



6" x 12" SURFACE GRINDER

MODEL SB1023



OWNER'S MANUAL

South Bend Lathe Co.[®]

Hundreds of Thousands of Lathes Sold With a Tradition of Quality Since 1906!



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For Machines Mfg. Since 8/09

Scope of Manual

This manual helps the reader understand the machine, how to prepare it for operation, how to control it during operation, and how to keep it in good working condition. We assume the reader has a basic understanding of how to operate this type of machine, but that the reader is not familiar with the controls and adjustments of this specific model. As with all machinery of this nature, learning the nuances of operation is a process that happens through training and experience. If you are not an experienced operator of this type of machinery, read through this entire manual, then learn more from an experienced operator, schooling, or research before attempting operations. Following this advice will help you avoid serious personal injury and get the best results from your work.

Manual Feedback

We've made every effort to be accurate when documenting this machine. However, errors sometimes happen or the machine design changes after the documentation process—so the manual may not exactly match your machine. If a difference between the manual and machine leaves you in doubt, contact our customer service for clarification.

We highly value customer feedback on our manuals. If you have a moment, please share your experience using this manual. What did you like about it? Is there anything you would change to make it better? Did it meet your expectations for clarity, professionalism, and ease-of-use?

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Updates

For your convenience, any updates to this manual will be available to download free of charge through our website at:

www.southbendlathe.com

Customer Service

We stand behind our machines. If you have any service questions, parts requests or general questions about the machine, feel free to contact us.

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About This Machine

Capabilities

This 6 x 12" Surface Grinder allows you to smooth the surface of metallic workpieces. It utilizes a table that moves on a horizontal plane and a grinding wheel that moves along a vertical axis. By mounting a workpiece to the table, then moving the table and the grinding wheel during the grinding process, extremely small amounts of material can be removed to create high-tolerance flat surfaces.

One example of this type of work may occur when the table surface of a metalworking or woodworking machine needs to be made perfectly flat. By removing the table from the machine and processing it with a surface grinder, a perfectly flat surface can be created.

Another example of this type of work often occurs in the automotive industry. When a head gasket needs replacing, it is common practice to resurface the engine head to make sure it is perfectly flat, in case any warping has occurred. The head can be precisely ground using a surface grinder.

Features

Now that you know the basics of what this machine can do, take a minute to consider its features.

The SB1023 is equipped with easy-to-reach front-mounted handwheels for controlling table movement.

The table travels in the longitudinal direction on a ball-bearing supported table, driven by a rack-and-pinion mechanism. The stand doubles as a storage cabinet where you can keep the necessary tools and extra grinding wheels right where you need them.

The included diamond dresser is used to true the grinding wheel, ensuring high-precision results.

Aside from these features, we designed this machine to be extremely solid and durable. With thick, hardened steel ways, cast-iron construction, and Allen Bradley electrical components, this South Bend surface grinder is built to last.

Identification

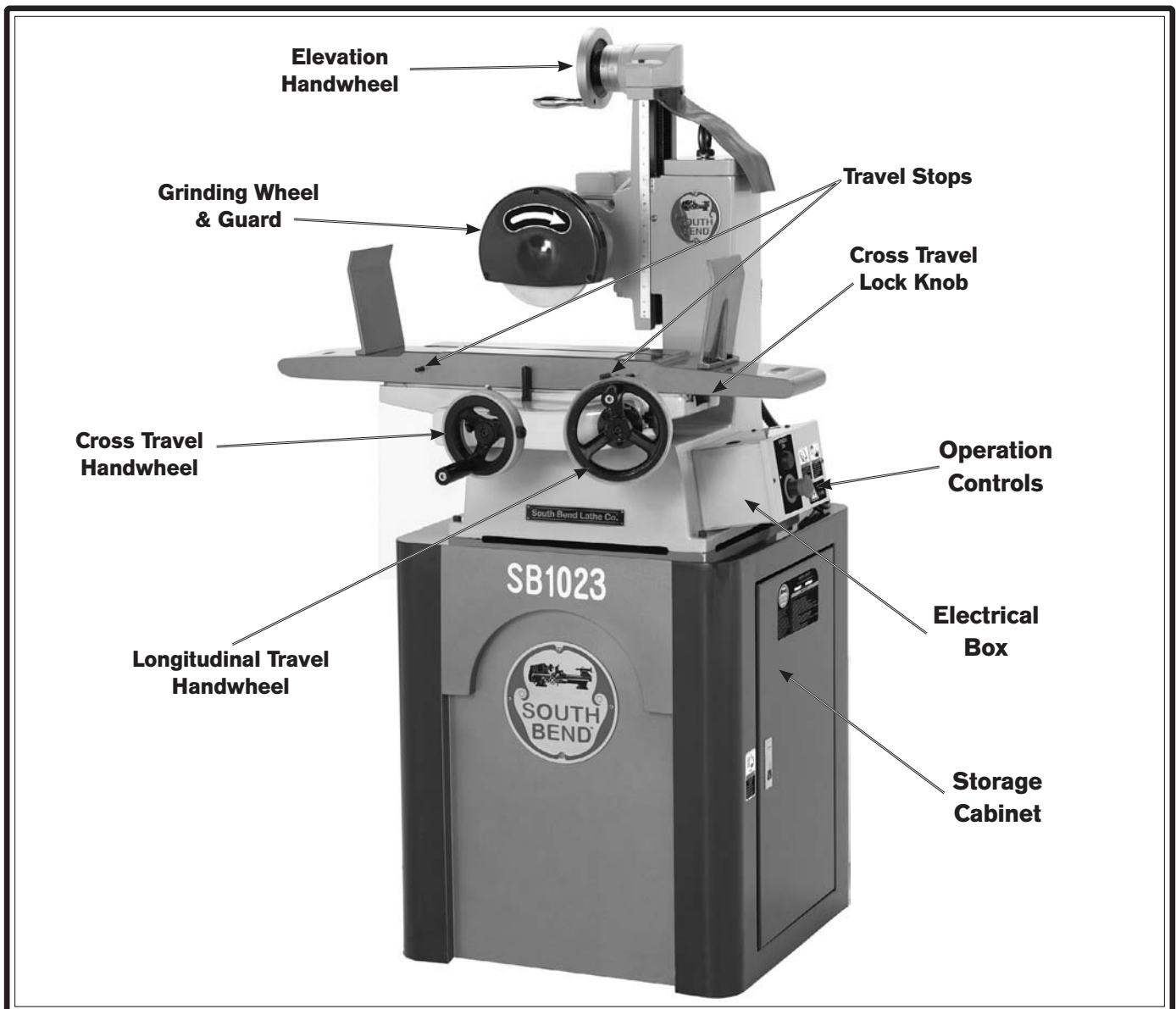


Figure 1. Identification.

!WARNING

Serious personal injury could occur if you connect the machine to power before completing the setup process. **DO NOT** connect power until instructed to do so later in this manual.

!WARNING

Untrained users have an increased risk of seriously injuring themselves with this machine. Do not operate this machine until you have understood this entire manual and received proper training.



Machine Specifications



P.O. Box 2027, Bellingham, WA 98227 U.S.A.
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Model SB1023 6" x 12" Surface Grinder

Product Dimensions:

Weight 540 lbs.
 Length/Width/Height 50¾" x 36½" x 66"
 Footprint (Length/Width)..... 24" x 24"

Shipping Dimensions:

Type Wooden Crate
 Content Machine
 Weight 690 lbs.
 Length/Width/Height 41" x 29" x 65"

Electrical:

Required Power Source 110V or 220V, Single Phase, 60 Hz
 Switch Allen/Bradley Magnetic Contactor w/Thermal Overload
 Switch Voltage 110V
 Cord Length 62"
 Cord Gauge 14 Gauge
 Recommended Circuit Size 15 Amp
 Plug Included Yes
 Plug Type 110V 5-15

Motors:

Spindle Motor

Type TEFC Capacitor Start Induction
 Horsepower..... ¼ HP
 Voltage..... 110V/220V
 Prewired 110V
 Phase Single-Phase
 Amps 9.5/5 Amp
 Speed..... 3450 RPM
 Cycle 60 Hz
 Number Of Speeds 1
 Power Transfer..... Integral Spindle
 Bearings..... Shielded and Permanently Sealed

Main Specifications:**Operation Information**

Maximum Distance Wheel To Table.....	8¼"
Maximum Distance Table To Spindle Center.....	12"
Long Stroke	14"
Maximum Grinding Width.....	8⅞"
Spindle Taper.....	5½ Degrees
Spindle Speed.....	3450 RPM
Hub Diameter.....	1¼"
Grinding Wheel Diameter	7"
Grinding Wheel Width.....	½"
Grinding Wheel Bore.....	1¼"
Floor To Table Height.....	40"
Column Width.....	5⅞"
Column Length	5⅞"
Vertical Handwheel Graduation.....	0.0005"
Vertical Handwheel Revolution	0.05"
Crossfeed Handwheel Graduation	0.001"
Crossfeed Handwheel Revolution	0.1"
Longitudinal Travel.....	14"
Cross Travel	8⅞"

Table

Table Length.....	12⅞"
Table Width.....	5 ¹⁵ / ₁₆ "
Table Thickness	2.2"
T-Slot Width.....	½"
T-Slot Height.....	¾"
Stud Size.....	½"

Construction

Base Construction Material	Meehanite Cast Iron
Body Construction Material.....	Meehanite Cast Iron
Table Construction Material.....	Meehanite Cast Iron
Paint	Urethane
Spindle Bearing Type.....	Angular Contact, P5 Class (ABEC-5)

Other Specifications:

Country Of Origin	Taiwan
Warranty.....	1 Year
Serial Number Location.....	Machine Data Label, Cabinet Door
Assembly Time.....	1 Hour

Features:

Allen-Bradley Electrical Components
 Storage Cabinet
 Grinding Wheel Included
 Swedish SKF Bearings
 Steel Ball Bearing Slideways for Super Smooth and Precise Operation
 Excellent South Bend Uncompromising Quality
 Diamond Wheel Dressing Tool w/Base
 Balancing Arbor and Hub
 Hub Puller
 Toolbox w/Tools Included

Understanding Risks of Machinery

Operating all machinery and machining equipment can be dangerous or relatively safe depending on how it is installed and maintained, and the operator's experience, common sense, risk awareness, working conditions, and use of personal protective equipment (safety glasses, respirators, etc.).

The owner of this machinery or equipment is ultimately responsible for its safe use. This responsibility includes proper installation in a safe environment, personnel training and usage authorization, regular inspection and maintenance, manual availability and comprehension, application of safety devices, integrity of cutting tools or accessories, and the usage of approved personal protective equipment by all operators and bystanders.

The manufacturer of this machinery or equipment will not be held liable for injury or property damage from negligence, improper training, machine modifications, or misuse. Failure to read, understand, and follow the manual and safety labels may result in serious personal injury, including amputation, broken bones, electrocution, or death.

The signals used in this manual to identify hazard levels are defined as follows:



Death or catastrophic harm WILL occur.



Moderate injury or fire MAY occur.



Death or catastrophic harm COULD occur.



Machine or property damage may occur.

Basic Machine Safety

- 1. Owner's Manual:** All machinery and machining equipment presents serious injury hazards to untrained users. To reduce the risk of injury, anyone who uses THIS item MUST read and understand this entire manual before starting.
- 2. Personal Protective Equipment:** Operating or servicing this item may expose the user to flying debris, dust, smoke, dangerous chemicals, or loud noises. These hazards can result in eye injury, blindness, long-term respiratory damage, poisoning, cancer, reproductive harm or hearing loss. Reduce your risks from these hazards by wearing approved eye protection, respirator, gloves, or hearing protection.
- 3. Trained/Supervised Operators Only:** Untrained users can seriously injure themselves or bystanders. Only allow trained and properly supervised personnel to operate this item. Make sure safe operation instructions are clearly understood. If electrically powered, use padlocks and master switches, and remove start switch keys to prevent unauthorized use or accidental starting.
- 4. Guards/Covers:** Accidental contact with moving parts during operation may cause severe entanglement, impact, cutting, or crushing injuries. Reduce this risk by keeping any included guards/covers/doors installed, fully functional, and positioned for maximum protection.

- 5. Entanglement:** Loose clothing, gloves, neckties, jewelry or long hair may get caught in moving parts, causing entanglement, amputation, crushing, or strangulation. Reduce this risk by removing/securing these items so they cannot contact moving parts.
- 6. Mental Alertness:** Operating this item with reduced mental alertness increases the risk of accidental injury. Do not let a temporary influence or distraction lead to a permanent disability! Never operate when under the influence of drugs/alcohol, when tired, or otherwise distracted.
- 7. Safe Environment:** Operating electrically powered equipment in a wet environment may result in electrocution; operating near highly flammable materials may result in a fire or explosion. Only operate this item in a dry location that is free from flammable materials.
- 8. Electrical Connection:** With electrically powered equipment, improper connections to the power source may result in electrocution or fire. Always adhere to all electrical requirements and applicable codes when connecting to the power source. Have all work inspected by a qualified electrician to minimize risk.
- 9. Disconnect Power:** Adjusting or servicing electrically powered equipment while it is connected to the power source greatly increases the risk of injury from accidental startup. Always disconnect power **BEFORE** any service or adjustments, including changing blades or other tooling.
- 10. Secure Workpiece/Tooling:** Loose workpieces, cutting tools, or rotating spindles can become dangerous projectiles if not secured or if they hit another object during operation. Reduce the risk of this hazard by verifying that all fastening devices are properly secured and items attached to spindles have enough clearance to safely rotate.
- 11. Chuck Keys or Adjusting Tools:** Tools used to adjust spindles, chucks, or any moving/rotating parts will become dangerous projectiles if left in place when the machine is started. Reduce this risk by developing the habit of always removing these tools immediately after using them.
- 12. Work Area:** Clutter and dark shadows increase the risks of accidental injury. Only operate this item in a clean, non-glaring, and well-lighted work area.
- 13. Properly Functioning Equipment:** Poorly maintained, damaged, or malfunctioning equipment has higher risks of causing serious personal injury compared to those that are properly maintained. To reduce this risk, always maintain this item to the highest standards and promptly repair/service a damaged or malfunctioning component. Always follow the maintenance instructions included in this documentation.
- 14. Unattended Operation:** Electrically powered equipment that is left unattended while running cannot be controlled and is dangerous to bystanders. Always turn the power **OFF** before walking away.
- 15. Health Hazards:** Certain cutting fluids and lubricants, or dust/smoke created when cutting, may contain chemicals known to the State of California to cause cancer, respiratory problems, birth defects, or other reproductive harm. Minimize exposure to these chemicals by wearing approved personal protective equipment and operating in a well ventilated area.
- 16. Difficult Operations:** Attempting difficult operations with which you are unfamiliar increases the risk of injury. If you experience difficulties performing the intended operation, **STOP!** Seek an alternative method to accomplish the same task, ask a qualified expert how the operation should be performed, or contact our Technical Support for assistance.

Additional Surface Grinder Safety

- 1. Eye Protection:** Grinding causes small particles to become airborne at a high rate of speed. ALWAYS wear eye protection when using this machine.
- 2. Wheel Speed Rating:** Wheels operated at a faster speed than rated for may break or fly apart. Before mounting a new wheel, be sure the wheel RPM rating is equal or higher than the speed of the grinder.
- 3. Wheel Flanges:** Only use the flanges included with the grinder when mounting wheels. Other flanges may not properly secure the wheel and could cause the wheel to fly off or break apart.
- 4. Ring Test:** Perform a "ring test" on grinding wheels before installation to ensure that they are safe to use. A wheel that does not pass the ring test may break or fly apart during operation.
- 5. Starting Grinder:** If a wheel IS damaged, it will usually fly apart shortly after start-up. To protect yourself, always stand to the side of the grinder when turning it ON and allow it to gain full speed before standing in front of it.
- 6. Lung Protection:** Grinding produces hazardous dust, which may cause long-term respiratory problems if breathed. Always wear a NIOSH approved dust mask or respirator when grinding.
- 7. Workpiece Contact:** A heavy impact on a grinding wheel can cause it to break or fly apart, causing serious personal injuries. Avoid jamming the workpiece into the wheel to reduce this risk.
- 8. Hand/Wheel Contact:** Grinding wheels have the capability of removing a lot of skin fast. Make sure the workpiece is securely clamped to the table, then position your hands a safe distance away when grinding. Avoid wearing gloves as they may get caught in the grinding wheel and cause even more serious entanglement injuries.
- 9. Cracked Wheel:** Cracked wheels may break and fly apart during operation. Replace cracked wheels immediately!
- 10. Fire Hazard: DO NOT** connect a surface grinder to a dust collection system that is used with woodworking machines. Sparks emitted from the grinding process may ignite wood particles, resulting in fire or explosion. Only use a metal-specific dust collection system with this machine.

Preparation Overview

The purpose of the preparation section is to help you prepare your machine for operation.

The typical preparation process is as follows:

1. Unpack the machine and inventory the contents of the box/crate.
2. Clean the machine and its components.
3. Identify an acceptable location for the machine and move it to that location.
4. Level the machine and either bolt it to the floor or place it on mounts.
5. Assemble the loose components and make any necessary adjustments or inspections to ensure the machine is ready for operation.
6. Connect the machine to the power source.
7. Test run the machine to make sure it functions properly and is ready for operation.

