WOODSTOCK

SHOP FOX®

INTERNATIONAL

MODEL M1116
MILL-DRILL w/DRO

Shown with Optional D4780 Stand

OWNER'S MANUAL

(FOR MODELS MANUFACTURED SINCE 06/17)

Phone: (360) 734-3482 • Online Technical Support: techsupport@woodstockint.com

#19003KB 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.

Contents

USE THE QUICK GUIDE PAGE LABELS TO SEARCH OUT INFORMATION FAST!

INTRODUCTION

Woodstock Technical Support

This machine has been specially designed to provide many years of trouble-free service. Close attention to detail, ruggedly built parts and a rigid quality control program assure safe and reliable operation.

Woodstock International, Inc. is committed to customer satisfaction. Our intent with this manual is to include the basic information for safety, setup, operation, maintenance, and service of this product.

We stand behind our machines! In the event that questions arise about your machine, please contact Woodstock International Technical Support at (360) 734-3482 or send e-mail to: **tech-support@shopfox.biz**. Our knowledgeable staff will help you troubleshoot problems and process warranty claims.

If you need the latest edition of this manual, you can download it from **http://www.shopfox.biz**.
If you have comments about this manual, please contact us at:

Woodstock International, Inc.
Attn: Technical Documentation Manager
P.O. Box 2309
Bellingham, WA 98227
Email: manuals@woodstockint.com

MACHINE SPECIFICATIONS

MODEL M1116
VARIABLE-SPEED MILL/DRILL WITH DRO

Product Dimensions

Weight..... 161 lbs.
Width (side-to-side) x Depth (front-to-back) x Height..... 25-1/2 x 19-1/2 x 32-1/2 in.
Footprint (Length x Width)..... 11 x 9 in.
Space Required for Full Range of Movement (Width x Depth)..... 39 x 19-1/2 in.

Shipping Dimensions

Type..... Wood Crate
Content..... Machine
Weight..... 204 lbs.
Length x Width x Height..... 24 x 22 x 32 in.
Must Ship Upright..... Yes

Electrical

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

Motors

Main

Horsepower..... 600W (3/4 HP)
Phase..... Single-Phase
Amps..... 10A
Speed..... 4500 RPM
Type..... High-Torque, Low-Noise DC
Power Transfer ..... Gear Drive
Bearings..... Sealed & Permanently Lubricated
Centrifugal Switch/Contacts Type..... N/A

Main Specifications

Operation Info

Spindle Travel	2 in.
Max Distance Spindle to Column	6-5/8 in.
Max Distance Spindle to Table	8-3/4 in.
Longitudinal Table Travel (X-Axis)	13-1/8 in.
Cross Table Travel (Y-Axis)	4-1/2 in.
Vertical Head Travel (Z-Axis)	8-1/4 in.
Head Tilt (Left/Right)	45 deg.
Drilling Capacity for Cast Iron	5/8 in.
Drilling Capacity for Steel	1/2 in.
End Milling Capacity	5/8 in.
Face Milling Capacity	2 in.

Table Info

Table Length	19-3/4 in.
Table Width	5-3/4 in.
Table Thickness	1-7/8 in.
Table Height (from Floor/Base)	6 in.
Number of T-Slots	3
T-Slot Size	3/8 in.
T-Slots Centers	1-1/2 in.
X/Y-Axis Travel per Handwheel Revolution	0.1 in.
Z-Axis Travel per Handwheel Revolution	0.1 in.

Spindle Info

Spindle Taper	R-8
Number of Vertical Spindle Speeds	Variable
Range of Vertical Spindle Speeds	50 – 200 RPM
Quill Diameter	2.36 in.
Drawbar Thread Size	7/16-20
Drawbar Length	9-7/8 in.
Spindle Bearings	Tapered Roller Bearings

Construction

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

Other

Country of Origin	China
Warranty	2 Years
Approximate Assembly & Setup Time	30 min.
Serial Number Location	ID Label
ISO 9001 Factory	Yes

Features

Dovetail Headstock Column and Table Ways
High-Torque, Low-Noise DC Motor
Variable-Speed Spindle w/DRO
Spindle Elevation DRO
3-Axis Precision Handwheel control
Coarse and Fine Spindle Downfeed
2-Speed Gearbox
Zero-Setting Dials on Handwheels
Hand wheel Dials Feature 0.002" Graduation

Accessories

Drill Chuck 3-16mm w/B16 Taper
Drill Chuck Arbor B16 x R8
Open-Ended Wrenches 8/10, 12/14, 17/19mm
Hex Wrenches 2.5, 3, 4, 5, 6mm
Toolbox
Optional Stand D2780

Controls & Components

Refer to **Figures 2-3** and the following descriptions to become familiar with the basic controls and components of this machine. Understanding these items and how they work will help you understand the rest of the manual and stay safe when operating this machine.

A. High/Low Gearbox Knob: Selects low gear "L" for maximum torque from 50–1000 RPM, or high gear "H" for 100–2000 RPM.

B. Drawbar Cap/Drawbar: Drawbar secures collets and tooling in the spindle.

C. Z-Axis Handwheel: Raises and lowers headstock.

D. Z-Axis Travel Locks: Lock position of headstock to column.

E. Downfeed Selector Knob: Selects between fine and coarse vertical quill travel.

F. Coarse Downfeed Handle: Provides coarse control over vertical quill travel.

G. Fine Downfeed Handwheel: Provides fine control over vertical quill travel.

H. Variable-Speed Knob: Controls spindle speed.

I. Variable-Speed Digital Readout Unit: Displays spindle speed.

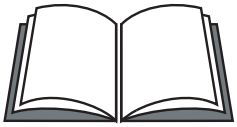
J. OFF Button: Disconnects power for spindle rotation.

K. ON Button: Supplies power for spindle rotation.

L. Spindle Downfeed Digital Readout Unit: Displays a precise reading of vertical positioning of spindle. It can be zeroed at any position and manually increased or decreased independent of spindle position when operation requires it.

M. Quill Lock Lever: Locks vertical position of quill when tightened.

⚠WARNING



To reduce your risk of serious injury or damage to the machine, read this entire manual BEFORE using machine.

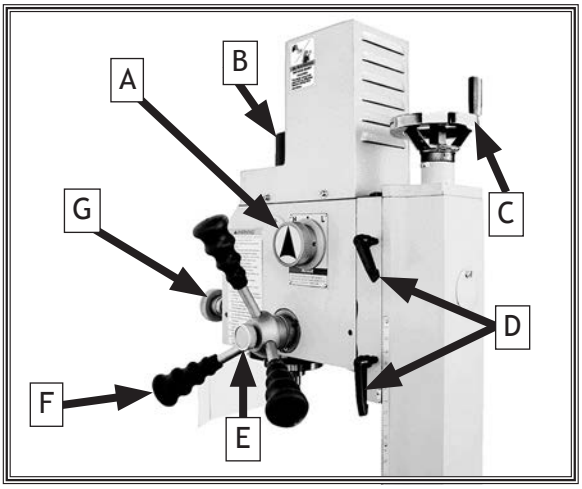


Figure 2. M1116 controls (right side).

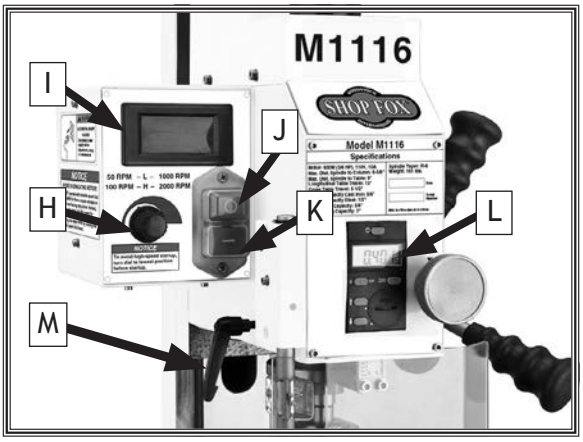


Figure 3. M1116 controls (front).

SAFETY

For Your Own Safety, Read Manual Before Operating 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—this responsibility is ultimately up to the operator!

⚠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.**

NOTICE **This symbol is used to alert the user to useful information about proper operation of the equipment or a situation that may cause damage to the machinery.**

Standard Machinery Safety Instructions

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

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

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

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

ELECTRICAL EQUIPMENT INJURY RISKS. You can be shocked, burned, or killed by touching live electrical components or improperly grounded machinery. To reduce this risk, only allow an electrician or 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 eliminates the risk of injury 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.

WEARING PROPER APPAREL. Do not wear clothing, apparel, or jewelry that can become entangled in moving parts. Always tie back or cover long hair. Wear non-slip footwear to avoid accidental slips, which could cause loss of workpiece control.

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

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

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

INTENDED USAGE. Only use machine for its intended purpose—never make modifications without prior approval from Woodstock International. Modifying machine or using it differently than intended will void the warranty and may result in malfunction or mechanical failure that leads to serious personal injury or death!

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

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

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

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

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

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

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

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

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

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

MAINTAIN POWER CORDS. When disconnecting cord-connected machines from power, grab and pull the plug—NOT the cord. Pulling the cord may damage the wires inside, resulting in a short. 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 Technical Support at (360) 734-3482.

Additional Safety for Mills/Drills

The primary risks of operating a mill are as follows: You can be seriously injured or killed by getting clothing, jewelry, or long hair entangled with rotating cutter/spindle. You can be severely cut or have fingers amputated from contact with the rotating cutter. You can be blinded or struck by broken cutting tools, metal chips, workpieces, or adjustment tools thrown from the rotating spindle with great force. To reduce your risk of serious injury when operating this machine, completely heed and understand the following:

UNDERSTAND ALL CONTROLS. Make sure you understand the function and proper use of all controls before starting. This will help you avoid making mistakes that result in serious injury.

AVOIDING ENTANGLEMENT. DO NOT wear loose clothing, gloves, or jewelry, and tie back long hair. Keep all guards in place and secure. Always allow spindle to stop on its own. DO NOT stop spindle using your hand or any other object.

WEAR FACE SHIELD. Always wear a face shield in addition to safety glasses. This provides more complete protection for your face than safety glasses alone.

USE CORRECT SPINDLE SPEED. Follow recommended speeds and feeds for each size and type of cutting tool. This helps avoid tool breakage during operation and ensures best cutting results.

INSPECT CUTTING TOOL. Inspect cutting tools for sharpness, chips, or cracks before each use. Replace dull, chipped, or cracked cutting tools immediately.

PROPERLY SECURE CUTTER. Firmly secure cutting tool or drill bit so it does not fly out of spindle during operation.

POWER DISRUPTION. In the event of a local power outage during operation, turn spindle switch OFF to avoid a possible sudden startup once power is restored.

CLEAN MACHINE SAFELY. Metal chips or shavings can be razor sharp. DO NOT clear chips by hand or compressed air that can force chips farther into machine—use a brush or vacuum instead. Never clear chips while spindle is turning.

SECURE WORKPIECE TO TABLE. Clamp workpiece to table or secure in a vise mounted to table, so workpiece cannot unexpectedly shift or spin during operation. NEVER hold workpiece by hand during operation.

PROPERLY MAINTAIN MACHINE. Keep machine in proper working condition to help ensure that it functions safely and all guards and other components work as intended. Perform routine inspections and all necessary maintenance. Never operate machine with damaged or worn parts that can break or result in unexpected movement during operation.

DISCONNECT POWER FIRST. To reduce risk of electrocution or injury from unexpected startup, make sure mill/drill is turned OFF, disconnected from power, and all moving parts have come to a complete stop before changing cutting tools or starting any inspection, adjustment, or maintenance procedure.

REMOVE CHUCK KEY & SPINDLE TOOLS. Always remove chuck key, drawbar wrench, and other tools used on the spindle immediately after use. This will prevent them from being thrown by the spindle upon startup.

ELECTRICAL

Circuit Requirements

This machine must be connected to the correct size and type of power supply circuit, or fire or electrical damage may occur. Read through this section to determine if an adequate power supply circuit is available. If a correct circuit is not available, a qualified electrician MUST install one before you can connect the machine to power.

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.)

Full-Load Current Rating

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

Full-Load Current Rating at 110V ..... 10 Amps

Circuit Requirements for 110V

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

Circuit Type ..... 110V/120V, 60 Hz, Single-Phase
Circuit Size ..... 15 Amps
Plug/Receptacle ..... NEMA 5-15

⚠WARNING

The machine must be properly set up before it is safe to operate. DO NOT connect this machine to the power source until instructed to do so later in this manual.

⚠WARNING

Incorrectly wiring or grounding this machine can cause electrocution, fire, or machine damage. To reduce this risk, only an electrician or qualified service personnel should do any required electrical work on this machine.

NOTICE

The circuit requirements listed in this manual apply to a dedicated circuit—where only one machine will be running at a time. If this machine will be connected to a shared circuit where multiple machines will be running at the same time, consult with an electrician to ensure that the circuit is properly sized for safe operation.

Grounding Requirements

This machine MUST be grounded. In the event of certain types of malfunctions or breakdowns, grounding provides a path of least resistance for electric current to travel—in order to reduce the risk of electric shock.

Improper connection of the equipment-grounding wire will increase the risk of electric shock. The wire with green insulation (with/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.

For 110V Connection

This machine is equipped with a power cord with an equipment-grounding wire and NEMA 5-15 grounding plug (see figure). The plug must only be inserted into a matching receptacle that is properly installed and grounded in accordance with local codes and ordinances.

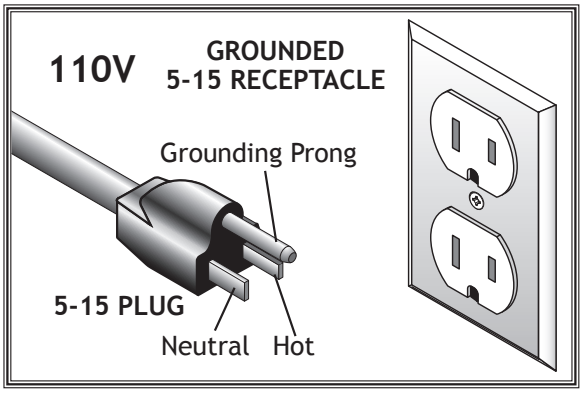
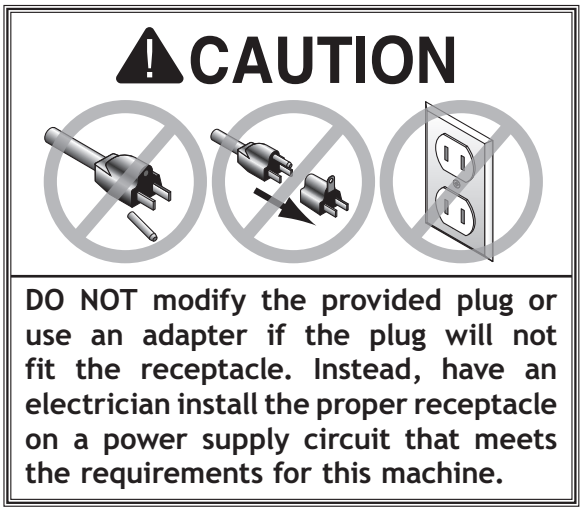


Figure 4. NEMA 5-15 plug & receptacle.



DO NOT modify the provided plug or use an adapter if the plug will not fit the receptacle. Instead, have an electrician install the proper receptacle on a power supply circuit that meets the requirements for this machine.

Extension Cords

We do not recommend using an extension cord with this machine. Extension cords cause voltage drop, which may damage electrical components and shorten motor life. Voltage drop increases with longer extension cords and smaller gauge sizes (higher gauge numbers indicate smaller sizes).

Any extension cord used with this machine must contain a ground wire, match the required plug and receptacle, and meet the following requirements:

Minimum Gauge Size at 110V ..... 14 AWG
Maximum Length (Shorter is Better)..... 50 ft.

SETUP

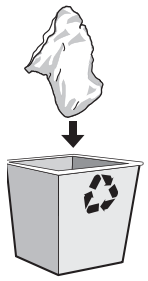
Unpacking

This machine has been carefully packaged for safe transportation. If you notice the machine has been damaged during shipping, please contact your authorized Shop Fox dealer immediately.

