



Busy Bee Tools

BBMM31/ BBMM31PF HEAVY-DUTY MILLING MACHINE

User's Manual



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V1.0-2026

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This document specifies the mandatory safety requirements governing the installation, operation, maintenance, and servicing of this equipment. It shall be retained for reference and made readily accessible to all authorized personnel.

Failure to read, comprehend, and follow the instructions provided in this document may result in fire, serious bodily injury, amputation, electrical shock, or death.

The equipment owner bears full responsibility for ensuring safe operation. This responsibility includes, but is not limited to, proper installation in a compliant environment; verification of operator competency and training; implementation of routine inspection and maintenance programs; ensuring availability and understanding of this documentation; maintaining the correct selection and condition of cutting, sanding, or grinding accessories; confirming the functionality of all safety devices; and enforcing the use of appropriate personal protective equipment.

The manufacturer disclaims all responsibility for injury, loss, or damage arising from negligence, insufficient training, unauthorized modification, or improper use of the equipment.

Exposure to dust produced during power sanding, sawing, grinding, drilling, or similar construction activities may include substances recognized as carcinogenic or as causing reproductive harm. Notable examples of such hazardous materials include:

- Lead from lead-containing coatings and paints
- Crystalline silica from concrete, bricks, cement, and other masonry materials
- Arsenic and chromium from chemically treated lumber

The level of exposure risk is directly related to the frequency and duration of the activity. To reduce health hazards, perform tasks in a well-ventilated area and employ suitable respiratory protection specifically rated to filter fine particulate matter.



INTRODUCTION

We take great pride in introducing our model BBMM31 and BBMM31PF milling machines, which are a distinguished addition to the expanding Busy Bee Tools family of exceptional metalworking machinery. Adhering to the comprehensive guidelines outlined in this manual will ensure years of reliable and enjoyable performance in keeping with Busy Bee Tools' unwavering commitment to customer satisfaction.

We are delighted to provide you with this manual for the BBMM31 and BBMM31PF. It has been meticulously crafted to assist you in the assembly process, ensure safety compliance, and cover essential operational procedures. Our goal is to deliver comprehensive documentation possible to facilitate your experience.

The specifications, drawings, and photographs featured in this manual accurately depict the BBMM31 and BBMM31PF as it was configured when this manual was produced. Nevertheless, adjustments and enhancements may be implemented at any time, with no obligation on Busy Bee Tools' part.

In keeping with Busy Bee Tools' continuous improvement policy and to enhance your convenience, we maintain an up-to-date repository of Busy Bee Tools manuals on our website at www.busybeetools.com. Any updates or modifications to your machine will be promptly reflected in these manuals. We encourage you to visit our website regularly to access the latest revisions to this manual and to stay informed about your equipment's optimal operation. Your satisfaction and safety are our top priorities, and we are committed to ensuring that your experience with the BBMM31 and BBMM31PF milling machines are exceptional.

Should you require additional assistance or have further questions, please do not hesitate to contact our dedicated Customer Service and Technical Support Department at:

Email us at: cs@busybeetools.com

Call us Toll Free: 1-800-461-2879.

Busy Bee Tools Head Office

130 Great Gulf Drive

Concord ON, L4K 5W1

Or at any of our branches across Canada.

For more information visit our website www.busybeetools.com

Our team of experts is here to provide the guidance and support you need and ensure the safe and efficient operation of your machine. We are committed to assisting you in any way we can. Your satisfaction and safety are our top priorities.



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Machine Identification

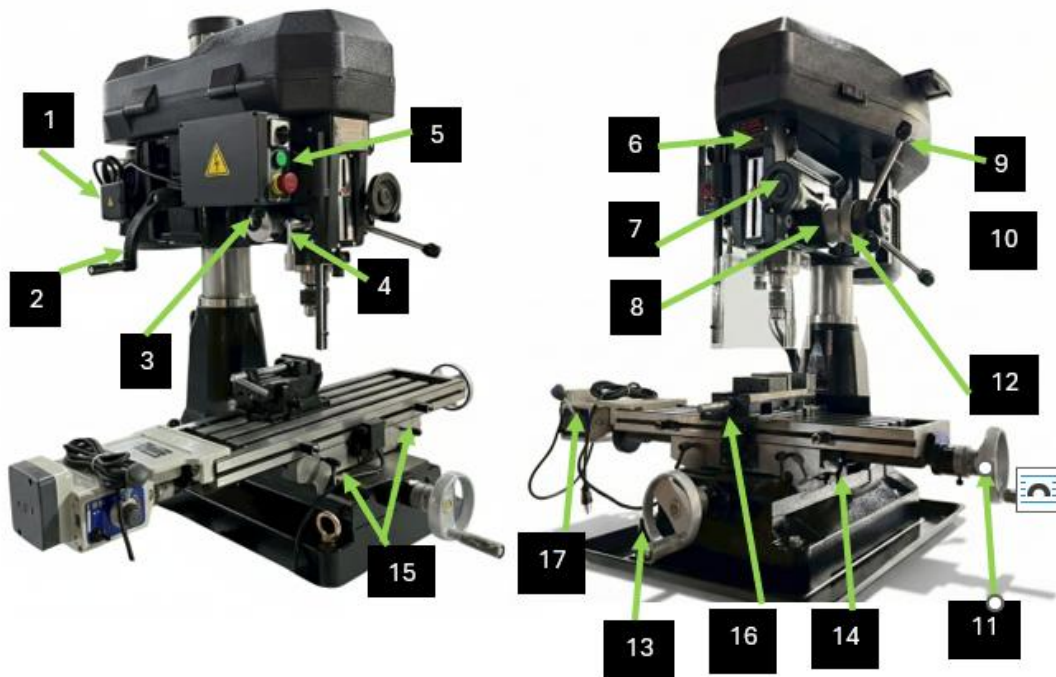
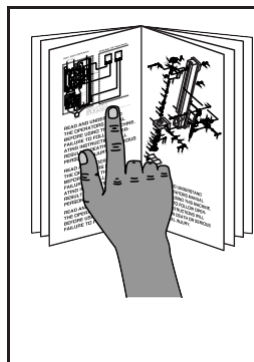


Figure 1: Machine Identification.

| | |
|--|---|
| <ol style="list-style-type: none"> 1. Electric Junction Box 2. Headstock Height Handle 3. Return Spring Assembly 4. Quill Lock 5. ON/OFF Switch | <ol style="list-style-type: none"> 6. Depth Stop 7. Micro-Adjustment Down feed 8. Motor Pivot Lock 9. Down Feed Handles 10. Pinion Hub Lock Knob 11. X-Axis Handwheel 12. Longitudinal Stop 13. Y-Axis Handwheel 14. X-Axis Lock Handle 15. Y-Axis Lock Handle 16. Drilling Angle Vise 17. Power Feed (BBMM31PF Only) |
|--|---|



To reduce the risk of serious injury when using this machine, read and understand this entire manual before beginning any operations.

Machine Specifications

Model BBMM31 2HP Mill/Drill

Measurements

- WeightG.W.547 lbs. N.W. 497 lbs.
- Width (side to side)X Depth (front to back)X Height50"X40"X48-1/2"
- Footprint24"X16"

Shipping Dimensions

- Type of packagingCarton with Pallet
- Gross Weight674 lbs.
- Length X width X Height28"X30"X46"

Electrical

- Minimum Circuit Size20 Amps at 220 V
- SwitchMagnetic switch with Thermal Overload Protection
- Cord Length6'
- Cord Gauge14 Gauge
- Plug includedYes

Main Motor

- TypeTEFC capacitor Start Induction
- Horsepower2HP
- Voltage220V
- PhaseSingle
- Amps11.5 Amps
- Speed1720 RPM
- Cycle60Hz
- Motor Speed1 Speed
- Power TransferBelt Drive
- BearingsShielded Permanently Lubricated

Machine Specifications

- Spindle Travel5"
- Swing15-7/8"
- Longitudinal Table Travel23-1/2"
- Cross Table Travel.....7"
- Ram Travel.....12"
- Head Travel5-1/4"
- Head Tilt (left to right)360°
- Maximum Distance Spindle to column8"
- Maximum Distance Spindel to Table18"
- Drilling Capacity for Cast Iron1-1/4"
- Drilling Capacity for Steel1-1/4"
- Number of Spindle Speeds12-Speed
- Range of Speeds..150, 225, 350, 400, 500, 850, 1200, 1500, 1600, 2300, 3000 RPM
- Quill Diameter2.95"

Table Measurements

- Table Length32"
- Table Width9-1/2"
- Table Thickness1-7/8"
- Number of T-Slots4
- T-Slot width0.625"



- T-Slot Height7/8"
- T-Slot center2-1/16"
- Stud Size1/2"

Spindle Specifications

- Spindle taperR-8
- End Milling Capacity3/4"
- Face milling Capacity3"
- Drawbar Diameter7/16"
- Drawbar TPI7/16-20
- Spindle BearingsTaper Roller

Leadscrew Specifications

- Leadscrew Diameter 15/16"
- Leadscrew TPI 10
- Leadscrew Length26"

Construction Material

- Spindle Housing/ QuillCast Iron
- Table.....Ground Cast Iron
- Head.....Cast Iron
- BaseCast Iron
- Paint.....Epoxy

Other Specifications

- Collar Graduations.....0.001"
- Column Diameter.....4-1/2"
- Optional Stand.....BBMILLSTAND
- Recommended Mobile Base.....BBMOBILS
- ISO Factory.....ISO 9001
- Country Of Origin.....Taiwan
- Warranty (LIMITED).....2 Year
- Serial Number Location.....Machine's Label on Head Casting
- Assembly Time (estimated).....1 hour

Machine's Features

- Clutch-Type Down feed Mechanism Graduations in Inches
- Exclusive Fine Down feed is Graduated in .001" and is Engaged by Clutch-Type Mechanism Heavy-Duty 12 Speed Tapered Roller Bearing Spindle
- Top Quality Workmanship Throughout
- Push Button Switch with Thermal Overload Protector

Included Accessories

1/2" Drill Chuck
 3" Angle Vise
 3" Face Mill



Model BBMM31PF Mill/Drill w/Variable Speed Power Feed

Measurements

- Weight.....G.W. 563 lbs. N.W. 508 lbs.
- Width (side to side)X Depth (front to back)X Height.....50”X40”X48-1/2”
- Footprint.....24”X16”

Shipping Dimensions

- Type of packaging.....Carton with Pallet
- Gross Weight.....674 lbs.
- Length X width X Height.....28”X30”X46”

Electrical

- Minimum Circuit Size.....20 Amps at 220 V
- Switch.....Magnetic switch with Thermal Overload Protection
- Cord Length.....6’
- Cord Gauge.....14 Gauge
- Plug included.....Yes

Main Motor

- Type.....TEFC capacitor Start Induction
- Horsepower.....2HP
- Voltage.....220V
- Phase.....Single
- Amps.....11.5 Amps
- Speed.....1720 RPM
- Cycle.....60Hz
- Motor Speed.....1
- Power Transfer.....Belt Drive
- Bearings.....Shielded Permanently Lubricated

Machine Specifications

- Spindle Travel.....5”
- Swing.....15-7/8”
- Longitudinal Table Travel.....23-1/2”
- Cross Table Travel.....7”
- Ram Travel.....12”
- Head Travel.....5-1/4”
- Head Tilt (left to right).....360°
- Maximum Distance Spindle to column.....8”
- Maximum Distance Spindel to Table.....18”
- Drilling Capacity for Cast Iron.....1-1/4”
- Drilling Capacity for Steel.....1-1/4”
- Number of Spindle Speeds.....12-Speed
- Range of Speeds.....150, 225, 350, 400, 500, 850, 1200, 1500, 1600, 2300, 3000 RPM
- Quill Diameter.....2.95”
- Number of Longitudinal Feeds (power feed).....Variable
- Power Feed Rate.....0-140 RPM

Table Measurements

- Table Length.....32”
- Table Width.....9-1/2”
- Table Thickness.....1-7/8”
- Number of T-Slots.....4
- T-Slot width.....0.625”
- T-Slot Height.....7/8”



- T-Slot center..... 2-1/16"
- Stud Size.....1/2"

Spindle Specifications

- Spindle taper.....R-8
- End Milling Capacity.....3/4"
- Face milling Capacity.....3"
- Drawbar Diameter.....7/16"
- Drawbar TPI.....7/16-20
- Spindle Bearings.....Taper Roller

Leadscrew Specifications

- Leadscrew Diameter.....15/16"
- Leadscrew TPI.....10
- Leadscrew Length.....26"

Construction Material

- Spindle Housing/ Quill.....Cast Iron
- Table.....Ground Cast Iron
- Head.....Cast Iron
- Base.....Cast Iron
- Paint.....Epoxy

Other Specifications

- Collar Graduations.....0.001"
- Column Diameter.....4-1/2"
- Optional Stand.....BBMILLSTAND
- Recommended Mobile Base.....BBMOBILS
- ISO Factory.....ISO 9001
- Country Of Origin.....Taiwan
- Warranty.....2 Year
- Serial Number Location.....Machine's Label on Head Casting
- Assembly Time (estimated).....1 hour

Features

- Clutch-type Down feed mechanism
- Graduations in Inches
- Fine Down feed graduated in 0.001" engaged by Clutch-type Mechanism
- Heavy Duty 12 Speed Tapered Roller Bearing Spindle
- Top Button Switch with Thermal Overload Protector
- Push Button Switch with Thermal Overload Protector
- Servo-Type Variable Speed Power Feed Table, Mounted on the Left.

Included Accessories

- 1/2" Drill Chuck
- 3" Angle Vise
- 3" Face Mill



Section 1: Safety

Instructions

WARNING: FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN SERIOUS PERSONAL INJURY

General Shop Safety instructions

Your safety is of utmost importance. Prior to starting the assembly of this machine, it is imperative that you thoroughly read the instruction manual.