Things You'll Need

During the setup process, operation, and maintenance of your machine, you'll need the following items:

For Lifting

- A forklift or other power lifting device rated for the weight of the machine.
- Lifting Strap or Chain (rated for at least 1500 lbs.)

For Power Connection

- A machine power connection that meets federal, state, and local electrical codes. An electrician may be required.

For Assembly

- Assistant
- Cotton Rags
- Mineral Spirits
- Safety Glasses
- Wrench 14mm
- Wrench 19mm
- Oil Can with any General Machine Oil

Unpacking

This item was carefully packaged to prevent damage during transport. If you discover any damage, please immediately call Customer Service at (360) 734-1540 for advice. You may need to file a freight claim, so save the containers and all packing materials for possible inspection by the carrier or its agent.

Inventory

Main Inventory: (Figure 2) Qty
A. Machine w/Wheel Installed 1

Tool Box Inventory: (Figure 3) Qty
B. Tool Box 1
C. Phillips Head Screwdriver #2..... 1
D. Hub Puller 1
E. Handles..... 2
F. Balancing Arbor 1
G. Machine Foot Assemblies 5
H. Box-End Wrench 14 x 17mm..... 1
I. Open-End Wrench 12 x 14mm 1
J. Adjustable Spanner Wrench 1
K. Diamond Dresser 1
L. Diamond Dresser Base 1
M. Chuck Mounting Hex Bolts 1/2-12 x 2" w/Nuts 2
N. Hex Wrench 4mm 1
O. Bottle for Oil..... 1

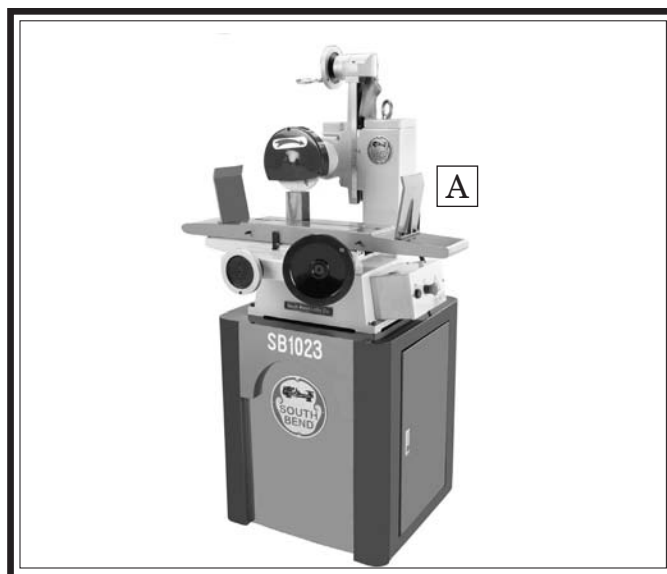


Figure 2. Main inventory.

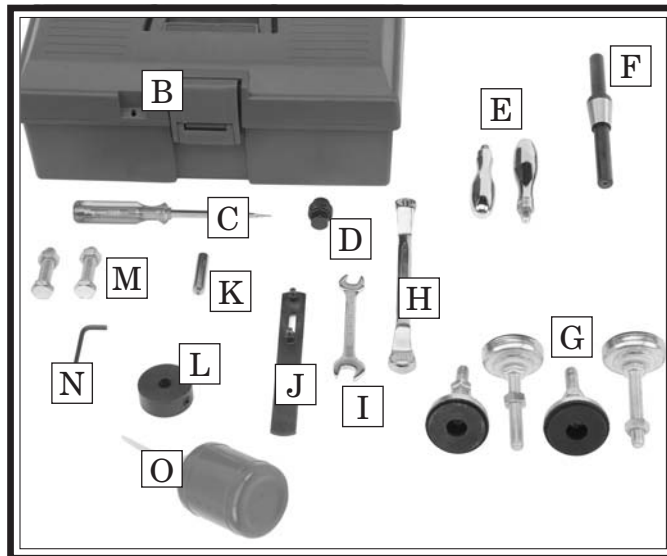


Figure 3. Small parts inventory.

Cleaning & Protecting

The unpainted surfaces are coated at the factory with a heavy-duty rust preventative that prevents corrosion during shipment and storage. The benefit of this rust preventative is that it works very well. The downside is that it can be time-consuming to thoroughly remove.

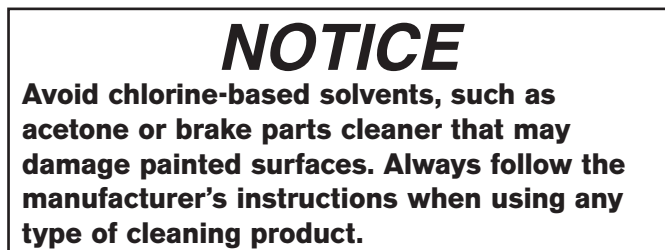
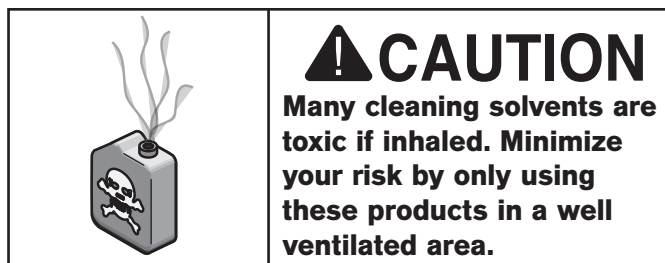
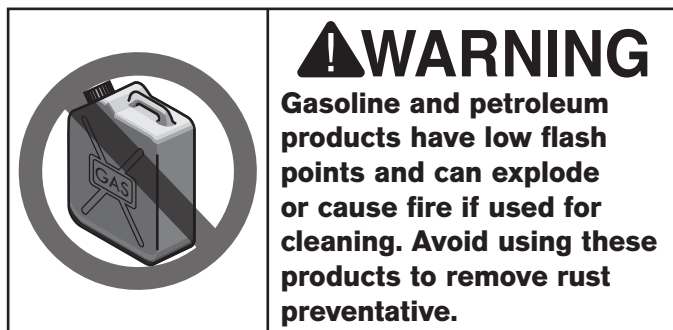
Be patient and do a careful job when cleaning and removing the rust preventative. The time you spend doing this will reward you with smooth-sliding parts and a better appreciation for the proper care of the unpainted surfaces.

Although there are many ways to successfully remove the rust preventative, we have cleaned thousands of machines and found the following process to be the best balance between efficiency and minimized exposure to toxic fumes or chemicals.

Before cleaning, gather the following:

- Disposable rags
- Cleaner/degreaser (certain citrus-based degreasers work extremely well and they have non-toxic fumes)
- Safety glasses & disposable gloves

Note: Automotive degreasers, mineral spirits, or WD•40 can be used to remove rust preventative. Before using these products, though, test them on an inconspicuous area of a painted area to make sure they will not damage it.



Basic steps for removing rust preventative:

1. Put on safety glasses and disposable gloves.
 2. Coat all surfaces that have rust preventative with a liberal amount of your cleaner or degreaser and let them soak for a few minutes.
 3. Wipe off the surfaces. If your cleaner or degreaser is effective, the rust preventative will wipe off easily.
- Note:** To clean off thick coats of rust preventative on flat surfaces, such as beds or tables, use a PLASTIC paint scraper to scrape off the majority of the coating before wiping it off with your rag. (Do not use a metal scraper or it may scratch the surface.)
4. Repeat **Steps 2–3** as necessary until clean, then coat all unpainted surfaces with a quality metal protectant or light oil to prevent rust.

Location

Physical Environment

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

Electrical Installation

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

Lighting

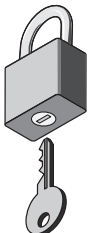
Lighting around the machine must be adequate enough that operations can be performed safely. Shadows, glare, or strobe effects that may distract or impede the operator must be eliminated.

Weight Load

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

Space Allocation

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

	<p>⚠ CAUTION Children or untrained people may be seriously injured by this machine. Only install in an access restricted location.</p>
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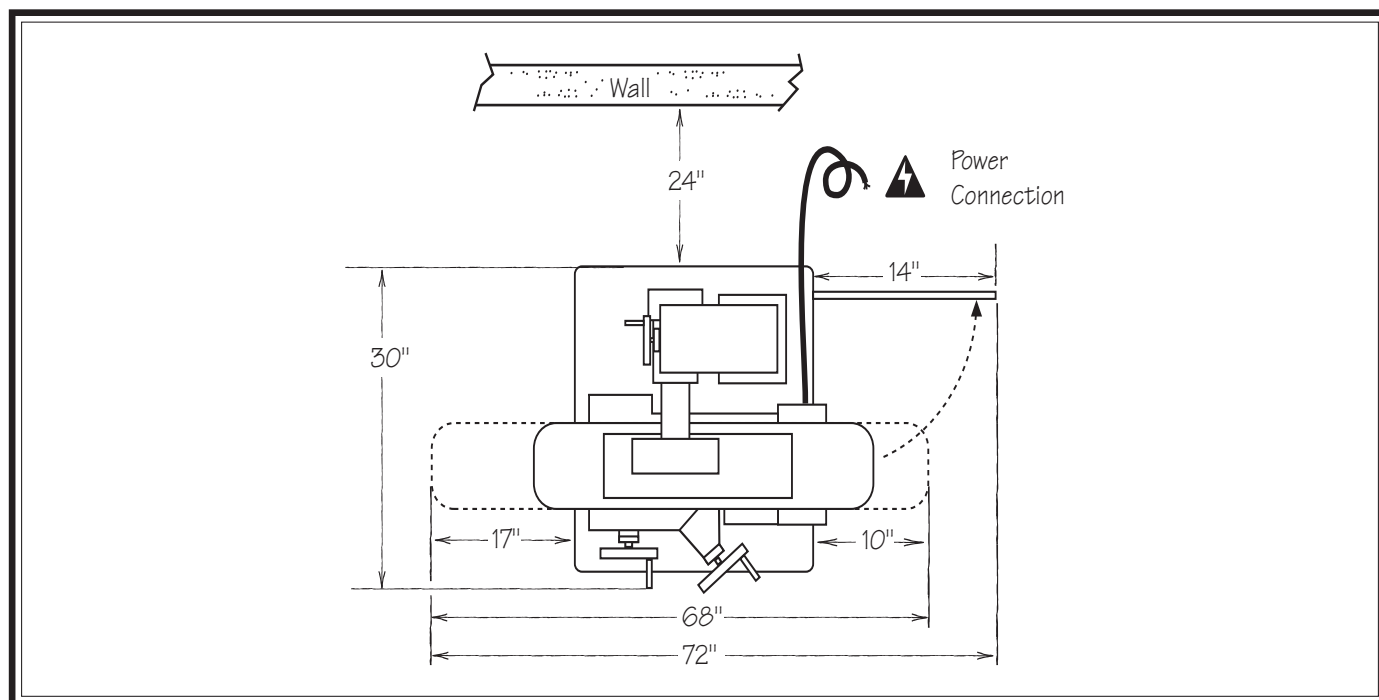
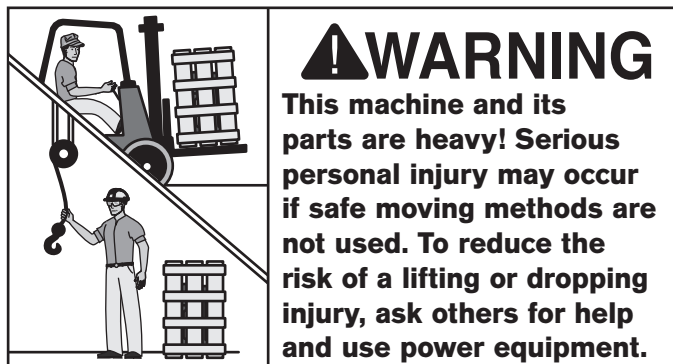


Figure 4. Space required for full range of movement.

Lifting & Moving



Unbolt the machine from the pallet and make sure that the table is locked in place. Connect a chain or lifting strap to the lifting hook on the machine (**Figure 5**), use a hoist or forklift to lift the machine off the pallet, and move it to the suitable location. All hoisting equipment and straps must be rated to lift at least 1500 lbs.

NOTICE

Never attempt to move this machine without first locking the table in place. If the machine is slightly tilted, the table could uncontrollably slide, fall off of the machine and cause machine damage or severe injury.



Figure 5. Lifting location.

Leveling & Mounting

Generally, you can either bolt your machine to the floor or mount it on machine mounts. Although not required, we recommend that you secure the machine to the floor and level it while doing so. Because this is an optional step and floor materials may vary, hardware for securing the machine to the floor is not included.

NOTICE

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

Leveling

Leveling machinery helps precision components, such as bed ways, remain straight and flat during the lifespan of the machine. Components on an unlevelled machine may slowly twist due to the dynamic loads placed on the machine during operation.

For best results, use a precision level that is at least 12" long and sensitive enough to show a distinct movement when a 0.003" shim (approximately the thickness of one sheet of standard newspaper) is placed under one end of the level.

See the figure below for an example of a high precision level.

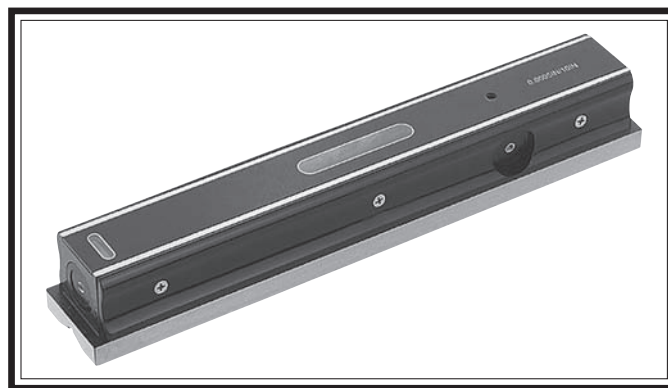


Figure 6. Example of a precision level.

Assembly

After the machine is placed in the final location, and before the lifting apparatus is removed, you should install the machine feet. Included with your machine are four cushioned feet with built-in adjustment studs (see **Figure 7**). These feet are easily installed and provide for accurate machine leveling.

To install the feet:

1. Using lifting equipment and wooden blocks, raise and support the machine base so there is approximately 5" between the floor and underside of the base.
2. Remove the jam nuts from the foot studs.
3. Apply any general-purpose automotive grease to the stud threads.
4. Thread the studs into the machine base from the bottom up until the studs emerge from the cabinet floor approximately 2" (see **Figure 7**).

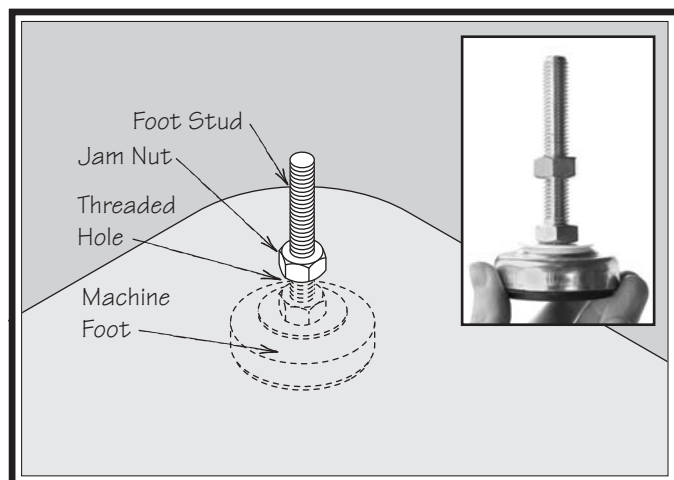


Figure 7. Machine feet.

5. Thread the jam nuts onto the protruding studs but do not tighten them at this time.
6. Place the machine onto the floor.
7. Using a precision level on the machine table, adjust the feet studs, so the machine is level from side-to-side and front-to-back.

8. Use a 19mm wrench to tighten the jam nuts inside of the cabinet and lock the feet studs into place.

Note: Over the course of the next six months, periodically verify that the machine is still level, and re-adjust the feet as required.

9. Rotate the top handwheel counterclockwise to raise the headstock slightly. Then remove the wood support block (see **Figure 8**).

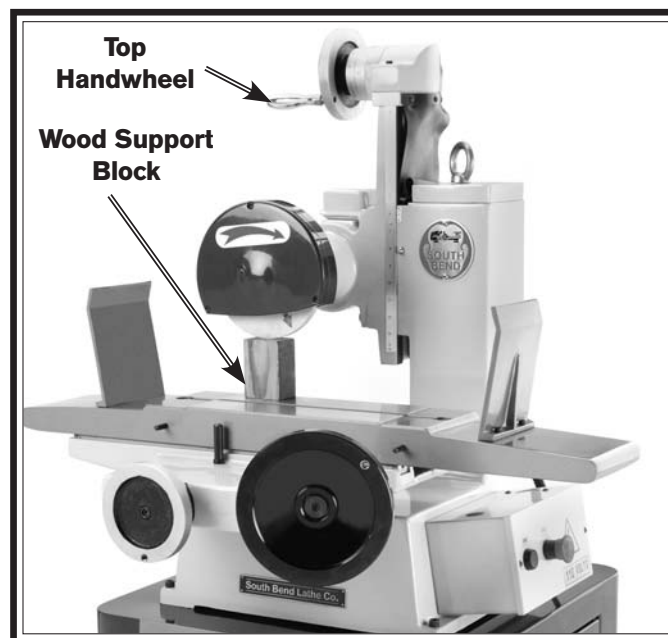


Figure 8. Support block.

