit Stop
O. X-Axis Ball Handle
P. X-Axis Power Feed Unit
Q. X-Axis Table Lock Handle
R. Y-Axis (Cross) Ball Handle
S. Knee Support
T. Y-Axis Table Lock Handle

G9901/G9902 Drive System & Headstock Controls

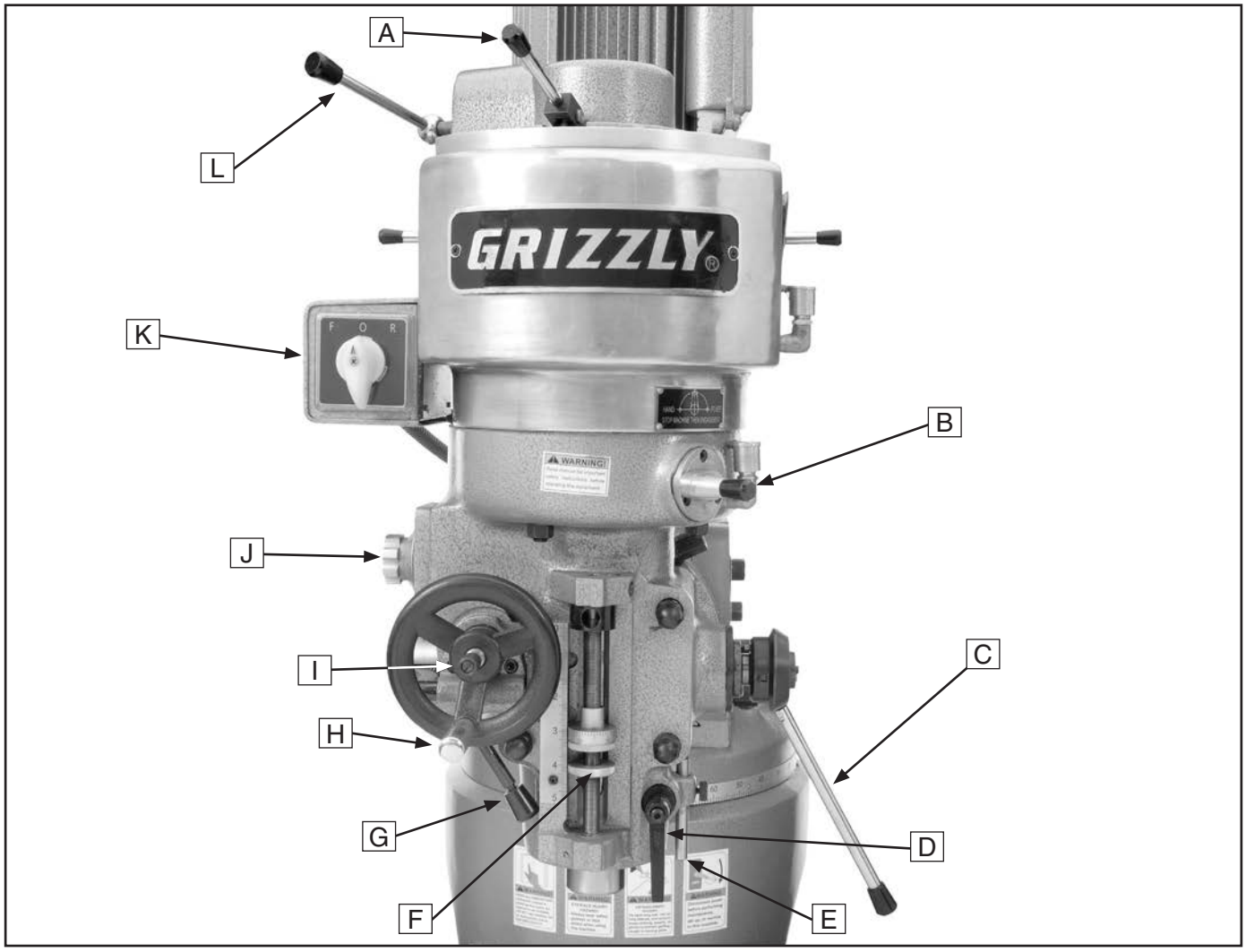


Figure 3. Model G9901/G9902 drive system and headstock controls.

A. Spindle Brake
B. Manual/Power Downfeed Selector
C. Coarse Downfeed Handle
D. Quill Locking Lever
E. Dial Indicator Rod
F. Adjustable Downfeed Stop
G. Downfeed Clutch Lever
H. Fine Downfeed Handwheel
I. Power Downfeed Direction Pin
J. Power Downfeed Rate Dial
K. Forward/Reverse Power Switch
L. Spindle Speed Range Lever

G9903 Drive System & Headstock Controls

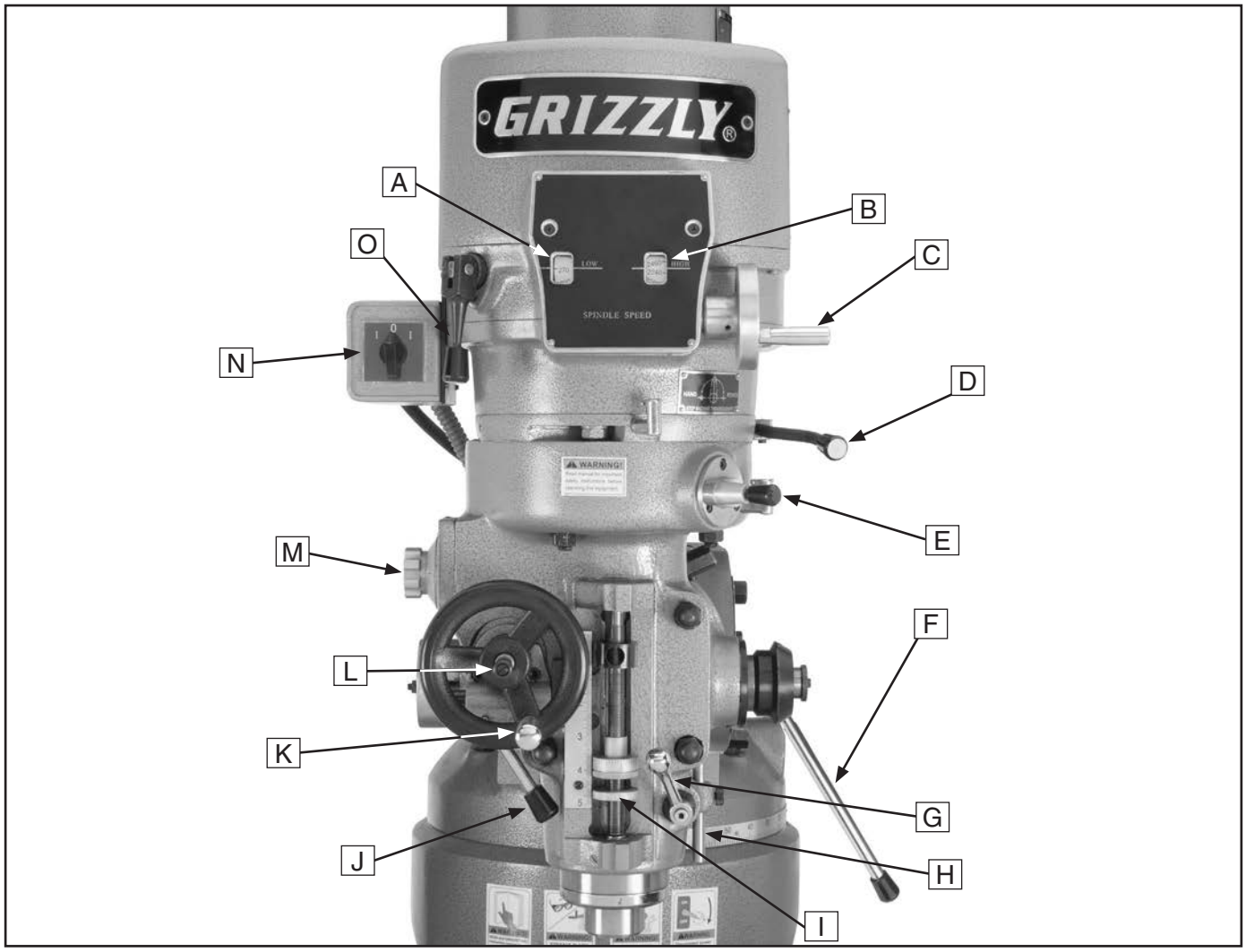


Figure 4. Model G9903 drive system and headstock controls.

A. Low Range Variable Speed Indicator
B. High Range Variable Speed Indicator
C. Variable Speed Handwheel
D. Spindle Speed Range Lever
E. Manual/Power Downfeed Selector
F. Coarse Downfeed Handle
G. Quill Locking Lever
H. Dial Indicator Rod
I. Adjustable Downfeed Stop
J. Downfeed Clutch Lever
K. Fine Downfeed Handwheel
L. Power Downfeed Direction Pin
M. Power Downfeed Rate Dial
N. Forward/Reverse Power Switch
O. Spindle Brake

SECTION 1: SAFETY

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

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

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

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

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

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

⚠WARNING

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

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

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

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

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

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

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

⚠WARNING

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

⚠WARNING

Additional Safety Instructions For Mills

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

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.

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.

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

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

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

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

STOPPING SPINDLE. DO NOT stop the spindle using your hand. Allow the spindle to stop on its own, or use the spindle brake.

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.

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.

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.

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

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

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.

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

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 lessen the possibility of operator injury. If normal safety precautions are overlooked or ignored, serious personal injury may occur.

Glossary of Terms

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

Arbor: A machine shaft that supports a cutting tool.

Collet: A conical shaped split-sleeve bushing that holds round tools by pressing against their outside diameter.

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

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

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

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

End Milling: The operation of machining flat surfaces either horizontal, vertical, or at an angle using an end mill as a cutter.

Face Milling: The milled surface in this method results from the combined action of cutting edges located on the face or end of the cutting tools.

Feed Rate: Usually measured in inches per minute.

Fixture: A device that securely holds the workpiece in place during a cutting operation.

Form Milling: The machining of irregular contours by using form cutters.

Gang Milling: When more than two cutters are mounted on the arbor to machine surfaces of a workpiece.

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

Headstock: The mill component that houses the vertical spindle, motor, and drive system.

Knee: The mill device that the saddle and table are mounted on, which can move along the Z-axis path.

Lead Screw: The device that moves the table along the X-axis, Y-axis, and Z-axis paths.

Peripheral Milling: The milled surface in this method is produced by cutting teeth located on the periphery (outer edge) of the cutter body.

Ram: The mill component that holds the headstock and moves in a linear path across the column.

Saddle: The sliding component that holds the table and moves along the Y-axis path.

Side Milling: The operation of machining a vertical surface on the side of a workpiece using a side milling cutter.

Slitting and Cutting Off: Metal slitting saws are used for milling narrow slots and for cutting off stock.

Spindle: The revolving hollow shaft that holds and drives the tool holder or arbor.

Turret: The top part of the column that the ram rotates on.

Ways: The precision machined and flat tracks on the mill on which the table, saddle, and knee travel.

X, Y, and Z-Axis: The straight path the table can travel longitudinally, crosswise, or vertically respectively.

SECTION 2: POWER SUPPLY

G9901/G9902

Availability

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

⚠WARNING

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

Full-Load Current Rating

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

G9901:
Full-Load Current Rating at 220V .... 9.5 Amps
Full-Load Current Rating at 110V..... 19 Amps

G9902:
Full-Load Current Rating at 220V ..... 13 Amps
Full-Load Current Rating at 110V..... 26 Amps

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

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

Circuit Information

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

⚠CAUTION

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

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

G9901 Circuit Requirements for 220V

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

Nominal Voltage 220V/240V
Cycle ..... 60 Hz
Phase ..... Single-Phase
Circuit Rating ..... 15 Amps
Plug/Receptacle ..... NEMA 6-15

G9901 Circuit Requirements for 110V

This machine can be converted to operate on a power supply circuit that has a verified ground and meets the requirements listed below. (Refer to **Voltage Conversion** instructions for details.)

Nominal Voltage 110V/120V
Cycle ..... 60 Hz
Phase ..... Single-Phase
Circuit Rating ..... 30 Amps
Plug/Receptacle ..... NEMA L5-30

G9902 Circuit Requirements for 220V

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

Nominal Voltage 220V/240V
Cycle ..... 60 Hz
Phase ..... Single-Phase
Circuit Rating ..... 15 Amps
Plug/Receptacle ..... NEMA 6-15

G9902 Circuit Requirements for 110V

This machine can be converted to operate on a power supply circuit that has a verified ground and meets the requirements listed below. (Refer to **Voltage Conversion** instructions for details.)

Nominal Voltage 110V/120V
Cycle ..... 60 Hz
Phase ..... Single-Phase
Circuit Rating ..... 30 Amps
Plug/Receptacle ..... NEMA L5-30

Grounding Requirements

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

For 220V operation: This machine is equipped with a power cord that has an equipment-grounding wire and a grounding plug (see following figure). The plug must only be inserted into a matching receptacle (outlet) that is properly installed and grounded in accordance with all local codes and ordinances.

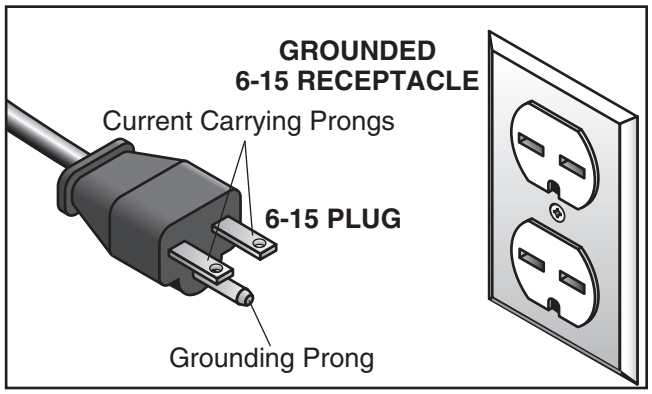
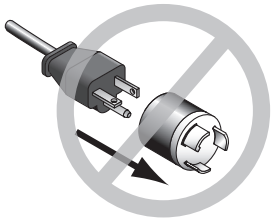


Figure 1. Typical 6-15 plug and receptacle.

⚠CAUTION



No adapter should be used with plug. If plug does not fit available receptacle, or if machine must be reconnected for use on a different type of circuit, reconnection must be performed by an electrician or qualified service personnel, and it must comply with all local codes and ordinances.

For 110V operation: The plug specified in the circuit requirements has a grounding prong that must be attached to the equipment-grounding wire inside the included power cord. The plug must only be inserted into a matching receptacle (see following figure) that is properly installed and grounded in accordance with all local codes and ordinances.

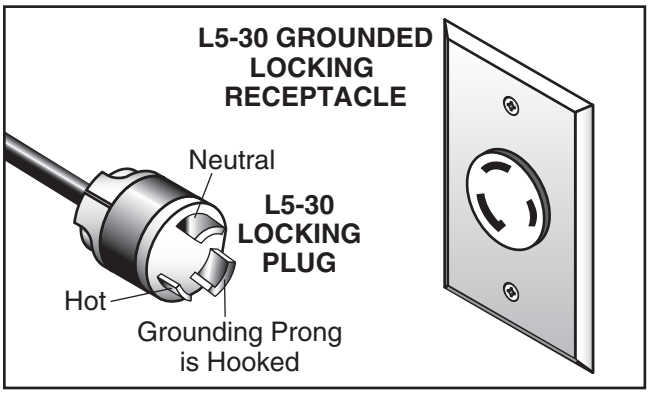


Figure 2. Typical L5-30 plug and receptacle.

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

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

Extension Cords

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

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

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

Minimum Gauge Size at 220V .....12 AWG
Minimum Gauge Size at 110V.....10 AWG
Maximum Length (Shorter is Better).....50 ft.

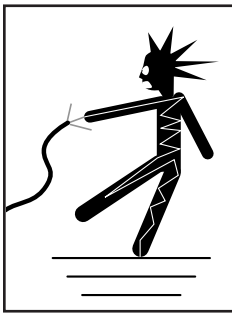
Voltage Conversion

The voltage conversion MUST be performed by a qualified electrician. To perform the voltage conversion, install the correct plug and rewire the motor to the new voltage, according to the provided wiring diagram. *If the diagram included on the motor conflicts with the one in this manual, the motor may have changed since the manual was printed. Use the diagram provided on the motor.*

G9903

Availability

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



⚠WARNING

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

Full-Load Current Rating

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

Full-Load Current Rating at 220V .... 6.2 Amps
Full-Load Current Rating at 440V .... 3.1 Amps

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

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

Circuit Requirements for 220V

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

Nominal Voltage 220V/240V
Cycle ..... 60 Hz
Phase 3-Phase
Circuit Rating ..... 15 Amps
Plug/Receptacle ..... NEMA 15-15
Cord ..... 4-Wire, 14 AWG, 300VAC, "S"-Type

Circuit Requirements for 440V

This machine can be converted to operate on a power supply circuit that has a verified ground and meets the requirements listed below. (Refer to **Voltage Conversion** instructions for details.)

Nominal Voltage 440V/480V
Cycle ..... 60 Hz
Phase 3-Phase
Circuit Rating ..... 15 Amps

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

⚠CAUTION

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

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

Grounding Requirements

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

For 220V operation: This machine is equipped with a power cord that has an equipment-grounding wire and a grounding plug (see following figure). The plug must only be inserted into a matching receptacle (outlet) that is properly installed and grounded in accordance with all local codes and ordinances.

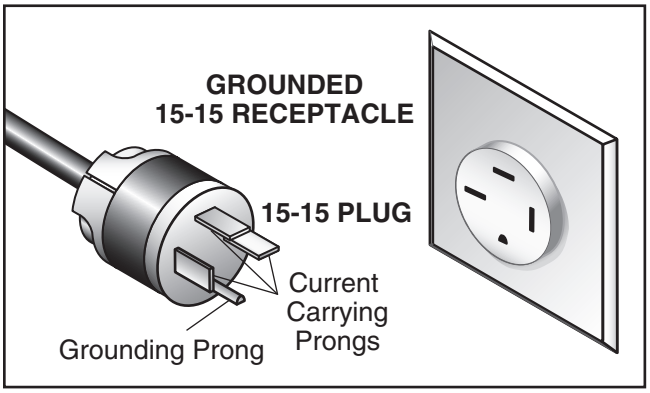
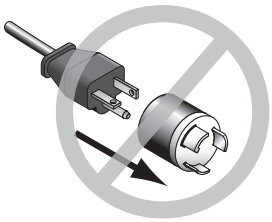


Figure 3. Typical 15-15 plug and receptacle.

⚠CAUTION



No adapter should be used with plug. If plug does not fit available receptacle, or if machine must be reconnected for use on a different type of circuit, reconnection must be performed by an electrician or qualified service personnel, and it must comply with all local codes and ordinances.

For 440V Operation: This machine must be permanently connected to the 440V power supply. A disconnection means, such as a locking switch (see the following figure), must be provided to allow the machine to be disconnected (isolated) from the power supply when required. This installation must be performed by a qualified electrician in accordance with all applicable electrical codes and ordinances.

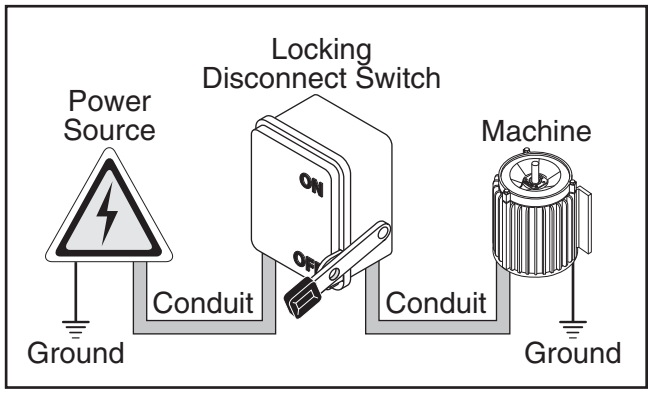
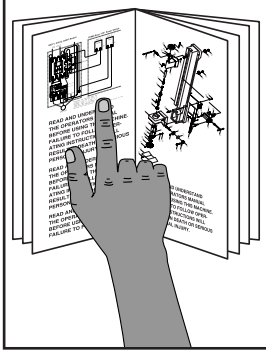


Figure 4. Typical setup of a permanently connected machine.

Voltage Conversion

The voltage conversion MUST be performed by a qualified electrician. To perform the voltage conversion, install the correct plug and rewire the motor to the new voltage, according to the provided wiring diagram. *If the diagram included on the motor conflicts with the one in this manual, the motor may have changed since the manual was printed. Use the diagram provided on the motor.*

SECTION 3: SETUP

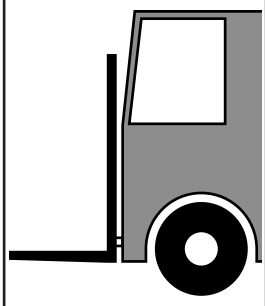


⚠WARNING

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

⚠WARNING

Wear safety glasses during the entire setup process!



⚠WARNING

Your milling machine is very heavy. Serious personal injury may occur if safe moving methods are not used. To be safe, get assistance and use a forklift to move the shipping crate and remove the machine from the crate.

Needed for Setup

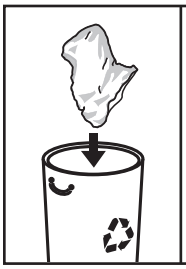
The following are needed to complete the setup process, but are not included with your machine:

Description	Qty
• Level (3' or longer)	1
• Wrench 22mm	1
• Wrench 24mm	1
• Assistants	2
• Safety Glasses (for each person)	1
• Forklift (3000 lb. rating)	1
• Safety Lifting Hook (3000 lb. rating)	1
• Lifting Webbing (3000 lb. rating)	1
• Solvent & Rags (for cleaning)	As Needed
• Mounting Hardware	As Needed
• Lubricant	As Needed

Unpacking

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

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



⚠WARNING

SUFFOCATION HAZARD!

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

Inventory

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

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

Inventory: (Figure 5)		Qty
A.	Tool Box	1
B.	Oil Can	1
C.	Standard Screwdriver 3/8" Blade	1
D.	Standard Screwdriver 1/4" Blade	1
E.	Wrench 17/19mm	1
F.	Hex Wrench Set 1.5–10mm	1
G.	Vertical Elevation Crank	1
H.	Fine Downfeed Handwheel	1
I.	Drawbar 7/16"-20 x 18" (not shown)	1

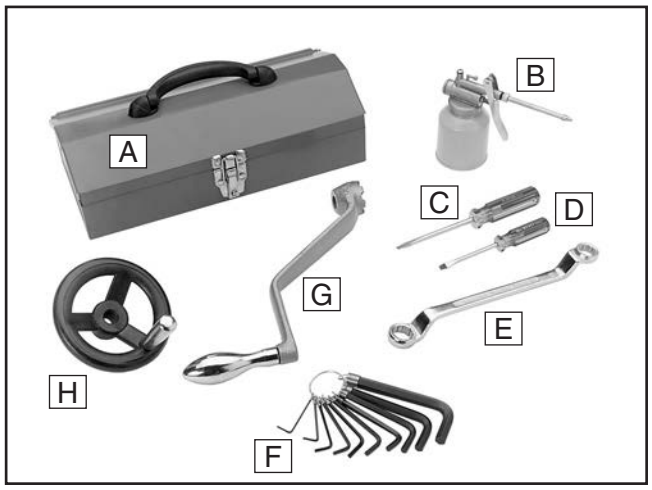


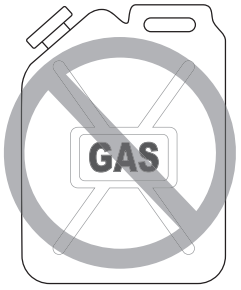
Figure 5. Model G9901/G9902/G9903 inventory.

NOTICE

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

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 citrus-based degreaser such as Grizzly's G7895 Citrus Degreaser. To clean thoroughly, some parts must be removed. **For optimum performance from your machine, 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.

G7895—Grizzly Citrus Degreaser

This natural, citrus-based degreaser is a great solution for removing export grease, and it's much safer to work around than nasty solvents.

Figure 6. Grizzly citrus degreaser.

Site Considerations

Floor Load

Refer to the **Machine Data Sheet** for the weight of your machine. Some floors may require additional reinforcement to support both the machine and operator.

Placement Location

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

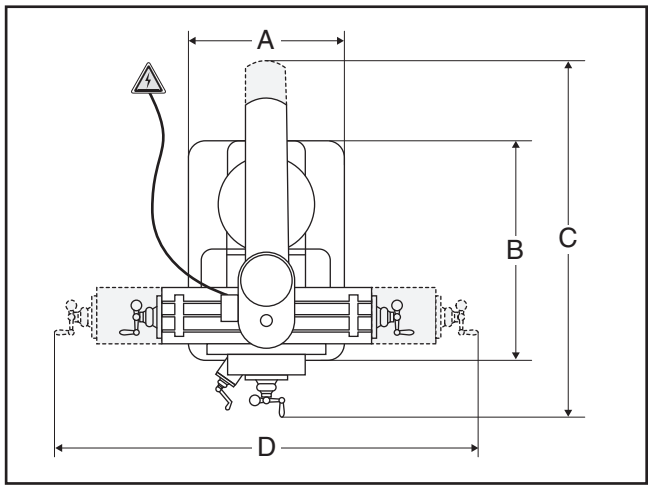
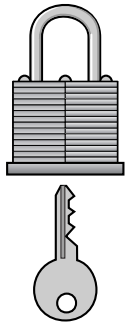


Figure 7. Model G9901/G9902/G9903 working dimensions.

Item		Dimension
A.	Footprint Width	24"
B.	Footprint Depth	28½"
C.	Working Depth	66½"
D.	Working Width:	
	—G9901 & G9902	60"
	—G9903	61"



⚠CAUTION

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

Table Ball Handles

Before lifting and moving your mill, the table must be centered and moved next to the column. In order to do this, reverse the table ball handles so that you can use them as intended.

To reverse the table ball handles:

1. Remove the acorn nut securing the ball handles onto the lead screws.

   Note: *Use a 24mm wrench for the left Y-axis (longitudinal) ball handle acorn nut and a 19mm wrench for the other two.*

2. Remove the ball handles from the lead screws, turn them around, and re-install them with the handle facing out (see **Figure 8**).

   Note: *Take care to align the keyway of the ball handle to the lead screw key.*

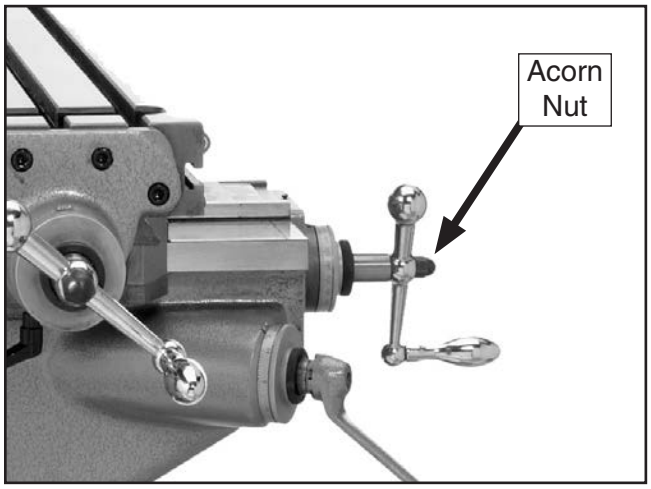
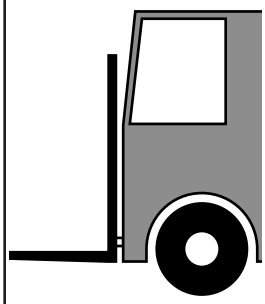


Figure 8. Table ball handle properly installed.