Items Needed for Setup

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

Description	Qty
• Additional People	1
• Safety Glasses	1
• Cleaner/Degreaser **(Page 14)**	As Needed
• Disposable Shop Rags	As Needed
• Forklift	1
• Lifting Sling (rated for at least 300 lbs.) **(Page 16)**	1
• Mounting Hardware **(Page 17)**	As Needed
• Brass Hammer **(Page 25)**	1
• Mineral Spirits **(Page 18)**	As Needed
• Wood Block **(Page 18)**	1



WARNING

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

WARNING

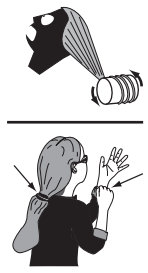
This machine presents serious injury hazards to untrained users. Read through this entire manual to become familiar with the controls and operations before starting the machine!

WARNING

Wear safety glasses during entire setup process!

WARNING

USE helpers or power lifting equipment to lift this machine. Otherwise, serious personal injury may occur.



WARNING

ENTANGLEMENT HAZARD! Tie back long hair, roll up sleeves, and remove loose clothing, jewelry, or gloves to prevent getting caught in moving parts.

Inventory

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

Note: *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.*

Inventory (Figure 5)	**Qty**
A. Handwheel Handles w/Shoulder Screws	3
B. Bottle for Oil	1
C. Toolbox	1
D. Drill Chuck Arbor R8 x B16	1
E. Spindle Pin	1
F. Standard Screwdriver #2	1
G. Phillips Screwdriver #2	1
H. Open-End Wrench 8/10mm	1
I. Open-End Wrench 12/14mm	1
J. Open-End Wrench 17/19mm	1
K. Drill Chuck 3–16mm w/Chuck Key	1
L. T-Bolt Assemblies M8-1.25 x 55	2
M. Hex Wrenches 2.5, 3, 4, 5, 6mm	1 Each

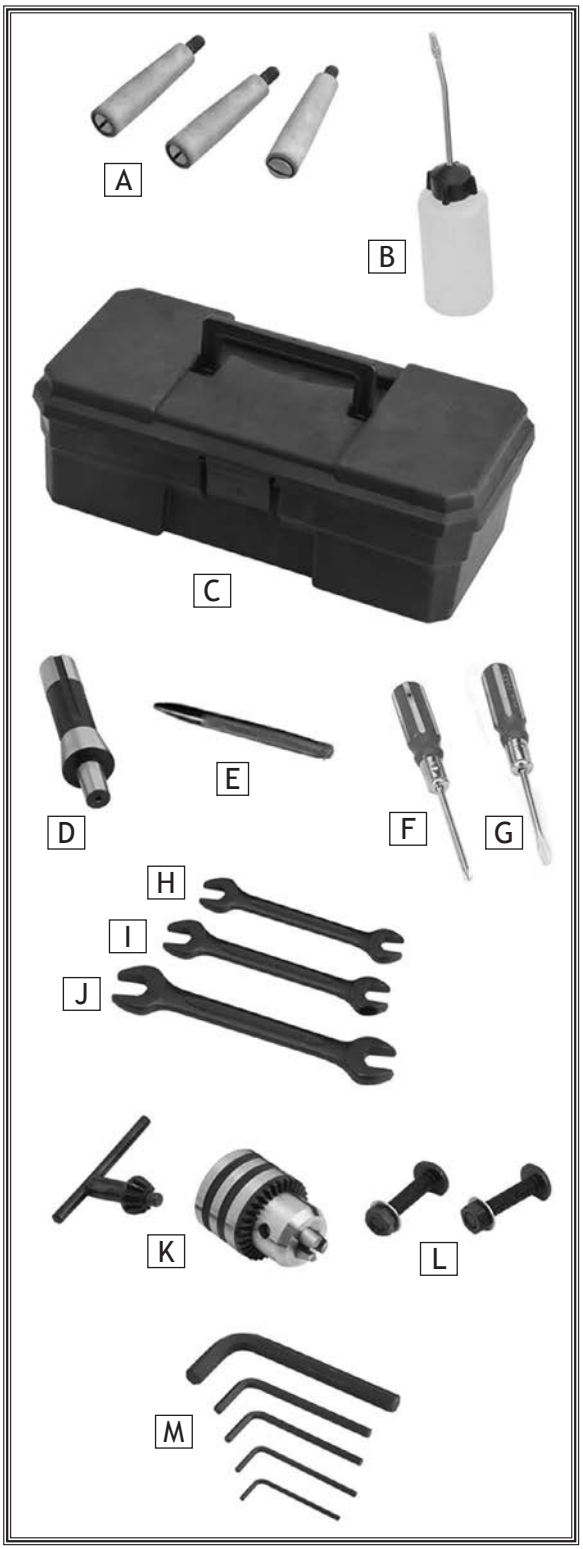


Figure 5. M1116 inventory.

Cleaning Machine

To prevent corrosion during shipment and storage of your machine, the factory has coated the bare metal surfaces of your machine with a heavy-duty rust prevention compound.

If you are unprepared or impatient, this compound can be difficult to remove. To ensure that the removal of this coating is as easy as possible, please gather the correct cleaner, lubricant, and tools listed below:

- Cleaner/degreaser designed to remove storage wax and grease
- Safety glasses & disposable gloves
- Solvent brush or paint brush
- Disposable Rags

To remove rust preventative coating, do these steps:

1. DISCONNECT MACHINE FROM POWER!

2. Put on safety glasses and disposable gloves.

3. Coat the rust preventative with a liberal amount of cleaner/degreaser, then let it soak for 5–10 minutes.

4. Wipe off surfaces. If your cleaner/degreaser is effective, the coating will wipe off easily.

   Tip: An easier way to clean off thick coats of rust preventative from flat surfaces is to use a PLASTIC paint scraper to scrape off the majority of the coating before wiping it off with your rag. (Do not use a metal scraper or you may scratch your machine.)

5. Repeat cleaning steps as necessary until all of the compound is removed.

6. To prevent rust on freshly cleaned surfaces, immediately coat with a quality metal protectant.

⚠WARNING

Gasoline and petroleum products have low flash points and can explode or cause fire if used to clean machinery. Avoid using these products to clean machinery. Many cleaning solvents are toxic if inhaled. Minimize your risk by only using these products in a well ventilated area.

NOTICE

In a pinch, automotive degreasers, mineral spirits or WD•40 can be used to remove rust preventative coating. Before using these products, though, test them on an inconspicuous area of your paint to make sure they will not damage it.

Machine Placement

Weight Load

Refer to the **Machine Specifications** for the weight of your machine. Make sure that the surface upon which the machine is placed will bear the weight of the machine, additional equipment that may be installed on the machine, and the heaviest workpiece that will be used. Additionally, consider the weight of the operator and any dynamic loading that may occur when operating the machine.

Space Allocation

Consider the largest size of workpiece that will be processed through this machine and provide enough space around the machine for adequate operator material handling or the installation of auxiliary equipment. With permanent installations, leave enough space around the machine to open or remove doors/covers as required by the maintenance and service described in this manual. **See below for required space allocation.**

⚠CAUTION

Children or untrained people may be seriously injured by this machine. Only install in an access restricted location.

Physical Environment

The physical environment where your machine is operated is important for safe operation and the longevity of its components. For best results, operate this machine in a dry environment that is free from excessive moisture, hazardous chemicals, airborne abrasives, or extreme conditions. Extreme conditions for this type of machinery are generally those where the ambient temperature range exceeds 41°–104°F; the relative humidity range exceeds 20–95% (non-condensing); or the environment is subject to vibration, shocks, or bumps.

Electrical Installation

Place this machine near an existing power source. Make sure all power cords are protected from traffic, material handling, moisture, chemicals, or other hazards. Make sure to leave access to a means of disconnecting the power source or engaging a lockout/tagout device.

Lighting

Lighting around the machine must be adequate enough that operations can be performed safely. Shadows, glare, or strobe effects that may distract or impede the operator must be eliminated.

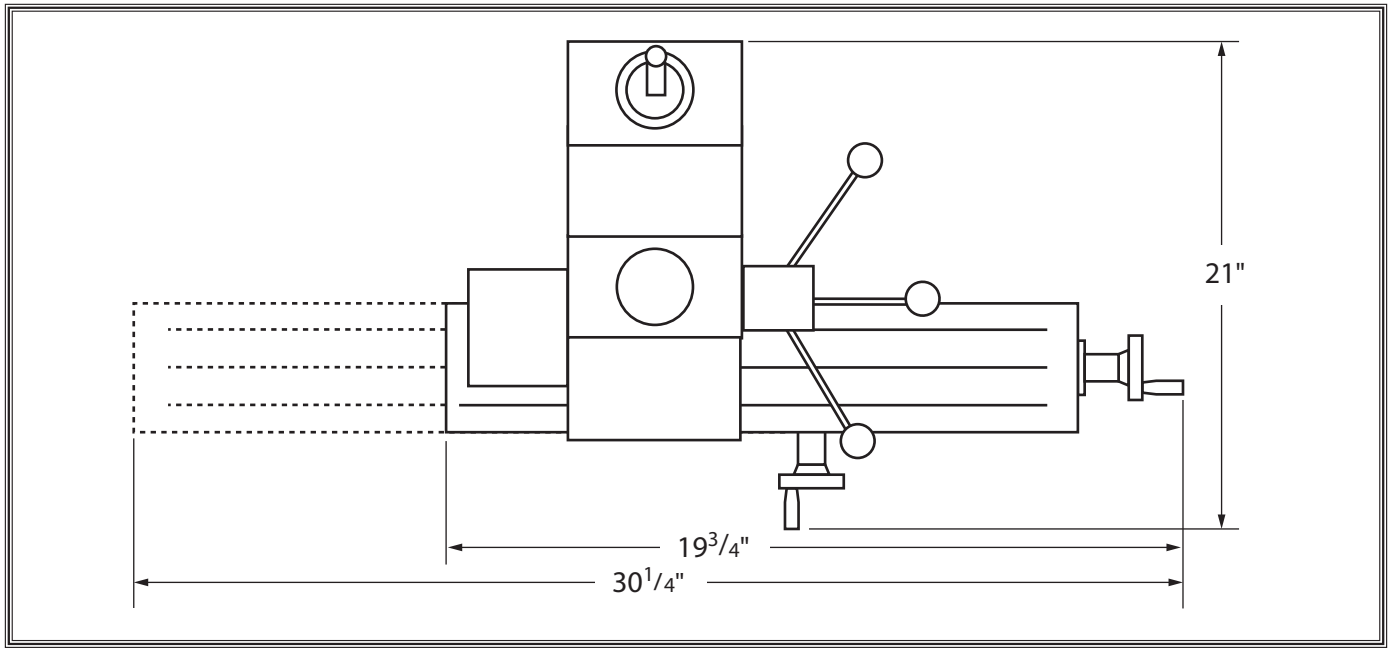


Figure 6. Working clearances.

Lifting & Moving

Use a forklift to lift the machine off the pallet and onto a suitable location.

The Model M1116 mill/drill can be mounted to a workbench or optional stand D4780 (see **Figure 7**). The stand is specifically designed for Model M1116 and comes with pre-drilled mounting holes.

To lift machine and place it in position, do these steps:

1. Place shipping crate next to workbench (or stand D4780) where machine will be placed.

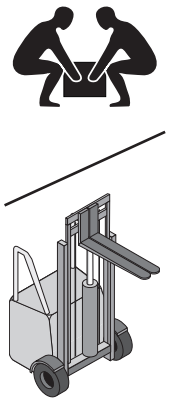
2. Use vertical handwheel to raise headstock as far as possible (see **Figure 8**). Lock headstock in place to avoid sudden shifts during lifting.

3. Hang lifting sling from forklift fork and place it under headstock, as shown in **Figure 8**. DO NOT place sling over any controls or against any components that may be damaged from the force required for lifting.

4. Unbolt machine from pallet. Have an assistant on the ground steady machine to prevent it from swinging and lift it slightly off the pallet with forklift.

5. Carefully place machine onto workbench or optional stand D4780.

6. Mount machine to workbench following instructions in **Bench Mounting** on **Page 17,** or to stand following instructions included with stand.



⚠WARNING

HEAVY LIFT!

Straining or crushing injury may occur from improperly lifting the machine or some of its parts. To reduce this risk, get help from other people and use a forklift (or other lifting equipment) rated for weight of machine.

Figure 7. Optional stand D4780 for Model M1116.

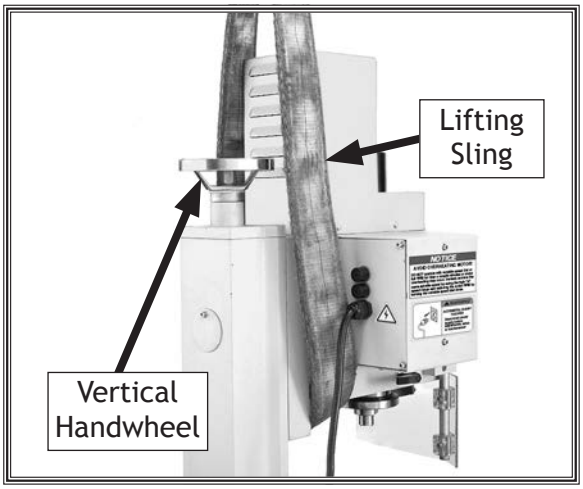


Figure 8. Headstock positioned for lifting.

Bench Mounting

Number of Mounting Holes..... 4
Diameter of Mounting Hardware Needed..... 1/2"

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

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

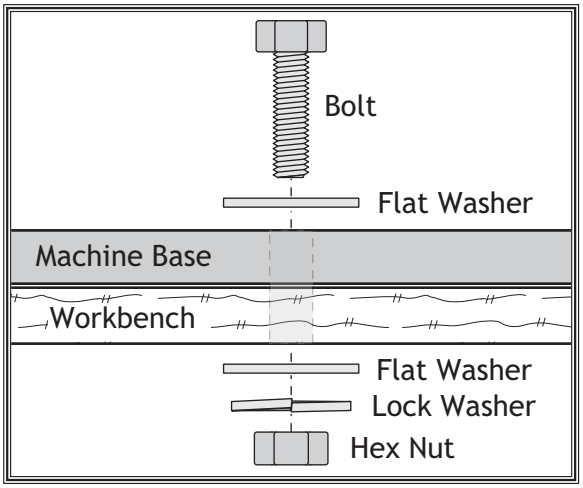


Figure 9. Typical "Through Mount" setup.

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

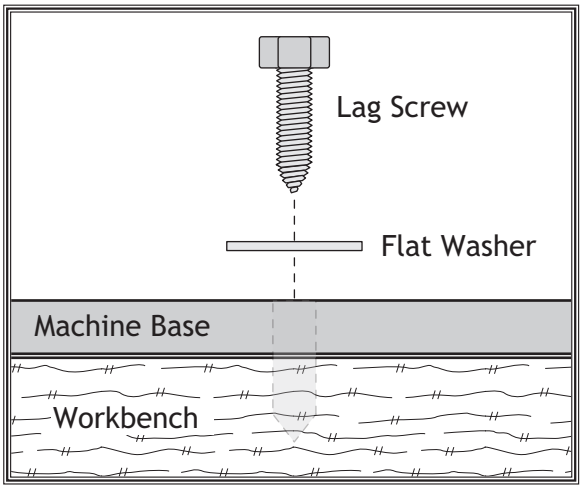


Figure 10. Typical "Direct Mount" setup.

Assembly

Except for the handwheel handles, the mill/drill is fully assembled at the factory.

Use a standard screwdriver to attach handwheel handles (see **Figures 11**–**12**).

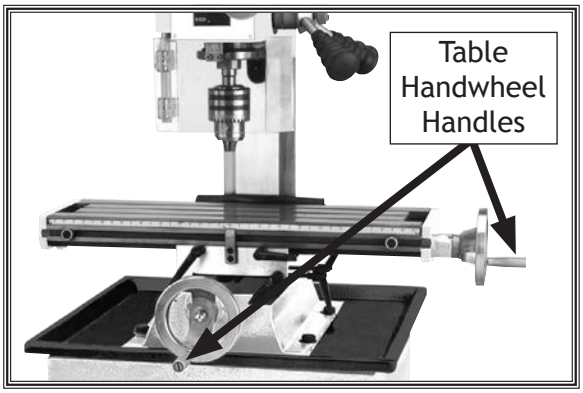


Figure 11. X- and Y-axis handwheel handles attached.

