WOODSTOCK

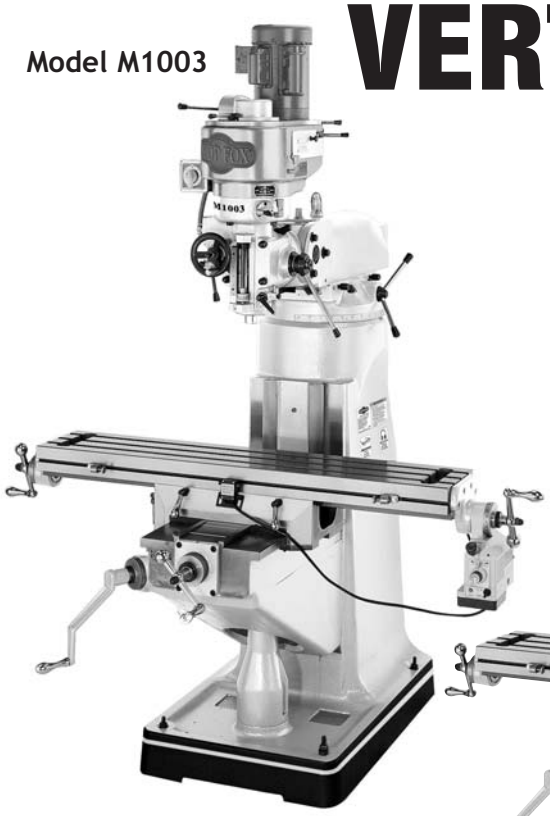
SHOP FOX®

INTERNATIONAL

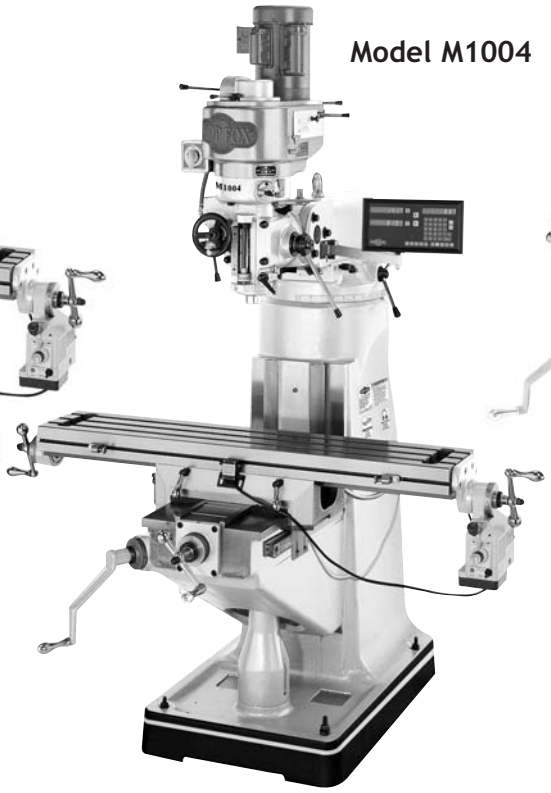
MODEL M1003/M1004/M1006

VERTICAL MILL

Model M1003



Model M1004



Model M1006

INSTRUCTION MANUAL

Phone: 1-360-734-3482 • On-Line Technical Support: tech-support@shopfox.biz

#6728EW

Printed in China

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!

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INTRODUCTION
Woodstock Technical Support

We stand behind our machines! In the event that questions arise about your machine, parts are missing, or a defect is found, please contact Woodstock International Technical Support at 1-360-734-3482 or send e-mail to: **tech-support@shopfox.biz**. Our knowledgeable staff will help you troubleshoot problems and send out parts for warranty claims.

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

Woodstock International, Inc.
Attn: Technical Support Department
P.O. Box 2309
Bellingham, WA 98227

About Your New Mill

Your new **SHOP FOX®** Model M1003/M1004/M1006 Mill 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.

Weighing in at over 2400 lbs of cast iron and hardened precision ground steel, the Model M1003 and M1004 have the size and stability to handle the toughest jobs. With a 2 HP motor driving 8 speeds from 78 to 2400 RPM, 3 speed quill feed with a micrometer depth stop and auto reverse, and a variable speed longitudinal power feed, this machine has the ability to do the most complex and precise jobs. For added performance, the M1004 includes a 2 axis digital readout with up to 5µm resolution, machine error compensation, absolute/incremental coordinate display, arc/line of holes/angled cut functions, and 199 user defined datum points.

The M1006 has all the features necessary for an industrial shop: a powerful 3 HP, 3-phase motor with variable speeds from 80 to 4250 RPM, a 10" x 54" table, longitudinal power feed, and a digital readout. The 3 axis digital readout has a 5µm resolution, machine error compensation, absolute/incremental coordinate display, arc/line of holes/angled cut functions, and 199 user defined datum points. This machine has the capability to complete the hardest jobs with extreme precision and repeatability.

Woodstock International, Inc. is committed to customer satisfaction in providing this manual. It is our intent to make sure all the information necessary for safety, ease of assembly, practical use and durability of this product be included.

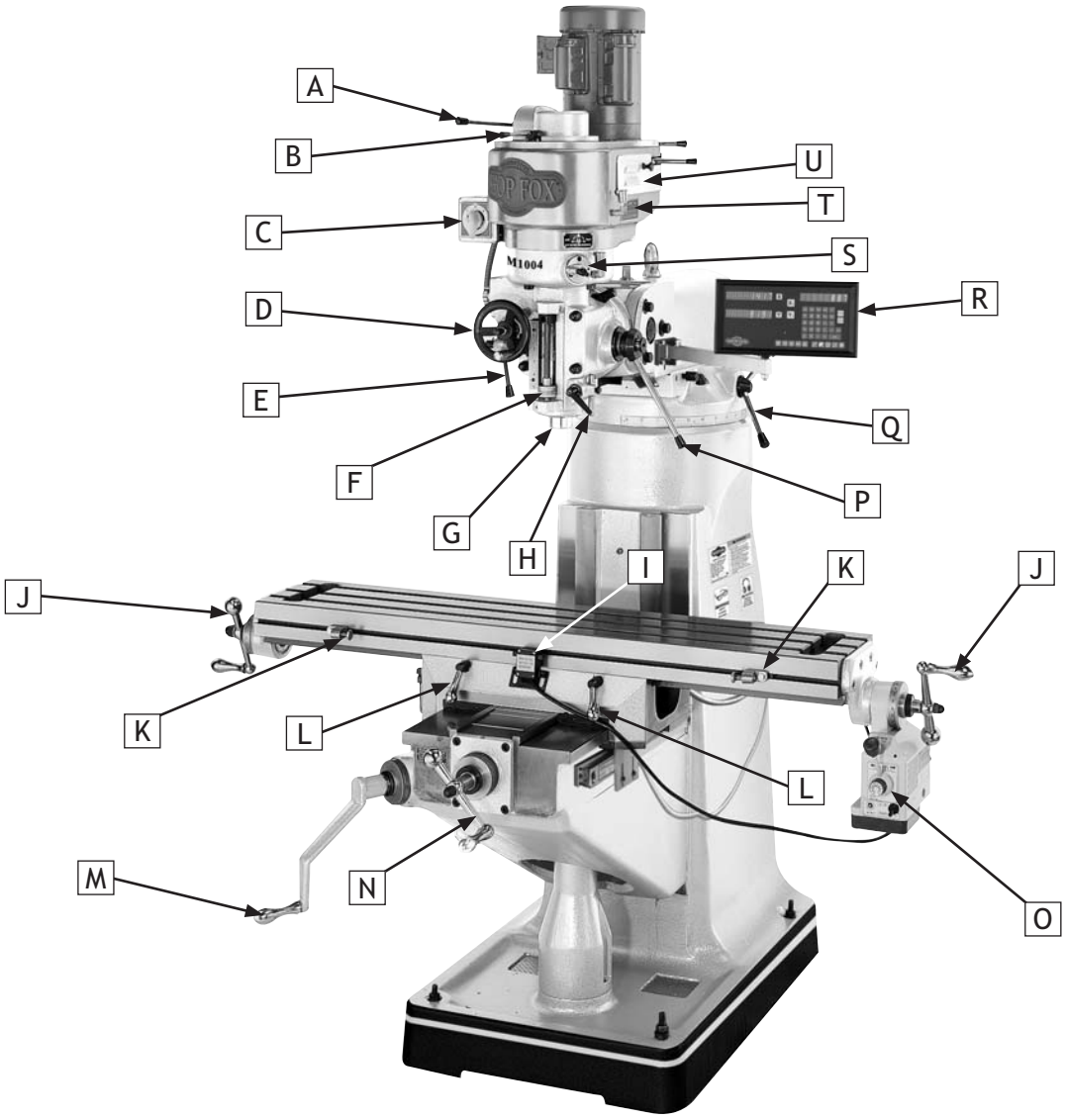
M1003 and M1004 Specifications

Motor	2 HP, 110/220V (prewired 220V), Single-Phase, 1725 RPM, 26/13 Amps
Power Transfer	Belt Drive
Table Size	9" x 49"
Spindle Travel	5"
Maximum Distance Spindle to Column	18-1/2"
Maximum Distance Spindle to Table	18-3/4"
Table Travel, Longitudinal	27"
Table Travel, Cross	12"
Knee Travel	16"
Head Tilt	45° Both Ways
Head Rotation	90° Both Ways
T-Slots	3 @ 2-1/2" Centers, 1/2" Stud
Speed Range	78, 98, 197, 278, 670, 850, 1700, 2400 RPM
Spindle	R8
Overall Size	66-1/2" L x 66-1/2" W x 85" H
Footprint	24" x 36"
Weight	2340 lbs.
	The M1004 includes a 2 axis digital readout.

M1006 Specifications

Motor	3 HP, 220V, Three-Phase, 1725 RPM, 9 Amps
Power Transfer	Belt Drive
Table Size	10" x 54"
Spindle Travel	5"
Maximum Distance Spindle to Column	24-1/2"
Maximum Distance Spindle to Table	17"
Table Travel, Longitudinal	33-3/4"
Table Travel, Cross	15-1/2"
Knee Travel	16-3/4"
Head Tilt	45° Both Ways
Head Rotation	90° Both Ways
T-Slots	3 @ 2-1/2" Centers, 1/2" Stud
Variable Speed	70-4200 RPM
Spindle	R8
Overall Size	75-1/2" L x 72-1/2" W x 86" H
Footprint	24" x 42"
Weight	3677 lbs.
	The M1006 includes a 3 axis digital readout.

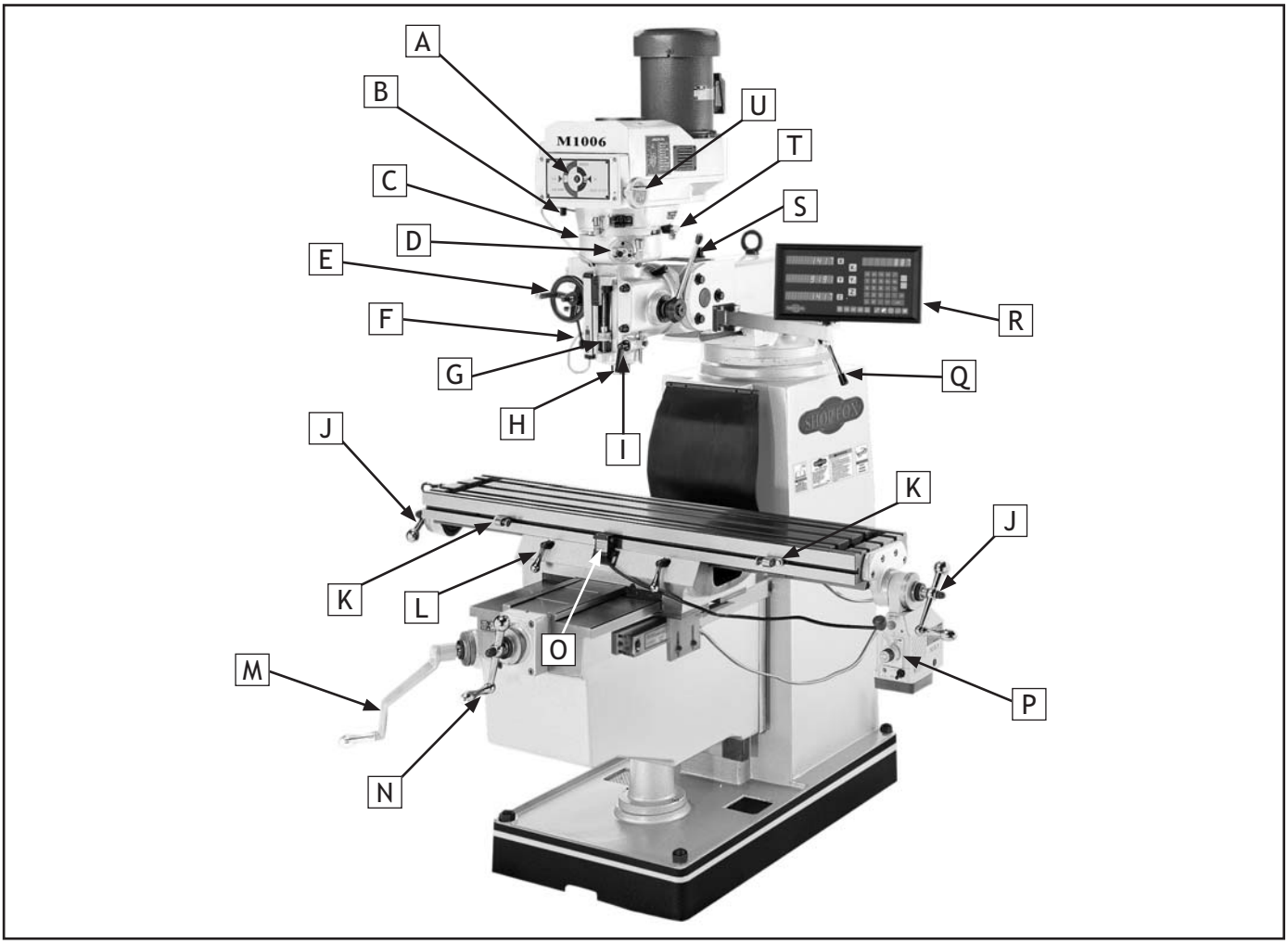
M1003 and M1004 Controls and Features



Please take time to become familiar with the location of the controls and features on this machine. These controls and features will be mentioned throughout the manual and knowing them is essential to understanding the instructions, safety, and operations described in this manual.

A. High/Low Gear Lever
B. Spindle Brake
C. Spindle FORWARD/REVERSE Switch
D. Microfeed Handwheel for Quill
E. Power Feed Handle for Quill
F. Micrometer Stop for Quill
G. Spindle
H. Quill Lock
I. Power Feed Limit Switch
J. Longitudinal Feed Handle (2 Places)
K. Power Feed Adjustable Stop (2 Places)
L. Longitudinal Feed Lock (2 Places)
M. Knee Feed Handle
N. Cross Feed Handle
O. Power Feed Controls
P. Quill Feed Handle
Q. Ram Positioning Handle
R. 2 Axis Digital Readout (M1004 Only)
S. Hand/Power Selector Lever
T. Spindle Speed Setting Chart
U. Access Panel to V-belt

M1006 Controls and Features



Please take time to become familiar with the location of the controls and features on this machine. These controls and features will be mentioned throughout the manual and knowing them is essential to understanding the instructions, safety, and operations described in this manual.

A. RPM Setting Indicator
B. Spindle Brake
C. Spindle FORWARD/REVERSE Switch
D. Hand/Power Selector Lever
E. Microfeed Handwheel for Quill
F. Power Feed Handle for Quill
G. Micrometer Stop for Quill
H. Spindle
I. Quill Lock
J. Longitudinal Feed Handle (2 Places)
K. Power Feed Adjustable Stop (2 Places)
L. Longitudinal Feed Lock (2 Places)
M. Knee Feed Handle
N. Cross Feed Handle
O. Power Feed Limit Switch
P. Power Feed Controls
Q. Ram Positioning Handle
R. 3 Axis Digital Readout
S. Quill Feed Handle
T. High/Low Gear Lever
U. Spindle Speed Setting Handle

SAFETY

READ MANUAL BEFORE OPERATING MACHINE. FAILURE TO FOLLOW INSTRUCTIONS BELOW WILL RESULT IN PERSONAL INJURY.

⚠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, and/or a situation that may cause damage to the machinery.

Standard Safety Instructions

1. **Thoroughly read the Instruction Manual before operating your machine.** Learn the applications, limitations and potential hazards of this machine. Keep the manual in a safe and convenient place for future reference.

2. **Keep work area clean and well lighted.** Clutter and inadequate lighting invite potential hazards.

3. **Ground all tools.** If a machine is equipped with a three-prong plug, it must be plugged into a three-hole grounded electrical receptacle or grounded extension cord. If using an adapter to aid in accommodating a two-hole receptacle, ground using a screw to a known ground.

4. **Wear eye protection at all times.** Use safety glasses with side shields or safety goggles that meet the appropriate standards of the American National Standards Institute (ANSI).

5. **Avoid dangerous environments.** Do not operate this machine in wet or open flame environments. Airborne dust particles could cause an explosion and severe fire hazard.

6. **Ensure all guards are securely in place** and in working condition.

7. **Make sure switch is in the *OFF* position** before connecting power to machine.

8. **Keep work area clean,** free of clutter, grease, etc.

9. **Keep children and visitors away.** Visitors must be kept at a safe distance while operating unit.

10. **Childproof your workshop** with padlocks, master switches or by removing starter keys.

11. **Stop and disconnect the machine when cleaning, adjusting or servicing.**

12. **Do not force tool.** The machine will do a safer and better job at the rate for which it was designed.

13. **Use correct tool.** Do not force machine or attachment to do a job for which it was not designed.

14. **Wear proper apparel.** Do not wear loose clothing, neck ties, gloves, jewelry, and secure long hair away from moving parts.

15. **Remove adjusting keys, rags, and tools.** Before turning the machine on, make it a habit to check that all adjusting keys and wrenches have been removed.

16. **Avoid using an extension cord.** But if you must use one, examine the extension cord to ensure it is in good condition. Immediately replace a damaged extension cord. Always use an extension cord that uses a ground pin and connected ground wire. Use an extension cord that meets the amp rating on the motor nameplate. If the motor is dual voltage, be sure to use the amp rating for the voltage you will be using. If you use an extension cord with an undersized gauge or one that is too long, excessive heat will be generated within the circuit, increasing the chance of a fire or damage to the circuit.

17. **Keep proper footing and balance** at all times.

18. **Do not leave machine unattended.** Wait until it comes to a complete stop before leaving the area.

19. **Perform machine maintenance and care.** Follow lubrication and accessory attachment instructions in the manual.

20. **Keep machine away from open flame.** Operating machines near pilot lights or open flames creates a high risk if dust is dispersed in the area. Dust particles and an ignition source may cause an explosion. Do not operate the machine in high-risk areas, including but not limited to, those mentioned above.

21. **If at any time you are experiencing** difficulties performing the intended operation, stop using the machine! Then contact our technical support or ask a qualified expert how the operation should be performed.

22. **Habits—good and bad—are hard to break.** Develop good habits in your shop and safety will become second-nature to you.

Additional Safety Instructions for Mills

⚠WARNING

READ and understand this entire instruction manual before using this machine. Serious personal injury may occur if safety and operational information is not understood and followed. DO NOT risk your safety by not reading!

⚠CAUTION

USE this and other machinery with caution and respect. Always consider safety first, as it applies to your individual working conditions. No list of safety guidelines can be complete—every shop environment is different. Failure to follow guidelines could result in serious personal injury, damage to equipment or poor work results.

1. **SET UP INSTRUCTIONS.** Do not operate until unit is assembled and installed according to the set up instructions in this manual.

2. **FAMILIARITY WITH CONTROLS.** Make sure you understand the use and operation of all controls.

3. **WORKPIECE STABILITY.** Never hold a workpiece by hand for any type of machining operation. Secure your workpiece with a mill vise, step clamps, etc.

4. **CHIP REMOVAL.** Wait until machine has come to a complete stop to clear away chips. Turn machine ***OFF*** and wait for the cutting tool to come to a complete stop. Chips are sharp—use a brush to clear them.

5. **LOOSE CUTTING TOOLS.** Make sure that the cutting tool is chucked or colleted properly. Cutting tools that are loose or not rotating correctly can come off and cause serious personal injury.

6. **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.

7. **CHUCK KEY SAFETY.** Always remove your chuck key, draw bar wrench, and any service tools immediately after use.

8. **PROPER FEED/SPEED RATES.** Research the proper feed and speed rate for the material you are machining. Do not exceed these recommended rates.

9. **MOTOR DIRECTION**. Never reverse motor direction while the mill is in motion.

10. **TURNING OFF THE MILL.** Allow the mill to come to a complete stop before leaving it unattended.

11. **SERVICE**. Make sure mill is turned ***OFF***, unplugged, and the machine has come to a complete stop before servicing. Perform routine inspections and service promptly.

12. **HAZARDOUS COOLANTS.** Coolants used for machining may contain hazardous chemicals. Read and understand all user information on the coolant container and take any necessary precautions.

ELECTRICAL

M1003/4 220V Operation

The **SHOP FOX®** Model M1003 and Model M1004 are prewired for 220 volt, single-phase operation. The cord included with this machine does not come with a plug as the style of plug you require will depend upon the type of service you currently have or plan to install.

At 220V operation, the maximum amp draw from these models is 13 amps.

Use a 6-15 plug and receptacle (**Figure 1**) and connect your machine to a circuit that is protected by a 15 amp circuit breaker when operating at 220V.

▲CAUTION: Using a circuit breaker rated higher than 15 amps will increase the risk of fire!

Keep in mind that a circuit being used by other machines or tools at the same time will add to the total load being applied to the circuit. Add up the load ratings of all machines on the circuit. If this number exceeds the rating of the circuit breaker or fuse, use a different circuit.

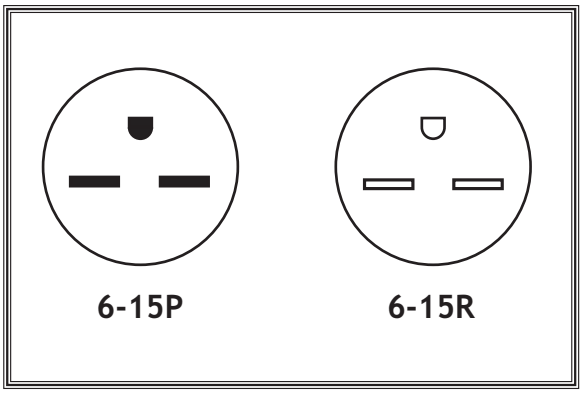


Figure 1. Typical 6-15 plug and receptacle profile for 220V operation.

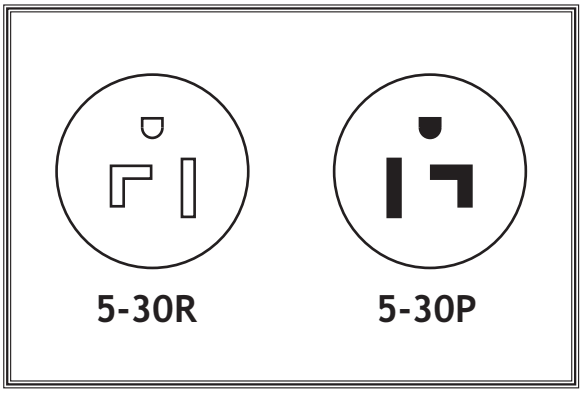


Figure 2. Typical 5-30 plug and outlet profile for 110V operation.

M1003/4 110V Operation

The **SHOP FOX®** Model M1003 and Model M1004 can be rewired for 110 volts. To do this, refer to the wiring diagram in the back of this manual. You will also need a NEMA-style 5-30 plug and outlet (see **Figure 2**).

At 110V operation, the maximum amp draw from your new mill is 26 amps.

Only connect your machine to a circuit that is protected by a 30 amp circuit breaker when operating at 110V.

▲CAUTION: Using a circuit breaker rated higher than 30 amps will increase the risk of fire!

Keep in mind that a circuit being used by other machines or tools at the same time will add to the total load being applied to the circuit. Add up the load ratings of all machines on the circuit. If this number exceeds the rating of the circuit breaker or fuse, use a different circuit.

M1006 220V Operation

The **SHOP FOX®** Model M1006 is prewired for 220 volt, three-phase operation and the maximum amp draw from this machine is 9 amps. We recommend that you hardwire this machine directly to a circuit protected by a 15 amp circuit breaker and install a locking shut-off lever (**Figure 3**) near the machine as a way to quickly disconnect the power and prevent accidental starting.

▲**CAUTION:** Using a circuit breaker rated higher than 15 amps will increase the risk of fire!

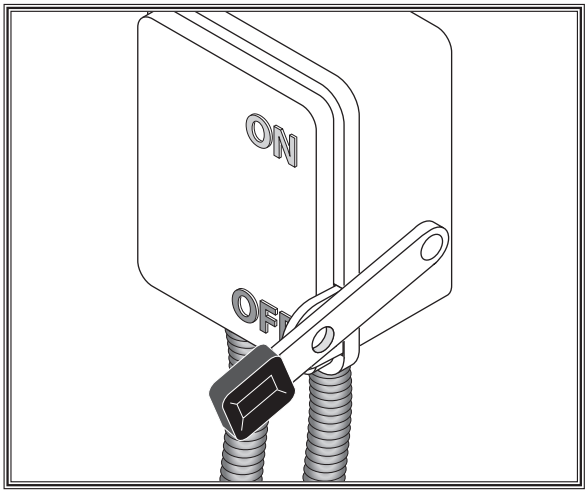


Figure **3**. A power disconnect used for three-phase operation.

Grounding

This machine must be grounded! The electrical cord supplied with this machine does not come with a plug. Use a plug with a ground pin. If your outlet does not accommodate a ground pin, have it replaced by a qualified electrician or have an appropriate adapter installed and grounded properly. An adapter with a grounding wire does not guarantee that this machine will be grounded. A ground source must be verified.

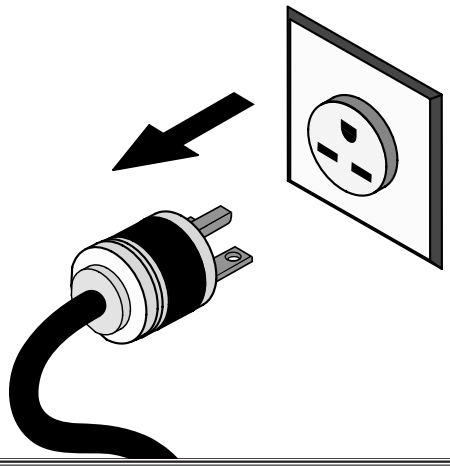
Extension Cords

We do not recommend using an extension cord for 220V equipment. Instead, arrange the placement of your machinery and installed wiring to eliminate the need for extension cords. If you must use an extension cord, please use the following guidelines:

- Use cords rated for Standard Service
- Only use cords 50 feet long or less
- Use cords with 12 ga. wire or bigger
- Ensure cord has a ground wire and pin
- Only use undamaged cords

⚠WARNING

This equipment must be grounded. Verify that any existing electrical outlet and circuit you intend to plug into is actually grounded. If it is not, it will be necessary to run a separate 12 AWG copper grounding wire from the outlet to a known ground. Under no circumstances should the grounding pin be removed from any three-pronged plug or serious injury may occur.



SET UP

Unpacking

The **SHOP FOX®** Model M1003/M1004/M1006 has been carefully packaged for safe transporting. If you notice the machine has been damaged, please contact your authorized **SHOP FOX®** dealer immediately.

Inventory

The following is a description of the main components shipped with the **SHOP FOX®** Model M1003/M1004/M1006. Lay the components out to inventory them.