Safety symbols

and signal words have been incorporated into this manual to draw your attention to potentially hazardous conditions and to convey the significance of the safety messages.

It is essential to remember that these safety messages alone cannot eliminate danger and should not replace the implementation of proper accident prevention measures.



(Minor or Moderate Injury): This symbol indicates a potentially hazardous situation that, if not avoided, MAY result in minor or moderate injury. It may also serve as a warning against unsafe practices.



(Death or Serious Injury): The warning symbol signifies a potentially hazardous situation that, if not avoided, COULD result in death or serious injury.



(Imminent Death or Serious Injury): The danger symbol is used to indicate an imminently hazardous situation that, if not avoided, WILL result in death or serious injury.

General Machine Safety Instructions

- 1- Thoroughly review the entire manual before operating machinery: It is crucial to read and understand the complete manual before commencing any machinery operations. machinery can pose serious injury hazards to individuals who lack proper training and familiarity with its operation.
- 2- Always utilize CSA Approved Safety Glasses During machinery operation: For your safety, it is imperative to wear safety glasses that meet CSA standards when using machinery. Conventional eyeglasses are not equipped with impact resistant lenses and should not be considered a substitute for proper safety glasses.
- 3- Always Wear a CSA Approved Respirator When operating dust-producing machinery: When operating machinery that generates dust, it is essential to wear a respirator that has been approved by CSA Wood dust is classified as a carcinogen and can lead to cancer and severe respiratory illnesses. Your respiratory protection is paramount to your health and safety.
- 4- Utilize Hearing Protection When Operating Machinery: Always wear hearing protection when operating machinery. Prolonged exposure to

machinery noise can result in permanent hearing damage and protecting your hearing is vital for your long-term well-being.

- 5- Adhere to proper apparel guidelines: Avoid wearing loose clothing, gloves, neckties, rings, or jewelry that could potentially become entangled in moving parts of the machinery. Additionally, wear a protective hair covering to confine long hair and ensure you have non-slip footwear to prevent accidents.
- 6- Do Not operate machinery When Fatigued, or Under the Influence of Substances: Never operate machinery when you are tired, or if you are under the influence of drugs or alcohol. It is crucial to be always mentally alert when running machinery to maintain your safety and the safety of those around you.
- 7- Authorize trained and supervised personnel only: Permit only individuals who have received proper training and supervision to operate machinery. Ensure that operational instructions are not only safe but also clearly understood by those using the equipment.
- 8- Keep children and visitors at a safe distance: Maintain a safe distance between all children and visitors and the work area where machinery is in use.
- 9- Secure your workshop for child safety: Take measures to childproof your workshop, including the use of padlocks, master switches, and the removal of start switch keys to prevent unauthorized use by children.
- 10- Never leave machinery running unattended: It is essential never to

leave machinery unattended while it is

- 11- still running. Turn off the power and allow all moving parts to come to a complete stop before leaving the machine unattended.
- 12- Avoid dangerous environments: Refrain from using machinery in locations that are damp, wet, or where flammable or noxious fumes may be present. Always ensure a safe operating environment.
- 13- Maintain a clean and well-lit work area: Keep your work area clean and well-lit to prevent accidents. Clutter and dark shadows can pose significant safety risks.
- 14- Use properly rated extension cords: When necessary, use a grounded extension cord rated for the amperage of the machine. Undersized cords can overheat and lose power. Replace damaged extension cords promptly. Do not use extension cords with 220V machinery.
- 15- Disconnect from power source before servicing: Always disconnect the machinery from the power source before servicing it. Ensure the switch is in the OFF position before reconnecting.
- 16- Maintain machinery with care: To ensure the best and safest performance, maintain your machinery with care. Keep blades sharp and clean and follow the manufacturer's instructions for lubrication and changing accessories.
- 17- Verify guards are in place and functional: Before using machinery, confirm that all safety guards are in place and functioning correctly.



- Never operate machinery if guards are missing or not working as intended. Your safety relies on the proper functioning of these guards.
- 18- Remove adjusting keys and wrenches: Prior to turning on the machinery, it's essential to cultivate the habit of checking for adjusting keys and wrenches and ensuring they are removed. Leaving such tools in place can result in accidents.
 - 19- Inspect for damaged parts before use: Before using the machinery, conduct a thorough inspection for damaged parts. Check for any issues such as binding or misalignment of parts, broken components, improperly mounted parts, loose bolts, or any other conditions that might impact the safe operation of the machine. Any damaged parts should be promptly repaired or replaced.
 - 20- Utilize recommended accessories: Consult the instruction manual to identify the recommended accessories for your machinery. Using improper accessories can pose a risk of injury, so it's essential to adhere to the manufacturer's recommendations.
 - 21- Avoid forcing machinery: Operate the machinery at the speed for which it was designed and avoid forcing it beyond its intended capabilities.
 - 22- Secure the workpiece: Whenever possible, use clamps or a vise to secure the workpiece. A properly secured workpiece not only protects your hands but also allows you to use both hands to operate the machine safely.
 - 23- Avoid overreaching: always maintain proper footing and balance.

- Overreaching can compromise your stability and pose a risk of accidents.
- 24- Beware of workpiece ejection: Be aware that certain machines may eject the workpiece toward the operator. Take precautions and avoid conditions that could lead to workpiece "kickback."
 - 25- Lock mobile bases (If Used) Before Operation: If your machinery is equipped with mobile bases, ensure they are locked securely before operating the equipment. This prevents unintended movement during use.
 - 26- Understand dust hazards: Recognize that some dust types can be hazardous to respiratory systems, both for people and animals, particularly fine dust particles. Familiarize yourself with the hazards associated with the specific type of dust you will be exposed to and always wear a respirator approved for that specific type of dust to protect your respiratory health.

Milling Machine Safety Instructions

Entanglement with rotating cutters or the spindle can result in severe injury or fatality. Contact with rotating tools may cause deep lacerations or amputation, and ejected tooling, chips, or workpieces may cause eye or bodily injury. Strictly comply with the following requirements to minimize risk.

- 1- Understand all controls: Verify familiarity with the function, location, and operation of all machine controls before startup.



- 2- Confirm the ability to stop the machine immediately in an emergency.
- 3- Avoid entanglement hazards: Do not wear loose clothing, gloves, or jewelry; secure long hair.
- 4- Ensure all guards and protective covers are installed and secured.
- 5- Allow the spindle to coast to a complete stop; never attempt to stop rotation manually or with external objects.
- 6- Wear appropriate eye and face protection: Use approved safety glasses at all times. Wear a face shield in addition to safety glasses to provide full facial protection from chips and fragments.
- 7- Use correct spindle speeds and feeds: Apply manufacturer-recommended parameters for tool type, diameter, and material. Improper settings increase likelihood of tool breakage and ejection.
- 8- Inspect cutting tools prior to use: Check for wear, cracks, or chipping before installation. Replace defective tools immediately; do not attempt reuse.
- 9- Secure tooling properly: Install and tighten cutters or drill bits according to specification. Verify retention before spindle engagement.
- 10- Prepare for power disruptions: In the event of power loss, switch controls
- 11- to the OFF position. This prevents unintended startup when power is restored.
- 12- Clean the machine safely: Chips and swarf may be sharp; never remove by hand or with compressed air.
- 13- Use a brush or vacuum system only after spindle motion has ceased.
- 14- Secure the workpiece: Clamp to the table or hold in a machine vise to prevent shifting or rotation.
- 15- Never hold material by hand during machining operations.**
- 16- Maintain machine condition: Conduct routine inspections and maintenance to ensure mechanical integrity and proper guard function.
- 17- Do not operate equipment with worn, damaged, or missing components.
- 18- Disconnect power before servicing: Turn the machine OFF, isolate from electrical supply, and confirm complete stoppage before adjustments, tool changes, or maintenance.
- 19- Remove spindle keys and setup tools: Remove chuck keys, drawbar wrenches, and similar tools immediately after use. Failure to do so may result in tool projection upon startup.

These instructions shall be retained with the machine documentation and communicated to all authorized operators prior to use.



Section 2: Power Supply and Electrical Safety

Electrical Supply and Circuit Requirements

Prior to machine installation, evaluate the accessibility and capacity of the intended electrical supply circuit. Confirm that the existing circuit meets the machine's specified voltage and current demands. If the available circuit is inadequate, a compliant circuit must be installed. To reduce the risk of electrical shock, fire, or equipment damage, all electrical installation and wiring activities shall be performed by a licensed electrician or qualified service personnel in accordance with applicable local codes and recognized standards. Improper grounding or connection to the supply network may result in electrocution, fire, or damage to the machine.

The full-load current rating represents the current drawn when the machine operates at its rated output capacity. For equipment incorporating multiple motors, this value reflects the demand of the largest motor or the combined load of components expected to operate simultaneously under normal conditions. For this machine, the full-load current at 220 V is 8.6 Amp. This value does not represent the maximum possible current draw; overload conditions may increase amperage beyond the rated level. Sustained overloading—particularly when connected to an undersized circuit—may cause overheating, component failure, or fire. To mitigate these risks, avoid operating beyond rated capacity and ensure the power circuit complies with the requirements specified below.

This machine is factory-configured for connection to a 220 V supply with verified grounding and shall be connected to a circuit meeting the following criteria:

- Nominal Voltage: 220 / 230 / 240 V
- Frequency: 60 Hz
- Phase: Single-phase
- Minimum Circuit Capacity: 15 Amp
- Plug/Receptacle Type: NEMA 6-15
- Start capacitor 400MFD 125VAC

If uncertainty exists regarding electrical practices or regulatory requirements applicable to the installation location, consultation with a qualified electrician is required for personnel and property protection. These circuit specifications apply to a dedicated branch circuit intended to supply a single machine. Where connection to a shared circuit is anticipated, a qualified electrician must confirm that circuit capacity is sufficient to support concurrent loads while maintaining safe operation.

Grounding Instructions

This machine should be connected to an effective protective ground. Proper grounding provides a low-resistance path for fault current and reduces the likelihood of electric shock in the event of malfunction or electrical failure.

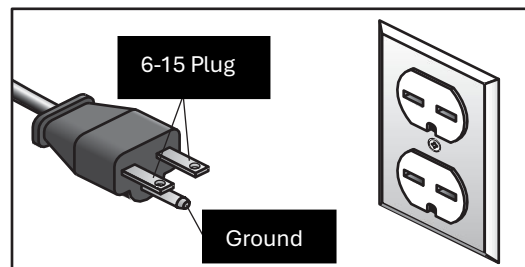


Figure 2: receptacle and plug 220V- 15Amp.

Incorrect termination of the equipment grounding conductor may create a shock

hazard. The conductor identified by green insulation, with or without yellow striping, is designated for grounding purposes only. If service or replacement of the supply cord or plug is required, this conductor shall not be connected to any energized terminal. Where grounding requirements are not fully understood, or verification of proper grounding is uncertain, consult a qualified electrician or authorized service personnel. Any damaged or deteriorated cord or plug shall be disconnected from the power source immediately and replaced before further use.

Connection of the machine to electrical power prior to completion of installation and setup procedures may result in serious injury. Electrical connection shall only be performed when specifically instructed within the installation sequence.

The power cord and plug specified in the circuit requirements incorporate an equipment grounding conductor and grounding prong. The plug shall be inserted only into a compatible receptacle that is correctly installed and grounded in accordance with applicable electrical codes and regulations. Use of adapters or modification of the plug is prohibited. If the supplied plug is incompatible with the available receptacle, or if reconnection to an alternative circuit configuration is required,

Section 3: Assembly and Setup

Unpacking and Inspection Instructions

This machine has been carefully packaged to ensure safe transport. Upon receipt, remove all components from the packaging

all modifications shall be carried out by a qualified electrician in compliance with applicable codes and standards.

Extension Cord Guidelines: Use of an extension cord with this machine is not recommended. Extension cords should only be employed when absolutely necessary and for temporary use.

Extended cords may cause a voltage drop, which can lead to premature wear of electrical components and reduce motor lifespan. Voltage drop increases with longer cord lengths and smaller conductor sizes (higher AWG numbers correspond to smaller wire diameters).

If an extension cord must be used, it shall:

- Include a grounding conductor.
- Be compatible with the machine's plug and receptacle.
- Meet the following specifications:

Minimum Wire Gauge: 14 AWG

Maximum Length: 50 ft (shorter is preferable to minimize voltage drop)

Permanent or long-term operation with an extension cord is not permitted; a properly rated dedicated circuit should be installed for safe operation.

and inspect each item for shipping damage. If any damage is detected, contact Busy Bee Tools immediately.

Important: Retain all original packaging until you are fully satisfied with the machine and any issues with the manufacturer or shipping carrier have been resolved. Original packaging is required to file a



freight claim, and it is also necessary if the machine must be returned in the future.

Additional Items Required for Setup (Not Included):

| Description | Qty. |
|--------------------------------|--------------|
| Additional personnel | 1 |
| Safety glasses | 1 per person |
| Cleaner/Degreaser | As needed |
| Disposable shop rags | As needed |
| Forklift | 1 |
| Lifting strap (rated 1000 lb.) | 1 |
| Mounting hardware | As needed |
| Flat-head screwdriver #2 | 1 |
| Brass hammer | 1 |
| Mineral spirits | As needed |

Follow these instructions carefully to ensure safe handling and preparation for machine setup.

Inventory

Before beginning machine setup, remove all shipped items from the packaging and verify that all components are present. Lay out the items and perform a complete inventory.

If any non-proprietary parts (e.g., nuts, washers) are missing, replacements can be obtained from a local hardware store or requested from Busy Bee Tools for immediate replacement.