3. Re-install and tighten the acorn nuts.

4. Check for proper installation by rotating the ball handles.

Lifting & Moving Mill



⚠WARNING

Your milling machine is very heavy. Serious personal injury may occur if safe moving methods are not used. To be safe, get assistance and use a forklift to move the shipping crate and remove the machine from the crate.

The two methods of lifting and moving described below require two assistants, and a forklift with safety hook and lifting webbing rated for at least 3000 lbs.

To lift and move your mill using the eye bolt:

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

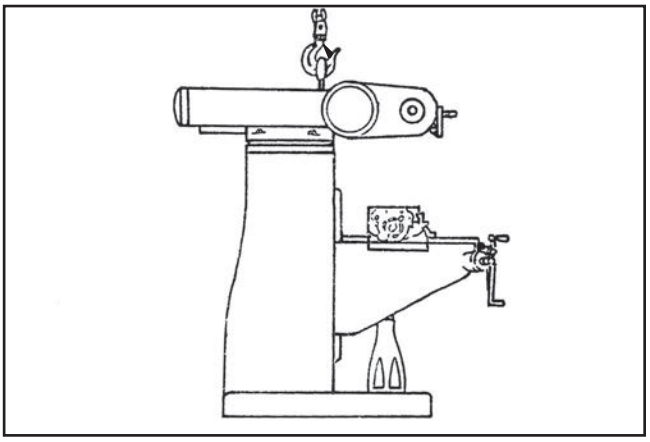


Figure 9. Using the eye bolt to lift the mill.

2. Move the ram so the eye bolt is aligned with the front edge of the column, and lock the ram in place (refer to **Ram Movement** on **Page 34** for detailed instructions).

⚠WARNING

To reduce the risk of serious personal injury and property damage if the mill should fall during moving, only lift the mill enough to clear the shipping pallet and floor.

3. Place the safety hook through the eye bolt, and lift slowly to make sure the hook is secure and the mill is lifting evenly. Have your assistants steady the mill as you move it to keep it from swinging.

   —If the mill tips to one side, lower the mill to the ground, and adjust the ram or table to balance the weight. Tighten the locking levers and bolts before lifting the mill again.

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

To lift and move your mill using lifting straps:

1. Swivel the head 180°, as shown in **Figure 10**, and lock it in place (refer to **Ram Movement** on **Page 34** for detailed instructions).

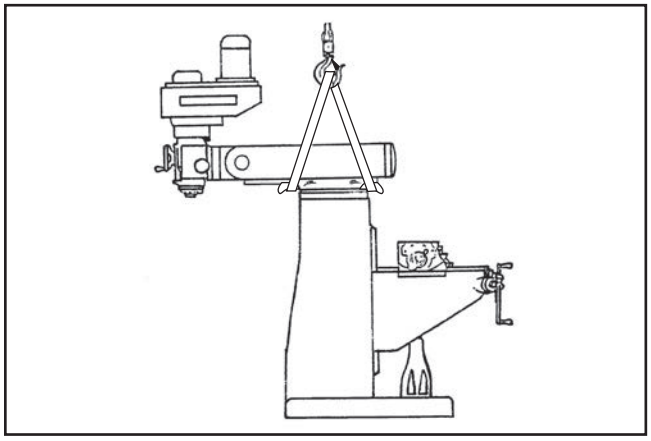


Figure 10. Using lifting straps to move the mill.

2. Place the lifting straps under the ram, as shown in **Figure 10**. Place padding between the straps and the mill to protect the ram ways.

3. Lift the mill slowly to make sure the straps are secure and the mill is lifting evenly. Have your assistants steady the mill as you move it to keep it from swinging.

   —If the mill tips to one side, lower the mill to the ground, and adjust the ram or table to balance the weight. Tighten the locking levers and bolts before lifting the mill again.

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

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. Using machine mounts is also an option. Both options are described below. Whichever option you choose, it is necessary to level your machine with a precision level.

Bolting to Concrete Floors

Lag shield anchors with lag bolts, and anchor studs (see **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.

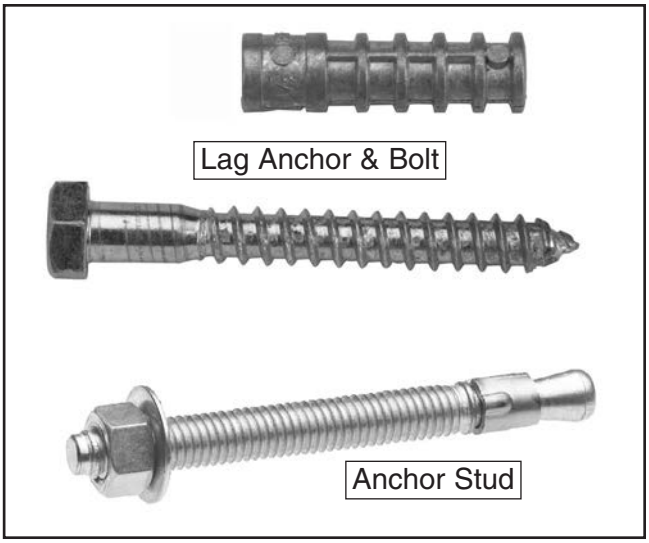


Figure 11. Typical fasteners for mounting to concrete floors.

NOTICE

When using mounting bolts, use shims between the mill base and the floor to fill the gaps. Otherwise, the cast iron base could become warped and crack when tightening the mounting fasteners.

Using Machine Mounts

Using machine mounts, shown in **Figure 12**, gives the advantage of fast leveling and vibration reduction. The large size of the foot pads distributes the weight of the machine to reduce strain on the floor.

Figure 12. Machine mount example.

NOTICE

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

Test Run

Once the machine has been permanently placed and cleaned off, test run your machine to make sure it runs properly.

If, during the test run, you cannot easily locate the source of an unusual noise or vibration, stop using the machine immediately, then review the **Troubleshooting** on **Page 50**. If you still cannot remedy a problem, contact our Tech Support at (570) 546-9663 for assistance.

To test run the machine:

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

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

3. Make sure that your mill is lubricated (refer to **Lubrication** beginning on **Page 45**).

4. Move the spindle speed range lever to the low position (see **Figures 28 & 29** on **Page 36** for location).

5. Ensure the manual/power downfeed selector is in the manual or "hand" position (refer to **Downfeed Operations** on **Page 38** for detailed instructions).

6. Connect the machine to the power source.

7. Turn the machine ***ON*** by turning the forward/reverse switch.

8. Listen to and watch for abnormal noises or actions. The machine should run smoothly with little or no vibration or rubbing noises.

   —Strange or unusual noises must be investigated and corrected before operating the machine further. Always disconnect the machine from power before investigating or correcting potential problems.

9. Turn the machine ***OFF*** by moving the forward/reverse switch to the middle position.

Your milling machine comes with a power feed unit for X-axis table travel. The limit switch for this table travel direction is important for the safe operation of your mill.

To test the power feed unit and table limit switch:

1. Make sure all tools, cables, and other items are well clear of table movement as you follow these steps.

2. Refer to **Table Movement** beginning on **Page 31** to understand how the power feeds and limit switches function.

3. Loosen the two X-axis table lock handles on the front side of the table.

4. Plug the power feed unit into a grounded 110V power source.

5. On the X-axis power feed to the right of the table, make sure the directional lever is in the center position (neutral) and turn the speed dial to "2"—the "2" will be top center.

6. Flip the power feed power switch up (ON) and move the directional lever to the left to start the table movement.

7. Confirm the table is moving to the left and watch for the table limit stop to hit the limit switch, which should stop the table movement.

   Note: *Alternatively, you can push in the limit switch plunger with a tool—not your finger—to make sure table movement will stop when the limit switch is activated.*

8. Move the directional lever on the power feed through the center position and all the way to the right—this should start the table moving to the right.

9. Confirm the table stops moving when the right table limit stop engages the limit switch, then move the power feed directional lever to the center position and flip the power switch down (OFF).

Spindle Break-In

NOTICE

Complete the spindle break-in procedure to avoid rapid deterioration 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. Successfully perform all the steps in the **Test Run** subsection on **Page 28**.

2. Make sure the mill is ***OFF*** and the spindle is stopped.

3. Move the spindle speed range lever to the low position (see **Figures 28 & 29** on **Page 36** for location).

4. Turn the mill ***ON*** and let it run for 20 minutes.

5. Turn the mill ***OFF*** and wait for the spindle to stop.

6. Move the spindle speed range lever to the high position, then rotate the spindle by hand to make sure the gears are engaged.

7. Turn the mill ***ON*** and let it run for 20 minutes.

8. Turn the mill ***OFF***.

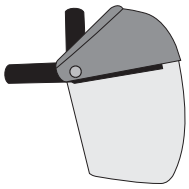
The spindle break-in of your mill is now complete.

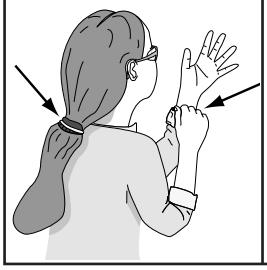
SECTION 4: OPERATIONS

Operation Safety

⚠WARNING

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





⚠WARNING

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

NOTICE

If you have never used this type of machine or equipment before, WE STRONGLY RECOMMEND that you read books, trade magazines, or get formal training before beginning any projects. Regardless of the content in this section, Grizzly Industrial will not be held liable for accidents caused by lack of training.

Operation Tips

Follow these tips for safe and productive operations:

- Read and understand this entire manual before beginning any milling operation.
- Ensure the mill is properly lubricated at all times (refer to **Lubrication beginning** on **Page 45** for detailed instructions).
- Clear away all tools and material not directly involved in the milling operation.
- Only the operator and assistants should be near the mill during operation. Keep all others at a safe distance away from the machine.
- Always wear safety glasses or a face shield when working with the milling machine. Flying metal chips are hazardous.
- Keep all headstock and ram locking bolts fully tightened during cutting operations.
- Make sure you are using the correct cutting tool and speed for the milling operation.
- Never start the mill with the cutting tool in contact with the workpiece. Always bring the mill to full speed before starting cutting operations.
- Always make sure the workpiece is firmly held to the table by clamps, fixtures, or other devices. Never attempt a mill operation while holding the workpiece with your hands.
- Always turn the power ***OFF*** when the cutting operation is finished.

Table Movement

The mill table can be moved in three directions: X- (longitudinal), Y- (cross), and Z-axis (vertical elevation) directions by using the table ball handles and crank (see **Figure 13**). Additionally, the table can be moved in the X-axis path by the included power feed unit.

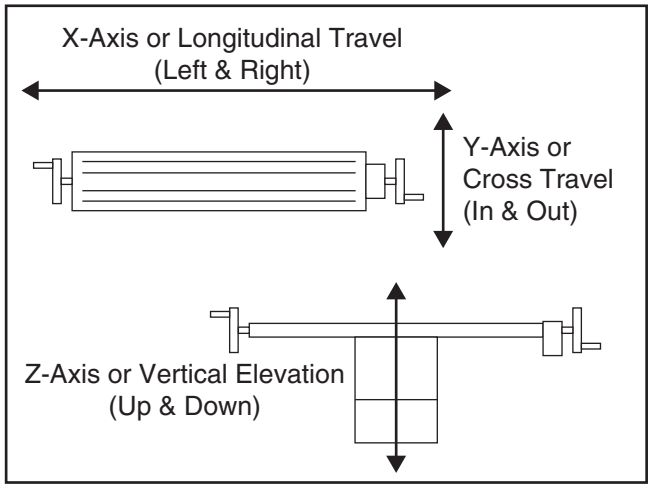


Figure 13. The three axis paths of the mill table travel.

The graduated dials for the X- and Y-axis table movement are in increments of 0.001", with one complete revolution of the ball handle moving the table 0.200".

The graduated dial for the Z-axis table movement is in increments of 0.001"mm, and one complete revolution of the crank will move the table 0.100".

Use the locking handles shown in **Figures 14–16** to secure the table position.

⚠CAUTION

Always keep the table locked in place unless table movement is required for your operation. Unexpected table and workpiece movement could cause the cutter to bind and break apart, resulting in personal injury to the operator.

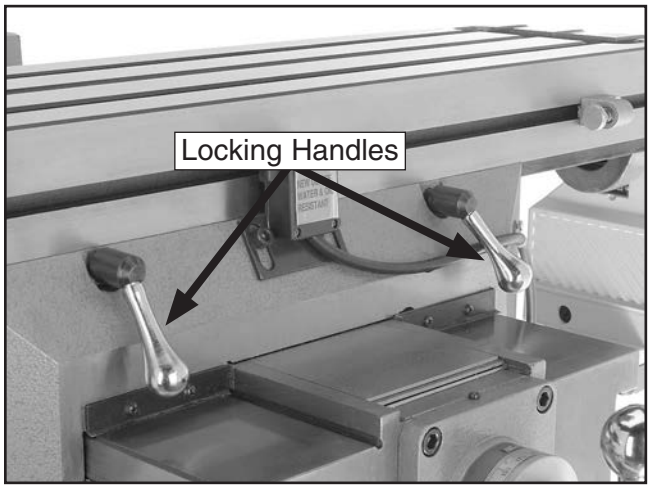


Figure 14. X-axis locking handles.

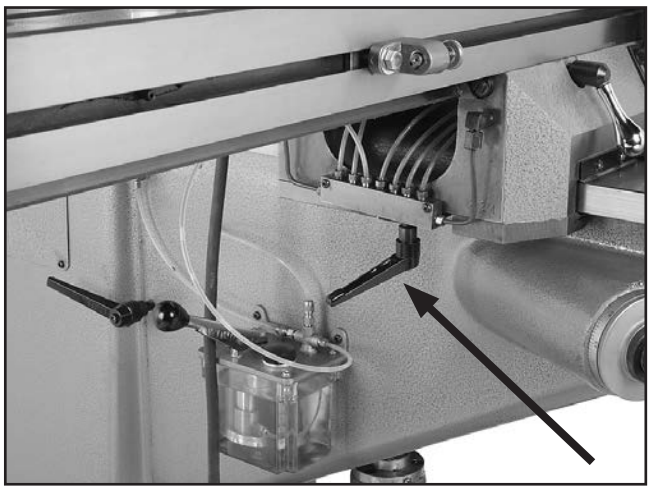


Figure 15. Location of Y-axis locking handle underneath the left side of the table.

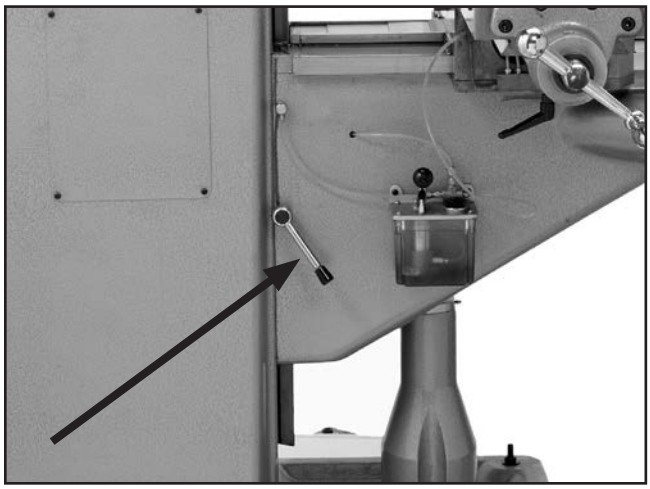


Figure 16. Location of Z-axis locking handle on left side of the knee.

Your mill is also equipped with a power feed unit for X-axis table movement. Refer to **Figure 17** as you familiarize yourself with the components of these systems and their descriptions listed below.

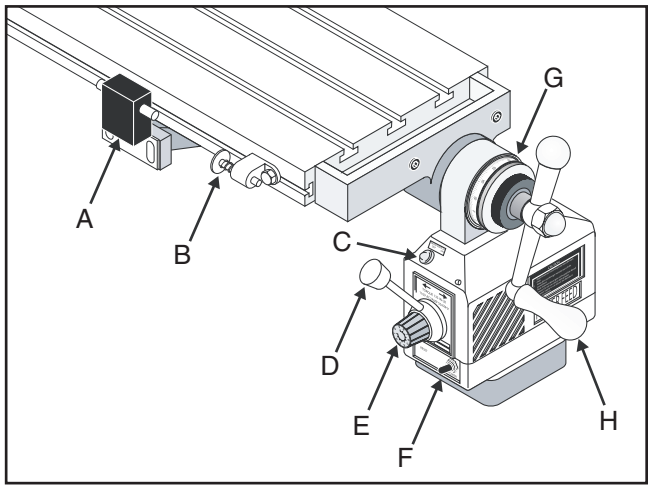


Figure 17. X-axis power feed system.

A. Limit Switch. Powered table movement will stop when either of the side plungers are depressed by the limit stops.

B. Limit Stop. Position the limit stops along the table (one on either end of the table) to activate the limit switch at the desired position.

C. Rapid Traverse Button. Once the directional lever has been activated, pushing this button will cause the power feed to move the table at full speed.

D. Directional Lever. Moving this lever to one side or the other will move the table in that direction. The center position is neutral.

E. Speed Dial. Controls the speed that the table moves—turning the dial clockwise causes the table to move faster.

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

G. Ball Handle. Use this handle to manually position the table.

H. Travel Graduated Dial. Marked in 0.001" increments, each complete revolution is equal to 0.200" of table travel.

⚠CAUTION

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

To operate the X-axis power feed:

1. Loosen the X-axis locking handles (see **Figure 18**).

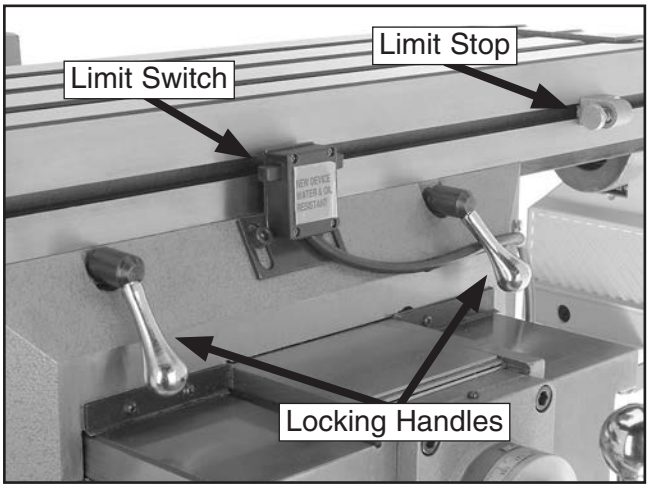


Figure 18. X-axis locking handles, limit stops, and limit switch.

2. Using a 12mm wrench, position the limit stops along the table to confine the distance you want the table to travel.

⚠CAUTION

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

3. Move the directional lever to the center or neutral position.

4. Connect the power feed to a grounded 110V power source.

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

6. Rotate the center speed dial to "0", and use the direction lever to select the table movement direction.

7. Adjust the speed dial to move the table at the required feed rate for your operation.

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

8. When you are finished using the power feed, leave the directional lever in the center or neutral position, and flip the ON/OFF switch down to turn the power feed ***OFF***.

Headstock Movement

The headstock can be tilted back and forth 45°, and rotated from left to right 90° (see **Figures 19–20** for examples).

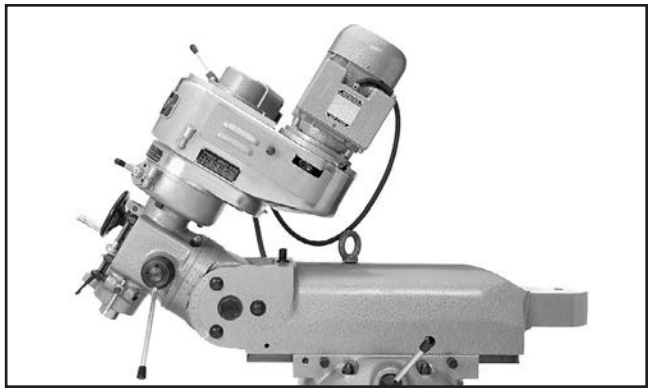


Figure 19. Headstock tilted back 30°.

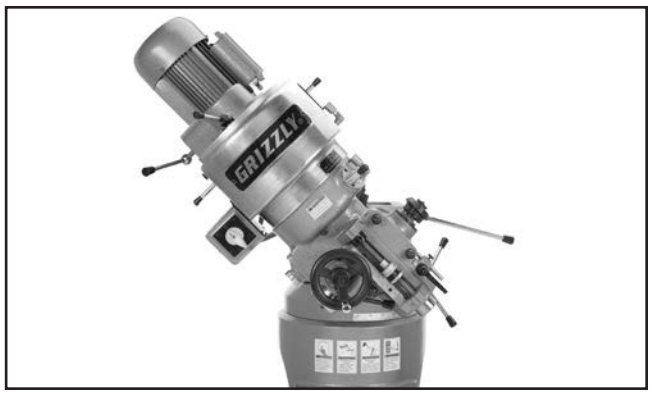


Figure 20. Headstock rotated to the right 45°.

To tilt the headstock backward or forward:

1. DISCONNECT THE MILL FROM POWER!

2. Use a 19mm wrench to loosen the three tilt locking bolts shown in **Figure 21**.

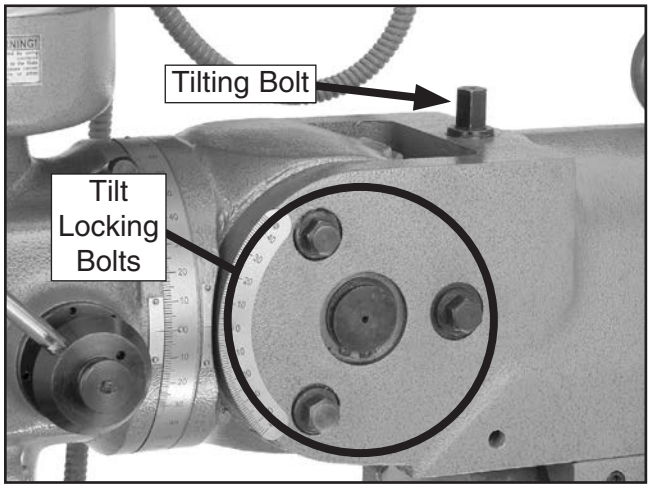


Figure 21. Headstock tilt locking bolts and tilting bolt.

3. With one hand pressing against the headstock, apply pressure in the direction of the desired tilt, then use a 19mm wrench to turn the tilt bolt (see **Figure 21**).

   Note: *Turn the tilt bolt clockwise to tilt the headstock forward and counterclockwise to tilt the headstock back.*

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

⚠WARNING

Always lock the headstock firmly in place after adjusting the tilt or rotation. If the headstock slips during milling operation, the spinning cutter could bind and break apart, causing serious personal injury or property damage.

To rotate the headstock right or left:

1. DISCONNECT THE MILL FROM POWER!

2. Use a 19mm wrench to loosen the four rotation locking bolts shown in **Figure 22**.

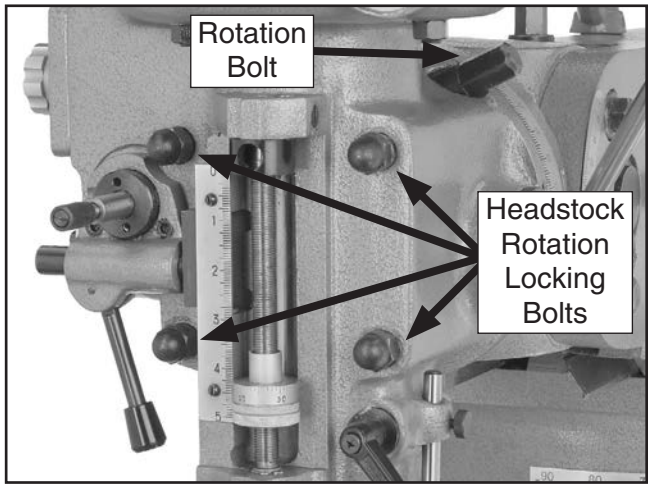


Figure 22. Headstock rotation locking bolts and rotation bolt.

3. With one hand against the headstock, apply pressure in the direction of the desired rotation, and use a 19mm wrench to turn the rotation bolt (see **Figure 22**).

   Note: *Turn the rotation bolt clockwise to rotate the headstock to the right and counterclockwise to rotate the headstock to the left.*

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

Ram Movement

The ram can be moved forward and backward, and rotated 360° around the column.

⚠WARNING

Always lock the ram firmly in place after adjusting its position. If the headstock slips during milling operation, the spinning cutter could bind and break apart, causing serious personal injury or property damage.

To move the ram forward or backward horizontally:

1. DISCONNECT THE MILL FROM POWER!

2. Use a 19mm wrench to loosen the two horizontal locking bolts shown in **Figure 23**.

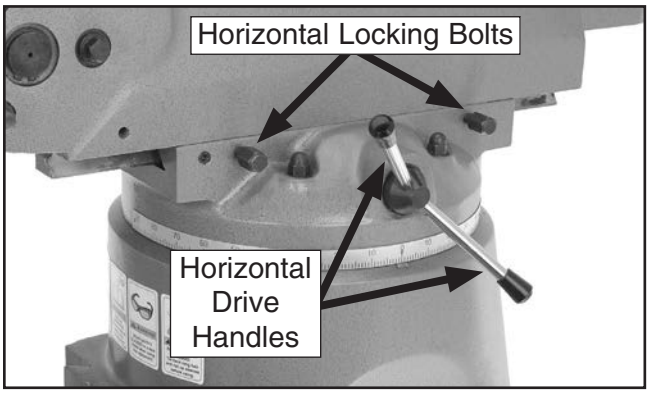


Figure 23. Ram horizontal locking bolts and drive handles.

3. Rotate the horizontal drive handles (**Figure 23**) in the direction of desired ram movement.

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

To rotate the ram around the column:

1. DISCONNECT THE MILL FROM POWER!

2. Use a 19mm wrench to loosen the four rotation locking bolts, as shown in **Figure 24**.

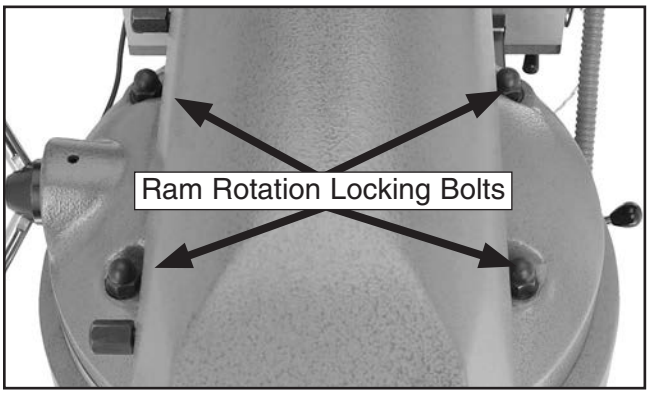


Figure 24. Ram rotation locking bolts.

3. Rotate the ram to the desired position, and re-tighten the rotation locking bolts to secure the ram in place.

Setting RPM

To select the proper RPM for your milling operation, you will need to: 1) determine the RPM needed to cut your workpiece, 2) select the correct spindle speed range, and 3) configure the spindle speed controls for the right RPM.

Calculating RPM

1. Use the table in **Figure 25** to determine the cutting speed required for your workpiece material.

Cutting Speeds for High Speed Steel (HSS) Cutting Tools	
Workpiece Material	Cutting Speed (sfm)
Aluminum & alloys	300
Brass & Bronze	150
Copper	100
Cast Iron, soft	80
Cast Iron, hard	50
Mild Steel	90
Cast Steel	80
Alloy Steel, hard	40
Tool Steel	50
Stainless Steel	60
Titanium	50
Plastics	300-800
Wood	300-500
Note: For carbide cutting tools, double the cutting speed. These values are a guideline only. Refer to the MACHINERY'S HANDBOOK for more detailed information.	