Wooden Box Contents (Figure 4)	**QTY**
A. Milling Machine (Not Shown)	1
B. Way Cover (M1006 only)	1
C. Toolbox	1
D. Drawbar	1
E. Phillips Head Screw M5-.8 x 10 (M1006 only)	6
F. Phillips Head Screw M5-.8 x 12 (M1006 only)	2
G. Hex Nut M5-.8 (M1006 only)	2
H. Way Cover Clamp Plates (M1006 only)	2

Toolbox Contents (Figure 5)	**QTY**
• Flat Head Screwdriver, Large	1
• Flat Head Screwdriver, Small	1
• Combo Wrench 17/19 mm	1
• Hex Wrench	3, 4, 5, 6, 8, 10mm
• Knee Handle	1
• Microfeed Quill Handle	1
• Oil Bottle	1

If any parts are missing, find the part number in the back of this manual and contact Woodstock International, Inc. at 360-734-3482 or at **tech-support@shopfox.biz**

WARNING

SUFFOCATION HAZARD!

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

WARNING

READ and understand this entire instruction manual before using this machine. Serious personal injury may occur if safety and operational information is not understood and followed. DO NOT risk your safety by not reading!

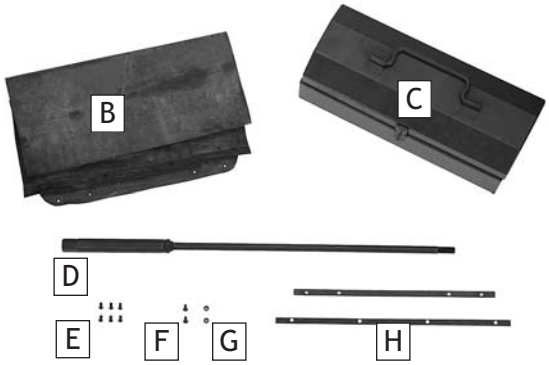


Figure 4. Wooden box contents.

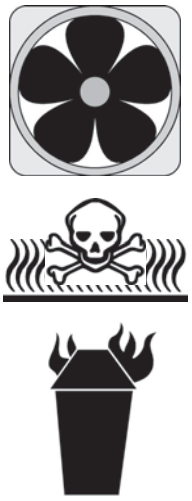
Figure 5. Tool box contents.

Cleaning Machine

The table and other unpainted parts of your mill are coated with a waxy grease that protects them from corrosion during shipment. Clean this grease off with a solvent cleaner or citrus-based degreaser. DO NOT use chlorine-based solvents such as brake parts cleaner or acetone—if you happen to splash some onto a painted surface, you will ruin the finish.

⚠WARNING

NEVER use gasoline or other petroleum-based solvents to clean with. Most have low flash points, which make them extremely flammable. A risk of explosion and burning exists if these products are used. Serious personal injury may occur if this warning is ignored!



⚠CAUTION

ALWAYS work in well-ventilated areas far from possible ignition sources when using solvents to clean machinery. Many solvents are toxic when inhaled or ingested. Use care when disposing of waste rags and towels to be sure they DO NOT create fire or environmental hazards.

Machine Placement

- **Floor Load:** The Model M1003 and Model M1004 weigh over 2300 lbs. and have a footprint of 24" x 36". The Model M1006 mill weighs approximately 3700 lbs. and has a 24" x 42" footprint. We recommend placing on concrete floors only.

- **Working Clearances:** Consider the movement of the table and head, existing and anticipated needs, and space for auxiliary stands, work tables or other machinery when establishing a location for your mill. See **Figures 6 & 7** for minimum working clearances. Provide a minimum of 36" of clearance around the machine.

- **Lighting:** Lighting should be bright enough to eliminate shadow and prevent eye strain.

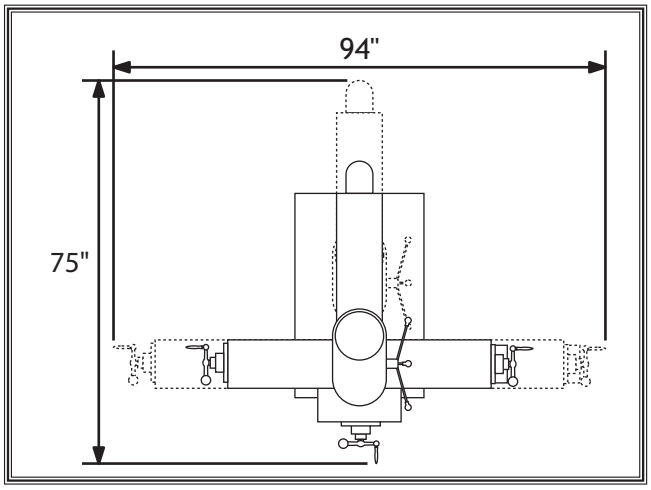


Figure 6. M1003/M1004 minimum working clearances.

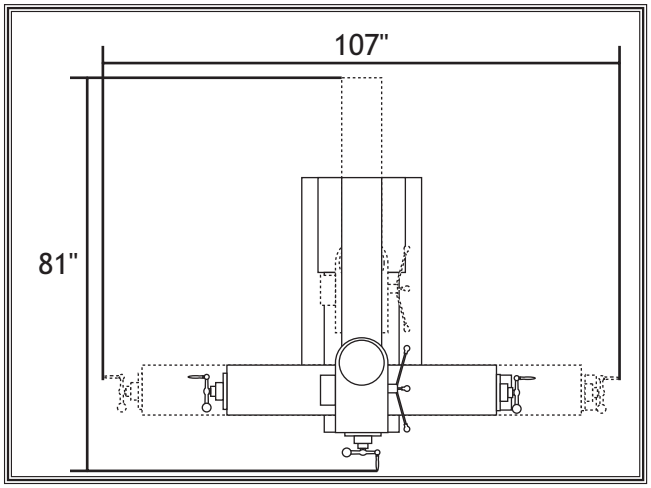


Figure 7. M1006 minimum working clearances.

Lifting the Mill

Special care should be taken when moving this mill. Only use the following methods to lift or move this mill.

⚠WARNING

Use a chain or a lifting strap with a minimum of 5000 lbs. lifting capacity. If the chain or lifting strap breaks, serious personal injury may occur.

To move the mill, do these steps:

Method 1:

1. Swivel the head 90° from vertical, as shown in **Figure 8**, to lower the center of gravity. The mill may be in position when removed from the crate.

2. Move the ram so the eye bolt is aligned with the front edge of the column and lock the ram so it will not slide on the column.

3. Place the hook through the eye bolt and lift slowly to make sure the hook is secure and the mill is lifting evenly.

   - 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 lock bolts before lifting.

   - If the mill lifts evenly, continue to move the mill to its final location.

Method 2:

1. Swivel the head 180°, as shown in **Figure 9** and lock it in place.

2. Lock the ram so it will not slide on the column.

3. Place a lifting strap around the ram as shown in **Figure 9**. Place padding between the sling and the mill to protect the sliding surfaces.

4. Lift the lifting strap slowly to make sure the sling is secure and the mill is lifting evenly.

   - 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 lock bolts before lifting.

   - If the mill lifts evenly, continue to move the mill to its final location.

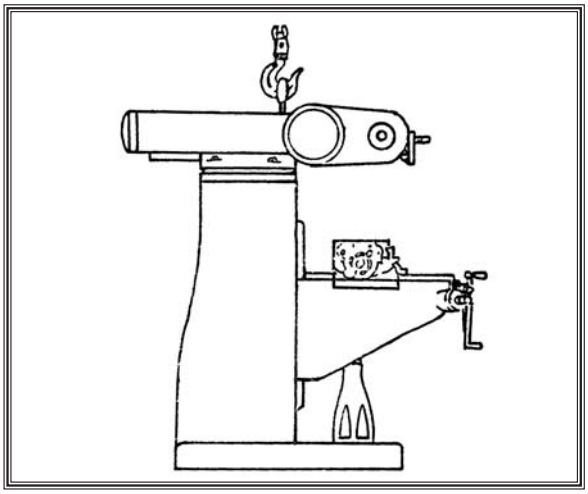


Figure 8: Using the eye bolt to lift the mill.

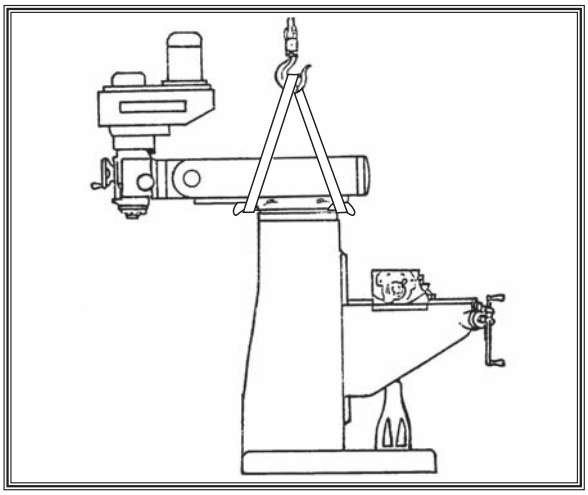
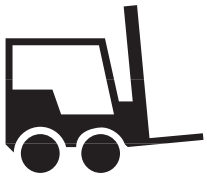


Figure 9: Lifting the mill with lifting strap.

⚠WARNING



USE POWER EQUIPMENT moving the machine into place. The SHOP FOX® Model M1003/M1004 weighs over 2300 lbs and the M1006 weighs approximately 3700 lbs.

Floor Mounting

We recommend mounting your new mill to the floor with at least 5/16" concrete anchor studs (see **Figure 10**) or lag screws and lag shields (see **Figure 11**), depending on your floor material and future space requirements.

Anchor studs are stronger and more permanent than lag shield anchors; however, they stick out of the floor, which may cause a tripping hazard if you decide to move your mill at a later point. Lag bolts/shields are not as strong as anchor studs, but are much more convenient if you need to move the mill in the future.

Because of the large weight load and relatively small footprint, we do not recommend mounting this machine to wood floors.

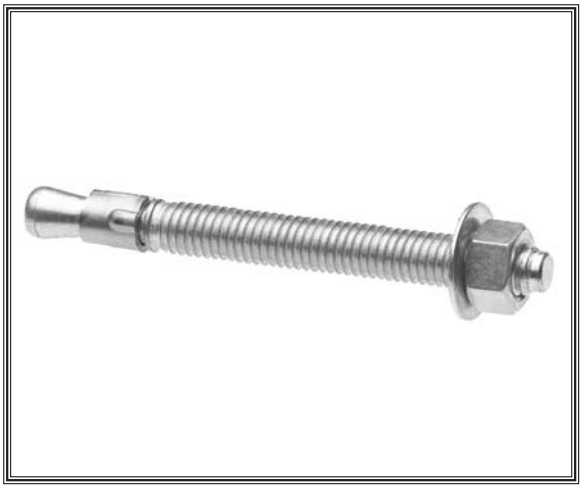


Figure 10. Anchor stud for concrete floor.

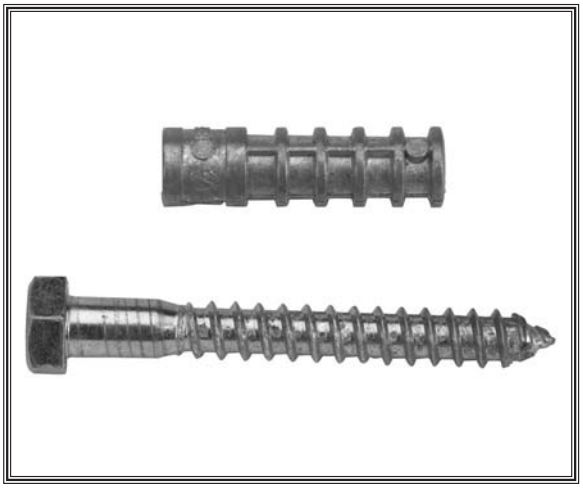


Figure 11. Lag screw and lag shield combination for concrete floor.

To mount the mill to the floor, do these steps:

1. Position the mill as close to its electrical source as possible, making sure to leave at least three feet between the back of the mill and the wall.

2. Check the mill table with a level to ensure that it is flat along its travel. If it is not, insert steel shims under the base as necessary until the table is level.

   Note: If the slope of your floor requires you to shim more than a 3/8" or your floor is very uneven, consider pouring a level machine pad. Consult a specialist for the proper dimensions of this new pad because fastening anchors too close to the edge will crack the concrete.

3. Using the mounting holes in the mill base as a guide, drill at least 3-1/2" deep into your floor.

4. Secure the mill to the floor with your chosen hardware.

Handle Installation

The knee handle and the microfeed quill handle both can be found in the toolbox. The feed handles are installed on the mill at the factory, but have been placed on the machine backwards for protection during shipping. You will need to reattach the handles as described below.

To install the feed handwheels, do these steps:

1. Use a 19mm wrench to remove the acorn nut that secures the handle in place.

2. Pull the handle off, rotate the handle around 180°, and place it back onto the shaft.

3. Secure the handle in place by screwing the acorn nut back onto the shaft.

4. Repeat this process for all the feed handles shown in **Figure 12**.

To install the knee handle, do these steps:

1. Slide the knee handle over the shaft on the knee as shown in **Figure 13**.

2. Engage the splines on the shaft and the handle to raise and lower the knee.

   Note: Remove the knee handle when not in use to prevent bumping the handle and moving the knee unintentionally.

To install the microfeed quill handle, do these steps:

1. Slide the handle on the shaft as shown in **Figure 14**.

2. Rotate the handle until the pin on the back of the handle slides into the socket at the base of the shaft.

   Note: You may wish to unscrew the knob from the locking pin in the center of the handle and place an 8mm washer over the shaft to prevent the handle from coming off during use.

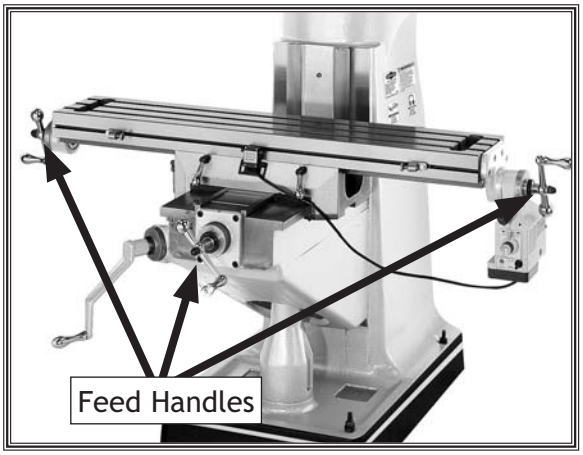


Figure 12. Feed handle locations.

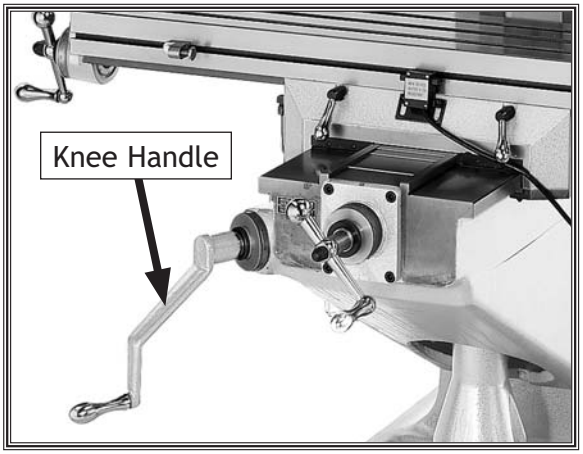


Figure 13. Knee handle installation.

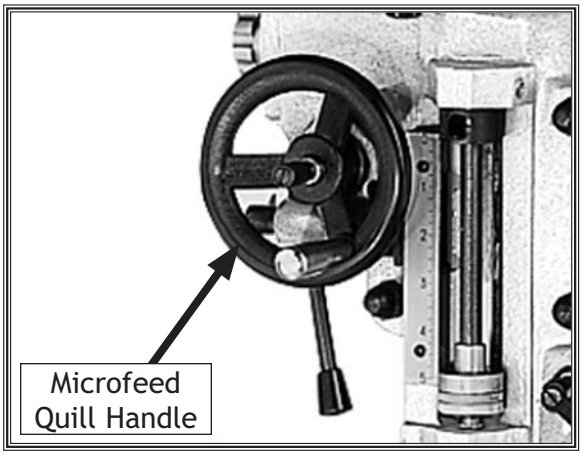


Figure 14. Microfeed quill handle.

Way Cover Installation

To install the Model M1006 way cover, do these steps:

1. Slide the M5-.8 button head screws through the clamp plates (see **Figure 15**).

   Note: The longer button head screws belong on the outside edges.

2. Thread the screws through the way cover and into the holes in the column and the back of the table and secure the two outside screws with hex nuts.

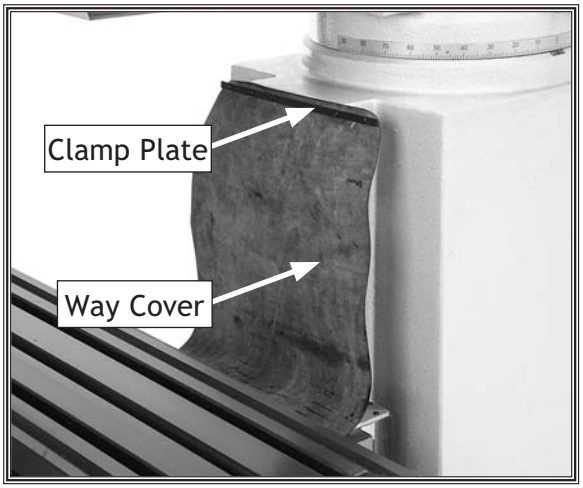


Figure 15. Milling machine way cover.

Spindle Controls

Figure 16 shows the location of the power switch and the spindle brake for the Model M1003/M1004, and **Figure 17** shows the spindle controls for the Model M1006.

- The power switch turns the mill ON/OFF and controls which direction the spindle rotates, depending on which direction the switch is turned.

- The spindle brake will slow the spindle when turning the mill ***OFF***, or hold the spindle for tool installation.

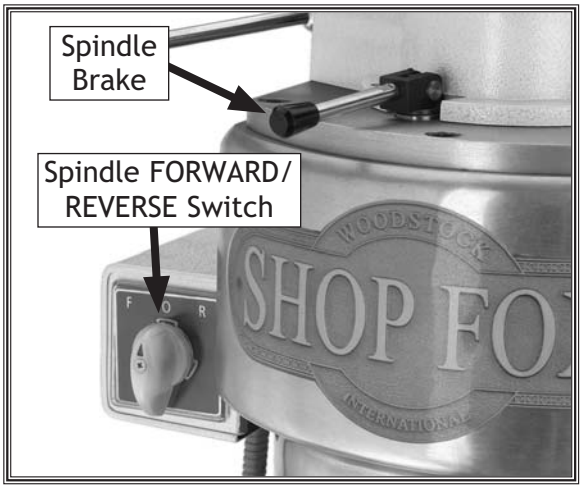


Figure 16. M1003/M1004 spindle controls.

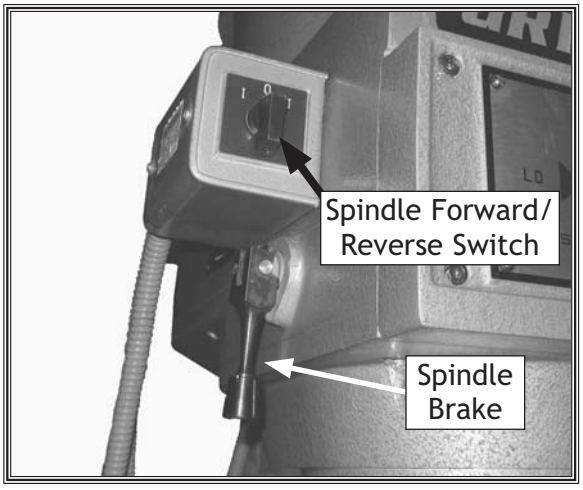


Figure 17. M1006 spindle controls.

Test Run

Complete this process once you have familiarized yourself with all instructions in this manual and have made sure the machine is completely lubricated as described in **Lubrication** on **Page 32**.

NOTICE

Follow spindle break in procedures on Page 29 after the test run and before performing any operations with this machine! Failure to follow the break-in procedures included in this manual may lead to shortened spindle bearing life and may void warranty.

To begin the test run procedure, do these steps:

1. Make sure there are no obstructions around or underneath the spindle.

2. Move the high/low speed lever to the "A" position for low speed on the Model M1003/M1004 (**Figure 18**), or to the LOW position on the Model M1006 (see **Figure 19**).

3. Put on safety glasses and hearing protection, and make sure any bystanders are wearing safety glasses and hearing protection and are out of the way.

4. Plug the machine into the power outlet and rotate the ON/OFF switch to turn the mill ***ON***, but make sure that your hand stays over the switch. The mill should run smoothly, with little or no vibration or rubbing noises.

   - If you hear squealing or grinding noises, turn the mill ***OFF*** immediately. Wait for the mill to stop moving, unplug the machine, and correct any problems before further operation.

   - If the source of an unusual noise or vibration is not readily apparent, contact our technical support for help at 1-360-734-3482 or contact us online at **tech-support@shopfox.biz.**

Figure 18. M1003 and M1004 high/low speed lever.

Figure 19. M1006 high/low speed lever.

OPERATIONS

General

The Model M1003/M1004/M1006 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.

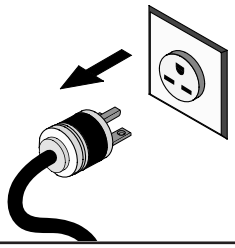
The instructions in this section are written with the understanding that the operator has the necessary knowledge and skills to operate this machine. **If at any time you are experiencing difficulties performing any operation, stop using the machine!**

If you are an inexperienced operator, we strongly recommend that you read books, trade articles, or seek training from an experienced milling machine operator before performing any unfamiliar operations. **Above all, your safety should come first!**

⚠WARNING

Always wear safety glasses when operating the mill. Failure to comply may result in serious personal injury.

⚠WARNING



DO NOT investigate problems or adjust the mill while it is running. Wait until the machine is *OFF*, unplugged, and all working parts have come to a complete stop before proceeding!

Digital Readout

The Model M1004 and the Model M1006 have factory installed digital readouts. No calibration or alignment is necessary. Digital readout operating instructions are covered in a separate manual.

Positioning Spindle Head

The vertical spindle head can be moved forward/backward, rotated 90° both ways, tilted 45° up or down, and swiveled horizontally on the column.

To move the head forward/backward, do these steps:

1. Make sure the spindle is stopped and the work area is free from obstructions before proceeding.

2. Use a 19mm wrench to loosen the lock nuts that secure the ram (see **Figure 20**).

3. Rotate the ram positioning handle (**Figure 20**) clockwise or counterclockwise until the spindle is in the desired position.

4. Tighten the two ram lock nuts.

   Note: Position the spindle as close as possible to the column for maximum rigidity.

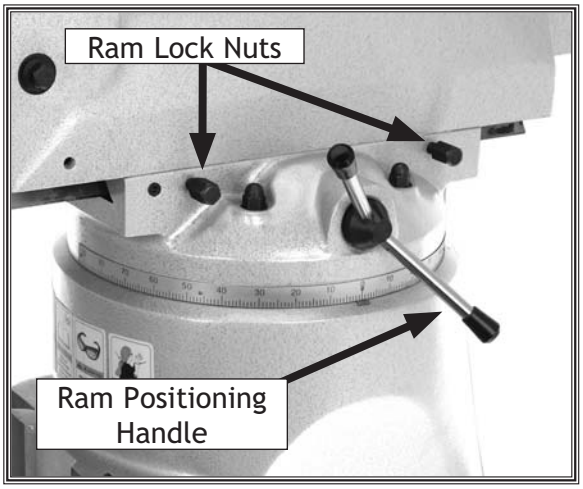


Figure 20. Location for forward/backward movement controls.

To rotate the spindle head, do these steps:

1. Make sure the spindle is stopped and the work area is free from obstructions before proceeding.

2. Use a 19mm wrench to loosen the four nuts that lock the spindle in place (see **Figure 21**).

3. Rotate the drive nut (**Figure 21**) until the spindle is rotated to the desired angle, as displayed on the rotation scale shown in **Figure 22**.

   Note: Have an assistant push up on the head when returning the spindle to vertical.

4. Tighten the spindle locking nuts.

Note: Additional setup tools should be used to determine the precise angle of the spindle head.

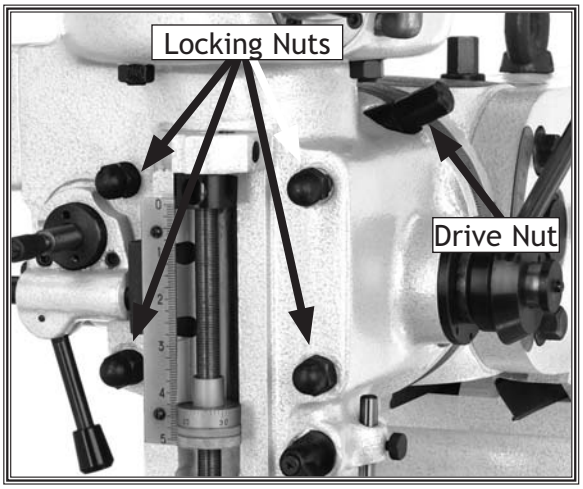


Figure 21. Controls for rotating spindle head.

To tilt the spindle head, do these steps:

1. Make sure the spindle is stopped and the work area is free from obstructions before proceeding.

2. Use a 19mm wrench to loosen the three locking nuts shown in **Figure 22**.

3. Rotate the drive nut indicated in **Figure 22**, until the spindle is tilted to the desired angle, as displayed on the tilt scale shown in **Figure 22**.

4. Tighten the four nuts to lock the spindle in position.

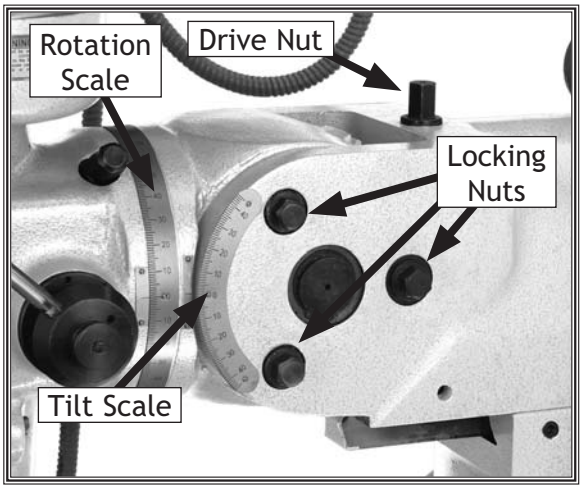


Figure 22. Controls for tilting spindle head.

Note: Additional setup tools should be used to determine the precise angle of the spindle head.

To swivel the spindle head, do these steps:

1. Make sure the spindle is stopped and the work area is free from obstructions before proceeding.

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

3. Push or pull the spindle head to swivel it to the desired position. At the base, there is a graduated scale for positioning.

4. Tighten the four nuts to lock the spindle position.

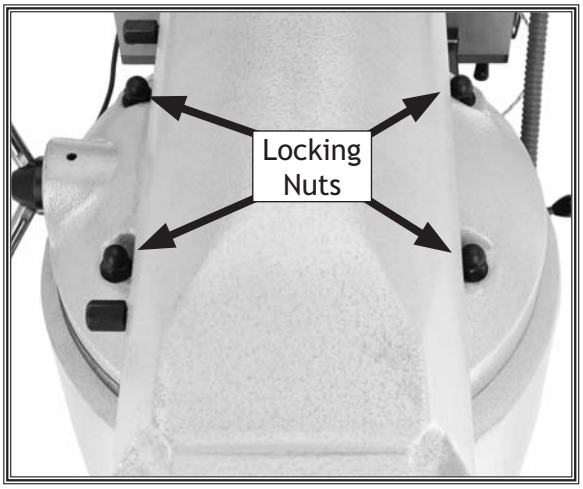


Figure 23: Column swivel locking nuts.