Box 1: BBMM31 and BBMM31PF

| | |
|---------------------------------------|---|
| 1- Drilling Angle Vise..... | 1 |
| 2- Drill Chuck | 1 |
| 3- R8 Arbor | 1 |
| 4- Feed Levers with Knobs | 3 |
| 5- Plastic Handwheels w/Handles | 3 |
| 6- Lug Wrench 23mm | 1 |
| 7- Head Crank w/Handle | 1 |
| 8- Cap Screw M10-1.5 x 25..... | 1 |
| 9- Fender Washer 10mm (Fly Cutter)... | 1 |
| 10- Fly Cutter | 1 |

Box 1: BBMM31PF ONLY:

Power Feed



Figure 3: Box 1 Accessories.

| | |
|--|---|
| Cap Screws ¼-20 x 1-½ (End Stops)..... | 2 |
| Flat Washers ¼" (End Stops) | 2 |
| End Stops | 2 |
| End Stop Clamp Plates | 2 |
| Hex Bolts M8-1.25 x 25 (Power Feed) | 2 |
| Lock Washers 8mm (Power Feed) | 2 |
| Flange Bushings 8mm (Power Feed) | 2 |
| Power feed Mounting Bracket | 1 |
| Hex Bolts w/Tapered Tip M8-1.25 x 25 (Power Feed)..... | 2 |
| Gear Cover | 1 |
| Limit Switch Plate | 1 |
| Cap Screws M8-1.25 x 12 (Stop Bracket) 4 | |
| Flat Washers 8mm (Stop Bracket) | 2 |
| Power feed Unit (Not Shown) | 1 |



Figure 4: Power Feeder (BBMM31PF only).

Confirm all items are accounted for before proceeding with assembly to ensure proper installation and operation.

Machine Cleanup Instructions

The unpainted surfaces of this machine are coated with a heavy-duty rust preventative to protect against corrosion during shipping and storage. While highly effective, this coating requires careful cleaning before use. Thorough cleaning at this stage ensures proper maintenance and prolongs the life of all unpainted components.

Precautions:

- Always follow the manufacturer's instructions for any cleaning products used.
- Work in a well-ventilated area to minimize exposure to fumes.
- Wear safety glasses and disposable gloves during the cleaning process.

Required Materials:

- Disposable rags
- Cleaner/degreaser (e.g., WD-40)
- Safety glasses and disposable gloves
- Plastic paint scraper (optional)

Cleaning Procedure:

- 1- Put on safety glasses and gloves.
- 2- Apply a liberal amount of cleaner/degreaser to the rust preventative and allow it to soak for 5–10 minutes.
- 3- Wipe the surfaces with a rag. If necessary, use a plastic paint scraper to remove thicker deposits before finishing with the rag.
- 4- Repeat the soaking and wiping process until all unpainted surfaces are clean.

- 5- After cleaning, apply a quality metal protectant to all unpainted surfaces to prevent future rust and corrosion.

Careful attention to this process ensures optimal protection and long-term durability of the machine's unpainted metal components.



Do **not** use gasoline, kerosene, or other petroleum-based products to clean this machine. These substances have low flash points and present a serious risk of fire or explosion. Use only approved cleaning agents and degreasers in a well-ventilated area.



Many cleaning solvents can be toxic if inhaled. Always perform cleaning and degreasing operations in a well-ventilated area to minimize exposure to fumes. Use appropriate personal protective equipment, such as gloves and safety glasses.

Notice: Solvent Compatibility

Do not use chlorine-based solvents, including acetone or brake parts cleaner, on the machine. These chemicals can damage painted surfaces. Use only approved cleaning agents that are safe for both painted and unpainted components.

Site Consideration

Weight and Space Requirements

Weight Load:

Refer to the Machine Data Sheet for the exact weight of your machine. Ensure that the installation surface can safely support the combined weight of the machine, any additional equipment, and the heaviest



anticipated workpiece. Account for the operator's weight and any dynamic forces generated during machine operation.

Space Allocation:

Provide sufficient clearance around the machine to accommodate the largest workpiece and allow safe operator movement and material handling. For permanent installations, ensure adequate space to fully open or remove doors and covers as required for maintenance and service procedures outlined in this manual. Follow the recommended space allocation guidelines to maintain safe and efficient operation.

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

Operating Environment and Electrical Requirements

Physical Environment:

For safe operation and long-term reliability, operate the machine in a clean, dry environment free from excessive moisture, corrosive chemicals, airborne particulates, or other hazardous conditions. Avoid locations with extreme ambient temperatures (outside 41°–104°F), relative humidity above 95% or below 20% (non-condensing), or areas subject to vibration, shock, or mechanical impact.

Electrical Installation:

Install the machine near a suitable power source. Protect all power cords from foot traffic, material handling equipment, moisture, chemicals, and other potential hazards. Ensure

 **WARNING** Protect all power cords from foot traffic, material handling equipment, moisture, chemicals, and other potential hazards. Ensure

unobstructed access to a disconnect device or provision for lockout/tagout procedures where required.

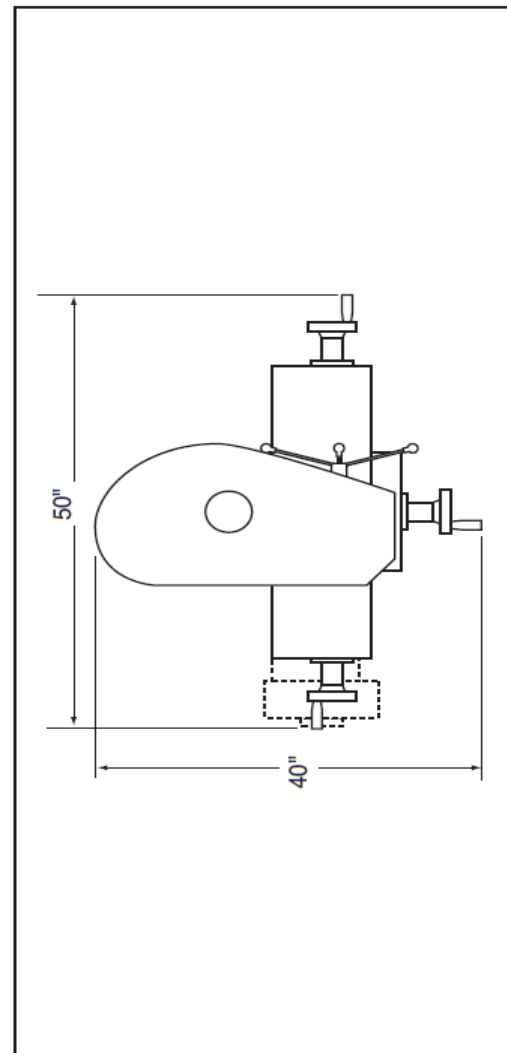


Figure 5: Machine Clearance.

Lighting:

Provide sufficient lighting around the machine to allow safe operation. Eliminate shadows, glare, or stroboscopic effects that could distract the operator or interfere with visibility during machining tasks.

Heavy Lifting

Improper lifting of the machine or its components can result in serious strain or crushing injuries. Always use multiple

personnel and/or mechanical lifting equipment, such as a forklift or hoist, rated for the full weight of the machine. Follow proper lifting techniques and secure the load before moving.

Machine Positioning Instructions

To safely move the machine into its installation location:

1. Position the shipping crate adjacent to the workbench or stand, then unbolt the machine from its pallet.
2. Move the table as close to the column as possible and raise the headstock to its maximum height. This improves balance during lifting.
3. Engage the Z-axis locks to prevent unexpected movement while lifting.
4. Place a lifting strap under the headstock (refer to Figure 6) and attach the strap ends securely to a forklift or appropriate lifting device. Lift and carefully position the machine in its final location.

Always ensure the lifting equipment is rated for the machine's weight and that the load is stable before moving.

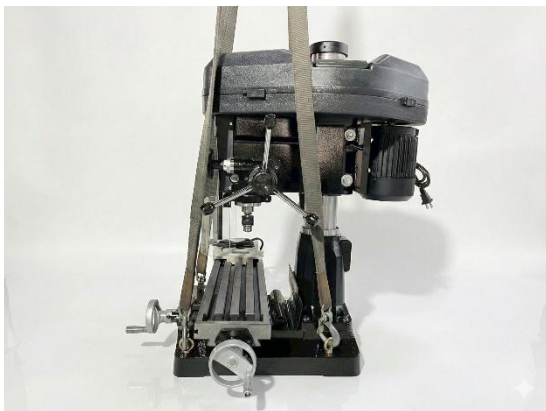


Figure 6: lifting the machine into location.

Machine Mounting Instructions

After confirming that all inventory items are present, secure the machine to a workbench using the mounting holes in the base. For Mill/Drill models, it is recommended to cut an access hole in the bench top to reach the underside of the base, which is required for adjusting the Y-axis leadscrew.

Mounting Options:

- **Through Mount (Recommended):**
 - Drill holes completely through the workbench.
 - Secure the machine using hex bolts, washers, and hex nuts.
 - Provides the strongest and most stable attachment, minimizing vibration and movement during operation.
- **Direct Mount:**
 - Fasten the machine directly to the workbench with lag screws.
 - Suitable for general use but offers less rigidity than the through mount.

Ensure all fasteners are properly tightened and the machine is stable before beginning operation.

Assembly Instructions for Model BBMM31/ BBMM31PF

Most components of the Model BBMM31 and BBMM31PF are factory-assembled; however, certain parts must be installed after delivery. The assembly procedure is presented in sequential steps and should be followed in order for proper setup.

Drilling Angle Vise:

- The supplied drilling angle vise mounts to the machine table using a table clamping kit.
- Table clamping kits are sold separately (see Accessories). The machine table accommodates

½-inch bolt clamping kits model BB111.

- The drilling angle vise can be positioned at various locations on the table, providing flexibility for a wide range of drilling operations.

Angle Vise Use

The drilling angle vise is designed **exclusively for drilling operations** and must not be used for milling. It does not provide sufficient clamping force to safely secure a workpiece during milling. Attempting to mill with this vise may allow the workpiece to shift or eject, potentially causing tool breakage, flying debris, or serious personal injury. Use only appropriate milling vises or clamps for milling operations.

Power Feeder BBMM31PF (only)

The Model BBMM31PF includes a 110 V auto-feed mechanism that enables hands-free, side-to-side milling passes. The variable-speed feed control provides consistent motion for flat surface milling.

Installation Procedure:

1. Mount the 2 ¼-inch diameter drive gear onto the **left end of the longitudinal table leadscrew**.
2. Align the gear couplers on the drive gear and leadscrew so that they interlock securely.

Ensure the gear is fully seated and engaged before operating the auto-feed mechanism.

Clamping Bracket:

1. Position the clamping bracket assembly on the **left end of the table**.



WARNING

2. Mark the points on the table trough where the mounting bolts make contact.
3. Remove the clamping bracket assembly and **spot drill** the marked locations. This creates a small indentation to help the mounting bolts seat securely on the rough cast surface.



Figure 8: mounting the power feed bracket.

4. Reposition the clamping bracket assembly on the table end and **tighten the mounting bolts** firmly. Ensure the bracket is properly aligned and secured before proceeding with further installation or operation.



Figure 7: Power feed bracket.

Power Feed Attachment:



1. Mount the power feed body onto the clamping bracket assembly using the provided hex bolts.

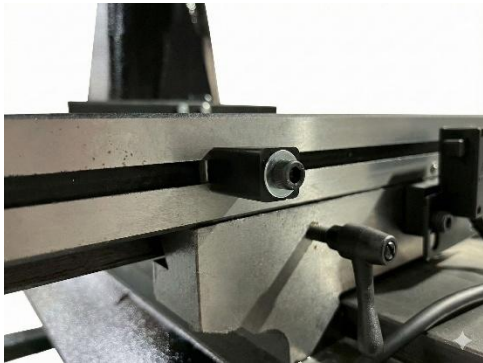


Figure 10: Installing the end stops.

2. Before fully tightening, adjust the position of the power feed body so that the drive gears **mesh correctly**.
3. Once proper gear engagement is confirmed, **securely tighten all hex bolts** to fix the power feed body in place.

Ensure the gears are properly aligned to prevent premature wear or binding during operation.

Power Feed Gear Alignment:

Carefully align the table leadscrew gears with the power feed gears. Proper alignment is achieved when one gear can **slightly move without fully engaging** the other.

- **Excessive clearance:** Can cause gear teeth to strip under heavy load.
- **Excessive tightness:** Can accelerate wear on the power feed's supporting bearings.

NOTE: Adjust carefully to maintain correct gear engagement and ensure long-term reliable operation.

Power Feed Electrical and Limit Switch Installation

1. Connect the **rapid switch cord** to the receptacle located on the underside of the power feed body.

2. Thread the **direction handle knob** onto the handle securely.
3. Attach the **plastic gear cover** to the

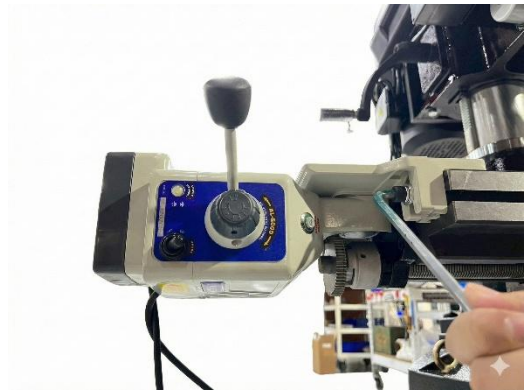


Figure 9: installing the power feed motor.

- bottom of the power feed body to protect the gears from debris.
4. Insert the **end stops** into the slots on the front edge of the table and tighten them in place (see Figure).
5. Remove the **center travel stop** from the front of the table and retain the mounting bolts for later use.
6. Attach the **switch bracket** to the front of the Mill/Drill using the mounting bolts removed in Step 5 (see Figure).



Figure 11: Installing the limit switch bracket.