Figure 25. Cutting speed table for HSS cutting tools.

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

3. Use the following formula to determine the required RPM for you operation:

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

*Double if using carbide cutting tool

Selecting Spindle Speed Range

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

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

Model G9901/G9902 Spindle Speed Ranges (RPM)	
Low Range (A)	78–278
High Range (B)	670–2400

Figure 26. Model G9901/G9902 spindle speed range chart.

Model G9903 Spindle Speed Ranges (RPM)	
Low Range	70–500
High Range	600–4200

Figure 27. Model G9903 spindle speed range chart.

⚠CAUTION

When changing the spindle speed range, the spindle direction will reverse. Always know which way the spindle is spinning before engaging the cutting tool with your workpiece.

3. Move the spindle speed range lever to the desired range (see **Figures 28–29**).

Note: *For the Model G9903, you must press the speed range lever in toward the headstock to retract the locking pin and move it.*

It may be necessary to rotate the spindle by hand to ensure the speed range gears have properly engaged.

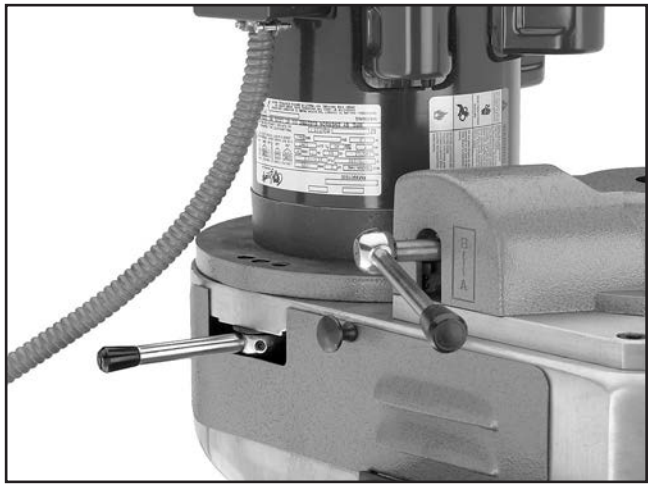


Figure 28. Model G9901/G9902 spindle speed range lever (shown in the low range).

NOTICE

To avoid damage to the drive gears, make sure the mill is turned *OFF* and the spindle is stopped before you change the spindle speed range.

Figure 29. Model G9903 spindle speed range lever (shown in high range).

NOTICE

Your milling machine is not designed to run in the neutral position of the speed range lever. Doing so may cause damage to the drive gears.

Configuring Spindle Speed Controls (G9901 & G9902)

1. DISCONNECT THE MILL FROM POWER!

2. Remove the two side belt covers to access the V-belt and pulleys (see **Figure 30**).

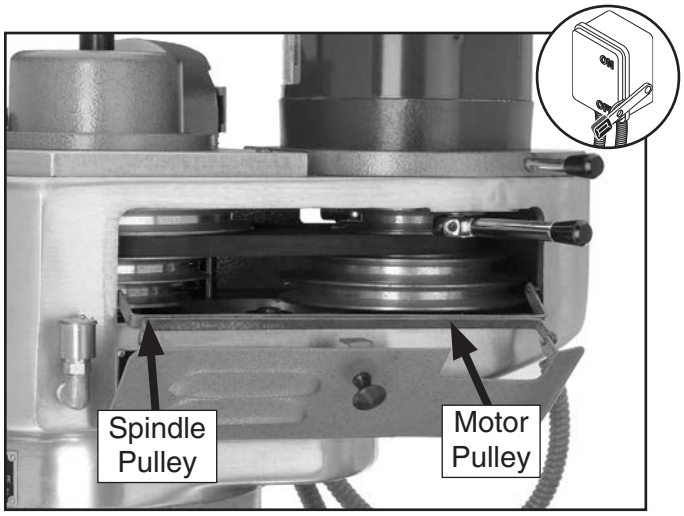


Figure 30. Model G9901/G9902 side belt cover removed (right side shown).

3. Loosen both motor locking handles shown in **Figure 31**.

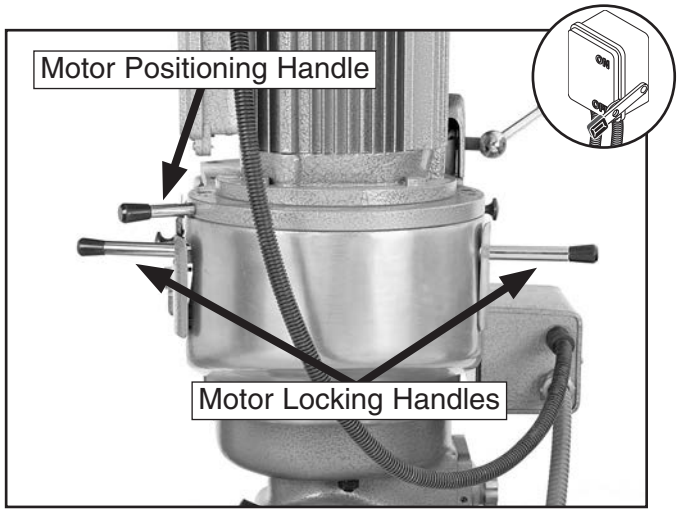


Figure 31. Model G9901/G9902 motor positioning controls (shown from rear of motor).

4. Use the motor positioning handle (**Figure 31**) to pull the motor forward and release the V-belt tension.

5. Use the V-belt positions shown in **Figure 32** to set your mill to the correct RPM.

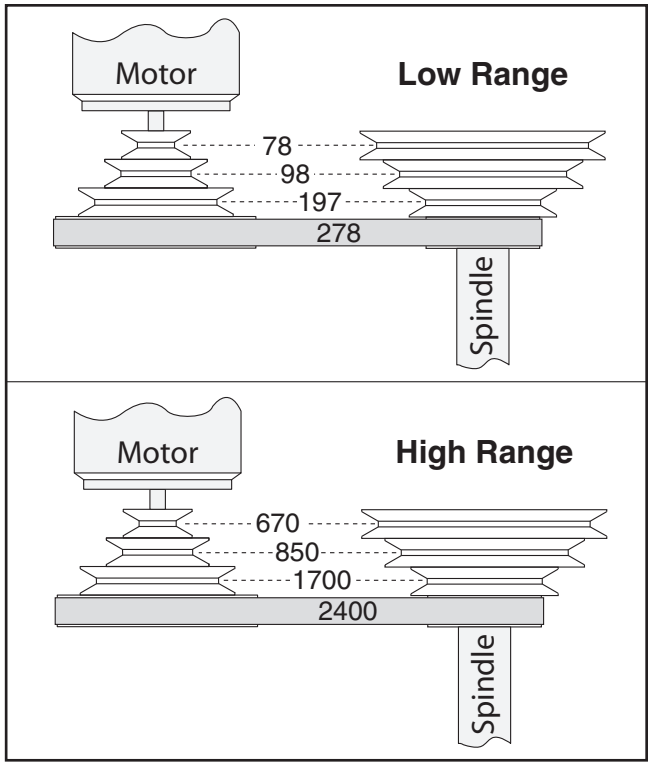


Figure 32. Model G9901/G9902 V-belt positioning for desired speed (RPM).

6. To re-tension the V-belt, use the motor positioning handle to push the motor back, then lock the motor in place with the two motor locking handles.

7. Replace the two belt covers before starting the mill.

⚠CAUTION

To avoid an entanglement hazard, always operate the Model G9901/G9902 mill with the two side belt covers in place.

Configuring Spindle Speed Controls (G9903)

1. With the spindle in motion, use the variable speed handwheel to select the correct speed for your workpiece (see **Figure 33**).

NOTICE

To avoid damage to the variable speed system on the Model G9903 mill, always have the spindle in motion when changing the spindle speed.

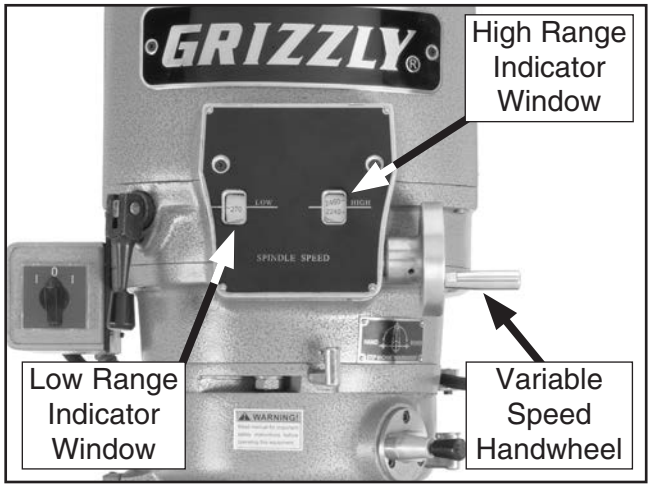


Figure 33. Model G9903 variable speed handwheel and speed indicator windows.

Note: *Each speed range has an indicator window that shows the spindle speed as selected.*

Downfeed Controls

The spindle downfeed movement can be controlled by three mechanisms: 1) coarse downfeed handle, 2) fine downfeed handwheel, and 3) the power downfeed system.

Coarse Downfeed Handle

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

2. Pull the knob of the manual/power downfeed selector out and move it to the left-hand manual or "hand" position (see **Figure 34**).

   Note: *It may be necessary to rotate the spindle by hand to ensure the downfeed selector gears have properly engaged.*

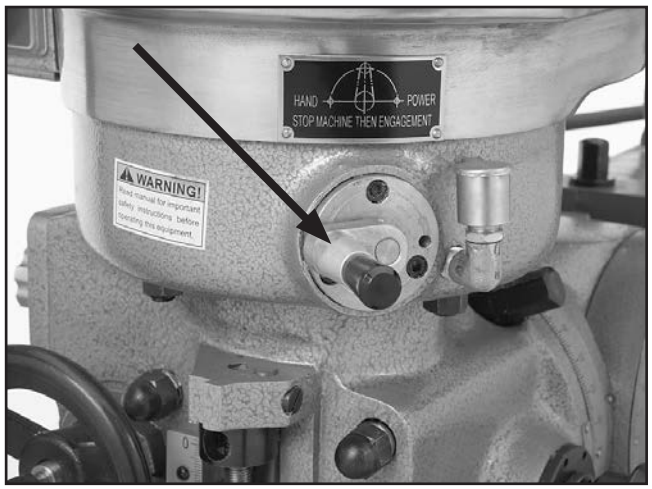


Figure 34. Manual/power downfeed selector in the manual or "hand" position.

3. Remove the fine downfeed handwheel, if it is installed.

4. Insert the pin of the handle hub into a hole on the base, as shown in **Figure 35**.

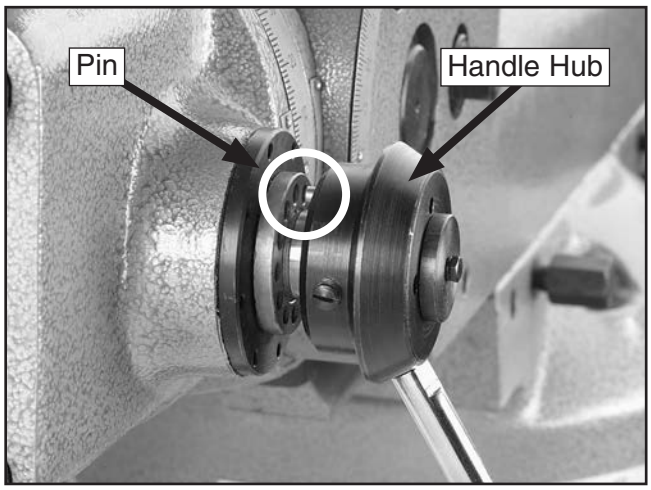


Figure 35. Coarse downfeed handle engaged.

5. Make sure the quill locking lever (**Figure 36**) is loose, and rotate the coarse downfeed handle around its hub to control the depth of the spindle.

⚠CAUTION

When changing the spindle speed range, the spindle direction will reverse. Always know which way the spindle is spinning before moving the cutting tool into the workpiece.

There are a number of devices that are used with fine and power downfeed control. Familiarize yourself with these controls, as described below and shown in **Figure 36**.

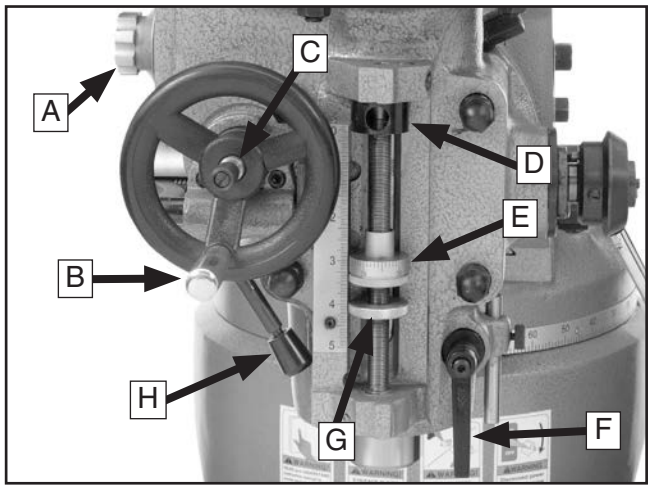


Figure 36. Fine and power downfeed controls.

A. Power Downfeed Rate Dial: Selects one of three power downfeed rates.

B. Fine Downfeed Handwheel: Manually controls the fine downfeed of the spindle.

C. Power Downfeed Direction Pin: Moves the spindle up or down in power downfeed mode. Moving this pin fully in or out reverses the direction of the downfeed. The center position is neutral and downfeed will stop.

D. Quill Dog: Moves with the quill and is used with the downfeed stop.

E. Downfeed Stop: Adjusts to a selected depth for the cutting operation. Each rotation of the stop moves it one millimeter, and it is marked in 0.001". The scale to the left of the stop is in inches.

F. Quill Locking Lever: Locks the quill in place.

G. Downfeed Stop Locking Thumb Wheel: Locks the downfeed stop in place.

H. Downfeed Clutch Lever: Engages the fine/power downfeed gear.

Fine Downfeed Handwheel

1. Turn the mill ***OFF***, wait for the spindle to stop, and loosen the quill locking lever.

2. Pull the knob of the manual/power downfeed selector out and move it to the left-hand manual or "hand" position (see **Figure 34**).

3. Disengage the coarse downfeed handle hub from the mill.

4. Place the fine downfeed handwheel on the axle, and insert the handwheel hub pin into a hole on the base (see **Figure 36**).

5. To move the spindle with fine control, pull the downfeed clutch lever to the left and rotate the fine downfeed handwheel.

   Note: *The downfeed clutch will stay engaged until either you push the lever to the right, or the quill dog engages the downfeed stop.*

Power Downfeed System

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

2. Pull the knob of the manual/power downfeed selector out and move it to the right-hand "power" position.

4. Loosen the quill locking lever.

5. Adjust the downfeed stop to the desired depth of cut.

6. Turn the mill ***ON***.

⚠CAUTION

When changing the spindle speed range, the spindle direction will reverse. Always know which way the spindle is spinning before moving the cutting tool into the workpiece.

7. Refer to the table below for power downfeed rates, and turn the power downfeed rate dial to the correct setting for your operation (see **Figure 38**).

Dial Position	Feed Rate (inches/spindle revolution)
1	0.0019
2	0.0035
3	0.0058

Figure 37. Power downfeed rates.

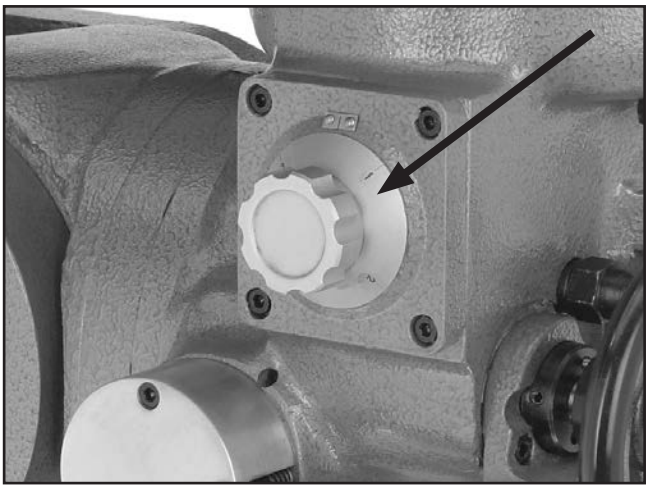


Figure 38. Power downfeed rate dial.

8. Observe the fine handwheel movement, then fully push in or pull out the power downfeed direction pin to select the correct quill direction for your operation.

   Note: *When the spindle speed range is changed, the spindle direction will reverse and so will the power downfeed direction.*

9. To engage the power downfeed, move the downfeed clutch lever to the left.

   Note: *When using the power downfeed, the spindle will automatically return to the top when the quill dog reaches the downfeed stop. The accuracy of the power feed to the downfeed stop is ±0.010".*

NOTICE

To avoid damage to the downfeed gearing, DO NOT use the power downfeed system for spindle speeds over 2400 RPM.

Spindle Brake

After the spindle has been turned ***OFF,*** move the spindle brake lever left or right to bring the spindle to a full stop (see **Figure 39 & 40**).

To evenly wear the brake pads, alternate the direction you move the lever.

Figure 39. Model G9901/G9902 spindle brake lever.

NOTICE

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

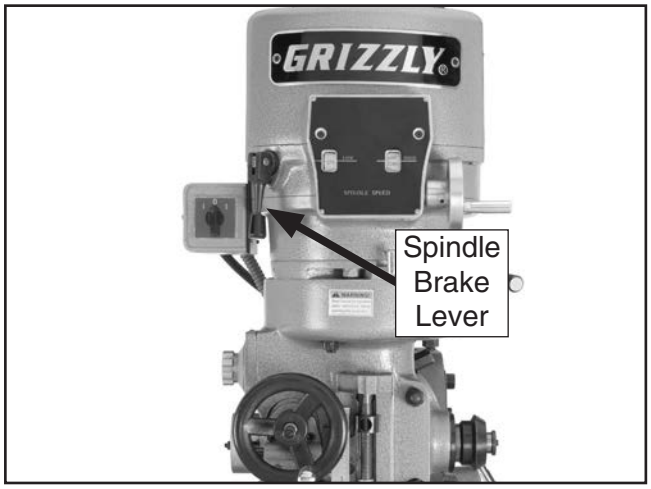


Figure 40. Model G9903 spindle brake lever.

Loading/Unloading Tools

Your mill is equipped with a 7/16"-20 x 18" drawbar that includes two spacers for tool attachment flexibility (see **Figure 41**).

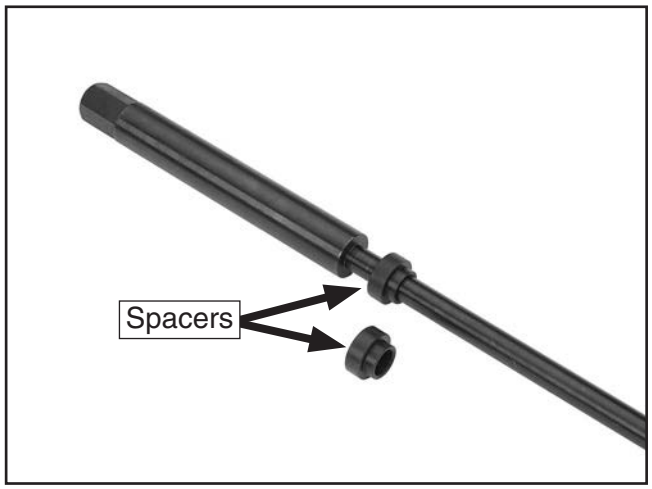


Figure 41. Drawbar and spacers.

To load a tool into the spindle:

1. DISCONNECT THE MILL FROM POWER!
2. Clean any debris from the mating surfaces of the spindle and tool.
3. Tighten the quill locking lever.
4. Align the keyway of the tool with the protruding set screw inside the spindle, and push the tool firmly into the spindle taper to seat it.
5. Holding the tool in place, insert the drawbar into the top of the headstock and thread it into the tool (see **Figure 42**).

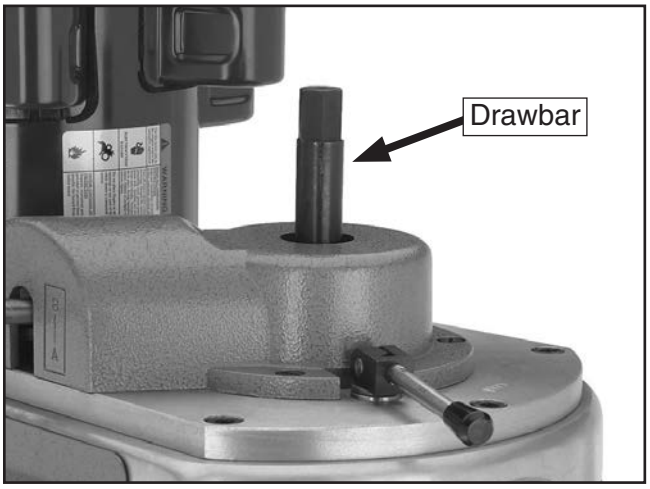


Figure 42. Drawbar inserted (Model G9902 shown).

6. Tighten the drawbar with a 19mm wrench.

   Note: *Only tighten the drawbar until it is snug. Overtightening the drawbar could make removing the tool difficult.*

To unload a tool:

1. DISCONNECT THE MILL FROM POWER!
2. Tighten the quill locking lever.
3. Keeping one hand on the tool, use a 19mm wrench to completely unthread the drawbar.

   Note: *If the tool does not immediately release from the spindle when the drawbar is loosened, you may need to strike the top of the drawbar with a dead blow hammer or rubber mallet.*

SECTION 5: ACCESSORIES

H2689—R-8 Quick Change Collet Set
An affordable quick change collet system with ultra precision. These spring collets are hardened and ground to exacting tolerances and offer incredible holding power. This set includes an R-8 arbor and nut, spanner wrench, plastic carrying case and collets sized 1/8", 1/4", 3/8", 1/2", 5/8", 3/4", 7/8", and 1". What's more, the nut features a self-ejecting rim! A set like this will truly speed up any tool changing process. Drawbar size is 7/16" x 20.

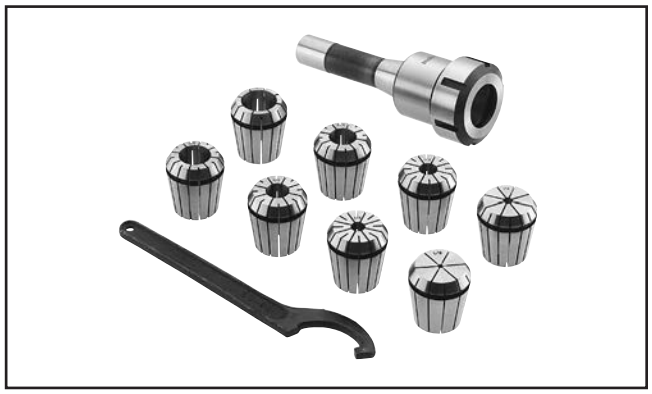


Figure 43. H2689 R-8 Quick Change Collet Set.

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.

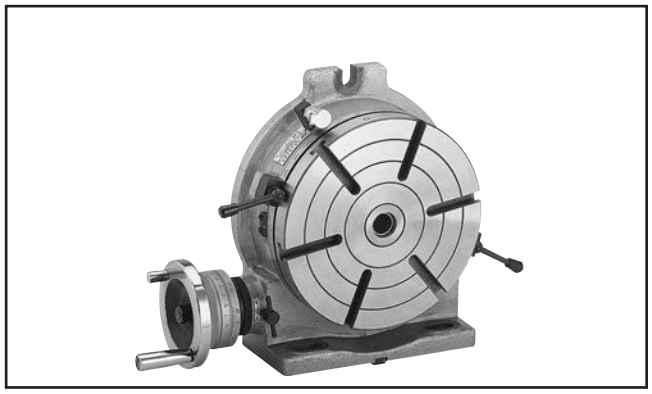


Figure 44. G9299 10" Yuasa-Type Rotary Table.

G1076—52-PC. Clamping Kit
This clamping kit includes 24 studs, six step block pairs, six T-nuts, six flange nuts, four coupling nuts, and six end hold-downs. The rack is slotted so it can be mounted close to the machine for easy access.

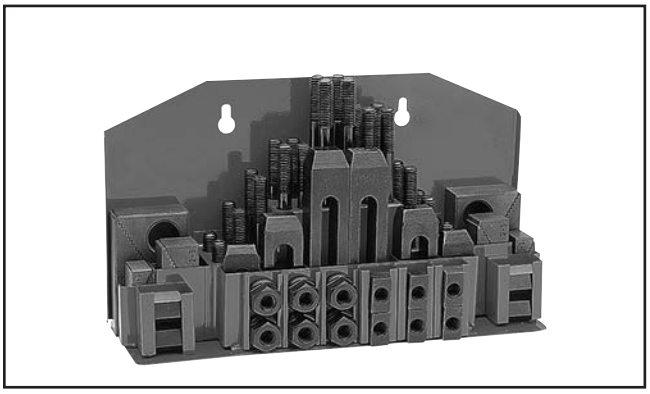


Figure 45. G1076 52-PC. Clamping Kit.

H6089—2 Axis Digital Read Out (12" x 30")
H6093—3 Axis Digital Read Out (12" x 30" x 5")
H7850—3 Axis Digital Read Out (12" x 30" x 16¾")
You will be amazed the list of features for these DROs that include: selectable resolution down to 5μm, absolute/incremental coordinate display, arc function, line of holes function, angled cuts function, 199 user defined datum points, centering/cutter offset, double sealed scales, inches/millimeters, calculator with trig functions, and linear error compensation.

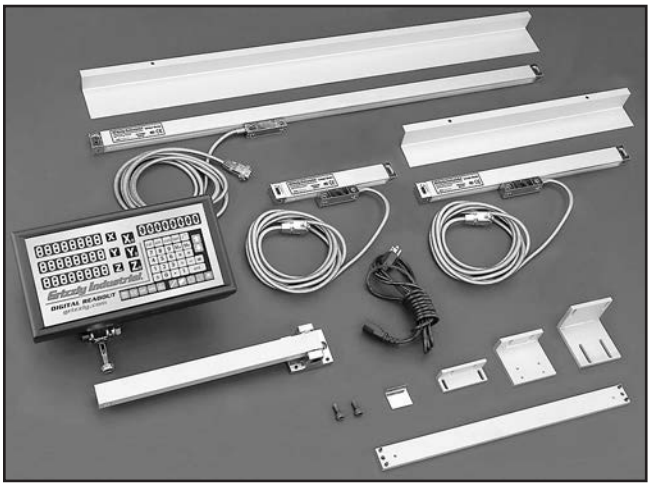


Figure 46. 3 Axis Digital Read Out.

G2861—Face Mill
G4051—Carbide Insert for Face Mill
This 2½" Face Mill accepts four carbide inserts (not included). Comes with an R-8 arbor.

Figure 47. G2861 Face Mill.

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

Figure 48. G9760 20-PC End Mill Set.