Table Travel

The table of this mill can be moved in 3 axes. Each axis is handwheel controlled, and each handwheel has a graduated dial to accurately position the workpiece in relation to the cutting tool (see **Figure 24** for locations).

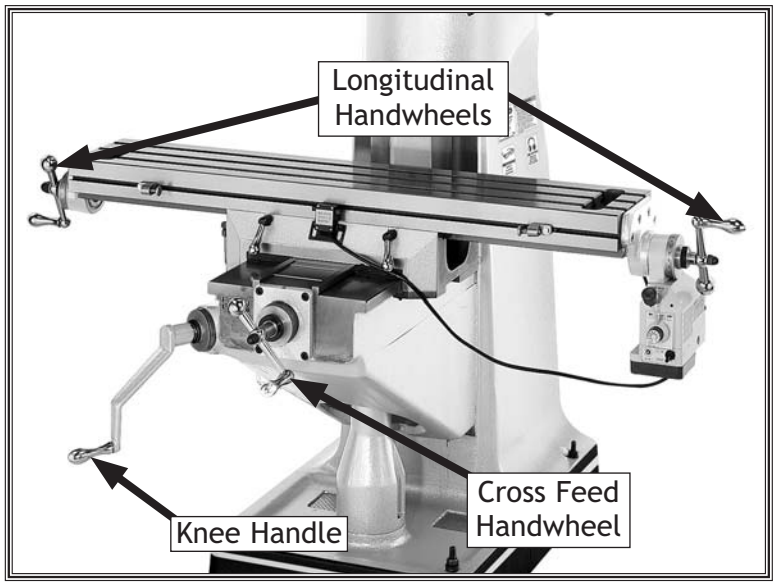


Figure 24. Table travel handwheel locations.

Cross Feed

The cross feed is controlled by the center handwheel (**Figure 24**), and can be locked in position by the lock under the left side of the mill table (see **Figure 25**).

Longitudinal Feed Control

The longitudinal feed is controlled by two handwheels, one at each end of the table (**Figure 24**), and can be locked in position by the two locks at the front of the table (see **Figure 26**).

Knee Feed

The knee feed is controlled by one handle, just off center at the front of the machine (**Figure 24**). The Model M1006 has two knee feed locks on the left side of the machine where the knee meets the ways (see **Figure 27**), while the Model M1003 and M1004 only have one lock.

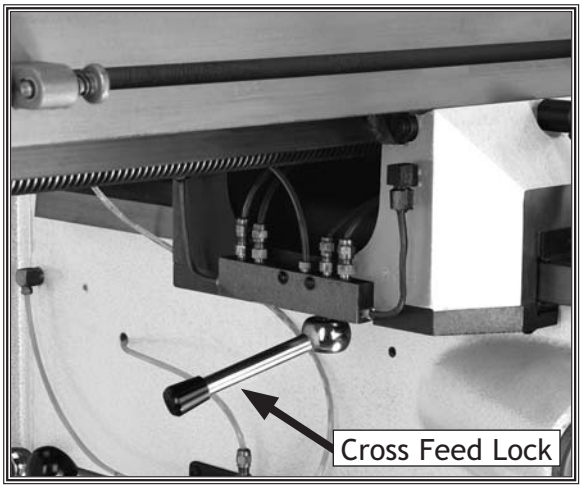


Figure 25. Cross feed lock location.

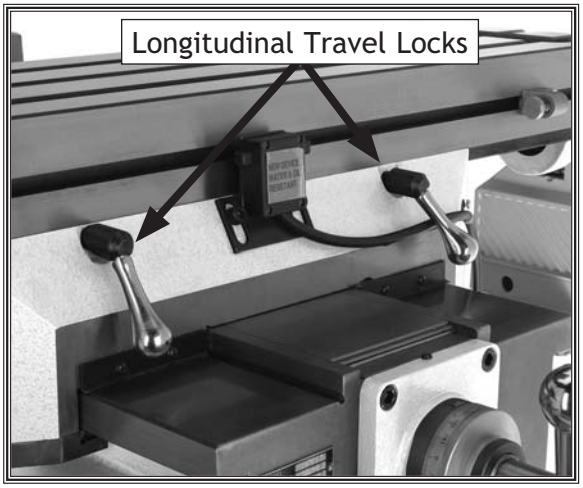


Figure 26. Longitudinal feed lock locations.

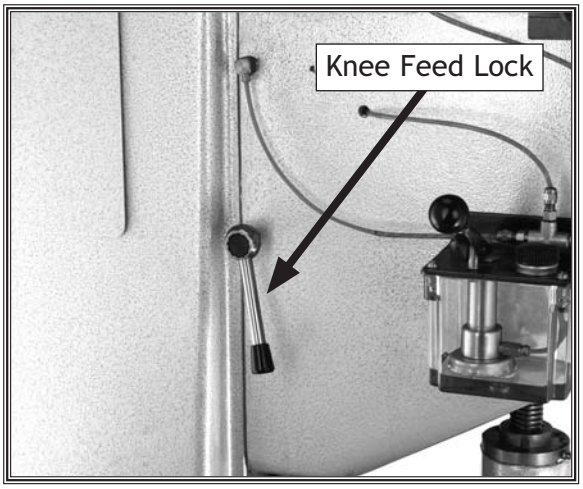


Figure 27. Knee feed lock locations.

Graduated Dials

The table handwheels and the knee handle have graduated dials. Each mark represents 0.001" of movement and one full revolution equals 0.100" The graduated dials float and can be indexed or "zeroed" by loosening the lock ring, rotating the graduated dial to "0", and securing the setting with the lock ring (see **Figure 28**).

Example:
Suppose you want to drill a series of holes with 1/2" centers (0.500"). After locating the first hole placement and drilling, you would zero the graduated dial of the appropriate axis, set the knurled head thumb screw, move the table 0.500" in the appropriate direction, and drill the next hole.

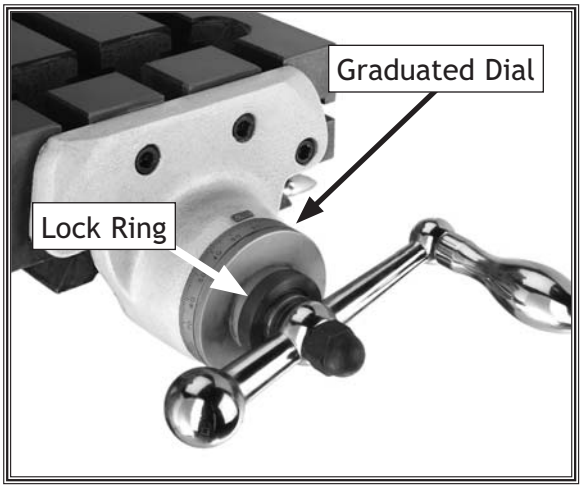


Figure 28. Graduated dial.

Backlash

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

To correct for backlash, do these steps:

1. Loosen the lock ring on the graduated dial.

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

3. Turn the handwheel to move the table in the intended direction (see **Figure 29**).

4. When the lead screw catches and the table begins to move, backlash has been eliminated and the graduated dial can be "zeroed."

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

5. Tighten the lock ring against the graduated dial to secure the setting.

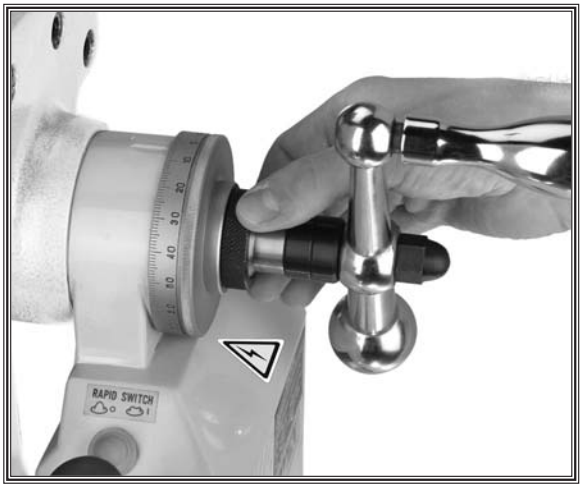


Figure 29. Adjusting backlash.

Quill Travel

Quill Feed Control

The quill feed is controlled by the quill feed handle shown in **Figure 30**. The handle allows the mill to operate as a drill.

To use the quill feed handle, do these steps:

1. Pull the quill feed handle (**Figure 30**) forward to feed the quill down towards the workpiece. The quill feed handle is spring loaded to assist in returning the handle to the upmost vertical position.

NOTICE: When returning the quill to its upmost position, slow the return of the quill feed handle so it does not slam the quill into the mill head.

2. Lock the quill in place at any depth by tightening the quill feed handle lock shown in **Figure 30**.

3. Adjust the position of the handle by pulling out on the handle to disengage the locating pin and rotate the handle to the desired position. Push in on the handle to engage the locating pin in the new position.

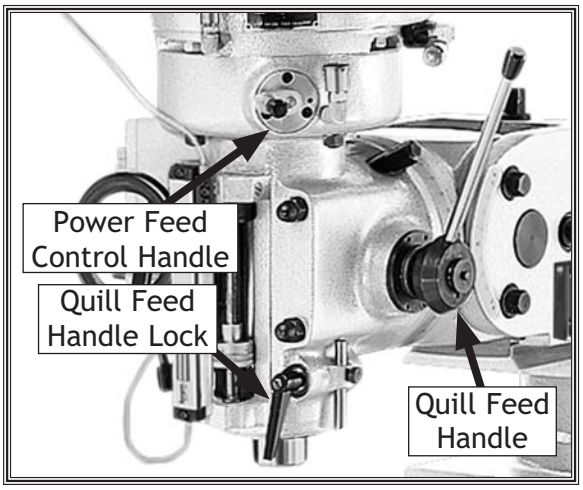


Figure 30. Quill feed handles.

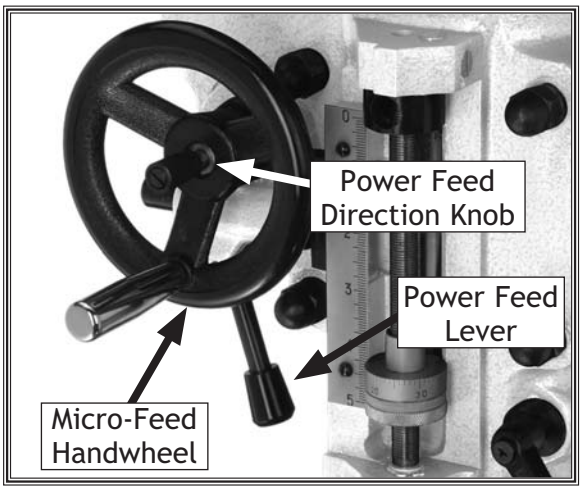


Figure 31. Quill micro-feed handwheel.

Microfeed Depth Adjustment

The micro-feed handwheel is used to accurately control the quill depth (**Figure 31**).

To use the micro-feed handwheel, do these steps:

1. Turn the mill ***OFF*** and allow the spindle to come to a complete stop.

2. Make sure the quill is unlocked and move the power feed control handle to HAND (see **Figure 30**).

3. Turn the mill ***ON*** and move the power feed direction knob to the neutral position (see **Figure 31**).

   Note: This lever has three positions–1) All the way in for down feed, 2) All the way out for up feed, 3) In the middle for neutral.

4. Engage the power feed lever (**Figure 31**) by pulling it to the left.

5. Turn the micro-feed handwheel (**Figure 31**) clockwise to feed the quill down, counterclockwise to feed the quill up.

Quill Power Downfeed

The power downfeed has three feed rate options and can be set to automatically return at a specific depth.

To use the quill power downfeed, do these steps:

1. Turn the mill ***OFF*** and allow the spindle to come to a complete stop.

2. Make sure the quill is unlocked and move the power feed control handle to POWER (see **Figure 32**).

3. Set the micro adjusting depth stop (**Figure 33**) to the desired depth and tighten the locking nut against the depth stop.

   Note: One rotation of the depth stop equals 0.050". Depth is measured when the top edge of the graduated dial on the depth stop is parallel with the ruler on the milling head.

4. Select the feed rate by turning the feed rate selection dial to 1, 2, or 3 (**Figure 34**). A setting of 1 equals 0.0019 inches/rev.; 2 equals 0.0035 inches/rev.; and 3 equals 0.0058 inches/rev.

   Note: You may have to turn the spindle by hand to allow the selection dial to engage at the desired feed rate.

5. Turn the mill ***ON*** and move the power feed direction knob to the appropriate direction position (in for down feed or all the way out for up feed).

6. Engage the power feed lever by pulling it to the left. DO NOT engage automatic feed when the mill is operating over 2400 RPM.

   Note: When using the power feed, the feed will automatically return when it reaches the micrometer stop set in **Step 3**. The accuracy of the power feed is ±0.010". If you hand feed to the micrometer stop, the repeating accuracy is ±0.001".

Figure 32. Power feed control handle.

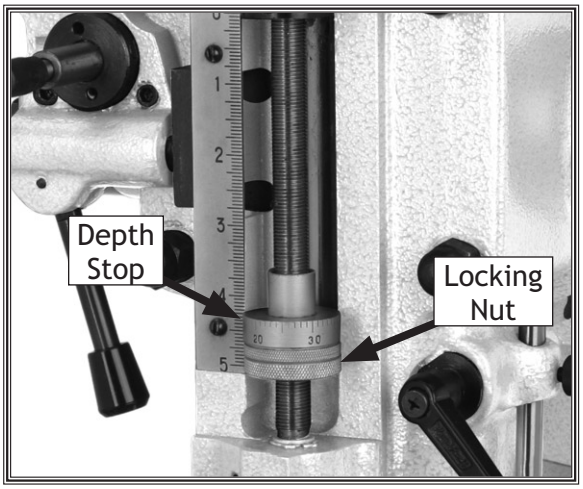


Figure 33. Micro adjusting depth stop.

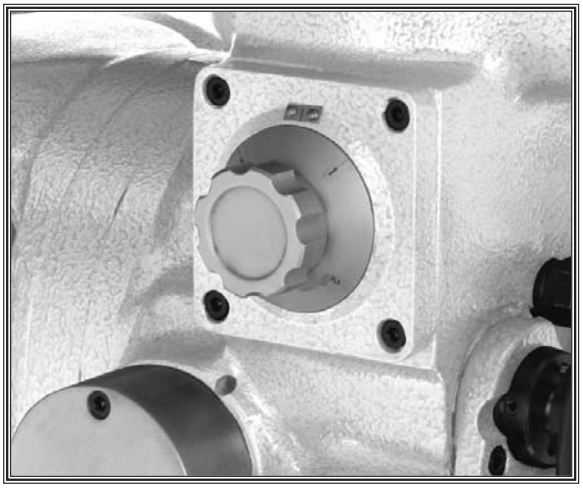


Figure 34. Feed rate selection dial.

Power Feed Controls

This mill comes equipped with a power feed on the longitudinal travel. The power feed has the following controls (see **Figure 35** for items A–D, and see **Figure 36** for items E–F):

A. Right/Left Feed Selector—Switch the lever to the left or the right for the desired travel direction. The table should come to a complete stop before changing directions.

B. Rapid Speed Switch—Pressing this switch will cause the table to feed at its maximum rate until it is released.

C. Feed Setting Dial—Setting from "0" (no travel) to "10" (fastest travel). There is no correlation between the numerical setting on the dial and actual feed in inches per minute.

D. ON/OFF Switch—Starts/stops the power feed. (The power feed should be left off when not in use.)

E. Limit Switch—Stops the power feed when it makes contact with the power feed stops.

F. Power Feed Stops—Adjustable stops trigger the limit switch when the power feed is at the end of its travel.

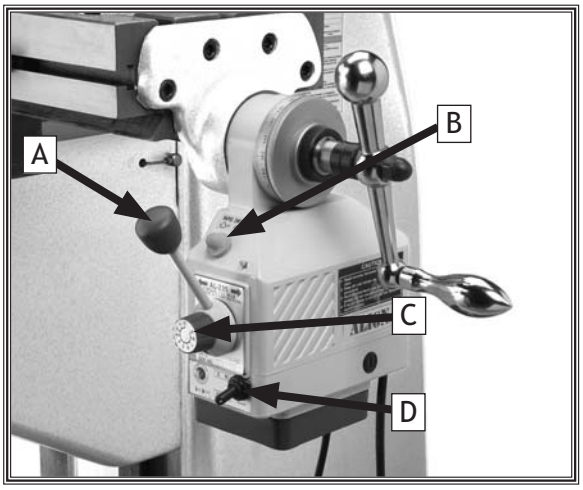


Figure 35. Power feed controls.

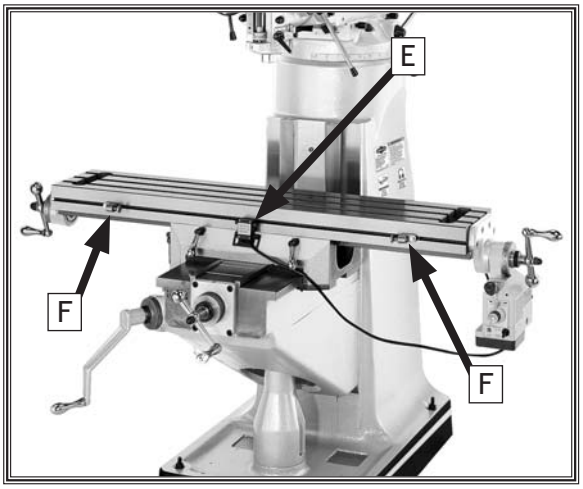


Figure 36. Power feed and table stops.

Determining Needed RPM

Before changing speeds, you must first determine the best RPM to use with the material and diameter of your cutting tool. Using this determined RPM, you can then set the mill to match that speed.

To determine the RPM needed for your workpiece, do these steps:

1. Use the chart in **Figure 37** to determine the cutting speed for your workpiece material.

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

3. Use the following formula in **Figure 38** to determine the best RPM for your operation.

   Note: Always round to the closest RPM given on the spindle speed chart.

   Example 1
   You have a piece of aluminum stock, and you are using a 1/2" diameter HSS cutting tool.

   Step 1:
   300 (SFM from chart) x 4 = 1200

   Step 2:
   1200 / .5" (Diameter of cutting tool) = 2400 RPM

   Result:
   The best speed for this workpiece is 2400 RPM.

   Example 2:
   You have a piece of stainless steel, and you are using a 1" diameter carbide cutting tool.

   Step 1:
   60 (SFM from chart) x 2 (for carbide tool) = 120

   Step 2:
   120 (determined SFM) x 4 = 480

   Step 3:
   480 / 1" (Diameter of cutting tool) = 480 RPM

   Result:
   The best speed for this workpiece is 480 RPM.

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

Figure 37. Cutting speed chart for HSS cutting tools.

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

Figure 38. Formula to determine required RPM.

Setting RPM on the M1003 and M1004 Mills

Setting the RPM on the Model M1003 and M1004 involves shifting the High/Low gear lever to the desired setting and placing the V-belts on the pulleys as shown in the spindle speed chart below.

To set the spindle speed, do these steps:

1. Examine the **Spindle Speed Chart** in **Figure 39** to find the closest match to your needed RPM.

2. **UNPLUG THE MILL!**

3. Move the high/low gear lever (**Figure 40**) down to "A" for low speeds, or up to "B" for high speeds.

   Note: You may have to rotate the spindle to move the gear lever to the new setting.

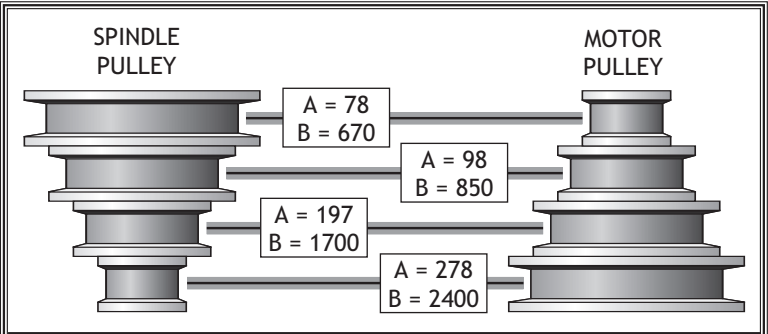
4. Open the access panel to the spindle pulleys as shown in **Figure 41**.

5. Unlock the motor release lever shown in **Figure 42**, and move the motor by pulling the motor rotation lever to loosen the V-belt.

6. Move the belt to the appropriate pulley combination as shown on the spindle speed chart below.

7. Tension the V-belts by pushing the motor rotation lever and locking the motor release lever.

8. Close the access panel to the spindle pulleys and plug in the mill.



A	78 RPM	98 RPM	197 RPM	278 RPM
B	670 RPM	850 RPM	1700 RPM	2400 RPM

Figure 39. Spindle speed chart.

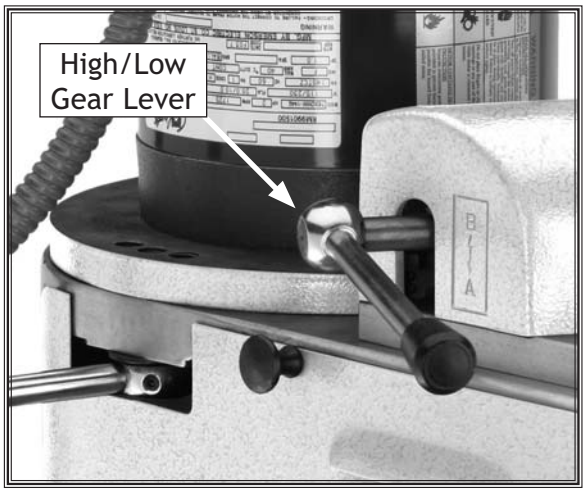


Figure 40. High/Low gear lever.

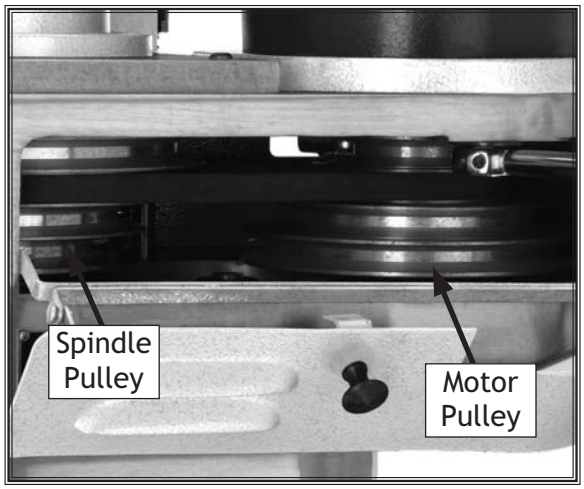


Figure 41. Pulley locations.

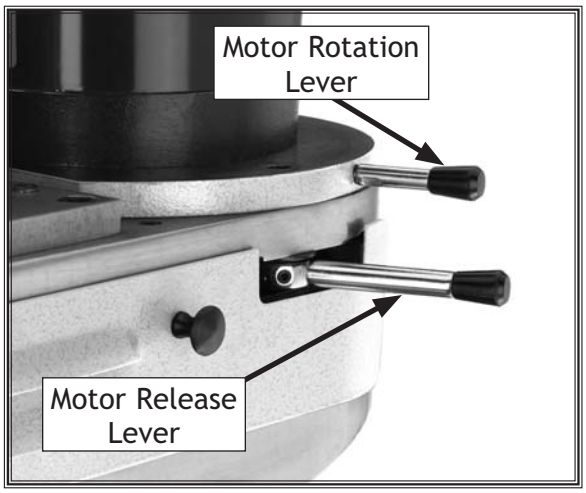


Figure 42. Motor release levers.

Setting RPM on the M1006 Mill

Setting the RPM on the Model M1006 involves shifting the High/Low gear lever to the desired setting and rotating the variable speed adjustment handwheel until the dial shows the desired spindle speed.

To set the spindle speed, do these steps:

1. Turn the mill ***OFF*** and allow it to come to a complete stop.

2. Move the gear change lever (**Figure 43**) forward for high speeds, or backward for low speeds. You may have to rotate the spindle to move the gear lever to the new setting.

   Note: Changing the High/Low gears reverses the spindle rotation. For example: When in low gear, turning the power switch clockwise turns the spindle in the FORWARD direction. When in high gear, turning the power switch clockwise turns the spindle in the REVERSE direction.

3. Turn the mill ***ON*** and rotate the variable speed adjustment handwheel (**Figure 44**) until the indicator dial shown in **Figure 45** shows the desired RPM.

Figure 43. Gear change lever.

Figure 44. Variable speed adjustment handwheel.

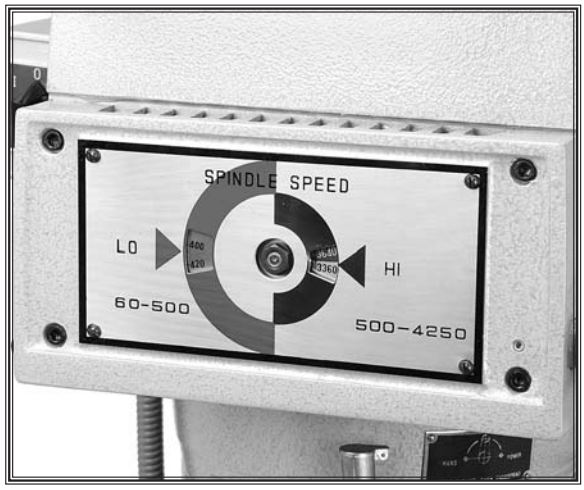


Figure 45. Variable speed indicator dial.

Spindle Break-in Procedures

Complete this process once you have familiarized yourself with all instructions in this manual and have made sure the machine is completely lubricated.

NOTICE

The spindle break-in procedures are important for ensuring long life and trouble-free performance from your mill. Failure to perform these procedures will lead to rapid deterioration of the spindle and other related parts, and may void the warranty!

To break-in the spindle, do these steps:

1. Make sure the mill has been properly lubricated as explained on Page 32.

2. Make sure there are no obstructions around or underneath the spindle.

3. Move the high/low speed lever to the "A" position for low speed on the Model M1003 and M1004, or to the LOW position on the Model M1006.

4. Set the spindle speed to the lowest RPM.

5. Put on safety glasses and hearing protection, and make sure any bystanders are wearing safety glasses and hearing protection and are out of the way.

6. Plug the machine into the power outlet and turn the mill ***ON***.

7. On the Model M1006, turn the spindle ON/OFF switch to either FORWARD or REVERSE and verify that the spindle rotates in the desired direction.

   - If the spindle on the Model M1006 is moving the wrong direction, reverse any two power wires on the motor to reverse the blade direction.

     Note: Change the wires on the motor, not at the switch.

   - If the spindle on the Model M1006 is moving in the desired direction, continue with the break-in procedures.

8. Turn ***ON*** the spindle in the forward rotation and let it run for a minimum of 10 minutes.

9. Turn the spindle ***OFF***, wait for the spindle to come to a complete stop.

10. Set the SPINDLE DIRECTION toggle to the reverse position and turn the spindle ***ON***. Run the spindle in the reverse direction for 10 minutes.

11. Repeat these steps for each RPM setting.

Installing Tools

To load a tool in the spindle, do these steps:

1. Turn the mill ***OFF*** and allow it to come to a complete stop.
2. Clean any debris from the spindle opening.
3. Insert the tool holder or a collet into the spindle.
4. Rotate the holder until the groove lines up with the key and the holder slides into the spindle.
5. Lock the spindle with the spindle brake and use a wrench to tighten the drawbar (see **Figure 46**) until the tool is secure in the spindle.
6. Clear all items away from the cutting tool before turning the mill ***ON***.