7. Mount the **limit switch** to the switch bracket with the provided cap screws. When the switch is engaged, the power feed will **automatically stop**, and table

movement will cease. Ensure all electrical connections are secure and the limit switch functions correctly before operating the power feed.



Figure 12: Installing the limit switch.

2. Screw the handle into the handwheel and tighten the lock nut against the wheel. The lock nut functions both as a **spacer** and a **locking mechanism**.



Figure 13: Installing the handwheels.

Power Feed Safety

Before operating the Model BBMM31PF:

1. Ensure that the **power feed cord** and the **microswitch control cord** are routed clear of all moving parts to prevent pinching or crushing.
2. Determine and mark the **maximum table travel** before the power feed contacts the machine base.
3. Use this reference mark each time the table stops are adjusted to prevent **damage to the power feed** and to maintain safe operation.

Proper cord management and consistent travel limits help ensure both operator safety and long-term reliability of the power feed system.

Handwheel Installation

The machine includes three handwheels for table movement, but the Model BBMM31 requires only **two handwheels**.

Installation Procedure:

1. Adjust the lock nut on each handwheel handle so that it is positioned just short of the plastic handle.

Ensure the handwheels are securely fastened and rotate smoothly before operating the table.

Install the handwheels in the designated locations by performing the following:

4. Slide each handwheel onto the corresponding leadscrew shaft at the specified mounting positions.
5. Align the set screw with the flat or keyway on the leadscrew, if applicable.
6. Tighten the set screw securely to fix the handwheel in place.

Verify that each handwheel rotates freely and is firmly retained before placing the machine into service.

Head Crank Installation

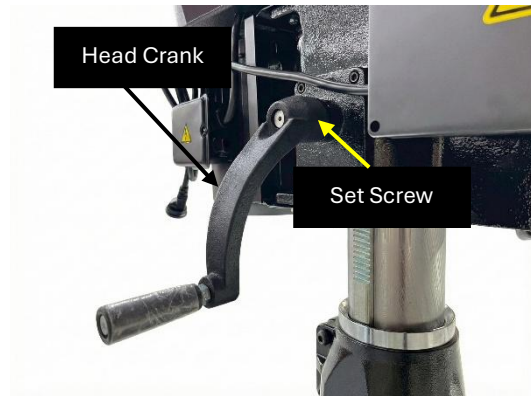


Figure 14: Installing the hand crank.

The head crank mounts to the **left side of the machine** and is used to adjust the vertical position of the headstock.

Installation Procedure:

1. Assemble the head crank by installing the handle using the same method as for the handwheels. Thread the handle into the crank body and tighten the lock nut to secure it.
2. Slide the assembled head crank onto the crank shaft.
3. Tighten the set screw to secure the crank in position.

Confirm the crank is firmly attached and operates smoothly before adjusting the headstock.

Feed Lever Installation

The feed levers control the vertical movement of the spindle.

Installation Procedure:

1. Thread a black knob onto one end of each of the three chrome feed levers.
2. Install the levers by threading them into the tapped holes on the hub located on the right side of the machine.

3. Tighten each lever securely to ensure proper engagement. Verify that the levers are firmly installed and provide smooth spindle movement prior to operation.



Figure 15: Installing the feed levers.

Collet or Arbor Installation

The Model BBMM31 and BBMM31PF is equipped with an **R-8 spindle** compatible with standard industrial collets and arbors.

Installation Procedure:

1. Release the latches on the head cover and open the cover to access the spindle area.
2. Insert the collet or cutting tool arbor upward into the spindle taper.
3. Rotate the collet or arbor until the keyway aligns with the locating pin inside the spindle opening.

Ensure proper alignment before tightening the drawbar to secure the tooling.



Figure 16: Tightening the draw bar.

Tool Retention Drawbar Tightening Procedure

4. Rotate the hex head at the top of the drawbar (located at the front upper portion of the head) clockwise until the drawbar threads engage with the internal threads of the installed collet or arbor.
5. Insert the cutter into the collet opening at the spindle nose, then continue tightening the drawbar until both the collet and cutter are firmly secured. Avoid excessive tightening. While applying final torque, hold the V-belt at the front pulley and apply light resistance to prevent spindle rotation.

Confirm the tooling is securely retained and properly seated before operating the machine.

Collet or Arbor Removal

To safely remove a collet or arbor:

1. Loosen the hex head on the top of the drawbar by turning it **2–3 turns**.
2. Grip the cutter using a shop towel to prevent it from falling.
3. Lightly tap the top of the drawbar with a **rubber mallet** to release the collet from the spindle.

Ensure the collet and tool are fully disengaged before removing them from the spindle.



Figure 17: Removing the draw bar.

Collet Replacement

4. Continue turning the drawbar **counterclockwise** until it is fully disengaged from the collet.
5. Remove the collet and replace it with the desired collet as needed.
6. Always remove cutting tools from the spindle when the machine is not in use to ensure safety and prevent accidental damage.

Drill Chuck Installation

The Mill/Drill is supplied with a drill chuck arbor featuring an **R-8 shank** and a **Jacobs Taper**, ready to accept the standard drill chuck included with the machine.

Installation Procedure:

1. Thoroughly clean the drill chuck, especially the **bore**, removing all grease, oil, and debris.
2. Clean the Jacobs Taper on the arbor to ensure it is free of grease, oil, and debris.
3. Fully retract the drill chuck jaws by turning the body of the chuck clockwise.

4. Press the drill chuck onto the Jacobs Taper and tap lightly with a **rubber mallet** to ensure a secure fit.

Note: The Jacobs Taper provides a strong mechanical connection, securely holding the drill chuck in place without additional fasteners.



Figure 18: Joining The drill chuck and arbor.



WARNING

Drill Chuck Permanence

The drill chuck is **permanently installed** on the Jacobs Taper. Do not attempt to remove the chuck, as doing so may damage the arbor or spindle and compromise safe operation.

Fly Cutter Installation

The Mill/Drill includes a fly cutter designed to mount on the **1-inch stub end of the R-8 arbor**.

Installation Procedure:

1. Remove all grease, oil, and debris from the R-8 arbor.
2. Clean the fly cutter thoroughly to ensure it is free of grease, oil, and debris.

3. Align the keys on the arbor with the keyways on the fly cutter and slide



Figure 19: Flywheel assembly.

the cutter onto the stub end of the arbor.

4. Secure the fly cutter in place using the **cap screw and washer** provided.
5. Insert the assembled arbor with fly cutter into the Mill/Drill following the procedure outlined for **Collet/Arbor Installation**.

Ensure the fly cutter is tightly secured and properly aligned before operation.

Power Connection and Disconnection

After completing all assembly and setup steps, and verifying that the **circuit requirements** are met, the machine may be connected to the power supply. Follow these procedures to prevent accidental startup or equipment damage.

Connecting the Machine to Power:

1. Ensure the machine power switch is **OFF**.
2. Insert the power cord plug into a properly rated and grounded receptacle.



3. The machine is now safely connected to the power source.



Figure 20: ON/OFF power switch.

Disconnecting the Machine:

1. Ensure the machine power switch is **OFF**.
2. Grasp the plug and pull it completely from the receptacle. **Do not pull on the cord**, as this may damage the wiring.

Always follow these steps to maintain electrical safety and prevent accidental startup.

Section 4: Operations

Test Run

After completing assembly and setup, perform a test run to verify that the machine operates correctly and safely before placing it into service.



If unusual noise, vibration, or irregular operation is observed during

the test run and the source cannot be identified:

- Stop the machine immediately and disconnect it from the power supply.
- Refer to the troubleshooting section of this manual to diagnose the issue.
- If the condition cannot be resolved, contact **Busy Bee Tools Customer Service or Technical Support** before operating the machine further.

Do not resume operation until the cause has been identified and corrected.

Test Run Procedure:

1. Ensure all fasteners, guards, and covers are properly installed and secured.
2. Confirm that all tooling and loose objects have been removed from the spindle and table.
3. Verify that all controls are in their neutral or OFF positions.
4. Connect the machine to the power supply and stand clear of moving components.
5. Start the machine and allow it to run at low speed, observing for abnormal vibration, noise, or irregular movement.
6. Stop the machine and confirm that all controls respond properly and the spindle comes to a complete stop.

Upon successful completion of the test run and verification that the machine is functioning correctly, the machine is ready for operation.

Before beginning work:

- Ensure all safety guards and covers are installed and secured.
- Confirm the workpiece is properly clamped and tooling is correctly installed.
- Select appropriate spindle speed, feed rate, and cutting parameters for the intended operation.
- Verify that all operators are familiar with the controls and safety procedures.

The machine may now be placed into service under normal operating conditions.

Notice Operator Training

If you are unfamiliar with this type of machine or equipment, obtain appropriate instruction before beginning

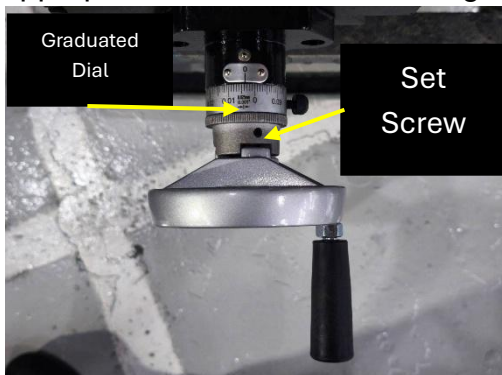


Figure 21: Graduated dial indexing.

operation. Review technical literature, industry publications, or complete formal

training to develop the necessary skills and understanding.

Regardless of the information provided in this section, the manufacturer assumes no liability for incidents resulting from insufficient operator training or experience.

Personal Protective Equipment:

Operating this machine without appropriate protective equipment may result in injury to the eyes or respiratory system. Always wear approved safety glasses and suitable respiratory protection during operation.

Graduated Dials

The **graduated dials** on the handwheels for the table and fine feed allow for accurate, repeatable movements. Each dial can be **indexed or reset to zero** using the provided setscrew or thumbscrew.

Example Use:

To drill a series of holes at 0.625" centers:

1. Position and drill the first hole.
2. While holding the handwheel, set the corresponding dial to **zero**.
3. Move the table exactly 0.625" using the dial as a reference.
4. Drill the next hole and repeat the process for subsequent holes (see Figure).

This method improves precision and efficiency when performing repetitive operations.

Spindle Height Adjustment

The machine provides **two methods** for controlling spindle vertical movement: a drill press-style **levered down feed** and a **micro-adjustment handwheel**.

Levered Down feed Operation:

- Pull the lever closest to you forward and downward.
- The spindle will descend until you release the lever or it reaches the **depth stop**.

Micro-Adjustment Handwheel Operation:

1. Tighten the **locking knob** at the center of the down feed lever hub. Locking the levered down feed transfers control to the handwheel. The handwheel will not operate if the locking knob is loose.
2. Loosen the **setscrew** on the handwheel dial rim. Rotate the dial so the "0" aligns with the index line, then retighten the setscrew.
3. Turn the handwheel to lower the spindle to the desired position.
Each full revolution moves the spindle 0.100".

Use the appropriate method based on the precision required for your

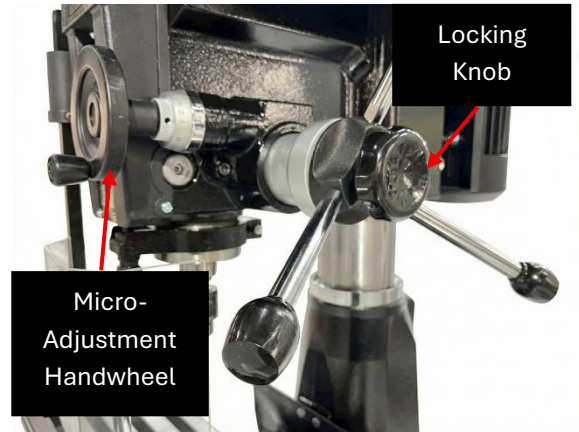


Figure 22: Micro adjustment handwheel.

operation.

Spindle Locking

To secure the spindle during milling operations:

1. **Tighten the spindle locking lever** until the spindle is firmly held in place.

Ensure the spindle is fully locked before performing any milling to prevent unintended movement and maintain safety.

Depth Stop Calibration

The **depth stop** limits the downward travel of the drill bit or cutter. Maximum allowable depth is **5 inches**.

Calibration Procedure:



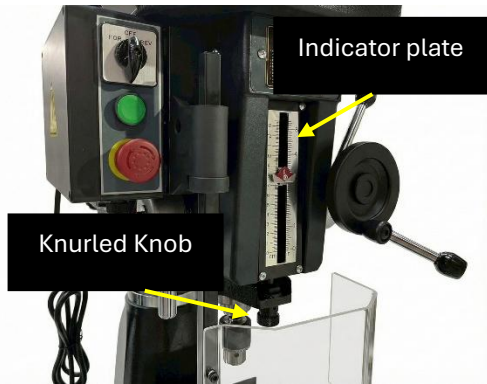


Figure 23: Setting the depth indicator.

1. Raise the spindle fully into the head and place a piece of paper on the workpiece.
2. Loosen the **headstock bolts** and lower the head until the drill bit or cutter just touches the paper. Retighten the headstock bolts.
3. Adjust the **depth stop leadscrew** so that the top of the indicator plate aligns with the desired depth on the left or right scale.
4. The leadscrew is controlled using the **knurled knob** located under the front of the headstock (see Figure).

Verify the depth setting before beginning the drilling or cutting operation.

Head Height Adjustment

The head of the Mill/Drill can be raised or lowered to accommodate different workpiece sizes and operations.

Adjustment Procedure:

1. Loosen the **two head-locking nuts** on the right rear side of the

head using the supplied lug wrench (see Figure).

2. Rotate the **head crank** to raise or lower the head to the desired height.
3. Retighten the **head-locking nuts** to secure the head in position.