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

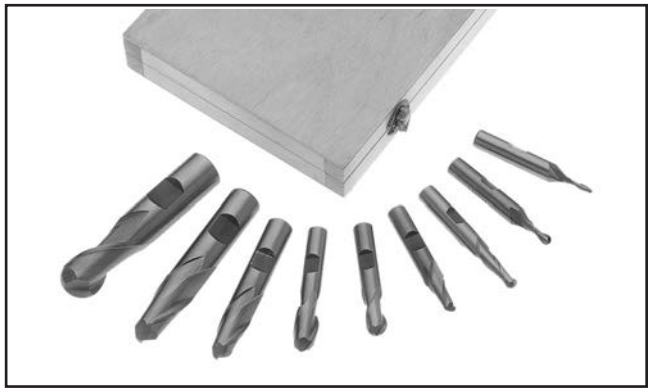


Figure 49. G9765 9 PC. Ball End Mill Set.

G5641—1-2-3 Blocks
G9815—Parallel Set
H5556—Edge Finder Set

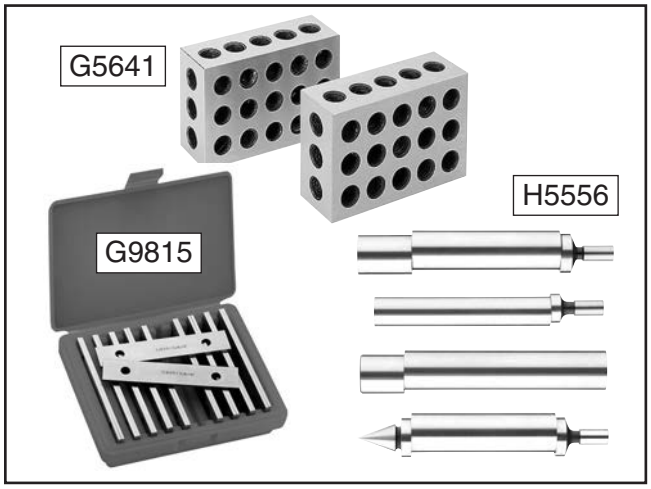


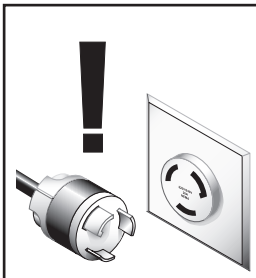
Figure 50. G5641 1-2-3 Blocks, G9815 Parallel Set, and H5556 Edge Finder Set.

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 51. Recommended products for protecting unpainted cast iron/steel machinery parts.

Call 1-800-523-4777 To Order

SECTION 6: MAINTENANCE



⚠WARNING

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

Schedule

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

Every 8 Hours of Operation:

- Clean the mill of all debris.
- Check belt for proper tension, damage, or wear (refer to **Replacing Belts** on **Page 55 & 56** for detailed instructions).
- Lubricate as required (refer to **Lubrication** beginning on **Page 45** for detailed instructions).
- Check mill base for accumulated coolant and debris.
- Check for damaged or worn electrical connections, wires, and switch.
- Check for any other condition that would hamper the safe and efficient operation of your mill.

Every 40 Hours of Operation:

- Lubricate as required (refer to **Lubrication** beginning on **Page 45** for detailed instructions).

Every 1000 Hours of Operation:

- Lubricate as required.

Cleaning and Protecting

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

Remove any rust build-up from unpainted cast iron surfaces or your mill, and treat them with regular applications of products like G96® Gun Treatment, SLIPIT®, or Boeshield T-9® (see **ACCESSORIES** beginning on **Page 42**).

Lubrication Overview

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

Refer to **Figure 52** for a recommended lubrication schedule, and follow the detailed instructions below for your mill.

Note: *This recommended lubrication schedule is based on light to medium mill usage. Keeping in mind that lubrication helps to protect the value and operation of your mill, you may need to perform lubrication tasks more frequently depending on usage.*

Lubrication Task	Hours of Use
Downfeed Gearing	4
Spindle Bearings	4
Table Ways & Lead Screws	8
Elevation Lead Screw	8
Ram Dovetail Way	40
Spindle Spline	40
Power Feed Gearing	150
Speed Range Gearing	1000

Figure 52. Recommended lubrication task schedule.

NOTICE

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

Lubrication Tasks

Downfeed Gearing and Spindle Bearings

1. DISCONNECT THE MILL FROM POWER!

2. Refer to **Figures 53 & 54** to identify the oil cups for downfeed gearing and spindle bearing lubrication.

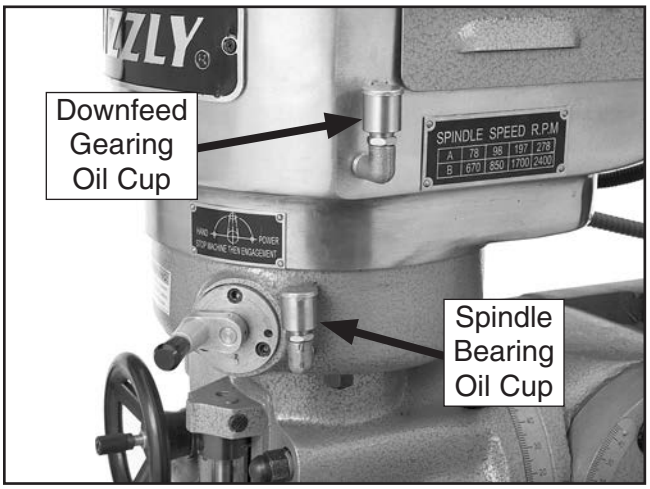


Figure 53. Model G9901/G9902 downfeed gearing and spindle bearing oil cups.

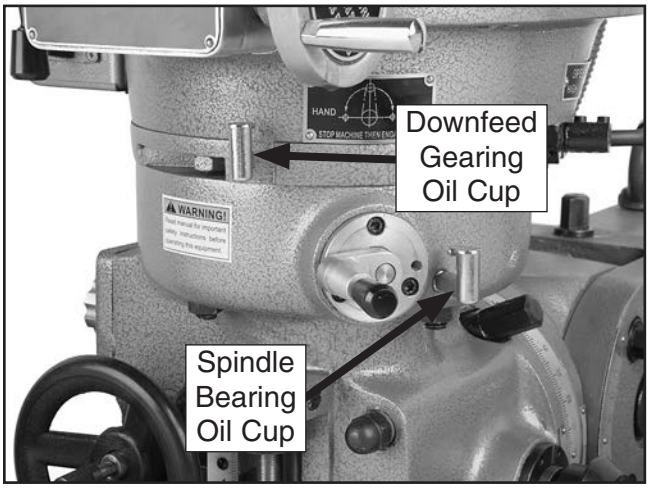


Figure 54. Model G9903 downfeed gearing and spindle bearing oil cups.

3. Clean any debris away from the top of the oil cup before lifting the lid.

4. Using the oil can, soak the cotton string inside the oil cup with ISO 68 or SAE 20 non-detergent oil.

   Note: *Do not attempt to fill the cavity leading to the oil cup. Keeping the cotton string soaked with oil will slowly lubricate the related devices.*

Table Ways and Lead Screws

1. Make sure the one-shot oiler reservoir is at least ¾ full of ISO 68 or SAE 20 non-detergent oil.

2. To pump lubricant to the X, Y, and Z-axis table ways, and the X and Y-axis lead screws, press down on the pump handle and release it (see **Figure 55**).

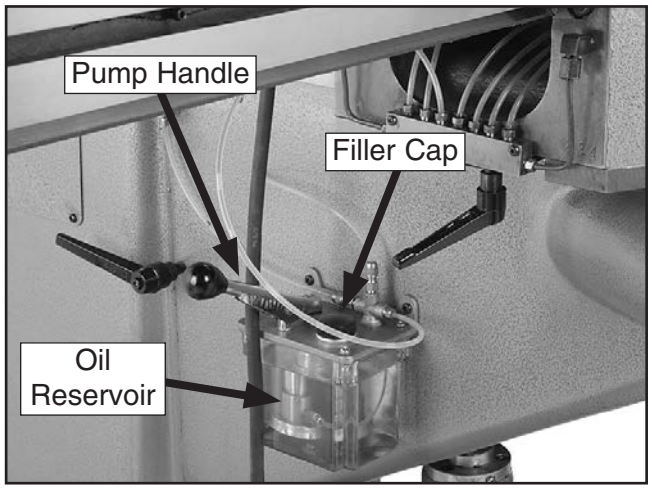


Figure 55. Model G9901/G9902/G9903 one shot oiler.

3. Move the table through the X, Y, and Z-axis paths to distribute the lubricant evenly.

   Note: *There should be a thin film of oil on the table ways when adequately lubricated.*

Elevation Lead Screw

1. Raise the knee up so that you can access the elevation lead screw grease fitting, as shown in **Figure 56**.

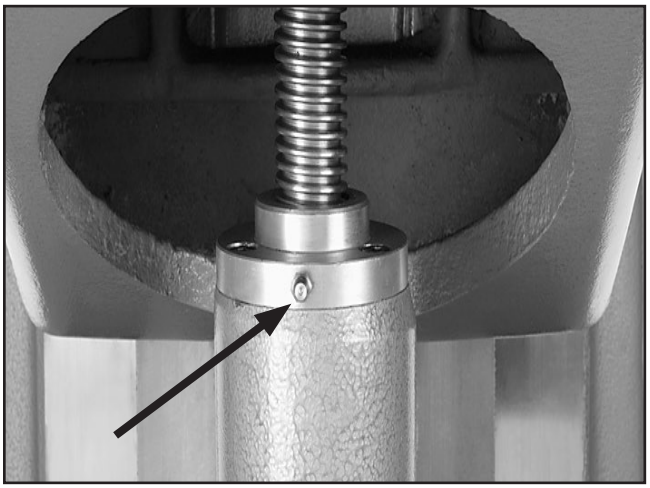


Figure 56. Elevation lead screw grease fitting.

3. Clean the outside of the grease fitting before and after each use to keep out contaminants.

4. Use a medium weight white lithium grease and a grease gun to add approximately ½ teaspoon of grease.

5. Move the knee through the full range of movement to distribute the lubricant evenly.

Ram Dovetail Way

1. DISCONNECT THE MILL FROM POWER!

2. Move the ram horizontally as needed, and apply a thin film of ISO 68 or SAE 20 non-detergent oil to the full length of the ram way (see **Figure 57**).

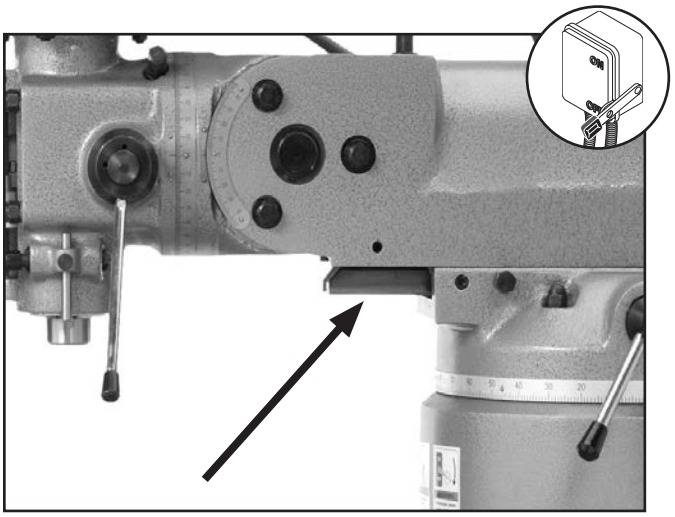


Figure 57. Ram dovetail way.

Spindle Spline

1. DISCONNECT THE MILL FROM POWER!

2. Manually lower the quill approximately two inches and lock it in place.

3. Using the oil can, drip four or five drops of ISO 68 or SAE 20 non-detergent oil around the inside of the drawbar access on top of the headstock (see **Figures 58 & 59**).

Figure 58. Model G9901/G9902 drawbar access.

Figure 59. Model G9903 drawbar access.

4. Move the quill through the full range of movement to distribute the lubricant evenly.

5. Using a clean shop rag, wipe away any lubricant from the inside mating surface of the spindle.

Power Feed Gearing

1. DISCONNECT THE MILL FROM POWER!

2. Use a 19mm wrench to remove the acorn nut, and handwheel from the power feed unit (see **Figure 60**).

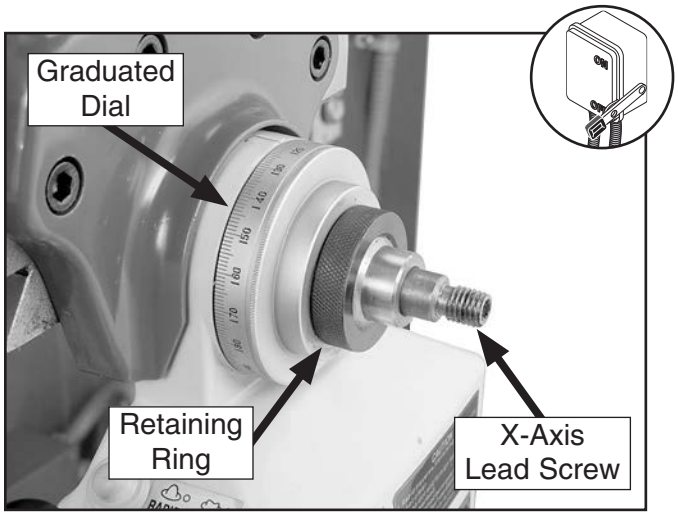


Figure 60. Power feed with the handwheel removed.

3. Unthread and remove the knurled retaining ring and graduated dial from the end of the lead screw.

4. Remove the brass gear from the end of the lead screw.

   Note: *Make sure to remove and retain the small alignment key from lead screw (see* ***Figure*** **61***).*

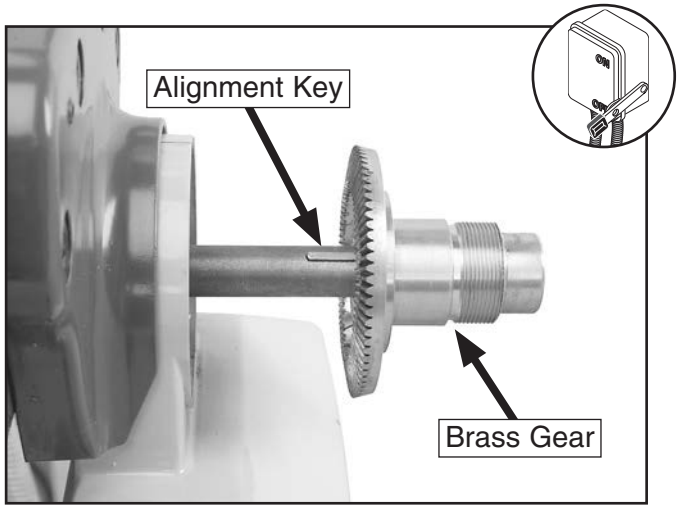


Figure 61. Power feed alignment key and brass gear.

5. Brush medium weight white lithium grease on the teeth of the brass gear and the smaller drive gear (see **Figure 62**).

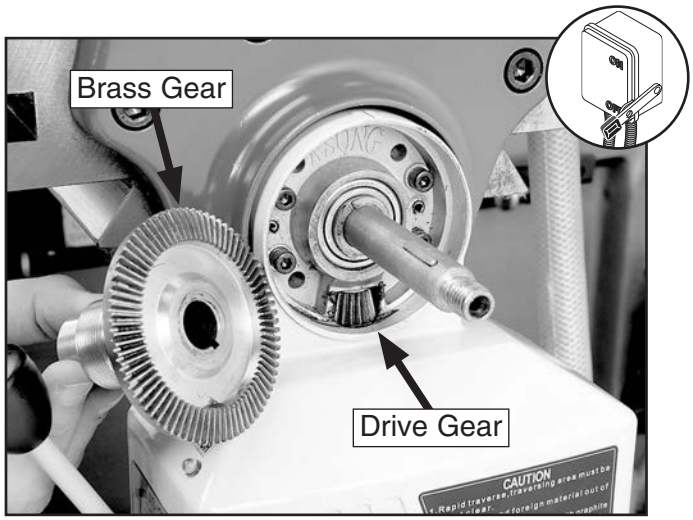


Figure 62. Power feed gears.

6. Align the key with the brass gear keyway as you slide the gear onto the lead screw and into the power feed housing.

7. Secure the graduated dial onto the lead screw with the knurled retaining ring—do not overtighten.

8. Align the key with the handwheel keyway as you slide it onto the leadscrew, then secure it with the acorn nut removed in **Step 2**.

9. Rotate the handwheel to check the power feed gear operation and to distribute the grease on the gears.

Speed Range Gearing

1. DISCONNECT THE MILL FROM POWER!

2. Refer to **Figures 63 & 64** and identify the speed range grease fitting for your mill.

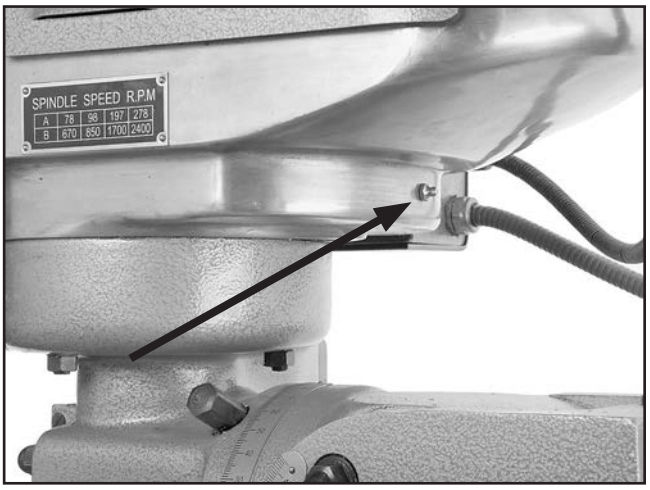


Figure 63. Model G9901/G9902 speed range gearing grease fitting.

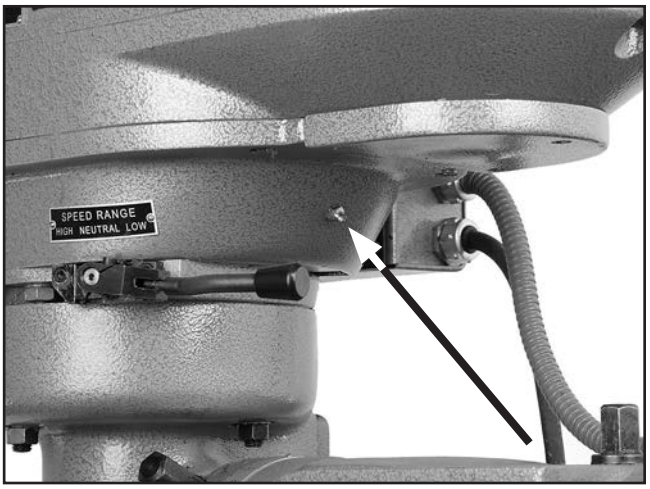


Figure 64. Model G9903 speed range gearing grease fitting.

3. Clean the outside of the grease fitting before and after each use to keep out contaminants.

4. Use one pump of a grease gun to add white lithium grease to the gearing.

Coolant

Although your mill does not include a coolant system, it is designed so that a coolant system can be installed. There are drains in the table, a bottom splash pan, and a cavity in the base of the column for the coolant pump. Refer to the Grizzly catalog or *www.grizzly.com* for options.

If you use coolant with your mill operations, it is inevitable that some will drain through the screens in the bottom splash pan. This fluid will accumulate in the base of the column and must be cleaned out on a regular basis. You can access this area through the panels on the back and side of the column.

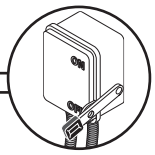
⚠WARNING

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

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

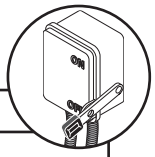


Motor & Electrical

Symptom	Possible Cause	Possible Solution
Machine does not start or a breaker trips.	1. Power connection is at fault or wired incorrectly.	1. Test for good contacts; correct the wiring.
	2. Motor connection wired incorrectly.	2. Correct motor wiring connections.
	3. Wall fuse/circuit breaker is blown/tripped.	3. Ensure circuit size is suitable for this machine; replace weak breaker.
	4. Power supply switched ***OFF*** or is at fault.	4. Ensure power supply is switch ***ON***; ensure power supply has the correct voltage.
	5. Wiring is open/has high resistance.	5. Check for broken wires or disconnected/corroded connections, and repair/replace as necessary.
	6. Forward/reverse switch at fault.	6. Replace faulty switch.
	7. Motor is at fault.	7. Test/repair/replace motor.
Machine stalls or is overloaded.	1. Feed rate/cutting speed too fast for task.	1. Decrease feed rate/cutting speed.
	2. Workpiece alignment is poor.	2. Eliminate workpiece binding; use jig or clamps and position table properly for workpiece alignment control.
	3. Wrong workpiece material.	3. Use metal with correct properties for your type of machining.
	4. Incorrect spindle speed for workpiece.	4. Select correct spindle speed (see **Page 35**).
	5. Motor connection is wired incorrectly.	5. Correct motor wiring connections.
	6. Belt(s) slipping.	6. Replace bad belt(s) and re-tension (see **Page 55 & 56**).
	7. Belt pulley(s)/shaft or spindle speed range gearing is at fault.	7. Replace belt pulley(s)/shaft or spindle speed range gearing.
	8. Machine is overloaded for task.	8. Use smaller sharp cutters/drill bits; reduce the feed rate; reduce the spindle RPM; use cutting fluid if possible.
	9. Motor is overheated.	9. Clean off motor, allow to cool, and reduce workload.
	10. Motor is at fault.	10. Test/repair/replace motor.

Symptom	Possible Cause	Possible Solution
Machine has vibration or noisy operation.	1. Motor or component is loose.	1. Inspect/replace stripped or damaged bolts/nuts, and re-tighten with thread locking fluid.
	2. Belt is slapping belt cover/headstock; is worn or loose.	2. Replace/realign belt (refer to **Page 55 & 56**).
	3. Belt pulley is loose.	3. Replace shaft, pulley, setscrew, and key as required.
	4. Motor mount loose/broken.	4. Tighten/replace.
	5. Machine is incorrectly mounted or sits unevenly.	5. Tighten/replace anchor studs in floor; relocate/shim machine.
	6. Workpiece is loose.	6. Use the correct holding fixture and reclamp workpiece.
	7. Motor fan is rubbing on fan cover.	7. Replace dented fan cover; replace loose/damaged fan.
	8. Cutter is at fault.	8. Replace out-of-round cutter; replace/resharpen cutter; use appropriate feed rate and cutting RPM.
	9. Bit is chattering.	9. Replace/sharpen bit; index bit to workpiece; use appropriate feed rate and cutting RPM (see **Page 35**).
	10. Motor bearings are at fault.	10. Test by rotating shaft; rotational grinding/loose shaft requires bearing replacement.

Operation and Work Results



SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Tool slips in collet.	1. Collet is not fully drawn up into spindle taper.	1. Snug up draw bar.
	2. Wrong size collet.	2. Measure tool shank diameter and match with appropriate diameter collet.
	3. Debris in collet or in spindle taper.	3. Remove oil and debris from collet and spindle taper.
	4. Taking too big of a cut.	4. Lessen depth of cut and allow chips to clear.
Breaking tools or cutters.	1. RPM and or feed rate is too fast.	1. Set correct RPM and feed rates (see **Page 35**).
	2. Cutting tool getting too hot.	2. Use coolant fluid or oil for appropriate application.
	3. Taking too big of a cut.	3. Lessen 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.	1. Decrease depth of cut.
	2. Dull cutting tools.	2. Use sharp cutting tools.
Workpiece vibrates or chatters during operation.	1. Table locks not tight.	1. Tighten down table locks.
	2. Quill lock not tight.	2. Tighten quill lock.
	3. Workpiece not securely clamped to table or into mill vice.	3. Check that clamping is tight and sufficient for the job. Make sure mill vice is tight to the table.
	4. RPM and feed rate too high.	4. Use appropriate RPM and feed for the job (see **Page 35**).
Table hard to move.	1. Table locks are tightened down.	1. Make sure table locks are fully released.
	2. Chips have loaded up on ways.	2. Frequently clean away chips that load up during milling operations.
	3. Ways are dry and in need of lubrication.	3. Lubricate ways and handles.
	4. Gibs are too tight.	4. Adjust gibs (see **Page 52**).
Bad surface finish.	1. Wrong RPM or feed rate.	1. Adjust for appropriate RPM and feed rate (see **Page 35**).
	2. Dull cutting tool or poor cutting tool selection.	2. Sharpen cutting tool or select a better cutting tool for the intended operation.
	3. Wrong rotation of cutting tool.	3. Check for proper cutting rotation for cutting tool.
	4. Workpiece not securely clamped.	4. Properly secure workpiece.

Adjusting Gibs

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

NOTICE

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

Each sliding surface on your mill table has a tapered gib that is sandwiched between the stationary and moving surfaces. There is one adjusting screw for each that moves the tapered gib back and forth.

Note: *To access the cross and elevation gib adjusting screws, you must remove the covering way wipers.*

The ram gib does not need adjustment. The horizontal locking bolts apply force when tight, and allow the gib to slide along the dovetail way when loose.

DISCONNECT THE MILL FROM POWER BEFORE ADJUSTING THE GIBS!

Adjust the gibs by turning the gib adjusting screw until you feel a slight drag when moving the sliding component.

Refer to **Figures 65–67** for the locations of the gib adjusting screws.

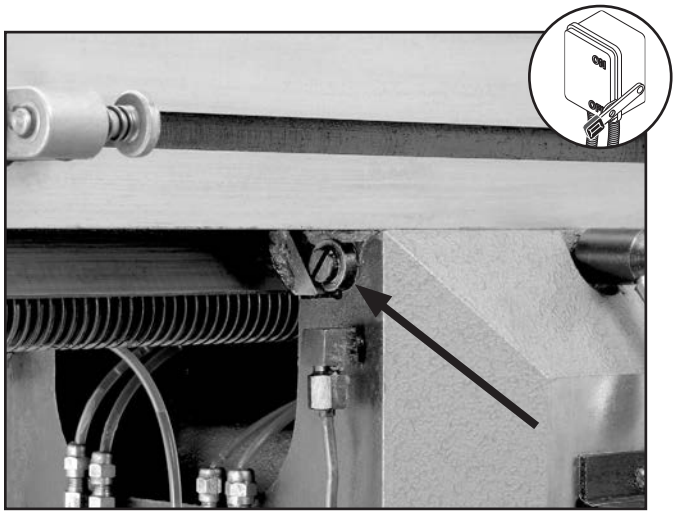


Figure 65. X-axis gib adjusting screw (underneath the left side of the table).

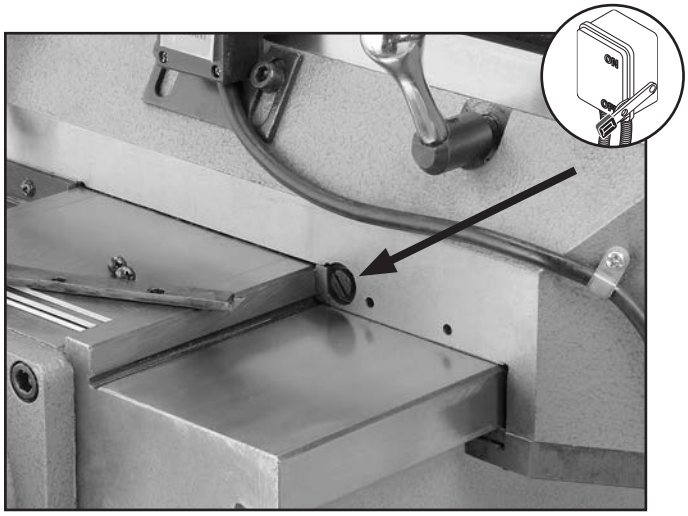


Figure 66. Y-axis gib adjusting screw (right front side of table).

Figure 67. Z-axis gib adjusting screw (left side of knee).