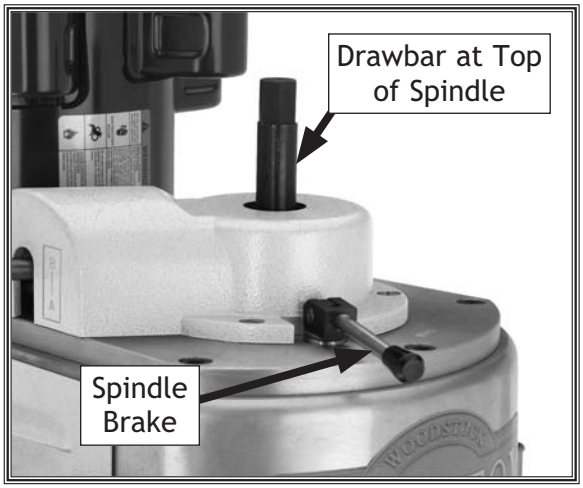


Figure 46. Spindle drawbar.

Removing Tools

To remove cutting tools, do these steps:

1. Make sure the spindle is turned ***OFF*** and the quill is at the upmost position.
2. Use a brush to remove any debris or chips from the tool and the tool holder/arbor.
3. Lock the spindle in place with the spindle brake to keep it from rotating.
4. Use a wrench to loosen the drawbar from the tool.
5. Once the tool is loosened, support the cutter with a gloved hand, and strike the drawbar with a dead blow hammer or rubber mallet to release the tool holder from the spindle.

   Note: DO NOT strike the drawbar if it is completely unscrewed from the tool. This can damage the threads on the drawbar and the tool.
6. Finish unscrewing the drawbar by hand.
7. Clean any debris from the spindle opening area.
8. Return the spindle to the appropriate operating position for the next cut.

NOTICE

DO NOT overtighten the drawbar. Overtightening makes collet removal difficult and causes damage to the drawbar threads, collets, and spindle taper.

NOTICE

When not in use, always remove collets and cutting tools from spindle taper. Failure to do so may cause the collet to seize and be very hard to remove later.

MAINTENANCE

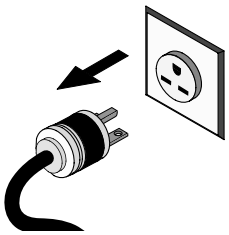
General

Regular periodic maintenance on your **SHOP FOX®** Model M1003/M1004/M1006 mill will ensure optimum performance. Make a habit of inspecting your mill each time you use it.

A thorough cleaning, on a regular basis, will increase the machine durability and efficiency by removing chips and grime that can gum up moving parts.

A regular application of a protective spray coating will keep the table and other bare metal parts from rusting and pitting.

⚠WARNING



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

Cleaning

Cleaning the Model M1003/M1004/M1006 is relatively easy. Vacuum excess metal chips from the table and ways, and wipe off the remaining waste with a dry cloth. If any coolant is left on the table, wipe it up with a rag. Treat all unpainted cast iron and steel with a non-staining lubricant after cleaning.

Table and Base

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

Keep exposed cast iron rust-free with regular applications of surface lubricants designed for cast iron.

Remove vices, clamps, rotary tables, etc. after use so moisture cannot be trapped between the components and cause rust.

Lubrication

Power Feed

The power feed uses SAE 40 oil and should not need to be changed unless the unit is being repaired.

One Shot Lubrication

Use the one shot lubrication system to oil the ways, the crossfeed screw, and the longitudinal screw by pumping the handle on the reservoir 2-4 times each day (see **Figure 47**). Fill the reservoir regularly with ISO 68 or SAE 20 weight machine oil.

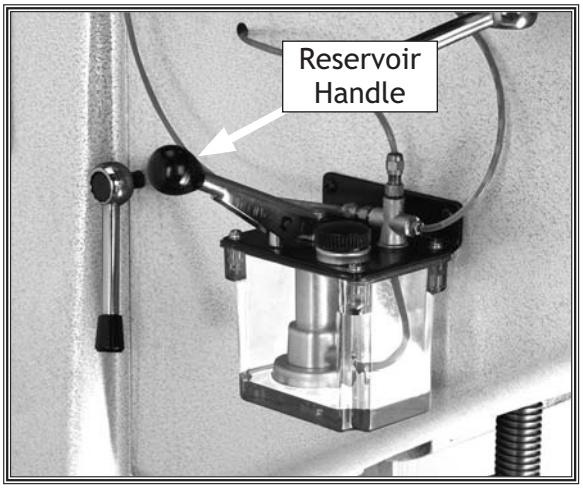


Figure 47. One shot lubrication system.

Oil Cups

Top off the oil cups (**Figure 48**) daily with ISO 68 or SAE 20 weight machine oil, or twice per day if the mill is used heavily. Failure to fill the oil cups can result in a tight quill or a partial seizure of the quill in the housing.

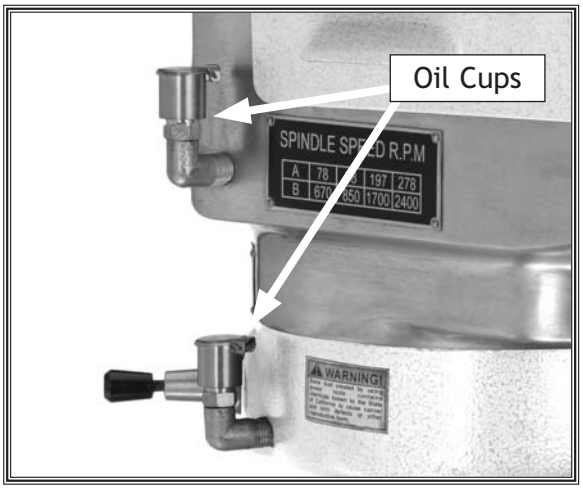


Figure 48. Oil cups.

Knee Elevating Screw

Wipe clean and lube the threads of the elevating screw with a light lubricating grease every six months.

Drawbar Splines

Place five drops of ISO 68 or SAE 20 weight machine oil on the quill splines once a week. This is accomplished by moving the quill all the way down and locking it in place. Apply the oil to the splines on the back side of the drawbar hole. Next, run the quill through complete motion a couple of times to lubricate splines.

Head Lubrication

Wipe clean and lube the points indicated in **Figure 49** every six months. Lubricate the Model M1006 with ISO 68 or SAE 20 weight machine oil. The Model M1003 and M1004 require a light lubricating grease.

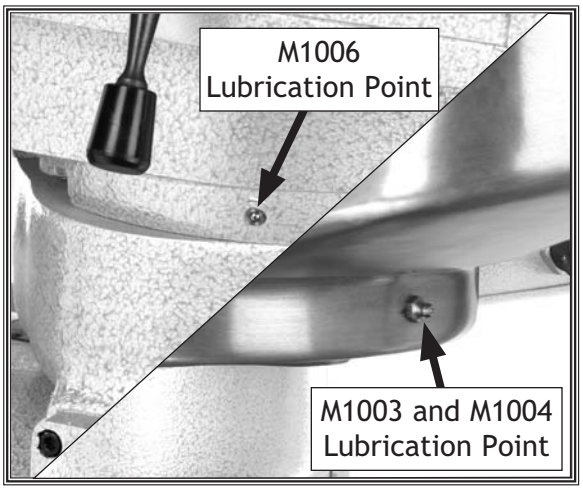


Figure 49. Head lubrication points.

Maintenance Schedule

Daily:
- Fill oil cups for quill bearings.
- Pump the one shot lubrication system handle 2-4 times.
- Clean machine to remove debris.
- Make sure table/vise is clean and free of metal chips.
- Clean spindle openings before inserting tools.
- Check for any unsafe conditions.

Weekly:
- Oil the knee elevating screw with five shots from an oil gun.
- Place five drops of oil on the drawbar splines.
- Thoroughly clean the machine ways to remove chips and debris.
- Clean/grease the longitudinal, cross, and knee lead screws.

Monthly:
- Clean/vacuum dust buildup from the machine surface and from the motor).

Every six Months:
- Lubricate the head.

Notes

DATE	MAINTENANCE PERFORMED

SERVICE

General

This section covers the most common service adjustments or procedures that may need to be made during the life of your machine. **Always disconnect your machine from the power source before performing any service!**

If you have additional service questions, please contact Woodstock International Technical Support at (360) 734-3482 or send e-mail to: **tech-support@shopfox.biz**.

Gibs

The gibs are pre-adjusted at the factory and should not need further adjustment until many hours of machine use. If the movement seems too tight, make sure that the locks are fully released, and make sure that the bedways are thoroughly cleaned of rust preventative and lubricated with oil.

When adjusting the gibs, the goal is to take out unnecessary play in the table and cross slide without causing the slides to bind. Loose gibs may cause poor finishes on the workpiece and may cause undue wear on the slide. Overtightening may cause premature wear. Adjust the gibs by loosening or tightening the adjustment screws until a slight drag is felt while moving the table/spindle along the dovetail slides (see **Figures 50-53** for the locations of the adjustment screws). The chip wiper guards must be removed to access some of the gib adjustment screws.

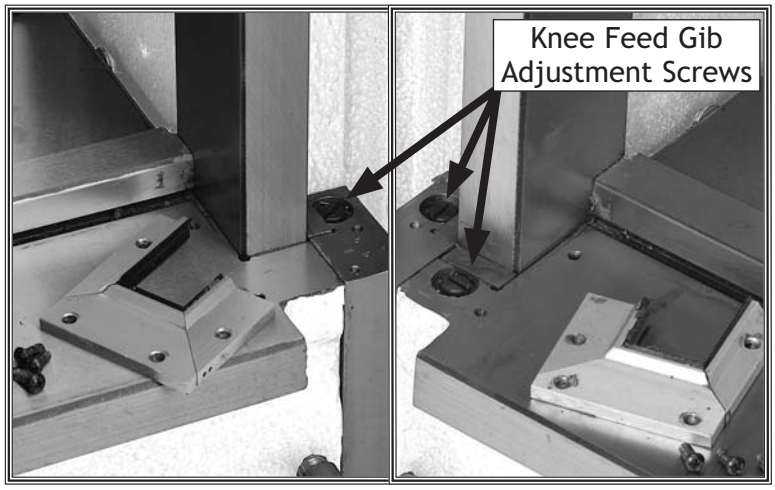


Figure 50. M1006 knee feed gib adjustment screws.

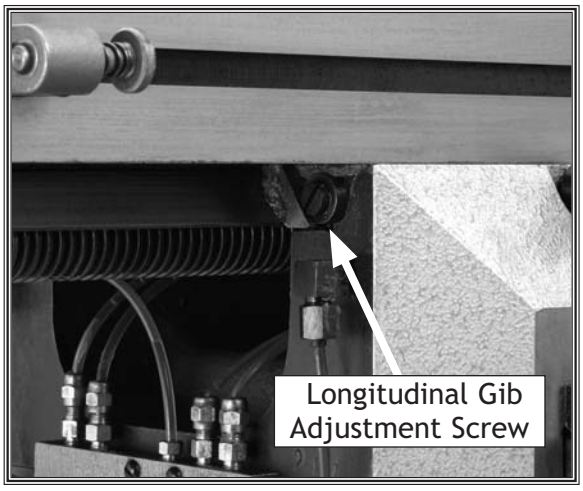


Figure 51. Location of the longitudinal gib adjustment screw.

Figure 52. Location of cross feed gib adjustment screw.

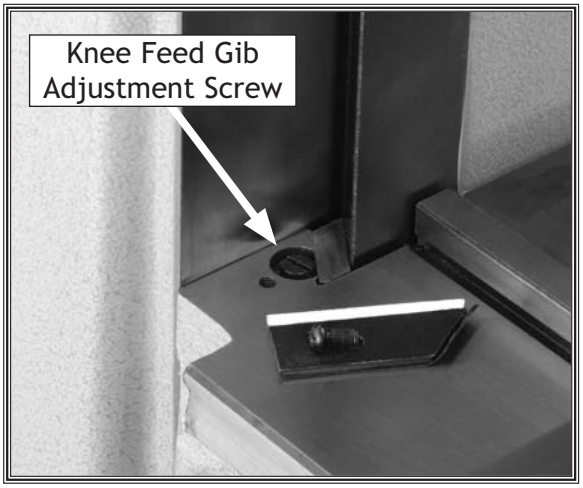


Figure 53. M1003/M1004 knee feed gib adjustment screw.

Adjusting Backlash

Backlash is adjusted at the factory and should not need any adjustment for many hours of machine use, if ever. Overtightening the backlash adjustment will increase leadscrew wear. Keeping a clean and well lubricated machine will ensure long leadscrew life.

To adjust the backlash, do these steps:

Longitudinal Feed Adjustment

1. Feed the table to the center to gain access to the adjustment screws under the table.

2. Loosen the lock screw 1/2 a turn (see **Figure 54**).

3. Slowly turn the longitudinal feed handle and gradually tighten or loosen the adjustment screw shown in **Figure 54** until a slight drag is felt in the handle. Tighten the lock screw to secure the adjustment.

Crossfeed Adjustment

1. Turn the crossfeed handle so that the table is as far out as possible and remove the cap screws that secure the crossfeed handle (see **Figure 55**).

2. Turn the crossfeed handle to withdraw the feed screw as shown in **Figure 56**. Withdraw the feed screw until the adjustment screws are accessible.

3. Loosen the lock screw 1/2 a turn (see **Figure 55**).

4. Slowly turn the crossfeed handle and gradually tighten or loosen the adjustment screw shown in **Figure 55** until a slight drag is felt in the handle. Tighten the lock screw to secure the adjustment.

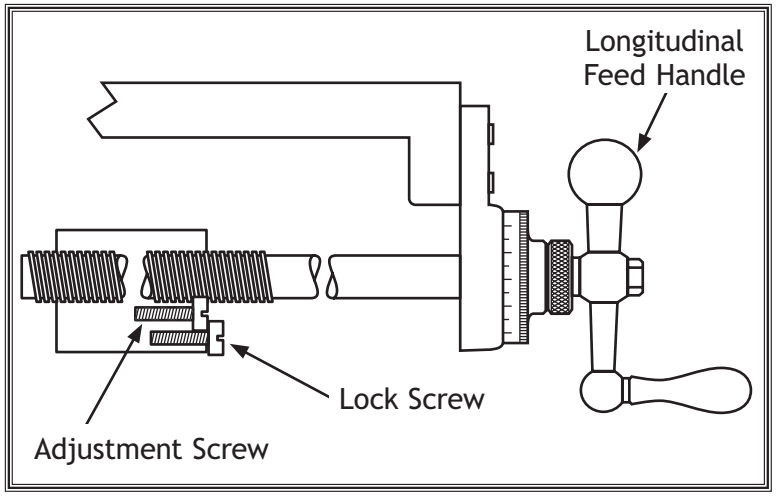


Figure 54. Longitudinal backlash adjustment.

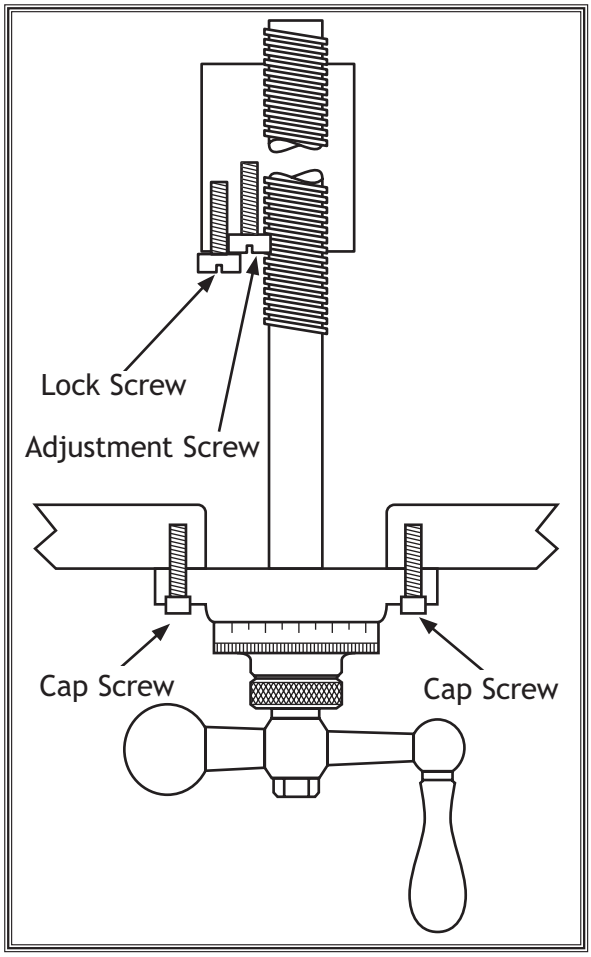


Figure 55. Crossfeed backlash adjustment.

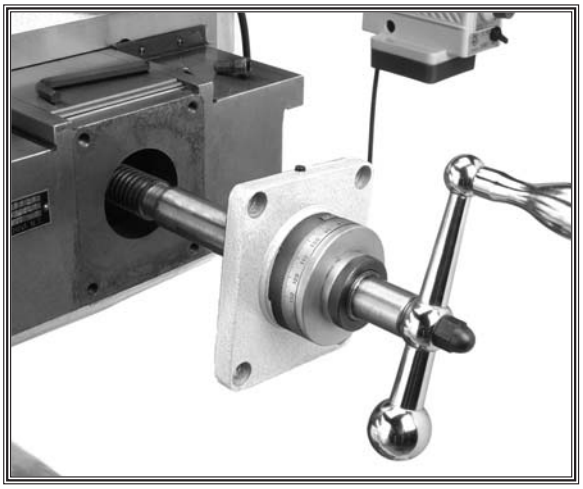


Figure 56. Crossfeed handle removal.

Adjusting Quill Power Feed Lever

The quill power feed lever is adjusted at the factory and should not need adjustment for many hours of machine use, if ever. The power feed lever should disengage once the depth stop comes in contact with the quill stop. If this does not occur, it will be necessary to readjust the lever. Please follow the procedures below.

To adjust the quill power feed lever, do these steps:

1. Loosen the locknut shown in **Figure 57**.
2. Engage the power feed lever (**Figure 58**), by pulling to the left.
3. Adjust the depth stop until it is threaded to the top, against the quill stop as shown in **Figure 58**.
4. Turn the adjusting screw (**Figure 57**) until the power feed lever disengages.
5. Tighten the locknut loosened in **Step 1**.
6. Check to make sure that the power feed lever disengages during operation.

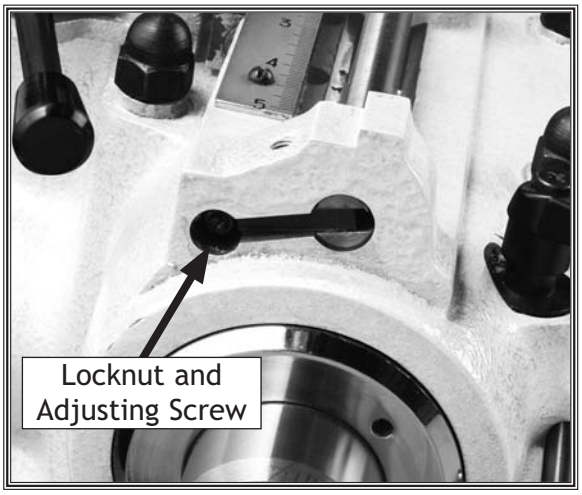


Figure 57. Power feed lever adjusting screw.

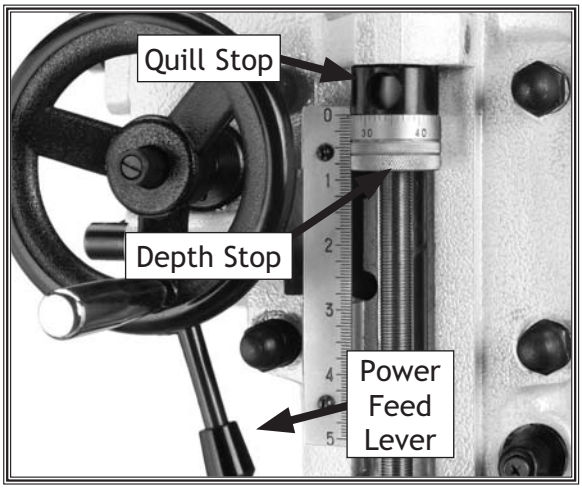


Figure 58. Quill power feed.

Replacing Belts on the M1003 and M1004

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 shoe at the same time. This is a process that you do not want to have to repeat unnecessarily. Order part number XM1003322 for the drive belt, number XM1003323 for the timing belt, and number XM1003318 for the brake shoe.

To replace the belts, do these steps:

1. **DISCONNECT THE MILL FROM ITS POWER SOURCE.**

2. Remove the drawbar and upper cover (**Figure 59**).

3. Remove the cap screws **(Figure 60**), and the taper pin from the transmission case cover plate.

4. Open the belt access panels as shown in **Figure 61**.

   Note: Open the access panel located near the FORWARD/REVERSE switch by unscrewing the knob.

5. Loosen the setscrew in the motor locking levers, rotate the levers to unlock the motor, and remove the motor locking levers. Remove the nuts the levers were attached to, then loosen the V-belt (see **Figure 61**).

6. Pull the transmission case cover plate up to remove the cover from the mill.

   Note: Push down on the flat toothed belt while lifting the cover plate to prevent the belt from binding.

7. If necessary, replace the brake shoe as described on **Page 38**, before replacing the belts.

8. Lift the motor and place a new flat toothed belt and V-belt around the pulleys.

9. Replace the transmission case cover plate, making sure the belts are around the appropriate pulleys.

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

11. Tension the V-belt and lock the motor release lever.

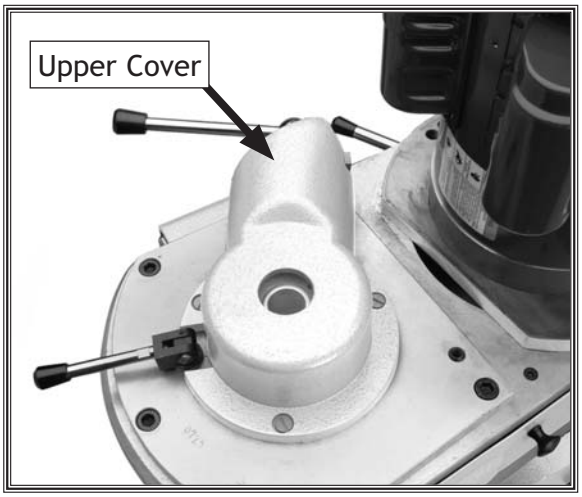


Figure 59. Upper cover.

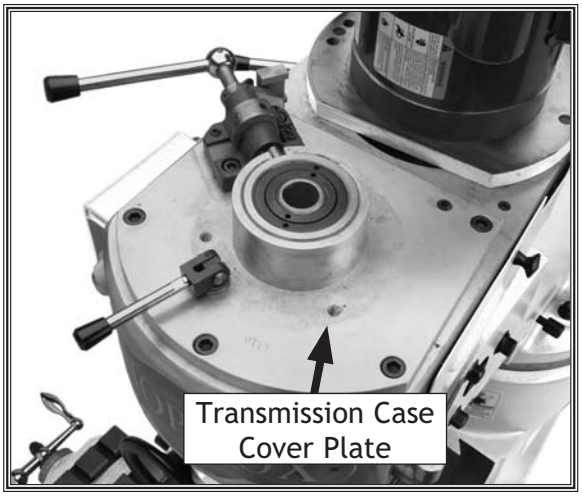


Figure 60. Transmission case cover plate.

Figure 61. Belt access panel.

SERVICE

Replacing the Brake Shoe on M1003/M1004

Replace the brake shoe when it no longer stops the spindle. If it is necessary to replace the brake shoe, you may want to replace the belts at the same time. This is a process that you do not want to have to repeat unnecessarily. Order part number XM1003318 for the brake shoe.

To replace the brake shoe, do these steps:

1. Complete **Steps 1-7** from **Replacing Belts on the M1003 and M1004** on **Page 37**.

2. Remove the high/low gear lever assembly (**Figure 62**) by removing the cap screws and prying up on the assembly to disengage the taper pins.

3. Remove the gear change pin shown in **Figure 63** by removing the cap screw, pushing down on the transmission case cover plate, and pulling the pin out.

4. Lift the transmission case cover plate off the pulleys and flip it over to expose the spindle brake shoe.

5. Remove the three screws securing the old brake shoe (**Figure 64**) and replace with a new brake shoe.

6. Place the springs in the holes, as shown in **Figure 64**, and slide the pulley shaft into the transmission case cover plate.

7. Replace all remaining items removed, and do so in reverse order.

8. Re-assemble the transmission case as described in **Steps 9—12** in **Replacing Belts on the M1003 and M1004** on **Page 37**.

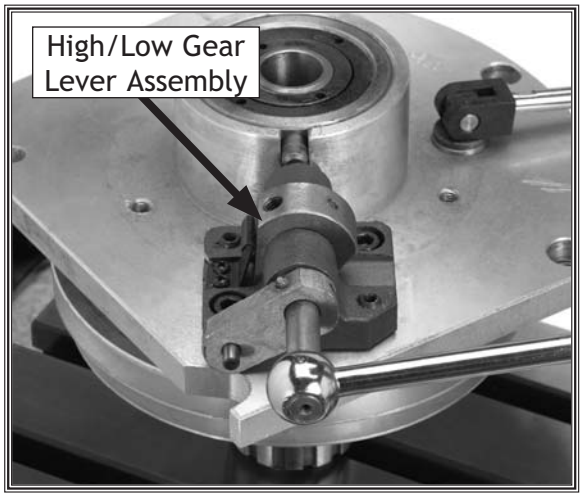


Figure 62. High/low gear lever assembly.

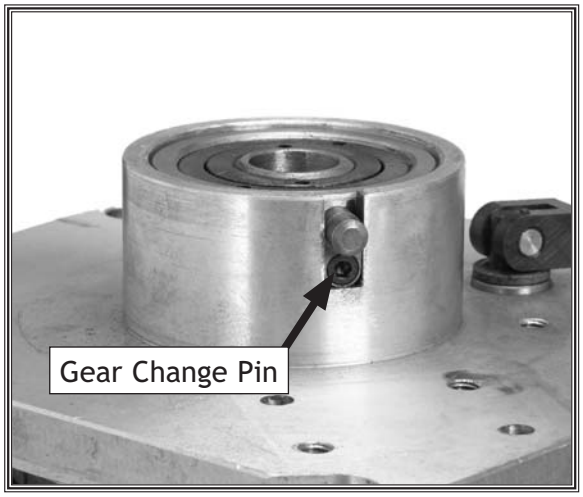


Figure 63. Gear change pin.

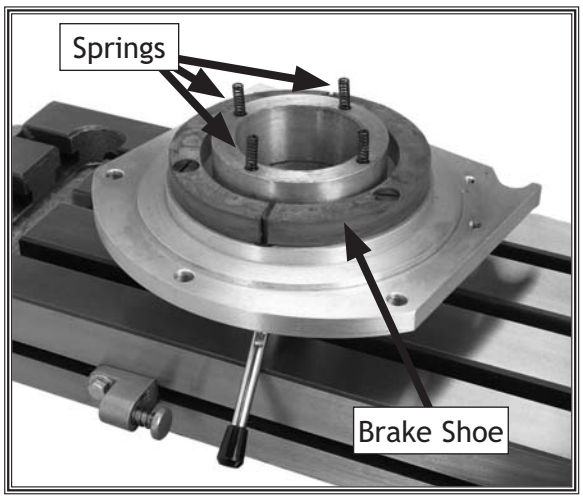


Figure 64. Spindle brake shoe.

SERVICE

Replacing Belts on M1006

Replace the belts when they are worn, cracked, or broken. If it is necessary to replace one of the belts, you may wish to replace both belts and the brake shoe at the same time. This is a process that you do not want to have to repeat unnecessarily. Order part number XM1006327 for the drive belt, number XM1006436 for the timing belt, and number XM1006332 for the brake shoe. You will also need two M6-1 x 60 hex bolts or cap screws.