10. Using a 14mm wrench, install the two handles into the handwheels (**Figure 9**).

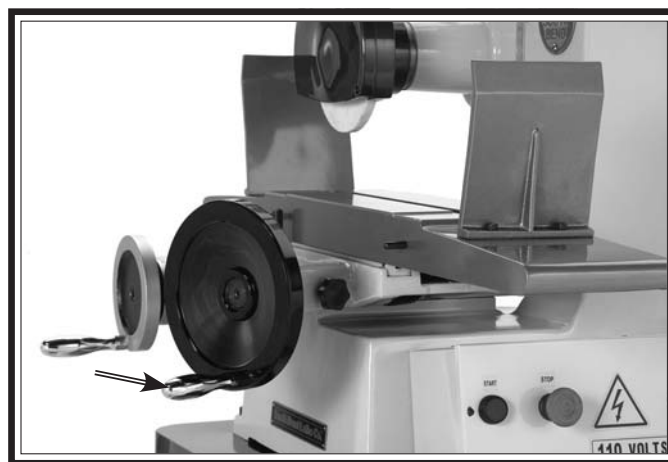
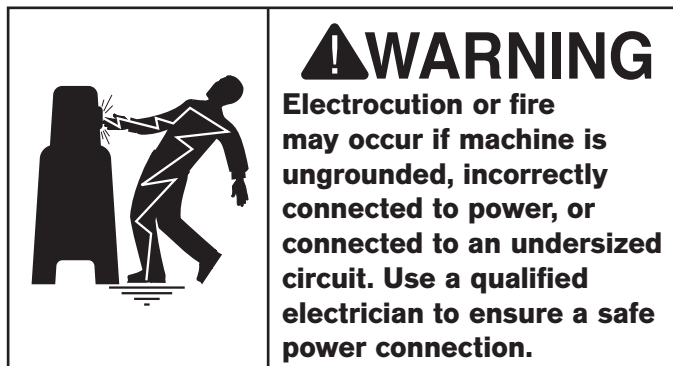


Figure 9. Headstock height handwheel.

Power Connection



Once your machine is set up and assembled as previously described in this manual, it is ready to be connected to the power source.

Note About Extension Cords: Using an incorrectly sized extension cord may decrease the life of electrical components on your machine.

SB1023 110V (Prewired)

Required Power Source..... 110V, 1-Phase, 60Hz
 Full Load Amp Draw 9.5 Amps
 Phase 1-Phase
 Frequency 60 Hz
 Minimum Circuit Size 15 Amps
 Included Plug NEMA 5-15
 Minimum Extension Cord Size 14 AWG
 Maximum Extension Cord Length..... 50 ft.

SB1023 (220V Option)

Required Power Source..... 220V, 1-Phase, 60Hz
 Full Load Amp Draw 5 Amps
 Phase 1-Phase
 Frequency 60 Hz
 Minimum Circuit Size 15 Amps
 Recommended Plug/Receptacle NEMA 6-15
 Minimum Extension Cord Size 16 AWG
 Maximum Extension Cord Length..... 50 ft.

220V Conversion for SB1023

Wiring diagrams are provided in the back of this manual (**Page 36**) showing the Model SB1023 wired for both 110V and 220V. Refer to these diagrams when following this procedure. Additionally, you must purchase the 220V conversion kit in order to complete the conversion. *Call our parts department at (417) 886-2954 and order part number PSB1023180.*

To convert the Model SB1023 to operate on 220V power:

1. DISCONNECT MACHINE FROM POWER!
2. Rewire the motor for 220V, as shown in the diagram on the inside of the motor junction box. If there is not a diagram in the junction box, use the diagram in this manual (**Page 36**).
3. Replace the contactor on the machine with the contactor from the 220V conversion kit. Set the amp dial to 5.5A
4. Replace the power cord plug with a NEMA 6-15 plug.

Initial Lubrication

Your machine was lubricated at the factory, but we strongly recommend that you inspect all lubrication points yourself and provide additional lubrication if necessary. Refer to **Lubrication on Page 30** for specific locations.

Test Run

After all preparation steps have been completed, the machine and its safety features must be tested to ensure correct operation. If you discover a problem with the operation of the machine or its safety components, do not operate it further until you have resolved the problem.

Refer to **Troubleshooting on Page 34** for solutions to common problems that may occur with surface grinders. If you need additional help, contact our Technical Support at (360) 734-1540.

To test run your machine:

1. Read and follow the safety instructions at the beginning of the manual, take the required safety precautions, and make sure the machine is set up and adjusted properly.
2. Ring test the grinding wheel, and install the wheel onto the spindle.

Refer to **Ring Test on Page 25**, and **Installing & Removing Grinding Wheels on Page 20** for procedures.

3. Clear away all tools and objects used during assembly and preparation.
4. Connect the machine to the power source.
5. Push the STOP button in, then twist it clockwise so it pops out. When the STOP button pops out, the switch is reset and ready for operation.
6. Verify that the machine is operating correctly by pushing the START button.

- When operating correctly, the machine runs smoothly with little or no vibration or rubbing noises.

- Investigate and correct strange or unusual noises or vibrations before operating the machine further. Always stop the machine and disconnect it from power before investigating or correcting potential problems.

7. Press the STOP button.

8. WITHOUT resetting the switch, press the START button. The machine should not start.

- If the machine does not start, the STOP button safety feature is working correctly.
- If the machine does start (with the stop button pushed in), immediately disconnect power to the machine. The STOP button safety feature is not working correctly. This safety feature must work properly before proceeding with regular operations. Call Tech Support for help.

Inspections & Adjustments

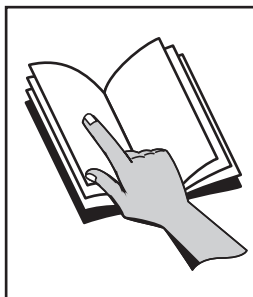
The following list of adjustments were performed at the factory before your machine was shipped:

- **Ring Test on Page 25**
- **Wheel Dressing on Page 25**
- **Wheel Balancing on Page 26**
- **Lubrication on Page 30**
- **Handwheel Backlash Adjustment on Page 32**
- **Column & Table Gib Adjustment on Page 32**

Operation Overview

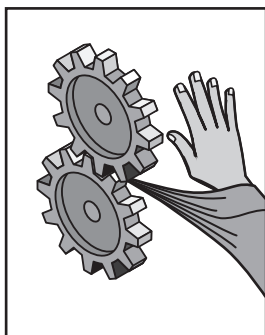
The purpose of the operation section is to familiarize you with the basic controls, terminology, capabilities, and adjustments that are necessary to use this machine.

To better understand the remaining parts of this section, please take a moment to read this overview.



!WARNING

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



!WARNING

Loose hair, clothing, or jewelry could get caught in machinery and cause serious personal injury. Keep these items away from moving parts at all times to reduce this risk.



!WARNING

During operation, small metal chips may become airborne, leading to serious eye injury. Wear safety glasses to reduce this risk.

To complete a typical operation, the operator does the following:

1. Examines the grinding wheel to make sure it is suitable for use t
 2. Examines the workpiece to make sure it is properly prepared for grinding.
 3. Uses the elevation handwheel to raise the grinding wheel assembly to provide clearance for mounting the workpiece.
 4. Wipes the table surface clean to remove any debris that may interfere with the clamping process.
 5. Uses a magnetic chuck to hold the workpiece to the table, then turns the elevation handwheel to lower the grinding wheel to just above the top surface of the workpiece.
 6. Turns the grinder **ON**, then stands aside while the wheel reaches full speed.
 7. Performs the grinding operation.
- Note: Because the method for performing each grinding operation varies, specific actions are not listed here.*
8. When the grinding operation is complete, turns the grinder **OFF** and allows the grinding wheel to come to a complete stop.
 9. Removes the workpiece from the table.

Controls

Refer to **Figures 10–11** and the following descriptions to become familiar with the basic controls of this machine.

- A. Longitudinal Travel Handwheel:** Moves the table back and forth along the longitudinal axis (X-axis).
- B. Center Table Stop:** Provides a barrier for the table stops to limit table movement.
- C. Table Stop:** Adjusts along the length of the table to limit longitudinal travel.
- D. Cross Axis Lock Knob:** Locks the cross table movement (Y-Axis).
- E. Elevation Handwheel:** Controls vertical movement of the grinding wheel assembly.
- F. Cross Travel Handwheel:** Moves the table forward and backward along the cross axis (Y-axis).

G. Spindle On Button: Supplies power to the grinding wheel motor.

H. Emergency Stop (Off) Button: Cuts power to the grinding wheel motor.



Figure 11. Control panel.



Figure 10. Basic controls.

Wheel Selection

Most grinding wheels from major manufacturers are marked in a somewhat uniform manner. Understanding these markings will help you understand the capabilities of various wheels. Always refer to the manufacturer's grinding recommendations when selecting a wheel for your project.

The grinding wheel you choose will depend on several factors related to the operation you plan to perform. The hardness of the material you will be grinding and the surface finish you desire are the two primary factors to consider when selecting a grinding wheel.

An example of the basic format for wheel numbering is shown below. The wheel in this example is a "36A60LV".

Prefix	Abrasive Type	Grit Size	Grade	Bond Type
36	A	60	L	V

The prefix is a manufacturer-specific designation and will vary depending on the manufacturer.

Use the charts below as a basic wheel selection outline for most grinding operations.

Abrasive Type

Abrasive Type	Application
A	Aluminum Oxide: For grinding common steel.
WA	White Aluminum Oxide: For grinding harder metals (heat treated steel, carbon steel, alloy steel, etc.).
H	For grinding high speed steel.
C	Silicon Carbide: For grinding cast iron and non-ferrous metals.
CG	Ceramic Grain: For extremely hard metals, such as tungsten carbide.

Grit Size

The ideal grit for an operation depends on a number of considerations. Use the table below to choose a grit suitable for your desired results.

Operation Consideration	Results	
	Coarse Grit (10–46)	Fine Grit (54–180)
Material Removal	Increased	Decreased
Surface Finish	Rough	Smooth
Workpiece Hardness	Soft	Hard
Width of Cut	Wide	Narrow

Grade

The grade of a wheel is an indicator of its hardness based on an alphabetical scale in which A is the softest and Z is the hardest.

Operation Consideration	Wheel Hardness	
	Soft A–M	Hard N–Z
Workpiece Hardness	Hard	Soft
Width of Cut	Wide	Narrow
Feed Rate	Slow	Fast
Wheel Speed	Fast	Slow

Removing & Installing Grinding Wheels

If you must conduct a ring test, the grinding wheel must be removed and reinstalled onto the hub. However, when doing this, remember that overtightening or rotating the spanner nut in the incorrect direction can damage threads, crack the grinding wheel, and make grinding wheel removal more difficult than necessary.

To remove and install a grinding wheel:

1. DISCONNECT MACHINE FROM POWER!
2. Place a sheet of plywood on top of the table to protect the table (**Figure 12**), and open the grinding wheel cover.

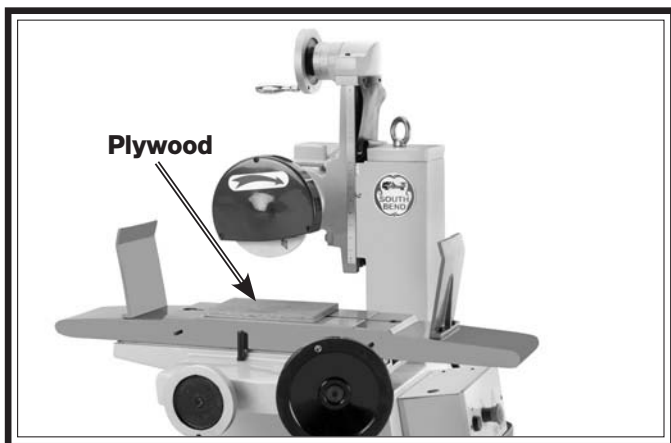


Figure 12. Protecting table.

3. Position a 12mm wrench on the spindle shaft that protrudes from the motor fan cover (**Figure 13**).



Figure 13. Spindle shaft.

4. Position the spanner wrench on the spanner nut (**Figure 14**).

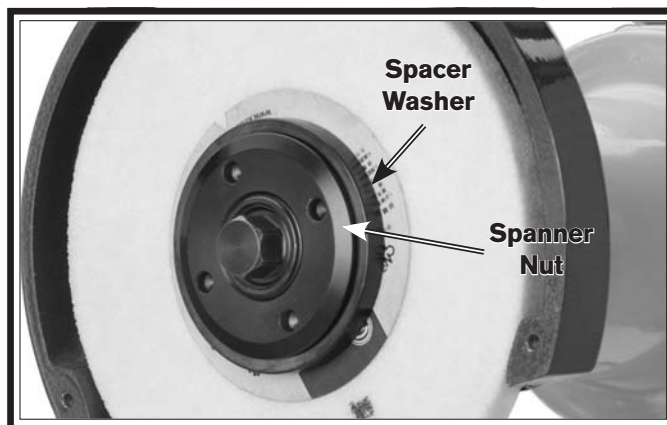


Figure 14. Wheel spanner nut.

5. Using the wrenches, loosen the spanner nut in the direction shown in **Figure 15**.

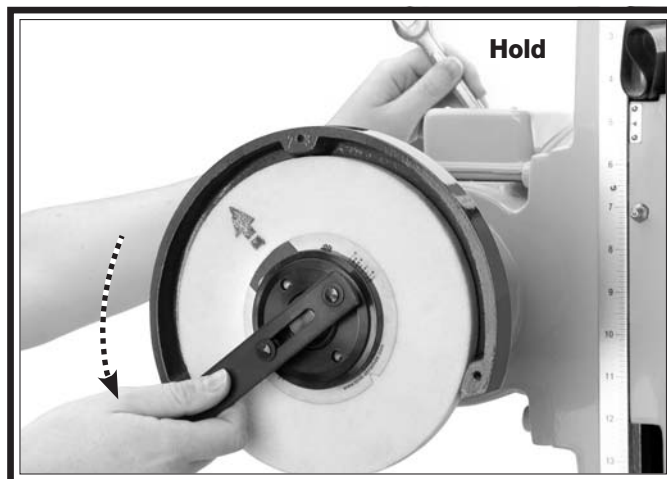


Figure 15. Removing spanner nut.

6. Unthread the spanner nut (**Figure 16**).



Figure 16. Exposing wheel spacer washer.

7. Remove the grinding wheel, as shown in **Figure 17**.



Figure 17. Removing wheel.

8. Wipe the grinding wheel seat shown in **Figure 18** so no paper is stuck to the seat. The seat must be clean and free of debris.

Note: Wiping the threads, grinding wheel seat, and hub with a lightly-oiled rag is acceptable to prevent rust.



Figure 18. Wheel mounting hub.

9. Inspect the paper washers for missing pieces on both sides of the grinding wheel (**Figure 19**). The paper washers are cushions between the spacer washer and the grinding wheel seat. Without the washers, cracks can spawn from the center of the wheel when the spanner nut is tightened. Over time, these cracks can radiate outward and the wheel may explode possibly causing injury.

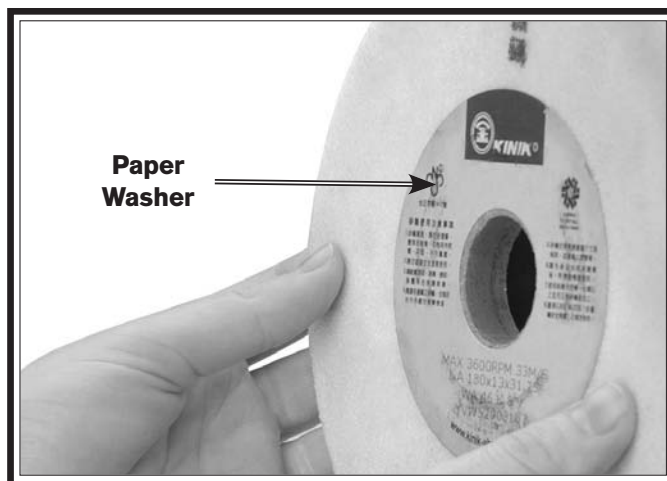


Figure 19. Important paper washer.

Note: If you need to replace or install new paper washers, replacements can be cut out of any thick construction paper or card stock. Regular notebook paper or paper from a copy machine is not acceptable, as it is too thin to provide the required cushion. Don't forget to record the wheel type and RPM rating on the new paper washer.

10. Ring test the grinding wheel, even if it is new, then if the wheel is free of cracks, slide the wheel onto the hub. Refer to **Ring Test** on **Page 25** for details.
11. Complete the preceding steps in the reverse order to install the grinding wheel.
- After the grinding wheel is installed, you will have to use the dressing tool to true-up the wheel. Refer to **Wheel Dressing** on **Page 25** for details.
 - When the wheel runs true, the hub and grinding wheel must then be removed and balanced as an assembly since grinding wheels can have different densities at various points of the wheel. The wheel will only deliver superior results if it is properly trued-up and balanced. Refer to **Removing & Installing Wheel & Hub** on **Page 22** to remove the assembly; and refer to **Wheel Balancing** on **Page 26** for specific procedures on balancing.

Removing & Installing Wheel & Hub

When the wheel has been ring tested, and dressed, the wheel and hub must be removed and balanced as an assembly. However, remember that overtightening or rotating the spindle bolt in the incorrect direction can damage threads, crack the grinding wheel, and make grinding wheel removal more difficult than it needs to be.