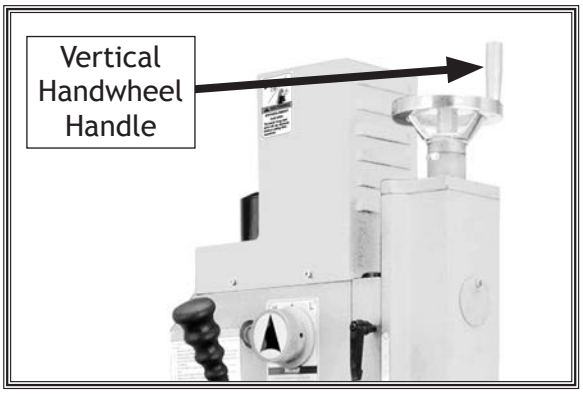


Figure 12. Z-axis handwheel handle attached.

Joining Drill Chuck & Arbor

A B16 x R8 arbor is included for the drill chuck that comes with this machine. The following procedure describes how to install the arbor in the chuck.

After the arbor is installed in the drill chuck, it is very difficult to separate the assembly. If you would like to use a different chuck in the future, we recommend getting a new arbor for that chuck.

IMPORTANT: DO NOT install the drill chuck and arbor into the spindle until AFTER the test run.

To join drill chuck and arbor, do these steps:

1. Use mineral spirits to clean drill chuck and arbor mating surfaces, especially the bore.
2. Retract chuck jaws completely into chuck.
3. Insert small end of arbor into chuck.
4. Hold assembly by arbor and tap chuck onto a block of wood with medium force, as illustrated in **Figure 13**.
5. Attempt to separate drill chuck and arbor by hand. If you can pull them apart, repeat **Step 4**.

Note: Refer to Installing/Removing Tooling section on **Page 25** for installing arbor into spindle instructions.

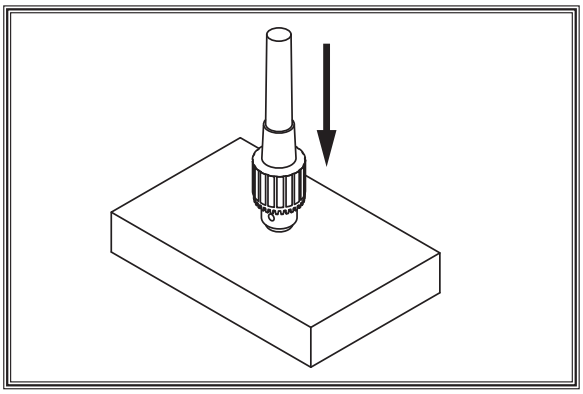


Figure 13. Tapping drill chuck/arbor on block of wood.

Lubrication

The lubrication procedures highlighted in the Lubrication subsection of **SECTION 6: MAINTENANCE** must be completed before performing the test run or spindle break-in.

NOTICE

Damage caused by running the mill/drill without first properly lubricating headstock gears will not be covered under warranty.

Test Run

Once assembly is complete, test run the machine to ensure it is properly connected to power and safety components are functioning properly.

If you find an unusual problem during the test run, immediately stop the machine, disconnect it from power, and fix the problem BEFORE operating the machine again. The **Troubleshooting** table in the **SERVICE** section of this manual can help.

To test run mill/drill, do these steps:

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

2. Press ***OFF*** button (see **Figure 14**). This will help prevent unexpected startup when machine is connected to power.

3. Rotate variable-speed knob to lowest setting.

4. Rotate high/low gearbox knob to low "L" gear setting (see **Figure 15**).

   Note: When switching between gears, it may be necessary to rotate spindle by hand so gears will align and engage.

5. Connect mill/drill to power supply.

6. Press ***ON*** button. Spindle should begin to rotate clockwise (as viewed from top), and machine should run smoothly with little or no vibration or rubbing noises.

7. Press ***OFF*** button.

8. Open chip guard half way and press ***ON*** button. Machine should not start.

   — If machine does start (with chip guard opened half way), press ***OFF*** button and immediately disconnect power to machine. The chip guard safety feature is not working correctly. This safety feature must work properly before proceeding with regular operations. Refer to **Troubleshooting** table in this manual.

Congratulations! The **Test Run** is complete. Continue to **Spindle Break-In**.

⚠WARNING

Serious injury or death can result from using this machine BEFORE understanding its controls and related safety information. DO NOT operate, or allow others to operate, machine until the information is understood.

⚠WARNING

DO NOT start machine until all preceding setup instructions have been performed. Operating an improperly set up machine may result in malfunction or unexpected results that can lead to serious injury, death, or machine/property damage.

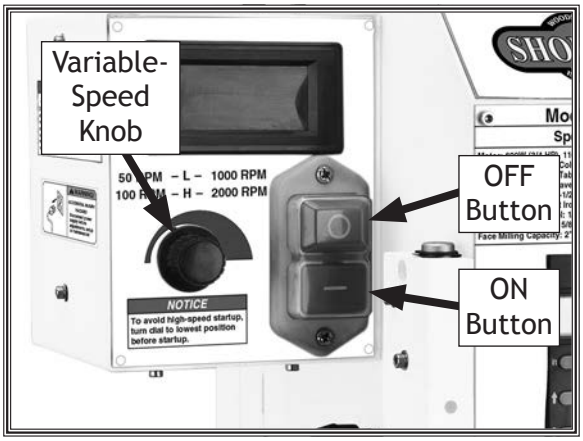


Figure 14. Location of mill/drill controls (front).

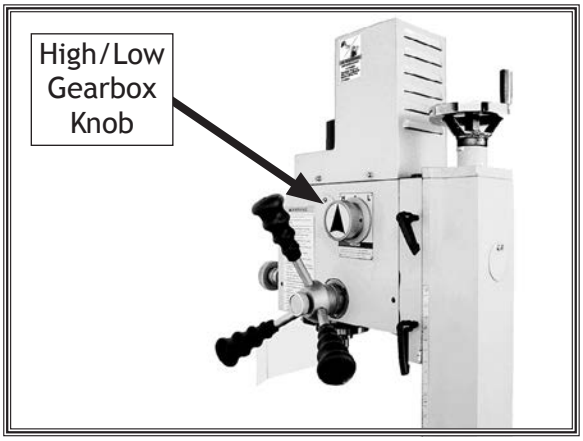


Figure 15. Rotate gearbox knob right for low setting.

Spindle Break-In

The spindle break-in procedure distributes lubrication throughout the bearings to reduce the risk of early bearing failure if there are any "dry" spots or areas where lubrication has settled in the bearings. You must complete this procedure before placing operational loads on the spindle for the first time when the machine is new or if it has been sitting idle for longer than 6 months.

Always start the spindle break-in at the lowest speed to minimize wear if there are dry spots. Allow the spindle to run long enough to warm up and distribute the bearing grease, then incrementally increase spindle speeds and repeat this process at each speed until reaching the maximum spindle speed. Following the break-in procedure in this progressive manner helps minimize any potential wear that could occur before lubrication is fully distributed.

To perform spindle break-in procedure, do these steps:

1. Successfully complete **Test Run** procedure beginning on **Page 19**.
2. Rotate variable-speed knob to 50 RPM and high/low gearbox knob to low "L".
3. Press ***ON*** button.
4. Run spindle for minimum of 10 minutes.
5. Without stopping spindle, use variable-speed knob to run machine at 500 and 1000 RPM for 10 minutes each.

NOTICE

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

6. Press ***OFF*** button.
7. Rotate variable-speed knob to 100 RPM and high/low gearbox knob to high "H".
8. Press ***ON*** button.
9. Run machine for a minimum of 10 minutes.
10. Without stopping spindle, use variable-speed knob to run machine at 1000 and 2000 RPM for 10 minutes each.
11. Press ***OFF*** button.

The spindle break-in of the machine is now complete!

Inspections & Adjustments

The following adjustments were performed at the factory before the machine was shipped:

Be aware that these can change during the shipping process. Pay careful attention to these adjustments when first operating the machine. If you find that the adjustments are not set to your personal preferences, re-adjust them.

OPERATIONS

General

This machine will perform many types of operations that are beyond the scope of this manual. Many of these operations can be dangerous or deadly if performed incorrectly.

The instructions in this section are written with the understanding that the operator has the necessary knowledge and skills to operate this machine. If at any time you are experiencing difficulties performing any operation, stop using the machine!

The overview below provides the novice machine operator with a basic understanding of how the machine is used during operation, so the machine controls/components discussed later in this manual are easier to understand. Due to its generic nature, this overview is **NOT** intended to be an instructional guide.

To complete typical operation, operator does the following:

1. Examines workpiece to make sure it is suitable for cutting/drilling.
2. Puts on personal protective equipment.
3. Securely clamps workpiece to table.
4. With machine disconnected from power, installs correct tooling.
5. Adjusts headstock height above table.
6. Rotates variable-speed knob to lowest setting.
7. Selects correct gear setting on gearbox.
8. Connects machine to power and presses ***ON*** button and rotates variable-speed knob to correct spindle speed.
9. Uses downfeed controls or table controls to perform operation.
10. Presses ***OFF*** button and waits for spindle to completely stop before removing workpiece, changing tooling, or changing spindle speeds.

⚠WARNING

To reduce your risk of serious injury or damage to the machine, read this entire manual BEFORE using machine.

⚠WARNING

To reduce the risk of eye injury, always wear ANSI-approved safety glasses and face shield while operating this machine.

NOTICE

If you are an inexperienced operator, we strongly recommend that you read books or trade articles, or seek training from an experienced operator of this type of machinery before performing unfamiliar operations. Above all, safety must come first!

Downfeed Controls

Identification (Figure 16)

A. Quill Lock Lever
B. Spindle Downfeed DRO
C. Fine Downfeed Handwheel
D. Coarse Downfeed Handle
E. Downfeed Selector Knob

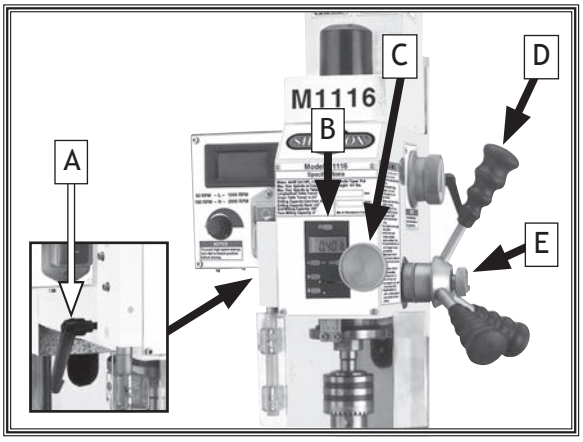


Figure 16. Identification of downfeed controls.

Using DRO

1. Press Power/⏻ button (see **Figure 17**). A reading should appear on display.

2. Press in/mm button to select inches or millimeters. Each press of button switches between units.

3. Press ZERO to "zero" readout at any time. Current reading will be cleared and scale will reset to 0.00.

   To increase or decrease reading, press ▲ or ▼ button. This is useful when calibrating mill/drill to known dimensions on a workpiece.

4. Press Power/⏻ button when operation is complete.

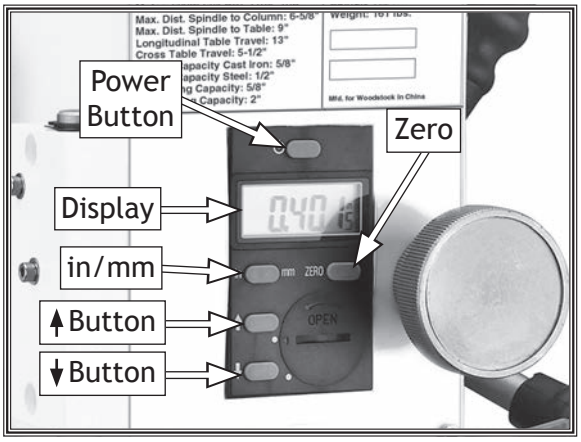


Figure 17. Identification of digital readout controls.

Using Coarse Downfeed

1. Loosen downfeed selector knob to engage coarse downfeed handles.

2. Loosen quill lock lever.

3. Turn on spindle digital readout and zero it out.

4. Use coarse downfeed handles to raise and lower spindle while referencing spindle digital readout for precise movement.

Using Fine Downfeed

1. Tighten downfeed selector knob to engage fine downfeed handwheel.

2. Loosen quill lock lever.

3. Turn on spindle digital readout and zero it out.

4. Rotate fine downfeed handwheel to raise and lower spindle while referencing spindle digital readout for precise movement.

Headstock Movement

The headstock moves in the following ways:

- Travels up and down the column (Z-axis).
- Tilts 45° left or right relative to the table.

Raising/Lowering Headstock

1. DISCONNECT MACHINE FROM POWER!

2. Loosen both Z-axis lock levers shown in **Figure 18**.

3. Use vertical handwheel shown in **Figure 18** to adjust headstock height.

4. Retighten lock levers.

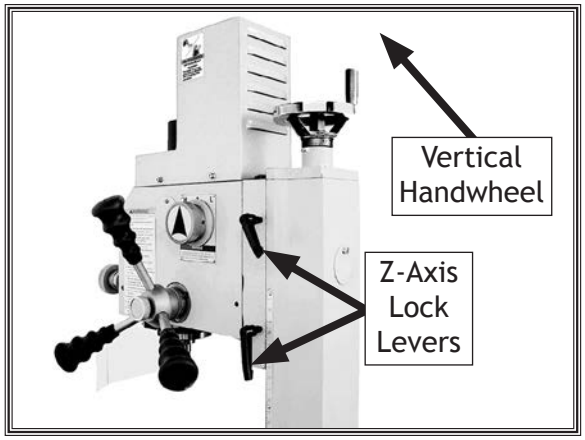


Figure 18. Location of Z-axis lock levers.

Tilting Headstock

Tools Needed	**Qty**
Wrench 19mm	1
Wrench 14mm	1

To tilt headstock, do these steps:

1. DISCONNECT MACHINE FROM POWER!

2. Support headstock with one hand, then loosen headstock center bolt and angle lock nut (see **Figure 19**).

3. While watching tilt scale, rotate headstock to required angle, then retighten center bolt and angle lock nut to secure headstock.

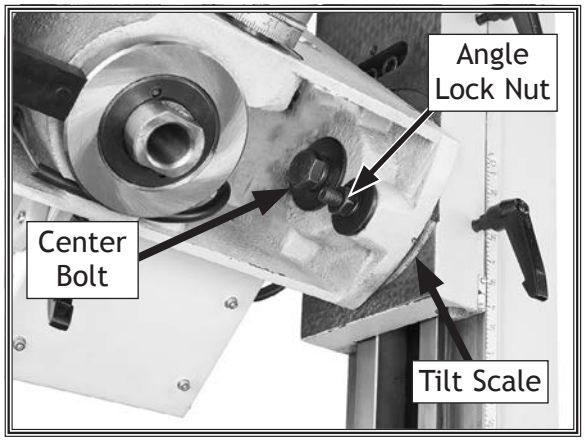


Figure 19. Headstock tilt controls.

Table Travel

The table travels in two directions and is controlled by handwheels, as illustrated in **Figure 20**:

- X-axis (longitudinal)
- Y-axis (cross)

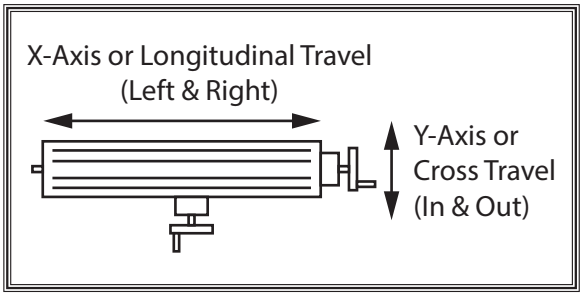


Figure 20. Possible directions of table travel.

Graduated Dials

The handwheels have graduated dials that are used to determine table movement in 0.002" increments, with one full revolution equalling 0.100".

Rotate graduated dial to a relative starting point (see **Figure 21**).

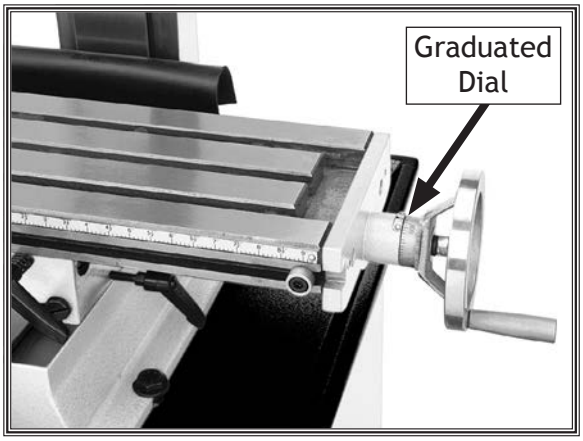


Figure 21. Graduated dial location.