To replace the belts, do these steps:

1. Change the variable speed to the highest RPM.
2. **Disconnect the mill from its power source.**
3. Remove the three cap screws to remove the lower pulley cover shown in **Figure 65**.
4. Thread two M6-1 x 60 bolts into the holes in the spring retaining plate shown in **Figure 66** and tighten the bolts to compress the spring slightly.

   Note: Compress the spring by tightening the bolts evenly; for example, turn one bolt two turns, then turn the other bolt two turns.
5. Remove the hex nut securing the spring retaining plate and then carefully remove the M6-1 x 60 bolts and the retaining plate.
6. Remove the FORWARD/REVERSE switch.
7. Remove the hex bolts shown in **Figure 67**.
8. Get assistance to remove the motor.

Continued on next page

Figure 65. Lower pulley cover.

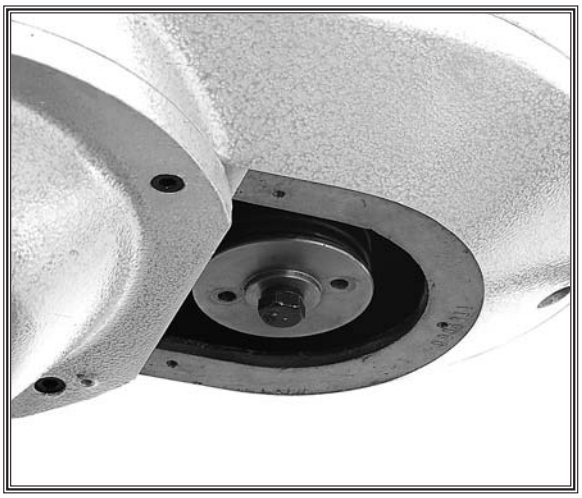


Figure 66. Pulley tension spring and spring retaining plate.

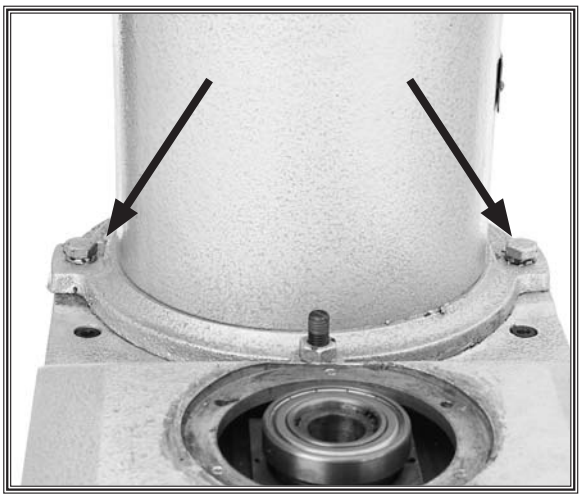


Figure 67. Hex bolts securing the motor.

9. Remove the cap screws from the upper bearing housing and thread them into the holes indicated in **Figure 68** to draw the bearing housing out.

Note: Pry up on the bearing housing, rotate it, pry up on it again, until the housing comes free.

10. Remove the Phillips head screws that are directly below the upper spindle bearing (see **Figure 69**).

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

12. Remove the four cap screws shown in **Figure 70** and remove the cap screw from the end of the underside of the transmission case.

13. Pull the upper transmission case off of the mill head.

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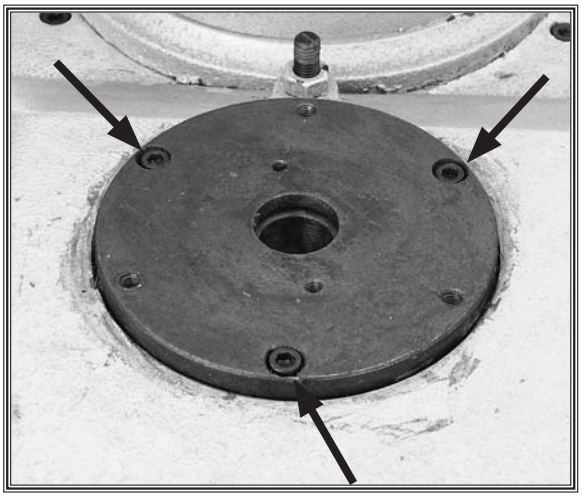


Figure 68. Upper bearing housing.

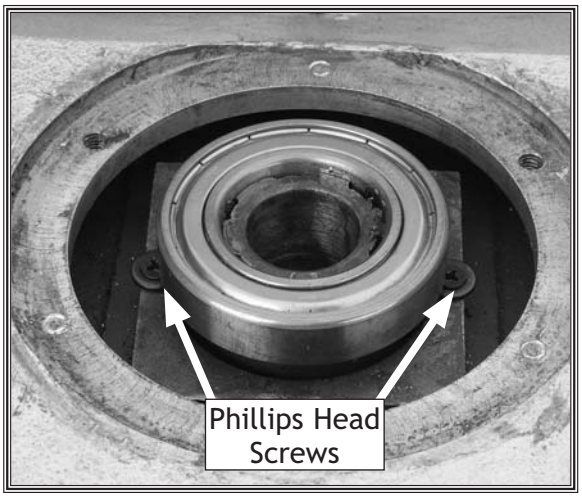


Figure 69. Upper spindle bearing.

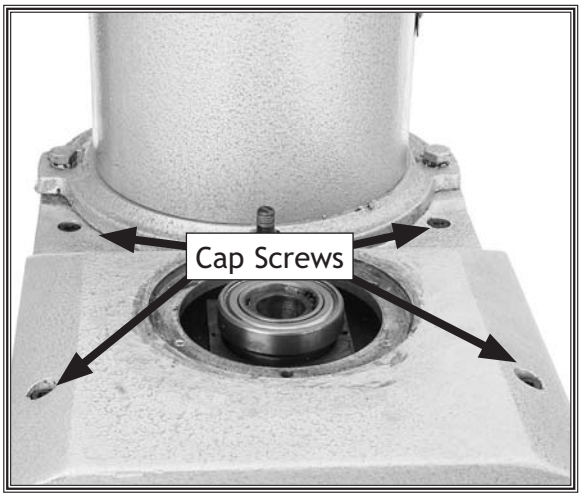


Figure 70. Upper transmission case.

14. To replace the timing belt, remove the four remaining cap screws from under the lower transmission case.

15. If necessary, replace the brake shoe as described on **Page 42**, before replacing the belts.

16. Place the new timing belt around the pulley and slide the lower transmission cover into place. Make sure the timing belt is around the pulley, not trapped under it.

17. Place the new variable speed belt around the pulley as shown in **Figure 71**.

18. Carefully compress the spring between the lower pulley and the spring retaining plate with an arbor press and thread two M6-1 X 60 bolts through the retaining 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 RPM setting handwheel to lower the plate under the upper spindle bearing. Replace the Phillips head screws removed in **Step 10.**

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

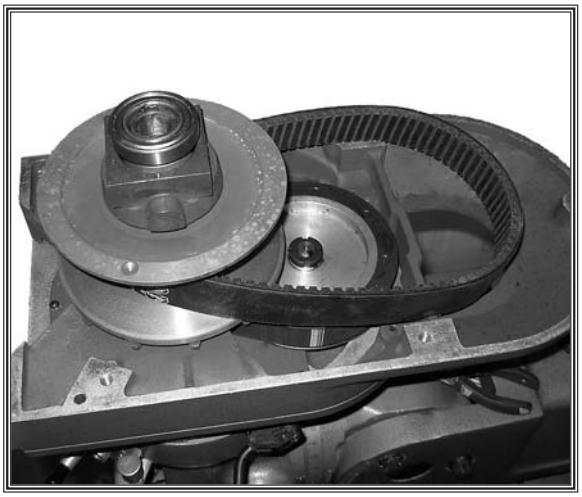


Figure 71. Variable speed belt removal.

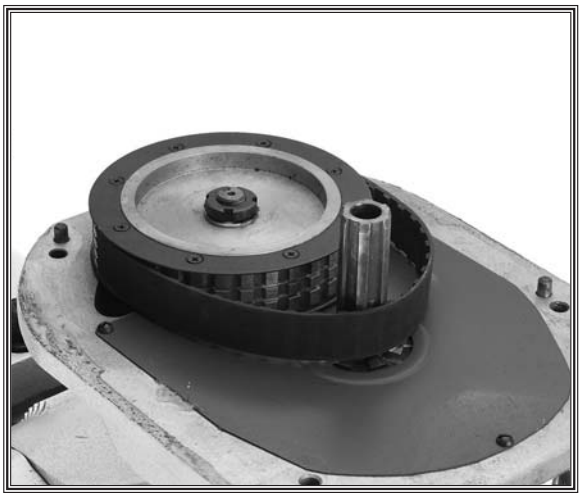


Figure 72. Timing belt removal.

Replacing the M1006 Brake Shoe

Replace the brake shoe when it no longer stops the spindle. If it is necessary to replace the brake shoe, make sure you replace both belts at the same time. This is a process that you do not want to have to repeat unnecessarily. Order part number XM1006332 for the brake shoe.

To replace the brake shoe, do these steps:

1. Complete **Steps 1-13** from **Replacing Belts on M1006** on **Page 39**.
2. Remove the pulley assembly by removing the screws shown in **Figure 73**.
3. Turn over the lower transmission case and remove the screw from the brake (see **Figure 74**).
4. Replace the old brake shoe with a new one and secure it with the screw removed in **Step 3**.
5. Spread the brake so it fits around the cam blocks shown in **Figure 75**.
6. Replace the pulley assembly removed in **Step 2**.
7. Re-assemble the transmission case as described in **Steps 15-17** in **Replacing Belts on M1006 on Page 39**.

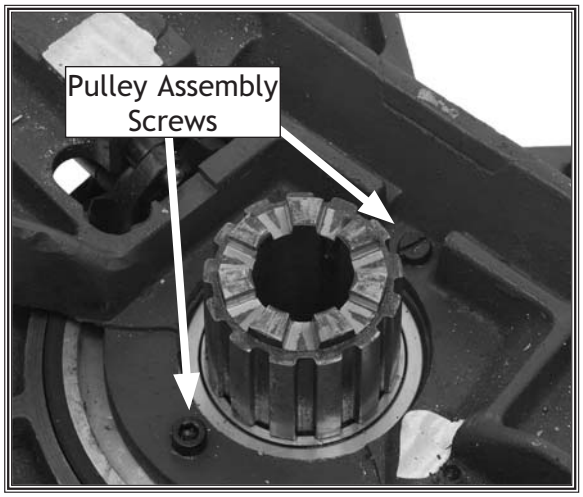


Figure 73. Pulley removal.

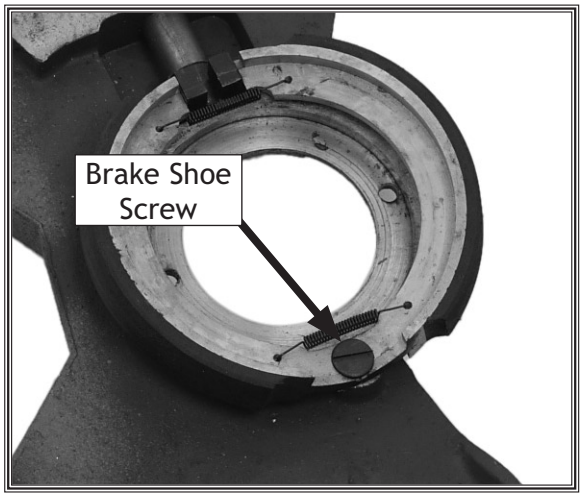
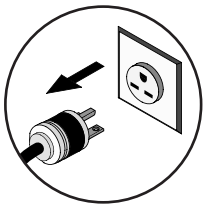


Figure 74. M1006 spindle brake.

Figure 75. Correct brake installation.

SERVICE

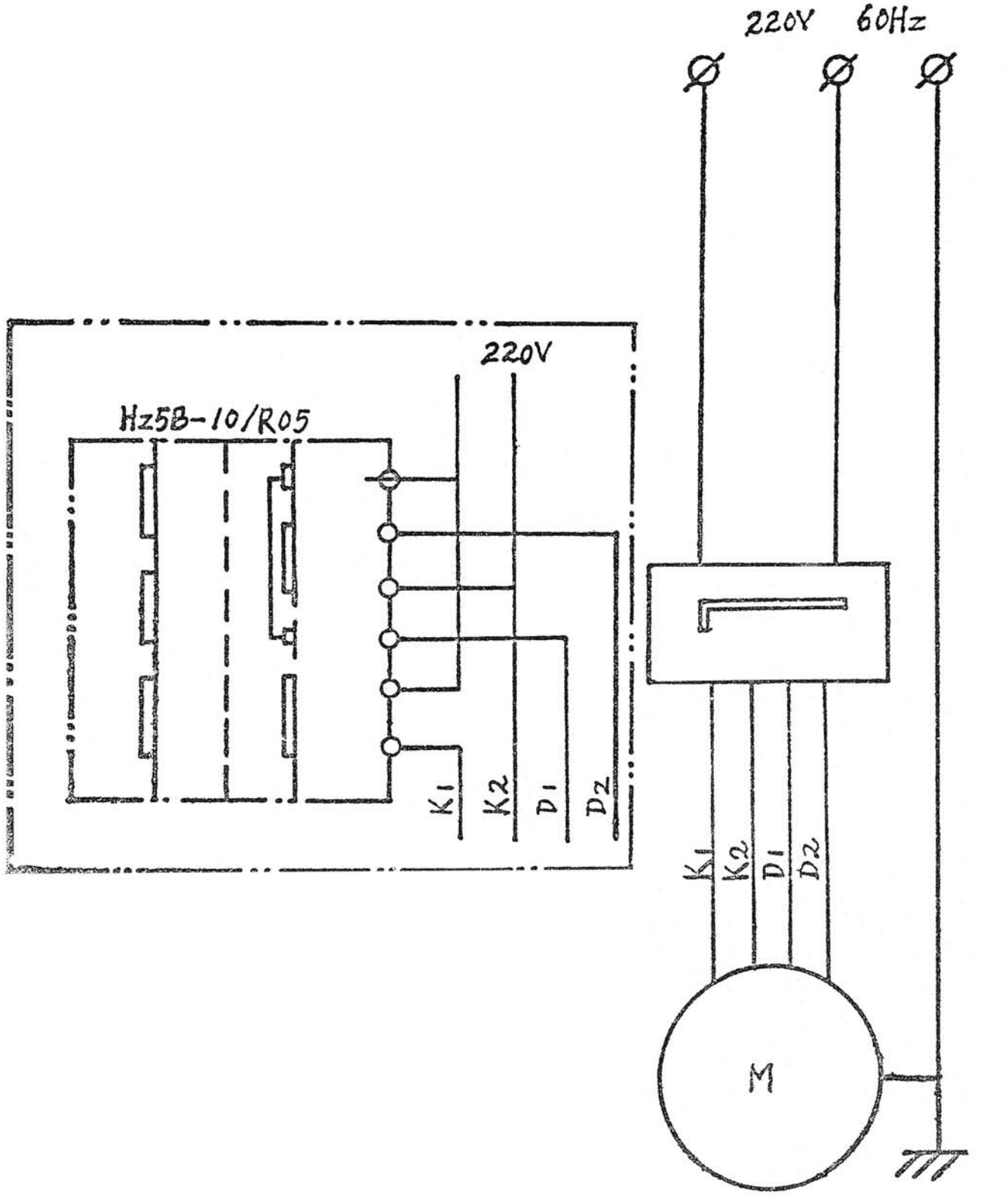
Troubleshooting



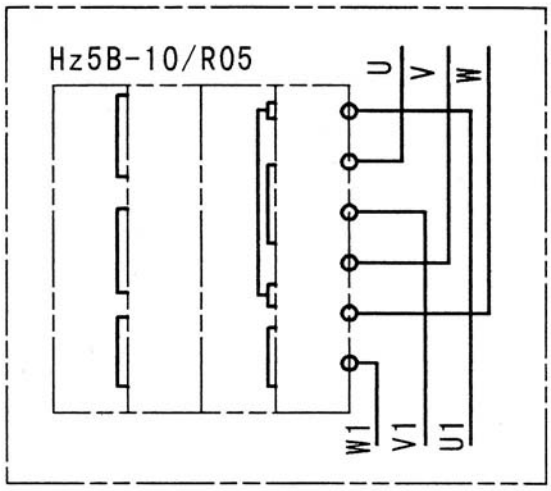
This section covers the most common symptoms. **WARNING! DO NOT make any adjustments until the mill is unplugged and all moving parts have come to a complete stop.**

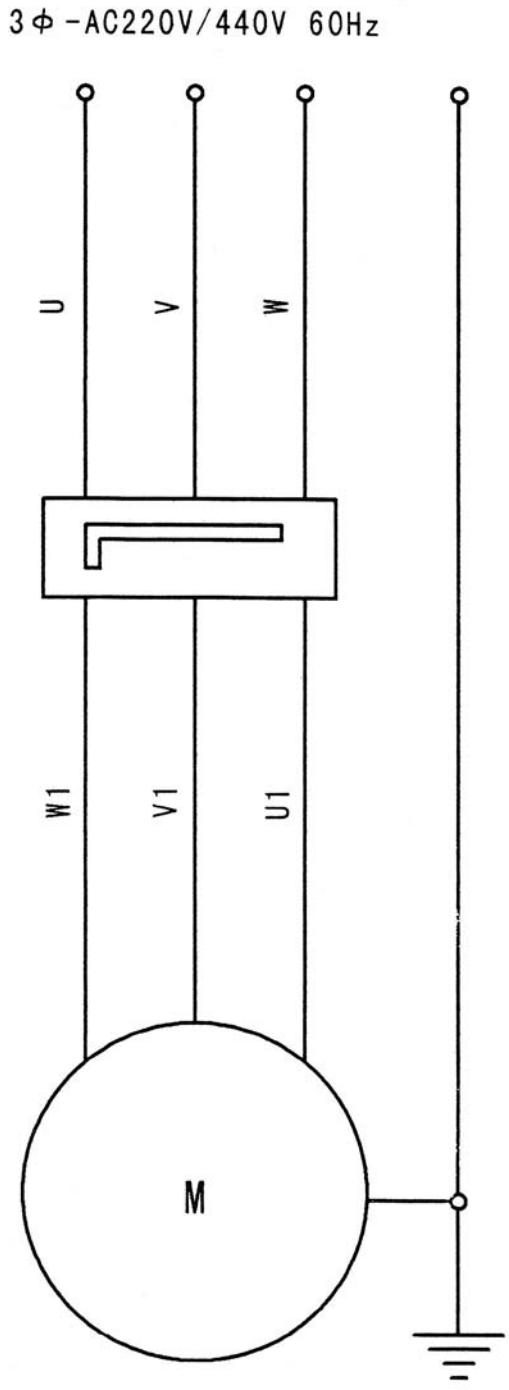
SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Motor will not start.	1. Main power switch position. 2. Wiring box door open. 3. Circuit breaker or relay inside machine wiring box tripped. 4. Low voltage. 5. Open circuit in motor or loose connections. 6. Switch at fault. 7. Faulty start capacitor.	1. Make sure main power switch is turned clockwise. 2. Close wiring box door. 3. Reset circuit breaker by flipping switch on then off then back on. Reset relay by pressing the reset button located on the face. 4. Check power supply for proper voltage. 5. Inspect all lead connections on motor and magnetic switch for loose or open connections. 6. Replace switch. 7. Replace start capacitor.
Fuses or circuit breakers trip open.	1. Short circuit in line cord or plug. 2. Short circuit in motor or loose connections. 3. Incorrect fuses or circuit breakers in power supply.	1. Inspect cord or plug for damaged insulation and shorted wires and replace extension cord. 2. Inspect all connections on motor for loose or shorted terminals or worn insulation. 3. Install correct fuses or circuit breakers.
Motor overheats.	1. Motor overloaded.	1. Reduce load on motor.
Tool slips in collet	1. Collet is not fully drawn up into spindle taper. 2. Wrong size collet. 3. Debris in collet or in spindle taper. 4. Taking too big of a cut.	1. Snug up draw bar. 2. Measure tool shank diameter and match with appropriate diameter collet. 3. Remove all oil and debris from collet and spindle taper. 4. Lessen depth of cut and allow chips to clear.
Breaking tools or cutters.	1. RPM and or feed rate is too fast. 2. Cutting tool getting too hot. 3. Taking too big of a cut.	1. Use tables to set correct RPM and feed rates. 2. Use cutting fluid or oil for appropriate application. 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. 2. Dull cutting tools.	1. Decrease depth of cut. 2. Use sharp cutting tools.
Workpiece vibrates or chatters during operation.	1. Table locks not tight. 2. Spindle lock not tight. 3. Workpiece not securely clamped to table or into mill vice. 4. RPM and feed rate too high.	1. Tighten down table locks. 2. Tighten spindle lock. 3. Check that clamping is tight and sufficient for the job. Make sure mill vice is tight to the table. 4. Use appropriate RPM and feed for the job.
Table hard to move.	1. Table locks are tightened down. 2. Chips have loaded up on bedways. 3. Bedways are dry and in need of lubrication. 4. Longitudinal stops are interfering. 5. Gibs are too tight.	1. Check to make sure table locks are fully released. 2. Frequently clean away chips that load up during milling operations. 3. Lubricate bedways and handles. 4. Check to make sure that stops are floating and not hitting the center stop. 5. Loosen gib screws))
Bad surface finish	1. Wrong RPM or feed rate. 2. Dull cutting tool or poor cutting tool selection. 3. Wrong rotation of cutting tool.	1. Adjust for appropriate RPM and feed rate. 2. Sharpen cutting tool or select a better cutting tool for the intended operation. 3. Check for proper cutting rotation for cutting tool.

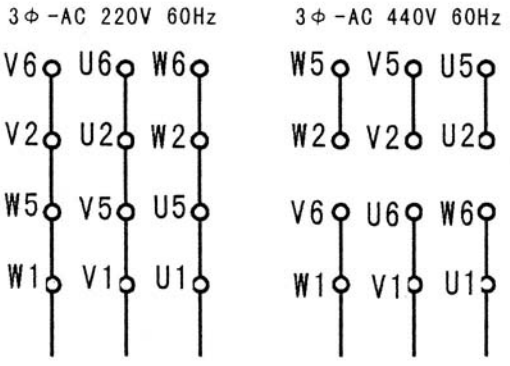
M1003 Wiring Diagram



M1006 Wiring Diagram





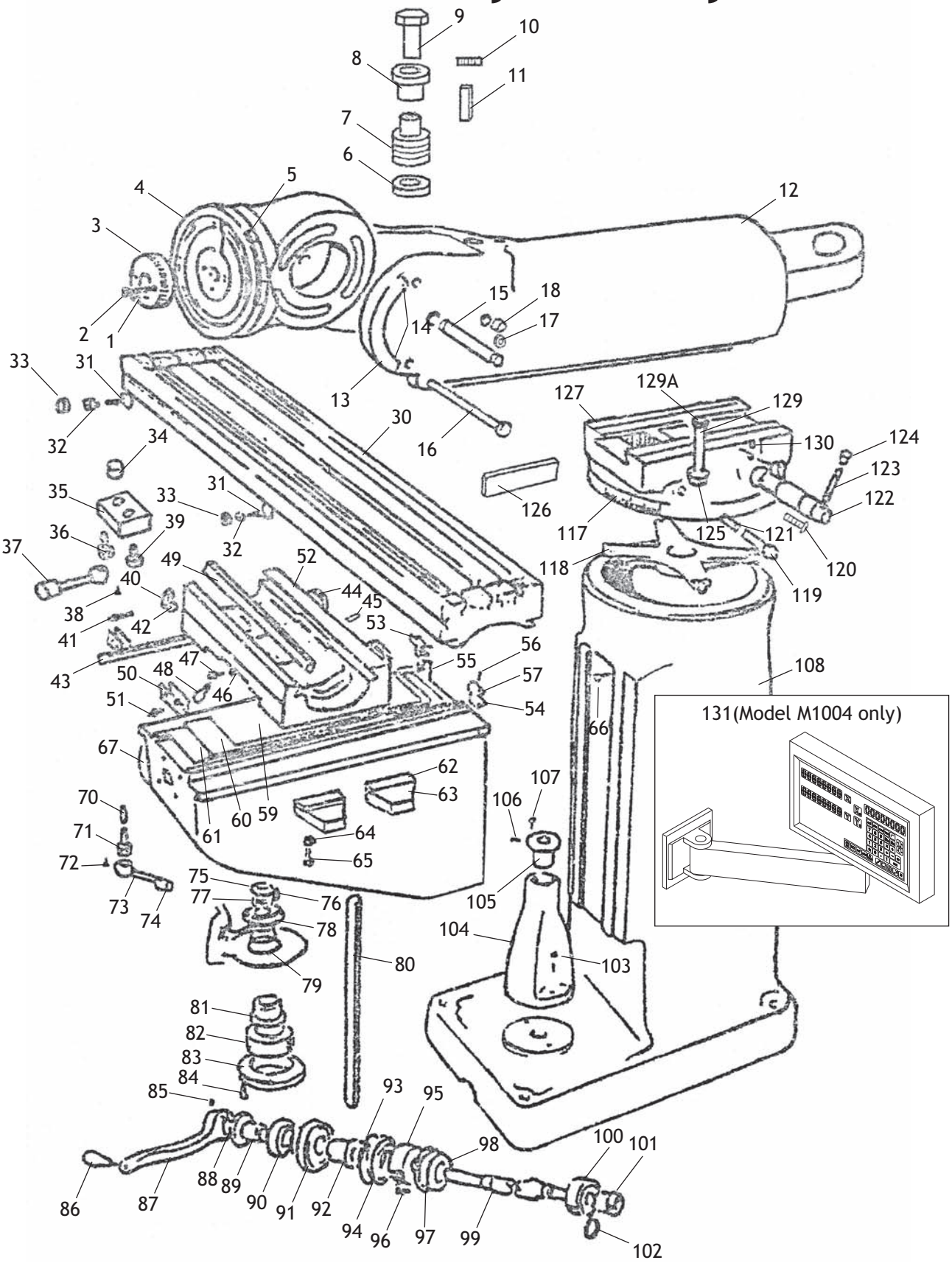


NOTE: The main motor is connected under the voltage of 3Φ-AC 220V 60Hz

SERVICE

M1003 and M1004 Parts

M1003/4 Body Assembly



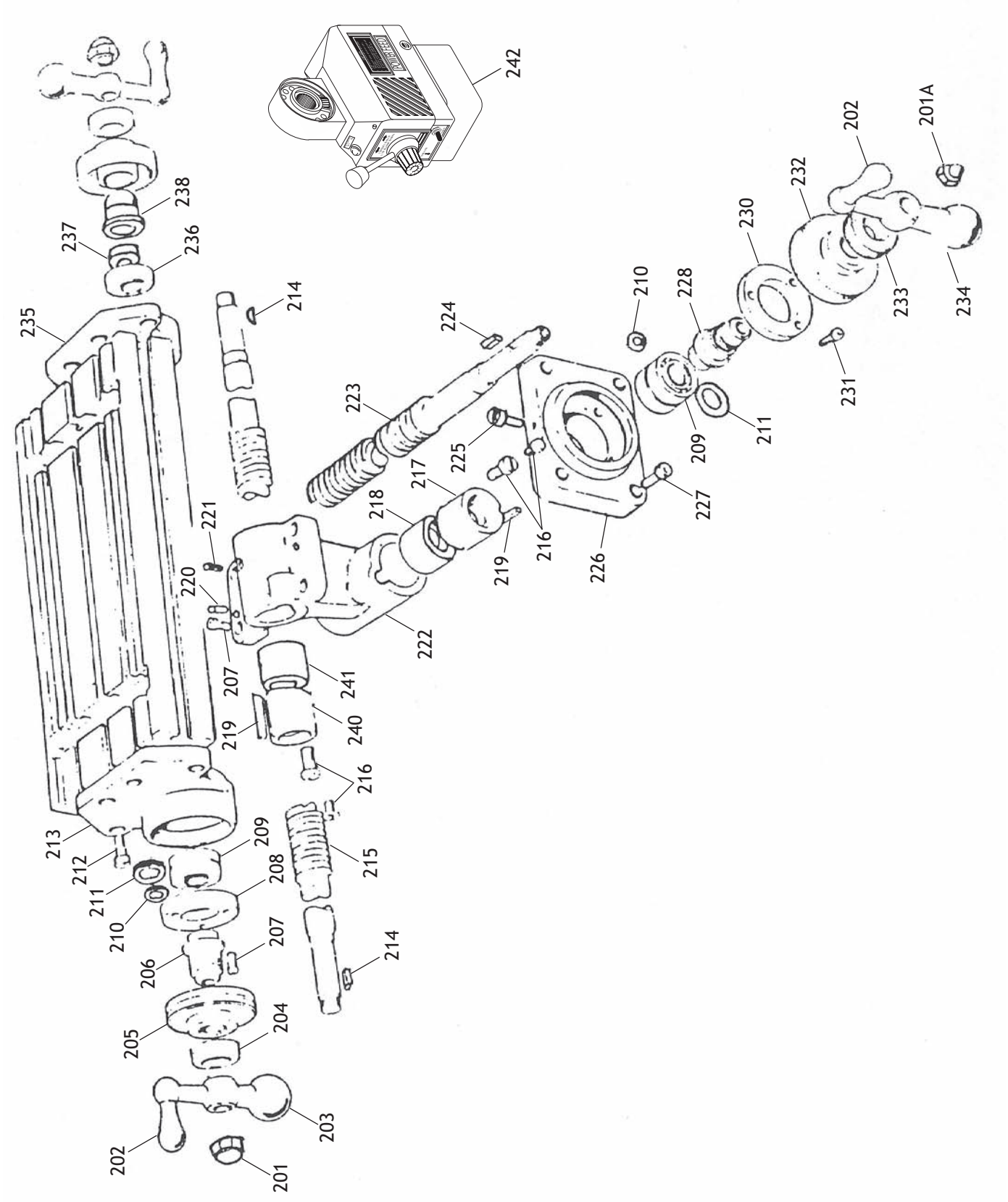
REF	PART #	DESCRIPTION
1	XM1003001	TAPER PIN 8 X 50
2	XPSB84M	CAP SCREW M10-1.5 X 35
3	XM1003003	WORM GEAR 20T
4	XM1003004	RAM ADAPTER
5	XM1003005	SCALE
6	XM1003006	SLEEVE
7	XM1003007	WORM
8	XM1003008	SLEEVE
9	XM1003009	SHAFT
10	XPSS83M	SET SCREW M5-.8 X 6
11	XPK23M	KEY 5 X 5 X 25
12	XM1003012	RAM
13	XM1003013	SCALE
14	XM1003014	RIVET 2 X 5
15	XM1003015	SHAFT
16	XM1003016	FLANGE BOLT M16-2 X 200
17	XPR68M	EXT RETAINING RING 40MM
18	XM1003018	CLAMPING SLEEVE
30	XM1003030	TABLE
31	XM1003031	T-BOLT M8-1.25 X 35
32	XM1003032	POSITIVE STOP
33	XM1003033	THICK HEX NUT M8-1.25
34	XM1003034	PLUG
35	XM1003035	CLAMPING PLATE
36	XPB35M	HEX BOLT M12-1.75 X 40
37	XM1003037	HANDLE
38	XPSS03M	SET SCREW M6-1 X 8