When removing and installing the hub onto the spindle or balancing arbor, keep in mind that the mating surfaces between these components have the single most important effect on your final balancing results. Hubs, spindles, and balancing arbors can be easily damaged during installation and removal. Just one grain of sand, small burr, or hidden ding in either mating surface will undermine all balancing results. Make sure that all mating surfaces are carefully stoned to establish a perfect fit.

NEVER pound on a hub or arbor for any reason. This will permanently displace metal and change high tolerance dimensions.

NEVER use a hydraulic press to install the balancing arbor or attempt to use a heat differential between parts to establish a shrink-fit. This will change high tolerance dimensions.

NEVER twist-fit the hub onto the spindle or the balancing arbor. Doing this can gall the tapered surfaces. Instead use a small arbor press with light pressure to install and remove the balancing arbor from the hub.

ALWAYS make sure that all mating surfaces are immaculately cleaned before hub or arbor installation. Use a lint-free photography lens cloth that is slightly oiled with a thin machine oil. For the best fit, the mating surfaces must be polished without having a wet layer of oil on them. The oil should only be in the pores of the metal.

To remove and reinstall the wheel and hub:

1. DISCONNECT MACHINE FROM POWER!
2. Place a sheet of plywood or similar on top of table to protect the table (**Figure 20**), and open the grinding wheel cover.



Figure 20. Protecting the table.

3. Position the spindle wrench on the spindle bolt (**Figure 21**).

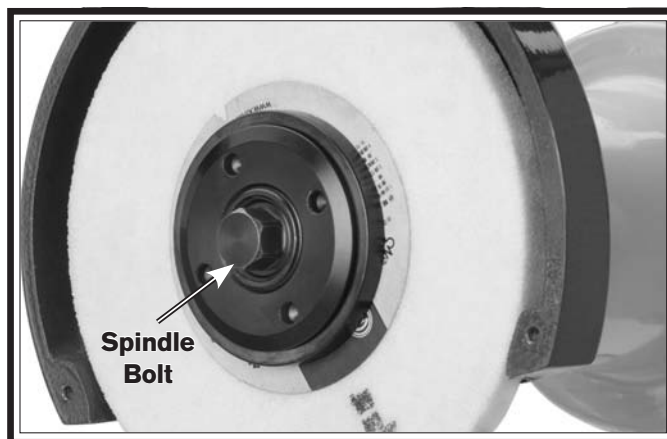


Figure 21. Retaining fasteners.

4. Position a 12mm open end wrench on the spindle shaft that protrudes from the motor fan cover (**Figure 22**).



Figure 22. Spindle shaft.

5. Using the wrenches, turn the spindle bolt clockwise as shown in **Figure 23**.

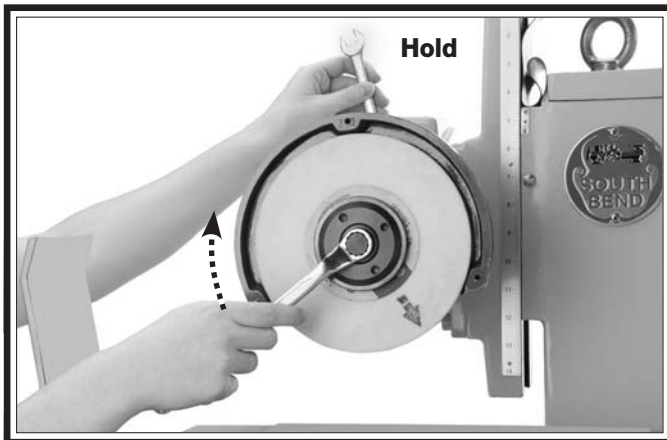


Figure 23. Hub removal.

6. Remove the spindle bolt (**Figure 24**).

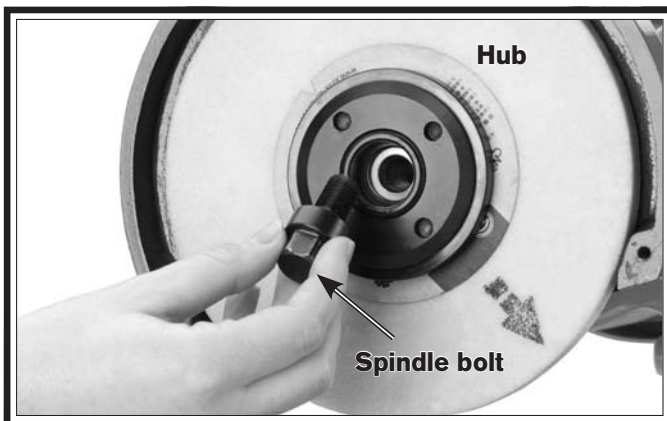


Figure 24. Spindle bolt removal.

7. Oil the threads and thread the hub puller (**Figure 25**) into the hub until it stops.

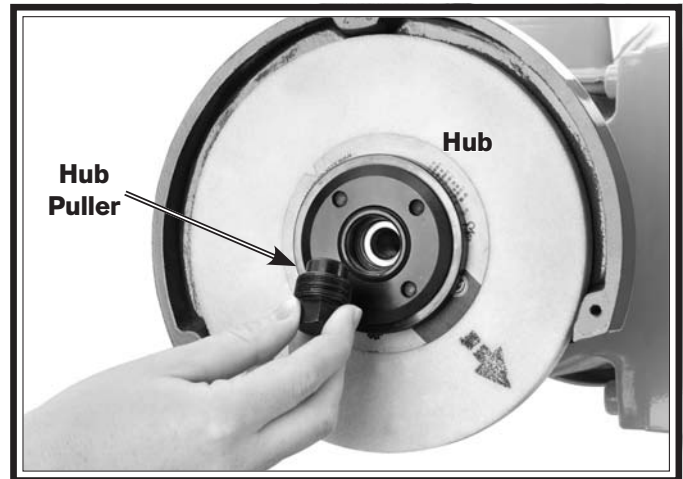


Figure 25. Hub puller.

8. While holding the wheel and hub from sliding off of the spindle, tighten the hub puller bolt until the wheel and hub assembly are pulled off the spindle as shown in **Figure 26**.

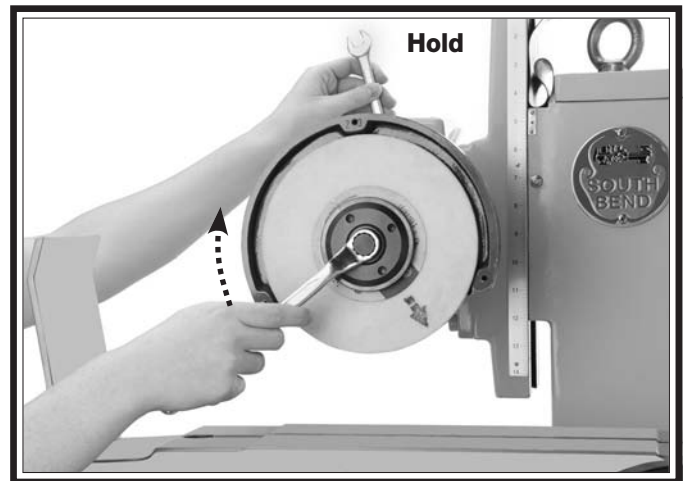


Figure 26. Pulling wheel hub.

9. Set the wrenches aside and carefully remove the wheel and hub assembly with the hub puller still installed (**Figure 27**).

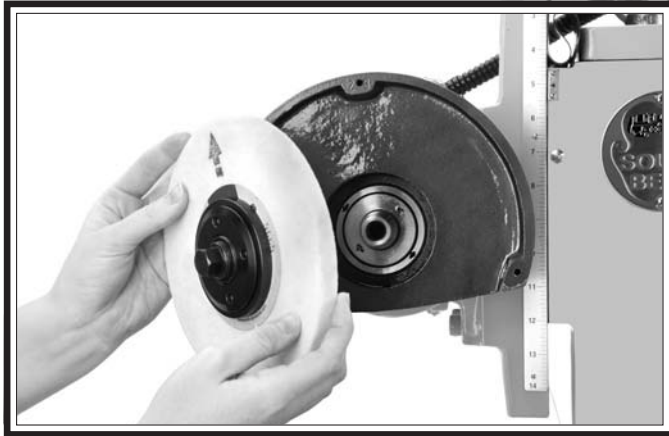


Figure 27. Wheel and hub removal.

10. Unthread the hub puller and set it aside.
11. Wipe the spindle and hub taper (**Figure 28**), so the tapers are perfectly clean. Wiping the threads and tapers with a lightly-oiled rag is acceptable to prevent rust and still to allow for a tight fit.

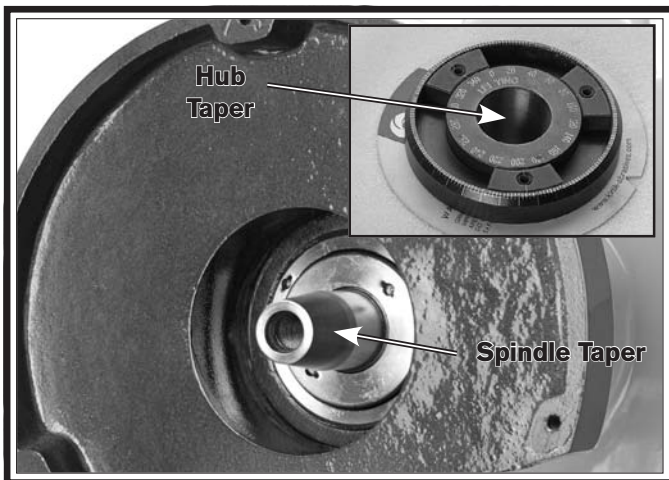


Figure 28. Spindle taper.

12. To install the grinding wheel and hub, complete the preceding steps in the reverse order, but skipping the steps regarding hub puller usage. After the grinding wheel and hub are installed, many machinists still choose to dress the grinding wheel. Refer to **Wheel Dressing** on **Page 25** for details.

Wheel Inspection

Do not assume that a wheel is in sound condition just because it is new—damage can often occur during shipping, with age, with prolonged exposure to moisture, or because of improper storage.

To inspect a wheel for damage:

1. Remove the wheel and look for any cracks, chips, nicks or dents in the surface of the wheel. If you see any of these, **DO NOT** attempt to use the wheel.
2. Do a ring test. This test will give you an indication of any internal damage that may not be obvious during a visual inspection.
3. Inspect the paper washers on both sides of the grinding wheel (**Figure 29**). These washers are cushions between the spacer washer and the grinding wheel seat. Without the washers, cracks can be spawned from the center of the wheel when the spanner nut is tightened. Over time, these cracks can radiate outward and the wheel may explode during operation, possibly causing injury.

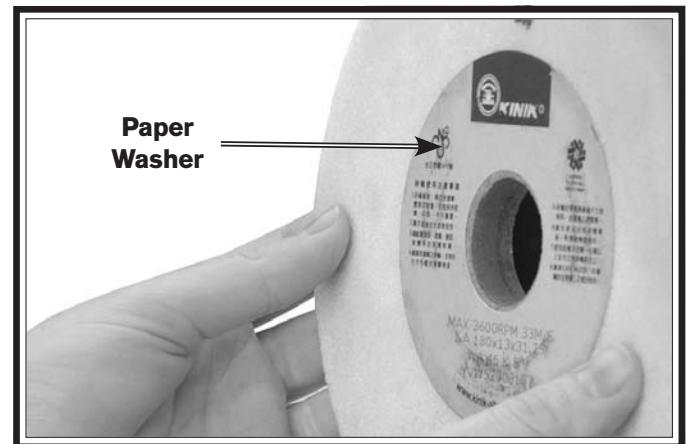


Figure 29. Important paper washer.

Note: If you need to replace or install new paper washers, replacements can be cut out of any thick construction paper or card stock. Regular notebook paper or paper from a copy machine is not acceptable, as it is too thin to provide the required cushion. Be sure to transfer any RPM limitations and wheel type information.

Ring Test

This test will give you an indication of any internal damage that may not be obvious during a visual inspection.

To perform a ring test:

1. Make sure the wheel that you test is clean and dry; otherwise, you may get false results.
2. Hang the wheel in the air with a piece of cord or string looped through the hole in the center, as shown in **Figure 30**.

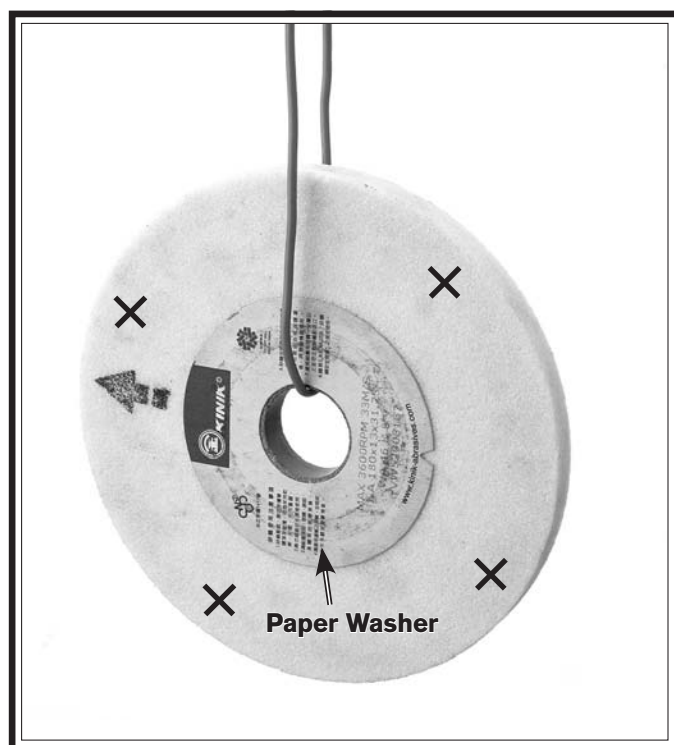


Figure 30. Ring test setup and test locations.

3. At the locations shown in **Figure 30**, gently tap the wheel with a light non-metallic device such as the handle of a screwdriver or a wooden mallet.

An undamaged wheel will emit a clear metallic ring or “ping” sound in each of these spots. A damaged wheel will respond with a dull thud that has no clear tone. If you determine from the ring test that the wheel is damaged, DO NOT use it!

Wheel Dressing

Superior grinding results can only be achieved with a properly balanced and dressed wheel. Do not assume that a wheel will run true on the spindle if it is new or has not been separated from the hub.

Dressing the wheel correctly will save you from wasting grinding abrasive and shattering the dressing tool diamond. Additionally, with a properly balanced and dressed wheel you can rest assured that if you have finish problems, the grinding wheel is not the culprit.

Depending on the finish required, varying degrees of roughness can be obtained. For example: A fast dressing at a depth of 0.03mm will prepare a wheel surface for rough cuts, and slow dressing with multiple light passes of the diamond at a depth of 0.01mm will prepare the same wheel for finish cuts.

Positioning is critical for the dressing tool so you will not shatter the diamond or have poor dressing results. The dressing tool must be positioned in the trailing zone of the wheel, as shown in **Figure 31**, for best results and safe use. If the tool is positioned on the leading side of the wheel, the diamond will be shattered or even grabbed by the wheel and drawn under the grinding wheel, causing severe damage or injury.

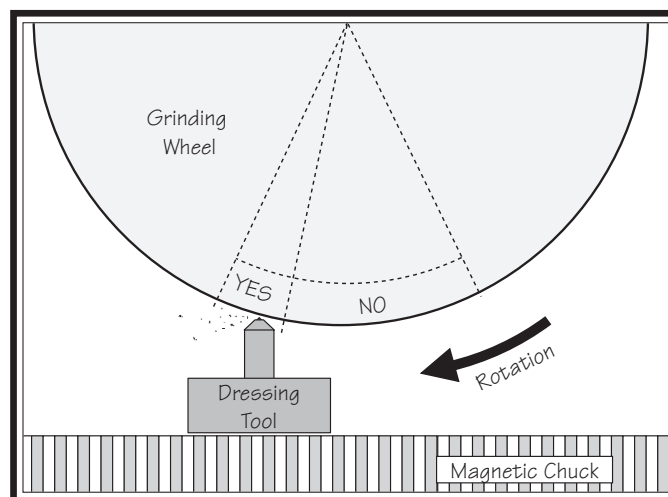


Figure 31. Safe tool positioning for wheel dressing.

To dress the grinding wheel:

1. Insert the diamond tipped dressing tool into its base (**Figure 32**), and use a 4mm hex wrench to tighten the locking set screw.



Figure 32. Dressing tool setup.

2. Lower the headstock so the wheel is approximately 5mm lower than the tip of the dressing tool.
3. Position the tip of the dressing tool at the trailing side of the wheel, as shown in **Figure 31**, and move the table inward until the diamond tip of the dressing tool slightly touches the edge of the grinding wheel. Verify by manually rotating the wheel and listening for contact.
4. Turn on the magnetic chuck, and move the cross slide so the tip is free of the grinding wheel.
5. Start the grinder, and use the cross slide handwheel to progressively move the table, so the diamond sweeps across the wheel at a depth between 0.01 – 0.03mm.

Wheel Balancing

Static wheel balancing can be difficult and very time consuming without practice. For accurate grinding results, wheel balancing is mandatory. For this balancing procedure, you will need a wheel balancing fixture. The wheel balancing fixture shown in **Figure 33** is one example of the many varieties available on the market. Before proceeding, the grinding wheel must be ring tested (refer to **Page**) and dressed (refer to **Page**).