X-Axis Handwheel

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

To use X-axis handwheel, do these steps:

1. Loosen both X-axis table locks shown in **Figure 22.**

   Note: *To re-adjust positioning of table locks, pull out on table lock handle and rotate.*

2. Position table stops along front of table to restrict table travel.

3. Adjust X-axis graduated dial to zero, then use handwheel to move table.

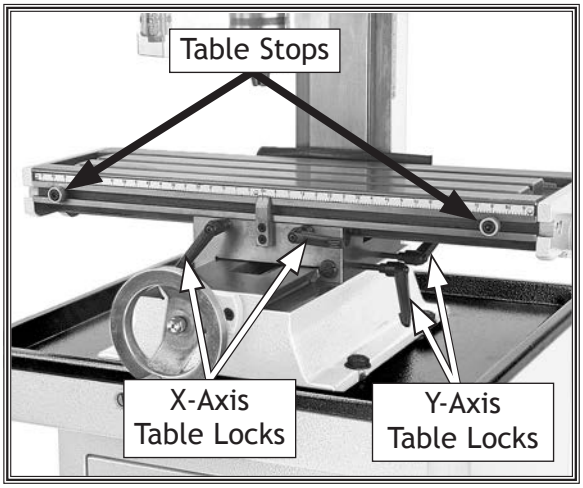


Figure 22. X- and Y-axis table travel locks.

Y-Axis Handwheel

The saddle does not have limit stops. To move the table along the Y-axis, loosen the Y-axis table locks shown in **Figure 22**, then use the handwheel in front of the table in the same manner as the X-axis handwheel.

Installing/Removing Tooling

Model M1116 includes a 1-13mm drill chuck with an R8 arbor (see **Figure 23**).

Installing Tooling

Tools Needed	Qty
Spindle Pin	1
Wrench 8mm	1
Brass Hammer	1

To install tooling, do these steps:

1. DISCONNECT MACHINE FROM POWER!
2. Remove drawbar cap (see **Figure 24**).
3. Align tool slot (see **Figure 25**) with pin inside spindle, then insert tooling into spindle until in contacts drawbar.

   Note: *Height of drawbar inside spindle can be changed by rotating adjustment nut* (see **Figure 25**).
4. From above, thread drawbar by hand into tooling.
5. Secure spindle with spindle pin and tighten drawbar with wrench, as shown in **Figure 25**.

   Note: *DO NOT overtighten drawbar.*
6. Re-install drawbar cap.

Removing Tooling

To remove tooling, do these steps:

1. DISCONNECT MACHINE FROM POWER!
2. Remove drawbar cap and secure spindle with spindle pin, as shown in **Figure 25**. Unthread drawbar from tooling one full rotation.

   Note: *DO NOT fully unthread tooling from drawbar or the drawbar and tool threads could be damaged in the next step.*
3. Tap top of drawbar with brass hammer to unseat taper.
4. Hold tooling with one hand and unthread drawbar.

⚠CAUTION

Cutting tools are sharp and can easily cause cutting injuries. Always protect your hands with leather gloves or shop rags when handling cutting tools.

Figure 23. 1-13mm drill chuck joined with R8 arbor.

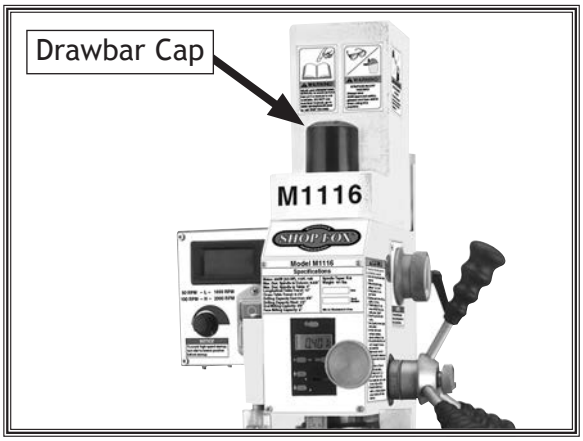


Figure 24. Location of drawbar cap.

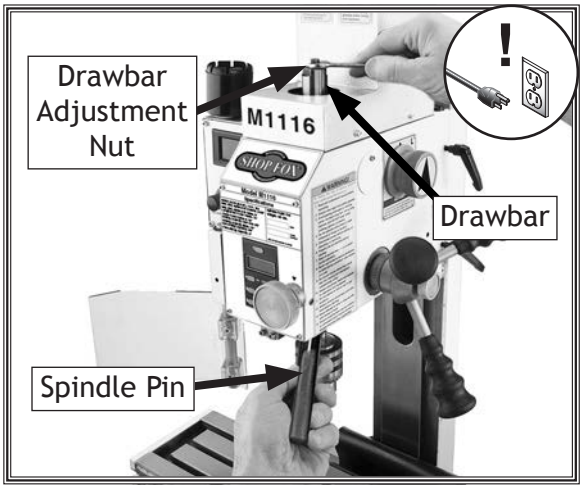


Figure 25. Components used when installing or removing tooling.

Spindle Speed

Using the correct spindle speed is important for safe and satisfactory results, as well as maximizing tool life.

To set the spindle speed for operation, you will need to: 1) Determine the best spindle speed for the cutting/drilling task, and 2) adjust the gear box knob and variable-speed knob to produce determined speed.

Determining Spindle Speed

Many variables affect the optimum spindle speed to use for any given operation, but the two most important are the recommended cutting speed for the workpiece material and the diameter of the cutting tool, as noted in the formula shown in **Figure 26**.

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

*Double if using carbide cutting tool

Figure 26. Formula for determining best spindle speed.

Cutting speed, typically defined in feet per minute (FPM), is the speed at which the edge of a tool moves across the material surface.

A recommended cutting speed is an ideal speed for cutting a type of material in order to produce the desired finish and optimize tool life.

The books **Machinery's Handbook** or **Machine Shop Practice**, and some internet sites, provide excellent recommendations for which cutting speeds to use when calculating the spindle speed. These sources also provide a wealth of additional information about the variables that affect cutting speed and they are a good educational resource.

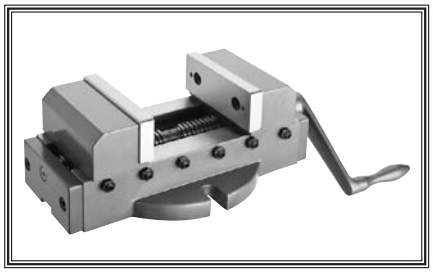
Also, there are a large number of easy-to-use spindle speed calculators that can be found on the internet. These sources will help you take into account the applicable variables in order to determine the best spindle speed for the operation.

ACCESSORIES

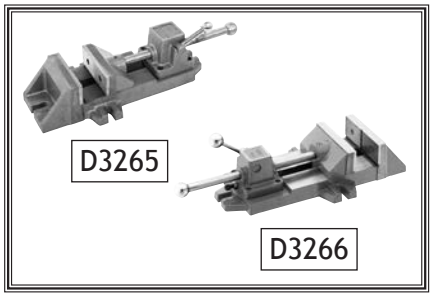
Mill-Drill Accessories

The following mill-drill accessories may be available through your local Woodstock International Inc. Dealer. If you do not have a dealer in your area, these products are also available through online dealers. Please call or e-mail Woodstock International Inc. Customer Service to get a current listing of dealers at: 1-800-840-8420 or at sales@woodstockint.com.

Both jaws on the **D4064—Precision Self-Centering Vise** move in equal and opposite directions so parts of varying size remain centered as long as the vise remains centered to the milling machine spindle. It's ideal for milling structural tubing of different diameters. Precision-ground dovetailed ways and an adjustable gib provide ultra-smooth operation. The jaws measure 4" wide by 1 1/2" high. Maximum capacity is 4". The crank handle measures 4" long and slides on and off when needed. Overall size is 10" long x 8 1/2" wide x 4 1/4" high.

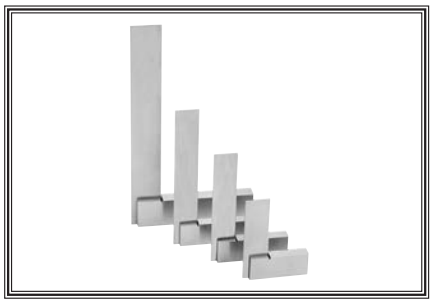


The Shop Fox **D3265—4" Quick-Release Vise** and **D3266—6" Quick-Release Vise** will speed up your shop's production. Heavy cast-iron construction. Simple push rod and cam-lever action securely locks and holds workpiece in place for tremendous holding power. Low profiles reduce lost drilling capacity, and clamping ears make set-up fast and easy. D3265 offers 3 5/8" capacity. D3266 offers 5 5/8" capacity.



The Steelex **M1079—12 pc. R8 Collet Set** features collets that are precision ground to very close tolerances. Sizes include: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 9/16", 5/8", 11/16", 3/4" & 7/8". Switch out end mills the easy way—just attach the quick change collet chuck to your mill and slip your end mill into the appropriate collet.

The Shop Fox **D4089—4-Pc. Machinist's Square Set** will prove useful in your shop. Each square is finely ground steel. All have common beam and blade widths and thicknesses which will allow them to be used in combination. 2", 3", 4" & 6" squares.



MAINTENANCE

General

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

Daily Check:
- Loose mounting bolts.
- Damaged tooling.
- Clean debris and built up grime off of machine.
- Worn or damaged wires.
- Any other unsafe condition.

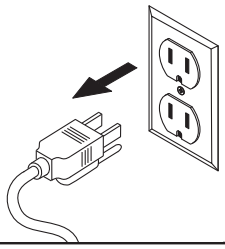
Every 8 Hours of Operation:
- Lubricate table and column ways (**Page 29**).
- Lubricate quill outside surface (**Page 31**).

Every 40 Hours of Operation:
- Lubricate table leadscrews (**Page 30**).

Every 90 Hours of Operation:
- Headstock gears (**Page 30**).
- Lubricate quill rack (**Page 31**).

Every 120 Hours of Operation:
- Lubricate Z-axis leadscrew (**Page 29**).

⚠WARNING



MAKE SURE that your machine is unplugged during all maintenance procedures! If this warning is ignored, serious personal injury may occur.

Cleaning & Protecting

Metal chips left on the machine that have been soaked with water-based coolant will invite oxidation and a gummy residue build-up around the moving parts. Use a brush and shop vacuum to remove chips and debris from the working surfaces of the mill/drill. Never blow off the mill/drill with compressed air, as this will force metal chips deep into the mechanisms and may cause injury to yourself or bystanders.

Remove any rust build-up from unpainted cast-iron surfaces of mill/drill and treat with a non-staining lubricant after cleaning.

Protect other unpainted cast-iron surfaces with regular applications of a product like South Bend Way Oil for Lathes.

Figure 27. SB1365 South Bend Way Oil for Lathes.

Lubrication

An essential part of lubrication is cleaning the components before lubricating them. This step is critical because grime and chips build up on lubricated components over time, which makes them hard to move.

Clean all exterior components in this section with mineral spirits, shop rags, and brushes before lubricating.

DISCONNECT MACHINE FROM POWER BEFORE PERFORMING LUBRICATION!

NOTICE

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

Table and Column Ways

Lube Type .....Model SB1365 or ISO 68 Equivalent
Lube Amount..... Thin Coat
Lubrication Frequency .....8 hrs. of Operation

Regular lubrication will ensure mill/drill performs at its highest potential. Regularly wipe table and column ways with recommended lubrication, then move components back and forth several times to ensure smooth movements (see **Figures 28-30**).

Z-Axis Leadscrew

Lube Type ..... NLGI#2
Lube Amount..... Thin Coat
Lubrication Frequency .....120 hrs. of Operation

To lubricate Z-axis leadscrew, do these steps:

1. DISCONNECT MACHINE FROM POWER!

2. Lower headstock as far as you can without contacting spindle to table surface.

3. Rotate cover to expose Z-axis leadscrew as shown in **Figure 31**. Use mineral spirits and a brush to clean as much existing grease and debris off of Z-axis leadscrew as possible. Allow leadscrew to dry.

4. Using a brush, apply NLGI#2 grease to exposed leadscrew threads, then move headstock through its full range of motion several times to disperse grease along full length of leadscrew.

Figure 28. Z-axis way lubrication points.

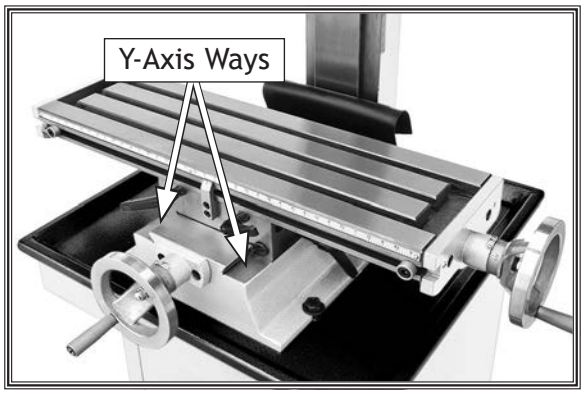


Figure 29. Y-axis way lubrication points.

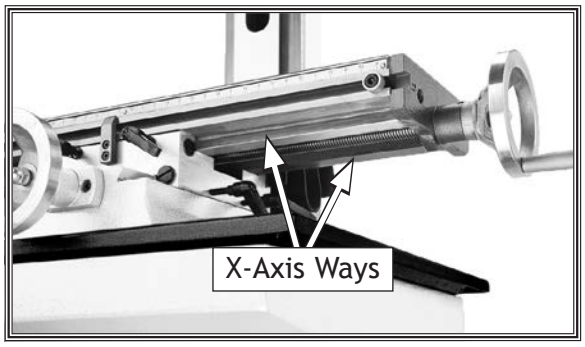


Figure 30. X-axis lubrication points.

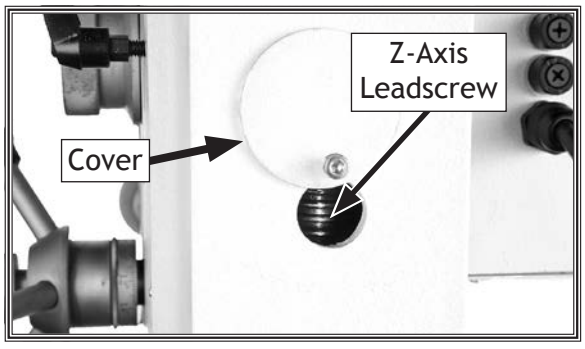


Figure 31. Z-axis leadscrew cover and lubrication point.

Table Leadscrews

Lube Type .....Model SB1365 or ISO 68 Equivalent
Lube Amount..... Thin Coat
Lubrication Frequency ..... 40 hrs. of Operation

To lubricate table leadscrews, do these steps:

1. DISCONNECT MACHINE FROM POWER!

2. Using Y-axis handwheel, move table as far forward as possible.

3. Use a 4mm hex wrench to remove rubber way cover, then use mineral spirits and a brush to clean existing grease and debris off of Y-axis leadscrew shown in **Figure 32**. Allow leadscrew to dry.

4. Apply thin coat of ISO 68 machine oil to exposed leadscrew threads, then move table through its full range of cross motion several times to disperse oil along full length of leadscrew.

5. Using X-axis handwheel, move table as far to one side as possible.

6. From beneath table, use mineral spirits and a brush to clean as much of existing grease and debris as possible off of X-axis leadscrew shown in **Figure 33**. Allow leadscrew to dry.

7. Repeat **Step 4** to lubricate X-axis leadscrew.

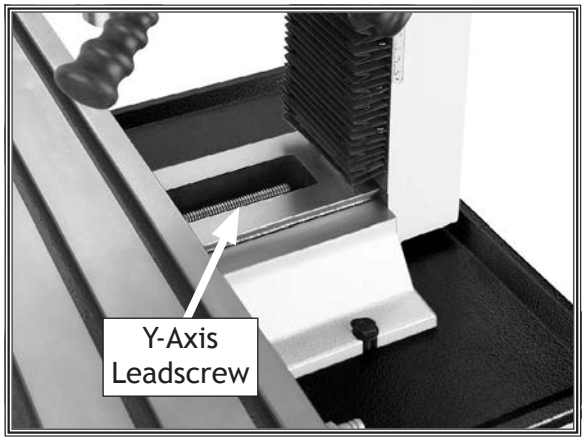


Figure 32. Location of Y-axis leadscrew (way cover removed).