REF	PART #	DESCRIPTION
39	XPB27M	HEX BOLT M12-1.75 X 30
40	XPSB11M	CAP SCREW M8-1.25 X 16
41	XM1003041	GIB SCREW M8-1.25 X 37
42	XM1003042	TABLE STOP BRACKET
43	XM1003043	GIB
44	XM1003044	WIPER
45	XM1003045	ROLL PIN 10 X 29
46	XM1003046	LOCKING PIN
47	XM1003047	LOCK HANDLE SHAFT
48	XM1003048	LOCKING LEVER
49	XM1003049	GIB
50	XM1003050	WIPER HOLDER
51	XPS05M	PHLP HD SCR M5-.8 X 8
52	XM1003052	SADDLE
53	XM1003053	WIPER HOLDER
54	XM1003054	WIPER
55	XM1003055	BEVEL GIB
56	XM1003056	GIB SCREW M8-1.25 X 50
57	XM1003057	WIPER HOLDER
59	XM1003059	CHIP GUARD
60	XM1003060	CHIP GUARD
61	XM1003061	CHIP GUARD
62	XM1003062	GIB
63	XM1003063	CLAMPING PLATE
64	XPN01M	HEX NUT M6-1
65	XPSS25M	SET SCREW M6-1 X 20
66	XPSB100M	CAP SCREW M8-1.25 X 15

REF	PART #	DESCRIPTION
67	XM1003067	KNEE
70	XM1003070	ROUND PIN 8MM
71	XPB38M	HEX BOLT M12-1.75 X 60
72	XPSS03M	SET SCREW M6-1 X 8
73	XM1003073	HANDLE SHAFT
74	XM1003074	KNOB M8-1.25
75	XPN09M	HEX NUT M12-1.75
76	XPK34M	KEY 5 X 5 X 20
77	XPLW05M	LOCK WASHER 12MM
78	XM1003078	SPIRAL BEVEL GEAR
79	XM1003079	FLAT WASHER 40MM
80	XM1003080	ELEVATING SCREW
81	XM1003081	BEARING BUSHING
82	XP206	BALL BEARING 206
83	XM1003083	BEARING RETAINER RING
84	XPSB100M	CAP SCREW M8-1.25 X 15
85	XPSS03M	SET SCREW M6-1 X 8
86	XM1003086	HANDLE
87	XM1003087	ARM
88	XM1003088	CLUTCH A
89	XM1003089	CLUTCH B
90	XM1003090	KNURLED RING
91	XM1003091	DIAL
92	XM1003092	SLEEVE
93	XPR25M	INT RETAINING RING 47MM
94	XM1003094	REGULATING RING
95	XP204	BALL BEARING 204ZZ
96	XPSB01M	CAP SCREW M6-1 X 16

REF	PART #	DESCRIPTION
97	XM1003097	BEARING CAP
98	XM1003098	FLAT PIN 5 X 16
99	XM1003099	SHAFT
100	XP204	BALL BEARING 204ZZ
101	XM1003101	FLAT WASHER 30MM
102	XM1003102	SPIRAL BEVEL GEAR
103	XPSB64M	CAP SCREW M10-1.5 X 25
104	XM1003104	BRACKET
105	XM1003105	ELEVATION NUT
106	XM1003106	OIL CUP M6
107	XPSB100M	CAP SCREW M8-1.25 X 15
108	XM1003108	COLUMN
117	XM1003117	SCALE
118	XM1003118	SPIDER
119	XM1003119	LOCKING SCREW M12-1.75 X 53
120	XPSB40M	CAP SCREW M8-1.25 X 35
121	XM1003121	LOCKING PIN
122	XM1003122	GEAR SHAFT
123	XM1003123	HANDLE SHAFT
124	XM1003124	KNOB M10-1.5
125	XPW06M	FLAT WASHER 12MM
126	XM1003126	GIB
127	XM1003127	ROTARY DISK
129	XM1003129	STUD M12-1.75 X 120
129A	XPN09M	HEX NUT M12-1.75
130	XPSS06M	SET SCREW M8-1.25 X 16
131	XM1004131	DIGITAL READOUT ASSEMBLY

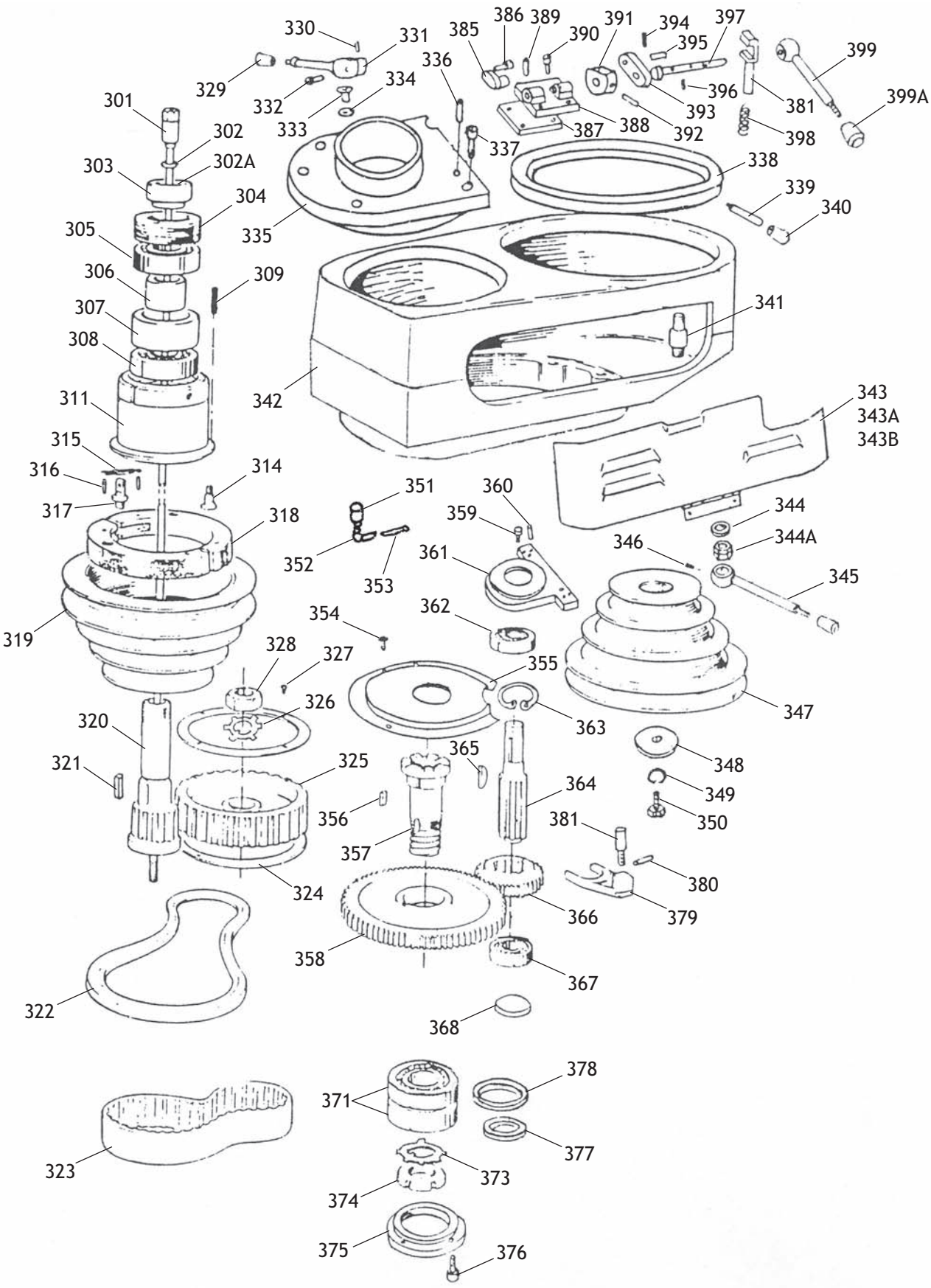
M1003/4 Table Assembly



REF	PART #	DESCRIPTION
201	XM1003201	ACORN NUT M16-2
201A	XM1003201A	ACORN NUT 1/2" - 20
202	XM1003202	HANDLE
203	XM1003203	HANDLE BODY
204	XM1003204	KNURLED RING
205	XM1003205	DIAL
206	XM1003206	SLEEVE
207	XPSB11M	CAP SCREW M8-1.25 X 16
208	XM1003208	FLANGE
209	XM1003209	THRUST BEARING 36204
210	XM1003210	ADJUSTING SPACER
211	XM1003211	ADJUSTING SPACER
212	XPSB61M	CAP SCREW M10-1.5 X 20
213	XM1003213	LEFT BRACKET
214	XPK31M	KEY 4 X 4 X 30
215	XM1003215	LEAD SCREW
216	XM1003216	GIB ADJ SCREW M8-1.25 X 32
217	XM1003217	LEAD SCREW NUT
218	XM1003218	LEAD SCREW NUT
219	XPK12M	KEY 5 X 5 X 30
220	XM1003220	INT THREAD TAPER PIN 8 X 30

REF	PART #	DESCRIPTION
221	XPSS14M	SET SCREW M8-1.25 X 12
222	XM1003222	LEAD SCREW HOUSING
223	XM1003223	LEAD SCREW
224	XM1003224	FLAT KEY (TRANSVERSE)
225	XPS07M	PHLP HD SCR M4-.7 X 8
226	XM1003226	BEARING BRACKET
227	XPSB130M	CAP SCREW M10-1.5 X 16
228	XM1003228	SLEEVE
230	XM1003230	BEARING RETAINER RING
231	XPSB100M	CAP SCREW M8-1.25 X 15
232	XM1003232	DIAL
233	XM1003233	KNURLED RING
234	XM1003234	HANDLE BODY
235	XM1003235	RIGHT BRACKET
236	XP204	BALL BEARING 204ZZ
237	XM1003237	ADJUSTING PAD
238	XM1003238	SLEEVE
240	XM1003240	LEAD SCREW NUT
241	XM1003241	LEAD SCREW NUT
242	XM1003242	POWER FEED UNIT

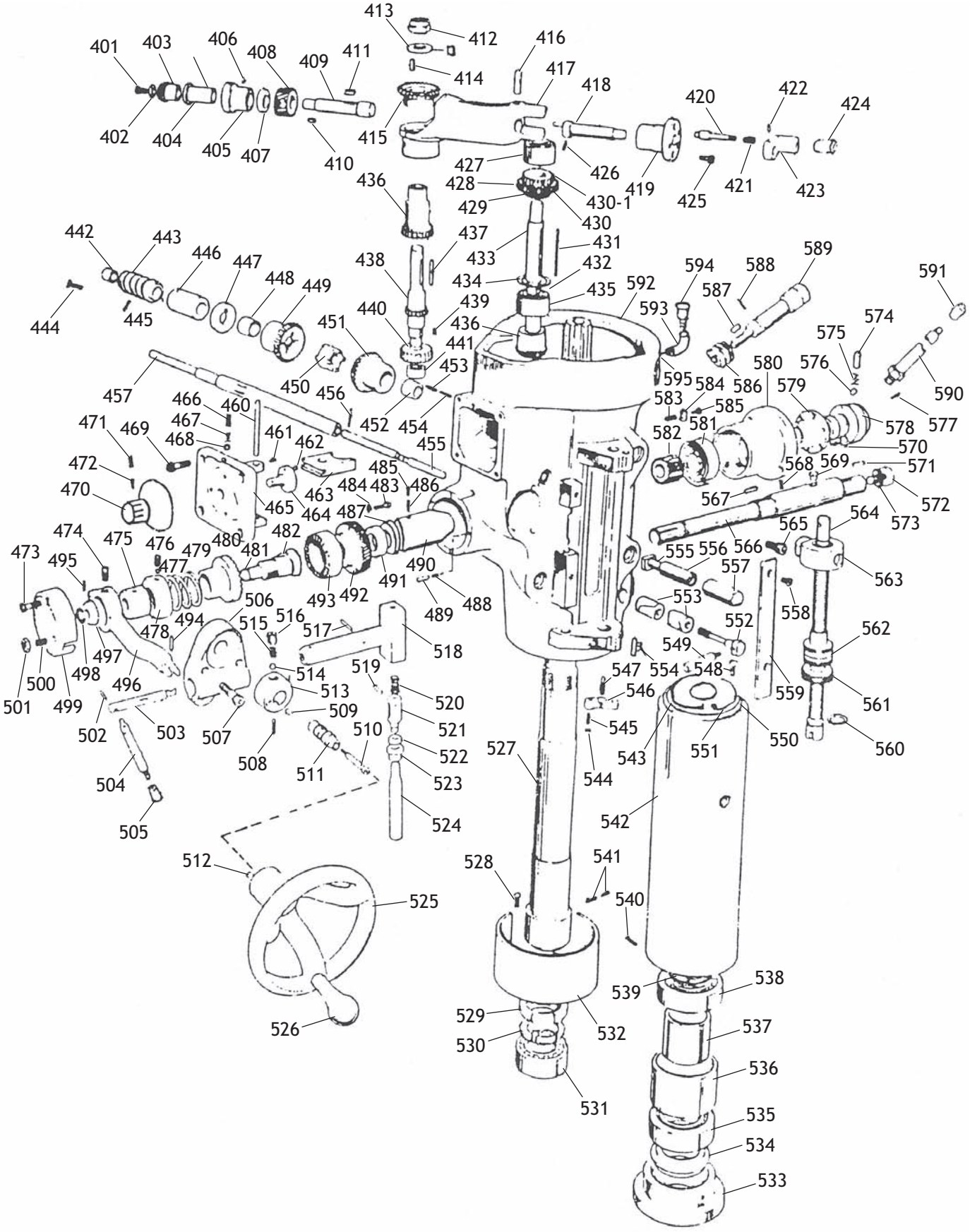
M1003/4 Head Assembly



REF	PART #	DESCRIPTION
301	XM1003301	DRAWBAR
302	XM1003302	DRAWBAR WASHER
302A	XM1003302A	O RING 16 X 2
303	XM1003303	THREADED COLLAR
304	XM1003304	THREADED COLLAR
305	XM1003305	THRUST BEARING 36107
306	XM1003306	ADJUSTABLE SPACER
307	XM1003307	ADJUSTABLE SPACER
308	XM1003308	THRUST BEARING 36107
309	XM1003309	COMPRESSION SPRING
311	XM1003311	BEARING BRACKET
314	XM1003314	SCREW M8-1.25 X 29
315	XM1003315	EXTERNAL SPRING
316	XM1003316	ROLL PIN 2.5 GA X 16
317	XM1003317	BRAKE LOCK STUD
318	XM1003318	BRAKE SHOE
319	XM1003319	PULLEY
320	XM1003320	COUPLING SHAFT
321	XM1003321	KEY 8 X 8 X 25
322	XM1003322	V-BELT
323	XM1003323	SYNCHRO BELT 2J650
324	XM1003324	PULLEY FLANGE
325	XM1003325	TIMING BELT PULLEY
326	XM1003326	THRUST WASHER 16MM
327	XPFH30M	FLAT HD SCR M5-.8 X 8
328	XM1003328	ROUND NUT M16 X 1.5
329	XM1003329	KNOB M6-1
330	XM1003330	SET SCREW M3-.5 X 5
331	XM1003331	HANDLE SHAFT
332	XM1003332	ROLL PIN 8 X 18
333	XM1003333	SLEEVE
334	XM1003334	FLAT WASHER 23MM
335	XM1003335	COVER
336	XM1003336	TAPER PIN 10 X 30
337	XPSB75M	CAP SCREW M10-1.5 X 18
338	XM1003338	MOTOR MOUNTING FLANGE
339	XM1003339	HANDLE SHAFT
340	XM1003340	KNOB M6-1
341	XM1003341	STUD M12-1.75 X 35
342	XM1003342	BELT HOUSING
343	XM1003343	RIGHT WINDOW CAP
343A	XM1003343A	LEFT WINDOW CAP
343B	XM1003343B	KNOB M6-1
344	XPW06M	FLAT WASHER 12MM
344A	XM1003344A	THICK HEX NUT M12-1.75
345	XM1003345	HANDLE
346	XPSS03M	SET SCREW M6-1 X 8
347	XM1003347	PULLEY

REF	PART #	DESCRIPTION
348	XM1003348	SPECIAL WASHER 30MM
349	XM1003349	LOCK WASHER 18MM
350	XM1003350	HEX BOLT M18-2.5 X 25
351	XM1003351	COTTON CORE TYPE OIL CAP
352	XM1003352	OIL CUP ADAPTER
353	XM1003353	COTTON CORE TUBE
354	XM1003354	SCREW M6-1 X 10
355	XM1003355	CAP
356	XPK40M	KEY 8 X 8 X 16
357	XM1003357	WORM COUPLING SHAFT
358	XM1003358	BULL GEAR 77T
359	XPSB01M	CAP SCREW M6-1 X 16
360	XM1003360	INT THREAD TAPER PIN 8 X 25
361	XM1003361	BEARING BRACKET
362	XP6203	BALL BEARING 6203ZZ
363	XPR23M	INT RETAINING RING 40MM
364	XM1003364	SPLINE SHAFT
365	XM1003365	WOODRUFF KEY 5 X 16
366	XM1003366	PINION GEAR
367	XP6203	BALL BEARING 6203ZZ
368	XM1003368	PLUG
371	XM1003371	THRUST BEARING 36108
373	XM1003373	THRUST WASHER 39MM
374	XM1003374	ROUND NUT M39 X 1.5
375	XM1003375	COVER
376	XPSB26M	CAP SCREW M6-1 X 12
377	XM1003377	REGULATING RING
378	XM1003378	REGULATING RING
379	XM1003379	SHIFTER FORK
380	XM1003380	TAPER PIN 3 X 25
381	XM1003381	DRAWBAR
385	XM1003385	OFFSET BRACKET
386	XPSB03M	CAP SCREW M5-.8 X 8
387	XM1003387	SHIM
388	XM1003388	SHAFT BRACKET
389	XM1003389	TAPER PIN 8 X 25
390	XPSB11M	CAP SCREW M8-1.25 X 16
391	XM1003391	ROCKER
392	XM1003392	TAPER PIN 4 X 32
393	XM1003393	ECCENTRIC BLOCK
394	XM1003394	TAPER PIN 4 X 25
395	XPRP07M	ROLL PIN 6 X 20
396	XM1003396	TAPER PIN 4 X 25
397	XM1003397	SPANNER SHAFT
398	XM1003398	COMPRESSION SPRING
399	XM1003399	HANDLE SHAFT
399A	XM1003399A	KNOB M8-1.25

M1003/4 Spindle Housing Assembly



REF	PART #	DESCRIPTION
401	XPB135M	HEX BOLT M4-.7 X 8
402	XPLW02M	LOCK WASHER 4MM
403	XM1003403	BEVEL GEAR 12T
404	XM1003404	SLEEVE
405	XM1003405	SLEEVE
406	XPSS31M	SET SCREW M5-.8 X 8
407	XM1003407	WORM GEAR SPACER
408	XM1003408	WORM GEAR 20T
409	XM1003409	SHAFT
410	XPK103M	KEY 3 X 3 X 12
411	XPK98M	KEY 3 X 3 X 16
412	XPN03M	HEX NUT M8-1.25
413	XPW01M	FLAT WASHER 8MM
414	XPK103M	KEY 3 X 3 X 12
415	XM1003415	BEVEL GEAR 24T
416	XM1003416	FEED ENGAGE PIN 12 X 32
417	XM1003417	WORM GEAR SUPPORT
418	XPRP07M	ROLL PIN 6 X 20
419	XM1003419	FLANGE
420	XM1003420	PLUNGER
421	XM1003421	COMPRESSION SPRING
422	XM1003422	TAPER PIN 3 X 20
423	XM1003423	SHIFTER CRANK
424	XM1003424	KNOB M6-1
425	XPSB33M	CAP SCREW M5-.8 X 12
426	XPSS03M	SET SCREW M6-1 X 8
427	XM1003427	BUSHING
428	XM1003428	GEAR 28T
429	XM1003429	GEAR 17T
430	XM1003430	GEAR 22T
430-1	XPSS47M	SET SCREW M3-.5 X 10
431	XM1003431	KEY 3 X 3 X 40
432	XPSS03M	SET SCREW M6-1 X 8

REF	PART #	DESCRIPTION
433	XM1003433	BEVEL GEAR SHAFT
434	XM1003434	INT RETAINING RING 14MM
435	XM1003435	BUSHING
436	XM1003436	GEAR 18T
437	XPK96M	KEY 3 X 3 X 20
438	XM1003438	GEAR SHAFT
439	XPK03M	KEY 3 X 3 X 8
440	XM1003440	GEAR 23T
441	XM1003441	BUSHING
442	XM1003442	BUSHING
443	XM1003443	WORM
444	XM1003444	PHLP HD SCR M6-1 X 20
445	XPRP02M	ROLL PIN 3 X 16
446	XM1003446	BUSHING
447	XM1003447	SPACER
448	XM1003448	SLEEVE
449	XM1003449	BEVEL GEAR 24T
450	XM1003450	REVERSE CLUTCH
451	XM1003451	BEVEL GEAR 24T
452	XM1003452	SLEEVE
453	XPSS01M	SET SCREW M6-1 X 10
454	XPSS03M	SET SCREW M6-1 X 8
455	XM1003455	SLIDE ROD
456	XPRP43M	ROLL PIN 3 X 22
457	XM1003457	HOLLOW SHAFT
460	XM1003460	SMALL SHAFT
461	XPSS26M	SET SCREW M5-.8 X 6
462	XPRP61M	ROLL PIN 3 X 12
463	XM1003463	SLIDE
464	XM1003464	ECCENTRIC WHEEL
465	XM1003465	CLUSTER GEAR COVER
466	XPSS41M	SET SCREW M8-1.25 X 18
467	XM1003467	COMPRESSION SPRING