Figure 33. Wheel on balancing fixture.

If flood coolant was used with the grinding wheel, run the machine with the grinding wheel installed for 5-minutes to sling off any residual coolant that may have settled to the low side of the wheel. If the paper washers are missing, wet, or damaged, replace them before proceeding. If during a period of machine operation, you find that a finish is becoming poor, redress the wheel. If that does not correct the problem rebalance your grinding wheel.

To balance the grinding wheel:

1. DISCONNECT MACHINE FROM POWER!
2. Set up the wheel balancer as outlined in its product user manual.
3. Remove the grinding wheel and hub as a unit from the spindle as outlined in **Removing & Installing Grinding Wheel Hub** on **Page 22**.

4. Without letting any of the dogs or the lock balls they contain fall out of the hub, use a 2.5mm hex wrench to loosen the dogs and position them at the 0°, 120°, and 240° degree locations as indicated by the degree scale on the hub (**Figure 34**).

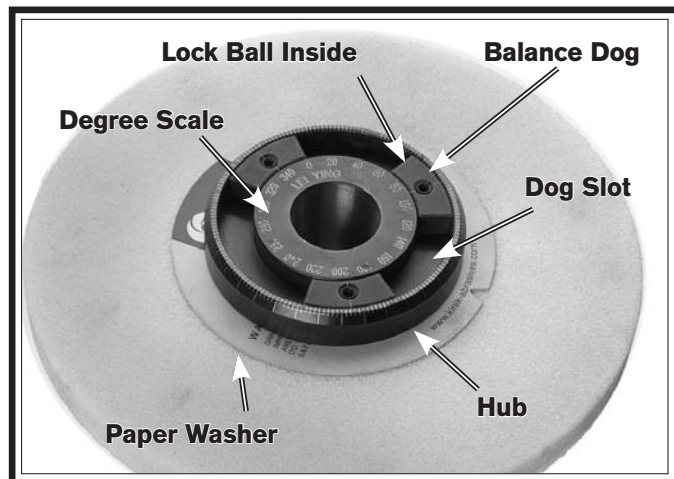


Figure 34. Grinding wheel hub.

Note: Pay special attention to keep the dogs engaged in the hub slot when they are loose. If you lose any of the 4mm lock balls, it will be impossible to continue this procedure until they are replaced.

5. Using a slightly-oiled lint free cloth, wipe the mating surfaces of the balancing arbor and the internal hub taper perfectly clean, and push the hub and arbor together, as shown in **Figure 35**.

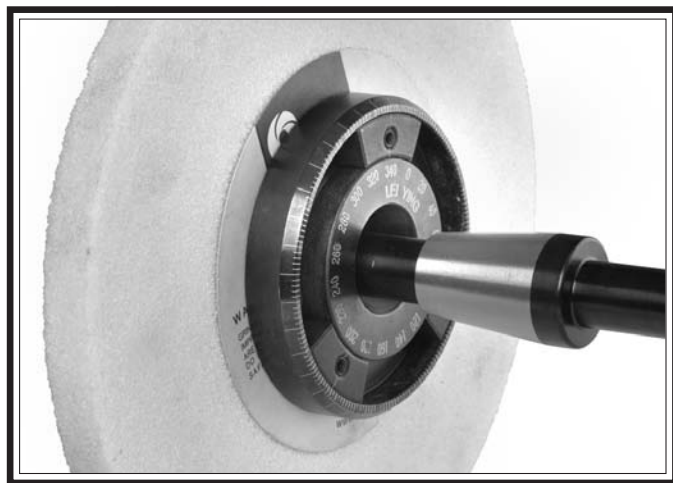


Figure 35. Installing the balancing arbor.

6. Place the balancing arbor onto the wheel balancing fixture (**Figure 33**).

7. Spin the wheel so it rotates one full turn and comes to rest with the heaviest side hanging down at six o'clock. This may take a few times to find the exact location.
8. Using a pencil, draw a line at the six o'clock position to mark the heaviest side of the wheel.
9. Line up the closest dog with the line you just drew and lock it in place. This dog will now be positioned at the heaviest side of the wheel and will be called dog "A".
10. Using the scale, position the other two "B" dogs so they are both evenly spaced 120° degrees apart from dog "A". At this point all dogs will be 120° apart from one another. The "B" dogs are the two dogs you will move to balance the wheel.

11. Rotate the wheel 90° degrees, let go, and observe the direction that it rotates out of balance. Move each "B" dog in one degree increments, toward each other and away from dog "A" to balance the wheel. For example, depending on the amount of balance correction, the distance between the two "B" dogs will decrease, and the distance between the "B" dogs and "A" dog will increase. This step must be repeated as many times as required until the wheel will not rock back and forth by itself in any position.

12. When you are satisfied with the wheel balance, install the grinding wheel on the machine, and run it for five minutes to verify the wheel is in balance.
13. If any balance problems are detected, repeat the balancing procedure.

Note: Some machinists will re-dress the grinding wheel one last time at this point to ensure ultra-high grinding precision.

Magnetic Chuck

The Model SB1023 is designed to be used with a magnetic chuck. The table is equipped with a T-slot for securing your magnetic chuck. Refer to your magnetic chuck manufacturer's instruction manual for proper chuck preparation and mounting techniques.

A magnetic chuck secures workpieces to the table without the use of clamps. With proper attention to preparation of both the workpiece and the magnetic chuck, a magnetic chuck will provide ample clamping force on most magnetic metals. Refer to your magnetic chuck manufacturer's instruction manual for proper workpiece mounting techniques.

Setup for a Typical Grinding Operation

Once you have chosen the proper wheel for the operation and properly installed the magnetic chuck on the table, use the following procedures to prepare for a grinding operation.

To prepare for a grinding operation:

1. DISCONNECT MACHINE FROM POWER!
2. To ensure flat mating surfaces on the workpiece and the magnetic chuck, surface grind and stone the top of the chuck and the bottom of the workpiece.
3. Make sure the magnetic chuck is turned **OFF**, then place the workpiece onto the chuck. Once the workpiece is positioned as needed, turn the magnetic chuck **ON**.
4. Make sure the grinding wheel is not contacting the workpiece, connect the grinder to power, then turn the motor **ON**.

Grinder Operation

Grinding with a surface grinder is a delicate process that takes practice, skill, and knowledge. In addition to this, the method used for any one procedure will depend on a number of factors, including, but not limited to the material being ground, the grinding wheel being used, the quality and calibration of measuring tools, and the finish that is desired.

For these reasons, specific techniques are not outlined in this manual. We recommend that you consult books, trade magazines, metalworking experts, and other reliable resources for techniques pertaining to the specific tasks you wish to perform.

The information that follows serves as a general outline to help familiarize you with the basic grinding technique.

Continued On Next Page



Using the Surface Grinder

Operation of the grinder is controlled through the movement of the three handwheels. The elevation handwheel controls the up and down movement of the grinding head. It is this axis that governs the amount of stock removal. Never attempt to remove too much material in one pass. The best results are achieved with multiple light passes.

The longitudinal travel handwheel rapidly moves the table from left to right. This allows the operator to move the workpiece back and forth underneath the grinding wheel.

The cross travel handwheel controls the front-to-back movement of the table and is only to be used between longitudinal passes to expose a new area of the workpiece to the grinding wheel.

When grinding, sweep the table back and forth under the wheel in the longitudinal direction until no further sparks emerge from the workpiece, move the table in the cross direction to expose a new portion of the workpiece to the wheel, then take another sweep in the longitudinal direction. Repeat this process until the entire surface is ground. See **Figure 36** for an illustration of this process.

Grinding Tips

While every grinding operation is unique, there are a few techniques that apply to most, if not all grinding operations.

- During longitudinal passes, tighten the cross travel lock knob to prevent chatter that may occur as a result of slight cross movement of the table.
- Between longitudinal passes, use the squeegee to remove any foreign material from the workpiece.

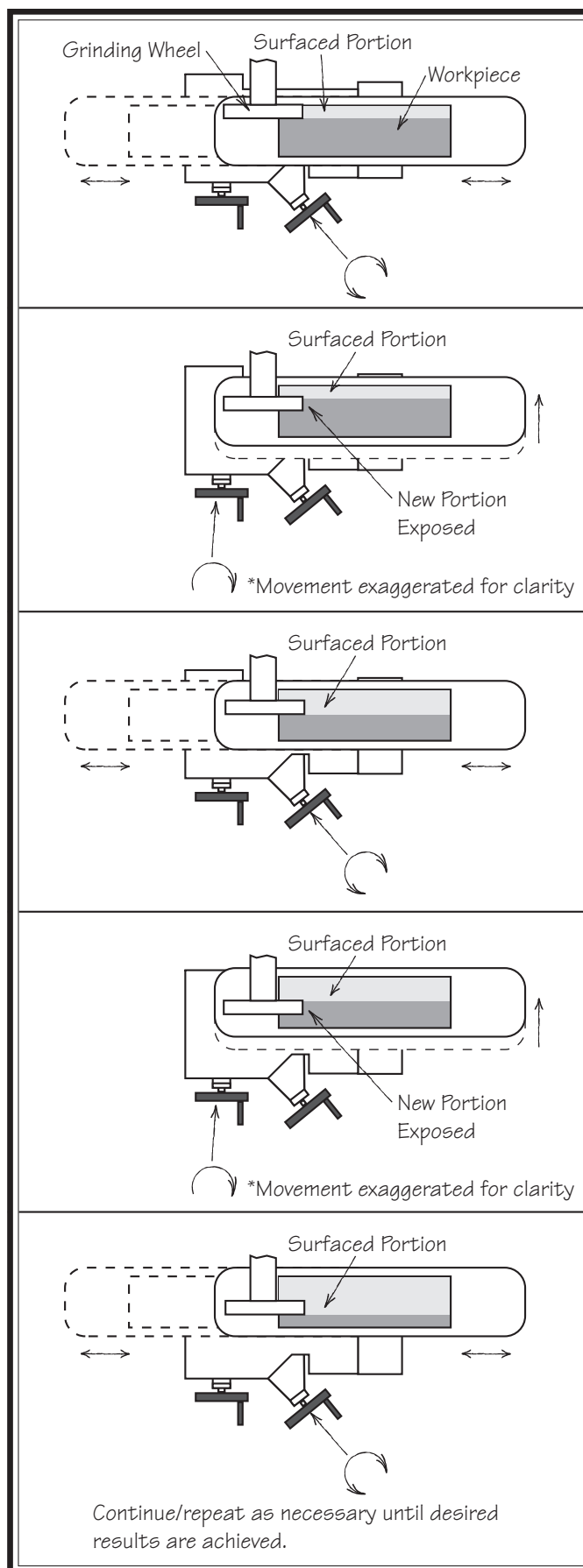
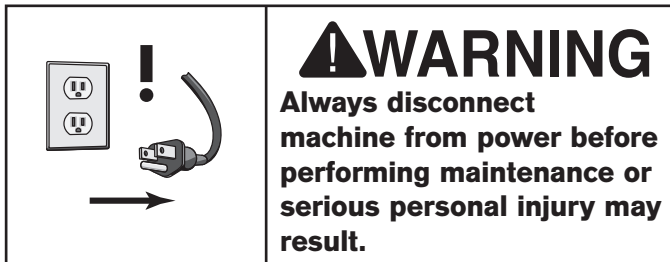


Figure 36. Grinding process illustrated.

Maintenance Schedule Lubrication



To keep this machine in the best operating condition, make sure to complete the following maintenance items within the minimum intervals listed below.

Daily:

- Check for and correct loose mounting bolts.
- Check for and correct damaged or cracked grinding wheel.
- Check for and correct worn or damaged wires.
- Clean and protect table.
- Vacuum metal shavings from machine.
- Correct any other unsafe condition.

Bi-weekly

- Remove the table, clean and relubricate the ways, ball bearings, and rack and pinion.
- Lubricate the column grease fitting with two pumps of grease.
- Lubricate the table cross way grease fitting with two pumps of grease.
- Clean and grease all three leadscrews.

If this machine is used in a heavy industrial setting, or in a dirty or damp environment, increase the lubrication intervals.

To lubricate your machine:

1. DISCONNECT MACHINE FROM POWER!
2. Clean the upper column leadscrew section with mineral spirits, dry with a rag, and relubricate with any standard machine or multipurpose grade grease (**Figure 37**).

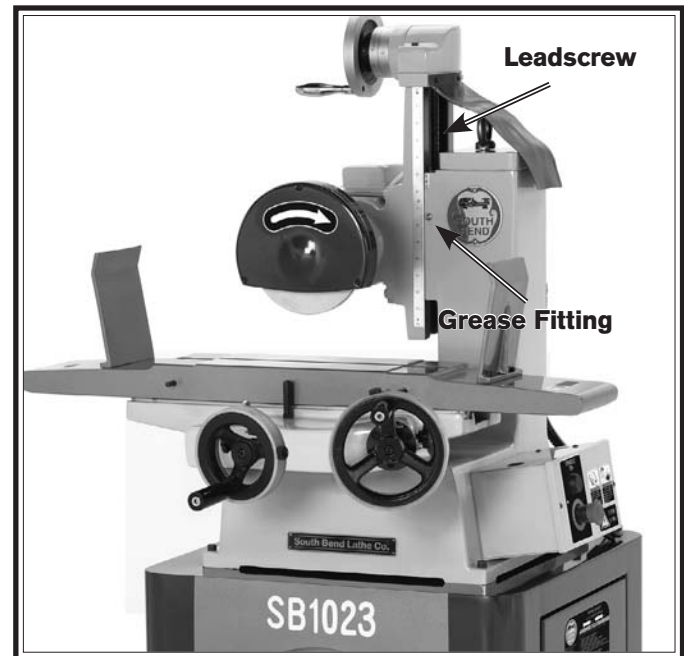


Figure 37. Upper column leadscrew and grease fitting.

3. Wipe the column grease fitting clean (see **Figure 37**) and pump the fitting with two or three pumps of grease. Wipe off any grease that bleeds through the seams.

4. Clean the lower column leadscrew section with mineral spirits, dry with a rag, and relubricate with any standard machine or multipurpose grade grease (**Figure 38**).



Figure 38. Lower column leadscrew.

5. Wipe the table cross feed grease fitting clean (**Figure 39**), and put two or three pumps of grease into it. Wipe off any grease that bleeds through the seams.

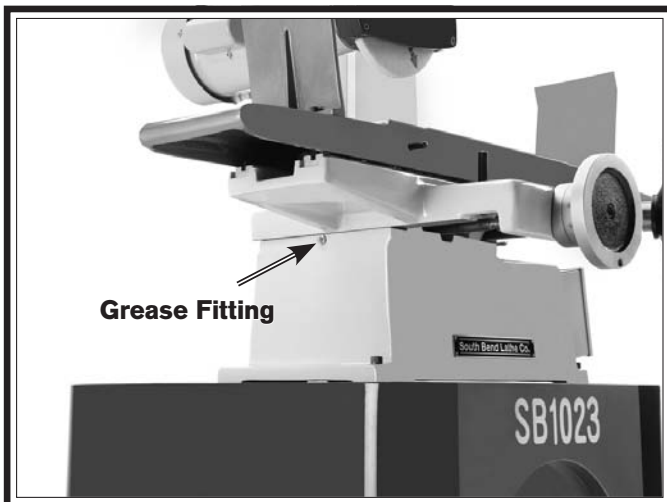


Figure 39. Cross way grease fitting.

6. With the help of another person, lift the table off the ways and set the table upside down on a workbench (**Figures 40-41**).

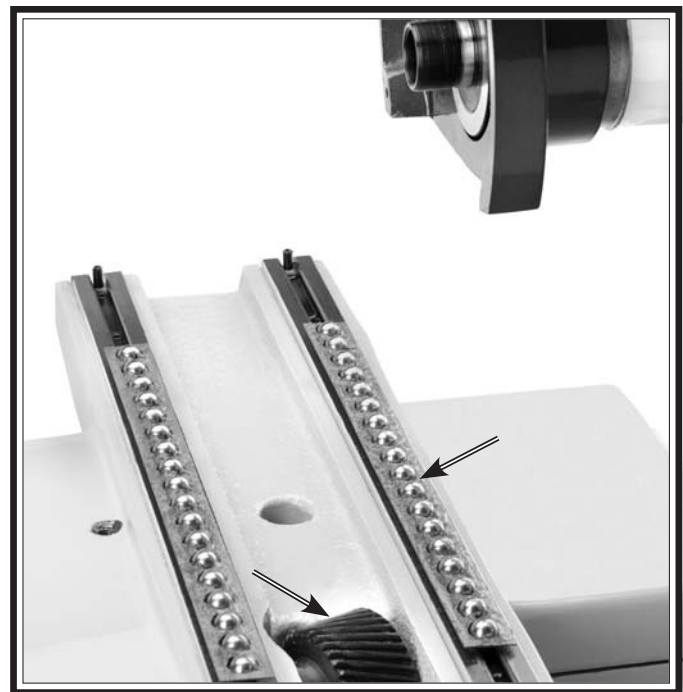


Figure 40. Ball bearing ways.