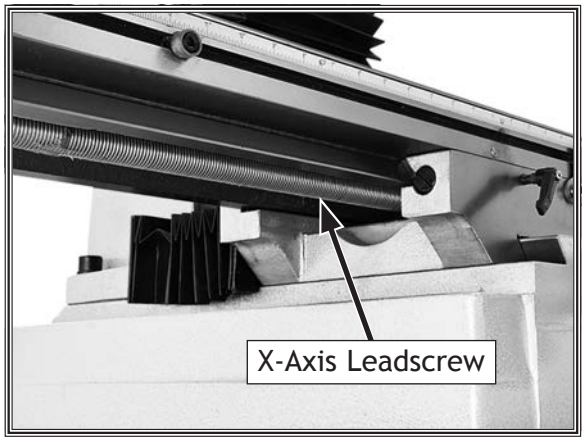


Figure 33. Location of X-axis leadscrew.

Headstock Gears

Lube Type ..... NLGI#2
Lube Amount..... Thin Coat
Lubrication Frequency ..... 90 hrs. of Operation

To lubricate headstock gears, do these steps:

1. Remove cap screw and headstock gear access cover shown in **Figure 34**.

2. Using small brush, apply thin coat of grease to headstock gears.

3. Operate mill/drill in both high and low gear settings to work grease through gears.

4. Re-install access cover and cap screw removed in **Step 1**.

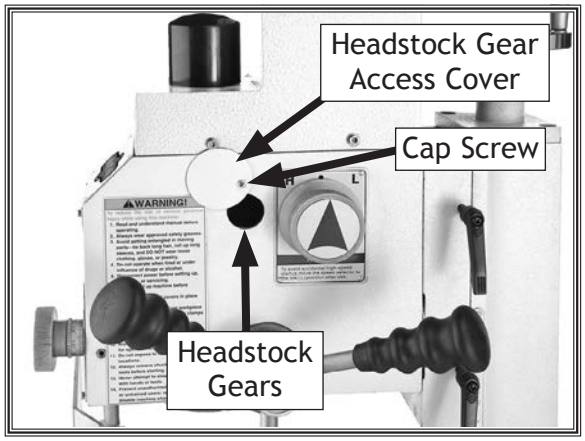


Figure 34. Headstock access cover and cap screw location.

Quill Outside Surface

Lube Type .....Model SB1365 or ISO 68 Equivalent
Lube Amount..... Thin Coat
Lubrication Frequency .....8 hrs. of Operation

To lubricate quill, do these steps:

1. Without disturbing grease on quill rack, clean outside smooth surface of quill (see **Figure 35**) with mineral spirits and shop rags.

2. When dry, apply thin coat of lubricant to smooth surface, then move spindle up and down to evenly distribute oil.

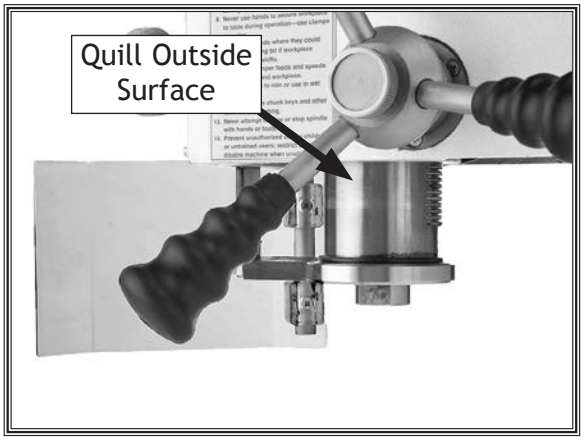


Figure 35. Outside surface of quill.

Quill Rack

Lube Type ..... NLGI#2
Lube Amount..... Thin Coat
Lubrication Frequency ..... 90 hrs. of Operation

To lubricate quill rack, do these steps:

1. Move quill down to gain full access to quill rack (see **Figure 36**).

2. Clean teeth with mineral spirits, shop rags, and brush.

3. When dry, apply thin coat of grease to teeth and raise/lower quill several times to evenly distribute.

   Note: *Re-apply oil that may have been removed during the cleaning process to the quill surface around the rack.*

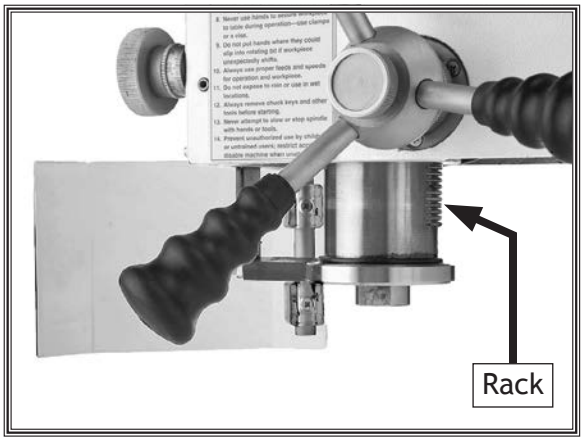


Figure 36. Quill rack location.

Replacing DRO Battery

If the DRO stops operating correctly, the 3V lithium cell battery must be replaced.

To replace DRO battery, do these steps:

1. Using a #3 standard screwdriver, remove battery cover (see **Figure 37**) by rotating counterclockwise.

2. Remove old battery, dispose of it according to state and federal regulations, then replace it with a new one.

3. Replace battery cover.

Figure 37. Battery cover for DRO.

SERVICE

General

This section covers the most common service adjustments or procedures that may need to be made during the life of your machine.

If you require additional machine service not included in this section, please contact Woodstock International Technical Support at (360) 734-3482 or send e-mail to: **techsupport@woodstockint.com**.

Adjusting Gibs

Tool Needed	**Qty**
Standard Screwdriver #2	1

Gibs are tapered lengths of metal sandwiched between two moving surfaces to control how much friction they have when they slide past one another. Correctly adjusting the gibs is critical to producing accurate milling results.

Tight gibs make table movement more accurate but stiff. Loose gibs make table movement sloppy but easy. The goal of gib adjustment is to remove unnecessary sloppiness without causing the ways to bind.

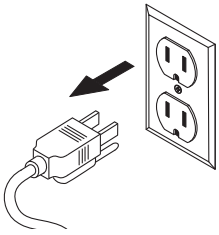
Tip: Many experienced machinists adjust the gibs until there is just a slight drag in table movement.

Standard screws on each end allow gib adjustment to increase or decrease the friction between the sliding surfaces of the ways.

DISCONNECT MACHINE FROM POWER BEFORE ADJUSTING THE GIBS!

Make sure all table locks are loose. Then, loosen one gib adjustment screw (see **Figure 38**) and tighten the opposing screw the same amount to move the gib, while at the same time using the handwheels to move the table until you feel a slight drag in that path of movement.

⚠WARNING



MAKE SURE that your machine is unplugged during all service procedures! If this warning is ignored, serious personal injury may occur.

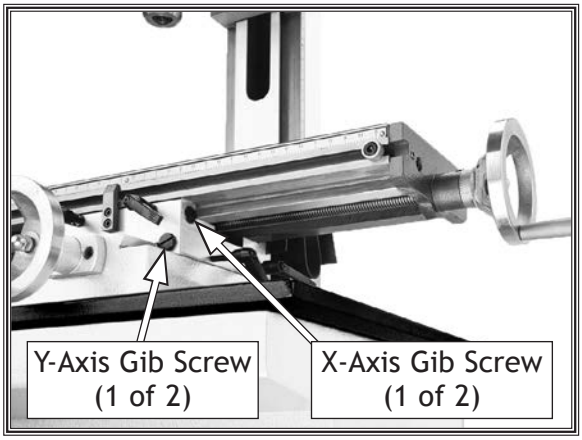


Figure 38. Location of gib screws.

Adjusting Leadscrew Backlash

Leadscrew backlash is the amount of free-play movement in the leadscrew (when changing the direction of rotation) before the attached device begins to move.

Leadscrews must have a certain amount of backlash, but over time, this will increase with normal wear. Generally, 0.003"–0.006" leadscrew backlash is acceptable to ensure smooth movement and reduce the risk of premature thread wear.

The X- and Y-axis leadscrew backlash is adjusted by using a long 5mm hex wrench to tighten/loosen the cap screw on the leadscrew nut. This adjusts the force the split leadscrew nut exerts on the leadscrew threads.

The X-axis leadscrew nut shown in **Figure 39** is accessed from underneath the left side of the table.

The Y-axis leadscrew nut is similar and is accessed from underneath the machine base.

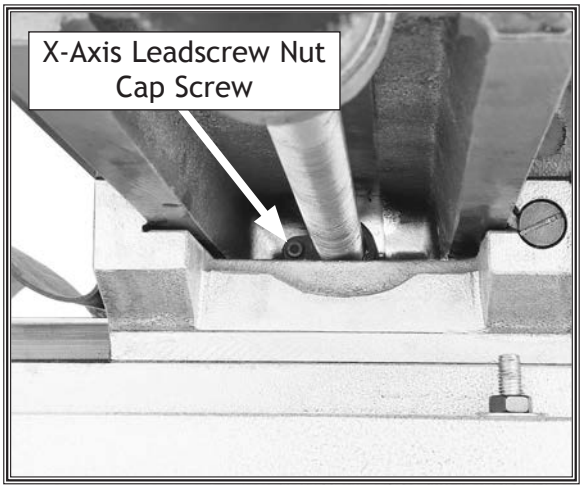


Figure 39. Example of X-axis leadscrew nut cap screw for adjusting backlash.

Brush Replacement

This mill/drill is equipped with a universal motor that uses two carbon brushes to transmit electrical current inside the motor. These brushes are considered to be regular "wear items" or "consumables" that will need to be replaced during the life of the motor. The frequency of required replacement is often related to how much the motor is used and how hard it is pushed.

Replace the carbon brushes in pairs (part number: XM1116202) when the motor no longer reaches full power, or when the brushes measure less than 1/4" long (new brushes are 5/8" long).

Tools Needed: **Qty**
Hex Wrench 3mm 1
Standard Screwdriver #2.....1

To inspect and replace motor brushes, do these steps:

1. DISCONNECT MACHINE FROM POWER!
2. Remove motor cover by removing cap screws (see **Figure 40**).
3. Unscrew one of the brush caps (see **Figure 41**).
4. Remove old brush assembly. If brush is worn down to less than 1/4", then replace it with a new one. Otherwise re-install old brush (see **Figure 42**).
5. Replace brush cap to secure brush.
6. Repeat **Steps 3-5** for second brush assembly on other side of motor.
7. Replace motor cover.

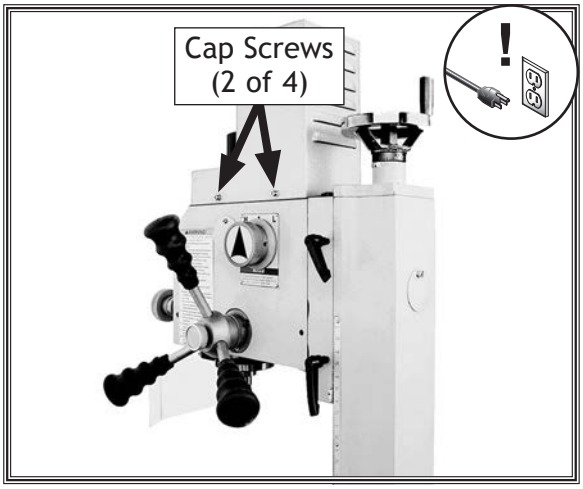


Figure 40. Location of motor cover cap screws.

Figure 41. Removing motor brush cap.

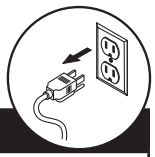
Figure 42. Inserting new motor brush.

SERVICE

Troubleshooting

The following troubleshooting tables cover common problems that may occur with this machine. If you need replacement parts or additional troubleshooting help, contact our Technical Support.

Note: *Before contacting Tech Support, find the machine serial number and manufacture date, and if available, your original purchase receipt. This information is required to properly assist you.*



Motor and Electrical

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
Machine does not start or a breaker trips.	1. Blown fuse in machine. 2. Chuck guard open. 3. Incorrect power supply voltage or circuit size. 4. Plug/receptacle at fault/wired incorrectly. 5. Power supply circuit breaker tripped or fuse blown. 6. Motor wires connected incorrectly. 7. Wiring open/has high resistance. 8. Motor brushes at fault. 9. Chuck guard safety switch at fault. 10. Circuit board at fault. 11. Motor at fault. 12. Potentiometer/variable-speed dial at fault.	1. Replace fuse/ensure no shorts. 2. Close guard. 3. Ensure power supply voltage and circuit size (**Page 37**). 4. Test for good contacts; correct wiring (**Page 37**). 5. Ensure circuit is sized correctly and free of shorts. Reset circuit breaker or replace fuse (**Page 37**). 6. Correct motor wiring connections (**Page 37**). 7. Check/fix broken, disconnected, corroded wires; repair/replace as necessary (**Page 38**). 8. Remove/replace brushes (**Page 34**). 9. Replace safety switch (**Page 37**). 10. Test/replace (**Page 38**). 11. Test/repair/replace (**Page 37**). 12. Test/replace (**Page 37**).
Machine stalls or is overloaded.	1. Feed rate/cutting speed too fast. 2. Wrong cutter type. 3. Machine undersized for task or tooling incorrect for task. 4. Motor wired incorrectly. 5. Motor bearings at fault. 6. Motor overheated. 7. Motor at fault.	1. Decrease feed rate/cutting speed. 2. Use correct cutter for task. 3. Use correct cutter/bit; reduce spindle RPM; use coolant fluid if possible. 4. Wire motor correctly (**Page 37**). 5. Test/repair/replace. 6. Clean motor/let cool/reduce workload. 7. Test/repair/replace.
Machine has vibration or noisy operation.	1. Motor or machine component loose. 2. Machine incorrectly mounted or sits unevenly. 3. Motor fan rubbing on fan cover. 4. Workpiece not secure. 5. Excessive depth of cut. 6. Cutter/tooling loose. 7. Cutter dull or at fault. 8. Bit is chattering. 9. Motor bearings at fault.	1. Inspect/replace damaged bolts/nuts, and retighten with blue thread-locking fluid. 2. Tighten/replace mounting bolts in bench/stand; relocate/shim machine (**Page 17**). 3. Fix/replace dented fan cover; replace loose/damaged fan. 4. Properly clamp workpiece on table or in vise. 5. Decrease depth of cut. 6. Make sure tooling is properly secured. 7. Replace/resharpen cutter. 8. Replace/sharpen bit; index bit to workpiece; use appropriate feed rate and cutting RPM. 9. Test by rotating shaft; rotational grinding/loose shaft requires bearing replacement.