Ensure the head is firmly locked before beginning any machining operation.

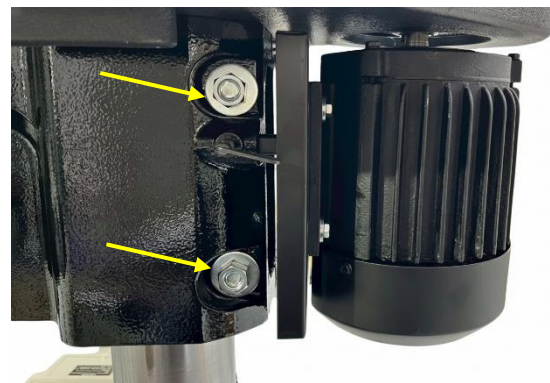


Figure 24: Head height adjustment.

Spindle Speed Adjustment

The Model BBMM31/BBMM31PF provides **twelve spindle speed settings** to accommodate different materials and cutting operations. Consult machining references or industry guidelines to select the appropriate speed for each application.

Speed Change Procedure:

1. Loosen the **motor locking lever** and slide the motor inward to move the rear pulley toward the spindle (see Figure).

2. Loosen the **two idler pulley**

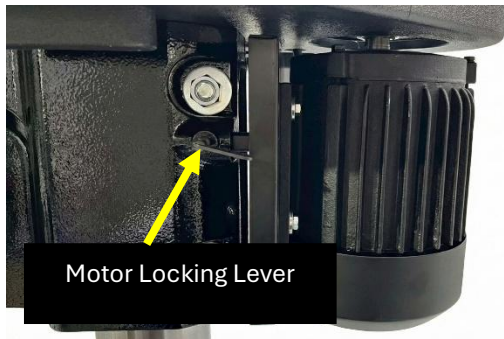


Figure 25L Locking lever for speed adjustment.

bolts securing the center pulley system so it can float freely (see Figure 33).

3. With the center and rear pulleys free, reposition the **V-belts** onto the pulleys according to the desired speed on the speed chart.
4. Slide the motor back to **tighten the rear V-belt**, then secure the motor locking lever.
5. Retighten the **center pulley bolts** to lock the pulley system in place.

Verify belt tension and pulley alignment before operating the machine.

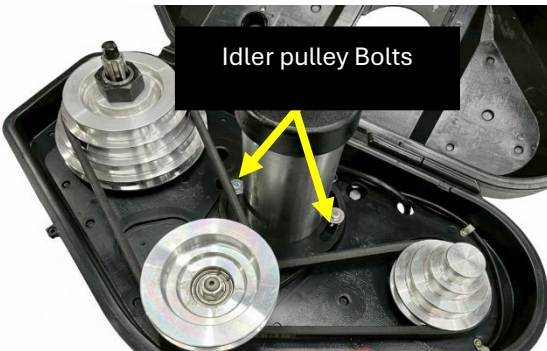
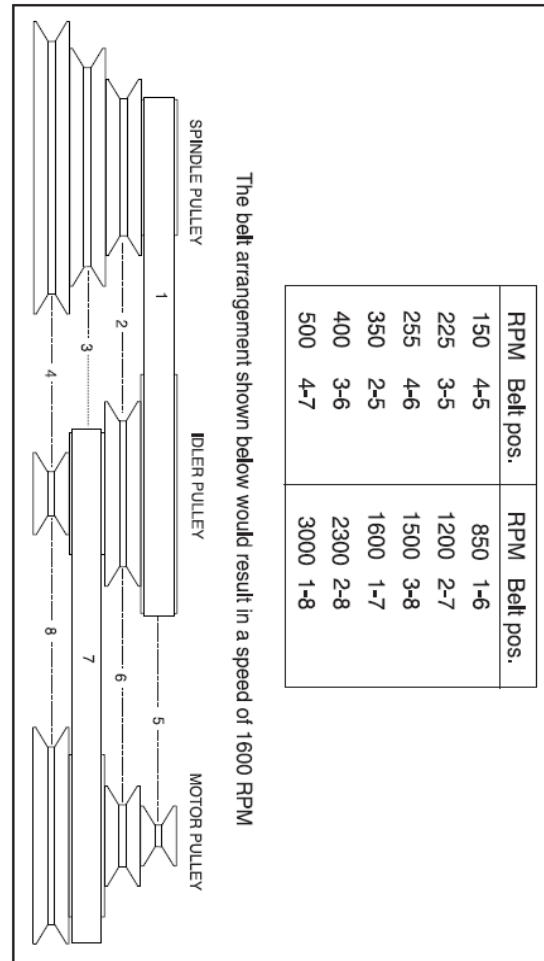


Figure 26: Idler pulley and belts.



Section 5: Accessories

Here are some selected accessories from Busy Bee Tools wide range of available accessories for milling machines.

B2485 6" Rotary Table with Tailstock Precision Rotary Work holding

- **Application:** Provides indexed work positioning in **horizontal and vertical orientations** for milling operations.

- **Construction:** Fine-grade cast iron with precision-ground surfaces and hardened worm gear.
- **Gear Ratio & Indexing:** 90 : 1 worm gear ratio with **360° graduations** for precise rotation.
- **Included Components:** **Tailstock and indexing plates** included to support longer workpieces and repeatable index drilling or machining cycles.
- Suitable for machining operations requiring accurate angular positioning and support for workpiece ends.

Busy Bee Tools B2724 Rotary Table 4" Horizontal/Vertical Compact Rotary Table

- **Table Diameter:** 4" rotary table ideal for smaller milling tasks.
- **Features:**
 - Whole-degree graduated dial with **0–360°** scale and 10-minute divisions.
 - **Ball bearing support** and worm gear drive for smooth rotation.
 - **Lash adjustment screw** and reference lines for precision setup.
- **Construction:** Machined steel with black oxide finish.
- Used extensively for indexed machining, bolt pattern cutting,

and precision rotational work on smaller parts.

Accusize Collet Chuck & Set B4031 18-PC ER32 Set Collet System for Tool Holding

- **Description:** Accusize branded **ER32 collet set** including a collet chuck compatible with milling operations.
- **Contents & Size:**
 - Example set includes **18 ER32 collets** covering a wide range of shank sizes (e.g., 1/8 in up to larger diameters) and chuck.
 - Collet chuck accepts standard cutting tools or drills and provides accurate radial clamping.
- **Use Case:** Enhances tooling flexibility by enabling precise clamping for end mills, drills, reamers, and other cutters in milling or drilling operations.

Busy Bee Tools BB111 Deluxe 52pc Clamping Kit T-Slot Clamping Set

- **Purpose:** Provides a comprehensive set of clamps and hardware for securing workpieces or accessories to the machine table.
- **Application:** Ideal for milling, drilling, or clamping fixtures on T-slot worktables; expands work holding versatility.



Precision Boring Bar Set 12 pc (3/4")

- **Description:** Precision boring bar set with **3/4" shank** and carbide-tipped cutting ends designed for flat-bottom boring and fine internal machining.
- **Construction:** High-quality alloy steel bars with precision-ground shanks and square carbide tips for accurate, clean bored surfaces.
- **Contents:** 12 precision boring bars in multiple lengths to accommodate different bore requirements.
- **Application:** Used in milling machines, lathes, and boring operations where rigid cutting and precise internal finishes are required.

Boring Bar Set 3/8"

- **Description:** Precision ground shank boring bars with **carbide tips** for reliable boring and minor internal machining tasks.
- **Material:** High-quality alloy steel with carbide cutting tips for durability and performance.
- **Features:** Offset taper design for rigidity, multiple bar lengths for versatility.
- **Use:** Suitable for smaller bore operations on milling machines

where precision and stability are needed.

Boring Bar Set 1/2"

- **Description:** 9-piece precision boring bar set with **1/2" shank** for internal machining and boring tasks requiring rigidity and accuracy.
- **Construction:** Alloy steel bodies with carbide tips and an offset taper for stable cutting performance.
- **Application:** Ideal for machining internal features on workpieces where controlled, flat-bottom holes are required.

2" End Mill with Carbide Inserts, MT3

- **Description:** End mill with **replaceable carbide inserts** designed for MT3 spindle tooling applications.
- **Features:** Multiple carbide cutting edges enhance tool life and performance; suitable for roughing and finishing cuts where insert-style end mills are appropriate.
- **Shank/Attachment:** MT3 compatible for direct mounting using collet or arbor systems.

(Specific B2136MT3 listing not found on site; the above end mill closely matches typical Busy Bee tooling found online.)

Parallel Bars Accusize



- **Accusize 1/8" Parallel Bar Set 5"**
 - Precision parallel bar set with 10 pairs of bars sized **1/8" thick and 5" long** for milling machine table work holding.
 - Used to support and elevate workpieces within machine vises to ensure consistent setup height and clearances.

1-2-3 Blocks — Busy Bee Tools

- Busy Bee does not explicitly list a catalogue page for 1-2-3 blocks under the SKU B4463, but these precision machinist blocks are standard hardened steel blocks used for setup, fixturing, and squaring of workpieces. They are typically manufactured to **1.000"**, **2.000"**, and **3.000"** dimensions **with ground surfaces** for accurate referencing in milling and inspection tasks.

For full specifications, detailed sizing, and pricing, visit Busy Bee Tools online or visit one of our branches across Canada. www.busybeetools.com.

Section 6: Maintenance

Scheduling

To maintain your mill's operation at its peak performance the following maintenance schedule must be followed.

Daily Cleaning & Lubrication

Procedure

Objective: Prevent corrosion, residue build-up, and mechanical wear to ensure consistent, safe machine operation.

Procedure:

1. Power Off and Lockout
 - Ensure the machine is turned OFF and disconnected from the power supply.
 - Engage lockout/tagout if required.
2. Chip & Debris Removal
 - Use a brush and shop vacuum to remove all metal chips, dust, and debris from the table, spindle, leadscrews, and other exposed surfaces.
 - Do not use compressed air; this may drive debris into bearings or other moving parts and create hazards.
3. Coolant Residue Management
 - Inspect surfaces exposed to water-soluble coolant. Wipe or clean to remove gummy residues that can interfere with smooth operation.



4. Lubrication of Daily Points
 - Apply a light, non-staining machine oil to the following:
 - Lead screws (X, Y, Z axes)
 - Spindle quill and arbor interfaces
 - Table ways and sliding surfaces
 - Ensure oil is evenly applied and wipe off any excess.
5. Inspection
 - Check cutting tools for damage or wear.
 - Inspect power cords, wiring, and plug connections.
 - Verify mounting bolts and guards are secure.
6. Surface Protection
 - Wipe any exposed unpainted metal surfaces with a light protective lubricant to prevent rust formation.

Weekly Cleaning & Lubrication Procedure

Objective: Maintain machine precision and prevent premature wear of critical components.

1. Complete Surface Cleaning
 - Repeat daily chip removal procedure.
 - Clean the machine base, column, and motor housing.
 - Remove any accumulated rust or corrosion from

unpainted surfaces using fine steel wool or non-abrasive pads; apply non-staining protective oil.

2. V-Belt & Pulley Check
 - Inspect V-belts for tension, wear, or cracks. Adjust or replace if necessary.
 - Clean pulleys to remove any dust, oil, or debris.
3. Lubrication of Weekly Points
 - Grease or oil bearings, spindle supports, and power feed gears according to manufacturer's recommendations.
 - Check gear mesh on power feed and lubricate if dry.
4. Coolant System Maintenance (if applicable)
 - Drain and clean trays or sumps to remove metallic residue or sediment.
 - Refill with fresh coolant if needed.
5. Safety and Function Check
 - Verify all guards and shields are correctly positioned and functional.
 - Check limit switches, depth stops, and handwheel dials for



smooth movement and accuracy.

Notes:

- Maintain a log sheet for daily and weekly maintenance.
- Immediately report or repair any damage, wear, or unsafe conditions.

Monthly Maintenance Checks

- Inspect **V-belts** for proper tension, signs of wear, or damage; adjust or replace as needed.

This format clearly separates daily versus monthly checks and emphasizes safety and preventive maintenance.

If you want, I can expand this into a **full preventive maintenance schedule** for the entire milling machine, including lubrication points and periodic inspections.

Here's a clear, technical rewrite of your cleaning and protection instructions:

Cleaning and Protecting the Machine

- **Chip Removal:** Metal chips that have been exposed to water-soluble coolant can promote oxidation and leave gummy residues on moving parts. Remove all chips and debris from the machine using a **brush and shop vacuum**.
- **Avoid Compressed Air: Do not use compressed air** to blow off chips, as this can drive particles

deep into the machine's mechanisms and create a safety hazard.

- **Rust Prevention:** Inspect all **unpainted surfaces** for rust. Remove any corrosion using appropriate methods, then apply a **non-staining protective lubricant** to prevent future oxidation.
- **Surface Maintenance:** Ensure that all cleaned surfaces are free of coolant, oil, or debris before applying lubricant to maintain smooth operation of all moving components.

Gib Adjustment

- **Factory Setting:** The gibs are pre-set at the factory and **typically require no adjustment** until the machine has experienced extended use.
- **Initial Movement:** If table movement feels stiff initially:
 1. Ensure **all rust preventative** has been thoroughly removed from the ways.
 2. Apply a **light machine oil** to the ways.
 3. Move the table back and forth several times to work the lubrication in and loosen the movement.
- **Adjusting Gibs:**



- **Front Screw:** Controls **cross-feed movement** (front-to-back).
- **Right-Side Screw:** Controls **longitudinal movement** (left-to-right).
- Adjust each screw by turning the **large-slotted screw heads** until there is a **slight, uniform drag** on the handwheels.
- **Loosening:** If movement becomes excessively stiff during use, the screws can be **loosened slightly** to restore smooth operation.
- **Safety Note:** Always adjust slowly and check movement frequently to avoid over-tightening, which can cause premature wear of the ways or handwheel mechanisms.