Adjusting Backlash

Lead screw backlash is the range of motion the lead screw rotates before the table begins to move. Lead screws always have a certain amount of backlash, but it will increase with wear. Generally, 0.005–0.010" of backlash is acceptable.

To adjust the X-axis lead screw backlash:

1. DISCONNECT THE MILL FROM POWER!

2. Locate the lead screw backlash adjusting screws underneath the left side of the table, as shown in **Figure 68**.

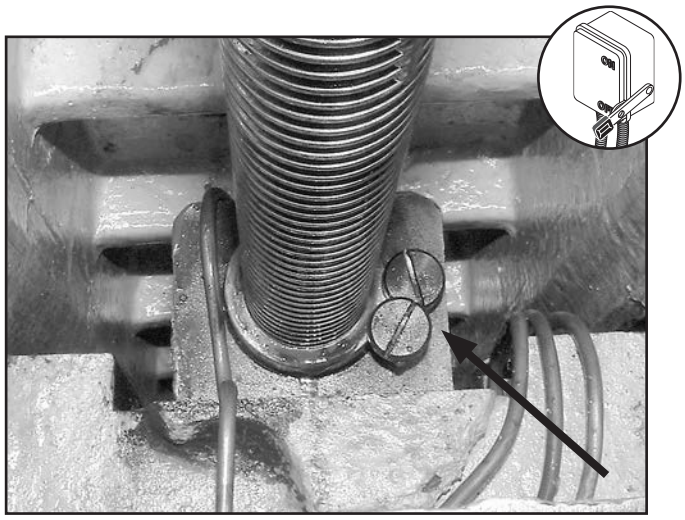


Figure 68. X-axis lead screw backlash adjusting screws.

Note: *The bottom screw adjusts the amount of backlash, and the top screw, when tightened down, locks the bottom screw setting.*

3. Loosen the top screw, and tighten the bottom screw until slightly snug.

4. Re-tighten the top screw to lock the bottom screw setting.

5. Check the amount of backlash by rotating the X-axis ball handle. Repeat **Steps 3–4** if necessary.

To adjust the Y-axis lead screw backlash:

1. DISCONNECT THE MILL FROM POWER!

2. Using the Y-axis ball handle, move the table close to the column.

3. Remove the Y-axis ball handle acorn nut with a 19mm wrench, then remove the handle and graduated scale assembly from the lead screw (see **Figure 69**).

   Note: *Align the device keyways with the lead screw key as you slide them off.*

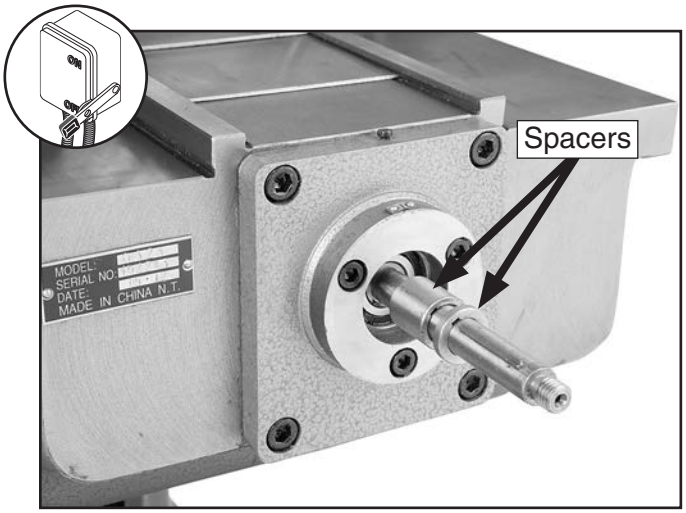


Figure 69. Ball handle and graduated dial removed from Y-axis lead screw.

4. Use an 8mm hex wrench to remove the four cap screws securing the mounting plate assembly; then remove it from the lead screw (see **Figure 70**).

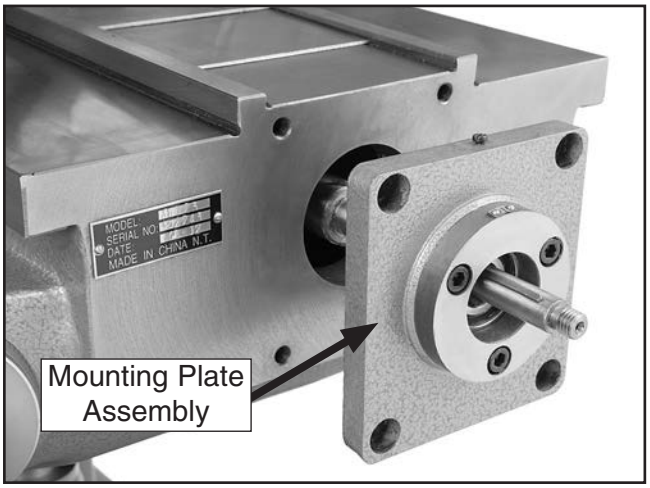


Figure 70. Removing mounting plate assembly from lead screw.

5. Looking into the cavity left by removing the mounting plate assembly, identify the two adjusting screws (see **Figure 71**).

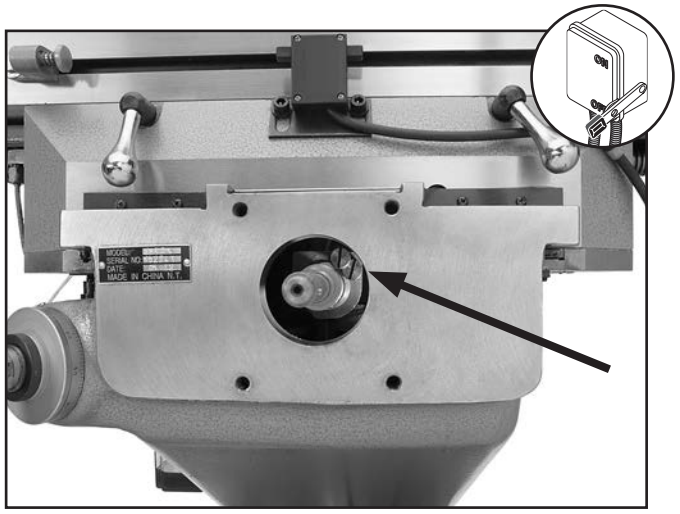


Figure 71. Y-axis lead screw adjusting screws.

Note: *The bottom screw adjusts the amount of backlash; and the top screw, when tightened down, locks the bottom screw setting.*

6. Loosen the top screw, and tighten the bottom screw until slightly snug.

7. Re-tighten the top screw to lock the bottom screw setting.

8. Temporarily slide the ball handle back on the lead screw and rotate it back and forth to check the amount of backlash. Repeat **Steps 6–7** if necessary.

9. Re-install the mounting plate assembly, spacers, graduated dial assembly, and ball handle in reverse order of the steps above.

Note: *Take care not to damage the mating surfaces of the mounting plate assembly bearings and the lead screw.*

Adjusting Downfeed Clutch Lever

The downfeed clutch lever is adjusted at the factory and should not need adjustment for many hours of machine use, if ever. The downfeed clutch lever disengages once the quill dog comes in contact with the downfeed stop. If this does not occur, re-adjust the lever.

To adjust the downfeed clutch lever:

1. DISCONNECT THE MILL FROM POWER!

2. Loosen the locknut shown in **Figure 72**.

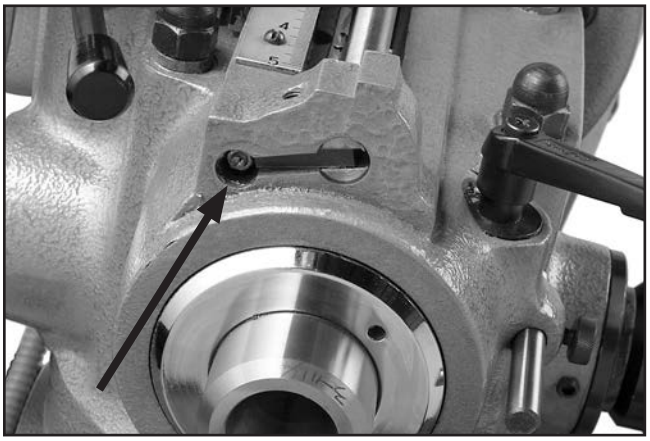


Figure 72. Downfeed clutch lever adjusting screw and locknut.

3. Move the manual/power downfeed selector to the manual or "hand" position (refer to **Page 38** for the location of downfeed devices).

4. While holding the downfeed clutch lever to the left, use the fine downfeed handle to move the spindle down until the clutch lever stays engaged by itself.

5. Move either the spindle down or the downfeed stop up until the quill dog and downfeed stop are in contact without disengaging the clutch lever.

6. Turn the adjusting screw until the clutch lever disengages, then re-tighten the locknut.

7. Check to make sure the downfeed clutch lever disengages during downfeed operation.

Replacing Belts G9901 & G9902

Replace the belts when they are worn, cracked or broken. If it is necessary to replace one of the belts, you may want to replace both belts and the brake shoes at the same time due to the time and labor involved.

Call Grizzly Customer Service at (800) 523-4777 to order the following parts:

Part Description	Part Number
V-Belt (G9901 & G9902)	P9901322
Ribbed Timing Belt (G9901 & G9902)	P9901323

To replace the belts:

1. DISCONNECT THE MILL FROM POWER!

2. Remove the drawbar and upper spindle cover (see **Figure 73**).

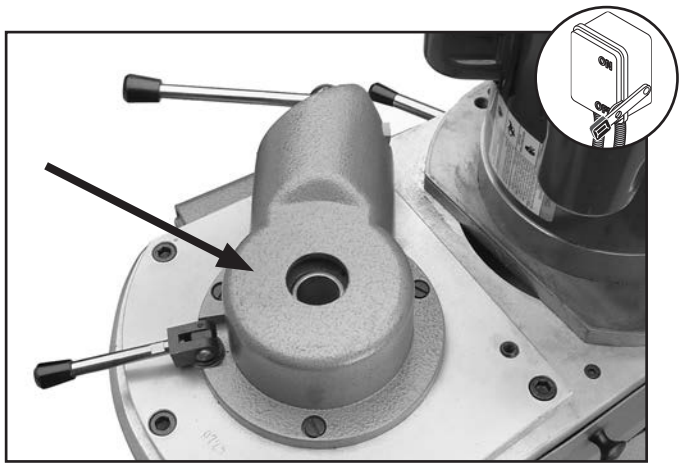


Figure 73. Upper spindle cover.

3. Remove the cap screws and taper pin from the transmission case cover plate (see **Figure 74**).

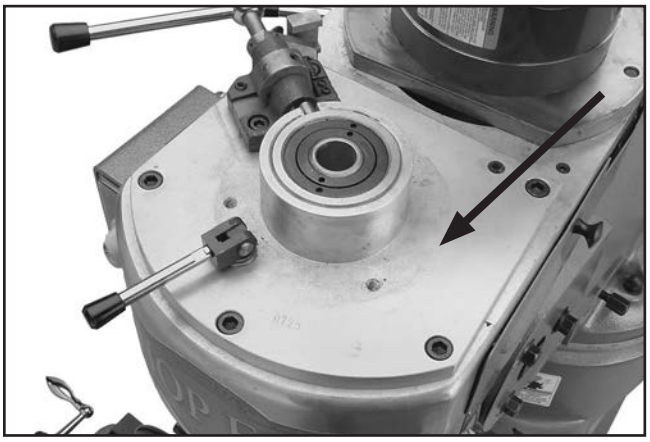


Figure 74. Transmission case cover plate.

4. Open both side belt covers.

5. Loosen the two motor locking handles, pull the motor forward with the motor positioning handle, and roll the V-belt off the spindle pulley.

6. Remove the motor locking handle set screws, then remove the handles and the nuts they were attached to.

7. With assistance, pull the transmission case cover plate up to remove it and the spindle pulley assembly.

   Note: *Push down on the ribbed timing belt as you lift the spindle pulley assembly up to prevent it from binding.*

8. If necessary, replace the brake shoes at this time (refer to **Replacing Brake Shoes G9901 & G9902** on **Page 59** for detailed instructions).

9. With assistance, lift the motor and place a new ribbed timing belt and V-belt around the pulleys.

10. Re-assemble the remaining parts in the reverse order they were removed.

11. Re-tension the V-belt, and replace the side belt covers.

Replacing Belts G9903

Replace the belts when they are worn, cracked or broken. If it is necessary to replace one of the belts, you may want to replace both belts and the brake shoes at the same time due to the time and labor involved.

Call Grizzly Customer Service at (800) 523-4777 to order the following parts:

Part Description	Part Number
Variable Speed Belt (G9903)	P9903727
Ribbed Timing Belt (G9903)	P9903836

To replace the belts:

1. With the mill running, change the variable speed to the highest RPM.

2. DISCONNECT THE MILL FROM POWER!

3. Remove the three cap screws and the lower pulley cover shown in **Figure 75**.

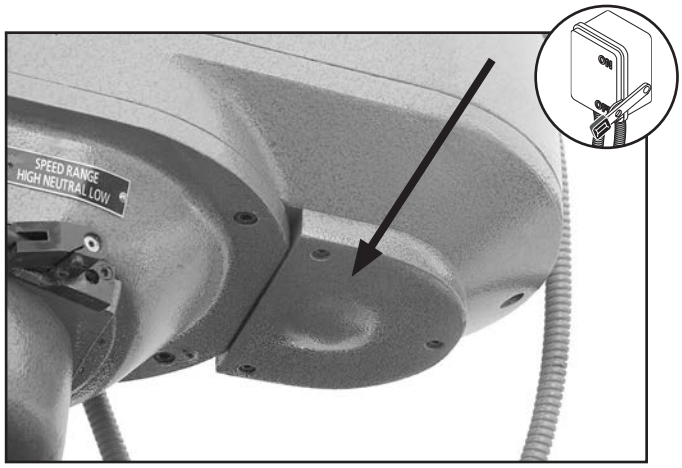


Figure 75. Lower pulley cover.

4. Thread two M6-1 x 60 bolts into the spring retaining plate holes shown in **Figure 76**, then tighten the bolts to compress the spring slightly.

   Note: *Tighten the bolts evenly, in small increments, to compress the spring. For example, turn one bolt two turns, then turn the other bolt two turns.*

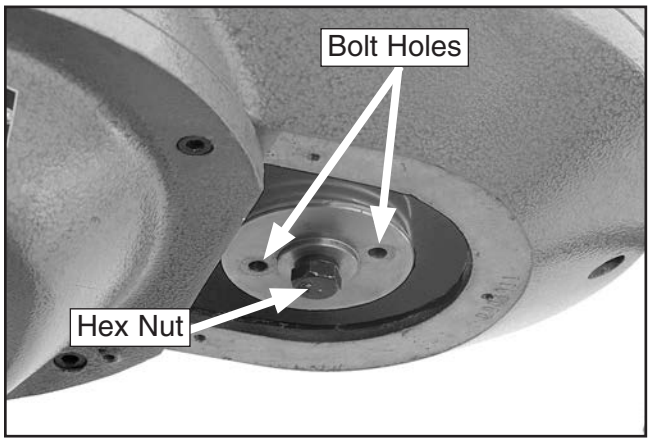


Figure 76. Location of the two spring retaining plate holes and hex nut.

5. Remove the spring retaining plate hex nut (see **Figure 76**), then carefully remove the two M6-1 x 60 bolts and the spring retaining plate.

6. Remove the forward/reverse switch from the side of the mill.

7. Remove the motor mount hex bolts shown in **Figure 77**.

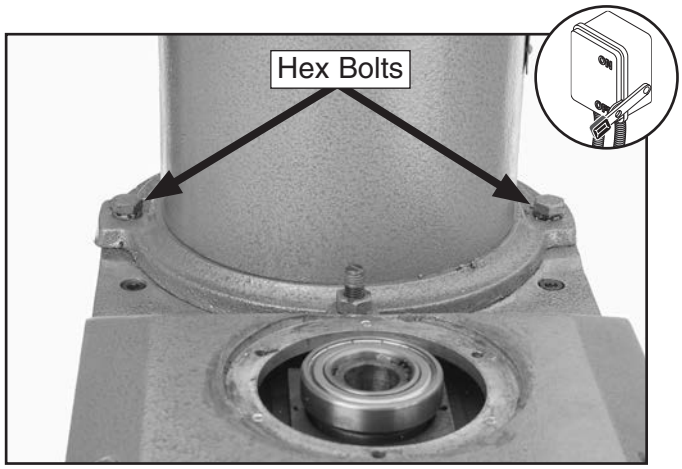


Figure 77. Motor mount hex bolts.

8. With assistance, remove the motor and lower it to the floor.

9. Remove the three upper bearing cap screws (see **Figure 78**), and thread them into the alternate three holes to draw the bearing housing up.

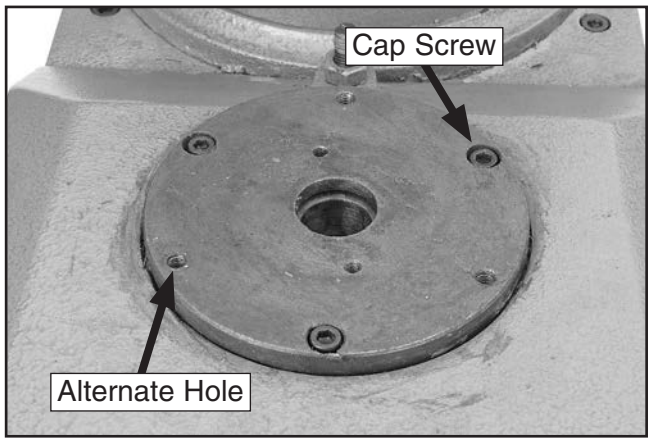


Figure 78. Upper bearing housing and cap screws.

Note: *Carefully pry up on the upper bearing housing, rotate it, and repeat this process until the housing comes free from the mill.*

10. Remove the two Phillips head screws that are directly below the upper spindle bearing (see **Figure 79**).

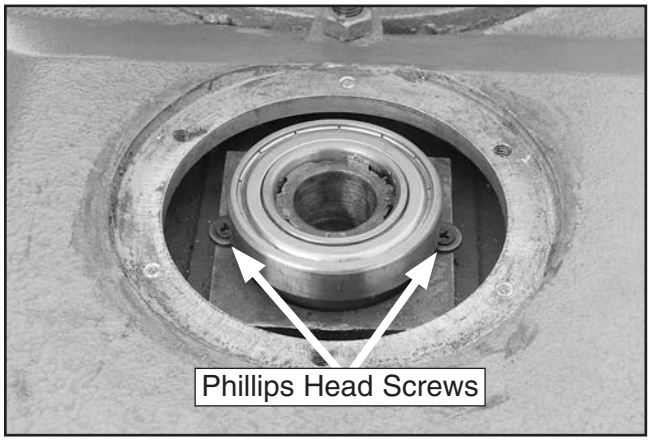


Figure 79. Upper spindle bearing.

11. Remove the lower cap screws holding the variable speed housing onto the front of the transmission case.

12. Remove the four cap screws shown in **Figure 80**, then remove the cap screw from the underside end of the transmission case.

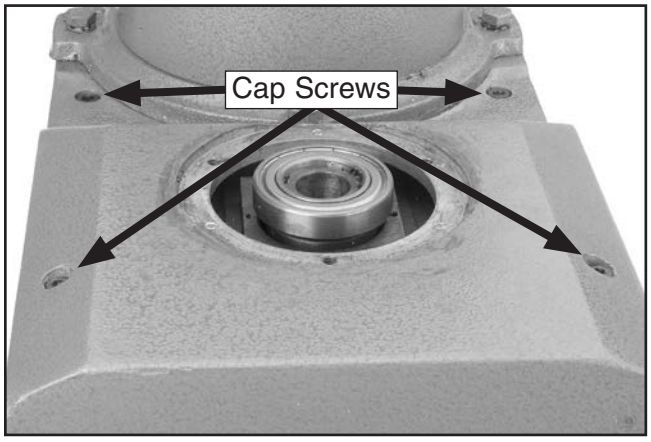


Figure 80. Upper transmission case cap screws.

13. With assistance, pull the upper transmission case off the mill.

14. Remove the four remaining cap screws from under the lower transmission case.

Note: *If necessary, replace the brake shoes before replacing the belts. Refer to* ***Replacing Brake Shoes G9903*** *on* ***Page 60*** *for detailed instructions.*

15. Place a new ribbed timing belt around the pulley (see **Figure 81**), then slide the lower transmission cover into place.

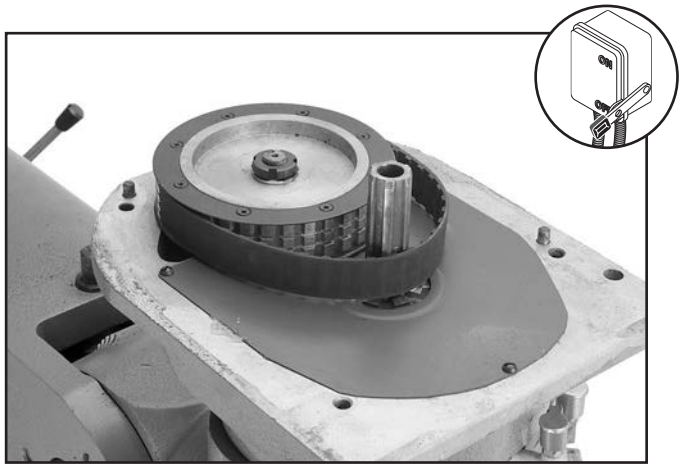


Figure 81. Ribbed timing belt.

16. Place a new variable speed belt around the pulley, as shown in **Figure 82**.

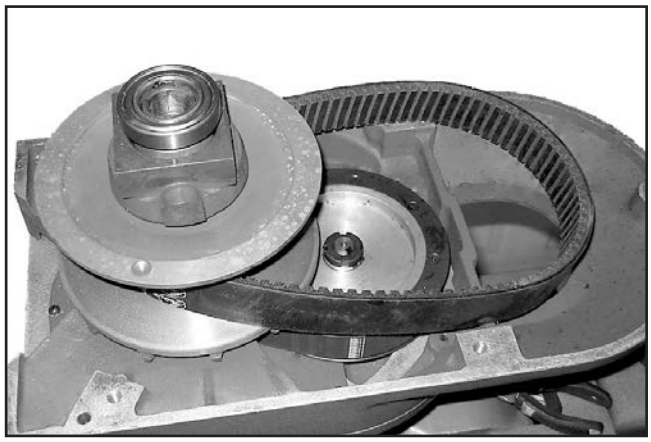


Figure 82. Variable speed belt.

17. Carefully compress the spring between the lower pulley and the spring retaining plate with an arbor press.

18. Thread two M6-1 x 60 bolts through the retaining spring plate and into the lower pulley to secure the spring.

19. Install the upper transmission case, and place the lower pulley assembly under the variable speed belt.

20. Slide the motor drive shaft into the lower pulley, and secure the motor to the transmission case.

21. Rotate the variable speed handwheel to lower the retaining spring plate under the upper spindle bearing.

22. Replace the Phillips head screws removed in **Step 10**.

23. Replace the remaining parts in the reverse order they were removed.

Note: *Be sure to remove the two M6-1 x 60 bolts after securing the retaining spring plate hex nut.*

Replacing Brake Shoes G9901 & G9902

Replace the brake shoes when they no longer stop the spindle. Due to the time and labor involved, you may want to replace the belts at this time as well.

Call Grizzly Customer Service at (800) 523-4777 to order the brake shoes (Part Number P9901318).

To replace the brake shoes:

1. DISCONNECT THE MILL FROM POWER!

2. Complete **Steps 2–7** from **Replacing Belts G9901 & G9902** on **Page 55**.

3. Separate the spindle speed range lever assembly from the transmission cover plate by removing the cap screws, then prying up on the assembly to disengage the taper pins (see **Figure 83**).

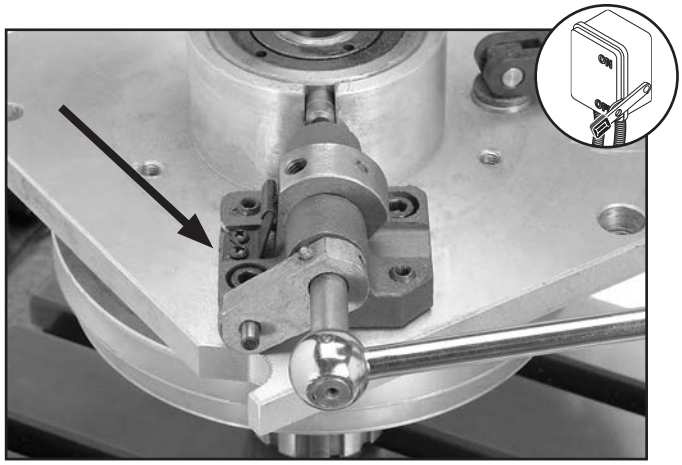


Figure 83. Spindle speed range lever assembly.

4. Remove the gear change pin by taking out the cap screw, pushing down on the transmission case cover plate, then pulling the pin out (see **Figure 84**).

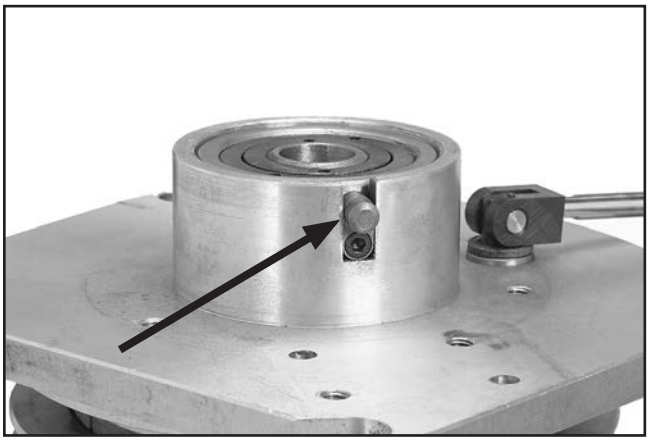


Figure 84. Gear change pin.

5. Lift the transmission case cover plate off the pulleys, and flip it over to expose the spindle brake shoes.

   Note: *There are four springs that may fall out when you flip the transmission case cover plate over. Do not lose these.*

6. Remove the screws securing the brake shoes, and install the new brake shoes (see **Figure 85**).

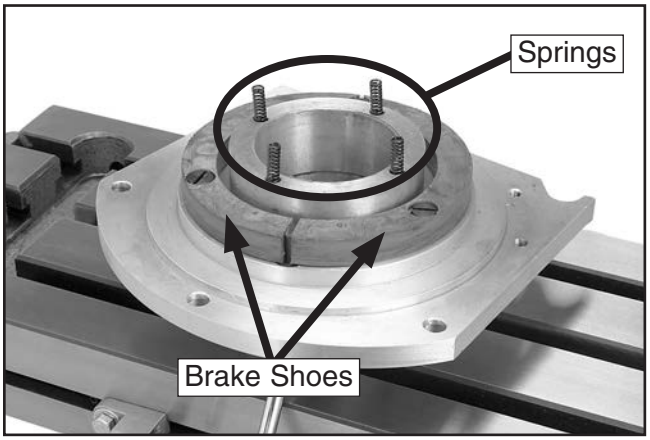


Figure 85. Brake shoes.

7. Re-install the three screws and the four springs, as shown in **Figure 85**, and slide the pulley shaft into the transmission case cover plate.

8. Replace the parts of the transmission case cover plate in the reverse order they were removed.

9. Re-assemble the remaining parts as described in **Steps 9–11** from **Replacing Belts G9901 & G9902** on **Page 55**.

Replacing Brake Shoes G9903

Replace the brake shoes when they no longer stop the spindle. Due to the time and labor involved, you may want to replace the belts at this time as well.