Operation

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
Tool loose in spindle.	1. Cutting tool not fully drawn up into spindle taper. 2. Debris on cutting tool or in spindle taper. 3. Taking too big of cut.	1. Tighten drawbar (do not overtighten) (**Page 25**). 2. Clean collet and spindle taper. 3. Lessen depth of cut and allow chips to clear.
Breaking tools or cutters.	1. Spindle speed/feed rate too fast for depth of cut, cutting tool size, or workpiece material. 2. Cutting tool too small. 3. Improper or no cutting lubricant/cutting tool getting too hot. 4. Taking too big of a cut. 5. Spindle extended too far down.	1. Reduce spindle speed (**Page 26**); reduce feed rate; take lighter cut. 2. Use larger cutting tool and slower feed rate. 3. Use proper lubricant for operation. 4. Lessen depth of cut and allow chips to clear. 5. Fully retract spindle and lower headstock. This increases rigidity.
Workpiece vibrates or chatters during operation.	1. Table locks not tight. 2. Workpiece not secure. 3. Spindle speed/feed rate too fast. 4. Spindle extended too far down.	1. Tighten table locks (**Page 24**). 2. Properly clamp workpiece on table or in vise. 3. Reduce spindle speed (**Page 26**); reduce feed rate. 4. Fully retract spindle and lower headstock. This increases rigidity.
Table is hard to move.	1. Table locks tightened down. 2. Chips loaded up on ways. 3. Ways are dry and need lubrication. 4. Table limit stops interfering. 5. Gibs too tight.	1. Release table locks (**Page 24**). 2. Frequently clean away chips that load up during milling operations. 3. Lubricate ways (**Page 29**). 4. Adjust table limit stops out of the way (**Page 24**). 5. Adjust gibs (see **Page 32**).
Bad surface finish.	1. Spindle speed/feed rate too fast. 2. Dull/incorrect cutting tool. 3. Wrong rotation direction of cutting tool. 4. Workpiece not secure. 5. Spindle extended too far down during or at beginning of operation.	1. Reduce spindle speed (**Page 26**); reduce feed rate. 2. Sharpen/replace cutting tool; select better tool for operation. 3. Check for proper direction of cutting tool rotation. 4. Properly clamp workpiece on table or in vise. 5. Fully retract spindle and lower headstock. This increases rigidity.
DRO doesn't give reading.	1. DRO not turned on. 2. Battery dead. 3. Shorted/disconnected wiring/plugs.	1. Press DRO ON/Power button (**Page 22**). 2. Replace battery (**Page 31**). 3. Inspect circuit boards, sensors, plugs, and wiring connections. Replace/repair as necessary.
DRO reading is incorrect.	1. Initial reading incorrect. 2. Sensor has gone bad. 3. Spacing between sensor and scale incorrect.	1. Zero/Reset DRO at beginning point (**Page 22**). 2. Test/replace sensor as necessary. 3. Adjust spacing between sensor and scale.

Electrical Safety Instructions

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 (360) 734-3482 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

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!

QUALIFIED ELECTRICIAN. Due to the inherent hazards of electricity, only a qualified electrician should perform wiring tasks on this machine. If you are not a qualified electrician, get help from one before attempting any kind of wiring job.

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.

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 before completing the task.

MODIFICATIONS. Using aftermarket parts or modifying the wiring beyond what is shown in the diagram may lead to unpredictable results, including serious injury or fire.

MOTOR WIRING. The motor wiring shown in these diagrams is current at the time of printing, but it may not match your machine. Always 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.

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

EXPERIENCING DIFFICULTIES. If you are experiencing difficulties understanding the information included in this section, contact our Technical Support at (360) 734-3482.

NOTICE

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

WIRING DIAGRAM 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	TUR-QUOISE	Tu
RED	Rd	ORANGE	Or	PINK	Pk		

SERVICE

M1116 Electrical Components

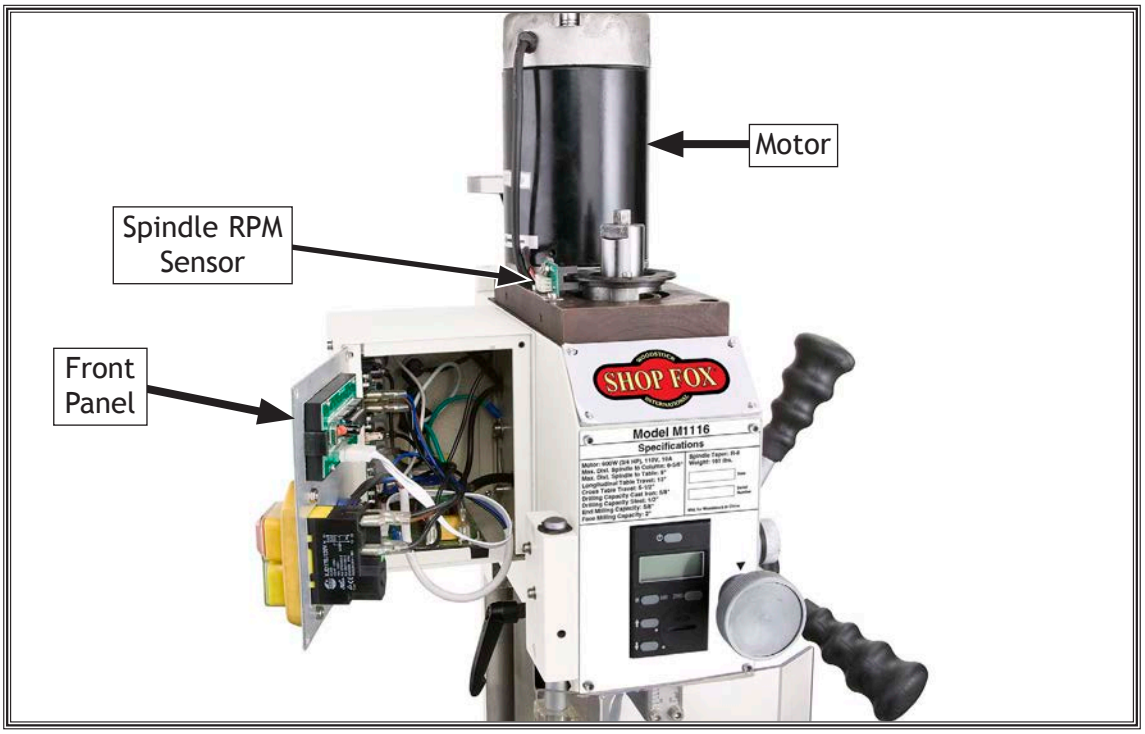


Figure 43. Wiring overview.

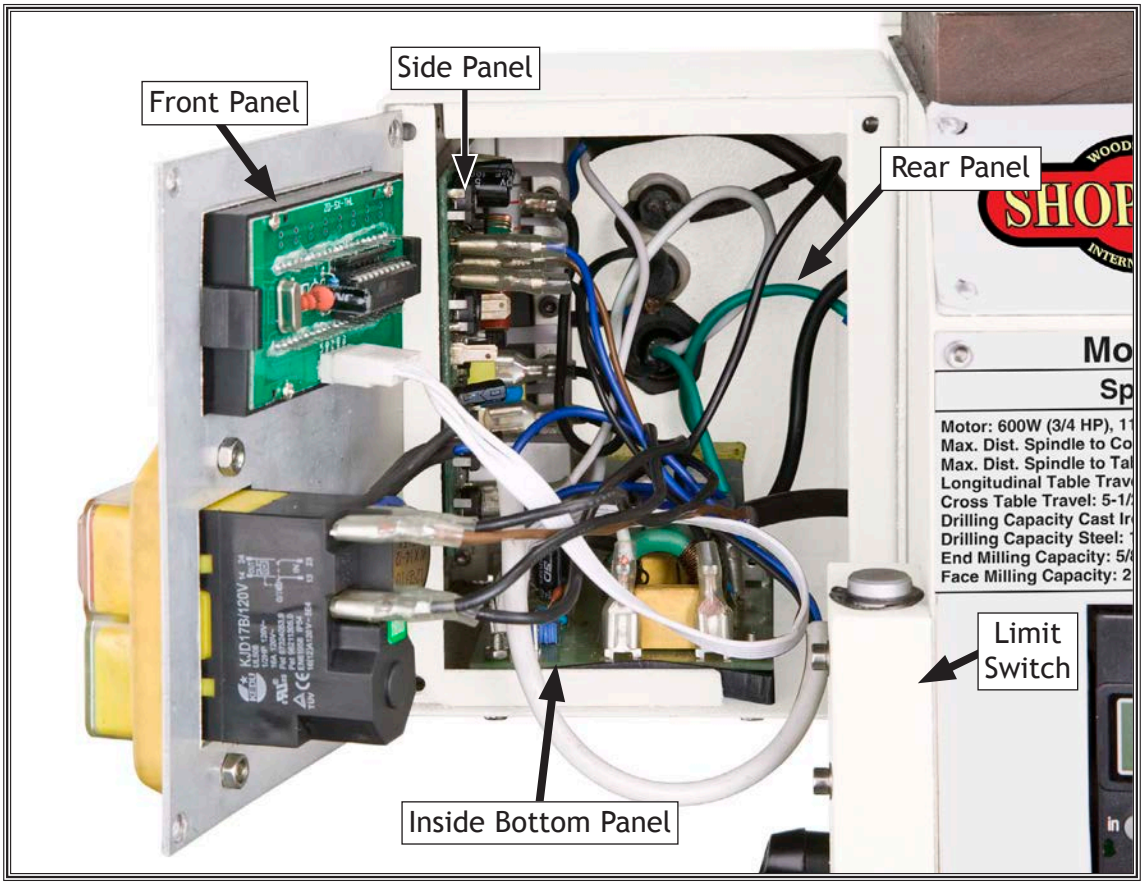
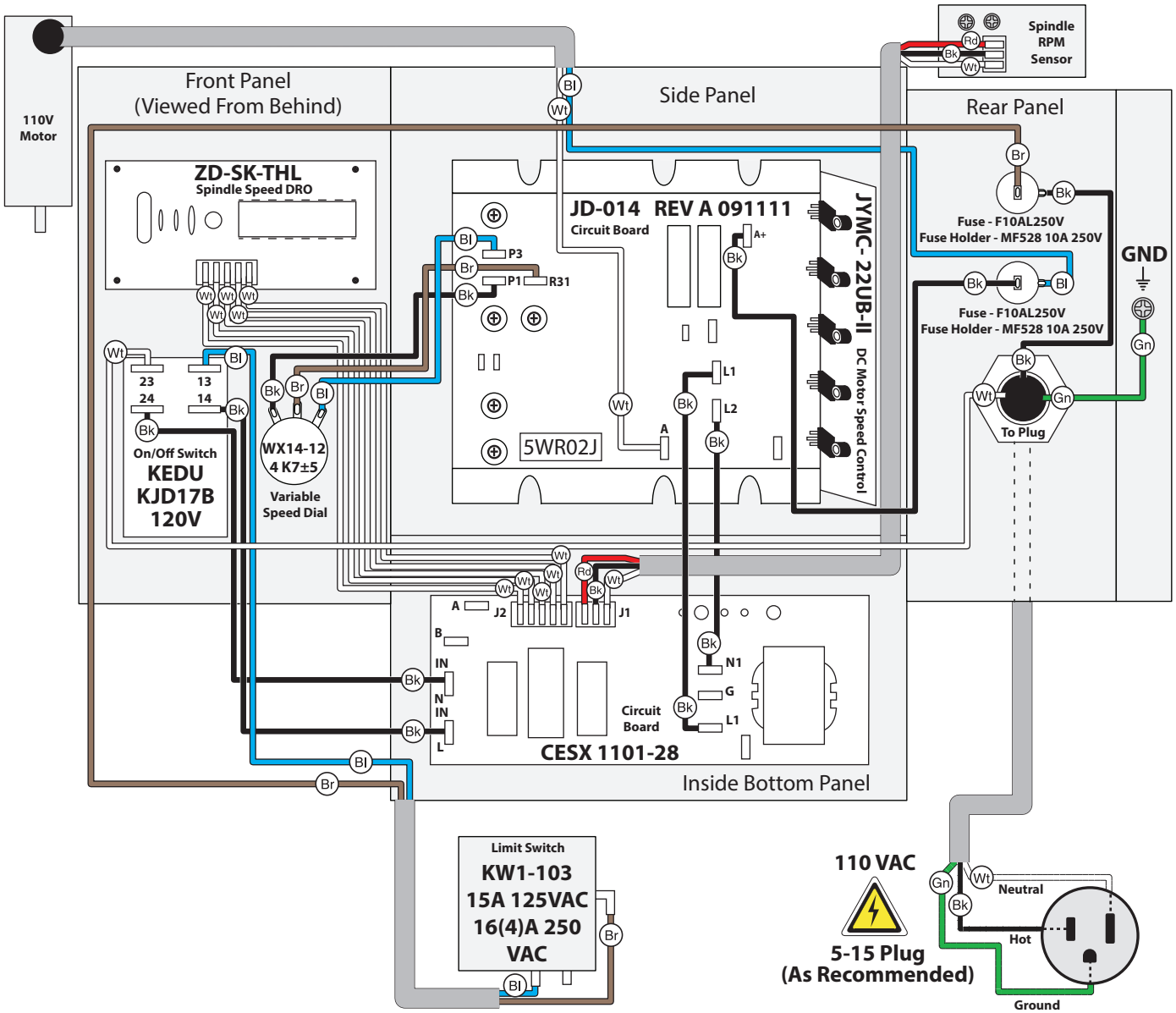


Figure 44. Control panel wiring overview.

M1116 Wiring Diagram



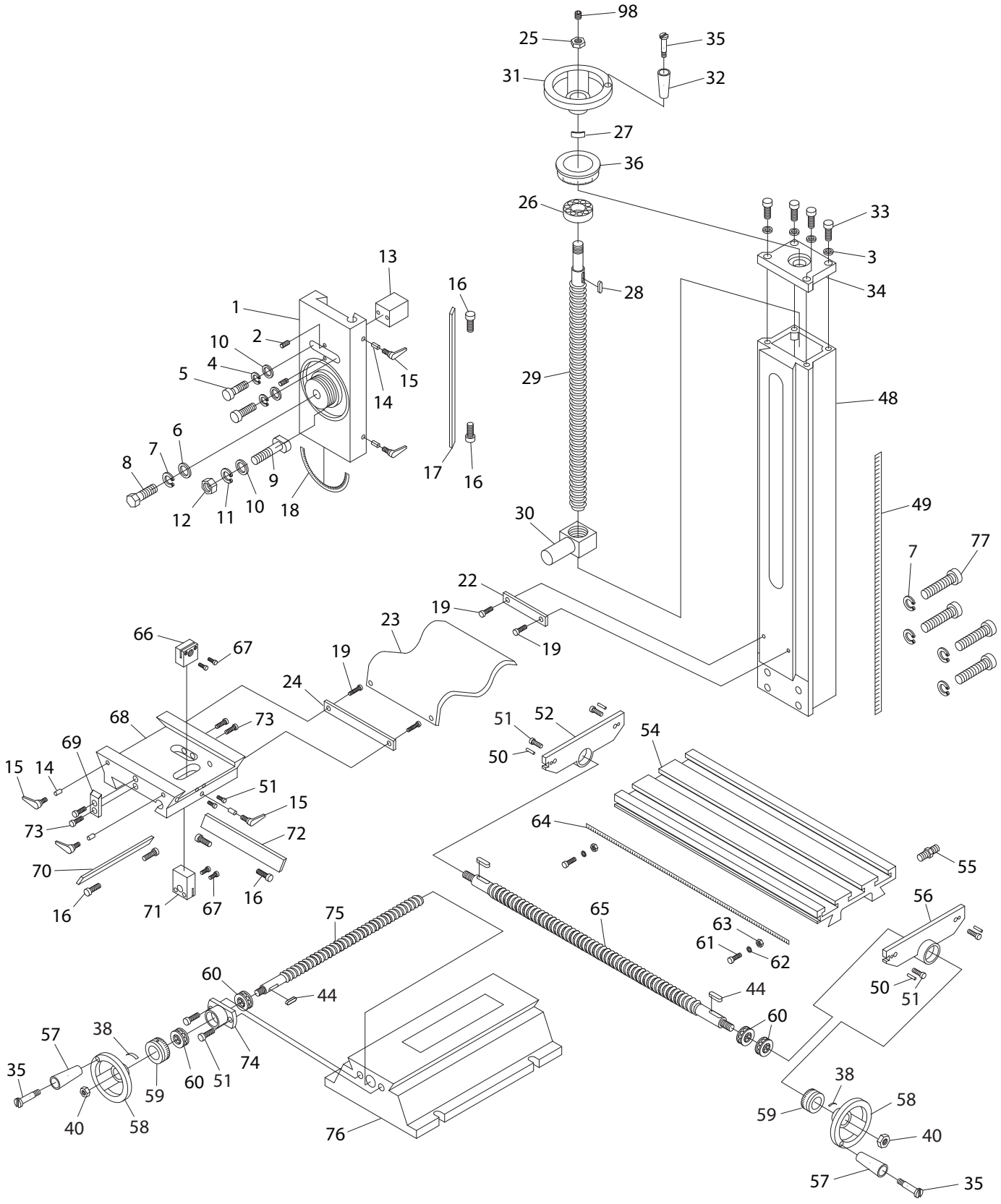
Read Page 37
STOP
Before Wiring

NOTICE

This motor wiring diagram is current at the time of printing; however, always use the diagram on the inside of the junction box cover when rewiring your motor!