Periodic Lubrication Points

- **Main Column**
 - Apply a light film of **SAE 30 oil** as needed.
 - Ensures smooth vertical movement and prevents rust/corrosion.
- **Quill**
 - Coat with a thin layer of **SAE 30 oil** as needed.
 - Maintains smooth spindle movement.
- **Quill Return Spring**
 - Oil **annually** using **SAE 30**.

- Apply with a brush or a squirt-can, this'll preserve elasticity and prevent corrosion.
- **Quill Pinion**
 - Lubricate **every 90 days** with **non-hardening grease**.
 - Ensures smooth gear engagement and reduces wear.
- **Table Leadscrews**
 - Lubricate **weekly** with several drops of **SAE 30 oil** along the threads.
 - Keeps table movement smooth and accurate.
- **Table Leadscrew Bearings**
 - Lubricate **daily**.
 - Bearings are located at the **ends of the table** and just in front of the **Y-axis hand crank**.
 - Use the oil port with a ball; depress the ball with the oil can tip while applying a small amount of **SAE 30 oil**.
- **Table and Apron Slides**
 - Lubricate **daily**.
 - Clean chips and debris from slides before applying oil.
 - Table slide: use the **oil port with ball** on the operator's side.



- Apron slide: oil directly after cleaning.

Notes:

- Always remove chips, debris, and coolant residues before lubrication.
- Avoid over-lubrication to prevent dust and chip buildup.
- Maintain a **lubrication log** to track daily, weekly, and annual maintenance.

Belt and Pulley Maintenance

- **Inspect Belts Regularly**
 - Check for tension, wear, cracks, or fraying.
 - Replace immediately if any damage is found.
- **Replacement Belts**
 - Spindle to idler pulley: Use B-42 belt.
 - Idler pulley to motor pulley: Use B-34 belt.
- **Pulley Alignment**
 - Ensure all pulleys are properly aligned to prevent premature belt wear or slippage.
- **Notes**
 - Regular inspection helps maintain accurate spindle speeds and prevents mechanical damage.
 - Keep belts free of oil, grease, and debris.

Quill Adjustments

The internal quill pin is a setscrew and has been pre-adjusted at the factory. It

should not need adjustment under normal circumstances.

The slotted setscrew on the left side of the head is used for limiting the amount of rotational play in the quill body.

Loosening the check-nut and tightening the setscrew will work to eliminate this play in the quill. If you are worried that you might have excessive quill play, spindle looseness or if an accident has occurred that requires re-adjusting this setscrew, contact Technical Support for advice.

Quill Return Spring Safety and Adjustment

- **Safety Precautions:**
 - The **spring tail** on the perimeter of the spring housing may be sharp.
 - Always wear **leather gloves** or use a **heavy shop towel** to cover the spring tail when loading or unloading spring tension.
 - Failure to take precautions may result in **serious personal injury**.



Figure 27: Return spring tensioning.

- **Factory Setting:**
 - The **automatic quill return spring** is pre-set at the factory.
 - **No adjustment is normally required** under standard operating conditions.

- **Adjustment Procedure (if needed):**

1. Locate the **spring housing** on the left side of the head.
2. Loosen the **black thumb knob two to three turns**.
3. Adjust the spring tension as required (follow full adjustment steps in the manual).
4. Retighten the thumb knob to secure the adjustment.

- **Caution:**

- Only perform spring adjustment if excessive or insufficient quill return is observed.
- Improper adjustment may affect **spindle operation** or cause injury.

Leadscrew Adjustment X and Y Axes

- **Purpose:**

- Reduce **excessive play** in handwheels when moving the table.
- Play exceeding **0.010"** (measured at the dial base) indicates adjustment is needed.

- **General Notes:**

- Adjust in **small increments**.
- Over-tightening can cause **excessive wear** on leadscrews and bearings.
- Some adjustments may require **hex wrench extensions**.

X-Plane Leadscrew Adjustment

1. Locate the **X-plane leadscrew adjuster** under the middle of the table.
 - Adjustment screw head faces to the **right** Figure
2. Turn the **adjustment screw**

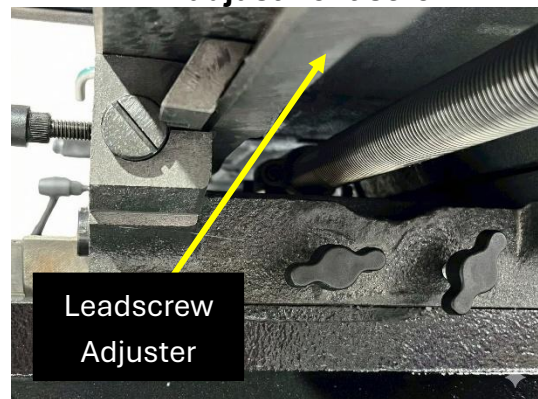


Figure 28: X-Axis leadscrew adjustment.

3. Turn the screw **carefully** to reduce play.
3. Tighten the screw once the play is minimized.
4. Test by turning one of the sides handwheels.
 - Play should be **less than 0.010"**.

Y-Plane Leadscrew Adjustment

1. Access the **underside of the base** through the bench hole.
2. Locate the **Y-plane leadscrew adjuster** midway along the leadscrew inside the base.

3. Tighten the **set screw** on the adjuster.
4. Test by turning the **front handwheel**.
 - Play should be **less than 0.010"**.
- **Caution:**
 - Make only **incremental adjustments**.
 - Verify movement and play after each adjustment before fully tightening.



Section 7: Service and Troubleshooting

Motor and Electrical

| Symptom | Possible cause | Solution |
|--|--|--|
| Machine does not start or a breaker trips. | <ol style="list-style-type: none"> 1. Plug/receptacle is at fault or wired incorrectly. 2. Motor connection wired incorrectly. 3. Wall fuse/circuit breaker is blown/tripped. 4. Overload relay has tripped. 5. Power supply switched <i>OFF</i> or is at fault. 6. Wiring is open/has high resistance. 7. Main power switch is at fault. 8. Motor is at fault. | <ol style="list-style-type: none"> 1. Test for good contacts; correct the wiring. 2. Correct motor wiring connections. 3. Ensure circuit size is suitable for this machine; replace weak breaker. 4. Reset overload relay. 5. Ensure power supply is switch on; ensure power supply has the correct voltage. 6. Check for broken wires or disconnected/corroded connections, and repair/replace as necessary. 7. Replace faulty ON/OFF switch. 8. Test/repair/replace. |
| Machine stalls or is underpowered. | <ol style="list-style-type: none"> 1. Feed rate/cutting speed too fast for task. 2. Workpiece alignment is poor. 3. Wrong workpiece material. 4. Motor connection is wired incorrectly. 5. V-belt(s) slipping. 6. Plug/receptacle is at fault. 7. Motor bearings are at fault. 8. Machine is undersized for the task. 9. Motor has overheated. 10. Contactor not getting energized or has poor contacts. 11. Spindle rotation s | <ol style="list-style-type: none"> 1. Decrease feed rate/cutting speed. 2. Eliminate workpiece binding; use jig or clamps and position table properly for workpiece alignment control. 3. Use metal with correct properties for your type of machining. 4. Correct motor wiring connections. 5. Replace bad V-belt(s). 6. Test for good contacts; correct the wiring. 7. Test by rotating shaft; rotational grinding/loose shaft requires bearing replacement. 8. Use smaller sharp cutters/drill bits; reduce the feed rate; reduce the spindle RPM; use cutting fluid if possible. 9. Clean off motor, let cool, and reduce workload. |

| | | |
|---|--|--|
| | | <ul style="list-style-type: none"> 10. Test for power on all legs and contactor operation. Replace if faulty. 11. Test/repair/replace switch. 12. Test/repair/replace motor. |
| Machine has vibration or noisy operation. | <ul style="list-style-type: none"> 1. Motor or component is loose. 2. V-belts are slapping belt cover; are worn or loose. 3. Belt pulley is loose. 4. Motor mount loose/broken. 5. Machine is incorrectly mounted or sits unevenly. 6. Workpiece is loose. 7. Motor fan is rubbing on fan cover. 8. Cutter is at fault. 9. Bit is chattering. 10. Motor bearings are at fault. | <ul style="list-style-type: none"> 1. Inspect/replace stripped or damaged bolts/nuts and re-tighten with thread locking fluid. 2. Replace/re-tension V-belts. 3. Replace shaft, pulley, setscrew, and key as required. 4. Tighten/replace. 5. Tighten/replace anchor studs in floor; relocate/shim machine. 6. Use the correct holding fixture and re-clamp workpiece. 7. Replace dented fan cover; replace loose/damaged fan. 8. Replace out-of-round cutter; replace/resharpen cutter; use appropriate feed rate and cutting RPM. 9. Replace/sharpen bit; index bit to workpiece; use appropriate feed rate and cutting RPM. 10. Test by rotating shaft; rotational grinding/loose shaft requires bearing replacement. |

Operation and Work Results

| Symptom | Possible cause | Solution |
|-----------------------|---|---|
| Tool slips in collet. | <ul style="list-style-type: none"> 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. | <ul style="list-style-type: none"> 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. | <ol style="list-style-type: none"> 1. RPM and or feed rate is too fast. 2. Cutting tool getting too hot. 3. Taking too big of a cut. | <ol style="list-style-type: none"> 1. Set correct RPM and feed rates. 2. Use coolant 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. | <ol style="list-style-type: none"> 1. Excessive depth of cut. 2. Dull cutting tools. | <ol style="list-style-type: none"> 1. Decrease depth of cut. 2. Use sharp cutting tools. |
| Workpiece vibrates or chatters during operation. | <ol style="list-style-type: none"> 1. Table locks not tight. 2. Quill lock not tight. 3. Workpiece not securely clamped to table or into mill vice. 4. RPM and feed rate too high. | <ol style="list-style-type: none"> 1. Tighten down table locks. 2. Tighten quill 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 is hard to move. | <ol style="list-style-type: none"> 1. Table locks are tightened down. 2. Chips have loaded up on ways. 3. Ways are dry and in need of lubrication. 4. Limit stops are interfering. 5. Gibs are too tight. | <ol style="list-style-type: none"> 1. Make sure table locks are fully released. 2. Frequently clean away chips that load up during milling operations. 3. Lubricate ways and handles. 4. Check to make sure that all limit stops are floating and not hitting the limit switch. 5. Adjust gibs (see Page). |
| Bad surface finish. | <ol style="list-style-type: none"> 1. Wrong RPM or feed rate. 2. Dull cutting tool or poor cutting tool selection. 3. Wrong rotation of cutting tool. 4. Workpiece not securely clamped. | <ol style="list-style-type: none"> 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. 4. Secure properly. |



Section 8: Electrical Wiring

Note on Electrical System Updates

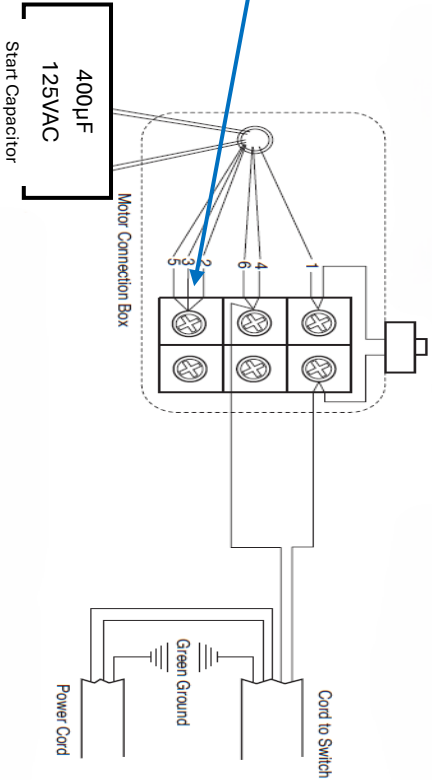
The information contained in this section reflects the electrical system configuration at the time this manual was produced. In the interest of continuous product improvement, future machines may feature modifications to the electrical components or layout. Before performing any work or reference, verify the **manufacture date of your machine** against the date indicated in this manual. Carefully review this section to ensure that the procedures, diagrams, and specifications correspond accurately to your specific unit.