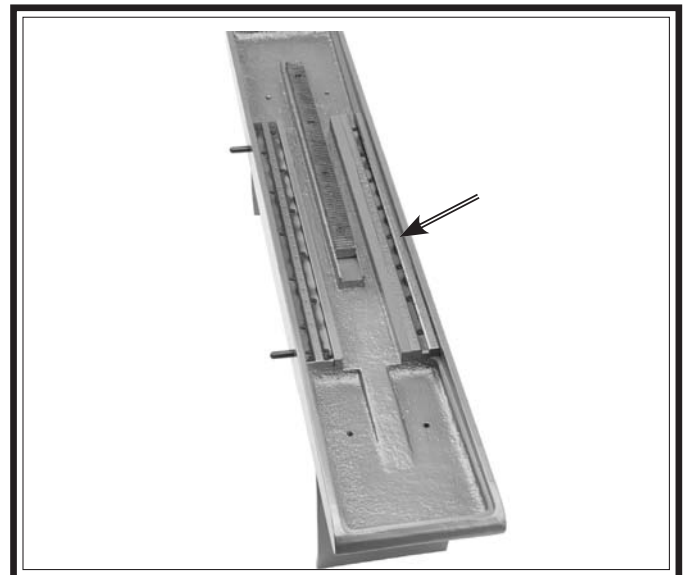


Figure 41. Table ways and rack.

7. Clean the pinion, rack, bearings, ways, and leadscrew with mineral spirits. Dry all parts, and re-lubricate with white lithium grease.
8. With the help of your assistant, CAREFULLY place the table back onto the ways. DO NOT drop the table or you may put a nick in a way and ruin it permanently.

Handwheel Backlash Adjustment

Backlash is the amount of play found in a leadscrew. Without moving the table, the amount of backlash can be determined by lightly turning the handwheel with your fingertips in one direction until the handwheel stops, noting the location shown on the handwheel scale. Then the handwheel is turned in the other direction until it stops. The distance between both stopping locations is the amount of backlash. If the backlash exceeds 0.007", adjust it back into range the of 0.003" to 0.006".

The backlash adjustment is made by tightening or loosening the cross-feed leadscrew halfnut cap screws shown in **Figure 42**. These screws draw two halves of the halfnut together against the leadscrew placing pressure on the threads. If this fit is too tight, loosen the cap screws, tap the table a few times with a rubber or wooden mallet, and turn the handle slowly back-and-forth until the handle turns freely. To readjust the backlash, rock the handle back-and-forth and tighten the screws slowly until the backlash is correct.

Note: Avoid the temptation to overtighten the cap screws at the leadscrew halfnut. Overtightening will cause excessive wear to the halfnut and leadscrew. Reducing backlash to less than 0.003" is impractical and reduces the life of the gib and the ways.

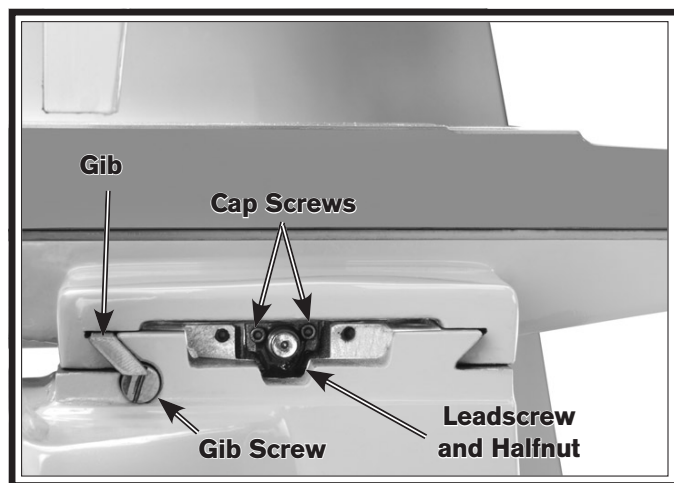


Figure 42. Table gib and leadscrew.

Column & Table Gib Adjustment

The gib is a tapered piece of steel that is held in position by a gib screw. When the screw is turned clockwise, the gib will be moved to fill the loose void in the way, thus, removing the play. If more play is needed, adjust the screws the opposite direction.

When adjusting the table or column gib screw (**Figure 43**), keep in mind that the goal is to remove sloppiness in the ways without causing the dovetailed ways to bind or prematurely wear. A loose gib can cause dimensional problems or a poor finish on the workpiece.

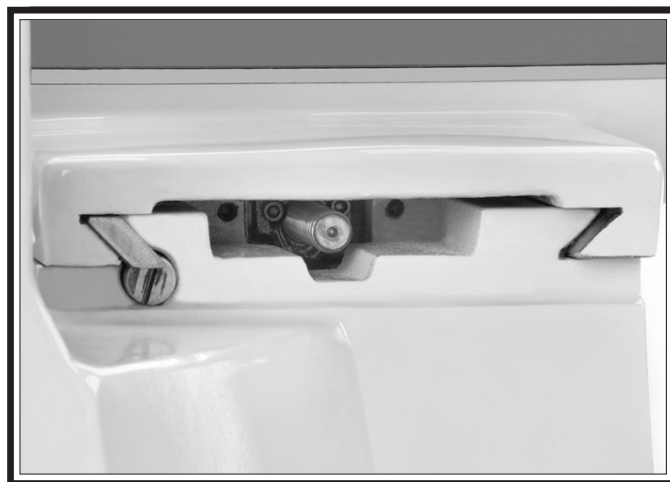


Figure 43. Column gib and leadscrew.

Machine Storage

NOTICE

Never attempt to move this machine without first locking the table in place. If the machine is slightly tilted, the table could uncontrollably slide and fall off of the machine and cause machine damage or severe injury.

Machinery can develop serious rust problems and corrosion damage if it is not properly prepared for storage. If decommissioning this machine, use the steps in this section to ensure that it remains in good condition.

Short-term storage (less than year)

1. DISCONNECT MACHINE FROM POWER!
2. Thoroughly clean all unpainted, bare metal surfaces, then coat them with a rust preventative oil or wax specifically designed to protect machinery while in storage. **DO NOT USE MOTOR OIL** in storage situations as it does not sufficiently protect against rust.
3. Lubricate the machine as outlined in the **Lubrication** section on **Page 30**.
4. Cover and place the machine in an area that is out of direct sunlight and away from where paints and thinners are stored, or where gasses are present. Fumes and sunlight can bleach or discolor paint and clear plastic guards.
5. Once or twice a month, depending on humidity, wipe down the machine as outlined in **Step 2**.
6. Every two months, move all handwheels so the headstock and column move at least once in their full range of motion. This will keep the bearings, bushings, gears, and shafts well lubricated and protected from corrosion, especially during the winter months.

Long-term storage (more than a year)

1. Empty and flush any cutting fluid pumps, lines, or tanks.
2. DISCONNECT MACHINE FROM POWER!
3. Thoroughly clean all unpainted, bare metal surfaces, then coat them with a heavy grease or rust preventative. Take care to ensure these surfaces are completely covered but that the grease or rust preventative is kept off painted surfaces. Make sure that both the upper and lower portions of the column leadscrew are completely coated with white lithium grease.
4. Remove the table, and then clean and pack the bearings with white lithium grease.
5. Using mineral spirits, clean and brush the ways, rack, pinion gear, and the leadscrew with any quality grease or wax that is specifically formulated for protecting machine parts during storage.
6. Open the main electrical box on the machine and place a few moisture absorbing desiccant packs at the bottom of the electrical box.
7. Cover and place the machine in an area that is out of direct sunlight and away from where paints and thinners are stored, or where gasses are present. Fumes and sunlight can bleach or discolor paint and clear plastic guards.

Note: When the machine is being put back into service from long-term storage, lubricate the machine as outlined in the **Lubrication** section on **Page 30**.

If you need replacement parts, or if you are unsure how to do any of the solutions given here, feel free to call us at (360) 734-1540.

Symptom	Possible Cause	Possible Solution
Machine does not start.	<ol style="list-style-type: none"> 1. Power supply switched off/has incorrect voltage. 2. Blown fuse/tripped circuit breaker at main panel. 3. Thermal overload relay has tripped. 4. Plug or receptacle is corroded or mis-wired. 5. Break or short in wiring; or loose connections. 6. Motor ON/OFF switch at fault. 7. Motor connection wired incorrectly. 8. Contactor not energized/has poor contacts. 9. Motor at fault. 	<ol style="list-style-type: none"> 1. Switch power supply on/verify voltage. 2. Correct the cause of overload, then reset/replace fuse or breaker. 3. Allow motor to cool. If necessary, press reset button inside switch. 4. Clean/retighten contacts; correct the wiring. 5. Trace/replace broken or corroded wires; fix loose connections. 6. Replace switch. 7. Wire motor correctly (refer to inside junction box cover or manual). 8. Test all legs for power, test field coil and replace if at fault. 9. Test for shorted windings, bad bearings and repair or replace.
Motor chatters during startup or during operation.	<ol style="list-style-type: none"> 1. Extension cord (if used) is causing voltage drop. 2. Low power supply voltage. 	<ol style="list-style-type: none"> 1. Move machine closer to the power source, or use a larger gauge wire or shorter extension cord. 2. Have the power supply verified and corrected by an electrician.
Machine has excessive vibration or noise.	<ol style="list-style-type: none"> 1. Motor fan rubbing on fan cover. 2. Motor is loose. 3. Grinding wheel out of balance. 4. Motor bearings worn or damaged. 	<ol style="list-style-type: none"> 1. Fix/replace fan cover; replace loose or damaged fan. 2. Tighten any loose fasteners. 3. Dress and balance grinding wheel. 4. Replace motor bearings or replace motor.
Machine stalls or slows when operating.	<ol style="list-style-type: none"> 1. Motor is being overloaded. 2. Motor at fault. 	<ol style="list-style-type: none"> 1. Reduce depth of cut. 2. Test for shorted windings, bad bearings and repair or replace.
Handwheel has excessive backlash, endplay, binds, or is difficult to move.	<ol style="list-style-type: none"> 1. Leadscrew is dirty or lacks proper lubrication. 2. Leadscrew or leadscrew nut worn. 3. Linkage bolts, pins, and holes are loose or worn. 4. Longitudinal feed rack and pinion are worn. 	<ol style="list-style-type: none"> 1. Clean and lubricate the leadscrew and service oil system (Page 30). 2. Adjust or replace leadscrew or leadscrew nut. 3. Replace linkage bolts, pins, and re-bush any worn pin holes. 4. Replace rack and pinion gears.

Symptom	Possible Cause	Possible Solution
Vibration when grinding, poor surface finish, or incorrect final dimensions.	<ol style="list-style-type: none"> 1. Grinding wheel is out-of-round or is loaded up with material. 2. Grinding wheel is out of balance or damaged. 3. Missing or torn grinding wheel paper washers. 4. Incorrect grinding wheel hardness or grit rating. 5. Improperly installed magnetic chuck. 6. Workpiece is loose. 7. Wheel hub not installed onto spindle shaft correctly. 8. Loose machine component. 9. Ways or leadscrews are out of lubrication or contaminants have loaded up on the ways. 10. Headstock is loose. 11. Grinding wheel has varying densities, or is of poor quality. 12. Table and handwheel have lash. 13. Table is loose. 14. Grinding operation requires coolant. 15. Coolant is incorrect or incorrectly mixed. 16. Bad motor or spindle bearings. 	<ol style="list-style-type: none"> 1. Dress grinding wheel to make concentric and to the required grit level (Page 25). 2. Remove, and ring test, and balance the grinding wheel (Page 20 & 26). 3. Remove and replace paper washers, dress and rebalance grinding wheel. 4. Match wheel grade and grit rating with workpiece hardness. 5. Stone table and chuck surfaces, and remove all burrs and foreign material from mating surfaces, and reinstall the chuck. 6. Replace or repair chuck for poor holding power. 7. Remove wheel and hub assembly, stone taper high spots or dings, and reinstall wheel and hub (Page 22). 8. Inspect all machine connections, and tighten any loose fasteners. 9. Remove table, clean and relubricate the ways and ball bearings (Page 30). 10. Tighten column gib (Page 32). 11. Replace grinding wheel with acceptable brand (Page 20). 12. Adjust cross feed leadscrew halfnut (Page 32). 13. Adjust cross feed gib (Page 32). 14. Install aftermarket coolant kit. 15. Refer to coolant manufacturer's workpiece verses coolant type recommendations and correct coolant. 16. Replace motor or replace bearings.

Electrical Safety Instructions

These pages are accurate at the time of printing. In the constant effort to improve, however, we may make changes to the electrical systems of future machines. Study this section carefully. If you see differences between your machine and what is shown in this section, call Technical Support at (360) 734-1540 for assistance BEFORE making any changes to the wiring on your machine.

- Shock Hazard:** It is extremely dangerous to perform electrical or wiring tasks while the machine is connected to the power source. Touching electrified parts will result in personal injury including but not limited to severe burns, electrocution, or death. For your own safety, disconnect machine from the power source before servicing electrical components or performing any wiring tasks!
- Wire Connections:** All connections must be tight to prevent wires from loosening during machine operation. Double-check all wires disconnected or connected during any wiring task to ensure tight connections.
- Modifications:** Using aftermarket parts or modifying the wiring beyond what is shown in the diagram may lead to unpredictable results, including serious injury or fire.
- Motor Wiring:** The motor wiring shown in these diagrams is current at the time of printing, but it may not match your machine. Always use the wiring diagram inside the
- Circuit Requirements:** Connecting the machine to an improperly sized circuit will greatly increase the risk of fire. To minimize this risk, only connect the machine to a power circuit that meets the minimum requirements given in this manual.
- Capacitors/Inverters:** Some capacitors and power inverters store an electrical charge for up to 10 minutes after being disconnected from the power source. To reduce the risk of being shocked, wait at least this long before working on capacitors.
- Wire/Component Damage:** Damaged wires or components increase the risk of serious personal injury, fire, or machine damage. If you notice that any wires or components are damaged while performing a wiring task, replace those wires or components before completing the task.
- Experiencing Difficulties:** If you are experiencing difficulties understanding the information included in this section, contact

WIRING DIAGRAM COLOR KEY

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

NOTICE: The photos and diagrams included in this section are best viewed in color. You can see them in color at www.southbendlathe.com.

SB1023 Wiring Diagram 110V

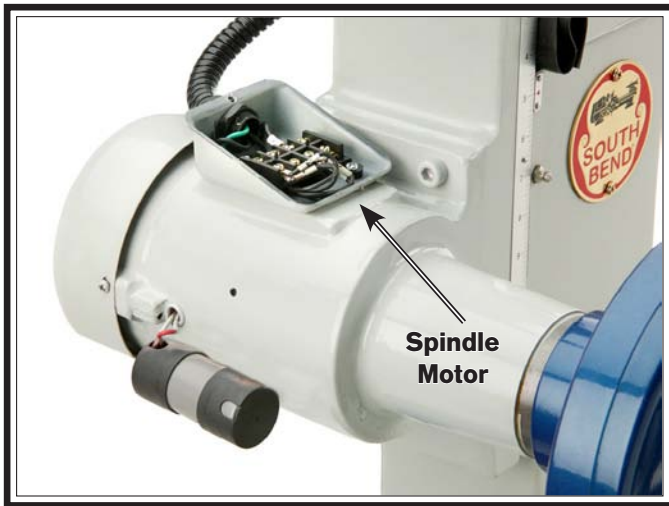


Figure 44. Spindle motor & pump motor locations.