PARTS

Column



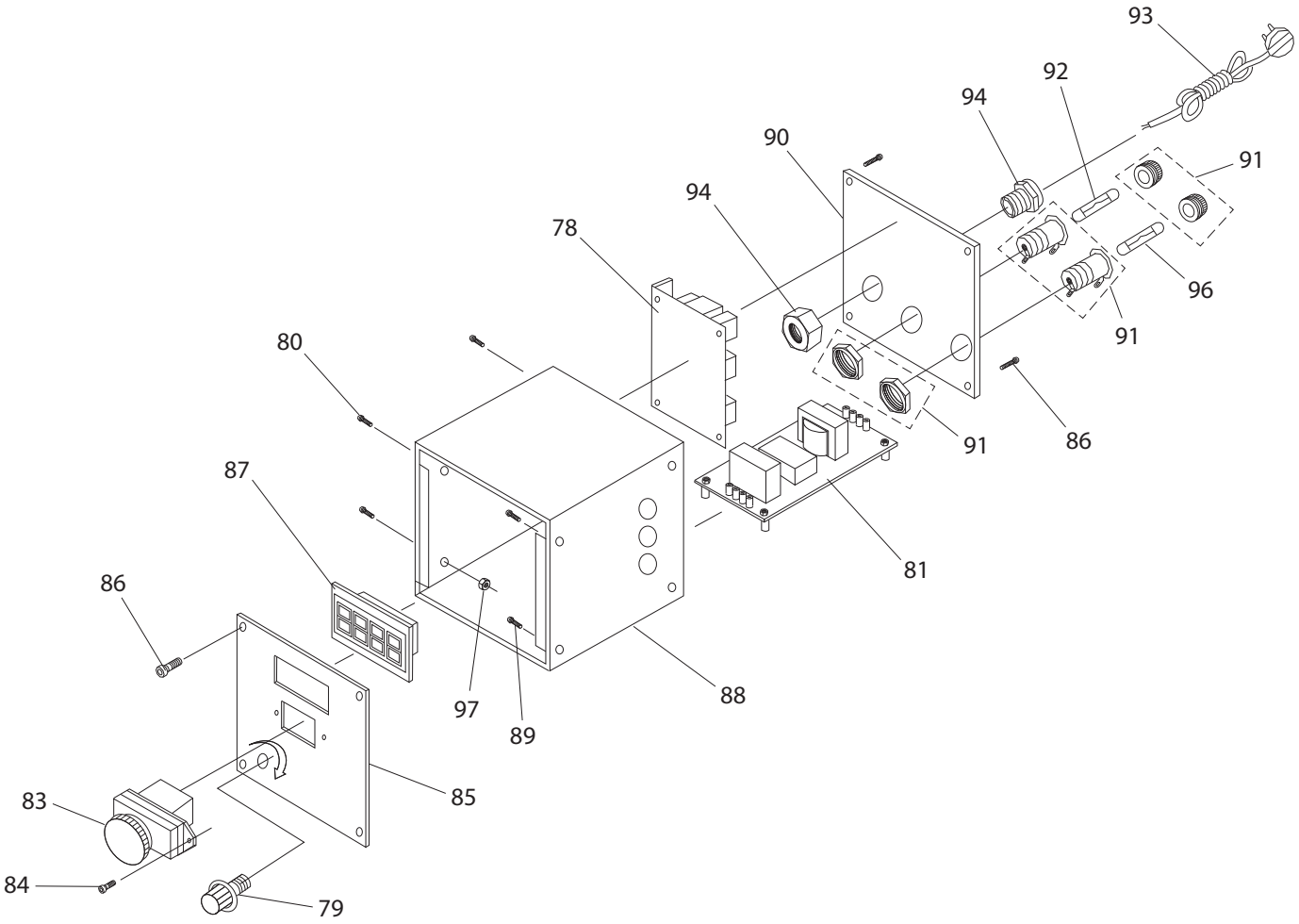
PARTS

Column Parts List

REF	PART #	DESCRIPTION
1	XM1116001	Z-AXIS SLIDE
2	XM1116002	SET SCREW M6-1 X 16
3	XM1116003	FLAT WASHER 6MM
4	XM1116004	LOCK WASHER 8MM
5	XM1116005	CAP SCREW M8-1.25 X 25
6	XM1116006	FLAT WASHER 12MM
7	XM1116007	LOCK WASHER 12MM
8	XM1116008	CAP SCREW M12-1.75 X 40
9	XM1116009	T-BOLT M8-1.25 X 60
10	XM1116010	FLAT WASHER 8MM
11	XM1116011	LOCK WASHER 8MM
12	XM1116012	HEX NUT M8-1.25
13	XM1116013	SLIDE ALIGNMENT BLOCK
14	XM1116014	LOCK PLUNGER, BRASS
15	XM1116015	ADJUSTABLE HANDLE 50L, M6-1 X 16
16	XM1116016	GIB ADJUSTMENT SCREW M6-1 X 25
17	XM1116017	Z-AXIS GIB
18	XM1116018	HEADSTOCK ANGLE SCALE
19	XM1116019	CAP SCREW M5-.8 X 10
22	XM1116022	Z-AXIS WAY COVER BRACKET
23	XM1116023	Y-AXIS WAY COVER
24	XM1116024	Y-AXIS WAY COVER BRACKET
25	XM1116025	HEX NUT M10-1.5 TALL
26	XM1116026	THRUST BEARING 51200
27	XM1116027	INDICATOR PLATE
28	XM1116028	MACHINE KEY 4 X 4 X 16
29	XM1116029	Z-AXIS LEADSCREW
30	XM1116030	Z-AXIS LEADSCREW NUT
31	XM1116031	HANDWHEEL TYPE-4 100D X 10B-K X M6-1
32	XM1116032	HANDLE W/OUT SHAFT 15 X 50, 8D
33	XM1116033	CAP SCREW M6-1 X 14
34	XM1116034	COLUMN TOP COVER
35	XM1116035	SHOULDER SCREW M6-1 X 60, 8 X 45
36	XM1116036	Z-AXIS GRADUATED DIAL

REF	PART #	DESCRIPTION
38	XM1116038	HANDWHEEL CURVED PLATE SPRING
40	XM1116040	HEX NUT M8-1.25
44	XM1116044	MACHINE KEY 4 X 4 X 12
48	XM1116048	COLUMN
49	XM1116049	Z-AXIS SCALE
50	XM1116050	THREADED SLEEVE M6-1 X 16
51	XM1116051	CAP SCREW M6-1 X 14
52	XM1116052	X-AXIS LEADSCREW BRACKET (LH)
54	XM1116054	TABLE
55	XM1116055	COOLANT HOSE FITTING
56	XM1116056	X-AXIS LEADSCREW BRACKET (RH)
57	XM1116057	HANDLE W/OUT SHAFT 15 X 50, 8D
58	XM1116058	HANDWHEEL TYPE-4 100D X 10B-K X M6-1
59	XM1116059	TABLE GRADUATED DIAL
60	XM1116060	THRUST BEARING 51100
61	XM1116061	CAP SCREW M6-1 X 10
62	XM1116062	LIMIT STOP
63	XM1116063	T-NUT M6-1
64	XM1116064	X-AXIS SCALE
65	XM1116065	X-AXIS LEADSCREW
66	XM1116066	X-AXIS LEADSCREW NUT
67	XM1116067	CAP SCREW M4-.7 X 20
68	XM1116068	SADDLE
69	XM1116069	TABLE STOP BLOCK
70	XM1116070	Y-AXIS GIB
71	XM1116071	Y-AXIS LEADSCREW NUT
72	XM1116072	X-AXIS GIB
73	XM1116073	CAP SCREW M6-1 X 25
74	XM1116074	X-AXIS BEARING HOUSING
75	XM1116075	X-AXIS LEADSCREW
76	XM1116076	BASE
77	XM1116077	CAP SCREW M12-1.75 X 90
98	XM1116098	SET SCREW M10-1.5 X 8

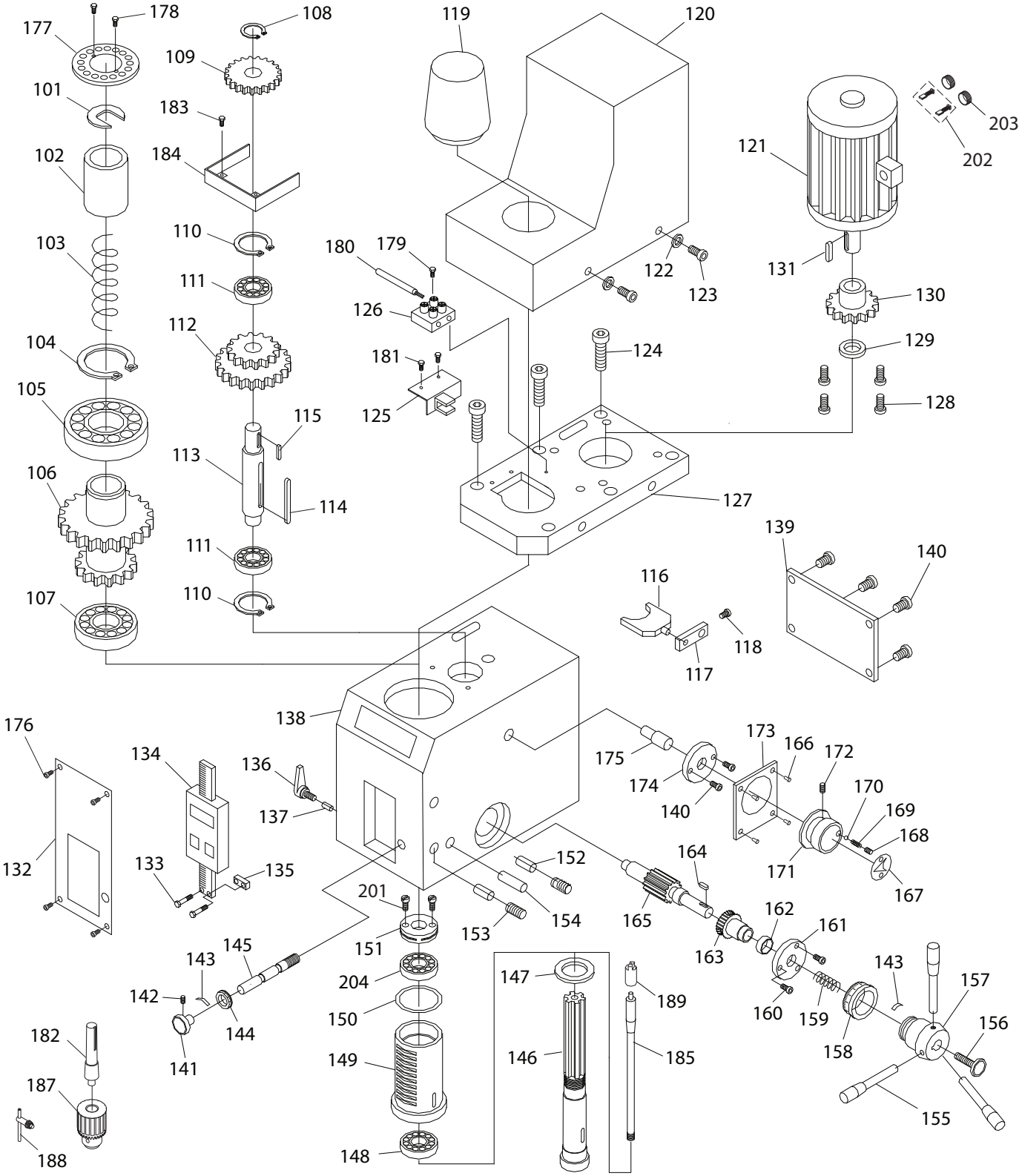
Control Panel Parts



REF	PART #	DESCRIPTION
78	XM1116078	CIRCUIT BOARD JD-014 5WR02J
79	XM1116079	SPINDLE POTENTIOMETER WX14-12
80	XM1116080	CAP SCREW M3-.5 X 16
81	XM1116081	CIRCUIT BOARD CESX 1101-28
83	XM1116083	ON/OFF SWITCH KEDU KJD-17B/120V
84	XM1116084	CAP SCREW M4-.7 X 10
85	XM1116085	CONTROL PANEL PLATE
86	XM1116086	CAP SCREW M4-.7 X 6
87	XM1116087	RPM DIGITIAL DISPLAY ZD-SX-THL

REF	PART #	DESCRIPTION
88	XM1116088	ELECTRICAL BOX
89	XM1116089	CAP SCREW M5-.8 X 8
90	XM1116090	ELECTRICAL BOX REAR COVER
91	XM1116091	FUSE HOLDER
92	XM1116092	FUSE 15A 250V FAST-ACTING, GLASS
93	XM1116093	POWER CORD 16G 3W 72" 5-15P
94	XM1116094	STRAIN RELIEF M20 X 1.5 TYPE-3
96	XM1116096	FUSE 10A 250V FAST-ACTING, GLASS
97	XM1116097	HEX NUT M3-.5

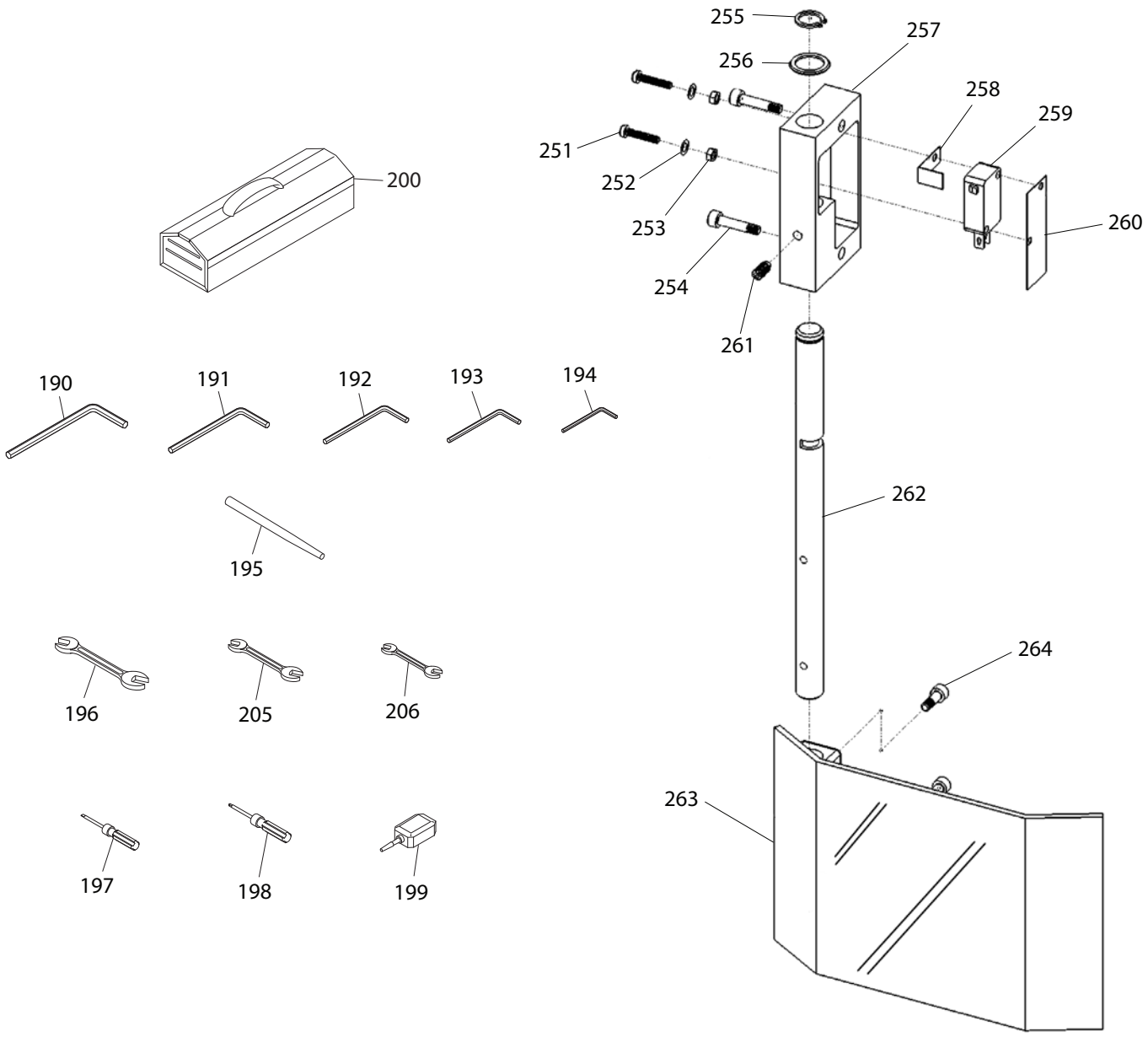
Headstock


177
178
108
109
101
183
102
184
110
103
111
180
179
126
112
104
181
124
105
125
115
113
106
114
111
107
110
119
120
121
203
202
122
123
131
130
129
128
127
139
140
116
118
117
138
176
134
136
137
132
133
135
201
151
152
154
153
175
174
140
173
166
172
170
169
168
171
167
164
165
162
163
161
160
159
158
143
157
156
155
145
143
142
144
141
204
150
149
148
147
146
189
185
182
187
188