Wiring Safety – Quick Reference

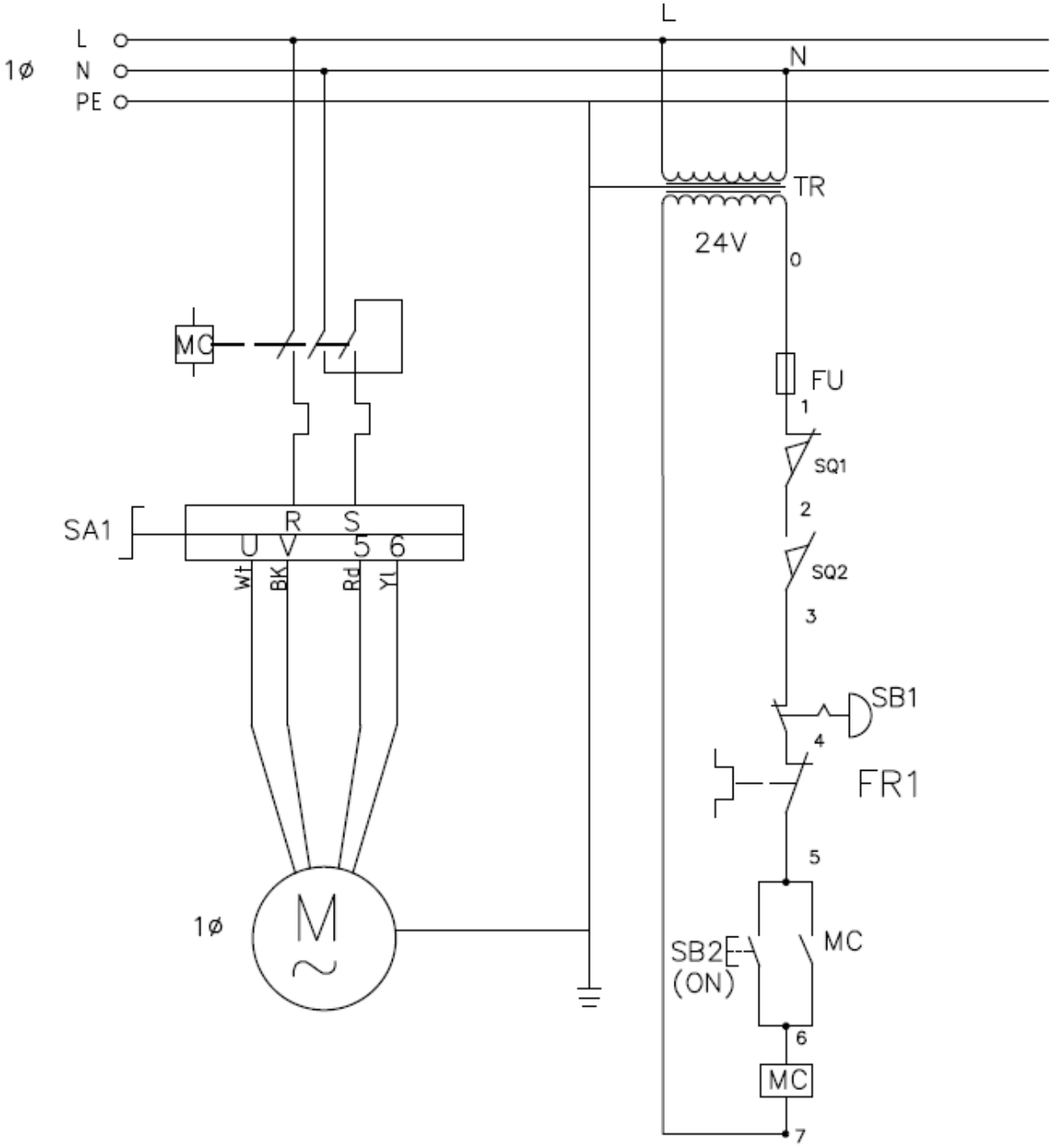
- **Shock Hazard:**
 - Disconnect power before servicing or inspecting.
 - Use insulated tools and PPE.
- **No Modifications:**
 - Do not alter wiring or replace components with non-approved parts.
- **Wire Connections:**
 - Ensure connections are tight, clean, and match the wiring diagram.
- **Circuit Requirements:**
 - Connect only to a dedicated circuit matching voltage, phase, and amperage specifications.
- **Wire & Component Damage:**
 - Inspect for cracks, wear, or overheating; replace damaged parts immediately.
- **Motor Wiring:**
 - Confirm proper voltage/phase and secure connections. Protect from moisture and vibration.
- **Capacitor Safety:**
 - Discharge capacitors before touching. Avoid bare-hand contact with terminals.
- **If Difficulties Occur:**
 - Stop operation, disconnect power, and contact qualified service personnel.
- **General Practices:**
 - Keep wiring organized, secured, and away from moving parts, heat, and sharp edges.
 - Follow local electrical codes and maintain regularly for safe operation.



Motor Wiring Diagram

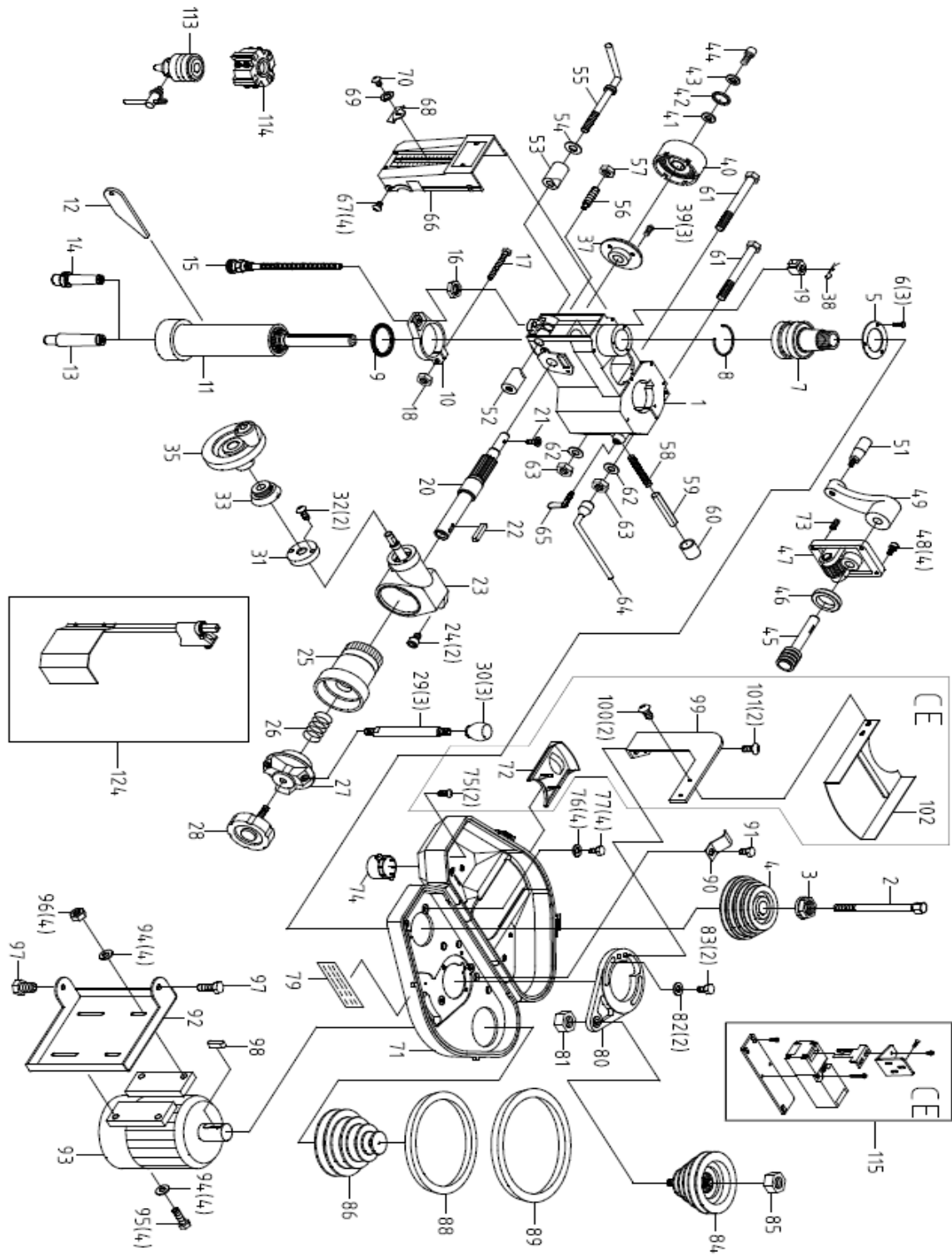


Electric Diagram

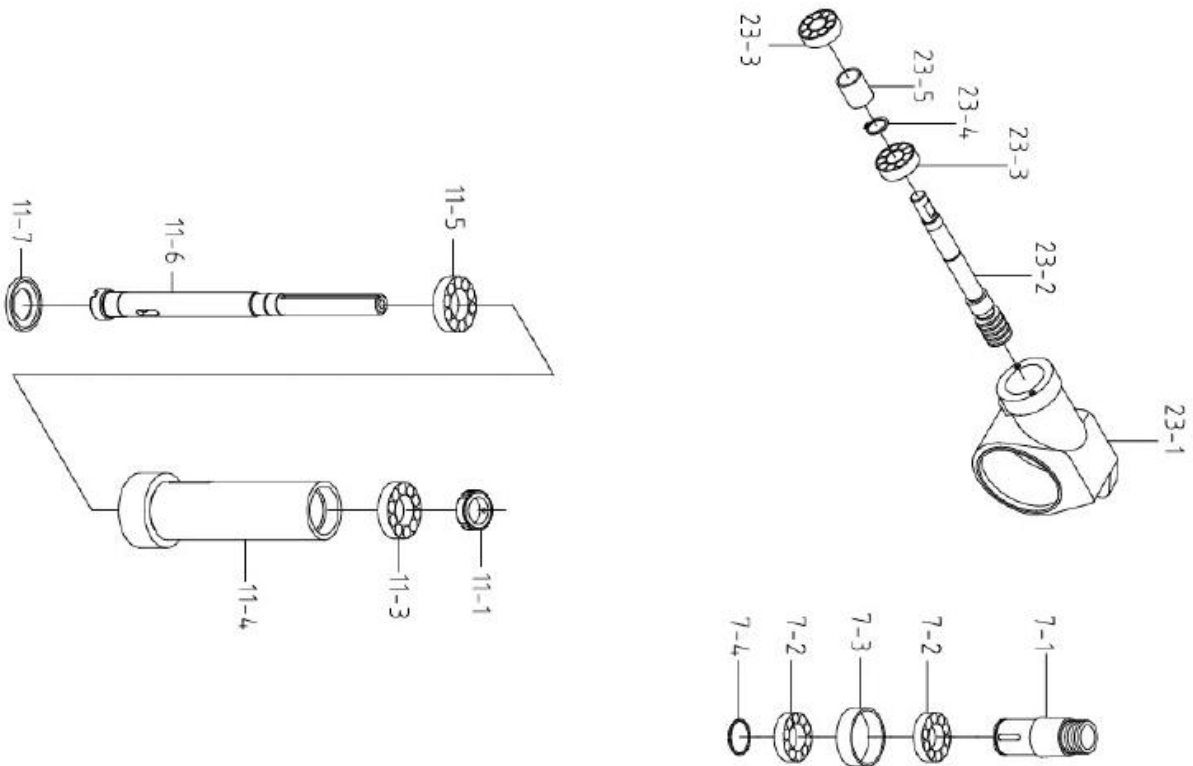


Section 9: Machine Diagrams and Parts List

Machine's Head Diagram



Quill, Spindle and Feed Mechanism Assembly



Machine's Head Parts List

| Item No. | Part No. | Description |
|----------|-------------|--|
| 1 | PBBMM3001 | Head Body |
| 2 | PBBMM3002 | Chuck Arbor Bolt RB W 7/16-20 |
| 3 | PBBMM3003 | Spindle Locknut |
| 4 | PBBMM3004 | Spindle Pulley |
| 5 | PBBMM3005 | Outer Bearing Plate $\phi 105 \times 66 \times 2.5T$ |
| 6 | PBBMM3006 | Cross Round Head Screw 1/4"x1/2"L |
| 7 | PBBMM3007 | Spindle Taper Sleeve Assembly 2-SLOT |
| 7-1 | PBBMM3007-1 | Spindle Taper Sleeve 2-SLOT |
| 7-2 | PBBMM3007-2 | Ball Bearing 6009ZZ |
| 7-3 | PBBMM3007-3 | Washer OD74, ID68 X22 |
| 7-4 | PBBMM3007-4 | Fixed Ring 2x $\phi 41MM$ |
| 8 | PBBMM3008 | C-Retainer Ring 3X80MM |



| Item No. | Part No. | Description |
|-----------------|-----------------|--|
| 9 | PBBMM3009 | Rubber Flange 92X75 (T=6MM) |
| 10 | PBBMM3010 | Feed Base |
| 11 | PBBMM3011 | Pinion Assembly R8 2-SLOT |
| 11-1 | PBBMM3011-1 | Locknuts |
| 11-3 | PBBMM3011-3 | Taper Roller Bearing E30206J |
| 11-4 | PBBMM3011-4 | Rack Sleeve R8 |
| 11-5 | PBBMM3011-5 | Taper Roller Bearing 30207J |
| 11-6 | PBBMM3011-6 | Spindle Shaft R8 2-SLOT |
| 11-7 | PBBMM3011-7 | Bearing Cap MT3/R8 |
| 13 | PBBMM3013 | Chuck Arbor R8 W 7/16"- 20 (JT6) |
| 14 | PBBMM3014 | Cutter Arbor R8 W 7/16"-20 (25.4MM) |
| 15 | PBBMM3015 | Graduated Rod Assembly |
| 16 | PBBMM3016 | Nut 5/8"-18UNF |
| 17 | PBBMM3017 | Hex. Head Screw 1/4"x1/2"L |
| 18 | PBBMM3018 | Hex. Nut 1/4" |
| 19 | PBBMM3019 | Position Set Bracket |
| 20 | PBBMM3020 | Pinion Shaft |
| 21 | PBBMM3021 | Flat Cross Head Screw 3/16"X1/2"L |
| 22 | PBBMM3022 | Key 7X7X20MM |
| 23 | PBBMM3023 | Feed Cover Assembly |
| 23-1 | PBBMM3023-1 | Bearing Cover |
| 23-2 | PBBMM3023-2 | Worm Shaft |
| 23-3 | PBBMM3023-3 | Ball Bearing 6202ZZ |
| 23-4 | PBBMM3023-4 | C-Retainer Ring 15MM |
| 23-5 | PBBMM3023-5 | Bearing Washer 34X27.5X30L MM |
| 24 | PBBMM3024 | Hex. Socket Head Screw 5/16"X3/4"L |
| 25 | PBBMM3025 | Worm Gear |
| 26 | PBBMM3026 | Spring Assembly |
| 27 | PBBMM3027 | Handle Base |
| 28 | PBBMM3028 | Blade Adjustable Knob |
| 29 | PBBMM3029 | Knob W/Shaft |
| 30 | PBBMM3030 | Plastic Round Knob |
| 31 | PBBMM3031 | Worm Cover |
| 32 | PBBMM3032 | Cross Round Head Screw 3/16"X3/8" |
| 33 | PBBMM3035 | Micro Adjusting Indicator Set IMPERIAL |