Call Grizzly Customer Service at (800) 523-4777 to order the brake shoes (Part Number P9903732).

To replace the brake shoes:

1. Complete **Steps 1–14** from **Replace Belts G9903** on **Page 56**.

2. Remove the pulley assembly by removing the screws shown in **Figure 86**.

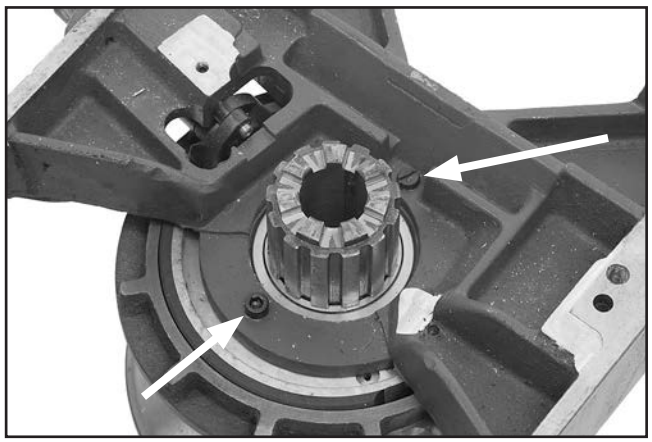


Figure 86. Pulley assembly screws.

3. Flip the pulley assembly over, and remove the retaining screw from the brake shoes shown in **Figure 87**.

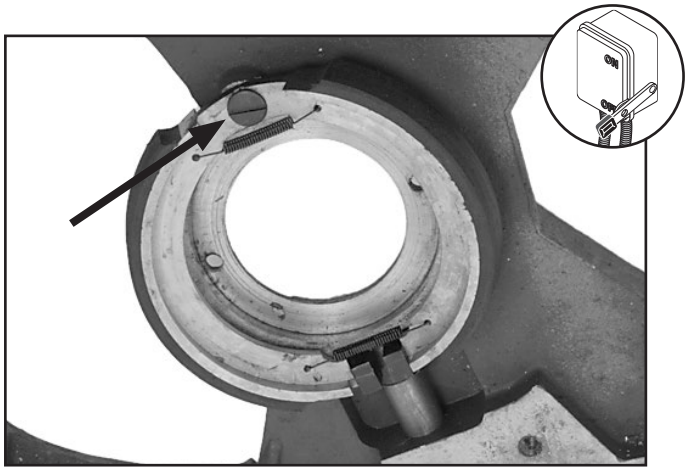


Figure 87. Brake shoe retaining screw.

4. Replace the old brake shoes with new ones, then secure them with the retaining screw removed in **Step 3**.

5. Spread the brake so it fits around the cam blocks, as shown in **Figure 87**.

6. Replace the pulley assembly removed in **Step 2**.

7. Re-assemble the transmission case, as described in **Steps 15–23** from **Replacing Belts G9903** on **Page 56**.

SECTION 8: WIRING

These pages are current at the time of printing. However, in the spirit of improvement, we may make changes to the electrical systems of future machines. Compare the manufacture date of your machine to the one stated in this manual, and study this section carefully.

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

⚠WARNING
Wiring Safety Instructions

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

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

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

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

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

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

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

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

NOTICE

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

COLOR KEY

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

G9901/G9902 220V, Single-Phase Wiring Diagram

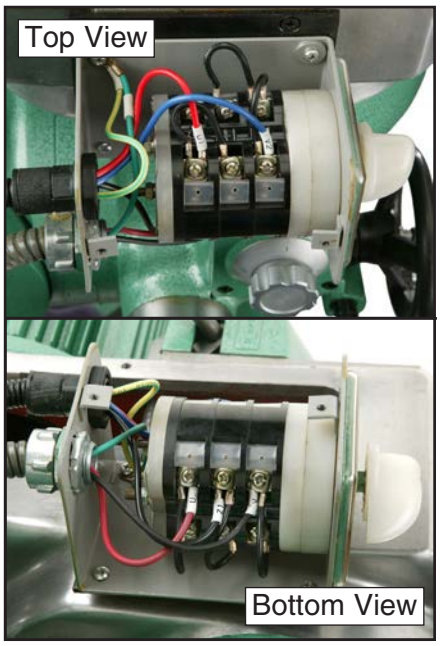
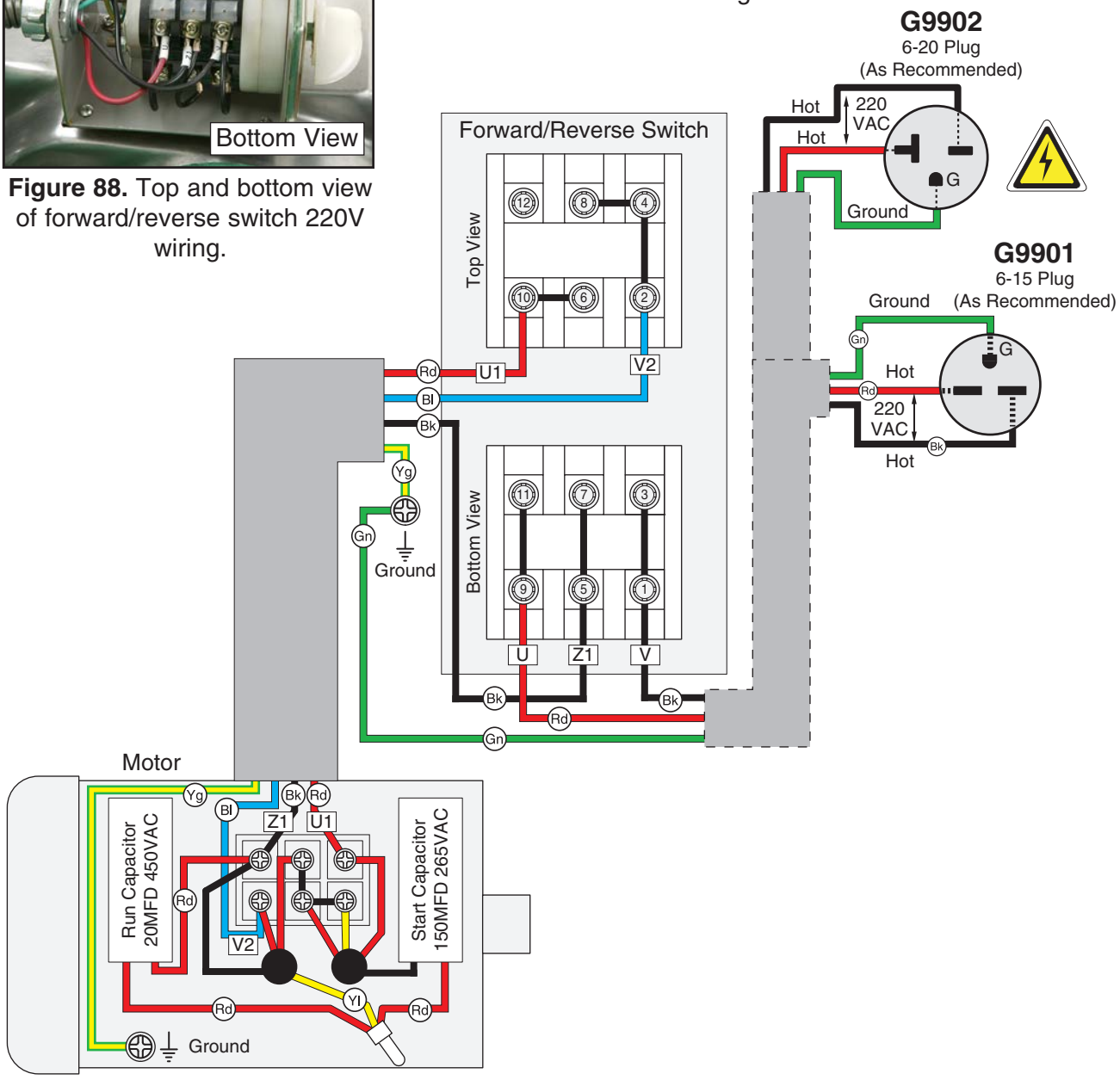


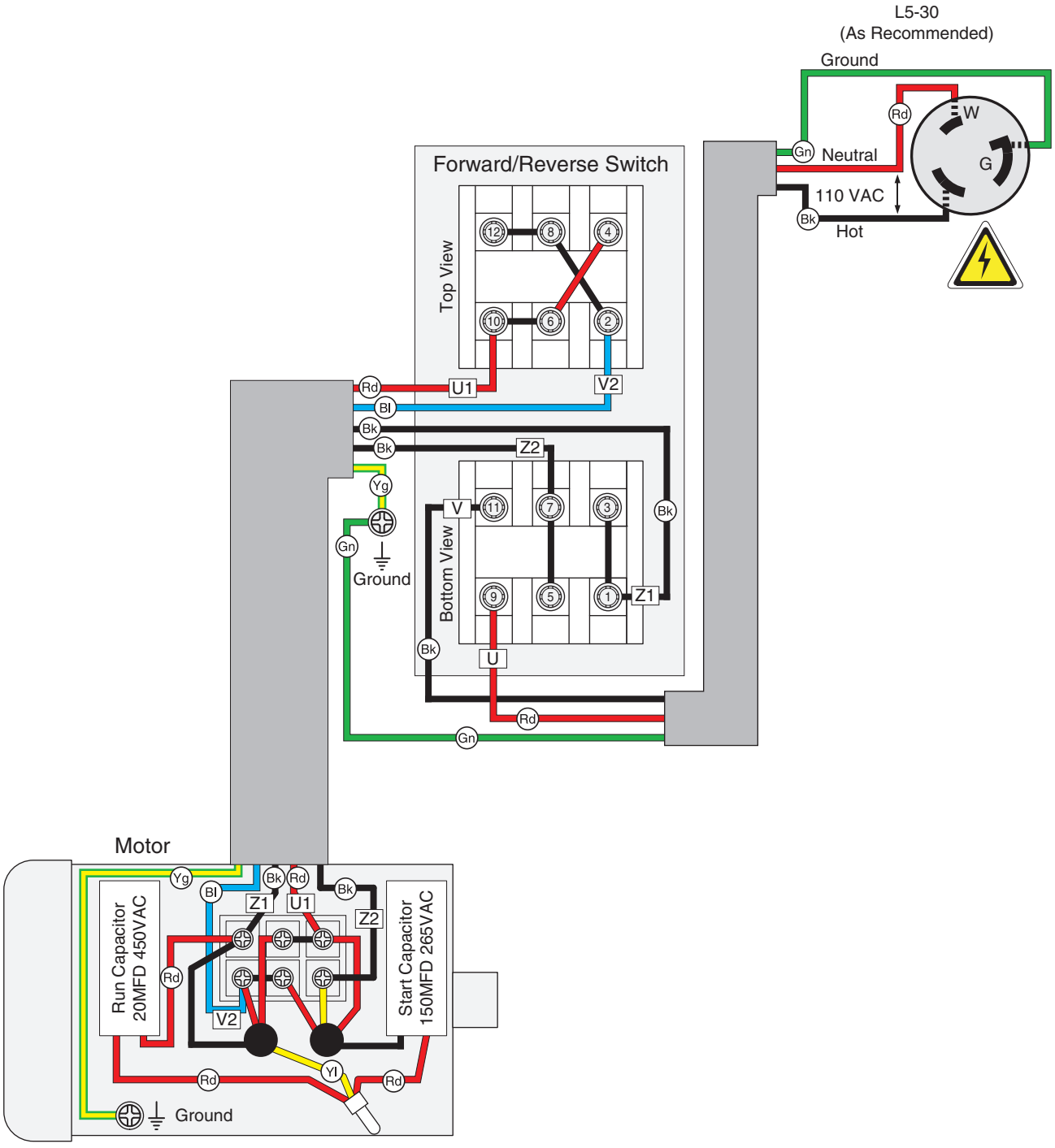
Figure 88. Top and bottom view of forward/reverse switch 220V wiring.

Figure 89. Model G9901/G9902 220V motor wiring.



STOP *READ ELECTRICAL SAFETY ON PAGE 61!*

G9901/G9902 110V, Single-Phase Wiring Diagram



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G9903 220V, 3-Phase Wiring Diagram

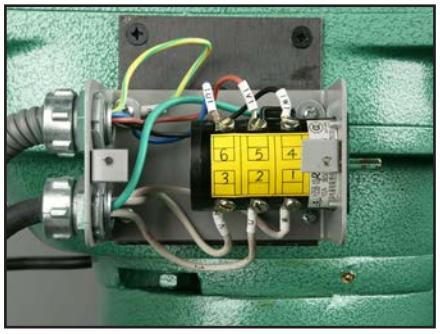

Figure 90. Forward/reverse switch.

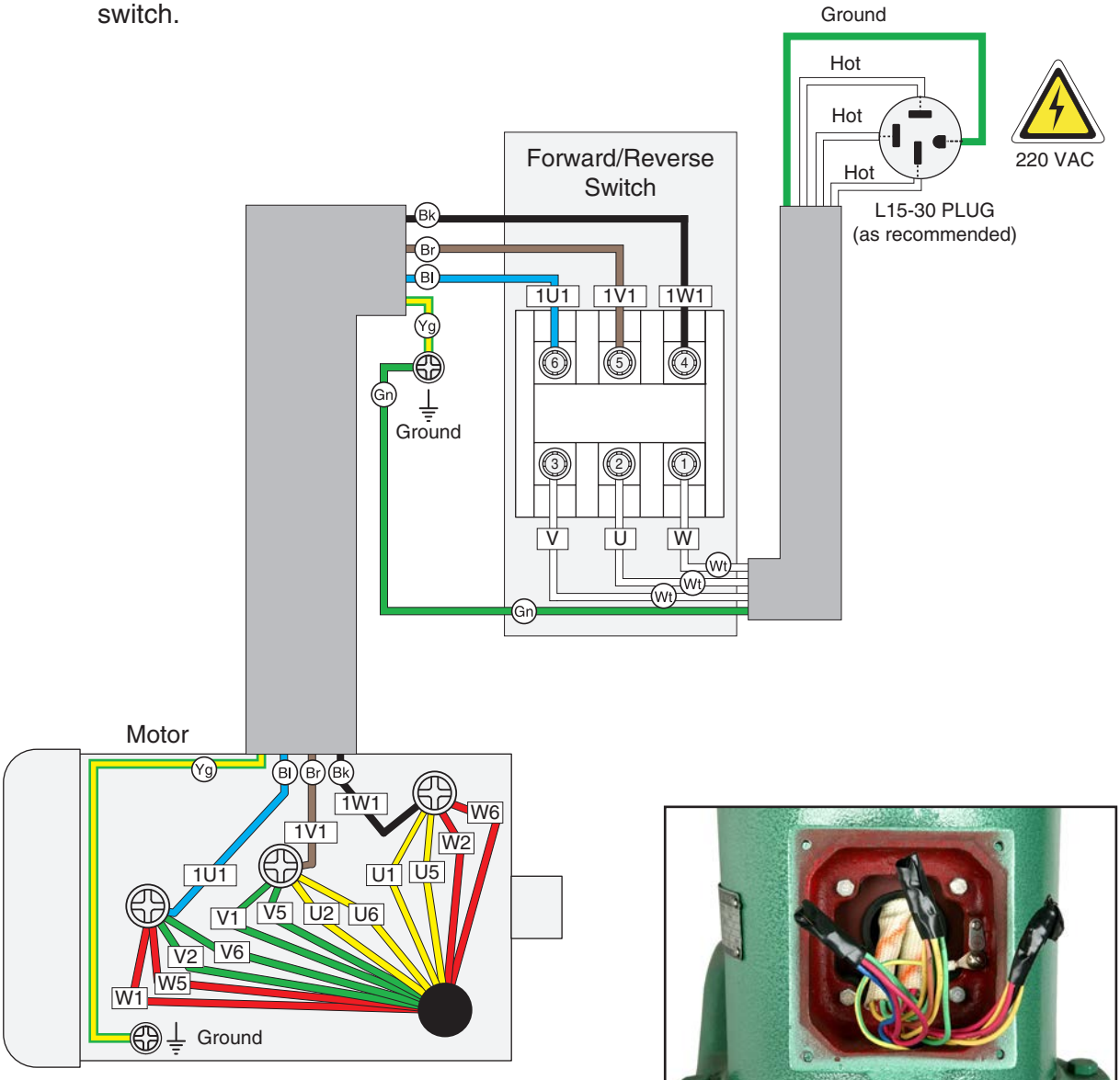

Figure 91. Model G9903 220V motor wiring.

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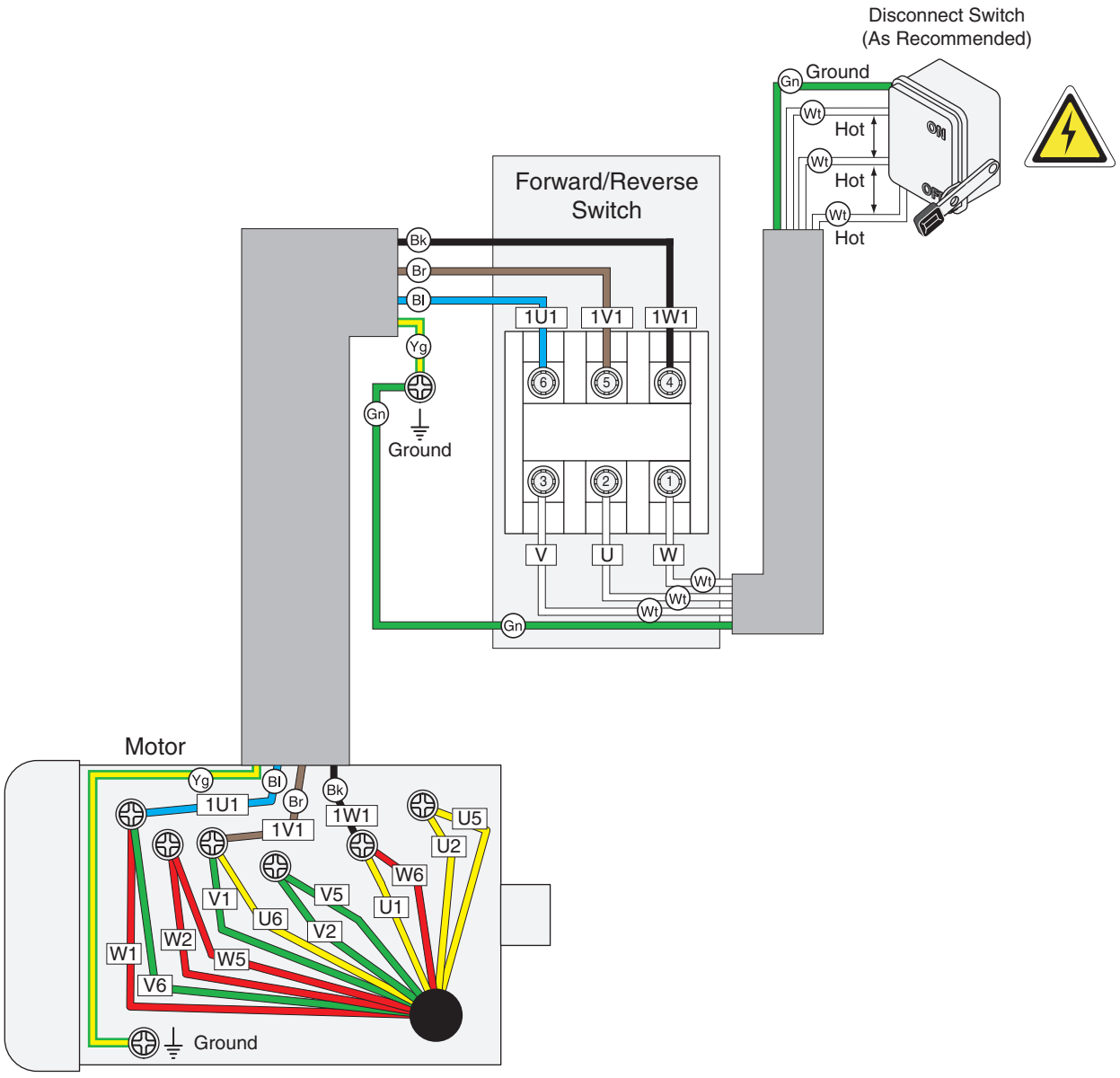
G9903 440V, 3-Phase Wiring Diagram



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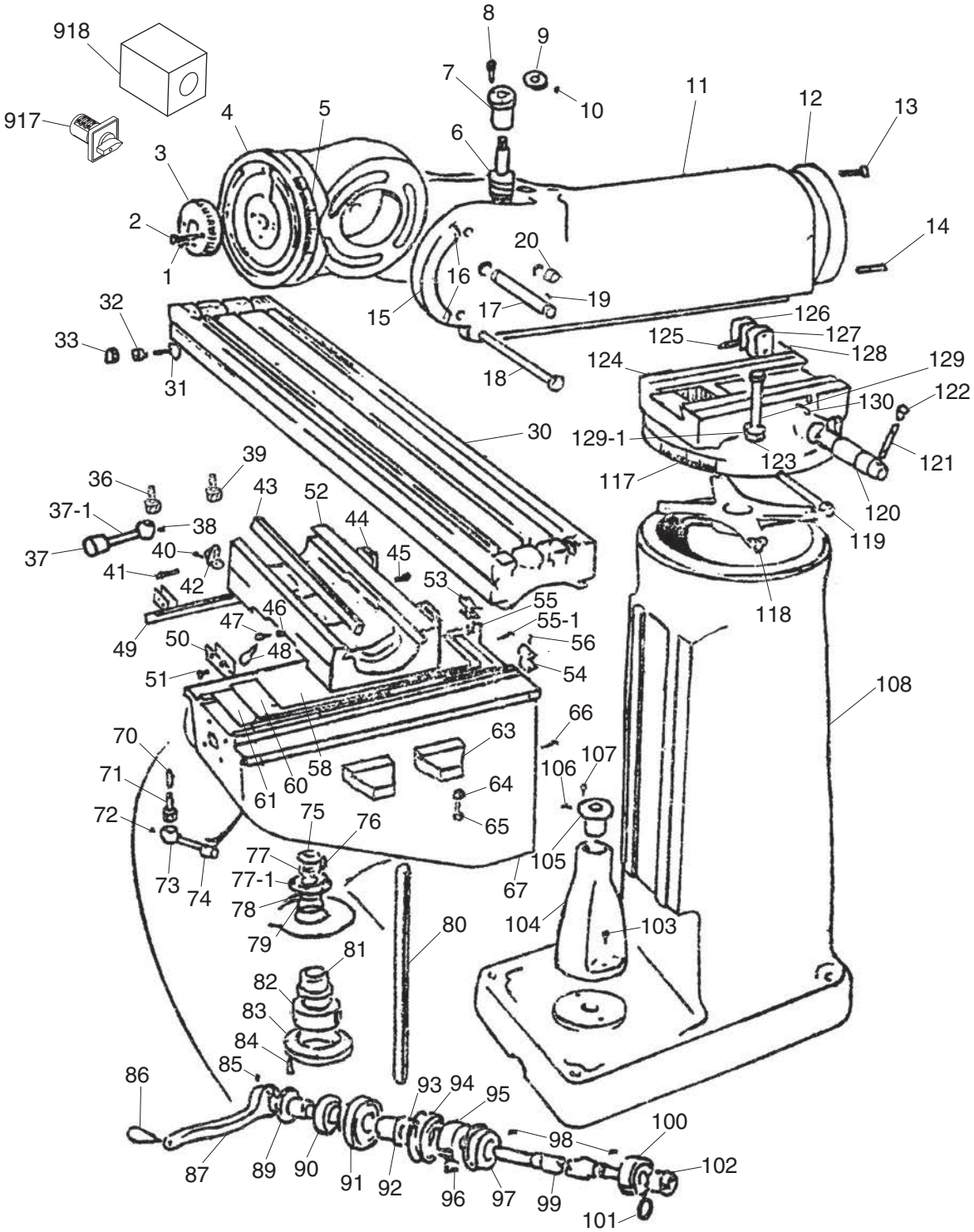
SECTION 9: PARTS

Body Assembly Breakdown



Body Assembly Parts List

REF	PART #	DESCRIPTION
1	P9901001	TAPERED PIN 8 X 50
2	P9901002	CAP SCREW M10-1.5 X 35
3	P9901003	WORM GEAR 20T
4	P9901004	RAM ADAPTER
5	P9901005	GRADUATED SCALE
6	P9901006	WORM GEAR
7	P9901007	FLANGE
8	P9901008	CAP SCREW M6-1 X 16
9	P9901009	RETAINING RING
10	P9901010	TAPERED SET SCREW M5-.8 X 10
11	P9901011	RAM
12	P9901012	TURRET
13	P9901013	CAP SCREW M8-1.25 X 20
14	P9901014	TAPER PIN 8 X 30
15	P9901015	GRADUATED SCALE
16	P9901016	RIVET 2 X 5
17	P9901017	SHAFT
18	P9901018	HEX BOLT M16-2 X 200
19	P9901019	KEY 5 X 5 X 12
20	P9901020	CLAMPING SLEEVE
30	P9902030	TABLE (G9902/G9903)
30	P9902030	TABLE (G9902/G9903)
31	P9901031	T-SLOT BOLT M8-1.25 X 35
32	P9901032	TABLE STOP
33	P9901033	HEX NUT M8-1.25
36	P9901036	CAP SCREW M12-1.75 X 20
37	P9901037	HANDLE KNOB
37-1	P9901037-1	HANDLE BOLT M8-1.25 X 25
38	P9901038	SET SCREW M6-1 X 8
39	P9901039	CAP SCREW M12-1.75 X 18
40	P9901040	CAP SCREW M8-1.25 X 16
41	P9901041	GIB SCREW M8-1.25 X 27
42	P9901042	TABLE STOP BRACKET
43	P9901043	LONGITUDINAL GIB (G9901)
43	P9902043	LONGITUDINAL GIB (GG902/G9903)
44	P9901044	WIPER
45	P9901045	SPECIAL PIN
46	P9901046	LOCKING PIN
47	P9901047	LOCKING SCREW M12-1.75 X 15
48	P9901048	LOCKING LEVER
49	P9901049	CROSS GIB
50	P9901050	WIPER HOLDER
51	P9901051	PHLP HD SCR M5-.8 X 8
52	P9901052	SADDLE
53	P9901053	WIPER HOLDER

REF	PART #	DESCRIPTION
54	P9901054	WIPER
55	P9901055	VERTICAL GIB
55-1	P9901055-1	GIB SCREW M8-1.25 X 40
56	P9901056	PHLP HD SCR M6-1 X 12
58	P9901058	SMALL CHIP GUARD
60	P9901060	MEDIUM CHIP GUARD
61	P9901061	LARGE CHIP GUARD
63	P9901063	CLAMPING PLATE
64	P9901064	HEX NUT M6-1
65	P9901065	SET SCREW M6-1 X 20
66	P9901066	CAP SCREW M8-1.25 X 14
67	P9901067	KNEE
70	P9901070	LOCK PIN
71	P9901071	PHLP HD SCR M12-1.75 X 40
72	P9901072	SET SCREW M6-1 X 8
73	P9901073	LEVER HUB
74	P9901074	LEVER BOLT M8-1.25 X 25
75	P9901075	HEX NUT M12-1.75
76	P9901076	KEY 5 X 5 X 20
77	P9901077	LOCK WASHER 12MM
77-1	P9901077-1	FLAT WASHER 12MM
78	P9901078	SPECIAL BEVEL GEAR
79	P9901079	SPECIAL WASHER
80	P9901080	VERTICAL LEAD SCREW
81	P9901081	BUSHING
82	P9901082	BALL BEARING 6206 2 RS
83	P9901083	BEARING RETAINER RING
84	P9901084	CAP SCREW M8-1.25 X 14
85	P9901085	SET SCREW M6-1 X 8
86	P9901086	HANDLE KNOB
87	P9901087	HANDLE
89	P9901089	CLUTCH
90	P9901090	SPECIAL NUT M33 X 1.5
91	P9901091	GRADUATED DIAL
92	P9901092	BUSHING
93	P9901093	INT RETAINING RING 47MM
94	P9901094	REGULATING RING
95	P9901095	BALL BEARING 62042RZ
96	P9901096	CAP SCREW M6-1 X 16
97	P9901097	BEARING COVER
98	P9901098	KEY 5 X 5 X 16
99	P9901099	SHAFT
100	P9901100	BALL BEARING 62042RZ
101	P9901101	SPECIAL WASHER
102	P9901102	SPIRAL BEVEL GEAR