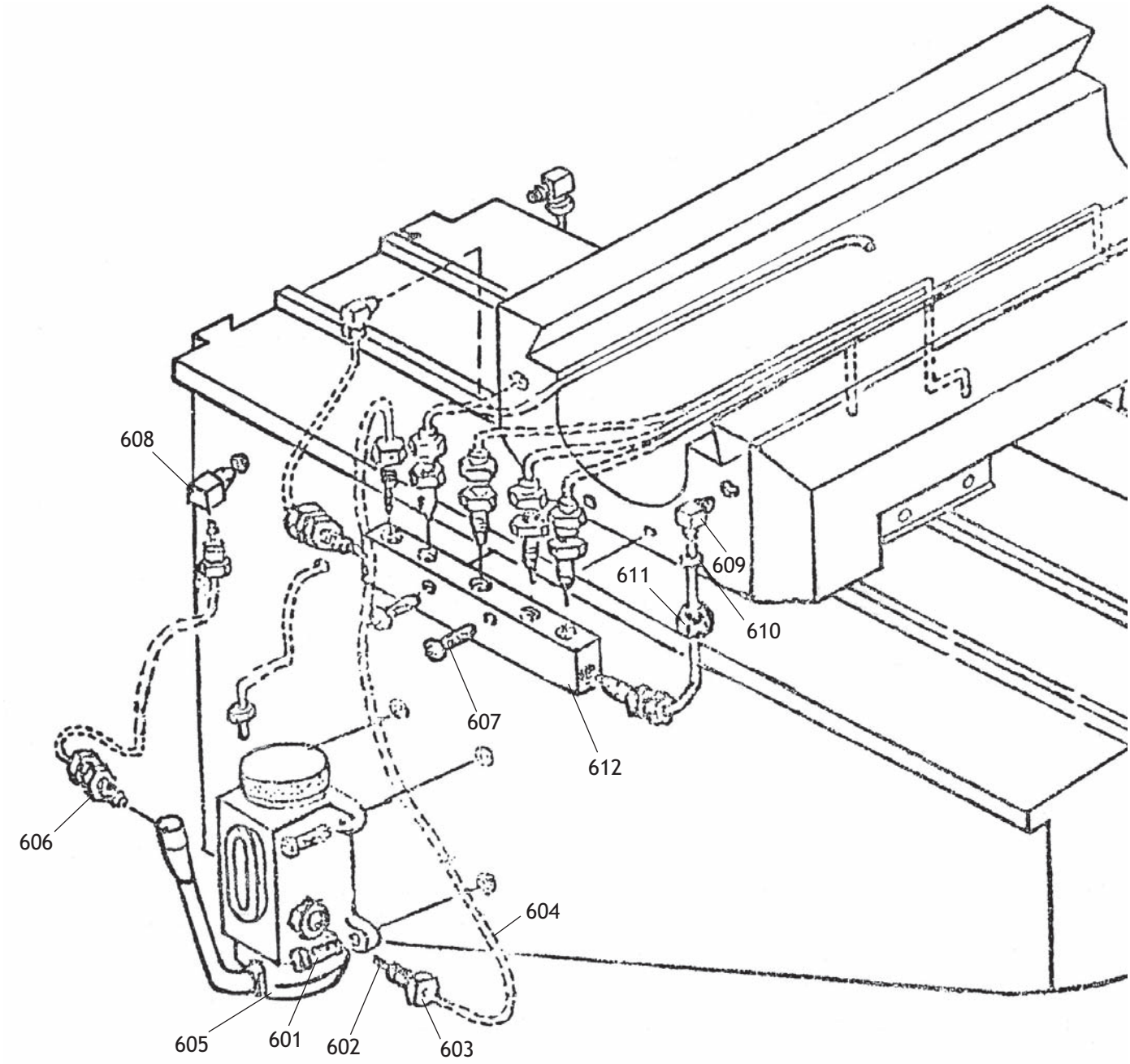
REF	PART #	DESCRIPTION
468	XM1003468	STEEL BALL 3/16"
469	XPSB24M	CAP SCREW M5-.8 X 16
470	XM1003470	DIAL
471	XPSS26M	SET SCREW M5-.8 X 6
472	XPSS26M	SET SCREW M5-.8 X 6
473	XPSB78M	CAP SCREW M5-.8 X 40
474	XM1003474	THREAD PIN 5 X 15
475	XM1003475	SLEEVE
476	XPSS03M	SET SCREW M6-1 X 8
477	XM1003477	PLUG 4 X 2
478	XM1003478	COLLAR
479	XM1003479	COMPRESSION SPRING
480	XM1003480	CLUTCH
481	XM1003481	COUPLING SHAFT
482	XM1003482	KEY 14 X 5 X 8.5
483	XPS56M	PHLP HD SCR M4-.7 X 16
484	XPLW02M	LOCK WASHER 4MM
485	XPSS04M	SET SCREW M6-1 X 12
486	XPSS04M	SET SCREW M6-1 X 12
487	XM1003487	REGULATING WASHER
488	XM1003488	COMPRESSION SPRING
489	XM1003489	STOP PIN
490	XM1003490	SLEEVE
491	XP8102	THRUST BEARING 8102
492	XM1003492	FEED WORM GEAR
493	XM1003493	CLUTCH
494	XM1003494	ROLL PIN 5 GA X 16
495	XM1003495	ROLL PIN 4 GA X 20
496	XM1003496	CONNECTING ROD
497	XM1003497	FLAT WASHER 22MM
498	XPR01M	EXT RETAINING RING 10MM
499	XM1003499	COVER
500	XPSS64M	SET SCREW M6-1 X 15

REF	PART #	DESCRIPTION
501	XPN01M	HEX NUT M6-1
502	XM1003502	ROLL PIN 5 GA X 20
503	XM1003503	DRAWBAR
504	XM1003504	HANDLE SHAFT
505	XM1003505	KNOB M8-1.25
506	XM1003506	BRACKET
507	XPSB27M	CAP SCREW M6-1 X 14
508	XPSS03M	SET SCREW M6-1 X 8
509	XPK29M	KEY 4 X 4 X 8
510	XM1003510	FEED REVERSE STUD
511	XM1003511	FEED REVERSE HANDLE
512	XPRP76M	ROLL PIN 4 X 16
513	XM1003513	LOCK COLLAR
514	XM1003468	STEEL BALL 3/16"
515	XM1003467	COMPRESSION SPRING
516	XPSS16M	SET SCREW M8-1.25 X 10
517	XM1003517	ROLL PIN 4 GA X 16
518	XM1003518	T-ROD
519	XPRP61M	ROLL PIN 3 X 12
520	XM1003520	COMPRESSION SPRING
521	XM1003521	SHAFT
522	XM1003522	SLEEVE
523	XM1003523	SLEEVE
524	XM1003524	PLUNGER
525	XM1003525	HANDWHEEL
526	XM1003526	HANDLE
527	XM1003527	SPINDLE
528	XPSB33M	CAP SCREW M5-.8 X 12
529	XM1003529	LOCK NUT M55 X 3
530	XM1003530	LOCK NUT M55 X 10
531	XP206	BALL BEARING 206ZZ
532	XM1003532	QUILL SKIRT
533	XM1003533	NOSE PIECE

REF	PART #	DESCRIPTION
534	XM1003534	SPINDLE DIRT SHIELD
535	XM1003535	THRUST BEARING 46108
536	XM1003536	BEARING SLEEVE
537	XM1003537	BEARING SLEEVE
538	XM1003538	THRUST BEARING 46108
539	XM1003539	LOCATING NUT
540	XPSS26M	SET SCREW M5-.8 X 6
541	XPSS26M	SET SCREW M5-.8 X 6
542	XM1003542	QUILL
543	XM1003543	OIL SEALER
544	XPN07M	HEX NUT M3-.5
545	XM1003545	SET SCREW M3-.5 X 14
546	XM1003546	FORKED ROD
547	XM1003547	THREAD PIN M6-1 X 19
548	XPS07M	PHLP HD SCR M4-.7 X 8
549	XM1003549	HANDLE
550	XM1003550	RETAINING PLATE
551	XPR63M	INT RETAINING RING 65MM
552	XM1003552	QUILL LOCK BOLT M8-1.25 X 70
553	XM1003553	LOCK SLEEVE TAPPED
554	XM1003554	INDICATOR ROD
555	XM1003555	T-BOLT M12-1.75 X 175
556	XM1003556	THREADED SLEEVE
557	XM1003557	THREADED SLEEVE
558	XPS17M	PHLP HD SCR M4-.7 X 6
559	XM1003559	SCALE
560	XPR54M	INT RETAINING RING 15MM
561	XM1003561	KNURLED NUT
562	XM1003562	DIAL
563	XM1003563	DEPTH STOP
564	XM1003564	LEAD SCREW

REF	PART #	DESCRIPTION
565	XM1003565	SPECIAL SCREW M10-1.5 X 16
566	XM1003566	SHAFT
567	XPK34M	KEY 5 X 5 X 20
568	XPSS16M	SET SCREW M8-1.25 X 10
569	XM1003569	ROLL PIN 5 X 6
570	XM1003570	ROLL PIN 5 GA X 16
571	XPK34M	KEY 5 X 5 X 20
572	XPB136M	HEX BOLT M4-.7 X 16
573	XM1003573	STOP PLATE
574	XPSS59M	SET SCREW M8-1.25 X 14
575	XM1003467	COMPRESSION SPRING
576	XM1003468	STEEL BALL 3/16"
577	XPSS35M	SET SCREW M4-.7 X 14
578	XM1003578	HANDLE HUB
579	XM1003579	SLEEVE
580	XM1003580	SLEEVE
581	XM1003581	FLAT COILED SPRING
582	XM1003582	GEAR 16T
583	XM1003583	LEVER
584	XM1003584	SHAFT
585	XM1003585	STUD M11.5 X 11.5
586	XM1003586	WORM
587	XPK37M	KEY 4 X 4 X 16
588	XPSS26M	SET SCREW M5-.8 X 6
589	XM1003589	SHAFT
590	XM1003590	HANDLE SHAFT
591	XM1003591	KNOB M8-1.25
592	XM1003592	HOUSING
593	XM1003593	OIL CUP ADAPTER
594	XM1003594	OIL CUP
595	XM1003595	TUBING

M1003/4 Lubrication System

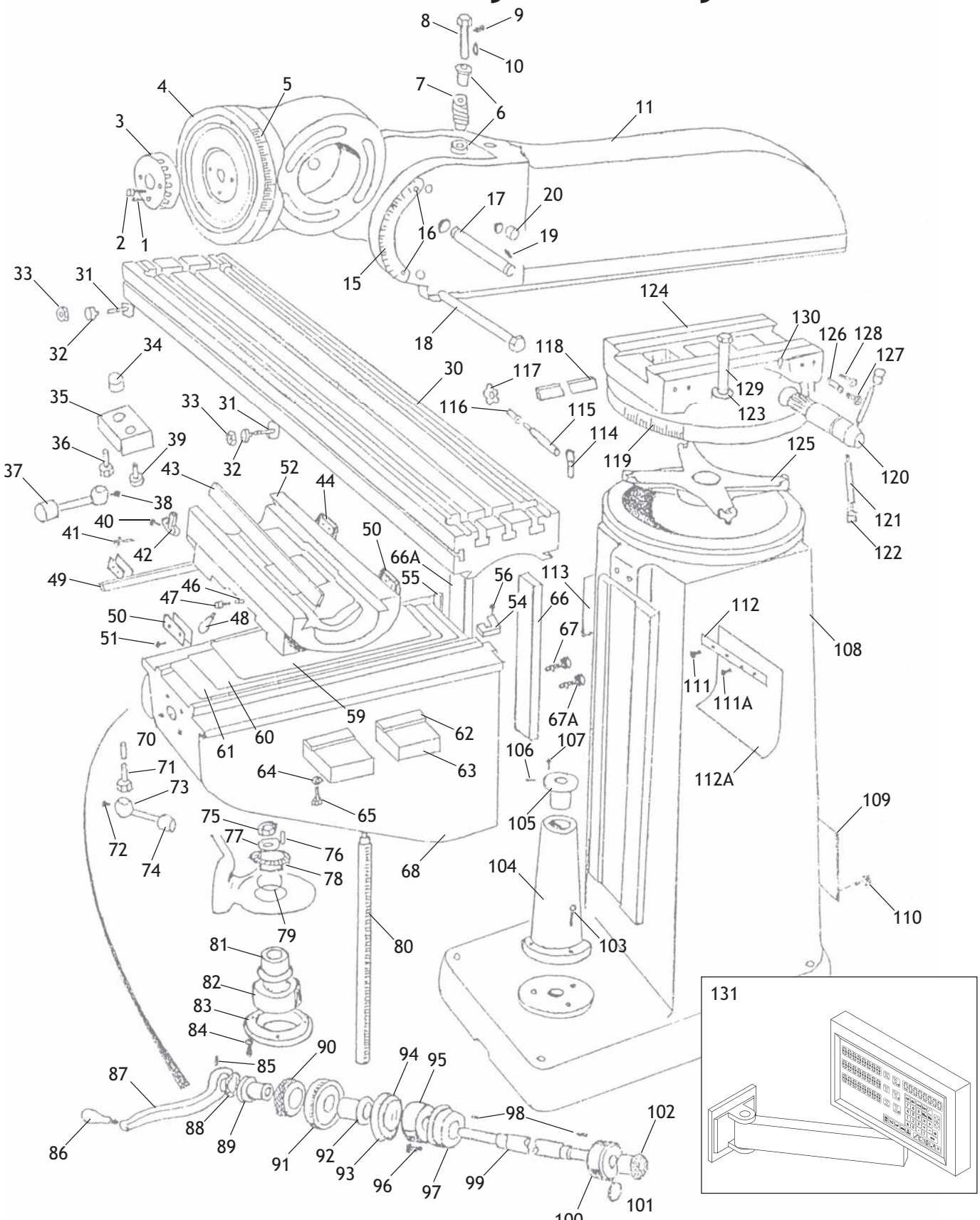


REF	PART #	DESCRIPTION
601	XPSB04M	CAP SCREW M6-1 X 10
602	XM1003602	SLEEVE 4MM
603	XM1003603	SPECIAL BOLT M8-1.25 X 1
604	XM1003604	NYLON TUBING 4MM
605	XM1003605	LUBRICATING PUMP
606	XM1003606	METER UNIT

REF	PART #	DESCRIPTION
607	XM1003607	SPECIAL SCREW M5-.8 X 20
608	XM1003608	FITTING
609	XM1003609	ELBOW FITTING 3MM
610	XM1003610	SLEEVE 3MM
611	XM1003611	TUBE NUT 3MM
612	XM1003612	MULTI-WAY JUNCTION

M1006 Parts

M1006 Body Assembly

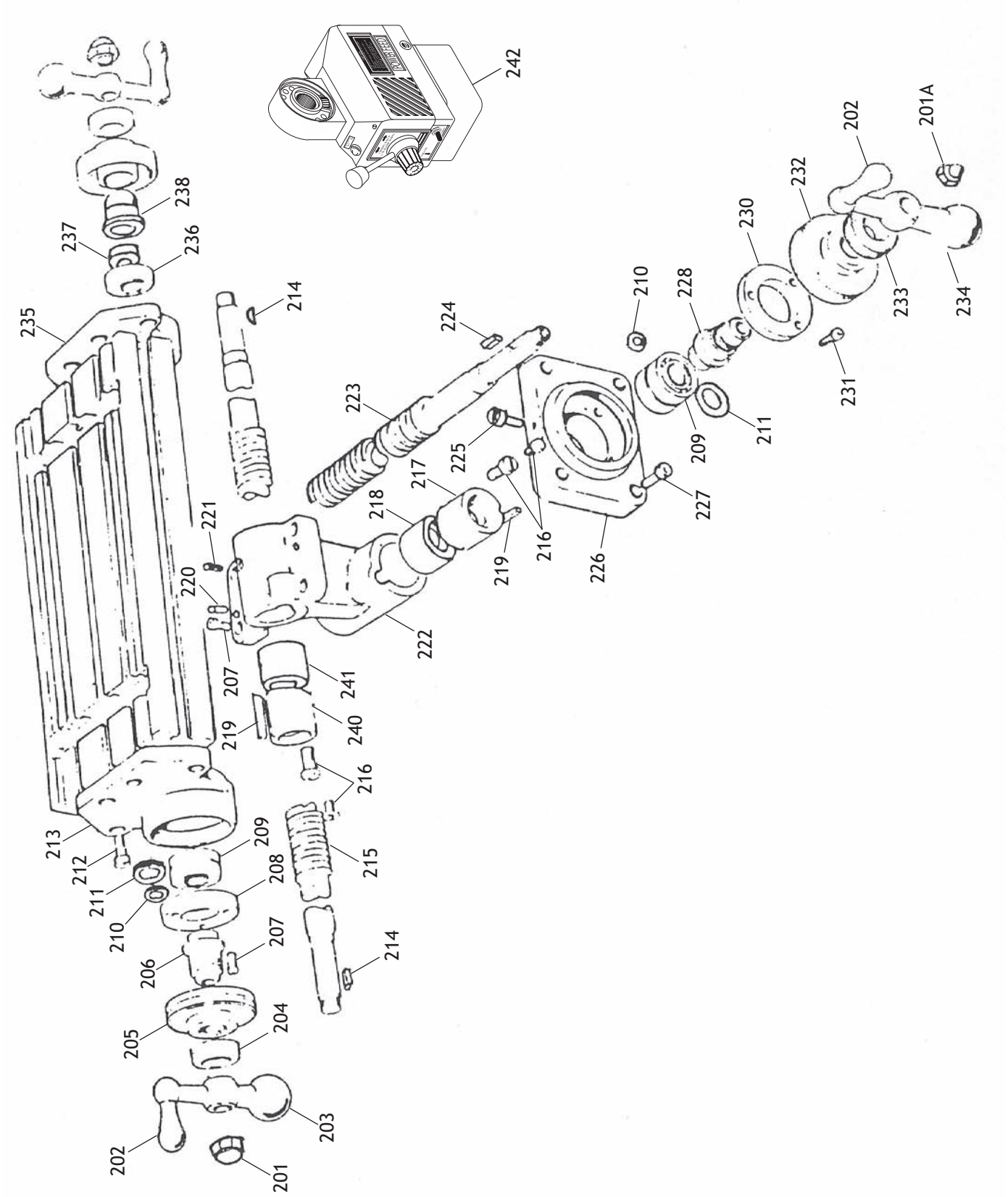


PARTS

REF	PART #	DESCRIPTION
1	XM1006001	TAPER PIN 8 X 50
2	XPSB84M	CAP SCREW M10-1.5 X 35
3	XM1006003	WORM GEAR 28T
4	XM1006004	RAM ADAPTOR
5	XM1006005	SCALE
6	XM1006006	SLEEVE
7	XM1006007	WORM
8	XM1006008	SHAFT
9	XPSS83M	SET SCREW M5-.8 X 6
10	XPK23M	KEY 5 X 5 X 25
11	XM1006011	RAM
15	XM1006015	SCALE
16	XM1006016	RIVET 2 X 5
17	XM1006017	SHAFT
18	XM1006018	FLANGE BOLT M16-2 X 200
19	XM1006019	ROLL PIN 5 X 10
20	XM1006020	CLAMPING SLEEVE
30	XM1006030	TABLE
31	XM1006031	T-BOLT M8-1.25 X 35
32	XM1006032	POSITIVE STOP
33	XM1006033	THICK HEX NUT M8-1.25
34	XM1006034	PLUG
35	XM1006035	CLAMPING PLATE
36	XPSB92M	CAP SCREW M12-1.75 X 40
37	XM1006037	HANDLE
38	XPSS03M	SET SCREW M6-1 X 8
39	XPSB77M	CAP SCREW M12-1.75 X 30
40	XPSB11M	CAP SCREW M8-1.25 X 16
41	XM1006041	GIB SCREW
42	XM1006042	TABLE STOP BRACKET
43	XM1006043	GIB
44	XM1006044	WIPER
46	XM1006046	LOCKING PIN
47	XM1006047	LOCK HANDLE SHAFT
48	XM1006048	LOCKING LEVER
49	XM1006049	GIB
50	XM1006050	WIPER HOLDER
51	XPS05M	PHLP HD SCR M5-.8 X 8
52	XM1006052	SADDLE
54	XM1006054	WIPER
55	XM1006055	BEVEL GIB
56	XPS09M	PHLP HD SCR M5-.8 X 10
59	XM1006059	CHIP GUARD
60	XM1006060	CHIP GUARD
61	XM1006061	CHIP GUARD
62	XM1006062	GIB
63	XM1006063	CLAMPING PLATE
64	XPN01M	HEX NUT M6-1
65	XPSS25M	SET SCREW M6-1 X 20
66	XM1006066	RIGHT CLAMPING PLATE
66A	XM1006066A	LEFT CLAMPING PLATE
67	XPSB131M	CAP SCREW M12-1.75 X 45
67A	XPSB45M	CAP SCREW M8-1.25 X 45
68	XM1006068	KNEE
70	XM1006070	LOCKING PIN
71	XM1006071	GIB LOCKING SHAFT
72	XPSS03M	SET SCREW M6-1 X 8
73	XM1006073	LEVER
74	XM1006074	KNOB M8-1.25

REF	PART #	DESCRIPTION
75	XPN09M	HEX NUT M12-1.75
76	XPK14M	KEY 5 X 5 X 18
77	XPLW05M	LOCK WASHER 12MM
78	XM1006078	SPIRAL BEVEL GEAR 40T
79	XM1006079	FLAT WASHER 40MM
80	XM1006080	ELEVATING SCREW
81	XM1006081	BEARING BUSHING
82	XP206	BALL BEARING 206ZZ
83	XM1006083	BEARING RETAINER RING
84	XPSB100M	CAP SCREW M8-1.25 X 15
85	XPSS03M	SET SCREW M6-1 X 8
86	XM1006086	HANDLE
87	XM1006087	ARM
88	XM1006088	CLUTCH A
89	XM1006089	CLUTCH B
90	XM1006090	KNURLED RING
91	XM1006091	DIAL
92	XM1006092	SLEEVE
93	XPR25M	INT RETAINING RING 47MM
94	XM1006094	REGULATING RING
95	XP204	BALL BEARING 204ZZ
96	XPSB77M	CAP SCREW M12-1.75 X 30
97	XM1006097	BEARING CAP
98	XM1006098	FLAT PIN 5 X 16
99	XM1006099	SHAFT
100	XP204	BALL BEARING 204ZZ
101	XM1006101	FLAT WASHER 30MM
102	XM1006102	SPIRAL BEVEL GEAR 20T
103	XPSB77M	CAP SCREW M12-1.75 X 30
104	XM1006104	BRACKET
105	XM1006105	ELEVATION NUT
106	XM1006106	OIL CUP M6
107	XPSB100M	CAP SCREW M8-1.25 X 15
108	XM1006108	COLUMN
109	XM1006109	COVER PLATE
110	XPS14M	PHLP HD SCR M6-1 X 12
111	XPS09M	PHLP HD SCR M5-.8 X 10
111A	XPS08M	PHLP HD SCR M5-.8 X 12
112	XM1006112	CLAMPING PLATE
112A	XM1006112A	RUBBER COVER
113	XM1006113	COVER PLATE
114	XM1006114	KNOB 12-1.75 X 20
115	XM1006115	SHAFT
116	XM1006116	SLEEVE
117	XM1006117	HANDLE
118	XM1006118	GIB
119	XM1006119	SCALE
120	XM1006120	GEAR SHAFT
121	XM1006121	LEVER
122	XM1006122	HANDLE
123	XPW06M	FLAT WASHER 12MM
124	XM1006124	ROTARY DISK
125	XM1006125	SPIDER
126	XM1006126	LOCKING PIN
127	XM1006127	LOCKING SCREW
128	XPSB40M	CAP SCREW M8-1.25 X 35
129	XM1006129	STUD M12-1.75 X 150
130	XPSS06M	SET SCREW M8-1.25 X 16
131	XM1006131	DIGITAL READOUT ASSEMBLY

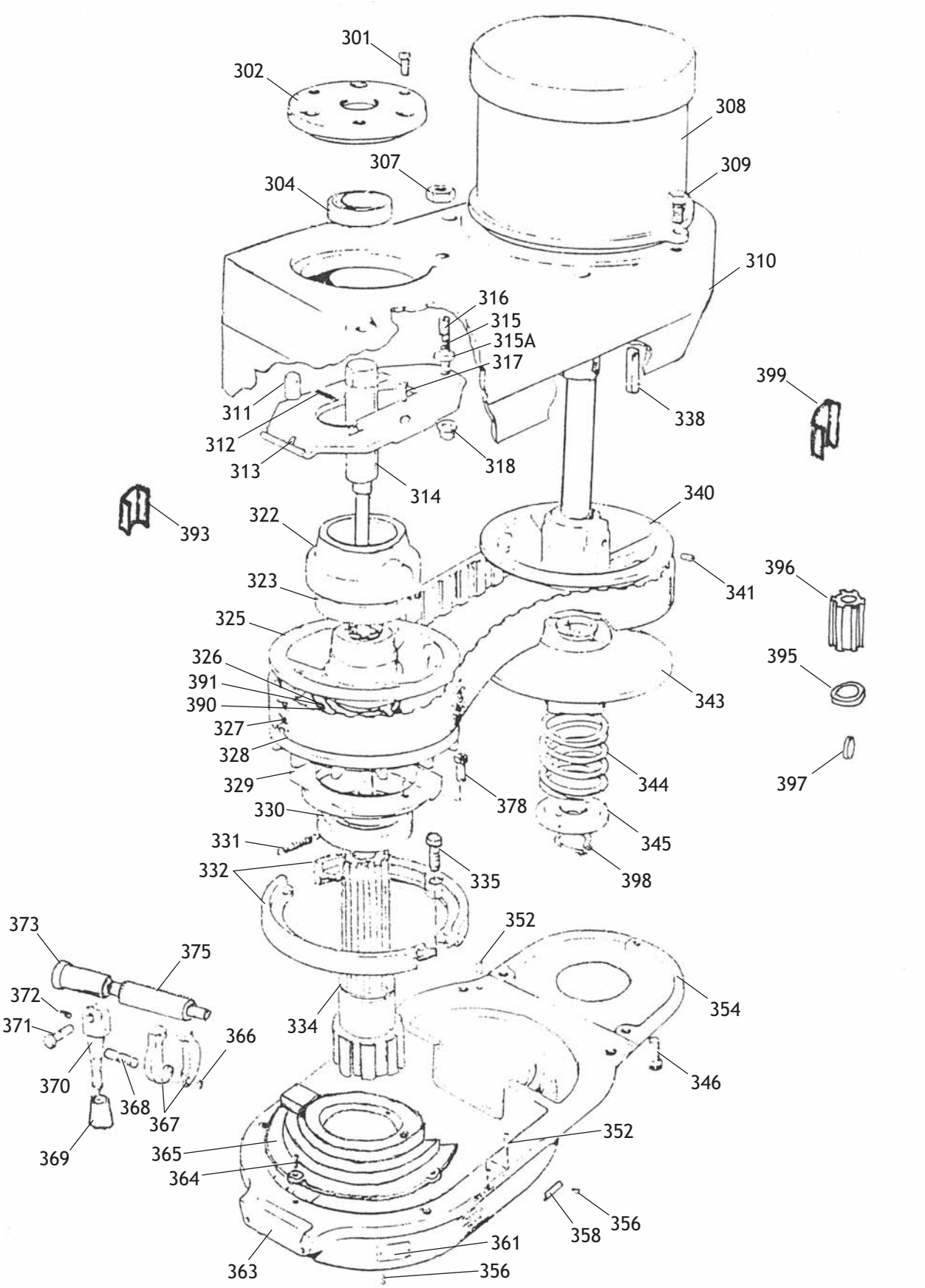
M1006 Table Assembly



REF	PART #	DESCRIPTION
201	XM1006201	ACORN NUT M16-2
201A	XM1006201A	ACORN NUT 1/2"-20
202	XM1006202	HANDLE
203	XM1006203	HANDLE BODY
204	XM1006204	KNURLED RING
205	XM1006205	DIAL
206	XM1006206	SLEEVE
207	XPSB11M	CAP SCREW M8-1.25 X 16
208	XM1006208	FLANGE
209	XM1006209	THRUST BEARING 160204
210	XM1006210	ADJUSTING SPACER
211	XM1006211	ADJUSTING SPACER
212	XPSB61M	CAP SCREW M10-1.5 X 20
213	XM1006213	LEFT BRACKET
214	XPK31M	KEY 4 X 4 X 30
215	XM1006215	LEAD SCREW
216	XM1006216	REGULATING SCREW
217	XM1006217	LEAD SCREW NUT
218	XM1006218	LEAD SCREW NUT
219	XPK12M	KEY 5 X 5 X 30
220	XM1006220	INT THREAD TAPER PIN 8 X 30

REF	PART #	DESCRIPTION
221	XPSS14M	SET SCREW M8-1.25 X 12
222	XM1006222	LEAD SCREW HOUSING
223	XM1006223	LEAD SCREW
224	XM1006224	KEY
225	XPS07M	PHLP HD SCR M4-.7 X 8
226	XM1006226	BEARING BRACKET
227	XPSB90M	CAP SCREW M10-1.5 X 55
228	XM1006228	SLEEVE
230	XM1006230	BEARING RETAINER RING
231	XPSB100M	CAP SCREW M8-1.25 X 15
232	XM1006232	DIAL
233	XM1006233	KNURLED RING
234	XM1006234	HANDLE BODY
235	XM1006235	RIGHT BRACKET
236	XP204	BALL BEARING 204ZZ
237	XM1006237	ADJUSTING SPACER
238	XM1006238	SLEEVE
240	XM1006240	LEADSCREW NUT
241	XM1006241	LEADSCREW NUT
242	XM1006242	POWERFEED ASSEMBLY