| Item No. | Part No. | Description |
|-----------------|-----------------|--|
| 35 | PBBMM3036 | Handwheel Assembly |
| 37 | PBBMM3037 | Spring Base Set |
| 38 | PBBMM3038 | R-type Pin S SP5 |
| 39 | PBBMM3039 | Cross Round Head Screw 3/16"X3/4"L |
| 40 | PBBMM3040 | Spring Cover Assembly |
| 41 | PBBMM3041 | Spring Washer 1/4"X1"X1.5T |
| 42 | PBBMM3042 | Washer 1/4" |
| 43 | PBBMM3043 | Spring Washer 1/4"X1"X1.5T |
| 44 | PBBMM3044 | Hex. Socket Head Screw 1/4"X5/8"L |
| 45 | PBBMM3045 | Worm Shaft |
| 46 | PBBMM3046 | Bushing |
| 47 | PBBMM3047 | Head Raise Bracket Assembly |
| 48 | PBBMM3048 | Hex. Socket Head Screw 1/4"X3/4"L |
| 49 | PBBMM3049 | Head Handle Set FOR ELECTERIC BOX USE |
| 51 | PBBMM3051 | Clamp Handle Assembly |
| 52 | PBBMM3052 | Fixed Tight Collar 31.5X51L (1/2"-12UNC) |
| 53 | PBBMM3053 | Fixed Tight Collar |
| 54 | PBBMM3054 | Washer 1/2" X7/8" X2t |
| 55 | PBBMM3055 | Handle Rod |
| 56 | PBBMM3056 | Screw Key 3/8" -16 |
| 57 | PBBMM3057 | Hex. Nut 3/8" -16 |
| 58 | PBBMM3058 | Compression Spring |
| 59 | PBBMM3059 | Pin |
| 60 | PBBMM3060 | Rubber Collar |
| 61 | PBBMM3061 | Head Body Fix Bolt |
| 62 | PBBMM3062 | Washer |
| 63 | PBBMM3063 | Hex. Nut |
| 64 | PBBMM3064 | Lock Handle |
| 65 | PBBMM3065 | Thumb Screw |
| 66 | PBBMM3066 | Front Cover Plate Assembly |
| 67 | PBBMM3067 | Cross Round Head Screw |
| 68 | PBBMM3068 | Pointer Plate Label |
| 69 | PBBMM3069 | Washer |
| 70 | PBBMM3070 | Cross Round Head Screw |
| 71 | PBBMM3071 | Belt Cover Assembly with Part 72 |



| Item No. | Part No. | Description |
|-----------------|-----------------|--|
| 72 | PBBMM3072 | Belt Cover Shelf Order with Part 71 Assembly |
| 74 | PBBMM3074 | Spindle Cover |
| 75 | PBBMM3075 | Screw |
| 76 | PBBMM3076 | Washer |
| 77 | PBBMM3077 | Hex. Head Screw |
| 79 | PBBMM3079 | Speed Chart Label |
| 80 | PBBMM3080 | Speed Change Inter Pulley Base |
| 81 | PBBMM3081 | Hex. Nut |
| 82 | PBBMM3082 | Washer |
| 83 | PBBMM3083 | Hex. Head Screw |
| 84 | PBBMM3084 | Inter Pulley Assembly |
| 85 | PBBMM3085 | Hex. Nut |
| 86 | BBMM31MOT | Motor Pulley |
| 88 | PBBMM3088 | V-Belt VB-33 |
| 89 | PBBMM3089 | V-Belt VB-42 |
| 90 | PBBMM3090 | Wire Relief Retainer |
| 91 | PBBMM3091 | Hex. Head Screw |
| 92 | PBBMM3092 | Motor Mount Plate |
| 93 | PBBMM3093 | Motor |
| 94 | PBBMM3094 | Washer |
| 95 | PBBMM3095 | Hex. Head Screw |
| 96 | PBBMM3096 | Hex. Nut |
| 97 | PBBMM3097 | Hex. Head Screw |
| 98 | PBBMM3098 | Key |
| 99 | PBBMM3099 | Guard Bracket |
| 100 | PBBMM3100 | Cross Round Head Screw |
| 101 | PBBMM3101 | Cross Round Head Screw |
| 102 | PBBMM3102 | Protective Plate |
| 113 | PBBMM30113 | Chuck |
| 114 | PBBMM30114 | Milling Cutter |
| 115 | PBBMM30115 | Micro Switch Bracket Set |
| 116 | PBBMM30116 | Limit Switch |
| 124 | PBBMM30124 | Chuck Guard Assembly |



Table and Column Assembly Diagram

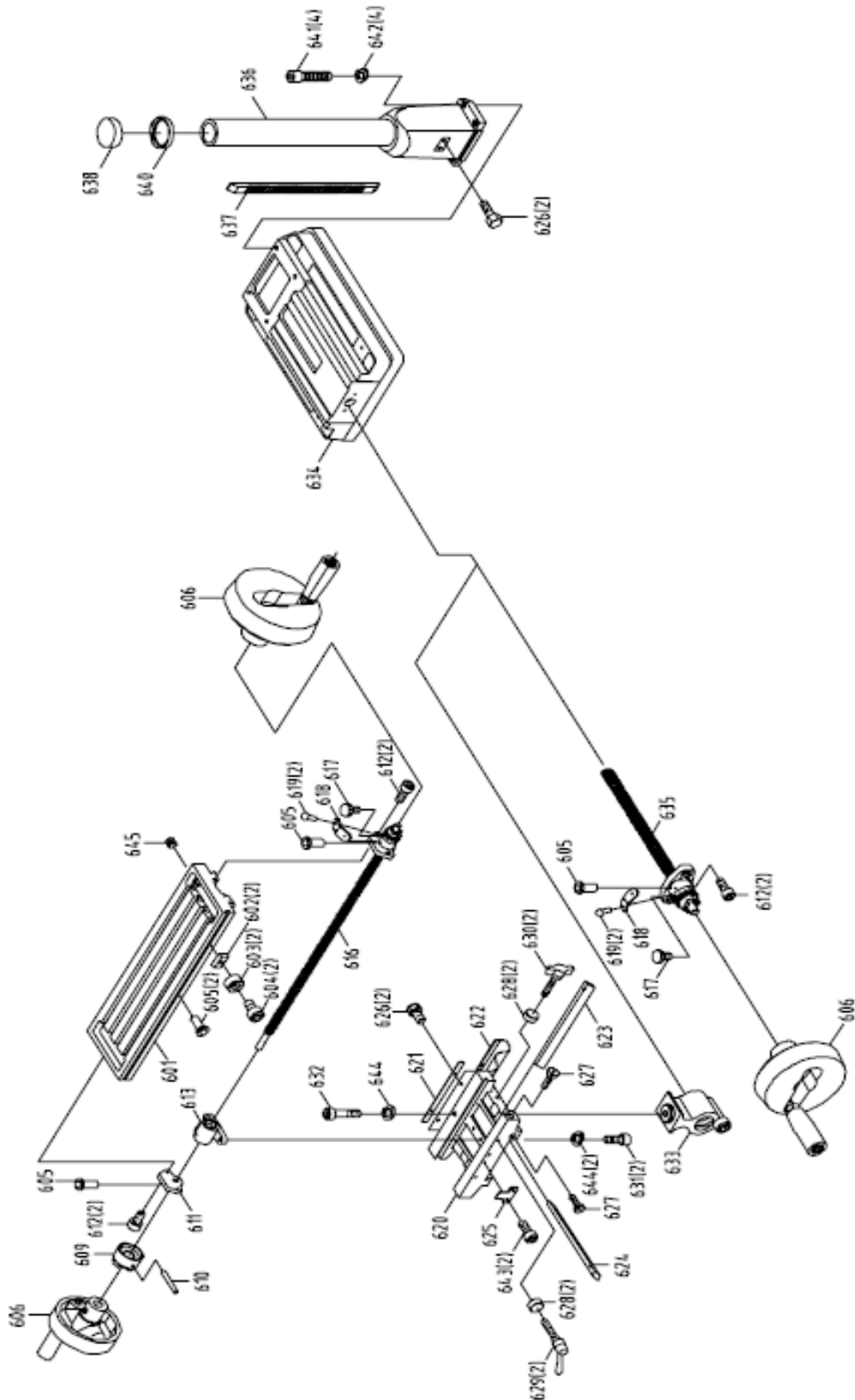


Table and Column Assembly Parts List

| Item No. | Part No. | Description |
|----------|--------------|-------------------------|
| 601 | PBBMM30601 | Table |
| 602 | PBBMM30602 | Fixed Block |
| 603 | PBBMM30603 | Movable Fixed Ring |
| 604 | PBBMM30604 | Hex. Socket Head Screw |
| 605 | PBBMM30605 | Ball Oiler |
| 606 | PBBMM30606 | Table Handle Wheel Set |
| 609 | PBBMM30609 | Table Clutch |
| 610 | PBBMM30610 | Cotter Pin |
| 611 | PBBMM30611 | Left Flange |
| 612 | PBBMM30612 | Hex. Socket Head Screw |
| 613 | PBBMM30613 | Table Nut Set |
| 616 | PBBMM30616 | Table Screw Assembly |
| 617 | PBBMM30617 | Link Screw |
| 618 | PBBMM30618 | Limit Plate |
| 619 | PBBMM30619 | Rivet |
| 620 | PBBMM30620 | Center Base |
| 621 | PBBMM30621 | Antidust Plate |
| 622 | PBBMM30622 | Antidust Plate Assembly |
| 623 | PBBMM30623 | Gib Strip |
| 624 | PBBMM30624 | Gib Strip |
| 625 | PBBMM30625 | Movable Fixed Block |
| 626 | PBBMM30626 | Hex. Head Screw |
| 627 | PBBMM30627 | Gib Strip Bolt |
| 628 | PBBMM30628 | Bushing |
| 629 | PBBMM30629 | Adjust Handle |
| 630 | PBBMM30630 | T Screw |
| 631 | PBBMM30631 | Hex. Socket Head Screw |
| 632 | PBBMM30632 | Hex. Socket Head Screw |
| 633 | PBBMM30633 | Acme Nut Assembly |
| 634 | PBBMM30634 | Swivel Base |
| 635 | PBBMM30635 | Acme Screw Assembly |
| 636-1 | PBBMM30636-1 | Column Base |



| Item No. | Part No. | Description |
|-----------------|-----------------|---------------------------------------|
| 636-2 | PBBMM30636-2 | Tube Column |
| 636-3 | PBBMM30636-3 | M12x50L |
| 636-4 | PBBMM30636-4 | M12 |
| 637 | PBBMM30637 | Rack |
| 638 | PBBMM30638 | Column Head |
| 640 | PBBMM30640 | Column Flange Ring |
| 641 | PBBMM30641 | Hex. Head Screw |
| 642 | PBBMM30642 | Spring Washer |
| 643 | PBBMM30643 | Hex. Socket Head Screw |
| 644 | PBBMM30644 | Spring Washer |
| 645 | PBBMM30645 | Plug |
| 646 | PBBMM30646 | Vise |
| 647 | PBBMM30647 | Eyebolts |
| 648 | PBBMM30PF648 | X-axis Table Power Feed BBMM31PF ONLY |





Busy Bee Tools

BUSY BEE TOOLS 2 YEARS LIMITED WARRANTY

Busy Bee Tools warrants every product to be free from defects in materials and agrees to correct such defects where applicable. This warranty covers **two years** for parts and 90 days for labor (unless specified otherwise), to the original purchaser from the date of purchase but does not apply to malfunctions arising directly or indirectly from misuse, abuse, improper installation or assembly, negligence, accidents, repairs or alterations or lack of maintenance.

Proof of purchase is necessary.

All warranty claims are subject to inspection of such products or part thereof and Busy Bee Tools reserves the right to inspect any returned item before a refund or replacement may be issued. This warranty shall not apply to consumable products such as blades, bits, belts, cutters, chisels, punches etc.

Busy Bee Tools shall in no event be liable for injuries, accidental or otherwise, death to persons or damage to property or for incidental contingent, special or consequential damages arising from the use of our products.

IF THE MACHINE IS ALTERED IN ANY WAY, THE WARRANTY SHALL BE NULL AND VOID.

WARRANTY, RETURNS, REPAIRS AND REPLACEMENTS

To return, repair, or replace a Busy Bee Tools product, you must visit the appropriate Busy Bee Tools showroom or call 1-800-461-BUSY.

For replacement parts directly from Busy Bee Tools, for this machine, please call 1-800-461-BUSY (2879), and have your model number and part number & payment option ready.

- All returned merchandise will be subject to a minimum charge of 15% for re-stocking and handling with the following qualifications.
- Returns must be pre-authorized by us in writing.
- We do not accept collect shipments.
- Items returned for warranty purposes must be insured and shipped pre-paid to the nearest warehouse
- Returns must be accompanied by a copy of your original invoice as proof of purchase. Returns must be in an un-used condition and shipped in their original packaging a letter explaining your reason for the return. Incurred shipping and handling charges are not refundable.
- Busy Bee will repair or replace the item at our discretion and subject to our inspection.
- Repaired or replaced items will be returned to you pre-paid by our choice of carriers.
- Busy Bee reserves the right to refuse reimbursement or repairs or replacement if a third party without our prior authorization has carried out repairs to the item.
- Repairs made by Busy Bee Tools are warranted for 30 days on parts and labor.
- Any unforeseen repair charges will be reported to you for acceptance prior to making the repairs.
- The Busy Bee Parts & Service Departments are fully equipped to do repairs on all products purchased from us except for some products that require the return to their authorized repair depots. A Busy Bee representative will provide you with the necessary information to have this done.
- For faster service it is advisable to contact the nearest Busy Bee location for parts availability prior to bringing your product in for repair.