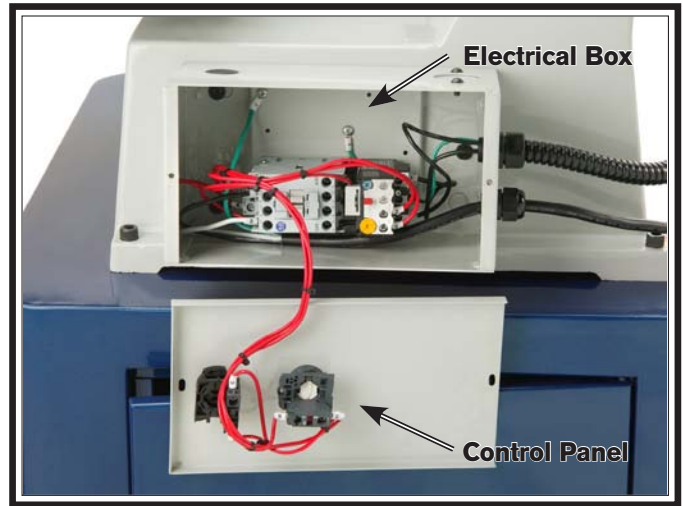
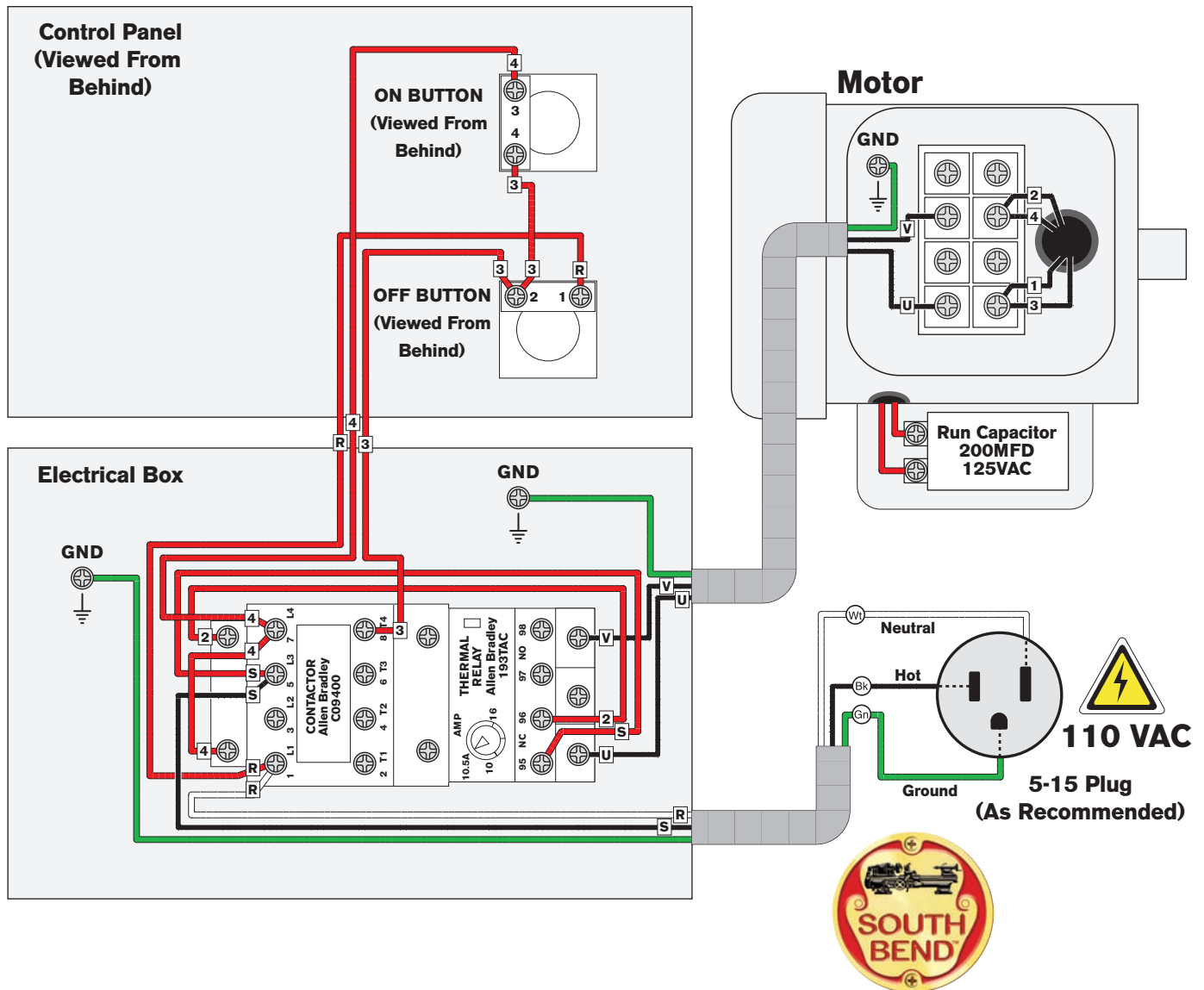
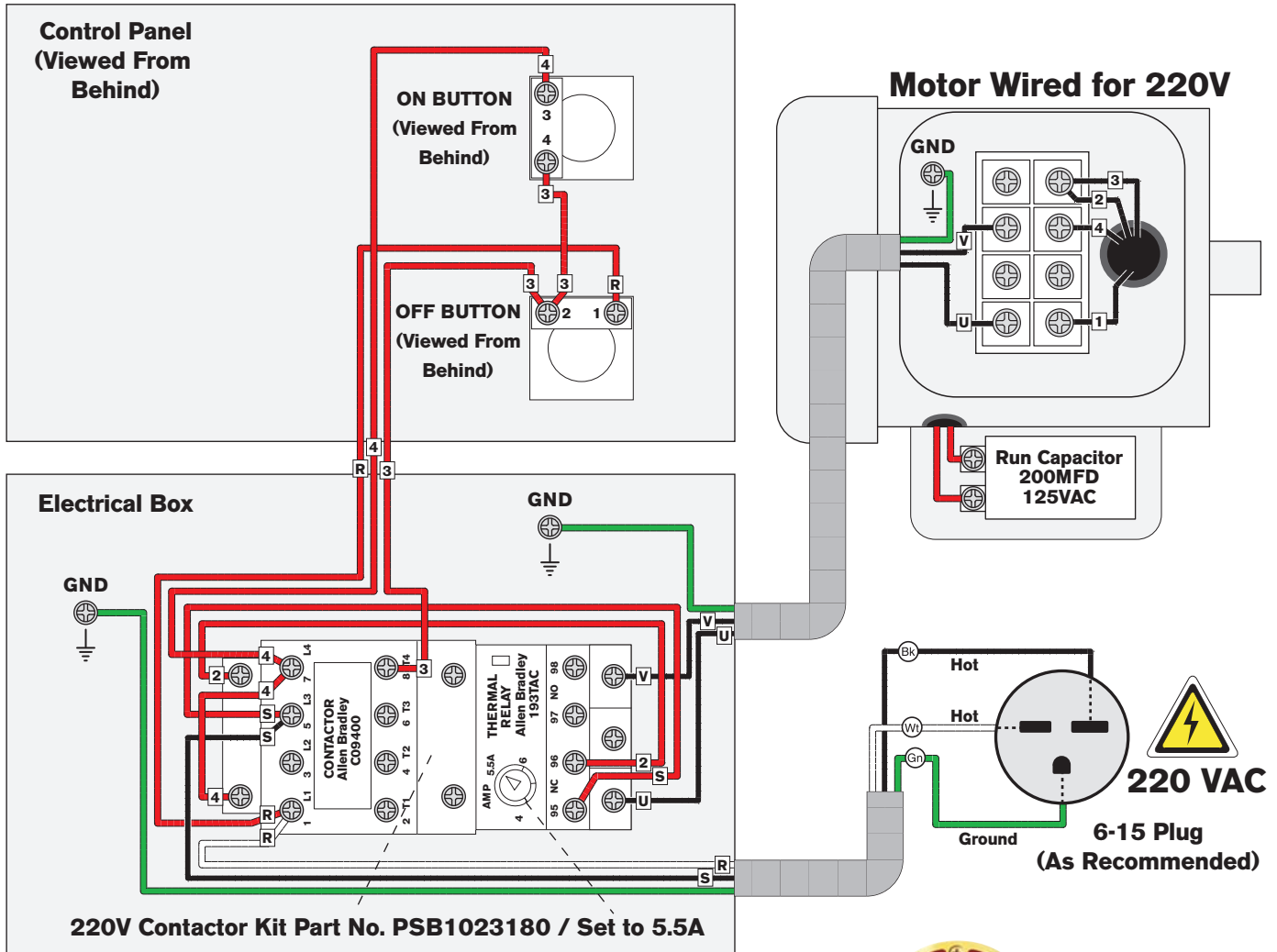


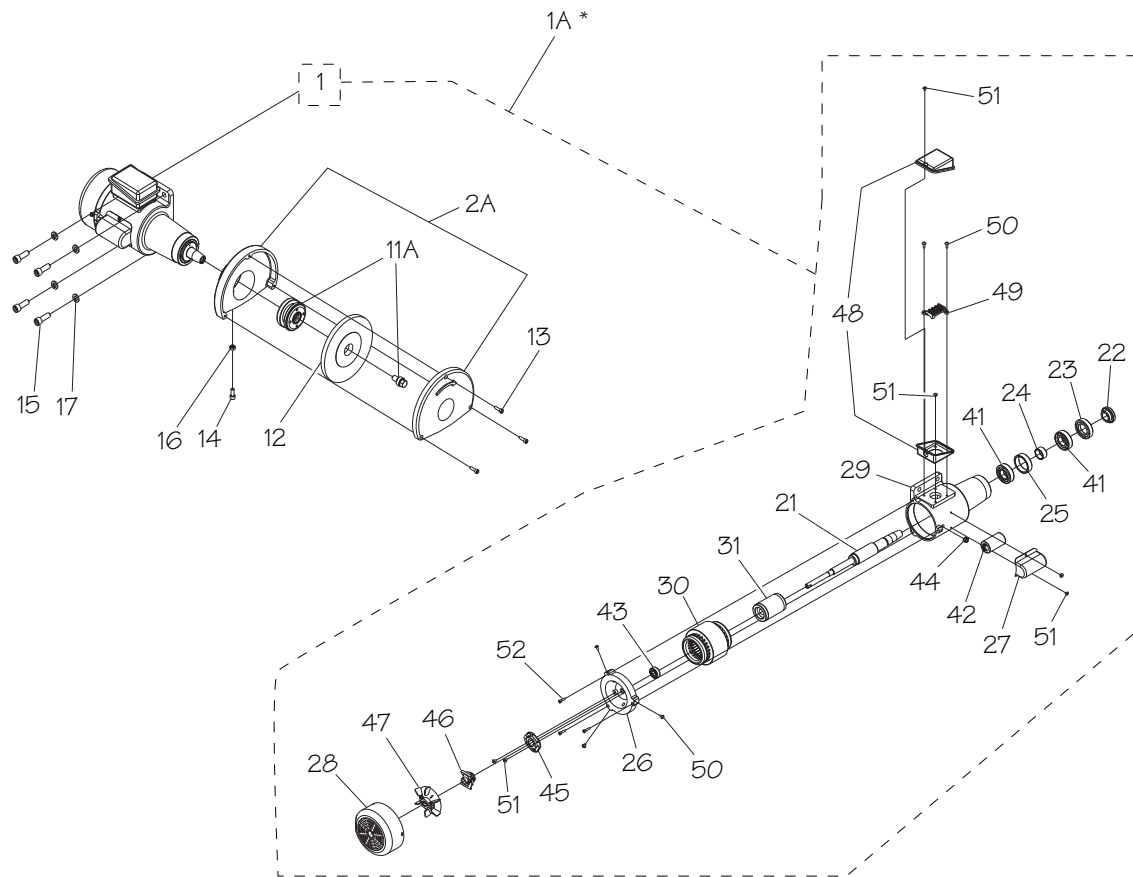
Figure 45. Electrical box & control panel location.



SB1023 Wiring Diagram 220V



Motor & Spindle

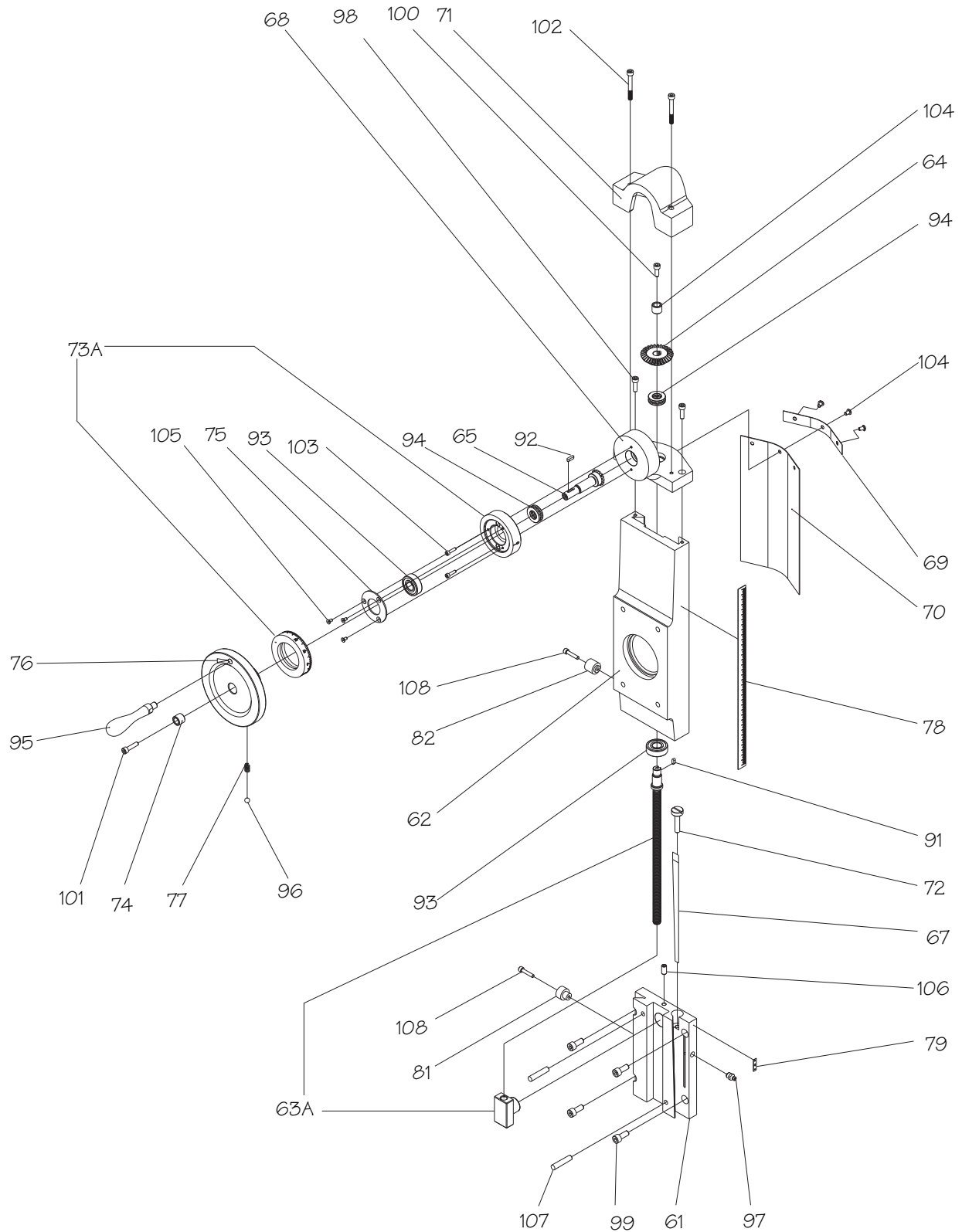


*Only available as a complete assembly

REF	PART #	DESCRIPTION
1A	PSB1023001A	MOTOR & SPINDLE ASSEMBLY
1	PSB1023001A	MOTOR 110/220V 3/4HP 1PH
2A	PSB1023002A	GRINDING WHEEL COVER ASSEMBLY
11A	PSB1023011A	WHEEL FLANGE ASSEMBLY
12	PSB1023012	GRINDING WHEEL 7"D X 1/2"W X 1-1/4"B
13	PCAP02M	CAP SCREW M6-1 X 20
14	PCAP14M	CAP SCREW M8-1.25 X 20
15	PCAP111M	CAP SCREW M12-1.75 X 35
16	PNO3M	HEX NUT M8-1.25
17	PLW05M	LOCK WASHER 12MM
21	PSB1023001A	SPINDLE
22	PSB1023001A	OUTER SPINDLE NUT
23	PSB1023001A	INNER SPINDLE NUT
24	PSB1023001A	OUTER SPINDLE SPACER
25	PSB1023001A	INNER SPINDLE SPACER
26	PSB1023001A	BEARING SEAT
27	PSB1023001A	CAPACITOR COVER

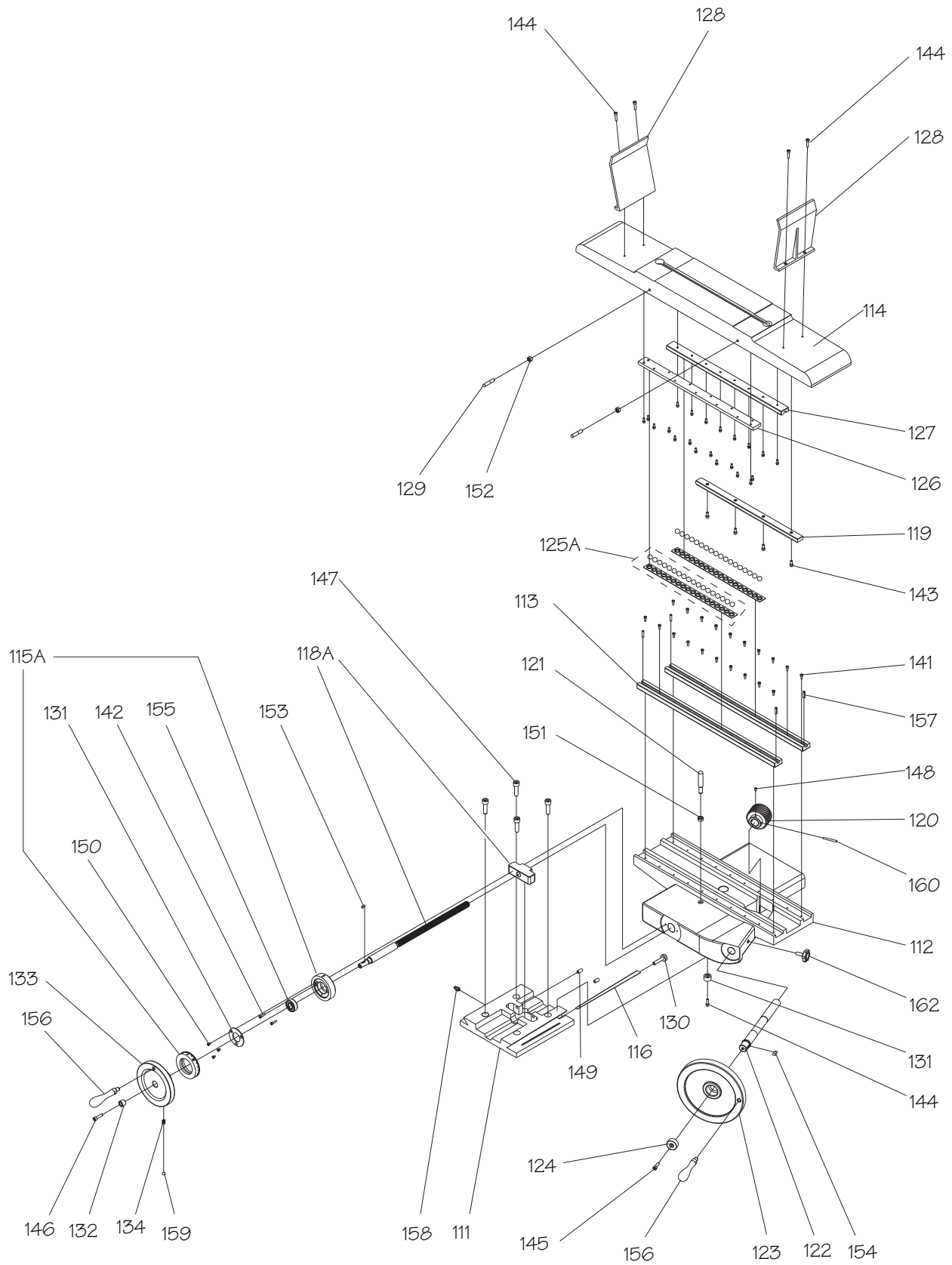
REF	PART #	DESCRIPTION
28	PSB1023001A	FAN COVER
29	PSB1023001A	MOTOR BODY
30	PSB1023001A	MOTOR COIL
31	PSB1023001A	MOTOR ROTOR
41	P7206	ANGULAR CONTACT BALL BEARING 7206
42	PC200F	5 CAPACITOR 200M 125V 1-3/8 X 2-3/4
43	P6202ZZ	BALL BEARING 6202ZZ
44	PSB1023001A	GROMMET
45	PSB1023001A	CONTACT PLATE
46	PSB1023001A	CENTRIFUGAL SWITCH
47	PSB1023001A	MOTOR FAN
48	PSB1023001A	JUNCTION BOX
49	PSB1023001A	TERMINAL BLOCK
50	PS22	PHLP HD SCR 10-24 X 5/8
51	PS06	PHLP HD SCR 10-24 X 3/8
52	PCAP15M	CAP SCREW M5-.8 X 20

Column



See Column Parts List on Page 42.