REF	PART #	DESCRIPTION
103	P9901103	CAP SCREW M10-1.5 X 25
104	P9901104	KNEE SUPPORT
105	P9901105	THREADED BUSHING
106	P9901106	OIL CUP 6MM
107	P9901107	CAP SCREW M8-1.25 X 14
108	P9901108	COLUMN
117	P9901117	GRADUATED SCALE
118	P9901118	SPIDER GEAR
119	P9901119	SPECIAL BOLT M12-1.75 X 120
120	P9901120	GEAR SHAFT
121	P9901121	LEVER
122	P9901122	LEVER KNOB

REF	PART #	DESCRIPTION
123	P9901123	FLAT WASHER 12MM
124	P9901124	ROTARY DISC
125	P9901125	KEY 6 X 10 X 70
126	P9901126	CLAMPING BLOCK
127	P9901127	CLAMPING BLOCK
128	P9901128	ROLL PIN 3 X 50
129	P9901129	SPECIAL BOLT M12-1.75 X 110
129-1	P9901129-1	HEX NUT M12-1.75
130	P9901130	SET SCREW M8-1.25 X 16
917	P9901917	FORWARD/REVERSE SWITCH
918	P9901918	SWITCH BOX

Table Assembly Breakdown

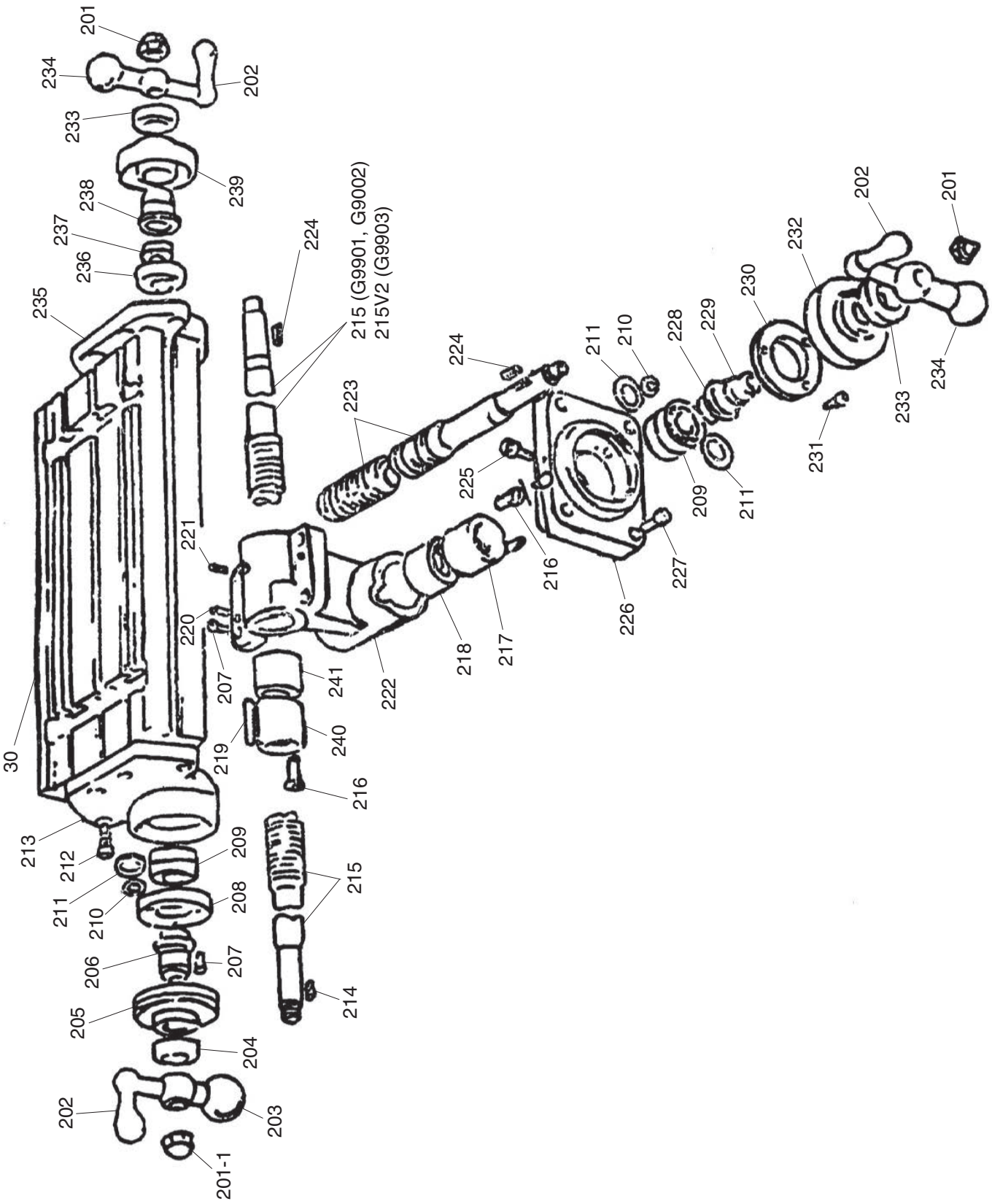
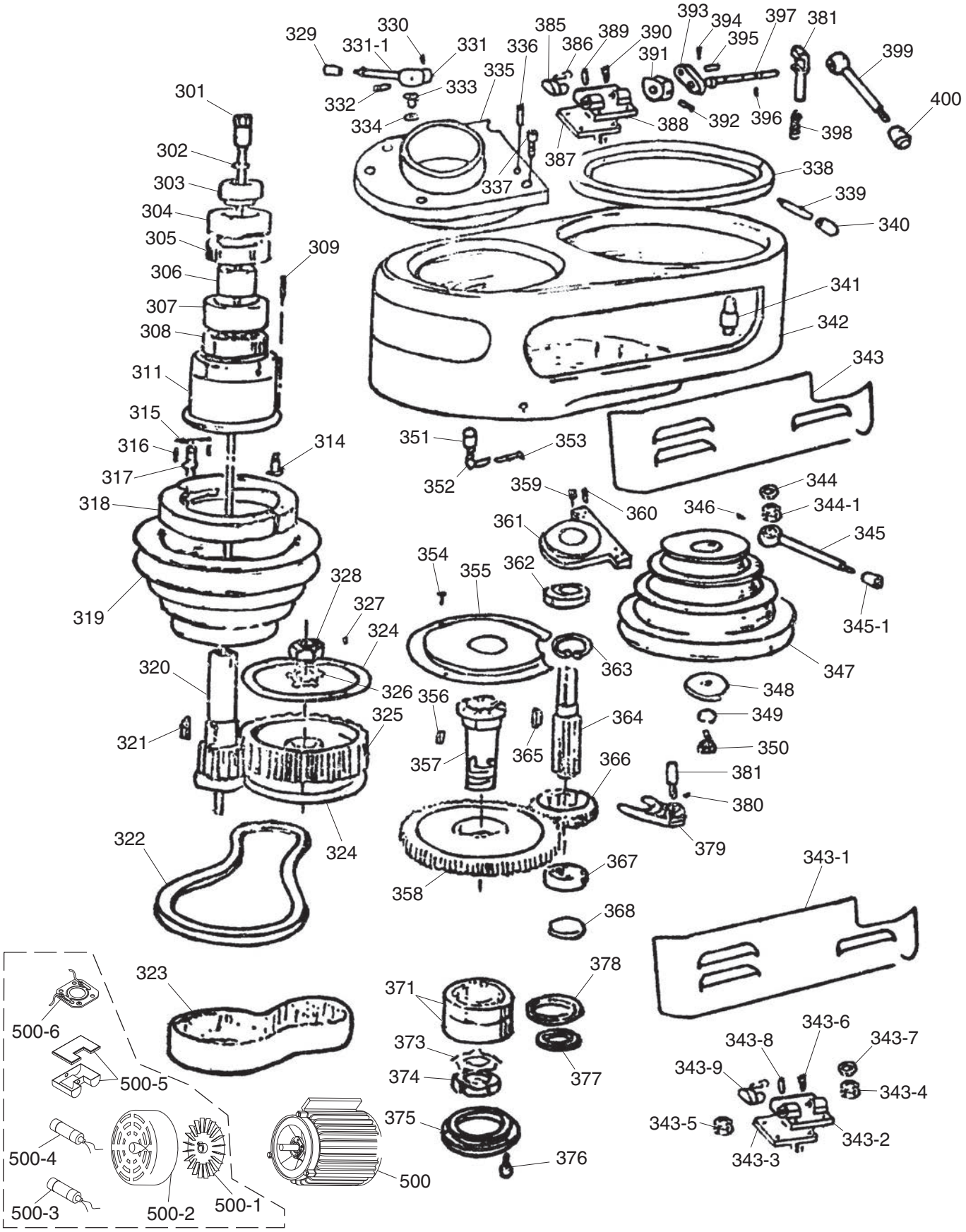


Table Assembly Parts List

REF	PART #	DESCRIPTION
30	P9901030	TABLE (G9901)
30	P9902030	TABLE (G9902/G9903)
201	P9901201	ACORN NUT 1/2-13
201-1	P9901201-1	ACORN NUT 5/8-11
202	P9901202	HANDLE
203	P9901203	HANDLE BODY
204	P9901204	SPECIAL NUT M33 X 1.5
205	P9901205	GRADUATED DIAL
206	P9901206	BUSHING
207	P9901207	CAP SCREW M8-1.25 X 16
208	P9901208	FLANGE
209	P9901209	BALL BEARING 62042RZ
210	P9901210	SPACER
211	P9901211	SPACER
212	P9901212	CAP SCREW M10-1.5 X 20
213	P9901213	LEFT TABLE BRACKET
214	P9901214	KEY 4 X 4 X 30
215	P9901215	LONG. LEAD SCREW (G9901)
215	P9902215	LONG. LEAD SCREW (G9902)
215V2	P9903215V2	LONG. LEAD SCREW (G9903)
216	P9901216	ADJUSTING SCREW M8-1.25 X 24
217	P9901217	THREADED BUSHING 1-1/4-7
218	P9901218	THREADED BUSHING 1-1/4-7

REF	PART #	DESCRIPTION
219	P9901219	KEY 5 X 5 X 30
220	P9901220	THREADED CONICAL PIN 8 X 30
221	P9901221	SET SCREW M8-1.25 X 12
222	P9901222	CROSS LEAD BRACKET
223	P9901223	CROSS LEAD SCREW
224	P9901224	WOODRUFF KEY
225	P9901225	CAP SCREW M4-.7 X 8
226	P9901226	BEARING BRACKET
227	P9901227	CAP SCREW M10-1.5 X 16
228	P9901228	BUSHING
229	P9901229	BUSHING
230	P9901230	BEARING RETAINER RING
231	P9901231	CAP SCREW M8-1.25 X 14
232	P9901232	GRADUATED DIAL
233	P9901233	SPECIAL NUT M33 X 1.5
234	P9901234	HANDLE BODY
235	P9901235	RIGHT TABLE BRACKET
236	P9901236	BALL BEARING 62042RZ
237	P9901237	SPACER
238	P9901238	BUSHING
239	P9901239	GRADUATED DIAL
240	P9901240	NUT 1-1/4"
241	P9901241	NUT 1-1/4"

Model G9901/G9902 Drive Assembly Breakdown



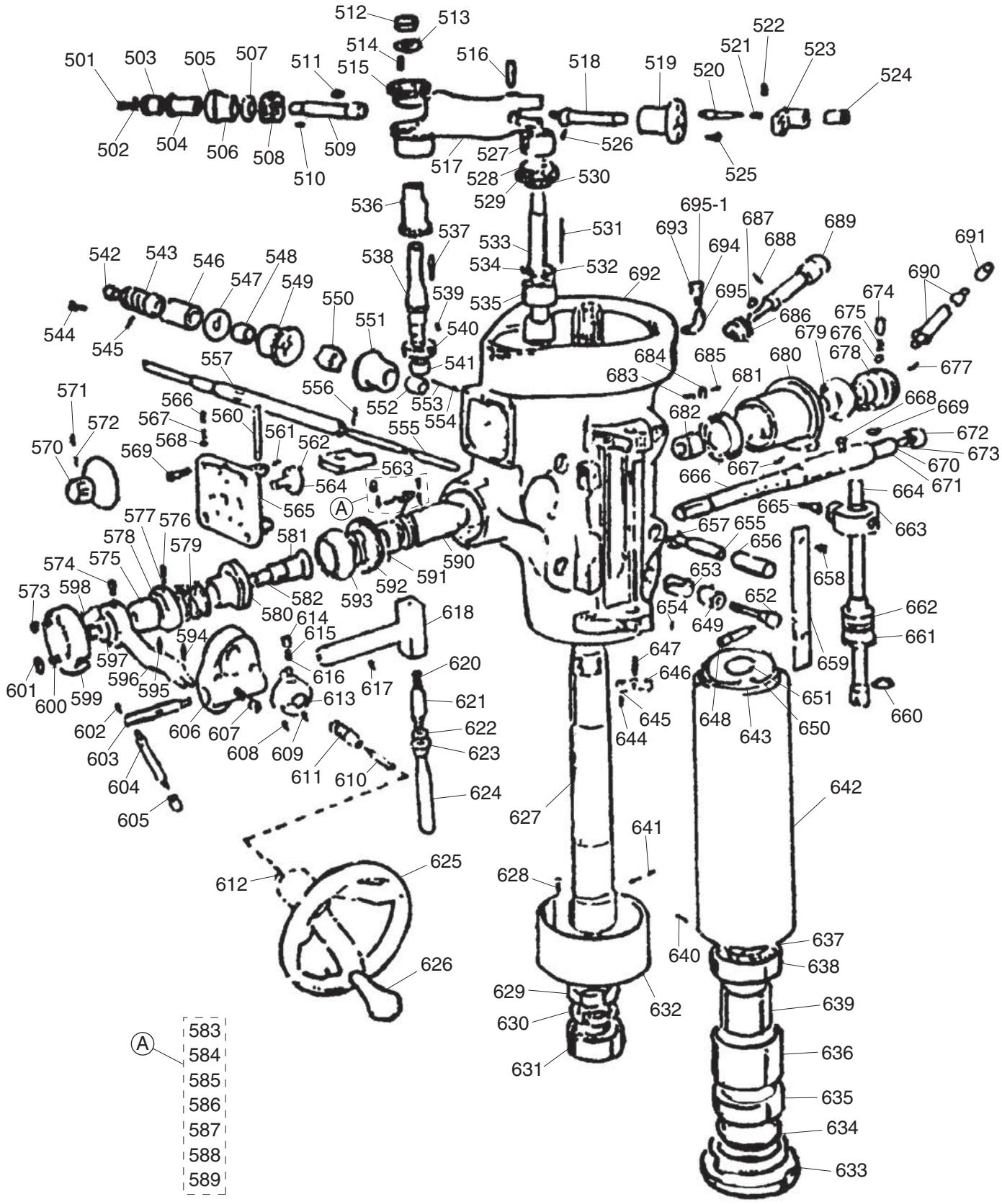
Model G9901/G9902 Drive Assembly Parts List

REF	PART #	DESCRIPTION
301	P9901301	DRAWBAR 24-3/16
302	P9901302	DRAWBAR SPACER
303	P9901303	SPECIAL NUT M33 X 1.5
304	P9901304	SPECIAL NUT M60 X 1.5
305	P9901305	BALL BEARING 7007-OPEN-P5
306	P9901306	SPACER
307	P9901307	SPACER
308	P9901308	BALL BEARING 6007-2RS
309	P9901309	SPRING
311	P9901311	BEARING BRACKET
314	P9901314	CAP SCREW M8-1.25 X 12
315	P9901315	SPRING
316	P9901316	ROLL PIN 2.5 X 16
317	P9901317	BRAKE LOCK STUD
318	P9901318	BRAKE SHOE
319	P9901319	SPINDLE PULLEY
320	P9901320	COUPLING SHAFT
321	P9901321	KEY 8 X 8 X 25
322	P9901322	V-BELT A-32 4L320
323	P9901323	RIBBED TIMING BELT
324	P9901324	PULLEY FLANGE
325	P9901325	TIMING BELT PULLEY
326	P9901326	TABBED LOCK WASHER 16MM
327	P9901327	SET SCREW M5-.8 X 8
328	P9901328	FLANGE NUT M16-1.5
329	P9901329	HANDLE KNOB
330	P9901330	SET SCREW M3-.5 X 5
331	P9901331	HANDLE HUB
331-1	P9901331-1	HANDLE
332	P9901332	PIN
333	P9901333	BUSHING
334	P9901334	SPECIAL WASHER
335	P9901335	TRANSMISSION COVER PLATE
336	P9901336	TAPERED PIN 10 X 30
337	P9901337	CAP SCREW M10-1.5 X 16
338	P9901338	MOTOR RING
339	P9901339	HANDLE
340	P9901340	HANDLE KNOB
341	P9901341	STUD M12-1.75 X 35
342	P9901342	BELT HOUSING
343	P9901343	RIGHT BELT COVER
343-1	P9901343-1	LEFT BELT COVER
343-2	P9901343-2	SPRING PLATE
343-3	P9901343-3	BRACKET
343-4	P9901343-4	HEX NUT M5-.8
343-5	P9901343-5	HEX NUT M6-1
343-6	P9901343-6	CAP SCREW M5-.8 X 16
343-7	P9901343-7	LOCK WASHER 5MM
343-8	P9901343-8	ROLL PIN 4 X 16
343-9	P9901343-9	HOLDER M6-1 X 20
344	P9901344	FLAT WASHER 12MM
344-1	P9901344-1	THICK HEX NUT M12 X 1.75
345	P9901345	HANDLE
345-1	P9901345-1	HANDLE KNOB
346	P9901346	SET SCREW M6-1 X 8
347	P9901347	MOTOR PULLY
348	P9901348	SPECIAL WASHER
349	P9901349	INT RETAINING RING 8MM
350	P9901350	HEX BOLT M8-1.25 X 25
351	P9901351	COTTON CORE TYPE OIL CAP
352	P9901352	OIL CUP ADAPTER
353	P9901353	COPPER TUBE
354	P9901354	PHLP HD SCR M6-1 X 10
355	P9901355	COVER
356	P9901356	KEY 8 X 8 X 16
357	P9901357	WORM COUPLING SHAFT
358	P9901358	BULL GEAR
359	P9901359	CAP SCREW M6-1 X 16
360	P9901360	THREADED CONICAL PIN 8 X 25
361	P9901361	BEARING BRACKET
362	P9901362	BALL BEARING 6203ZZ
363	P9901363	INT RETAINING RING 40MM
364	P9901364	SPLINE SHAFT
365	P9901365	WOODRUFF KEY 5 X 16
366	P9901366	PINION
367	P9901367	BALL BEARING 6203ZZ
368	P9901368	PLUG
371	P9901371	THRUST BEARING 40 X 68 X 15
373	P9901373	TABBED LOCK WASHER 39MM
374	P9901374	FLANGE NUT M39-1.5
375	P9901375	COVER
376	P9901376	CAP SCREW M6-1 X 12
377	P9901377	FLANGE RING SMALL
378	P9901378	FLANGE RING LARGE
379	P9901379	SHIFTER FORK
380	P9901380	ROLL PIN 3 X 25
381	P9901381	CONNECTING BAR
385	P9901385	BRACKET
386	P9901386	CAP SCREW M5-.8 X 8
387	P9901387	SHIM

REF	PART #	DESCRIPTION
388	P9901388	SHAFT BRACKET
389	P9901389	TAPERED PIN 8 X 25
390	P9901390	CAP SCREW M8-1.25 X 16
391	P9901391	LEVER BRACKET
392	P9901392	ROLL PIN 4 X 32
393	P9901393	ECCENTRIC BLOCK
394	P9901394	CONICAL PIN
395	P9901395	PIN
396	P9901396	ROLL PIN 4 X 25
397	P9901397	SPANNER SHAFT

REF	PART #	DESCRIPTION
398	P9901398	SPRING
399	P9901399	HANDLE
400	P9901400	HANDLE KNOB
500	P9901500	MOTOR 2HP,110/220V,1-PH
500-1	P9901500-1	MOTOR FAN
500-2	P9901500-2	MOTOR FAN COVER
500-3	P9901500-3	S. CAP CD60,150MFD,265VAC
500-4	P9901500-4	R. CAP CBB60,20MFD,450VAC
500-5	P9901500-5	WIRING/CAPACITOR JUNCTION BOX
500-6	P9901500-6	TERMINAL BOARD

Headstock Breakdown



Headstock Parts List

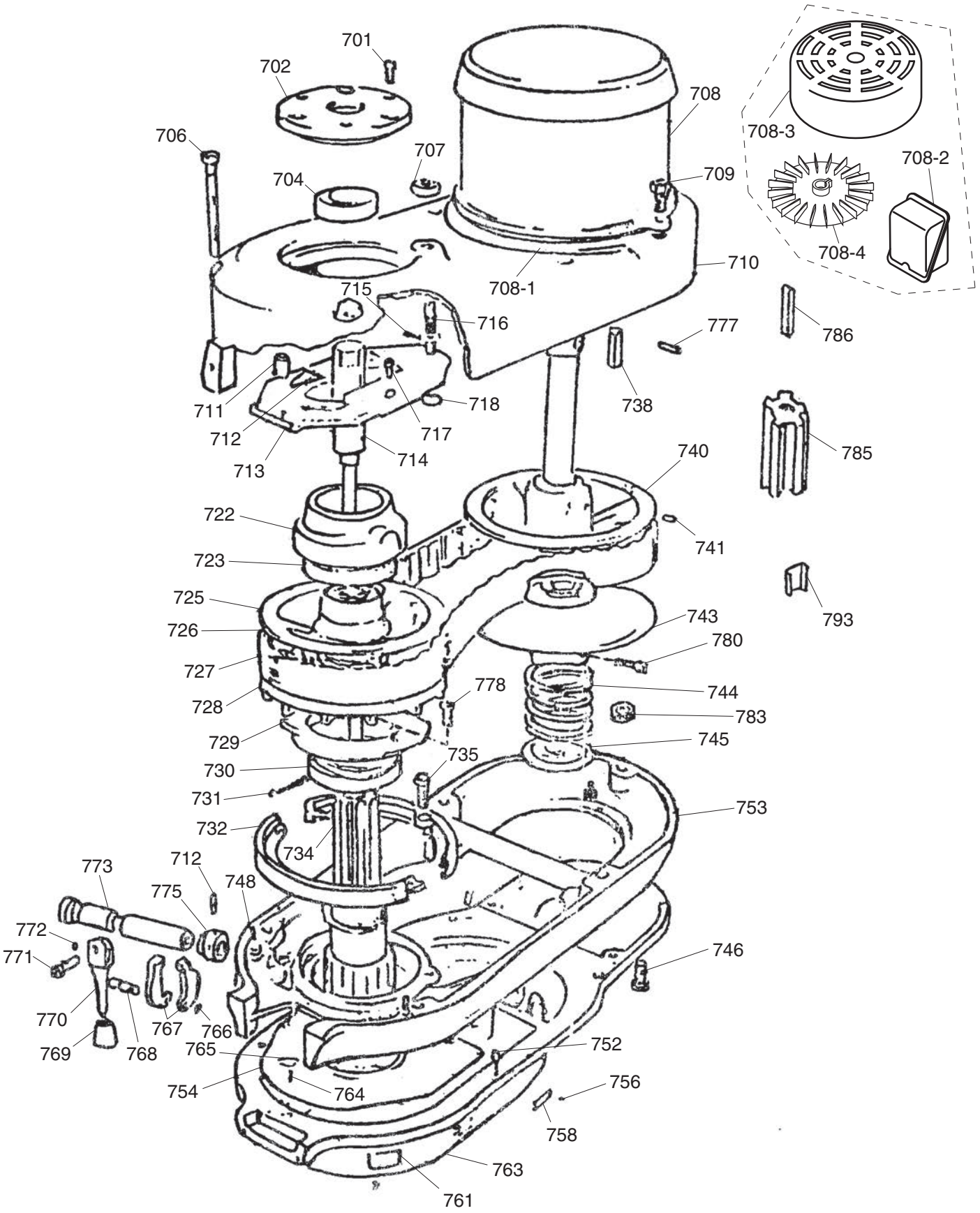
REF	PART #	DESCRIPTION
501	P9901501	HEX NUT M6-1
502	P9901502	LOCK WASHER 6MM
503	P9901503	BEVEL GEAR
504	P9901504	BUSHING
505	P9901505	BUSHING
506	P9901506	SET SCREW M5-.8 X 8
507	P9901507	WORM GEAR SPACER
508	P9901508	WORM GEAR
509	P9901509	SHAFT
510	P9901510	KEY 3 X 3 X 12
511	P9901511	KEY 3 X 3 X 16
512	P9901512	HEX NUT M8-1.25
513	P9901513	FLAT WASHER 8MM
514	P9901514	KEY 3 X 3 X 12
515	P9901515	BEVEL GEAR
516	P9901516	FEED ENGAGE PIN
517	P9901517	WORM GEAR SUPPORT
518	P9901518	SHAFT
519	P9901519	FLANGE
520	P9901520	PLUNGER
521	P9901521	SPRING
522	P9901522	ROLL PIN 3 X 20
523	P9901523	SHIFTER CRANK
524	P9901524	TAPERED KNOB M6 X 20
525	P9901525	CAP SCREW M5-.8 X 12
526	P9901526	SET SCREW M6-1 X 8
527	P9901527	BUSHING
528	P9901528	GEAR
529	P9901529	GEAR
530	P9901530	GEAR
531	P9901531	KEY 3 X 3 X 40
532	P9901532	SET SCREW M6-1 X 8
533	P9901533	BEVEL GEAR SHAFT
534	P9901534	EXT RETAINING RING 14MM
535	P9901535	BUSHING
536	P9901536	GEAR
537	P9901537	KEY 3 X 3 X 20
538	P9901538	GEAR SHAFT
539	P9901539	KEY 3 X 3 X 8
540	P9901540	GEAR
541	P9901541	BUSHING
542	P9901542	BUSHING
543	P9901543	WORM GEAR
544	P9901544	CAP SCREW M6-1 X 15
545	P9901545	ROLL PIN 3 X 16
546	P9901546	BUSHING
547	P9901547	SPECIAL WASHER
548	P9901548	SLEEVE
549	P9901549	BEVEL GEAR
550	P9901550	REVERSE CLUTCH