Headstock Parts List

REF	PART #	DESCRIPTION
101	XM1116101	QUILL RETAINING CLIP
102	XM1116102	BUSHING
103	XM1116103	COMPRESSION SPRING 2.5 X 29 X 100
104	XM1116104	EXT RETAINING RING 45MM
105	XM1116105	BALL BEARING 6209ZZ
106	XM1116106	COMBO GEAR 60/70T
107	XM1116107	ANG CONTACT BEARING 7007-2RSD
108	XM1116108	EXT RETAINING RING 15MM
109	XM1116109	GEAR 37T
110	XM1116110	EXT RETAINING RING 32MM
111	XM1116111	BALL BEARING 6002ZZ
112	XM1116112	COMBO GEAR 42/62T
113	XM1116113	SHAFT
114	XM1116114	MACHINE KEY 5 X 5 X 50
115	XM1116115	MACHINE KEY 5 X 5 X 12
116	XM1116116	FORK
117	XM1116117	FORK ARM
118	XM1116118	CAP SCREW M5-.8 X 8
119	XM1116119	DRAWBAR CAP
120	XM1116120	MOTOR COVER
121	XM1116121	MOTOR 600W 110VDC
122	XM1116122	FLAT WASHER 4MM
123	XM1116123	CAP SCREW M4-.7 X 8
124	XM1116124	CAP SCREW M6-1 X 14
125	XM1116125	L-BRACKET
126	XM1116126	SPEED SENSOR
127	XM1116127	MOTOR MOUNT
128	XM1116128	CAP SCREW M5-.8 X 12
129	XM1116129	MOTOR GEAR RING
130	XM1116130	GEAR 25T
131	XM1116131	MACHINE KEY 4 X 4 X 6
132	XM1116132	HEADSTOCK FRONT PANEL PLATE
133	XM1116133	HEX BOLT M3-.5 X 6
134	XM1116134	Z-AXIS DRO ASSEMBLY
135	XM1116135	DRO SLIDE MOUNT
136	XM1116136	ADJUSTABLE HANDLE 50L, M6-1 X 16
137	XM1116137	LOCK PLUNGER, BRASS
138	XM1116138	HEADSTOCK CASTING
139	XM1116139	HEADSTOCK REAR COVER
140	XM1116140	CAP SCREW M4-.7 X 8
141	XM1116141	FINE DOWNFEED KNOB 12 X 26 X 45D
142	XM1116142	SET SCREW M5-.8 X 6
143	XM1116143	SPRING PIECE
144	XM1116144	FINE DOWNFEED GRADUATED DIAL
145	XM1116145	WORM SHAFT
146	XM1116146	SPINDLE R8
147	XM1116147	QUILL SEAL, RUBBER (LOWER)
148	XM1116148	TAPERED ROLLER BEARING 32005
149	XM1116149	QUILL
150	XM1116150	QUILL SEAL, RUBBER (UPPER)
151	XM1116151	PRELOAD ADJUSTER NUT
152	XM1116152	DOWEL PIN 4 X 20, BRASS
153	XM1116153	SET SCREW M5-.8 X 12
154	XM1116154	DOWEL PIN 6 X 30
155	XM1116155	COARSE DOWNFEED LEVER M10-1.5 X 14
156	XM1116156	KNOB BOLT M8-1.25 X 30
157	XM1116157	COARSE DOWNFEED HUB
158	XM1116158	COARSE DOWNFEED GRADUATED DIAL
159	XM1116159	COMPRESSION SPRING 1.2 X 12 X 2.5
160	XM1116160	CAP SCREW M4-.7 X 40
161	XM1116161	FLANGE
162	XM1116162	BUSHING
163	XM1116163	WORM GEAR
164	XM1116164	MACHINE KEY 4 X 4 X 12
165	XM1116165	GEAR SHAFT 16T
166	XM1116166	RIVET 2 X 5MM NAMEPLATE, STEEL
167	XM1116167	HI/LO GEAR INDICATOR PLATE
168	XM1116168	SET SCREW M8-1.25 X 8
169	XM1116169	COMPRESSION SPRING 0.8 X 5 X 25
170	XM1116170	STEEL BALL 6.5MM
171	XM1116171	HI/LO GEAR KNOB 50D
172	XM1116172	SET SCREW M5-.8 X 16
173	XM1116173	SPEED KNOB PLATE
174	XM1116174	FORK SHAFT FLANGE
175	XM1116175	FORK SHAFT
176	XM1116176	CAP SCREW M3-.5 X 6
177	XM1116177	SPINDLE RING 16MM
178	XM1116178	CAP SCREW M3-.5 X 6
179	XM1116179	HEX BOLT M3-.5 X 12
180	XM1116180	SPEED SENSOR CORD
181	XM1116181	HEX BOLT M3-.5 X 6
182	XM1116182	DRILL CHUCK ARBOR R8 X B16
183	XM1116183	CAP SCREW M3-.5 X 6
184	XM1116184	GEAR GUARD
185	XM1116185	DRAWBAR 7/16-20 X 9-7/8
187	XM1116187	DRILL CHUCK B16 3-16MM
188	XM1116188	DRILL CHUCK KEY 1/4" STD 11T SD-3/4"
189	XM1116189	DRAWBAR RETAINER CAP
201	XM1116201	PRELOAD ADJUSTER SCREW M5-.8 X 10
202	XM1116202	MOTOR CARBON BRUSH (2-PC SET)
203	XM1116203	MOTOR CARBON BRUSH CAP 1-PC
204	XM1116204	TAPERED ROLLER BEARING 32005

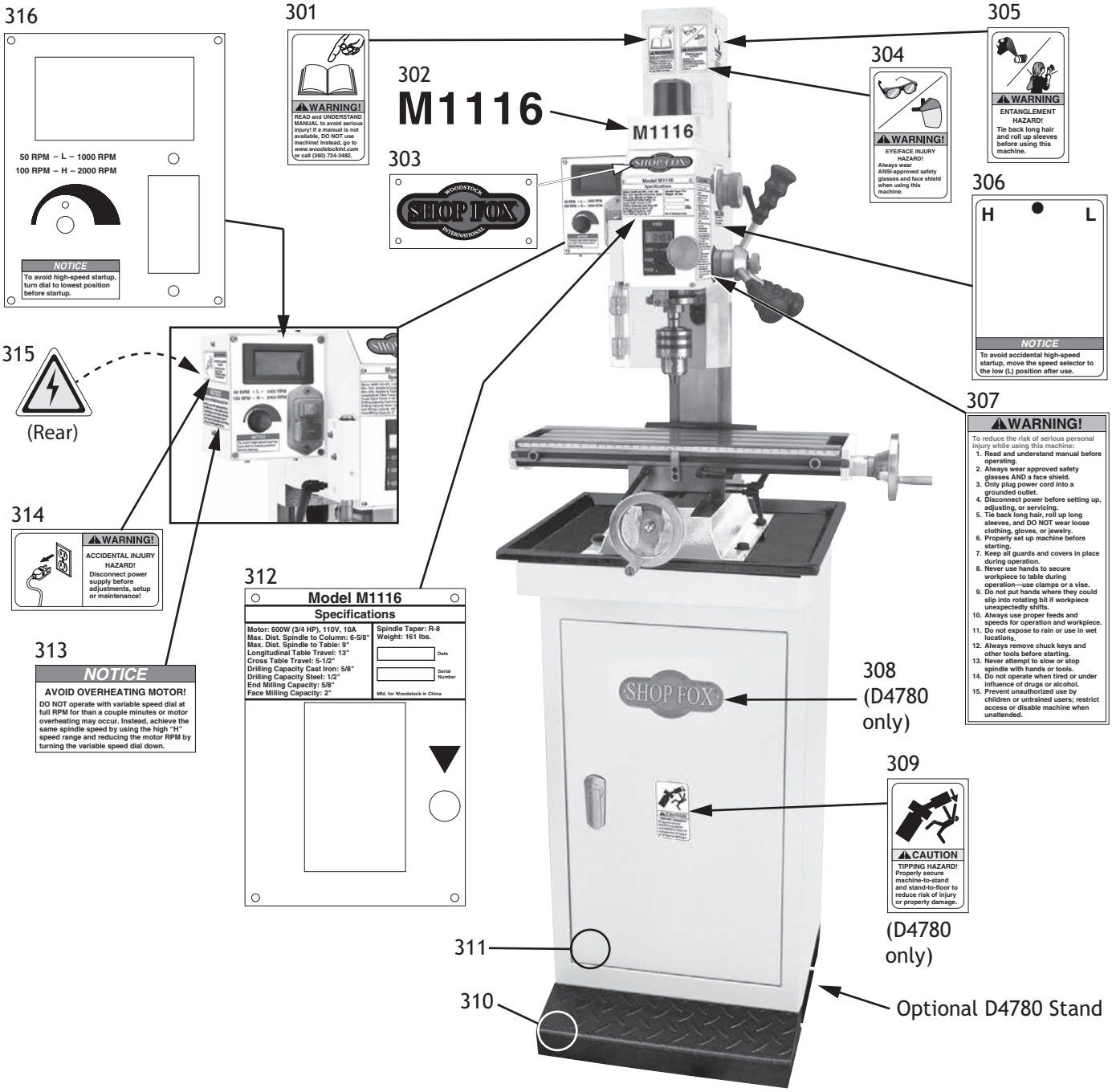
Tools & Chip Guard Parts



REF	PART #	DESCRIPTION
190	XM1116190	HEX WRENCH 6MM
191	XM1116191	HEX WRENCH 5MM
192	XM1116192	HEX WRENCH 4MM
193	XM1116193	HEX WRENCH 3MM
194	XM1116194	HEX WRENCH 2.5MM
195	XM1116195	SPINDLE PIN
196	XM1116196	WRENCH 17 X 19MM OPEN-ENDS
197	XM1116197	SCREWDRIVER FLAT #2
198	XM1116198	SCREWDRIVER PHILLIPS #2
199	XM1116199	BOTTLE FOR OIL
200	XM1116200	TOOLBOX
205	XM1116205	WRENCH 12 X 14MM OPEN-ENDS
206	XM1116206	WRENCH 8 X 10MM OPEN-ENDS
251	XM1116251	CAP SCREW M3-.5 X 16

REF	PART #	DESCRIPTION
252	XM1116252	FLAT WASHER 3MM
253	XM1116253	HEX NUT M3-.5
254	XM1116254	CAP SCREW M5-.8 X 15
255	XM1116255	EXT RETAINING RING 12MM
256	XM1116256	WAVY WASHER 20MM
257	XM1116257	GUARD MOUNTING BLOCK
258	XM1116258	LIMIT SWITCH L-BRACKET, COPPER
259	XM1116259	LIMIT SWITCH DATER KW1-103
260	XM1116260	PROTECTIVE PAPER
261	XM1116261	SET SCREW M5-.8 X 10
262	XM1116262	CHIP GUARD POST
263	XM1116263	CHIP GUARD
264	XM1116264	PHLP HD SCR M4-.7 X 10

Labels & Cosmetics



REF	PART #	DESCRIPTION
301	XM1116301	READ MANUAL LABEL
302	XM1116302	MODEL NUMBER LABEL
303	XM1116303	SHOP FOX LABEL
304	XM1116304	EYE INJURY WARNING LABEL
305	XM1116305	ENTANGLEMENT HAZARD LABEL
306	XM1116306	HI/LO SPEED RANGE LABEL
307	XM1116307	GENERAL WARNINGS LABEL
308	XM1116308	SHOP FOX NAMEPLATE (D4780)

REF	PART #	DESCRIPTION
309	XM1116309	TIPPING HAZARD LABEL (D4780)
310	XM1116310	TOUCH-UP PAINT, SHOP FOX BLACK
311	XM1116311	TOUCH-UP PAINT, SHOP FOX WHITE
312	XM1116312	MACHINE ID LABEL
313	XM1116313	AVOID OVERHEATING MOTOR LABEL
314	XM1116314	DISCONNECT POWER LABEL
315	XM1116315	ELECTRICITY LABEL
316	XM1116316	CONTROL PANEL LABEL

Warranty Registration

Name_____

Street _____

City _____ State_____ Zip_____

Phone #_____ Email_____ Invoice #_____

Model #_____ Serial #_____ Dealer Name_____ Purchase Date_____

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 ____ Local Store
_____ Mail Order Catalog _____ Website ____ Other:

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

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

3. How many of your machines or tools are Shop Fox?

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

4. Do you think your machine represents a good value? _____ Yes ____ No

5. Would you recommend Shop Fox products to a friend? _____ Yes ____ No

6. What is your age group?

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

7. 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+

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

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

9. Comments:_____

_____

_____

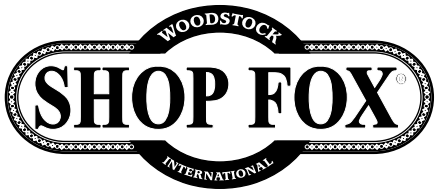
_____

_____

CUT ALONG DOTTED LINE

FOLD ALONG DOTTED LINE

Place
Stamp
Here



WOODSTOCK INTERNATIONAL INC.
P.O. BOX 2309
BELLINGHAM, WA 98227-2309

FOLD ALONG DOTTED LINE

TAPE ALONG EDGES--PLEASE DO NOT STAPLE

WARRANTY

Woodstock International, Inc. warrants all Shop Fox machinery to be free of defects from workmanship and materials for a period of two years from the date of original purchase by the original owner. This warranty does not apply to defects due directly or indirectly to misuse, abuse, negligence or accidents, lack of maintenance, or reimbursement of third party expenses incurred.

Woodstock International, Inc. will repair, replace, or arrange for a dealer refund, at its expense and option, the Shop Fox machine or machine part proven to be defective for its designed and intended use, provided that the original owner returns the product prepaid to an authorized warranty or repair facility as designated by our Bellingham, Washington office with proof of their purchase of the product within two years, and provides Woodstock International, Inc. reasonable opportunity to verify the alleged defect through inspection. If it is determined there is no defect, or that the defect resulted from causes not within the scope of Woodstock International Inc.'s warranty, then the original owner must bear the cost of storing and returning the product.

This is Woodstock International, Inc.’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 that Shop Fox machinery complies with the provisions of any law, acts or electrical codes. We do not reimburse for third party repairs. In no event shall Woodstock International, Inc.’s liability under this limited warranty exceed the purchase price paid for the product, and any legal actions brought against Woodstock International, Inc. 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.

Every effort has been made to ensure that all Shop Fox machinery meets high quality and durability standards. We are commited to continuously improving the quality of our products, and reserve the right to change specifications at any time.

WOODSTOCK INTERNATIONAL INC.

High Quality Machines and Tools

Woodstock International, Inc. carries thousands of products designed to meet the needs of today's woodworkers and metalworkers. Ask your dealer about these fine products:

BROSEM® PRECISION STOP BLOCK

THE REBEL®

BOARD BUDDIES®

PLANER PAL®

SLICKPLANE®

ACCU-SHARP®

STEELEX® FINE TOOLS

JOINTER PAL®

DURASTICK®

WOODSTOCK SHOP FOX® INTERNATIONAL

ROMAN CARBIDE®

Rotacator®

Gutmann®

Junglee®

PARROT VISE®

PRO-STIK® ABRASIVE BELT & DISC CLEANER

STEELEX® PLUS

Aluma-Classic®

WHOLESALE ONLY

WOODSTOCK INTERNATIONAL, INC.

Phone: (360) 734-3482 · Fax: (360) 671-3053 · Toll Free Fax: (800) 647-8801

P.O.Box 2309 · Bellingham, WA 98227

SHOPFOX.BIZ