Table



See Table Parts List on Page 42.

Column Parts List

REF	PART #	DESCRIPTION
61	PSB1023061	COLUMN BASE
62	PSB1023062	COLUMN
63A	PSB1023063A	ELEVATION LEADSCREW W/NUT ASSY
64	PSB1023064	BEVEL GEAR
65	PSB1023065	ELEVATION HANDWHEEL SHAFT
67	PSB1023067	COLUMN GIB
68	PSB1023068	HANDWHEEL MOUNTING BRACKET
69	PSB1023069	PLATE FOR RUBBER COVER
70	PSB1023070	RUBBER COVER
71	PSB1023071	TOP PLATE
72	PSB1023072	GIB ADJUSTMENT SCREW
73A	PSB1023073A	HANDWHEEL INDEX COLLAR ASSEMBLY
74	PSB1023074	ELEVATION HANDWHEEL SPACER
75	PSB1023075	HANDWHEEL COLLAR PLATE
76	PSB1023076	ELEVATION HANDWHEEL
77	PSB1023077	COMPRESSION SPRING
78	PSB1023078	ELEVATION SCALE
79	PSB1023079	ELEVATION INDICATOR
81	PSB1023081	LOWER VERTICAL TRAVEL STOP

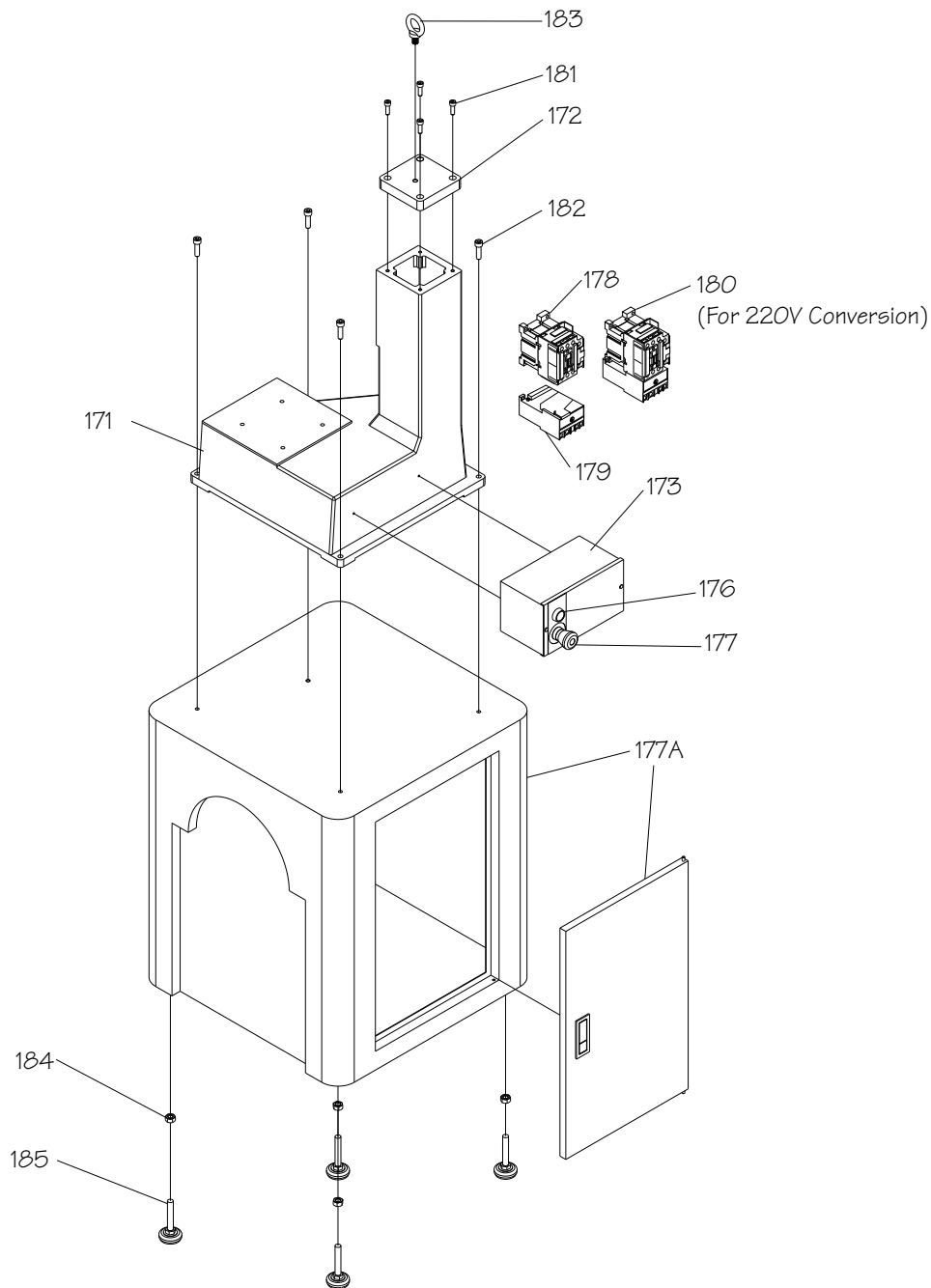
REF	PART #	DESCRIPTION
82	PSB1023082	UPPER VERTICAL TRAVEL STOP
91	PK05M	KEY 4 X 4 X 10
92	PK134M	KEY 4 X 4 X 14
93	P6202ZZ	BALL BEARING 6202ZZ
94	P51102	THRUST BEARING 51102
95	PSB1023095	HANDWHEEL HANDLE
96	PSTB002M	STEEL BALL 8MM
97	PZERK005	ZERK FITTING 1/8" PT
98	PCAP02M	CAP SCREW M6-1 X 20
99	PCAP14M	CAP SCREW M8-1.25 X 20
100	PCAP01M	CAP SCREW M6-1 X 16
101	PCAP06M	CAP SCREW M6-1 X 25
102	PCAP37M	CAP SCREW M6-1 X 50
103	PCAP16M	CAP SCREW M4-.7 X 16
104	PSB1023104	LEADSCREW SPACER
105	PCAP11M	CAP SCREW M8-1.25 X 16
106	PSS06M	SET SCREW M8-1.25 X 16
107	PSB1023107	TAPER PIN M8 X 40
108	PCAP38M	CAP SCREW M5-.8 X 25

Table Parts List

REF	PART #	DESCRIPTION
111	PSB1023111	CROSS TRAVEL BASE
112	PSB1023112	TABLE BASE
113	PSB1023113	LOWER BEARING RACE
114	PSB1023114	TABLE
115A	PSB1023115A	HANDWHEEL INDEX COLLAR ASSEMBLY
116	PSB1023116	CROSS GIB
118A	PSB1023118A	CROSS LEADSCREW W/NUT ASSEMBLY
119	PSB1023119	RACK
120	PSB1023120	CROSS FEED HELICAL GEAR
121	PSB1023121	LONGITUDINAL TRAVEL STOP
122	PSB1023122	LONGITUDINAL SHAFT
123	PSB1023123	LONGITUDINAL HANDWHEEL
124	PSB1023124	HANDWHEEL SPACER
125A	PSB1023125A	BEARING CAGE ASSEMBLY
126	PSB1023126	FRONT UPPER BEARING RACE
127	PSB1023127	REAR UPPER BEARING RACE
128	PSB1023128	SPARK STOP
129	PSB1023129	TRAVEL STOP
130	PSB1023130	GIB ADJUSTMENT SCREW
131	PSB1023131	BEARING RETAINING PLATE
132	PSB1023132	CROSS HANDWHEEL SPACER
133	PSB1023133	CROSS FEED HANDWHEEL

REF	PART #	DESCRIPTION
134	PSB1023134	COMPRESSION SPRING
141	PCAP17M	CAP SCREW M4-.7 X 10
142	PCAP16M	CAP SCREW M4-.7 X 16
143	PCAP33M	CAP SCREW M5-.8 X 12
144	PCAP24M	CAP SCREW M5-.8 X 16
145	PCAP02M	CAP SCREW M6-1 X 20
146	PCAP06M	CAP SCREW M6-1 X 25
147	PCAP84M	CAP SCREW M10-1.5 X 35
148	PSS31M	SET SCREW M5-.8 X 8
149	PSS06M	SET SCREW M8-1.25 X 16
150	PFH31M	FLAT HD SCR M4-.7 X 8
151	PN11	HEX NUT 3/8-16
152	PN02	HEX NUT 5/16-18
153	PK69M	KEY 4 X 4 X 12
154	PK09	KEY 1/4 X 1/4 X 3/4
155	P6202ZZ	BALL BEARING 6202ZZ
156	PSB1023156	CROSS HANDWHEEL HANDLE
157	PRPO3M	ROLL PIN 5 X 20
158	PSB1023097	ZERK FITTING 1/8" PT
159	PSB102396	STEEL BALL 8MM
160	PSB1023160	TAPER PIN M4 X 40
162	PSB1023162	KNOB BOLT M8-1.25 X 21

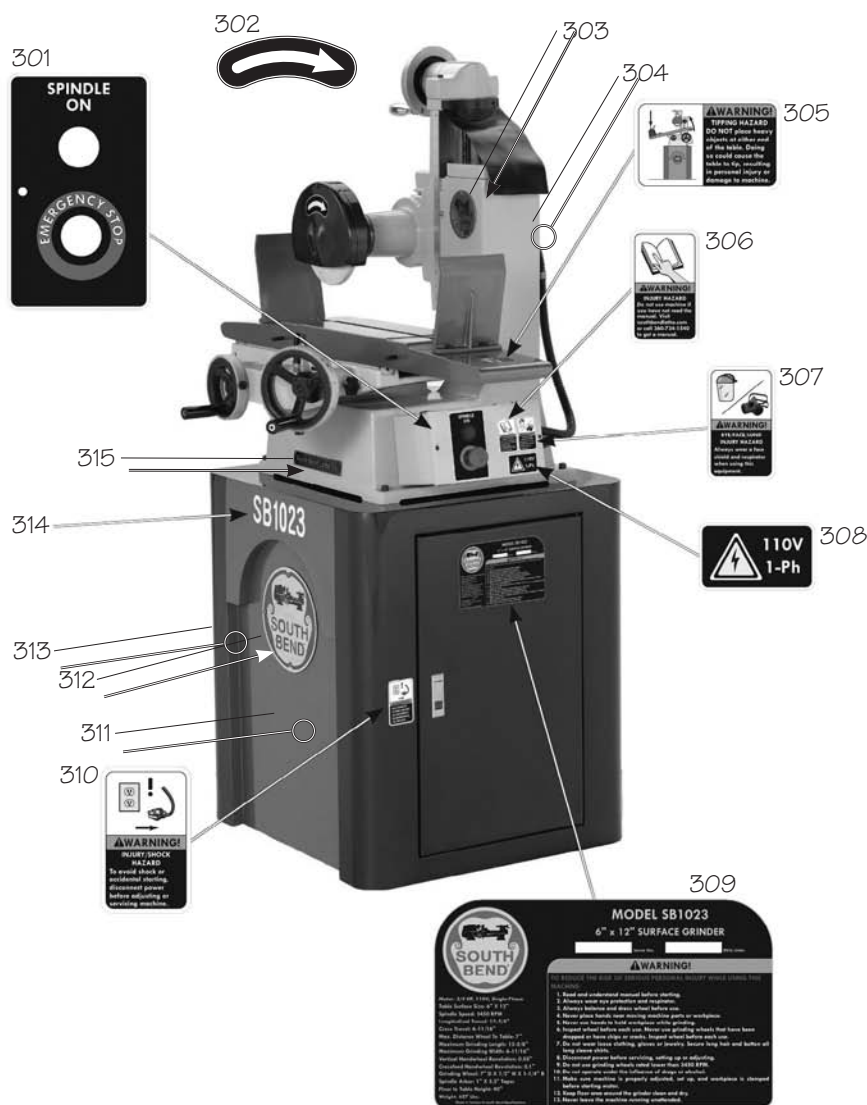
Stand



REF	PART #	DESCRIPTION
171	PSB1023171	GRINDER BASE
172	PSB1023172	COLUMN CAP
173	PSB1023173	ELECTRICAL BOX
174A	PSB1023174A	STAND W/DOOR ASSEMBLY
176	PSB1023176	ON BUTTON
177	PSB1023177	OFF BUTTON
178	PSB1023178	CONTACTOR AB C09-400 110V

REF	PART #	DESCRIPTION
179	PSB1023179	O/L RELAY AB 193TAC16 10-16A
180	PSB1023180	220V CONVERSION KIT
181	PCAP31M	CAP SCREW M8-1.25 X 25
182	PCAP84M	CAP SCREW M10-1.5 X 35
183	PSB1023183	LIFTING HOOK M12-1.75
184	PN06	HEX NUT 1/2-13
185	PSB1023185	ADJUSTING FOOT

Machine Labels



REF	PART #	DESCRIPTION
301	PSB1023301	CONTROL PANEL LABEL
302	PSB1023302	ROTATION LABEL
303	SB1317	SOUTH BEND NAMEPLATE 136MM
304	PSBPAINTO1	SB GRAY TOUCH-UP PAINT
305	PSB1023305	TABLE TIP LABEL
306	PSBLABELO1VS	READ MANUAL LABEL
307	PSBLABELO9VS	FACESHIELD RESPIRATOR LABEL
308	PSB1023308	110V 1-PH LABEL

REF	PART #	DESCRIPTION
309	PSB1023309	MACHINE ID LABEL
310	PSBLABELO2YL	DISCONNECT POWER LABEL
311	PSBPAINTO2	SB LIGHT BLUE TOUCH-UP PAINT
312	SB1321	SOUTH BEND NAMEPLATE 5 203MM
313	PSBPAINTO3	SB DARK BLUE TOUCH-UP PAINT
314	PSB1023314	MODEL NUMBER LABEL
315	PSB1023315	SOUTH BEND LOGO RECT

⚠ WARNING

The safety labels provided with your machine are used to make the operator aware of the machine hazards and ways to prevent injury. The owner of this machine **MUST** maintain the original location and readability of these safety labels. If any label is removed or becomes unreadable, **REPLACE** that label before using the machine again. Contact South Bend Lathe Co. at (360) 734-1540 or www.southbendlathe.com to order new labels.

WARRANTY

This quality product is warranted by South Bend Lathe Company to the original buyer for one year from the date of purchase. This warranty does not apply to consumable parts, or defects due to any kind of misuse, abuse, negligence, accidents, repairs, alterations or lack of maintenance. We do not reimburse for third party repairs. In no event shall we be liable for death, injuries to persons or property, or for incidental, contingent, special or consequential damages arising from the use of our products.

We do not warrant or represent that this machine complies with the provisions of any law, act, code, regulation, or standard of any domestic or foreign government, industry, or authority. In no event shall South Bend's liability under this warranty exceed the original purchase price paid for this machine. Any legal actions brought against South Bend Lathe Company shall be tried in the State of Washington, County of Whatcom.

This is the sole written warranty for this machine. Any and all warranties that may be implied by law, including any merchantability or fitness, for any purpose, are hereby limited to the duration of this warranty. To take advantage of this warranty, contact us by mail or phone to give us the details of the problem you are having.

Thank you for your business and continued support.



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