REF	PART #	DESCRIPTION
551	P9901551	BEVEL GEAR
552	P9901552	BUSHING
553	P9901553	SET SCREW M6-1 X 10
554	P9901554	SET SCREW M6-1 X 8
555	P9901555	SLIDE ROD
556	P9901556	ROLL PIN 3 X 22
557	P9901557	HOLLOW SHAFT
560	P9901560	SMALL SHAFT
561	P9901561	SET SCREW M5-.8 X 6
562	P9901562	PIN
563	P9901563	SLIDE
564	P9901564	ECCENTRIC WHEEL
565	P9901565	CLUSTER GEAR COVER
566	P9901566	SET SCREW M8-1.25 X 18
567	P9901567	COMPRESSION SPRING
568	P9901568	STEEL BALL 3/16"
569	P9901569	CAP SCREW M5-.8 X 16
570	P9901570	DIAL KNOB
571	P9901571	SET SCREW M5-.8 X 6
572	P9901572	SET SCREW M5-.8 X 6
573	P9901573	CAP SCREW M5-.8 X 40
574	P9901574	THREAD PIN
575	P9901575	SLEEVE
576	P9901576	SET SCREW M6-1 X 8
577	P9901577	PLUG 4X2
578	P9901578	SPECIAL NUT M22 X 1.5
579	P9901579	SPRING
580	P9901580	CLUTCH
581	P9901581	COUPLING SHAFT
582	P9901582	KEY
583	P9901583	PHLP HD SCR M4-.7 X 16
584	P9901584	LOCK WASHER 4MM
585	P9901585	SET SCREW M6-1 X 12
586	P9901586	SET SCREW M6-1 X 12
587	P9901587	ADJUSTING WASHER
588	P9901588	COMPRESSION SPRING
589	P9901589	TOP PIN
590	P9901590	SLEEVE
591	P9901591	THRUST BEARING 15 X 28 X 9
592	P9901592	FEED WORM GEAR
593	P9901593	CLUTCH
594	P9901594	ROLL PIN 5 X 16
595	P9901595	ROLL PIN 4 X 20
596	P9901596	CONNECTING ROD
597	P9901597	SPECIAL WASHER 10MM
598	P9901598	EXT RETAINING RING 10MM
599	P9901599	COVER
600	P9901600	SET SCREW M6-1 X 14
601	P9901601	HEX NUT M6-1
602	P9901602	ROLL PIN 5 X 20

REF	PART #	DESCRIPTION
603	P9901603	LEVER
604	P9901604	HANDLE
605	P9901605	HANDLE KNOB
606	P9901606	BRACKET
607	P9901607	CAP SCREW 5/8-11 X 2-1/2
608	P9901608	SET SCREW M6-1 X 8
609	P9901609	KEY 4 X 4 X 8
610	P9901610	FEED REVERSE KNOB STUD
611	P9901611	REVERSE KNOB
612	P9901612	PIN
613	P9901613	RETAINING RING
614	P9901614	STEEL BALL 3/16"
615	P9901615	SPRING
616	P9901616	SET SCREW M8-1.25 X 10
617	P9901617	ROLL PIN 4 X 16
618	P9901618	T-ROD
620	P9901620	SPRING 1.2 X 10 X 25
621	P9901621	SHAFT
622	P9901622	BUSHING
623	P9901623	BUSHING
624	P9901624	PLUNGER
625	P9901625	HANDWHEEL
626	P9901626	HANDWHEEL HANDLE
627	P9901627	SPINDLE
628	P9901628	CAP SCREW M5-.8 X 12
629	P9901629	LOCK NUT
630	P9901630	LOCK NUT
631	P9901631	BALL BEARING 6206 2 RS
632	P9901632	QUILL SKIRT
633	P9901633	NOSE PIECE
634	P9901634	SPINDLE DIRT SHIELD
635	P9901635	THRUST BEARING 40 X 60 X 15
636	P9901636	BEARING SLEEVE
637	P9901637	BEARING SLEEVE
638	P9901638	THRUST BEARING 40 X 60 X 15
639	P9901639	ADJUSTING NUT M39 X 1.5
640	P9901640	SET SCREW M5-.8 X 6
641	P9901641	DOG POINT SET SCREW M5-.8 X 6
642	P9901642	QUILL
643	P9901643	OIL SEALER
644	P9901644	HEX NUT M3-.5
645	P9901645	SET SCREW M3-.5 X 14
646	P9901646	FORKED ROD
647	P9901647	THREAD PIN
648	P9901648	CAP SCREW M4-.7 X 8
649	P9901649	THREADED BUSHING
650	P9901650	RETAINING PLATE

REF	PART #	DESCRIPTION
651	P9901651	EXT RETAINING RING 65MM
652	P9901652	QUILL LOCK BOLT M8-1.25 X 70
653	P9901653	LOCK SLEEVE
654	P9901654	SPECIAL SCREW M6-1 X 8
655	P9901655	T-SLOT BOLT M12-1.75 X 175
656	P9901656	SLEEVE
657	P9901657	HEX NUT M12-1.75
658	P9901658	PHLP HD SCR M4-.7 X 6
659	P9901659	SCALE
660	P9901660	EXT RETAINING RING 15MM
661	P9901661	ADJUSTING NUT
662	P9901662	DIAL
663	P9901663	STOP KNOB
664	P9901664	QUILL LEAD SCREW
665	P9901665	CAP SCREW M10-1.5 X 16
666	P9901666	SHAFT
667	P9901667	KEY 5 X 5 X 20
668	P9901668	SET SCREW M8-1.25 X 10
669	P9901669	PIN
670	P9901670	ROLL PIN 5 X 16
671	P9901671	KEY 5 X 5 X 20
672	P9901672	HEX BOLT M4-.7 X 16
673	P9901673	STOP PLATE
674	P9901674	SET SCREW M8-1.25 X 14
675	P9901675	SPRING
676	P9901676	STEEL BALL 3/16"
677	P9901677	SET SCREW M4-.7 X 16
678	P9901678	HANDLE HUB
679	P9901679	BUSHING
680	P9901680	BUSHING
681	P9901681	COILED SPRING
682	P9901682	GEAR
683	P9901683	LEVER
684	P9901684	SHAFT
685	P9901685	SET SCREW M8-1.25 X 8
686	P9901686	WORM GEAR
687	P9901687	KEY 4 X 4 X 16
688	P9901688	SET SCREW M5-.8 X 6
689	P9901689	SHAFT
690	P9901690	HANDLE
691	P9901691	HANDLE KNOB
692	P9901692	HEADSTOCK
693	P9901693	OIL CUP ADAPTER
694	P9901694	OIL CUP
695	P9901695	TUBING
695-1	P9901695-1	COTTON WIRE

Model G9903 Upper Drive System Breakdown

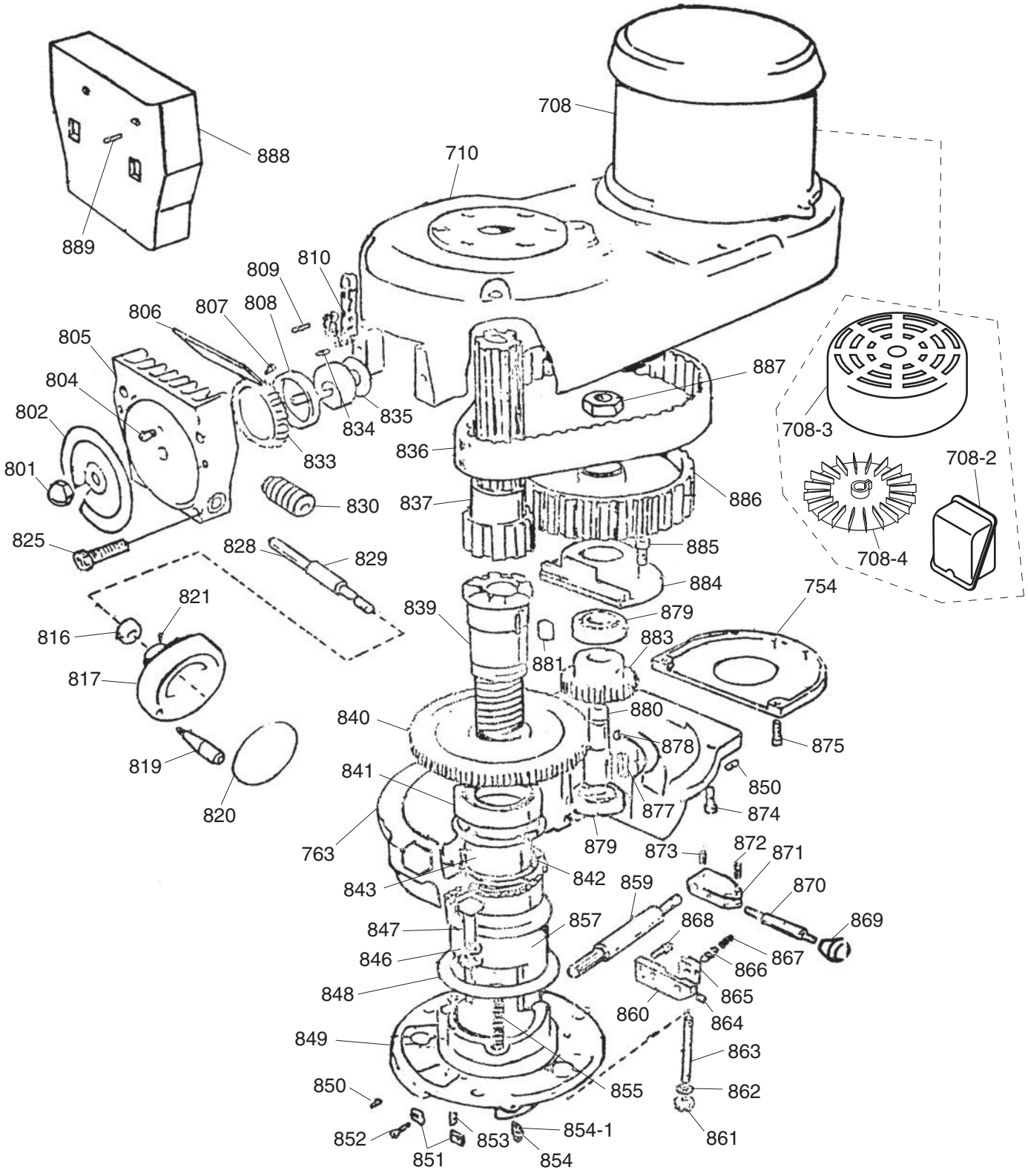


Model G9903 Upper Drive System Breakdown

REF	PART #	DESCRIPTION
701	P9903701	CAP SCREW M6-1 X 16
702	P9903702	BEARING CAP
704	P9903704	BALL BEARING 6007ZZ
706	P9903706	CAP SCREW M8-1.25 X 150
707	P9903707	HEX NUT M10-1.5
708	P9903708	MOTOR 2HP, 220V,3-PH
708-1	P9903708-1	MOTOR MOUNT PLATE
708-2	P9903708-2	MOTOR WIRING JUNCTION BOX
708-3	P9903708-3	MOTOR FAN COVER
708-4	P9903708-4	MOTOR FAN
709	P9903709	HEX BOLT M10-1.5 X 25
710	P9903710	UPPER HOUSING
711	P9903711	SHAFT
712	P9903712	ROLL PIN 4 X 25
713	P9903713	CLAMPING PLATE
714	P9903714	DRAWBAR
715	P9903715	ROLL PIN 3 X 20
716	P9903716	SHAFT
717	P9903717	PHLP HD SCR M4-.7 X 20
718	P9903718	FLAT WASHER 4MM
722	P9903722	BEARING SLIDING HOUSING
723	P9903723	BALL BEARING 6010-2RS
725	P9903725	PULLEY
726	P9903726	RETAINING RING 38MM
727	P9903727	VARIABLE SPEED BELT
728	P9903728	PULLEY
729	P9903729	BEARING CAP
730	P9903730	BALL BEARING 6010-2RS
731	P9903731	BRAKE SPRING
732	P9903732	BRAKE SHOE
734	P9903734	UPPER COUPLING SHAFT
735	P9903735	SET SCREW M6-1 X 10
738	P9903738	KEY 8 X 8 X 25

REF	PART #	DESCRIPTION
740	P9903740	UPPER PULLEY HALF
741	P9903741	SET SCREW M6-1 X 10
743	P9903743	LOWER PULLEY HALF
744	P9903744	COMPRESSION SPRING
745	P9903745	SPRING COLLAR
746	P9903746	CAP SCREW M5-.8 X 25
748	P9903748	CAP SCREW M8-1.25 X 20
752	P9903752	TAPER PIN 8 X 30
753	P9903753	MIDDLE HOUSING
754	P9903754	LOWER COVER
756	P9903756	RIVET C2 X 5
758	P9903758	NAMEPLATE
761	P9903761	NAMEPLATE
763	P9903763	LOWER HOUSING
764	P9903764	PHLP HD SCR M5-.8 X 6
765	P9903765	COVER PLATE
766	P9903766	RETAINING RING 6MM
767	P9903767	BRAKE OPERATING FINGER
768	P9903768	SHAFT
769	P9903769	HANDLE KNOB
770	P9903770	HANDLE
771	P9903771	PIN
772	P9903772	SET SCREW M5-.8 X 6
773	P9903773	SHAFT
775	P9903775	BRACKET
777	P9903777	SET SCREW M6-1 X 10
778	P9903778	CAP SCREW M6-1 X 20
780	P9903780	PHLP HD SCR M5-.8 X 12
783	P9903783	REGULATING RING
785	P9903785	MOTOR SPLINE SLEEVE
786	P9903786	KEY 6 X 6 X 70
793	P9903793	SPLINE SLEEVE

Model G9903 Lower Drive System Breakdown

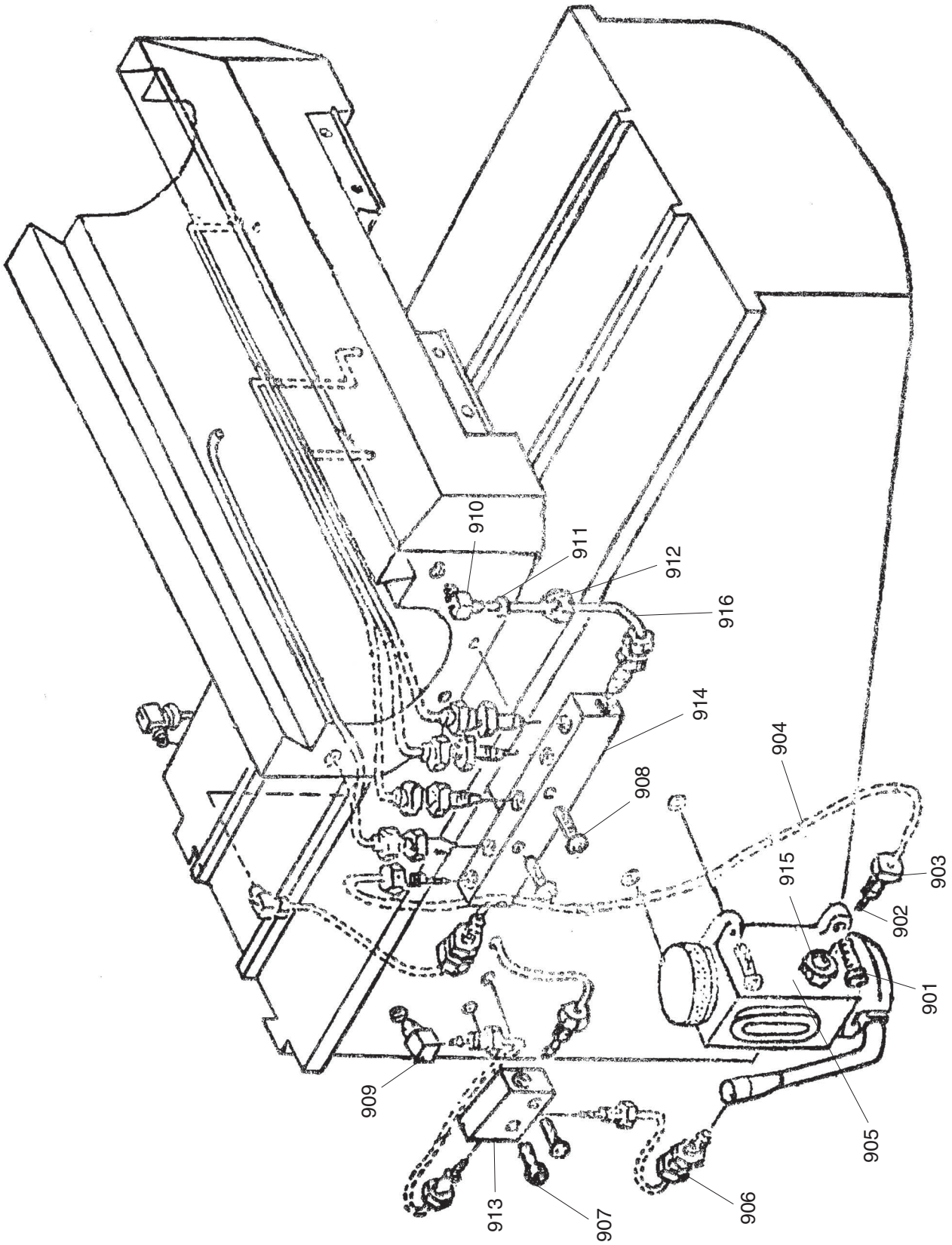


Model G9903 Lower Drive System Parts List

REF	PART #	DESCRIPTION
708	P9903708	MOTOR 2HP, 220V,3-PH
708-2	P9903708-2	MOTOR WIRING JUNCTION BOX
708-3	P9903708-3	MOTOR FAN COVER
708-4	P9903708-4	MOTOR FAN
710	P9903710	UPPER HOUSING
754	P9903754	LOWER COVER
763	P9903763	LOWER HOUSING
801	P9903801	ACORN NUT M8-1.25
802	P9903802	DIAL
804	P9903804	SET SCREW M6-1 X 12
805	P9903805	HOUSING
806	P9903806	CHIP SHIELD
807	P9903807	PHLP HD SCR M4-.7 X 6
808	P9903808	BUSHING
809	P9903809	ROLL PIN 3 X 25
810	P9903810	SPEED CHANGER CHAIN 1/8" X 1/2"
816	P9903816	BUSHING
817	P9903817	HANDWHEEL
819	P9903819	HANDWHEEL HANDLE
820	P9903820	CAUTION PLATE
821	P9903821	SET SCREW M6-1 X 8
825	P9903825	CAP SCREW M6-1 X 35
828	P9903828	SOLID PIN 3 X 12
829	P9903829	SHAFT
830	P9903830	WORM GEAR
833	P9903833	BEVEL GEAR
834	P9903834	KEY 3 X 3 X 8
835	P9903835	SHAFT
836	P9903836	RIBBED TIMING BELT
837	P9903837	UPPER COUPLING SHAFT
839	P9903839	LOWER COUPLING SHAFT
840	P9903840	BULL GEAR
841	P9903841	BALL BEARING 6008ZZ
842	P9903842	INT RETAINING RING 68MM
843	P9903843	SPACER
846	P9903846	FLAT WASHER 10MM
847	P9903847	SPECIAL BOLT
848	P9903848	SPRING SHIM

REF	PART #	DESCRIPTION
849	P9903849	FLANGE
850	P9903850	SET SCREW M6-1 X 6
851	P9903851	GUIDE
852	P9903852	CAP SCREW M4-.7 X 8
853	P9903853	DRIP PIPE
854	P9903854	OIL CUP
854-1	P9903854-1	OIL PIPE ADAPTER
855	P9903855	SPRING
857	P9903857	GEAR SLEEVE
859	P9903859	GEAR SHAFT
860	P9903860	DETENT PLATE
861	P9903861	SPECIAL NUT M12-1.75
862	P9903862	FLAT WASHER 12MM
863	P9903863	THREADED STUD M12-1.75 X 80
864	P9903864	SET SCREW M6-1 X 12
865	P9903865	SET BLOCK
866	P9903866	SET PIN
867	P9903867	COMPRESSION SPRING
868	P9903868	CAP SCREW M5-.8 X 12
869	P9903869	HANDLE KNOB
870	P9903870	HANDLE SHAFT
871	P9903871	HANDLE HUB
872	P9903872	ROLL PIN 3 X 16
873	P9903873	ROLL PIN 3 X 16
874	P9903874	CAP SCREW M8-1.25 X 20
875	P9903875	CAP SCREW M5-.8 X 25
877	P9903877	KEY 6 X 6 X 20
878	P9903878	WOODRUFF KEY 5 X 16
879	P9903879	BALL BEARING
880	P9903880	PINION SHAFT
881	P9903881	KEY
883	P9903883	PINION GEAR
884	P9903884	BEARING CAP
885	P9903885	CAP SCREW M5-.8 X 16
886	P9903886	TIMING PULLEY
887	P9903887	HEX NUT M16-1.5
888	P9903888	FRONT COVER
889	P9903889	CAP SCREW M4-.7 X 20

One-Shot Oiler Breakdown

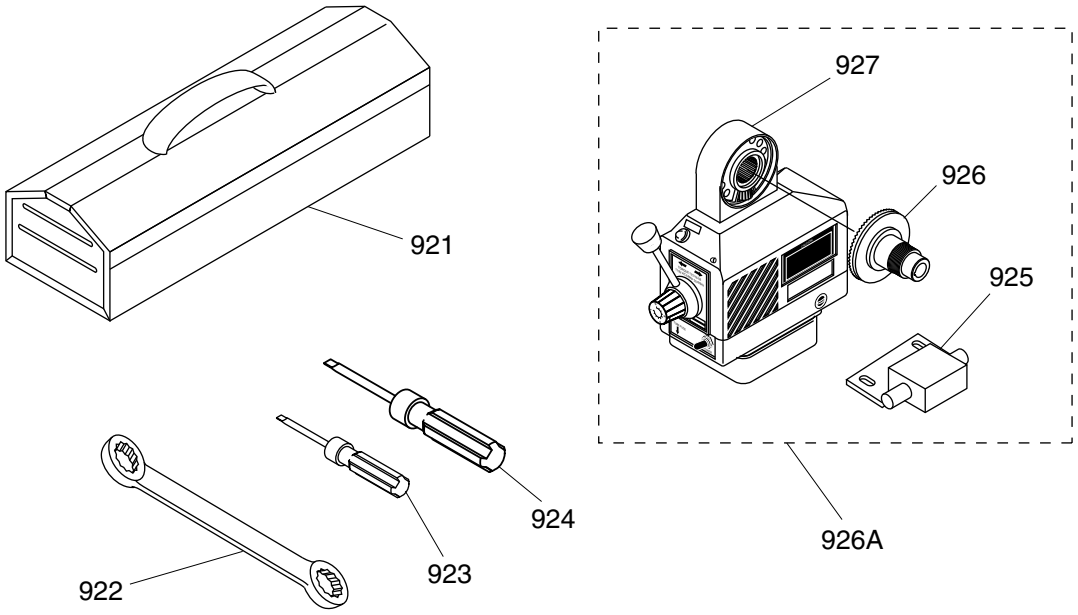


One-Shot Oiler Parts List

REF	PART #	DESCRIPTION
901	P9901901	CAP SCREW M6-1 X 20
902	P9901902	SLEEVE
903	P9901903	SPECIAL BOLT
904	P9901904	NYLON TUBING 4 X 3
905	P9901905	LUBRICATING PUMP
906	P9901906	ADAPTER
907	P9901907	CAP SCREW M5-.8 X 12
908	P9901908	CAP SCREW M5-.8 X 20

REF	PART #	DESCRIPTION
909	P9901909	ELBOW FITTING
910	P9901910	ELBOW FITTING
911	P9901911	SLEEVE
912	P9901912	SPECIAL NUT
913	P9901913	MULTI-WAY JUNCTION
914	P9901914	MULTI-WAY JUNCTION
915	P9901915	FITTING
916	P9901916	BRONZE TUBING 4 X 0.5

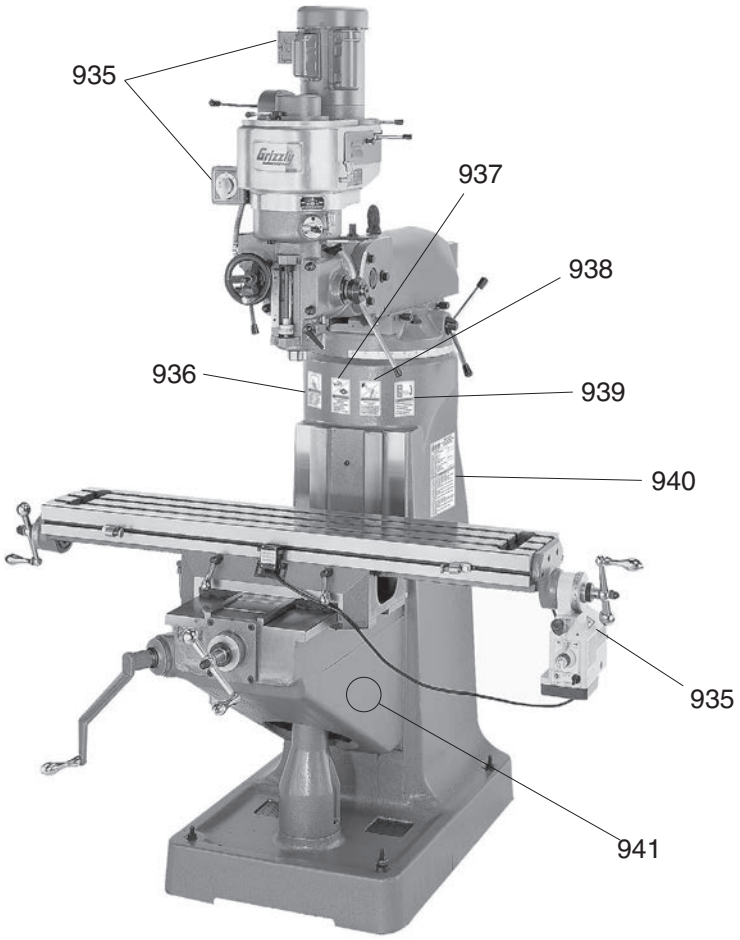
Accessories Breakdown & Parts List



REF	PART #	DESCRIPTION
921	P9901921	TOOL BOX
922	P9901922	WRENCH 17/19MM
923	P9901923	STANDARD SCREWDRIVER 3/8"
924	P9901924	STANDARD SCREWDRIVER 1/4"

REF	PART #	DESCRIPTION
925	P9901925	POWER FEED LIMIT SWTICH
926A	P9901926A	POWER FEED ASSY W/DRIVE GEAR
926	P9901926	POWER FEED BRASS DRIVE GEAR
927	P9901927	POWER FEED UNIT

Label Placement



REF	PART #	DESCRIPTION
935	P9901935	ELECTRICITY LABEL
936	P9901936	READ MANUAL LABEL
937	P9901937	EYE/FACE INJURY HAZARD LABEL
938	P9901938	ENTANGLEMENT HAZARD LABEL
939	P9901939	DISCONNECT WARNING LABEL

REF	PART #	DESCRIPTION
940	P9901940	MACHINE ID LABEL (G9901)
940	P9902940	MACHINE ID LABEL (G9902)
940	P9903940	MACHINE ID LABEL (G9903)
941	P9901941	GRIZZLY GREEN TCH-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.

NOTES

Grizzly Industrial, Inc. WARRANTY CARD

Name _____

Street _____

City _____ State _____ Zip _____

Phone # _____ Email _____

Model # _____ Order # _____ Serial # _____

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

1. How did you learn about us?

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

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

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

3. What is your annual household income?

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

4. What is your age group?

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

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

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

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

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

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

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

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

10. Comments: _____

_____

_____

_____

CUT ALONG DOTTED LINE

FOLD ALONG DOTTED LINE

Place
Stamp
Here

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

FOLD ALONG DOTTED LINE

Send a Grizzly Catalog to a friend:

Name_____

Street_____

City_____State_____Zip_____

TAPE ALONG EDGES--PLEASE DO NOT STAPLE

WARRANTY AND RETURNS

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

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

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

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

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

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