M1006 Upper Head Assembly

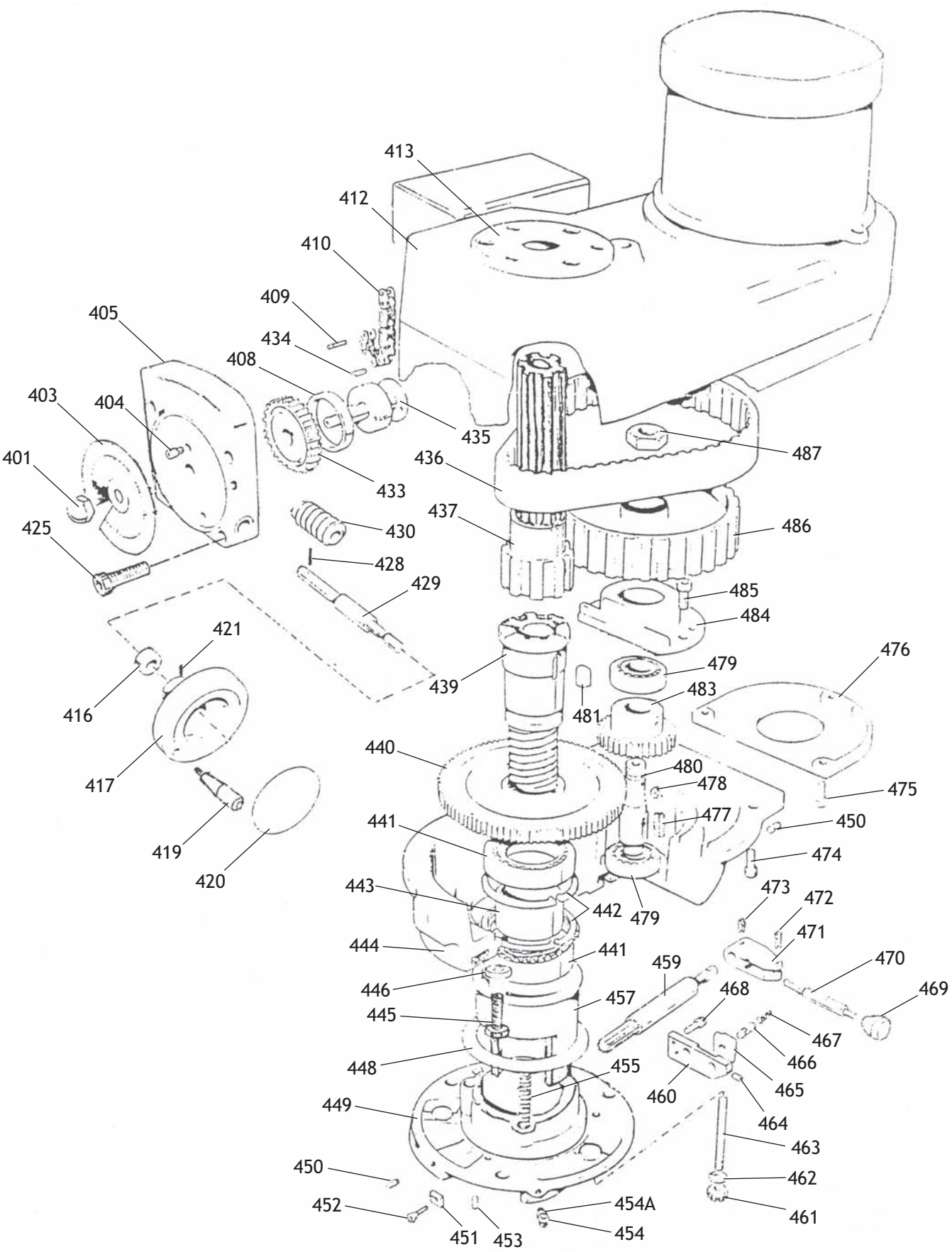


PARTS

REF	PART #	DESCRIPTION
301	XPSB01M	CAP SCREW M6-1 X 16
302	XM1006302	BEARING CAP
304	XP6007	BALL BEARING 6007
307	XPN02M	HEX NUT M10-1.5
308	XM1006308	MOTOR
309	XPB32M	HEX BOLT M10-1.5 X 25
310	XM1006310	UPPER HOUSING
311	XM1006311	SHAFT
312	XM1006312	ROLL PIN 4 GA X 25
313	XM1006313	CLAMPING PLATE
314	XM1006314	DRAWBAR
315	XM1006315	COTTER PIN 3 X 20
315A	XPW01M	FLAT WASHER 8MM
316	XM1006316	SHAFT
317	XPSB39M	CAP SCREW M4-.7 X 20
318	XPLN03M	LOCK NUT M6-1
322	XM1006322	BEARING SLIDING HOUSING
323	XM1006323	BALL BEARING 180112
325	XM1006325	PULLEY
326	XPR23M	INT RETAINING RING 40MM
327	XM1006327	STEPLESS VARIABLE BELT 2J668
328	XM1006328	PULLEY
329	XM1006329	BEARING CAP
330	XM1006330	BALL BEARING 180110
331	XM1006331	BRAKE SPRING
332	XM1006332	BRAKE SHOES
334	XM1006334	UPPER COUPLING SHAFT
335	XPSB74M	CAP SCREW M6-1 X 18
338	XPK90M	KEY 10 X 10 X 25
340	XM1006340	PULLEY
341	XPSS01M	SET SCREW M6-1 X 10

REF	PART #	DESCRIPTION
343	XM1006343	PULLEY
344	XM1006344	COMPRESSION SPRING
345	XM1006345	SPRING COLLAR
346	XPSB02M	CAP SCREW M6-1 X 20
352	XM1006352	TAPER PIN 8 X 25
354	XM1006354	LOWER COVER
356	XM1006356	RIVET 2 X 5
358	XM1006358	LABEL
361	XM1006361	LABEL
363	XM1006363	LOWER HOUSING
364	XPSB14M	CAP SCREW M8-1.25 X 20
365	XM1006365	COVER PLATE
366	XPR04M	EXT RETAINING RING 6MM
367	XM1006367	BRAKE OPERATING FINGER
368	XM1006368	SHAFT
369	XM1006369	KNOB M8-1.25
370	XM1006370	HANDLE ROD
371	XM1006371	FLANGED PIN
372	XPSS26M	SET SCREW M5-.8 X 6
373	XM1006373	SLEEVE
375	XM1006375	CAM
378	XPSB02M	CAP SCREW M6-1 X 20
390	XPLW06M	LOCK WASHER 10MM
391	XM1006391	FLAT WASHER
393	XM1006393	SPLINE SLEEVE
395	XPW21M	FLAT WASHER 32MM
396	XM1006396	MOTOR SPLINE SLEEVE
397	XM1006397	KEY 6 X 6 X 70
398	XM1006398	SPECIAL EXT RETAINING RING
399	XM1006399	SPLINE SLEEVE

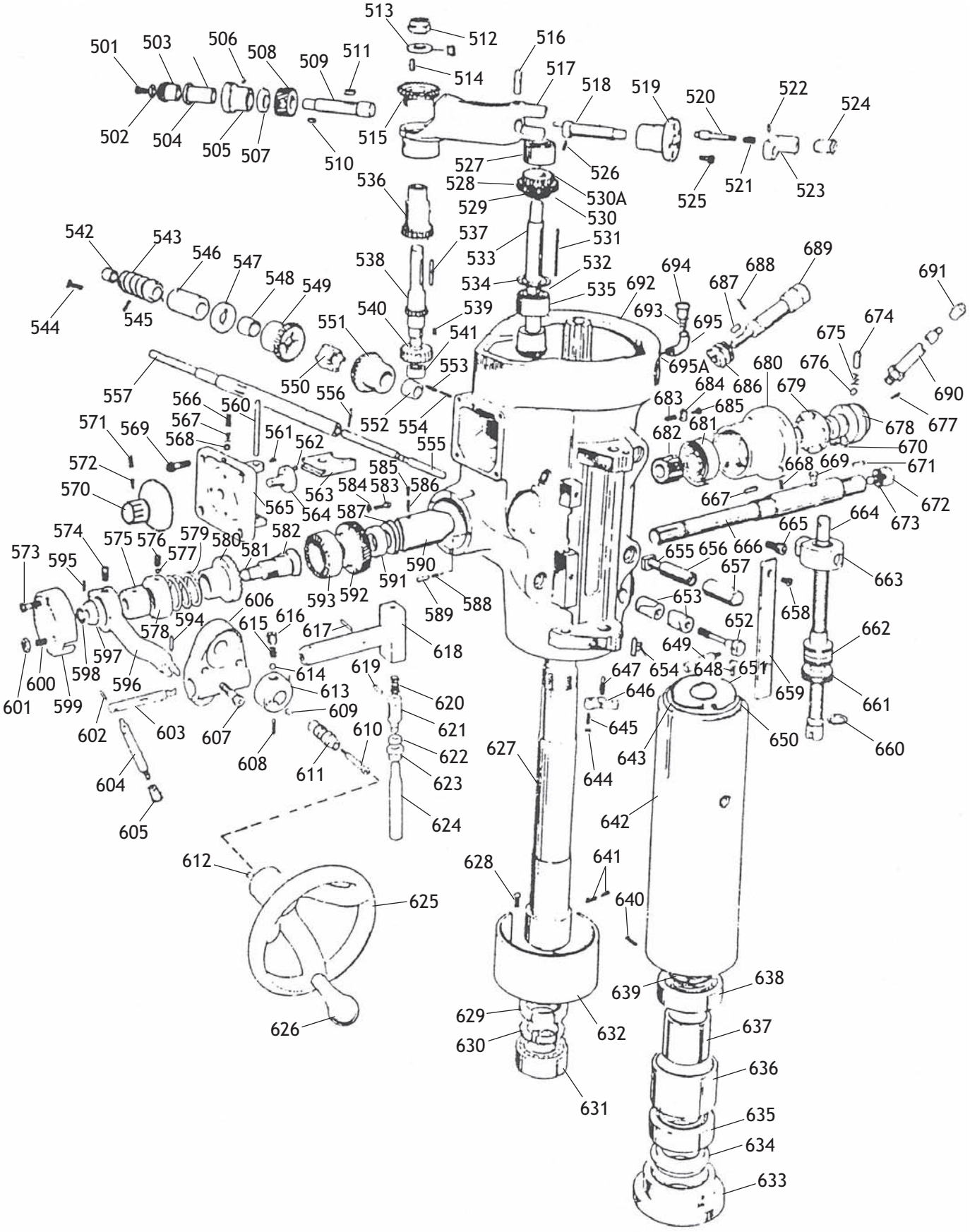
M1006 Lower Head Assembly



REF	PART #	DESCRIPTION
401	XPN03M	HEX NUT M8-1.25
403	XM1006403	60HZ DIAL
404	XPSS04M	SET SCREW M6-1 X 12
405	XM1006405	HOUSING
408	XM1006408	BUSHING
409	XM1006409	ROLL PIN 3 GA X 24
410	XM1006410	SPEED CHANGE CHN 1/8" X 1/2"
412	XM1006412	UPPER HOUSING
413	XM1006413	BEARING CAP
416	XM1006416	BUSHING
417	XM1006417	HANDWHEEL
419	XM1006419	HANDLE
420	XM1006420	CAUTION PLATE
421	XPSS26M	SET SCREW M5-.8 X 6
425	XPSB29M	CAP SCREW M6-1 X 40
428	XM1006428	TAPER PIN 3 X 12
429	XM1006429	SHAFT
430	XM1006430	WORM
433	XM1006433	BEVEL GEAR 32T
434	XPK03M	KEY 3 X 3 X 8
435	XM1006435	SHAFT
436	XM1006436	SYNCHRO TIMING BELT
437	XM1006437	UPPER COUPLING SHAFT
439	XM1006439	LOWER COUPLING SHAFT
440	XM1006440	BULL GEAR 77T
441	XP6008	BALL BEARING 6008
442	XPR70M	INT RETAINING RING 68MM
443	XM1006443	SPACER
444	XM1006444	LOWER HOUSING
445	XM1006445	T-BOLT M10-1.5
446	XPW04M	FLAT WASHER 10MM
448	XM1006448	SPRING SHIM
449	XM1006449	FLANGE
450	XM1006450	OIL CAP M6
451	XM1006451	GUIDE

REF	PART #	DESCRIPTION
452	XPSB18M	CAP SCREW M4-.7 X 8
453	XM1006453	DRIP PIPE
454	XM1006454	OIL CUP 1
454A	XM1006454A	OIL PIPE ADAPTER
455	XM1006455	COMPRESSION SPRING
457	XM1006457	GEAR SLEEVE
459	XM1006459	GEAR SHAFT
460	XM1006460	DETENT PLATE
461	XPN09M	HEX NUT M12-1.75
462	XPW06M	FLAT WASHER 12MM
463	XM1006463	STUD M12-1.75 X 80
464	XPSS12M	SET SCREW M6-1 X 25
465	XM1006465	SET BLOCK
466	XM1006466	SET PIN
467	XM1006467	COMPRESSION SPRING
468	XPSB33M	CAP SCREW M5-.8 X 12
469	XM1006469	KNOB M8-1.25
470	XM1006470	HANDLE SHAFT
471	XM1006471	HANDLE HUB
472	XM1006472	ROLL PIN 3 GA X 16
473	XPRP02M	ROLL PIN 3 X 16
474	XPSB61M	CAP SCREW M10-1.5 X 20
475	XPSB02M	CAP SCREW M6-1 X 20
476	XM1006476	LOWER COVER
477	XPK07M	KEY 6 X 6 X 20
478	XM1006478	WOODRUFF KEY 5 X 16
479	XP6203	BALL BEARING 6203ZZ
480	XM1006480	PINION SHAFT
481	XM1006481	KEY 4 X 8 X 7
483	XM1006483	PINION GEAR
484	XM1006484	BEARING CAP
485	XPSB24M	CAP SCREW M5-.8 X 16
486	XM1006486	SYNCHRO TIMING PULLEY
487	XM1006487	HEX NUT M16 X 1.5

M1006 Spindle Housing Assembly



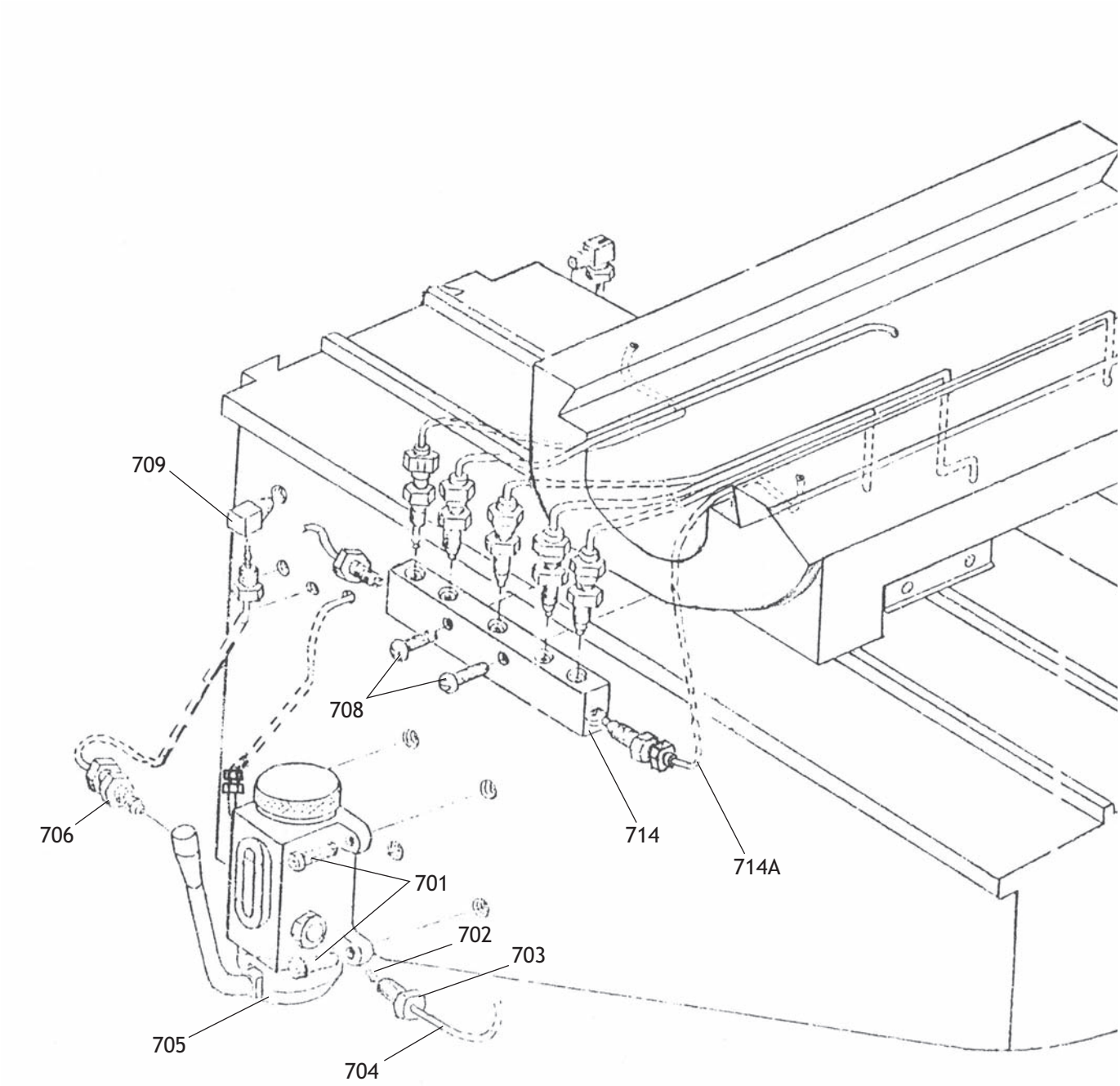
REF	PART #	DESCRIPTION
501	XPB135M	HEX BOLT M4-.7 X 8
502	XPLW02M	LOCK WASHER 4MM
503	XM1006503	BEVEL GEAR
504	XM1006504	SLEEVE
505	XM1006505	SLEEVE
506	XPSS31M	SET SCREW M5-.8 X 8
507	XM1006507	WORM GEAR SPACER
508	XM1006508	WORM GEAR 20T
509	XM1006509	SHAFT
510	XPK103M	KEY 3 X 3 X 12
511	XPK98M	KEY 3 X 3 X 16
512	XPN03M	HEX NUT M8-1.25
513	XPW01M	FLAT WASHER 8MM
514	XM1006514	FLAT KEY 3 X 12
515	XM1006515	BEVEL GEAR 24T
516	XM1006516	FEED ENGAGE PIN
517	XM1006517	WORM GEAR SUPPORT
518	XM1006518	SHAFT
519	XM1006519	FLANGE
520	XM1006520	PLUNGER
521	XM1006521	COMPRESSION SPRING
522	XM1006522	TAPER PIN 3 X 20
523	XM1006523	SHIFTER CRANK
524	XM1006524	KNOB M6-1
525	XPSB33M	CAP SCREW M5-.8 X 12
526	XPSS03M	SET SCREW M6-1 X 8
527	XM1006527	BUSHING
528	XM1006528	GEAR 28T
529	XM1006529	GEAR 17T
530	XM1006530	GEAR 22T
530A	XPSS47M	SET SCREW M3-.5 X 10
531	XM1006531	KEY 3 X 3 X 40
532	XPSS03M	SET SCREW M6-1 X 8
533	XM1006533	BEVEL GEAR SHAFT
534	XM1006534	INT RETAINING RING 14MM
535	XM1006535	BUSHING
536	XM1006536	GEAR 18T
537	XPK96M	KEY 3 X 3 X 20
538	XM1006538	GEAR SHAFT
539	XPK03M	KEY 3 X 3 X 8
540	XM1006540	GEAR 23T
541	XM1006541	BUSHING
542	XM1006542	BUSHING
543	XM1006543	WORM
544	XM1006544	SPECIAL SCREW M14-2 X 20
545	XPRP02M	ROLL PIN 3 X 16
546	XM1006546	BUSHING
547	XM1006547	SPACER
548	XM1006548	SLEEVE
549	XM1006549	BEVEL GEAR 24T

REF	PART #	DESCRIPTION
550	XM1006550	REVERSE CLUTCH
551	XM1006551	BEVEL GEAR 24T
552	XM1006552	SLEEVE
553	XPSS01M	SET SCREW M6-1 X 10
554	XPSS03M	SET SCREW M6-1 X 8
555	XM1006555	SLIDE ROD
556	XPRP43M	ROLL PIN 3 X 22
557	XM1006557	HOLLOW SHAFT
560	XM1006560	SMALL SHAFT
561	XPSS26M	SET SCREW M5-.8 X 6
562	XM1006562	PIN
563	XM1006563	SLIDE
564	XM1006564	ECCENTRIC WHEEL
565	XM1006565	CLUSTER GEAR COVER
566	XM1006566	SCREW M8-1.25 X 18
567	XM1006567	COMPRESSION SPRING
568	XM1006568	STEEL BALL 3/16"
569	XPSB24M	CAP SCREW M5-.8 X 16
570	XM1006570	DIAL
571	XPSS26M	SET SCREW M5-.8 X 6
572	XPSS26M	SET SCREW M5-.8 X 6
573	XPSB78M	CAP SCREW M5-.8 X 40
574	XM1006574	THREAD PIN
575	XM1006575	SLEEVE
576	XPSS03M	SET SCREW M6-1 X 8
577	XM1006577	PLUG 4 X 2
578	XM1006578	COLLAR
579	XM1006579	COMPRESSION SPRING
580	XM1006580	CLUTCH
581	XM1006581	COUPLING SHAFT
582	XM1006582	KEY 14 X 5 X 8.5
583	XPS56M	PHLP HD SCR M4-.7 X 16
584	XPLW02M	LOCK WASHER 4MM
585	XPSS04M	SET SCREW M6-1 X 12
586	XPSS04M	SET SCREW M6-1 X 12
587	XM1006587	REGULATING WASHER
588	XM1006588	COMPRESSION SPRING
589	XM1006589	STOP PIN 6 X 28
590	XM1006590	SLEEVE
591	XP8102	THRUST BEARING 8102
592	XM1006592	FEED WORM GEAR
593	XM1006593	CLUTCH
594	XM1006594	ROLL PIN 5 GA X 16
595	XM1006595	ROLL PIN 4 GA X 20
596	XM1006596	CONNECTING ROD
597	XM1006597	FLAT WASHER 22MM
598	XPR01M	EXT RETAINING RING 10MM
599	XM1006599	COVER
600	XPSS64M	SET SCREW M6-1 X 15

REF	PART #	DESCRIPTION
601	XPN01M	HEX NUT M6-1
602	XM1006602	ROLL PIN 5 GA X 20
603	XM1006603	DRAWBAR
604	XM1006604	HANDLE SHAFT
605	XM1006605	KNOB M8-1.25
606	XM1006606	BRACKET
607	XPSB27M	CAP SCREW M6-1 X 14
608	XPSS03M	SET SCREW M6-1 X 8
609	XPK29M	KEY 4 X 4 X 8
610	XM1006610	FEED REVERSE STUD
611	XM1006611	FEED REVERSE HANDLE
612	XM1006612	ROLL PIN
613	XM1006613	LOCK COLLAR
614	XM1006567	STEEL BALL 3/16"
615	XM1006568	COMPRESSION SPRING
616	XPSS16M	SET SCREW M8-1.25 X 10
617	XM1006617	ROLL PIN 4 GA X 16
618	XM1006618	T-ROD
619	XM1006619	ROLL PIN
620	XM1006620	COMPRESSION SPRING
621	XM1006621	SHAFT
622	XM1006622	SLEEVE
623	XM1006623	SLEEVE
624	XM1006624	PLUNGER
625	XM1006625	HANDWHEEL
626	XM1006626	HANDLE
627	XM1006627	SPINDLE
628	XPSB33M	CAP SCREW M5-.8 X 12
629	XM1006629	LOCK NUT M16
630	XM1006630	LOCK NUT M16
631	XP206	BALL BEARING 206ZZ
632	XM1006632	QUILL SKIRT
633	XM1006633	NOSE PIECE
634	XM1006634	SPINDLE DIRT SHIELD
635	XM1006635	THRUST BEARING 46108
636	XM1006636	BEARING SLEEVE
637	XM1006637	BEARING SLEEVE
638	XM1006638	THRUST BEARING 46108
639	XM1006639	LOCATING NUT
640	XPSS26M	SET SCREW M5-.8 X 6
641	XPSS26M	SET SCREW M5-.8 X 6
642	XM1006642	QUILL
643	XM1006643	OIL SEALER
644	XPN07M	HEX NUT M3-.5
645	XM1006645	SET SCREW M3-.5 X 14
646	XM1006646	FORKED ROD
647	XM1006647	THREAD PIN
648	XPS07M	PHLP HD SCR M4-.7 X 8

REF	PART #	DESCRIPTION
649	XM1006649	HANDLE
650	XM1006650	RETAINING PLATE
651	XPR63M	INT RETAINING RING 65MM
652	XM1006652	QUILL LOCK BOLT M8-1.25 X 70
653	XM1006653	LOCK SLEEVE TAPPED
654	XM1006654	INDICATOR ROD
655	XM1006655	T-BOLT M12-1.75 X 175
656	XM1006656	THREADED SLEEVE
657	XM1006657	THREADED SLEEVE
658	XPS17M	PHLP HD SCR M4-.7 X 6
659	XM1006659	SCALE
660	XPR05M	EXT RETAINING RING 15MM
661	XM1006661	KNURLED NUT
662	XM1006662	DIAL
663	XM1006663	DEPTH STOP
664	XM1006664	LEAD SCREW
665	XM1006665	ROLL SCREW 13.5 X 26
666	XM1006666	SHAFT
667	XPK34M	KEY 5 X 5 X 20
668	XPSS16M	SET SCREW M8-1.25 X 10
669	XM1006669	ROLL PIN
670	XM1006670	ROLL PIN 5 GA X 16
671	XPK34M	KEY 5 X 5 X 20
672	XPB136M	HEX BOLT M4-.7 X 16
673	XM1006673	STOP PLATE
674	XPSS59M	SET SCREW M8-1.25 X 14
675	XM1006567	COMPRESSION SPRING
676	XM1006568	STEEL BALL 3/16"
677	XPSS35M	SET SCREW M4-.7 X 14
678	XM1006678	HANDLE HUB
679	XM1006679	SLEEVE
680	XM1006680	SLEEVE
681	XM1006681	FLAT COILED SPRING
682	XM1006682	GEAR
683	XM1006683	LEVER
684	XM1006684	SHAFT
685	XM1006685	STUD 11.5 X 11.5
686	XM1006686	WORM
687	XPK37M	KEY 4 X 4 X 16
688	XPSS26M	SET SCREW M5-.8 X 6
689	XM1006689	SHAFT
690	XM1006690	HANDLE SHAFT
691	XM1006691	KNOB M8-1.25
692	XM1006692	HOUSING
693	XM1006693	OIL CUP ADAPTER
694	XM1006694	OIL CUP
695	XM1006695	TUBING
695A	XM1006695A	COTTON WIRE

M1006 Lubrication System



REF	PART #	DESCRIPTION		REF	PART #	DESCRIPTION
701	XPSB04M	CAP SCREW M6-1 X 10		706	XM1006706	METER UNIT
702	XM1006702	SLEEVE 4MM		708	XM1006708	PHLP HD SCR
703	XM1006703	SPECIAL BOLT M8-1.25 X 1		709	XM1006709	FITTING
704	XM1006704	NYLON TUBING 4MM		714	XM1006714	MULTI-WAY JUNCTION
705	XM1006705	LUBRICATING PUMP		714A	XM1006714A	BRONZES TUBING 4MM

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 or replace, at its expense and at its option, the **SHOP FOX®** machine or machine part which in normal use has proven to be defective, provided that the original owner returns the product prepaid to the **SHOP FOX®** factory service center or authorized repair facility designated by our Bellingham, WA 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 or acts. In no event shall Woodstock International, Inc.'s liability under this 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 reserve the right to change specifications at any time because of our commitment to continuously improve the quality of our products.

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 Const.
____ 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:_____

_____

_____

_____

_____

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

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